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## RURAL AND NEW TOWN PLANNING COMMITTEE OF THE TOWN PLANNING BOARD

RNTPC Paper No. 1/15

for Consideration by the Rural and New Town Planning Committee on 6.2.2015

> PROPOSED AMENDMENTS TO THE APPROVED TSEUNG KWAN O OUTLINE ZONING PLAN NO. S/TKO/20

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### PROPOSED AMENDMENTS TO THE APPROVED TSEUNG KWAN O OUTLINE ZONING PLAN No. S/TKO/20

#### 1. Introduction

The purpose of this paper is to seek Members' agreement that:

- (a) the proposed amendments to the approved Tseung Kwan O (TKO) Outline Zoning Plan (OZP) No. S/TKO/20 (**Appendix II**) and its Notes (**Appendix III**) are suitable for exhibition for public inspection under section 5 of the Town Planning Ordinance (the Ordinance); and
- (b) the revised Explanatory Statement (ES) of the OZP (**Appendix IV**) is an expression of the Town Planning Board (the Board)'s planning intentions and objectives for various land uses of the OZP.

#### 2. Status of the current Approved Tseung Kwan O Outline Zoning Plan No. S/TKO/20

- On 17.4.2012, the Chief Executive in Council (CE in C), under section 9(1)(a) of the Ordinance, approved the draft TKO OZP, which was subsequently renumbered as S/TKO/20. The approved TKO OZP No. S/TKO/20 was exhibited under section 9(5) of the Ordinance on 27.4.2012. A copy of the approved OZP is attached at **Appendix I** for Members' reference.
- 2.2 On 29.4.2014, the CE in C referred the approved TKO OZP to the Board for amendment under section 12(1)(b)(ii) of the Ordinance. The reference back of the OZP was notified in the Gazette on 16.5.2014.

#### 3. Background

3.1 Data centres are essential infrastructure to sustain Hong Kong's continued economic development, in particular for the financial, information and communications technology, e-commerce and media sectors. Over the past two years, a number of international and local companies have expressed interest in setting up data centres<sup>1</sup> in

<sup>&</sup>lt;sup>1</sup> A data centre is a facility for housing computer systems and associated components, such as telecommunications and storage systems in a secure and controlled environment. Data centres are classified into four tiers. High-tier data centres have more demanding serviceability levels and building requirements. Tier III data centres and above are classified as high-tier data centres. In the context of this paper, the term "data centre" primarily refers to high-tier data centre.

Hong Kong but failed to find suitable sites. This represents unmet demand and lost business opportunities for Hong Kong.

- 3.2 To foster development of data centres in Hong Kong, the Government announced in the 2011-12 Policy Address that about two hectares of land in TKO have been reserved for data centre development. In addition, another adjacent site of about one hectare could also be made available for data centre use after 2013. The three sites earmarked for data centre development are Sites 1, 2 and 3 in TKO Area 85 as shown in **Appendix V**. The Office of the Government Chief Information Officer (OGCIO) applied under Application No. A/TKO/93 for proposed information technology and telecommunications industries (data centre) use on the first site (Site 1), zoned "G/IC(9)". The application was granted planning permission from RNTPC on 19.10.2012 and the site was sold in October 2013. Site 2, which is also zoned "G/IC(9)" will require similar planning permission under the current OZP.
- 3.3 Site 3 straddles two zones with about 1.09 ha zoned "Other Specified Uses" annotated "Sewage Treatment Works" ("OU(STW)") and about 0.15 ha zoned "Government, Institution or Community (9)" ("G/IC(9)") (Appendix V). A consultancy study conducted by OGCIO in 2014 (Appendix VI) confirmed that the Site is feasible for data centre development and the technical assessments on visual, air ventilation, environmental (noise, air quality and landfill gas), drainage, sewerage, water supply and traffic aspects found that the proposed data centre development with development parameters similar to those for Site 1 will not generate significant adverse impact on the surrounding area.
- 3.4 OGCIO's latest consultancy study for Site 3 and their previous study in 2012 for Site 1 which found that data centre use on those sites were feasible with no significant adverse impacts on the surrounding area, it is considered that there are sufficient grounds to support data centre use on Site 3, as well as Site 2 which is sandwiched between Site 1 and Site 3. To facilitate possible data centre development on these sites, Site 3 is proposed to be rezoned from ("OU(STW)") to ("G/IC(9)"). Furthermore, the Notes of the OZP for the "G/IC" zone are proposed to be amended to include the use 'Information Technology and Telecommunications Industries (within "G/IC(9)" only)' under Column 1, as a use always permitted within the "G/IC(9)" zone, instead of under Column 2 which requires permission of the Board.

3.5 The proposed development parameters for data centre development at Sites 2 and 3, comparable to those for the approved development on Site 1, are as follows:

	Site 1	Site 2	Site 3
Site Area	About 1.03 ha	About 1.49 ha	About 1.24 ha
Site area for PR calculation	-	About 1.26 ha (excluding open channel and the proposed shared road access, refer to Plan	About 1.08 ha (excluding open channel and the proposed shared road access, refer to Plan
		<b>5a</b> )	<b>5a</b> )
Plot Ratio (PR)	Not more than 4.3	About 4.5	About 4.5
Building height (BH)	Not more than	Not more than	Not more than
	60mPD	60mPD	60mPD
	(about 10 storeys	(about 10 storeys	(about 10 storeys
	including a	including a	including a
	basement car park)	basement car park)	basement car park)
Site Coverage	Not more than 50%	Not more than 50%	Not more than 50%

While the layout and design of the data centre development on Sites 2 and 3 will be subject to detailed design, the indicative master layout plan and photomontages of the data centres are as shown in **Plans 5a-5e.** 

- 3.6 OGCIO consulted the Sai Kung District Council (SKDC) Housing and Environmental Hygiene Committee (HEHC) on the proposed data centre development at Site 3 on 11.9.2014. The majority of the members supported the proposed data centre development while a few members preferred the site be used for market and other community facilities. The relevant extract of the minutes of the meeting is at **Appendix VII.**
- 3.7 Opportunity is taken to include in the OZP the road scheme of the Tseung Kwan O Lam Tin Tunnel (TKO-LT Tunnel) and Cross Bay Link, Tseung Kwan O (CBL,TKO) as authorized by the CE in C on 29.4.2014 and 2.9.2014. The zoning of the adjoining areas are adjusted accordingly.

#### 4. Sites 2 & 3 and Surrounding Areas (Appendix V & Plans 1 to 4)

4.1 Sites 2 and 3 are formed land located to the east of Wan Po Road in TKO Area 85 (**Appendix V**). The main portion of Site 3 zoned ("OU(STW)") previously used for the development of an aerated lagoon is no longer required by the Drainage Services Department (DSD). The remaining small portion of Site 3 zoned ("G/IC(9)") is undesignated government land with temporary road access for the open storage uses at Site 2. To the immediate south of Site 3 is Site 2 is government land zoned "G/IC(9)" currently used partly as a temporary public car park and partly under short term tenancies for open storage of recycle materials. The Sites are within the 250m consultation zone of the TKO Stage II/III Landfill.

- 4.2 TKO Preliminary Treatment Works (TKOPTW) is located to the immediate north of Site 3 (**Appendix V**). To the further north beyond the TKOPTW are three "Residential (Group E)" sites with planning approvals for residential developments. The first one, the Beaumont is already developed and the second one is under construction. The third one facing Wan Po Road has an existing factory building due to be demolished (**Plan 4**). Located to the west of Site 2 and 3 across Wan Po Road is The La Splendeur which is among the first stage developments within the LOHAS Park comprehensive commercial and residential development.
- 4.3 To the immediate south of Site 2 within the same "G/IC(9)" zone is TKOTL 122, which is Site 1 with planning permission for data centre development. South of Site 1 is the government site reserved for the development of the Radio Television Hong Kong (RTHK) broadcasting House (**Plan 2 to 4**). Further to the south is the Tseung Kwan O Industrial Estate (TKOIE).
- 4.4 To the east of the Site 2 and 3 is vegetated slope covered by trees and shrubs zoned "Green Belt" and the restored TKO Stage II Landfill zoned "Open Space".

#### 5. Proposed Rezoning and Amendment to the Notes of the OZP

5.1 Rezone Site 3 from "OU(STW)" to "G/IC(9)" and amend the Schedule of Uses for the "G/IC" zone of the Notes of the OZP for Data Centre Developments

The southern portion of the "OU(STW)" zone with an area of about 1.09 ha in Area 85 is proposed to be rezoned to "G/IC(9)" zone on the OZP (**Plan 1**). 'Information Technology and Telecommunications Industries (within "G/IC(9)" only)' is proposed to be changed from a Column 2 use requiring permission of the Board to a Column 1 Use always permitted within the "G/IC(9)" zone for the Schedule of Use of the "G/IC" zone of the Notes of the OZP (**Appendix III**) to facilitate data centre developments in area 85. The following factors have been taken into account in the proposed rezoning and amendments of the Schedule of Use of the "G/IC" zone:

#### Planning Intention / Land Use Compatibility

(a) The "G/IC" zone is intended primarily for the provision of Government, institution or community facilities serving the needs of the local residents and/or a wider district, region or the territory. It is also intended to provide land for uses directly related to or in support of the work of the Government, organizations providing social services to meet community needs, and other institutional establishments. According to the ES of the OZP, due to the proximity of the "G/IC(9)" sub area to the areas for broadcasting, innovation and technology industries in TKO, information technology and telecommunications related uses may be permitted on application to the Board.

(b) Data Centre use is classified as a type of 'Information Technology and Telecommunications Industries' use requiring a clean environment for storage of digital data. According to the findings of OGCIO's Consultancy Studies, data centre use with no odour or noise sources is not a source of environmental nuisance. It is considered not incompatible with the character of the surrounding area with the TKOPTW to its north and the data centre and RTHK Broadcasting House to its south. The LOHAS Park comprehensive commercial and residential development is located to the west of the site across Wan Po Road. Further to the south of the subject sites is the TKOIE with mainly clean industrial uses including media technology industries and data centres.

#### Proposed Development Parameters

(c) According to the findings of OGCIO's consultancy studies, data centre development on the subject sites are feasible under the existing building height restriction of 60mPD for the "G/IC(9)" zone. As shown in the table at para. 3.5, Sites 2 and 3 may be developed for data centre use with development parameters similar to those for Site 1 with achievable plot ratio of about 4.5 and site coverage of not more than 50%.

#### Visual and Air Ventilation Aspects (Plans 5c-5e)

- (d) According to the Visual Impact Assessment conducted by the consultants, the visual impact of the potential data centre development with a maximum building height of 60mPD and 50% site coverage, will be similar to any other G/IC uses of similar scale always permitted in the "G/IC(9)" zone. While the views from the existing development of LOHAS Park across Wan Po Road will be somewhat affected, the provision of green roof, vertical greening as visual mitigation measures as recommended by the Consultants would significantly reduce the impact to the surrounding area.
- (e) Noting the photomontages in Plans 5c-5e, the Chief Town Planner /Urban Design and Landscape, Planning Department (CTP/UD&L, PlanD) considers data centre development at Sites 2 and 3 are considered not incompatible with the surrounding area. Significant adverse visual impact is not anticipated with mitigation measures. The greening requirements could be included in the land lease to ensure they will be implemented to the satisfaction of the relevant departments.
- (f) According to the air ventilation assessment expert evaluation conducted (**Appendices VI and VIII**), Sites 2 and 3 are not located at any major air corridors of the area. The future data centres at the proposed height and scale are not anticipated to have significant adverse impact with the mitigation measure. Noting the proposed data centres may impose slight

impact on Wan Po Road and a limited portion of the LOHAS Park development, CTP/UD&L, PlanD recommends a 20m wide non-building area be provided between Sites 2 and Site 3 as a localized air corridor in facilitating prevailing wind penetration to reach LOHAS Park. The requirements of the non-building area could be included in the land lease to ensure it will be implemented to the satisfaction of the relevant departments.

(g) CTP/UD&L, PlanD has no objection to the proposed amendments and the development restrictions for Sites 2 and 3 from urban design, visual impact and air ventilation perspectives subject to the implementation of the recommended mitigation measures.

#### Landscape Aspect

(h) According to the tree survey (**Appendices VI and IX**) conducted, existing trees of common species are found along the eastern and the western boundaries of Site 2 and eastern and south-western corner of Site 3. The consultant recommends the tree group along the eastern boundary of Site 3 be retained while those at the southwest corner could be felled and compensated (**Plans 3 and 4**). The requirements for tree preservation and landscaping could be included in the land lease to ensure they will be implemented to the satisfaction of the relevant departments. Director of Agriculture, Fisheries and Conservation (DAFC) and CTP/UD&L, PlanD have no objection to the proposed amendments from landscape perspective.

#### Environment and Infrastructure

(i) According to the technical assessments conducted, data centre developments will have no insurmountable problems on environmental (air quality and noise), sewerage, drainage and water supply aspects are anticipated as confirmed by DSD and Water supplies Department (WSD). The requirement for the submission of sewerage impact assessment for the approval of Director of Environmental Protection (DEP) could be included in the land lease to ensure the proposed development will not cause adverse sewerage impacts to local sewerage system.

#### Landfill Gas

(j) The subject site falls within the 250m Consultation Zone of the TKO Stage II/III Landfill. The consultancy study found that no insurmountable problems from the risk perspective on the proposed data centre development are anticipated. A detailed landfill gas hazard assessment report will need to be submitted for the approval of DEP during the detailed design stage of the proposed development. The

requirement could be include in the land lease to ensure the proposed development will be provided with proper mitigation measures to the satisfaction of DEP.

#### Land Contamination

(k) Noting that Site 2 is partially occupied by temporary open storage use, DEP advises that a contamination assessment and remediation action plan (if required) should be conducted to confirm the nature and extent of land contamination. Remediation actions must be taken to render the site safe for future use before the sale of the Site. OGCIO confirms that necessary action will be taken to ensure the site is decontaminated to the satisfaction of DEP before it is sold.

#### Traffic and Accessibility

(1) As advised by the Commissioner for Transport (C for T), a local access road with turnaround is proposed to serve both Sites 2 and 3 minimise the vehicular ingress/egress points along Wan Po Road (Plan **5a).** The provision of parking and loading/unloading spaces will follow the advice of the Study on the Requirements of Goods Vehicle Parking and Loading/Unloading for Data Centres in Hong Kong and the standards for Data Centre by Transport Department (4 May 2012). According to the Traffic Impact Assessment (TIA) conducted by the consultants, the traffic impact of data centre is insignificant and would not create adverse traffic impact on the road network in the vicinity of the sites. Relevant requirements could be incorporated in the land lease to ensure the provision of parking and loading/unloading spaces to the satisfaction of the relevant departments. C for T has no in-principle objection to the proposed amendments subject to Site 2 being occupied after the completion of the Cross Bay Link.

#### GIC Facilities and Open Space Provision

- (m) As shown in the summary on existing and planned provision of community facilities and open space in Tseung Kwan O in **Appendix X**, there is no apparent shortfall of G/IC facilities or district and local open space provision in Tseung Kwan O. The proposed rezoning for the data centre developments will not have any adverse impact on the site reservation for GIC facilities and open space provision in TKO.
- 5.2 <u>Inclusion of Authorized Road Scheme of Tseung Kwan O Lam Tin Tunnel (TKO-LT Tunnel) and Cross Bay Link, Tseung Kwan O (CBL, TKO)</u>

Pursuant to section 13A of the Town Planning Ordinance, road scheme authorized by the Chief Executive in Council (CE in C) under the Roads (Works, Use and Compensation) Ordinance (Chapter 370) shall deem to be approved under the Town

Planning Ordinance. The road schemes of the TKO-LT Tunnel and CBL,TKO authorized by the CE in C on 29.4.2014 and 2.9.2014 respectively are proposed to be incorporated into the OZP for public information (**Plans 6a and 6b**). The inclusion of the authorized road scheme and deletion of the affected "G/IC", "GB", "OU" and "O" zones are not regarded as amendment items under the Ordinance and an annotation will be added on the OZP indicating that it is for information only.

Relating to the authorized road scheme of the TKO-LT Tunnel, the area to be occupied by the future ventilation building is proposed to be rezoned from "GB" to "Other Specified Uses" annotated "Ventilation Building" "OU(Ventilation Building)" (Item B1 on **Plans 6a and 6b** and aerial photo on **Plan 6c**). Technical adjustments to the "Road" and "Open Space" zones related to the road scheme are included as Item B2 on **Plans 6a and 6b** and aerial photo on **Plan 6c**.

#### 5.3 <u>Deletion of the Annotation Indicating the Authorized Railway Scheme for the Mass</u> <u>Transit Railway Tseung Kwan O Extension (phase II)</u>

The railway scheme for the Mass Transit Railway Tseung Kwan O Extension (Phase II) was authorized by CE in C under the Railways Ordinance on 20.10.1998 and 14.9.1999 respectively and was amended on 9.5.2005 by the Secretary for Environment, Transport and Works. Phase II of the MTR TKO Extension project included a spur line to TKO South with a depot and the LOHAS Park Station in Area 86. The railway scheme has been incorporated into the OZP since then. Since the construction works for the railway scheme have been completed, the annotation indicating its authorization is proposed to be deleted.

#### 5.4 Other Amendments to the Notes of the OZP

Deletion of the words "for private clubs" from the Planning Intention of "Other Specified Uses" annotated "Sports and Recreation Club" ("OU(Sports and Recreation Club)") zone on the Notes of the OZP

As requested by the Leisure and Cultural Services Department, the words "for private clubs" is proposed to be deleted to allow flexibility for its future development either by the Government or private parties.

#### 6. Proposed Amendments to Matters shown on the OZP

#### 6.1 Amendment Item A (about 1.09 ha) (**Plan 2**)

Rezoning of an area in Area 85 to the east of Wan Po Road from "Other Specified Uses" annotated "Sewage Treatment Works" ("OU(STW)") to "Government, Institution or Community (9)" ("G/IC(9)") in accordance with paragraph 5.1 above.

#### 6.2 Amendment Item B1 (about 0.23 ha) (**Plans 6a and 6b**)

Rezoning of an area along Tseung Kwan O – Lam Tin Tunnel from "Green Belt" ("GB") to "Other Specified Uses" annotated "Ventilation Building" ("OU(Ventilation Building)") in accordance with paragraph 5.2 above.

#### 6.3 Amendment Item B2 (about 0.31 ha) (**Plans 6a and 6b**)

Rezoning of two strips of land along Road P2 shown as 'Road' to "Open Space ("O") in accordance with paragraph 5.2 above.

- An annotation indicating the authorized road schemes of the TKO-LT Tunnel and CBL,TKO is added in accordance with paragraph 5.2 above.
- 6.5 An annotation indicating the authorized railway scheme of the Mass Transit Railway Tseung Kwan O Extension (Phase II) is deleted in accordance with paragraph 5.3 above.

#### 7. Proposed Amendments to the Notes of the OZP

- 7.1 Change of the 'Information Technology and Telecommunications Industries (within "G/IC(9)" only)' use from Column 2 to Column 1 uses under the Schedule of Uses of "G/IC" zone.
- 7.2 In relation to the **Amendment Item B1** mentioned in paragraph 6.2 above, the Notes of the OZP will be amended to incorporate "OU(Ventilation Building)" zone.
- 7.3 Technical amendment to delete the words "for private clubs" from the Planning Intention of "Other Specified Uses" annotated "Sports and Recreation Club" zone on the Notes of the OZP.
- 7.4 The above proposed amendments have been incorporated in the draft Notes at **Appendix III** with addition in *bold and italic* and deletion in single crossed out for Members' consideration.

#### 8. Revision to the Explanatory Statement (ES) of the OZP

- 8.1 The ES of the TKO OZP has been revised to reflect the above amendments and to update the general description of various land use zones where appropriate.
- 8.2 As requested by the Leisure and Culture Services Department (Antiquities and Monuments Office), paragraph 11.2 under the heading of CULTURAL HERITAGE in the ES of the OZP is updated.
- 8.3 As requested by OGCIO, paragraph 8.8.2 (i) in the ES of the OZP is updated.

8.4 The updated ES (with additions in *bold and italics* and deletion in single crossed out) is attached at **Appendix IV** for Members' consideration.

#### 9. Plan Number

Upon gazette, the OZP will be renumbered as S/TKO/21.

#### 10. <u>Consultation</u>

- 10.1 The rezoning proposal was circulated to the following Government departments and their comments (if any) have been incorporated into the proposed amendments to the OZP as appropriate:
  - (a) Secretary for Development;
  - (b) Commissioner for Transport;
  - (c) Director of Environmental Protection;
  - (d) District Lands Officer/Sai Kung, Lands Department;
  - (e) Chief Engineer/Mainland South, Drainage Services Department
  - (f) Chief Engineer/Sewage Treatment Division 2, Drainage Services Department;
  - (g) Chief Highway Engineer/New Territories East, Highways Department;
  - (h) Chief Engineer/New Territories East, Civil Engineering and Development Department;
  - (i) Head of Geotechnical Engineering Office, Civil Engineering and Development Department;
  - (j) District Officer/Sai Kung, Home Affairs Department;
  - (k) Director of Fire Services;
  - (l) Chief Building Surveyor/New Territories East (2) and Rail, Buildings Department;
  - (m) Chief Engineer/Development(2), Water Supplies Department;
  - (n) Commissioner of Police;
  - (o) Director of Leisure and Cultural Services;
  - (p) Head of Antiquities and Monuments Office, Director of Leisure and Cultural Services;
  - (q) Director of Food and Environmental Hygiene;
  - (r) Senior Manager (Capital Works)/Commerce and Economic Development Bureau:
  - (s) Director of Electrical and Mechanical Services;
  - (t) Secretary for Education;
  - (u) Radio Television Hong Kong;
  - (v) Government Property Administrator;
  - (w) Chief Architect/Central Management Division 2, Architectural Services Department;
  - (x) Director of Agriculture, Fisheries and Conservation;
  - (y) Director of Trade and Industry;
  - (z) Government Chief Information Officer (OGCIO);
  - (aa) Chief Town Planner/Urban Design and Landscape, Planning Department;
  - (ab) Director of Housing; and
  - (ac) Director of Social Welfare.

10.2 The SKDC will be consulted during the exhibition period of the draft Tseung Kwan O OZP No. S/TKO/21 for public inspection under section 5 of the Ordinance.

#### 11. <u>Decision Sought</u>

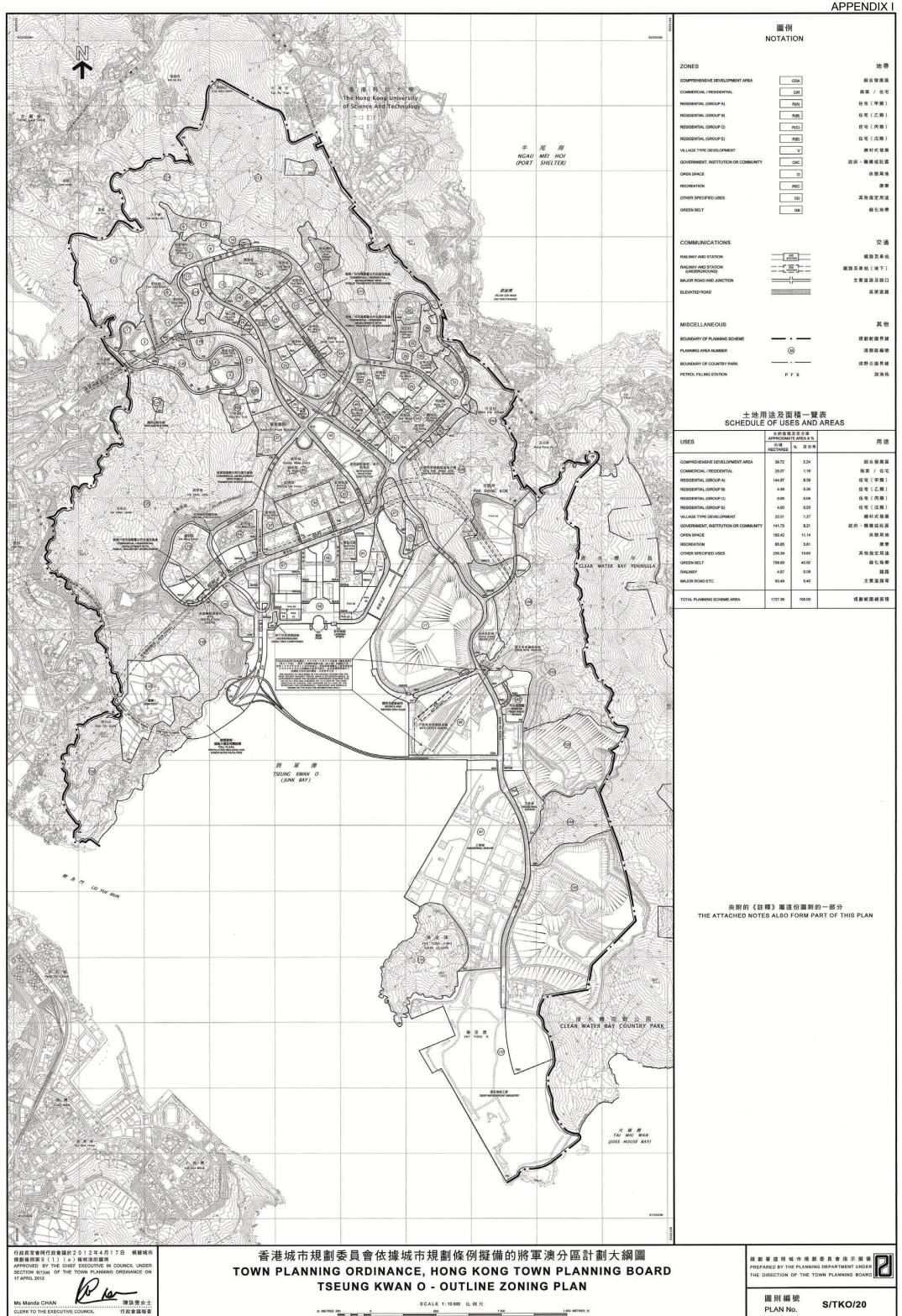
Members are invited to:

- (a) <u>agree</u> that the proposed amendments to the approved Tseung Kwan O OZP No. S/TKO/20 as shown on the draft Tseung Kwan O OZP No. S/TKO/20A (to be renumbered as S/TKO/21) at **Appendix II** and the draft Notes at **Appendix III** are suitable for exhibition for public inspection under section 5 of the Ordinance; and
- (b) <u>adopt</u> the revised ES at **Appendix IV** for the draft Tseung Kwan O OZP No. S/TKO/20A (to be renumbered as S/TKO/21)) as an expression of the planning intention and objectives of the Board for various land use zonings on the OZP and the revised ES will be published together with the draft OZP.

#### 12. Attachments

Appendix I	Approved Tseung Kwan O OZP No. S/TKO/20 (reduced scale)		
Appendix II	Draft Tseung Kwan O OZP No. S/TKO/20A		
Appendix III	Schedule of Amendments and revised Notes of Draft Tseung Kwan O		
	OZP No. S/TKO/20A		
Appendix IV	Revised Explanatory Statement of Draft Tseung Kwan O OZP No.		
	S/TKO/20A		
Appendix V	Site Plan (Designated sites in TKO area 85 for data centre use)		
Appendix VI	Consultancy study and relevant technical assessments by OGCIO		
Appendix VII	Extract of the minutes of the SKDC HEHC meeting on 11.9.2014		
Appendix VIII	Air Ventilation Assessment (Expert Evaluation)		
Appendix IX	Tree Survey for Site 2		
Appendix X	Provision of major community facilities in Tseung Kwan O		
Plan 1	Proposed Amendments to the approved Tseung Kwan O OZP No. S/TKO/20		
Plan 2	Site Plan		
Plan 3	Aerial Photo		
Plan 4	Site Photos of Amendment Items A		
Plan 5a-5b	Indicative master layout plan of the proposed data centres		
Plan 5c-5e	Photomontages of the proposed data centres		
Plan 6a-6c	Location plan and aerial photo of Items B1 and B2, and the proposed		
	TKO-LT Tunnel and CBL,TKO		

PLANNING DEPARTMENT February 2015



行政會議秘書

APPENDIX I

# SCHEDULE OF AMENDMENTS TO THE APPROVED TSEUNG KWAN O OUTLINE ZONING PLAN NO. S/TKO/20 MADE BY THE TOWN PLANNING BOARD UNDER THE TOWN PLANNING ORDINANCE (Chapter 131)

#### I. Amendments to Matters shown on the Plan

- Rezoning of an area in Area 85 to the east of Wan Po Road from "Other Specified Uses" annotated "Sewage Treatment Works" ("OU(STW)") to "Government, Institution or Community (9)" ("G/IC(9)").
- Item B1 Rezoning of an area along Tseung Kwan O Lam Tin Tunnel from "Green Belt" ("GB") to "Other Specified Uses" annotated "Ventilation Building" ("OU(Ventilation Building)").
- Item B2 Rezoning of two strips of land along Road P2 shown as 'Road' to "Open Space ("O").

Since the construction works of the railway scheme for the Mass Transit Railway Tseung Kwan O Extension (phase II) have been completed, opportunity is taken to delete the annotation indicating its authorization by the Chief Executive in Council under the Railways Ordinance and Roads (works, Use and Compensation) Ordinance.

The road schemes for Tseung Kwan O – Lam Tin Tunnel and Cross Bay Link, Tseung Kwan O were authorized by the Chief Executive in Council under the Roads (Works, Use and Compensation) Ordinance on 29 April 2014 and 2 September 2014. The authorized road schemes shall deem to be approved pursuant to section 13A of the Town Planning Ordinance. Opportunity is taken to indicate the authorized road schemes on the Plan for information.

#### II. Amendment to the Notes of the Plan

- (a) Change of the 'Information Technology and Telecommunications Industries (within "G/IC(9)" only)' use from Column 2 to Column 1 uses under the Schedule of Uses of "G/IC" zone.
- (b) In relation to the Amendment Item B1, the Notes of the OZP will be amended to incorporate "OU(Ventilation Building)" zone.
- (c) Deletion of the words "for private clubs" from the Planning Intention of "Other Specified Uses" annotated "Sports and Recreation Club" ("OU(Sports and Recreation Club)") zone on the Notes of the OZP.

#### APPROVED-DRAFT TSEUNG KWAN O OUTLINE ZONING PLAN NO. S/TKO/20A

(Being an Approved a Draft Plan for the Purposes of the Town Planning Ordinance)

#### NOTES

(N.B. These form part of the Plan)

- (1) These Notes show the uses or developments on land falling within the boundaries of the Plan which are always permitted and which may be permitted by the Town Planning Board, with or without conditions, on application. Where permission from the Town Planning Board for a use or development is required, the application for such permission should be made in a prescribed form. The application shall be addressed to the Secretary of the Town Planning Board, from whom the prescribed application form may be obtained.
- (2) Any use or development which is always permitted or may be permitted in accordance with these Notes must also conform to any other relevant legislation, the conditions of the Government lease concerned, and any other Government requirements, as may be applicable.
- (3) (a) No action is required to make the existing use of any land or building conform to this Plan until there is a material change of use or the building is redeveloped.
  - (b) Any material change of use or any other development (except minor alteration and/or modification to the development of the land or building in respect of the existing use which is always permitted) or redevelopment must be always permitted in terms of the Plan or, if permission is required, in accordance with the permission granted by the Town Planning Board.
  - (c) For the purposes of subparagraph (a) above, "existing use of any land or building" means –
    - before the publication in the Gazette of the notice of the first statutory plan covering the land or building (hereafter referred as 'the first plan'),
      - a use in existence before the publication of the first plan which has continued since it came into existence; or
      - a use or a change of use approved under the Buildings Ordinance which relates to an existing building; and
    - (ii) after the publication of the first plan,
      - a use permitted under a plan which was effected during the effective period of that plan and has continued since it was effected; or
      - a use or a change of use approved under the Buildings Ordinance which relates to an existing building and permitted under a plan prevailing at the time when the use or change of use was approved.

- (4) Except as otherwise specified by the Town Planning Board, when a use or material change of use is effected or a development or redevelopment is undertaken, as always permitted in terms of the Plan or in accordance with a permission granted by the Town Planning Board, all permissions granted by the Town Planning Board in respect of the site of the use or material change of use or development or redevelopment shall lapse.
- (5) Road junctions, alignments of roads and railway tracks, and boundaries between zones may be subject to minor adjustments as detailed planning proceeds.
- (6) Temporary uses (expected to be 5 years or less) of any land or building are always permitted as long as they comply with any other relevant legislation, the conditions of the Government lease concerned, and any other Government requirements, and there is no need for these to conform to the zoned use or these Notes. For temporary uses expected to be over 5 years, the uses must conform to the zoned use or these Notes.
- (7) The following uses or developments are always permitted on land falling within the boundaries of the Plan except where the uses or developments are specified in Column 2 of the Notes of individual zones:
  - (a) provision, maintenance or repair of plant nursery, amenity planting, open space, rain shelter, refreshment kiosk, road, bus/public light bus stop or lay-by, cycle track, taxi rank, nullah, public utility pipeline, electricity mast, lamp pole, telephone booth, telecommunications radio base station, automatic teller machine and shrine;
  - (b) geotechnical works, local public works, road works, sewerage works, drainage works, environmental improvement works, marine related facilities, waterworks (excluding works on service reservoir) and such other public works co-ordinated or implemented by Government; and
  - (c) maintenance or repair of watercourse and grave.
- (8) In any area shown as 'Road', all uses or developments except those specified in paragraph (7) above and those specified below require permission from the Town Planning Board:
  - toll plaza, on-street vehicle park and railway track.
- (9) Unless otherwise specified, all building, engineering and other operations incidental to and all uses directly related and ancillary to the permitted uses and developments within the same zone are always permitted and no separate planning permission is required.
- (10) In these Notes,
  - "existing building" means a building, including a structure, which is physically existing and is in compliance with any relevant legislation and the conditions of the Government lease concerned.
  - "New Territories Exempted House" means a domestic building other than a guesthouse or a hotel; or a building primarily used for habitation, other than a guesthouse or a hotel, the ground floor of which may be used as 'Shop and Services' or 'Eating Place', the building works in respect of which are exempted by a certificate of exemption under Part III of the Buildings Ordinance (Application to the New Territories) Ordinance (Cap. 121).

### APPROVED TSEUNG KWAN O OUTLINE ZONING PLAN NO. S/TKO/20

#### Schedule of Uses

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#### COMPREHENSIVE DEVELOPMENT AREA

#### Column 1 Uses always permitted

#### Column 2

Uses that may be permitted with or without conditions on application to the Town Planning Board

Ambulance Depot

Commercial Bathhouse/Massage Establishment

Eating Place

Educational Institution

Exhibition or Convention Hall

Flat

Government Refuse Collection Point

Government Use (not elsewhere specified)

Hospital

Hotel

House

Information Technology and Telecommunications

Industries

Institutional Use (not elsewhere specified)

Library

Market

Off-course Betting Centre

Office

Petrol Filling Station

Pier

Place of Entertainment

Place of Recreation, Sports or Culture

Private Club

Public Clinic

Public Convenience

Public Transport Terminus or Station

Public Utility Installation

Public Vehicle Park (excluding container vehicle)

Recyclable Collection Centre

Religious Institution

Research, Design and Development Centre

Residential Institution

School

Shop and Services

Social Welfare Facility

Training Centre

Utility Installation for Private Project

Planning Intention (Please see next page)

#### COMPREHENSIVE DEVELOPMENT AREA (cont'd)

#### Planning Intention

This zone is intended for comprehensive development/redevelopment of the area for residential and/or commercial uses with the provision of open space and other supporting facilities. The zoning is to facilitate appropriate planning control over the development mix, scale, design and layout of development, taking account of various environmental, traffic, infrastructure and other constraints.

#### Remarks

- (a) Pursuant to section 4A(2) of the Town Planning Ordinance, and except as otherwise expressly provided that it is not required by the Town Planning Board, an applicant for permission for development on land designated "Comprehensive Development Area" shall prepare a Master Layout Plan for the approval of the Town Planning Board and include therein the following information:
  - the area of the proposed land uses, the nature, position, dimensions, and heights of all buildings to be erected in the area;
  - the proposed total site area and gross floor area for various uses, total number of flats and flat size, where applicable;
  - (iii) the details and extent of Government, institution or community (GIC) and recreational facilities, public transport and parking facilities, and open space to be provided within the area;
  - (iv) the alignment, widths and levels of any roads proposed to be constructed within the area;
  - (v) the landscape and urban design proposals within the area;
  - (vi) programmes of development in detail;
  - (vii) an environmental assessment report to examine any possible environmental problems that may be caused to or by the proposed development during and after construction and the proposed mitigation measures to tackle them;
  - (viii) a drainage and sewerage impact assessment report to examine any possible drainage and sewerage problems that may be caused by the proposed development and the proposed mitigation measures to tackle them;
  - (ix) a traffic impact assessment report to examine any possible traffic problems that may be caused by the proposed development and the proposed mitigation measures to tackle them; and
  - (x) such other information as may be required by the Town Planning Board.

Remarks (cont'd) (Please see next page)

#### COMPREHENSIVE DEVELOPMENT AREA (cont'd)

#### Remarks (cont'd)

- (b) The Master Layout Plan should be supported by an explanatory statement which contains an adequate explanation of the development proposal, including such information as land tenure, relevant lease conditions, existing conditions of the site, the character of the site in relation to the surrounding areas, principles of layout design, major development parameters, design population, types of GIC facilities, and recreational and open space facilities.
- (c) On land designated "Comprehensive Development Area" in Area 86, no new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of a maximum domestic gross floor area of 1,612,800m² and a maximum non-domestic gross floor area of 40,000m².
- (d) On land designated "Comprehensive Development Area" in Area 92, no new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of a maximum gross floor area of 15,700m<sup>2</sup> and a maximum building height of 6 storeys over one level of carport.
- (e) In determining the maximum gross floor area for the purposes of paragraph (c) above, any floor space that is constructed or intended for use solely as car park, loading/unloading bay, plant room, caretaker's office and caretaker's quarters, or recreational facilities for the use and benefit of all the owners or occupiers of the domestic building or domestic part of the building, provided such uses and facilities are ancillary and directly related to the development or redevelopment, may be disregarded. Any floor space that is constructed or intended for use solely as public transport facilities or GIC facilities, as required by the Government, may also be disregarded.
- (f) In determining the maximum gross floor area for the purposes of paragraph (d) above, any floor space that is constructed or intended for use solely as car park, loading/unloading bay, plant room, caretaker's office and caretaker's quarters, or recreational facilities for the use and benefit of all the owners or occupiers of the domestic building or domestic part of the building, provided such uses and facilities are ancillary and directly related to the development or redevelopment, may be disregarded.
- (g) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the gross floor area restrictions stated in paragraph (c) above and the gross floor area/building height restrictions stated in paragraph (d) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

#### COMMERCIAL / RESIDENTIAL

#### Column 1 Uses always permitted

Column 2
Uses that may be permitted with or
without conditions on application
to the Town Planning Board

Ambulance Depot

Eating Place

**Educational Institution** 

(in a commercial building or in the purpose-designed non-residential portion<sup>®</sup> of an existing building only)

**Exhibition or Convention Hall** 

Flat

Government Use (not elsewhere specified)

Hotel House

Information Technology and

Telecommunications Industries

Library Market

Off-course Betting Centre

Office

Place of Entertainment

Place of Recreation, Sports or Culture

Private Club Public Clinic

Public Transport Terminus or Station

Public Utility Installation

Public Vehicle Park (excluding container vehicle)

Residential Institution

School (in free-standing purpose-designed school building, in a commercial building or in the purpose-designed non-residential portion<sup>®</sup>

of an existing building only)

Shop and Services (not elsewhere specified)

Social Welfare Facility

Training Centre

Utility Installation for Private Project

Wholesale Trade

Broadcasting, Television and/or Film Studio Commercial Bathhouse/Massage Establishment Educational Institution (not elsewhere specified)

Government Refuse Collection Point

Hospital

Institutional Use (not elsewhere specified)

Petrol Filling Station Public Convenience

Recyclable Collection Centre

Religious Institution

School (not elsewhere specified)

Shop and Services (Motor Vehicle Showroom only)

@ Excluding floors containing wholly or mainly car parking, loading/unloading bay and/or plant room

#### Planning Intention

This zone is intended primarily for commercial and/or residential development. Commercial, residential and mixed commercial/residential uses are always permitted.

#### RESIDENTIAL (GROUP A)

#### Column 1 Uses always permitted

Column 2

Uses that may be permitted with or without conditions on application to the Town Planning Board

Ambulance Depot

Flat

Government Use (not elsewhere specified)

House

Library Market

Place of Recreation, Sports or Culture

Public Clinic

Public Transport Terminus or Station (excluding open-air terminus or

station)

Residential Institution

School (in free-standing purpose-designed

building only) Social Welfare Facility

Utility Installation for Private Project

Commercial Bathhouse/Massage Establishment

Eating Place

**Educational Institution** 

**Exhibition or Convention Hall** 

Government Refuse Collection Point

Hospital

Hotel

Institutional Use (not elsewhere specified)

Office

Petrol Filling Station Place of Entertainment

Private Club

Public Convenience

Public Transport Terminus or Station (not

elsewhere specified)

Public Utility Installation

Public Vehicle Park (excluding container vehicle)

Religious Institution

School (not elsewhere specified)

Shop and Services Training Centre

In addition, the following uses are always permitted (a) on the lowest three floors of a building, taken to include basements; or (b) in the purpose-designed non-residential portion of an existing building, both excluding floors containing wholly or mainly car parking, loading/unloading bays and/or plant room:

Eating Place

**Educational Institution** 

Institutional Use (not elsewhere specified)

Off-course Betting Centre

Office

Place of Entertainment

Private Club

Public Convenience

Recyclable Collection Centre

School

Shop and Services

Training Centre

Planning Intention (Please see next page)

#### Planning Intention

This zone is intended primarily for high-density residential developments. Commercial uses are always permitted on the lowest three floors of a building or in the purpose-designed non-residential portion of an existing building.

#### Remarks

(a) No new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of the maximum plot ratio, site coverage and building height specified below, or the plot ratio, site coverage and height of the existing building, whichever is the greater:

Sub-	area	Maximum Domestic <u>Plot Ratio</u>	Maximum Non- Domestic <u>Plot Ratio</u>	Maximum Site Coverage (excluding basement(s))	Maximum Building Height (metres above Principal Datum)
R(A)1		5.5	0.5		138
R(A)2		5	0.5	50%	100
R(A)3		4	0.5	50%	100
R(A)4	Area (a) Area (b)	3 3	0.5 0.5	50% 50%	65 35
R(A)5		3	0.5	50%	65
R(A)6	Area (a) Area (b) Area (c)	2 2 2	0.5 0.5 0.5	50% 50% 50%	50 35 60

- (b) On land designated "R(A)3" in Area 65, a public open space of not less than 4,600 m² shall be provided in the southern portion and at the street level.
- (c) In determining the maximum plot ratio for the purposes of paragraph (a) above, any floor space that is constructed or intended for use solely as car park, loading/unloading bay, plant room, caretaker's office and caretaker's quarters, or recreational facilities for the use and benefit of all the owners or occupiers of the domestic building or domestic part of the building, provided such uses and facilities are ancillary and directly related to the development or redevelopment, may be disregarded.

Remarks (cont'd) (Please see next page)

#### Remarks (cont'd)

- (d) In determining the maximum site coverage for the purposes of paragraph (a) above, any floor space that is constructed or intended for use solely as car park, loading/unloading bay, plant room, caretaker's office and caretaker's quarters, or recreational facilities for the use and benefit of all the owners or occupiers of the domestic building or domestic part of the building, shall be included for calculation.
- (e) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the plot ratio/site coverage/building height restrictions stated in paragraph (a) above and minor adjustment to the boundaries of Areas (a)/(b) of "R(A)4" and/or Areas (a)/(b)/(c) of "R(A)6" as shown on the Plan may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

#### RESIDENTIAL (GROUP B)

#### Column 1 Uses always permitted

Column 2
Uses that may be permitted with or
without conditions on application
to the Town Planning Board

Flat

Government Use (Police Reporting Centre,

Post Office only)

House

Library

Residential Institution

School (in free-standing purpose-

designed building only)

Utility Installation for Private Project

Ambulance Depot

Eating Place

Educational Institution

Government Refuse Collection Point

Government Use (not elsewhere specified)

Hospital

Hotel

Institutional Use (not elsewhere specified)

Market

Off-course Betting Centre

Office

Petrol Filling Station Place of Entertainment

Place of Recreation, Sports or Culture

Private Club Public Clinic

Public Convenience

Public Transport Terminus or Station

Public Utility Installation

Public Vehicle Park (excluding container vehicle)

Recyclable Collection Centre

Religious Institution

School (not elsewhere specified)

Shop and Services Social Welfare Facility

Training Centre

#### Planning Intention

This zone is intended primarily for medium-density residential developments where commercial uses serving the residential neighbourhood may be permitted on application to the Town Planning Board.

#### RESIDENTIAL (GROUP C)

*1	Column 2		
Column 1	Uses that may be permitted with or		
Uses always permitted	without conditions on application		
	to the Town Planning Board		
Flat	Ambulance Depot		
Government Use (Police Reporting Centre,	Eating Place		
Post Office only)	Educational Institution		
House	Government Refuse Collection Point		
Utility Installation for Private Project	Government Use (not elsewhere specified)		
	Hospital		
	Hotel		
	Institutional Use (not elsewhere specified)		
	Library		
	Petrol Filling Station		
¥.	Place of Recreation, Sports or Culture		
	Private Club		
	Public Clinic		
	Public Convenience		
	Public Transport Terminus or Station		
	Public Utility Installation		
	Public Vehicle Park (excluding container vehicle)		
	Recyclable Collection Centre		
	Religious Institution		
	Residential Institution		
5	School -		
	Shop and Services		
	Social Welfare Facility		

#### Planning Intention

Training Centre

This zone is intended primarily for low-rise, low-density residential developments where commercial uses serving the residential neighbourhood may be permitted on application to the Town Planning Board.

#### Remarks

(a) No new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of the maximum plot ratio, site coverage and building height specified below, or the plot ratio, site coverage and height of the existing building, whichever is the greater:

> Remarks (cont'd) (Please see next page)

#### Remarks (cont'd)

Sub-area	Maximum	Maximum	Maximum
	Plot Ratio	Site Coverage	Building Height
R(C)1	0.6	30%	2 storeys over one level of carport

- (b) In determining the maximum plot ratio and site coverage for the purposes of paragraph (a) above, any floor space that is constructed or intended for use solely as car park, loading/unloading bay, plant room, caretaker's office and caretaker's quarters, or recreational facilities for the use and benefit of all the owners or occupiers of the domestic building or domestic part of the building, provided such uses and facilities are ancillary and directly related to the development or redevelopment, may be disregarded.
- (c) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the plot ratio/site coverage/building height restrictions stated in paragraph (a) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

#### RESIDENTIAL (GROUP E)

## Column 1 Uses always permitted

#### Column 2

Uses that may be permitted with or without conditions on application to the Town Planning Board

### Schedule I: for open-air development or for building other than industrial or industrial-office building<sup>®</sup>

Ambulance Depot

Government Use (not elsewhere specified)

Public Transport Terminus or Station

(excluding open-air terminus or station)

Utility Installation for Private Project

Commercial Bathhouse/Massage Establishment

Eating Place

**Educational Institution** 

Exhibition or Convention Hall

Flat

Government Refuse Collection Point

Hospital

Hotel

House

Institutional Use (not elsewhere specified)

Library

Market

Office

Petrol Filling Station

Place of Entertainment

Place of Recreation, Sports or Culture

Private Club

Public Clinic

Public Convenience

Public Transport Terminus or Station (not

elsewhere specified)

Public Utility Installation

Public Vehicle Park (excluding container vehicle)

Religious Institution

Residential Institution

School

Shop and Services

Social Welfare Facility

Training Centre

#### Column 1 Uses always permitted

Column 2
Uses that may be permitted with or without conditions on application to the Town Planning Board

In addition, the following uses are always permitted (a) on the lowest three floors of a building, taken to include basements; or (b) in the purpose-designed non-residential portion of an existing building, both excluding floors containing wholly or mainly car parking, loading/unloading bays and/or plant room:

Eating Place **Educational Institution** Institutional Use (not elsewhere specified) Library Off-course Betting Centre Office Place of Entertainment Place of Recreation, Sports or Culture Private Club Public Clinic Public Convenience Recyclable Collection Centre School Shop and Services Social Welfare Facility Training Centre

#### Column 1 Uses always permitted

Column 2
Uses that may be permitted with or
without conditions on application
to the Town Planning Board

#### Schedule II: for existing industrial or industrial-office building@

Ambulance Depot

Cargo Handling and Forwarding Facility

(not elsewhere specified)

Eating Place (Canteen only)

Government Refuse Collection Point

Government Use (not elsewhere specified)

Information Technology and

Telecommunications Industries

Non-polluting Industrial Use

(excluding industrial undertakings

involving the use/storage of

Dangerous Goods△)

Office (Audio-visual Recording Studio,

Design and Media Production,

Office Related to Industrial Use only)

Public Convenience

Public Transport Terminus or Station

Public Utility Installation

Public Vehicle Park (excluding container

vehicle)

Radar, Telecommunications Electronic

Microwave Repeater, Television and/or

Radio Transmitter Installation

Recyclable Collection Centre

Research, Design and Development Centre

Shop and Services (Motor Vehicle

Showroom on ground floor,

Service Trades only)

Utility Installation for Private Project

Warehouse (excluding Dangerous

Goods Godown)

Cargo Handling and Forwarding Facility

(Container Freight Station, free-standing

purpose-designed Logistics Centre only)

Industrial Use (not elsewhere specified)

Off-course Betting Centre

Office (not elsewhere specified)

Petrol Filling Station

Place of Recreation, Sports or Culture

Private Club

Shop and Services (not elsewhere specified)

(ground floor only except Ancillary

Showroom# which may be permitted on any

floor)

Vehicle Repair Workshop

Wholesale Trade

#### Column 1 Uses always permitted

Column 2
Uses that may be permitted with or
without conditions on application
to the Town Planning Board

In addition, the following uses are always permitted in the purpose-designed non-industrial portion on the lower floors (except basements and floors containing wholly or mainly car parking, loading/unloading bays and/or plant room) of an existing building, provided that the uses are separated from the industrial uses located above by a buffer floor or floors and no industrial uses are located within the non-industrial portion:

In addition, the following use may be permitted with or without conditions on application to the Town Planning Board in the purpose-designed non-industrial portion on the lower floors (except basements and floors containing wholly or mainly car parking, loading/unloading bays and/or plant room) of an existing building, provided that the use is separated from the industrial uses located above by a buffer floor or floors and no industrial uses are located within the non-industrial portion:

Eating Place
Educational Institution
Exhibition or Convention Hall
Institutional Use (not elsewhere specified)
Library
Off-course Betting Centre
Office
Place of Entertainment
Place of Recreation, Sports or Culture
Private Club
Public Clinic
Religious Institution
School (excluding kindergarten)
Shop and Services
Training Centre

Social Welfare Facility (excluding those involving residential care)

- <sup>®</sup> An industrial or industrial-office building means a building which is constructed for or intended to be used by industrial or industrial-office purpose respectively as approved by the Building Authority.
- Dangerous Goods refer to substances classified as Dangerous Goods and requiring a licence for their use/storage under the Dangerous Goods Ordinance (Cap. 295).
- \* Ancillary Showroom requiring planning permission refers to showroom use of greater than 20% of the total usable floor area of an industrial firm in the same premises or building.

Planning Intention (Please see next page)

#### Planning Intention

This zone is intended primarily for phasing out of existing industrial uses through redevelopment (or conversion) for residential use on application to the Town Planning Board. Whilst existing industrial uses will be tolerated, new industrial developments are not permitted in order to avoid perpetuation of industrial/residential interface problem.

#### Remarks

- (a) No new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of a maximum plot ratio of 5.0 and a maximum building height of 130m.
- (b) In determining the maximum plot ratio for the purposes of paragraph (a) above, any floor space that is constructed or intended for use solely as car park, loading/unloading bay, plant room, caretaker's office and caretaker's quarters, or recreational facilities for the use and benefit of all the owners or occupiers of the domestic building or domestic part of the building, provided such uses and facilities are ancillary and directly related to the development or redevelopment, may be disregarded. Any floor space that is constructed or intended for use solely as public vehicle park and public transport facilities, as required by the Government, may also be disregarded.
- (c) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the building height restriction stated in paragraph (a) above may be considered by Town Planning Board on application under section 16 of the Town Planning Ordinance.

#### VILLAGE TYPE DEVELOPMENT

#### Column 1 Uses always permitted

## Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board

Agricultural Use
Government Use (Police Reporting Centre,
Post Office only)
House (New Territories Exempted
House only)
On-Farm Domestic Structure
Religious Institution (Ancestral Hall only)
Rural Committee/Village Office

Eating Place Government Refuse Collection Point Government Use (not elsewhere specified)# House (not elsewhere specified) Institutional Use (not elsewhere specified)# Market Petrol Filling Station Place of Recreation, Sports or Culture Public Clinic Public Convenience Public Transport Terminus or Station Public Utility Installation# Public Vehicle Park (excluding container vehicle) Religious Institution (not elsewhere specified)# Residential Institution# School# Shop and Services Social Welfare Facility#

Utility Installation for Private Project

In addition, the following uses are always permitted on the ground floor of a New Territories Exempted House:

Eating Place Library School Shop and Services

#### Planning Intention

The planning intention of this zone is to reflect existing recognized and other villages, and to provide land considered suitable for village expansion and reprovisioning of village houses affected by Government projects. Land within this zone is primarily intended for development of Small Houses by indigenous villagers. It is also intended to concentrate village type development within this zone for a more orderly development pattern, efficient use of land and provision of infrastructures and services. Selected commercial and community uses serving the needs of the villagers and in support of the village development are always permitted on the ground floor of a New Territories Exempted House. Other commercial, community and recreational uses may be permitted on application to the Town Planning Board.

Remarks (please see next page)

#### VILLAGE TYPE DEVELOPMENT (cont'd)

#### Remarks

- (a) No new development, or addition, alteration and/or modification to or redevelopment of an existing building (except development or redevelopment to those annotated with #) shall result in a total development and/or redevelopment in excess of a maximum building height of 3 storeys (8.23m) or the height of the existing building, whichever is the greater.
- (b) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the building height restriction stated in paragraph (a) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

#### GOVERNMENT, INSTITUTION OR COMMUNITY

#### Column 1 Uses always permitted

Ambulance Depot

Animal Quarantine Centre (in Government

building only)

Broadcasting, Television and/or Film Studio

Cable Car Route and Terminal Building

Eating Place (Canteen,

Cooked Food Centre only)

**Educational Institution** 

Exhibition or Convention Hall

Field Study/Education/Visitor Centre Government Refuse Collection Point

Government Use (not elsewhere specified)

Hospital

Information Technology and

Telecommunications Industries (within

"G/IC(9)" only)

Institutional Use (not elsewhere specified)

Library Market Pier

Place of Recreation, Sports or Culture

Public Clinic

Public Convenience

Public Transport Terminus or Station

Public Utility Installation

Public Vehicle Park (excluding container vehicle) Refuse Disposal Installation (Refuse Transfer

Recyclable Collection Centre

Religious Institution

Research, Design and Development Centre

Rural Committee/Village Office

School

Service Reservoir

Social Welfare Facility

Training Centre Wholesale Trade

Column 2

Uses that may be permitted with or without conditions on application to the Town Planning Board

Animal Boarding Establishment

Animal Quarantine Centre (not elsewhere

specified)

Columbarium

Correctional Institution

Crematorium Driving School

Eating Place (not elsewhere specified)

Funeral Facility Holiday Camp

Hotel House

Information Technology and

Telecommunications Industries (within

"G/IC(9)" only)

Marine Fuelling Station Off-course Betting Centre

Office

Petrol Filling Station Place of Entertainment

Private Club

Radar, Telecommunications Electronic Microwave Repeater, Television and/or Radio Transmitter Installation

Station only) Residential Institution

Sewage Treatment/Screening Plant

Shop and Services

Utility Installation for Private Project

Zoo

#### Planning Intention

This zone is intended primarily for the provision of Government, institution or community facilities serving the needs of the local residents and/or a wider district, region or the territory. It is also intended to provide land for uses directly related to or in support of the work of the Government, organizations providing social services to meet community needs, and other institutional establishments.

> Remarks (Please see next page)

## GOVERNMENT, INSTITUTION OR COMMUNITY (cont'd)

#### Remarks

(a) No new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of the maximum building height specified below, or the height of the existing building, whichever is the greater:

Sub-area			Maximum Building Height
G/IC(1)			75m
G/IC(2)			55m
G/IC(3)			45m
G/IC(4)			40m
G/IC(5)			10m
G/IC(6)		9	- 5m
G/IC(7)	Area (a)		100 mPD, except a fire services rescue training tower up to 114 mPD
	Area (b)		120 mPD
G/IC(8)			106 mPD
G/IC(9)	3		60 mPD, except a communications tower up to 76 mPD

(b) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the building height restriction stated in paragraph (a) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

#### **OPEN SPACE**

## Column 1 Uses always permitted

Column 2
Uses that may be permitted with or
without conditions on application
to the Town Planning Board

Aviary

Barbecue Spot

Field Study/Education/Visitor Centre

Library (within "O(1)" only)

Park and Garden

Pavilion

Pedestrian Area

Place of Recreation, Sports or Culture (within

"O(1)" only)

Picnic Area

Playground/Playing Field

Promenade

Public Convenience

Sitting Out Area

Zoo

Cable Car Route and Terminal Building

Eating Place

Government Refuse Collection Point

Government Use (not elsewhere specified)

Holiday Camp

Pier

Place of Entertainment

Place of Recreation, Sports or Culture (not

elsewhere specified)

Private Club

Public Transport Terminus or Station

Public Utility Installation

Public Vehicle Park (excluding container

vehicle)

Religious Institution

Service Reservoir

Shop and Services

Tent Camping Ground

Utility Installation for Private Project

#### Planning Intention

This zone is intended primarily for the provision of outdoor open-air public space for active and/or passive recreational uses serving the needs of local residents as well as the general public.

## OPEN SPACE (2)

## Column 1 Uses always permitted

# Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board

Aviary

Barbecue Spot

Field Study/Education/Visitor Centre

Landfill

Park and Garden

Pavilion

Pedestrian Area

Picnic Area

Playground/Playing Field

Promenade

Public Convenience

Sitting Out Area

Zoo

Cable Car Route and Terminal Building

Eating Place

Government Refuse Collection Point

Government Use (not elsewhere specified)

Holiday Camp

Place of Entertainment

Place of Recreation, Sports or Culture

Private Club

Public Transport Terminus or Station

Public Utility Installation

Public Vehicle Park (excluding container

vehicle)

Religious Institution

Service Reservoir

Shop and Services

Tent Camping Ground

Utility Installation for Private Project

## Planning Intention

This zone is intended primarily for the provision of outdoor open-air public space for active and/or passive recreational uses serving the needs of local residents as well as the general public after the decommissioning and restoration of the landfill site, while permitting landfill use in the interim.

#### RECREATION

## Column 1 Uses always permitted

Column 2
Uses that may be permitted with or without conditions on application to the Town Planning Board

Agricultural Use

Field Study/Education/Visitor Centre

Government Use (Police Reporting Centre only)

Holiday Camp

Picnic Area

Place of Recreation, Sports or Culture

Public Convenience

Tent Camping Ground

Animal Boarding Establishment

Broadcasting, Television and/or Film Studio

Eating Place

Golf Course

Government Refuse Collection Point

Government Use (not elsewhere specified)

Marina Pier

Place of Entertainment

Private Club

Public Utility Installation

Public Vehicle Park (excluding container

vehicle)

Residential Institution

Shop and Services

Theme Park

Utility Installation for Private Project

Zoo

## Planning Intention

This zone is intended primarily for recreational developments for the use of the general public. It encourages the development of active and/or passive recreation and tourism/eco-tourism. Uses in support of the recreational developments may be permitted on application to the Town Planning Board.

#### Remarks

- (a) No new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of a maximum plot ratio of 0.1 and a maximum building height of 1 storey, or the plot ratio and height of the existing building, whichever is the greater.
- (b) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the plot ratio/building height restrictions stated in paragraph (a) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

## OTHER SPECIFIED USES

## Column 1 Uses always permitted

Column 2
Uses that may be permitted with or without conditions on application to the Town Planning Board

## For "Commercial Development with Public Transport Interchange" Only

Ambulance Depot

Commercial Bathhouse/Massage

Establishment

Eating Place

Educational Institution

Exhibition or Convention Hall

Government Use (not elsewhere specified)

Hotel

Information Technology and

Telecommunications Industries

Institutional Use (not elsewhere specified)

Library

Off-course Betting Centre

Office

Place of Entertainment

Place of Recreation, Sports or Culture

Private Club

Public Clinic

Public Convenience

Public Transport Terminus or Station

Public Utility Installation

Public Vehicle Park (excluding container

vehicle)

Recyclable Collection Centre

Religious Institution

School

Shop and Services

Social Welfare Facility

Training Centre

Utility Installation for Private Project

Wholesale Trade

Broadcasting, Television and/or Film Studio

Flat

Government Refuse Collection Point

Hospital

Petrol Filling Station

Residential Institution

#### Planning Intention

This zone is intended primarily for commercial developments, which may include uses such as office, shop and services, place of entertainment, eating place and hotel, with public transport interchange facilities serving as a major employment node and a commercial, retail and entertainment centre for the New Town as well as for Sai Kung hinterland.

## Column 1 Uses always permitted

Column 2
Uses that may be permitted with or without conditions on application to the Town Planning Board

#### For "Commercial/Residential Development with Public Transport Interchange" Only

Ambulance Depot

Eating Place

**Educational Institution** 

(in a commercial building or in the

purpose-designed non-residential portion@

of an existing building only)

**Exhibition or Convention Hall** 

Flat

Government Use (not elsewhere specified)

Hotel

House

Information Technology and

Telecommunications Industries

Library

Market

Off-course Betting Centre

Office

Place of Entertainment

Place of Recreation, Sports or Culture

Private Club

Public Clinic

Public Transport Terminus or Station

Public Utility Installation

Public Vehicle Park (excluding container

vehicle)

Residential Institution

School (in free-standing purpose-designed

school building, in a commercial building or

in the purpose-designed non-residential

portion<sup>®</sup> of an existing building only)

Shop and Services (not elsewhere specified)

Social Welfare Facility

Training Centre

Utility Installation for Private Project

Wholesale Trade

@ Excluding floors containing wholly or mainly car parking, loading/unloading bay and/or plant room

Planning Intention

This zone is intended primarily for commercial and/or residential development with public transport interchange facilities. Commercial, residential and mixed commercial/residential uses are always permitted.

(please see next page)

Broadcasting, Television and/or Film Studio Commercial Bathhouse/Massage Establishment Educational Institution (not elsewhere specified)

Government Refuse Collection Point

Hospital

Institutional Use (not elsewhere specified)

Petrol Filling Station Public Convenience

Recyclable Collection Centre

Religious Institution

School (not elsewhere specified)

Shop and Services (Motor Vehicle Showroom

only)

## Column 1 Uses always permitted

Column 2
Uses that may be permitted with or without conditions on application to the Town Planning Board

## For "Sports and Recreation Club" Only

Place of Recreation, Sports or Culture

Private Club

**Eating Place** 

Government Refuse Collection Point Government Use (not elsewhere specified) Public Vehicle Park (excluding container

vehicle) Shop and Services Social Welfare Facility

Utility Installation for Private Project

## Planning Intention

This zone is intended primarily to reserve land for private clubs for water sports and recreation facilities.

#### Remarks

- (a) No new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of a maximum plot ratio of 0.5, a maximum site coverage of 50% and a maximum building height of 1 storey, or the plot ratio, site coverage and height of the existing building, whichever is the greater.
- (b) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the plot ratio/site coverage/building height restrictions stated in paragraph (a) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

## Column 1 Uses always permitted

Column 2
Uses that may be permitted with or without conditions on application to the Town Planning Board

## For "Industrial Estate" Only

Ambulance Depot
Broadcasting, Television and/or Film Studio
Cargo Handling and Forwarding Facility
Dangerous Goods Godown
Eating Place
Gas Works
Government Refuse Collection Point
Government Use (not elsewhere specified)
Industrial Use
Information Technology and

Telecommunications Industries

Marine Fuelling Station

Office

Petrol Filling Station

Pier

Private Club

Public Convenience

Public Transport Terminus or Station

Public Utility Installation

Public Vehicle Park (excluding container vehicle)

Radar, Telecommunications Electronic

Microwave Repeater, Television and/or Radio

Transmitter Installation

Refuse Disposal Installation

Research, Design and Development Centre

Shop and Services

Social Welfare Facility (excluding those

involving residential care)

Training Centre

Utility Installation for Private Project

Warehouse (excluding Dangerous Goods

Godown)

Wholesale Trade

Electric Power Station
Off-course Betting Centre
Offensive Trades
Oil Depot, Oil Refinery and Petro-chemical
Plant
Place of Recreation, Sports or Culture
Service Industries (not elsewhere specified)

#### Planning Intention

This zone is intended primarily to provide/reserve land for the development of an industrial estate for industries to be admitted by the Hong Kong Science and Technology Parks Corporation according to the criteria set by the Corporation. Industries to be included would normally not be accommodated in conventional industrial buildings because of their specific requirements.

## Column 1 Uses always permitted

Column 2
Uses that may be permitted with or without conditions on application to the Town Planning Board

## For "Deep Waterfront Industry" Only

Ambulance Depot

Cargo Handling and Forwarding Facility

Eating Place (Canteen, Cooked Food Centre

only)

Government Refuse Collection Point

Government Use (not elsewhere specified)

Industrial Use (Motor-vehicle Assembly Plant,

Paint Manufacturing, Service Trades, Steel

Works only)

Information Technology and

Telecommunications Industries

Marine Fuelling Station

Open Storage of Construction Materials

Open Storage of Cement/Sand

Petrol Filling Station

Pier

Public Convenience

Public Transport Terminus or Station

Public Utility Installation

Public Vehicle Park (excluding container

vehicle)

Recyclable Collection Centre

Research, Design and Development Centre

Refuse Disposal Installation

Ship-building, Ship-breaking and Ship-repairing

Yard

Utility Installation for Private Project

Warehouse (excluding Dangerous Goods

Godown)

Asphalt Plant/Concrete Batching Plant

Container Storage/Repair Yard

Container Vehicle Park/Container Vehicle Repair

Yard

Dangerous Goods Godown

Eating Place (not elsewhere specified)

Electric Power Station

Gas Works

Industrial Use (not elsewhere specified)

Off-course Betting Centre

Office

Oil Depot, Oil Refinery and Petro-chemical Plant

Place of Recreation, Sports or Culture

Private Club

Shop and Services

Social Welfare Facility

Training Centre

Wholesale Trade

#### Planning Intention

This zone is intended primarily for special industries which require marine access, access to deep water berths or water frontage. Industries to be accommodated within this zone are usually capital intensive, land-intensive and cannot be accommodated in conventional industrial buildings.

Column 1 Uses always permitted

Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board

## For "Cemetery" Only

Columbarium Crematorium

Funeral Facility

Government Use (not elsewhere specified)

Grave

Public Convenience

Place of Recreation, Sports or Culture Public Transport Terminus or Station

Public Utility Installation Religious Institution

Shop and Services (Retail Shop only)

Utility Installation for Private Project

## Planning Intention

This zone is intended primarily for the provision of land for cemetery use serving the needs of the community.

## Column 1 Uses always permitted

Column 2
Uses that may be permitted with or without conditions on application to the Town Planning Board

## For "Petrol Filling Station" Only

Petrol Filling Station

Government Use Public Utility Installation Workshop (Vehicle Repair Workshop only)

## Planning Intention

This zone is intended primarily for the provision of petrol filling station serving the needs of the community.

Column 1 Uses always permitted Column 2
Uses that may be permitted with or
without conditions on application
to the Town Planning Board

## For "Pier" Only

Government Use

Pier

Eating Place

Marine Fuelling Station

Shop and Services

Utility Installation for Private Project

#### Planning Intention

This zone is primarily intended for the provision of pier for recreation and pleasure vessels and tourism to serve the needs of the community and to enhance the recreation and tourism potential of the area.

#### Remarks

Kiosks not greater than  $10\text{m}^2$  each in area and not more than 10 in number for uses as shop and services are considered as ancillary to "pier" use.

## For "Ventilation Building" only

Ventilation Building

Government Use
Utility Installation not ancillary to the
Specified Use

#### Planning Intention

This zone is intended primarily for the development of ventilation building.

Column 1 Uses always permitted Column 2
Uses that may be permitted with or without conditions on application to the Town Planning Board

## For All Other Sites (Not Listed Above)

As Specified on the Plan

Government Use Utility Installation not ancillary to the Specified Use

## Planning Intention

These zones are intended primarily to provide land for the specified use serving the specific needs of the community.

#### GREEN BELT

## Column 1 Uses always permitted

Column 2
Uses that may be permitted with or without conditions on application to the Town Planning Board

Agricultural Use
Barbecue Spot
Government Use (Police Reporting Centre only)
Nature Reserve
Nature Trail
On-Farm Domestic Structure
Picnic Area
Public Convenience
Tent Camping Ground
Wild Animals Protection Area

Animal Boarding Establishment
Broadcasting, Television and/or Film Studio
Cable Car Route and Terminal Building
Columbarium (within a Religious Institution or
extension of existing Columbarium only)
Crematorium (within a Religious Institution or
extension of existing Crematorium only)
Field Study/Education/Visitor Centre
Flat
Government Refuse Collection Point
Government Use (not elsewhere specified)
Helicopter Landing Pad
Holiday Camp

Marine Fuelling Station
Petrol Filling Station
Pier

House

Place of Recreation, Sports or Culture
Public Transport Terminus or Station
Public Utility Installation
Public Vehicle Park (excluding container vehicle)
Radar, Telecommunications Electronic
Microwave Repeater, Television

and/or Radio Transmitter Installation

Religious Institution
Residential Institution
Rural Committee/Village Office
School
Service Reservoir
Social Welfare Facility
Utility Installation for Private Project
Zoo

## Planning Intention

The planning intention of this zone is primarily for defining the limits of urban and sub-urban development areas by natural features and to contain urban sprawl as well as to provide passive recreational outlets. There is a general presumption against development within this zone.

# APPROVED-DRAFT TSEUNG KWAN O OUTLINE ZONING PLAN NO. S/TKO/20A

EXPLANATORY STATEMENT

# EXPLANATORY STATEMENT

# APPROVEDDRAFT TSEUNG KWAN O OUTLINE ZONING PLAN NO. S/TKO/20A

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## APPROVED-DRAFT TSEUNG KWAN O OUTLINE ZONING PLAN NO. S/TKO/20A

(Being an Approved Plan for the Purposes of the Town Planning Ordinance)

#### EXPLANATORY STATEMENT

Note: For the purposes of the Town Planning Ordinance, this Statement shall not be deemed to constitute a part of the Plan.

#### INTRODUCTION

This Explanatory Statement is intended to assist an understanding of the approved <u>draft</u> Tseung Kwan O Outline Zoning Plan (OZP) No. S/TKO/20<u>4</u>. It reflects the planning intention and objectives of the Town Planning Board (the Board) for various land-use zonings of the Plan.

## AUTHORITY FOR THE PLAN AND PROCEDURE

- 2.1 On 11 December 1992, the draft Tseung Kwan O OZP No. S/TKO/1, the first statutory plan covering the Tseung Kwan O area, was gazetted under section 5 of the Town Planning Ordinance (the Ordinance). The OZP was subsequently amended twice.
- On 16 July 1996, the then Governor in Council, under section 9(1)(a) of the Ordinance, approved the draft Tseung Kwan O OZP, which was subsequently renumbered as S/TKO/4. On 4 November 1997, the Chief Executive in Council (CE in C) referred the approved OZP No. S/TKO/4 to the Board for amendment under section 12(1)(b)(ii) of the Ordinance. The amended OZP was subsequently exhibited for public inspection under section 5 of the Ordinance on 29 May 1998.
- On 9 February 1999, the CE in C, under section 9(1)(a) of the Ordinance, approved the draft Tseung Kwan O OZP, which was subsequently renumbered as S/TKO/6. On 20 July 1999, the CE in C referred the approved OZP No. S/TKO/6 to the Board for amendment under section 12(1)(b)(ii) of the Ordinance. The OZP was subsequently amended three times.
- 2.4 On 15 May 2001, the CE in C, under section 9(1)(a) of the Ordinance, approved the draft Tseung Kwan O OZP, which was subsequently renumbered as S/TKO/10. On 25 September 2001, the CE in C referred the approved OZP No. S/TKO/10 to the Board for amendment under section 12(1)(b)(ii) of the Ordinance. The OZP was subsequently amended twice.
- On 17 December 2002, the CE in C, under section 9(1)(a) of the Ordinance, approved the draft Tseung Kwan O OZP, which was subsequently renumbered as S/TKO/13. On 8 July 2003, the CE in C referred the approved OZP No. S/TKO/13 to the Board for amendment under section 12(1)(b)(ii) of the

- Ordinance. The amended OZP was subsequently exhibited for public inspection under section 5 of the Ordinance on 31 October 2003.
- 2.6 On 2 November 2004, the CE in C, under section 9(1)(a) of the Ordinance, approved the draft Tseung Kwan O OZP, which was subsequently renumbered as S/TKO/15. On 30 May 2006, the CE in C referred the approved OZP No. S/TKO/15 to the Board for amendment under section 12(1)(b)(ii) of the Ordinance.
- 2.7 On 13 June 2008, the draft Tseung Kwan O OZP No. S/TKO/16 incorporating amendments mainly reflecting the relevant recommendations of the Feasibility Study for Further Development of Tseung Kwan O was exhibited for public inspection under section 5 of the Ordinance.
- On 13 February 2009, the proposed amendments to the draft Tseung Kwan O OZP to meet partially two of the representations received were exhibited for public inspection under section 6C(2) of the Ordinance. No further representation was received. The proposed amendments were confirmed by the Board under section 6G of the Ordinance on 20 March 2009.
- 2.9 On 2 June 2009, the CE in C, under section 9(1)(a) of the Ordinance, approved the draft Tseung Kwan O OZP, which was subsequently renumbered as S/TKO/17. On 12 June 2009, the approved Tseung Kwan O OZP No. S/TKO/17 was exhibited for public inspection under section 9(5) of the Ordinance.
- 2.10 On 1 December 2009, the Secretary for Development (SDEV), under the delegated authority of the Chief Executive (CE), directed the Board under section 3(1)(a) of the Ordinance to extend the planning scheme boundary of the Tseung Kwan O OZP to cover a piece of land proposed to be excised from the Clear Water Bay Country Park (CWBCP) for the proposed South East New Territories Landfill Extension.
- 2.11 On 2 February 2010, the CE in C referred the approved OZP No. S/TKO/17 to the Board for amendment under section 12(1)(b)(ii) of the Ordinance. On 12 March 2010, the reference was notified in the Gazette under section 12(2) of the Ordinance.
- 2.12 On 7 May 2010, the draft Tseung Kwan O OZP No. S/TKO/18 incorporating amendments to rezone a site in Area 78 (Pak Shing Kok) from "Residential (Group C) 2", "Residential (Group C) 3", "Residential (Group C) 4" ("R(C)4"), "Government, Institution or Community (4)", "Government, Institution or Community (5)" and area shown as 'Road' to "Government, Institution or Community (7)", another site in the south of Area 78 (Pak Shing Kok) from "R(C)4" to "Government, Institution or Community (8)", a site in Area 137 (Fat Tong O) from "Other Specified Uses" annotated "Deep Waterfront Industry" to "Open Space (2)" ("O(2)"), to zone a piece of land proposed to be excised from the CWBCP to "O(2)", and to rezone a site in Area 101 from "O" to "O(2)" was exhibited for public inspection under section 5 of the Ordinance. A total of 2,479 representations were received during the 2-month plan exhibition period

- and 205 valid comments were received during the first 3 weeks of the representation publication period.
- 2.13 On 1 March 2011, SDEV, under the delegated authority of the CE, directed the Board under section 3(1)(a) of the Ordinance to exclude about 5 ha of CWBCP land from the planning scheme boundary of the Tseung Kwan O OZP.
- 2.14 On 30 March 2011, the CE agreed under section 8(2) of the Ordinance to extend the statutory time limit for submission of the draft OZP to the CE in C for approval for 6 months to 7 October 2011.
- On 13 May 2011, the draft Tseung Kwan O OZP No. S/TKO/19 incorporating amendments of rezoning a site in Area 85 from "Other Specified Uses" annotated "Sewage Treatment Works" to "Government, Institution or Community (9)" was exhibited for public inspection under section 7 of the Ordinance. A total of 4 valid representations were received during the 2-month plan exhibition period and 1 valid comment was received during the first 3 weeks of the representation publication period.
- 2.16 On 16 November 2011, 30 November 2011, 1 December 2011, 2 December 2011, 3 December 2011, 7 December 2011, 9 December 2011 and 13 December 2011, the Board considered the 2,479 representations and 205 comments to the draft Tseung Kwan O OZP No. S/TKO/18 under section 6B(1) of the Ordinance and decided on 13 December 2011 to propose amendments to meet/partially meet some of the representations. On 16 December 2011, the proposed amendments to reflect the reduced scale of the proposed South East New Territories Landfill Extension were exhibited for public inspection under section 6C(2) of the Ordinance. During the 3-week exhibition period, no valid further representation was received. The proposed amendments were confirmed by the Board under section 6G of the Ordinance on 17 February 2012.
- 2.17 On 16 November 2011, 9 December 2011 and 13 December 2011, the Board gave consideration to the valid representations and comment with respect to the draft Tseung Kwan O OZP No. S/TKO/19 and decided on 13 December 2011 to note the supporting representations and not to uphold the opposing representation.
- 2.18 On 17 April 2012, the CE in C, under section 9(1)(a) of the Ordinance, approved the draft Tseung Kwan O OZP, which was subsequently renumbered as S/TKO/20. On 27 April 2012, the approved Tseung Kwan O OZP No. S/TKO/20 (the Plan) was exhibited under section 9(5) of the Ordinance.
- 2.19 On 29 April 2014, the CE in C referred the approved Tseung Kwan O OZP

  NO. S/TKO/20 to the Board for amendment under section 12(1)(b)(ii) of the

  Ordinance. On 16 May 2014, the reference was notified in the Gazette

  under section 12(2) of the ordinance.
- 2.20 On XXXXX 2015, the draft Tseung Kwan O OZP No. S/TKO/21 (the Plan) incorporating amendments mainly to rezone a site in Area 85 from "Other Specified Uses" annotated "Sewage Treatment Works" to "Government,

Institution or Community (9)" to facilitate 'Government, Institution or Community' uses which may include 'Information Technology and Telecommunications Industries' use was exhibited for public inspection under section 5 of the Ordinance. In addition, the Tseung Kwan O – Lam Tin Tunnel and Cross Bay Link, Tseung Kwan O road schemes authorized by the CE in C under the Roads (Works, Use and Compensation) Ordinance are shown on the Plan for information.

## OBJECT OF THE PLAN

- 3.1 The object of the Plan is to indicate the broad land use zones and major transport networks for the Tseung Kwan O area so that development and redevelopment in the area can be subject to statutory planning control. Such control is necessary to develop Tseung Kwan O New Town into a balanced community.
- 3.2 The Plan is to illustrate the broad principles of development within the Planning Scheme Area. As it is a small-scale plan, the alignments of roads and the Mass Transit Railway (MTR) line as well as boundaries between the land use zones may be subject to minor alterations as detailed planning and development proceed.
- 3.3 Since the Plan is to show broad land use zonings, there would be situations in which small strips of land not intended for building development purposes and carry no development right under the lease, such as the areas restricted as non-building area or for garden, slope maintenance and access road purposes, are included in the zones. The general principle is that such areas should not be taken into account in plot ratio and site coverage calculation. Development within zones should be restricted to building lots carrying development right in order to maintain the character and amenity of the Tseung Kwan O area and not to overload the road network in this area.

## NOTES OF THE PLAN

- 4.1 Attached to the Plan is a set of Notes which shows the types of uses or developments which are always permitted within the Planning Scheme Area and in particular zones and which may be permitted by the Board, with or without conditions, on application. The provision for application for planning permission under section 16 of the Ordinance allows greater flexibility in land use planning and control of development to meet changing needs.
- 4.2 For the guidance of the general public, a set of definitions that explains some of the terms used in the Notes may be obtained from the Technical Services Division of the Planning Department and can be downloaded from the Board's website at http://www.info.gov.hk/tpb.

## THE PLANNING SCHEME AREA

- 5.1 The Planning Scheme Area (the Area), which covers an area of about 1,727 hectares (ha), is located at the southern part of Sai Kung District in the South East New Territories. It is bounded by the Clear Water Bay Peninsula to the east, Junk Bay to the south, Lam Tin and Sau Mau Ping areas to the west, and Tseng Lan Shue and the Hong Kong University of Science and Technology to the north. The Area is surrounded by steep sloping hills in the north, east and west, and is physically segregated from East Kowloon and Clear Water Bay Peninsula.
- 5.2 The boundary of the Area is shown in a heavy broken line on the Plan. For planning and reference purposes, the Area has been divided into a number of smaller planning areas as shown on the Plan.

## POPULATION

According to the 2006 Population By-census, the population of the Area was about 350,000 persons. It is estimated that the planned population of the Area would be about 445,000 persons.

#### URBAN DESIGN FRAMEWORK

- 7.1 Tseung Kwan O is a third generation new town. Capitalizing on the enhanced accessibility brought about by the Tseung Kwan O MTR Line, high-density developments are located close to the MTR stations at Po Lam, Hang Hau, Tseung Kwan O, Tiu Keng Leng and Tseung Kwan O South, each forming a district centre with its own retail and supporting facilities. The southeastern part of the New Town is reserved for specific uses to meet territorial needs, such as the Tseung Kwan O Industrial Estate in Area 87, the deep waterfront industries in Area 137, landfills and proposed landfill extension in Areas 77, 101, 105 and 137.
- 7.2 As recommended under the Study completed in 2005, an urban design framework has been formulated mainly for the new development areas in the Town Centre South, Tiu Keng Leng and Pak Shing Kok areas to direct the development of a coherent and legible structure of land uses, urban form and open spaces that is appropriate to the unique development context of a waterfront and valley setting of the New Town.
- 7.3 The framework seeks to optimize opportunities afforded by the new development areas in Town Centre South to create a new and distinctive waterfront district that capitalizes on the dramatic visual and physical relationship of the natural landscape of the surrounding country parks and Junk Bay, with the objective of fostering a unique district identity. It also seeks to maximize the development potential of the existing Eastern Channel and Junk Bay by promoting water sports and recreation. The primary objective is to provide a high quality vibrant leisure and recreational area for the enjoyment of the Tseung Kwan O residents and visitors. The new development areas in the Town Centre South, Tiu Keng Leng and Pak Shing Kok areas are intended to be

highly integrated with the hinterland through the provision of a comprehensive pedestrian circulation and open space framework and to incorporate architectural designs and landscape treatments that promote a positive public image of the New Town.

- 7.4 The key features of the new development areas proposed under the urban design framework include the following:
  - reduction in the population density within Town Centre South and Tiu
     Keng Leng from that formerly proposed for the area;
  - (b) diminution in building height towards the waterfront with modulation in building height at the waterfront to enhance variety in the height and massing of new development;
  - elimination of waterfront roads to promote a more pedestrian friendly and attractive waterfront district;
  - (d) provision of a "Central Avenue" which is a landscaped pedestrian retail corridor in the form of open space that links the commercial and entertainment node adjacent to the MTR Tseung Kwan O Station with the waterfront;
  - (e) provision of a high quality waterfront park and promenade with related leisure and commercial uses;
  - (f) provision of a new riverine park along a landscaped corridor adjacent to the Eastern Channel that provides connections to the waterfront and opportunities for active and passive recreation;
  - (g) provision for water sports activity and recreation in the Eastern Channel and Junk Bay;
  - (h) continual provision of a comprehensive breezeway system by suitably aligned open space, low-rise Government, Institution or Community (GIC) facilities and major road corridors to promote better ventilation within the New Town;
  - provision of a signature Civic Node and GIC cluster at the western gateway to the New Town at the intersection of Po Yap Road and Road P2;
  - (j) provision of 'breathing spaces' for the more densely populated areas such as Tiu Keng Leng, by the introduction of district parks and local open spaces;
    - (k) provision of low-rise development at Pak Shing Kok to maintain the existing ridgeline when viewed from Sai Kung;
    - promotion of lively streetscapes and activities and avoidance of podium

developments which may create 'dead' development edges; and

 (m) development of Cross Bay Link (CBL) in the form of a landmark feature bridge.

#### LAND USE ZONINGS

- 8.1 "Comprehensive Development Area" ("CDA"): Total Area 38.72 ha
  - 8.1.1 This zone is intended for comprehensive development/redevelopment of the area for residential and/or commercial uses with the provision of open space and other supporting facilities. It is to facilitate appropriate planning control over the development mix, scale, design and layout of development, taking account of various environmental, traffic, infrastructure and other constraints. It is also intended for developing or redeveloping relatively large sites in a comprehensive manner and maintaining planning control within the zone through the submission of Master Layout Plan (MLP). Developments within this zone are subject to gross floor area (GFA) and/or building height restrictions. To provide flexibility for innovative design adapted to the characteristics of particular sites, minor relaxation of these restrictions may be considered by the Board through the planning permission system. Each proposal will be considered on its individual planning merits.
  - 8.1.2 The "CDA" site in Area 86 is intended to facilitate comprehensive development including a MTR depot, a MTR station, associated property development and supporting community facilities. Development/redevelopment within this "CDA" site is restricted to a maximum domestic GFA of 1,612,800m² and a maximum non-domestic GFA of 40,000m² (mainly for retail purpose).
  - 8.1.3 The existing film studio site in Area 92 is within this zoning and is intended for comprehensive redevelopment for low-density residential use. Development or redevelopment within this "CDA" site is restricted to a maximum GFA of 15,700m² and a maximum building height of 6 storeys over one level of carport.
  - 8.1.4 Pursuant to section 4A(1) of the Ordinance, any development proposal under this zoning will require the approval of the Board by way of a planning application under section 16 of the Ordinance. Unless otherwise specified, a MLP should be submitted together with environmental, traffic and other relevant assessment reports as well as other materials as specified in the Notes of the Plan for the approval of the Board under section 4A(2) of the Ordinance. A copy of the approved MLP will be made available for public inspection pursuant to section 4A(3) of the Ordinance.

## 8.2 "Commercial/Residential" ("C/R"): Total Area 20.07 ha

- 8.2.1 This zone is intended primarily for commercial and/or residential development. Commercial, residential and mixed commercial/ residential uses are always permitted.
- 8.2.2 The areas within this zoning are primarily planned and concentrated in the town centre and district centres where accessibility is enhanced by the MTR Tseung Kwan O Extension.

## 8.3 "Residential (Group A)" ("R(A)"): Total Area 144.97 ha

- 8.3.1 This zone is intended primarily for high-density residential developments. Commercial uses are always permitted on the lowest three floors of a building or in the purpose-designed non-residential portion of an existing building.
- 8.3.2 This zoning constitutes the major type of residential land use in the Area. It covers public rental housing estates, Home Ownership Schemes (HOS), Private Sector Participation Schemes (PSPS), Sandwich Class Housing (SCH) and Flat for Sale Schemes (FFSS) as well as private residential developments. Commercial uses such as eating places, offices, shops and services are permitted as of right on the lowest three floors of the buildings, including basement(s), and in the purposedesigned non-residential portion of the existing buildings.
- 8.3.3 Existing public rental housing estates include Tsui Lam Estate in Area 5, Po Lam Estate in Area 14, King Lam Estate in Area 23, Ming Tak Estate in Area 34, Hau Tak Estate in Areas 39 & 41, Sheung Tak Estate in Area 59, Kin Ming Estate in Area 73 and part of Choi Ming Court in Area 74. In addition, thirteen HOS developments namely King Ming Court in Area 6, Ying Ming Court in Area 14, Yan Ming Court in Area 21, Ho Ming Court in Area 23, Hin Ming Court and Yuk Ming Court in Area 34, Yu Ming Court in Area 39, Chung Ming Court in Area 41, Wo Ming Court in Area 34/44, Tong Ming Court in Area 57, Kwong Ming Court and Po Ming Court in Area 59, and part of Choi Ming Court in Area 74 as well as four PSPS developments namely Fu Ning Garden in Area 30, On Ning Garden in Area 40, Beverly Garden in Area 55 and Bauhinia Garden in Area 65 have also been completed.
- 8.3.4 Existing SCH developments comprise the Serenity Place in Area 13, the Radiant Towers in Area 18 and the Pinnacle in Area 24. The Verbena Heights in Area 19 is an existing mixed public rental and FFSS development developed by the Hong Kong Housing Society.
- 8.3.5 The ex-Tiu Keng Leng cottage area in Areas 73 and 74 has been cleared and planned primarily for the development of public rental housing estates and private residential developments. Some of the residential developments within the area have been completed. A number of proposed residential sites in the town centre are also within this zoning.

8.3.6 There are six sub-areas within this zone, each with its own specific development restrictions:

## (a) "Residential (Group A)1" ("R(A)1"): 1.49 ha

A site to the southwest of the Kin Ming Estate in Area 73 is zoned "R(A)1". Development within this sub-area is restricted to a maximum domestic and non-domestic plot ratio (PR) of 5.5 and 0.5 respectively and a maximum building height of 138m above Principal Datum (mPD). A stepped building height profile should be adopted for developments within the site thereby reducing its visual impact on the surrounding low-rise GIC developments.

## (b) "Residential (Group A)2" ("R(A)2"): 6.60 ha

Two sites in Area 66 to the south of Po Yap Road are zoned "R(A)2". Development within this sub-area is subject to a maximum domestic and non-domestic PR of 5 and 0.5 respectively, a maximum site coverage (SC) of 50% and a maximum building height of 100mPD. Podium development within these sites should be avoided as far as possible, but may be used within these sites to act as noise mitigation measure against Po Yap Road. Besides, built form and heights should be articulated to create a varied and interesting built form and activity/development edge. Retail and commercial facilities should be promoted along the boundaries fronting directly onto the pedestrianized Central Avenue.

## (c) "Residential (Group A)3" ("R(A)3"): 3.04 ha

A site in Area 65 to the east of the Bauhinia Garden is zoned "R(A)3". Development within this sub-area is restricted to a maximum domestic and non-domestic PR of 4 and 0.5 respectively, a maximum SC of 50% and a maximum building height of 100mPD. The prospective developer is required to provide a public open space with a minimum site area of 4,600 m<sup>2</sup> at the southern portion of this sub-area and at street level to serve as a transitional buffer with the adjacent non-residential developments as well as serving the needs of the surrounding neighbourhoods. To be compatible with the overall urban design concept of the Town Centre South area, the use of podium and wall-like development within this sub-area should be avoided.

#### (d) "Residential (Group A)4" ("R(A)4"): 3.54 ha

A site in Area 65 to the west of the Eastern Channel is zoned "R(A)4". Development within this sub-area is restricted to a

maximum domestic and non-domestic PR of 3 and 0.5 respectively, and a maximum SC of 50%. To achieve a gradation in height towards the waterfront, this sub-area has different building height restrictions, i.e. 65mPD for Area (a) and 35mPD for Area (b). To create a varied and interesting activity edge along the waterfront promenade, publicly accessible outdoor spaces in the form of 'urban courtyards' are encouraged to be provided adjoining the promenade within the site. It is proposed that recreational and entertainment uses such as alfresco dining, sitting out areas, gardens could be provided within these outdoor spaces.

#### (e) "Residential (Group A)5" ("R(A)5"): 3.67 ha

Two sites in Area 66 abutting the town plaza and the waterfront park along Tong Chun Street and along Tong Yin Street respectively are zoned "R(A)5". They are subject to a maximum domestic and non-domestic PR of 3 and 0.5 respectively, a maximum SC of 50% and a maximum building height of 65mPD. Retail and commercial activities should be developed along the edge that fronts onto the town plaza and the waterfront park.

## (f) "Residential (Group A)6" ("R(A)6"): 9.36 ha

Two sites in Area 68, one along Tong Chun Street to the west of the Eastern Channel and one along Tong Yin Street to the south of the Civic Node are zoned "R(A)6". They are subject to a maximum domestic and non-domestic PR of 2 and 0.5 respectively, and a maximum SC of 50%. To achieve a gradation in height towards the waterfront, this sub-area also has different building height restrictions, i.e. 50mPD for Area (a), 35mPD for Area (b) and 60mPD for Area (c). The building height restriction for Area (c) of both sites is intended to allow the development of a feature tower to provide height variation at the waterfront. Similar to the "R(A)4" site, 'urban courtyards' are encouraged to be provided along the promenade.

- 8.3.7 The five sites in the "R(A)4", "R(A)5" and "R(A)6" sub-areas are intended for the development of waterfront-related commercial and residential uses. These sites will provide a mix of high quality residential development with the provision of retail and other commercial, leisure and entertainment activities to enhance activity and to create a unique, interesting and vibrant waterfront for use by local residents and visitors. The different building height restrictions within these sub-areas are intended to introduce a height variation for each site.
- 8.3.8 Land has been reserved in the "R(A)5" site at Tong Yin Street and two "R(A)6" sites adjacent to the waterfront promenade for the provision

- of 24 hour-dedicated pedestrian passageways. These are generally non-building areas which will follow the major pedestrian desire lines and guide pedestrians to the waterfront. The passageways would be landscaped to high quality and are planned to be consistent with the waterfront landscape treatments.
- 8.3.9 The use of podium and wall-like development within the "R(A)2", "R(A)3", "R(A)4", "R(A)5" and "R(A)6" sub-areas should be avoided to ensure compatibility with the overall urban design concept of the Town Centre South area, particularly the promotion of lively streetscapes and activities. This objective would be attained by ensuring the inclusion of car parking facilities, loading/unloading facilities, plant room, caretaker's office and quarters and recreational facilities in SC calculation, if provided above ground. Future developments are encouraged to adopt suitable design measures to minimize any possible adverse air ventilation impacts. These include lower podium height, greater permeability of podium, wider gap between buildings, nonbuilding area to create air path for better ventilation and minimizing the blocking of air flow through positioning of building towers and podiums to align with the prevailing wind directions, as appropriate.
- 8.3.10 To provide flexibility for innovative design adapted to the characteristics of particular sites, minor relaxation of PR/SC/building height restrictions of the sub-areas and/or minor adjustment to the boundaries of Areas (a)/(b) of "R(A)4" and/or Areas (a)/(b)/(c) of "R(A)6" may be considered by the Board through the planning permission system. Each proposal will be considered on its individual planning merits.

#### 8.4 "Residential (Group B)" ("R(B)"): Total Area 4.49 ha

- 8.4.1 This zone is intended primarily for medium-density residential developments where commercial uses serving the residential neighbourhood may be permitted on application to the Board.
- 8.4.2 Two sites are under this zoning, one is the Hong Sing Garden in Area 4 and the other is Oscar by the Sea (the ex-Hong Kong Oxygen site) in Area 51.

## 8.5 "Residential (Group C)" ("R(C)"): Total Area 0.66 ha

- 8.5.1 This zone is intended primarily for high quality, low-rise residential developments where commercial uses serving the residential neighbourhood may be permitted on application to the Board.
- 8.5.2 Developments within this zone are subject to PR, SC and building height controls.

## "Residential (Group C)1" ("R(C)1"): 0.66 ha

Development within this sub-area is restricted to a maximum PR of 0.6, a maximum SC of 30%, and a maximum building height of 2 storeys over one level of carport, or the PR, SC and height of the existing building(s), whichever is the greater. These restrictions are to ensure that any development or redevelopment of this sub-area will be in line with the general character of the adjoining environment. Two sites in Areas 36 and 92 fall within this sub-area.

8.5.3 Application for minor relaxation of the PR/SC/building height restrictions may be considered by the Board under section 16 of the Ordinance. The purpose of this provision is to allow the Board to consider building layout and design proposals which, whilst not strictly complying with the stated restrictions, will meet the planning objectives for the area and provide some additional benefits, such as the conservation of environmentally important natural features or mature vegetation. Each application will be considered on its own merits.

## 8.6 "Residential (Group E)" ("R(E)"): Total Area 4.00 ha

- 8.6.1 This zone is intended primarily for phasing out of existing industrial uses through redevelopment (or conversion) for residential use on application to the Board.
- 8.6.2 Two sites abutting Shek Kok Road in Area 85 are under this zoning. Development within the zone is subject to a maximum PR of 5 and a maximum building height of 130m. To provide flexibility for innovative design adapted to the characteristics of particular sites, minor relaxation of the building height restriction may be considered by the Board through the planning permission system. Each proposal will be considered on its individual planning merits.
- 8.6.3 The developers will be required to submit adequate information to demonstrate that new residential developments will be environmentally acceptable, and suitable mitigation measures, if required, will be implemented to address the potential industrial/residential interface problems, the potential land contamination issue, and the noise impact of the MTR open track section nearby. One of the sites will also accommodate a public vehicle park comprising 21 private car and 26 lorry parking spaces for reprovisioning of the public vehicle park originally located at the northern end of Shek Kok Road. One footbridge across Wan Po Road and one across Shek Kok Road to link up the sites with the "CDA" in Area 86 are required in the new residential developments.
- 8.6.4 Under this zoning, existing industrial uses will be tolerated but new industrial development will not be permitted upon redevelopment in

order to avoid the perpetuation or aggravation of the industrial/residential interface problems with the new residential development during the redevelopment process. In existing industrial buildings, new developments involving offensive trades will not be permitted. Any modification of use from non-industrial to industrial uses (other than non-polluting industrial uses) within existing industrial buildings will require the permission of the Board. In addition, commercial uses, other than those permitted in the purpose-designed non-industrial portion of the existing industrial buildings, would require the permission of the Board. Upon redevelopment of the industrial buildings to non-industrial buildings, commercial uses will be permitted as of right on the lowest three floors, including basement(s), and in the purpose-designed non-residential portion of the existing buildings.

## 8.7 "Village Type Development" ("V"): Total Area 22.01 ha

- 8.7.1 The planning intention of this zone is to reflect existing recognized and other villages, and to provide land considered suitable for village expansion and reprovisioning of village houses affected by Government projects. Land within this zone is primarily intended for development of Small Houses by indigenous villagers. It is also intended to concentrate village type development within this zone for a more orderly development pattern, efficient use of land and provision of infrastructures and services. Selected commercial and community uses serving the needs of the villagers and in support of the village development are always permitted on the ground floor of a New Territories Exempted House. Other commercial, community and recreational uses may be permitted on application to the Board.
- 8.7.2 In order to retain the village character, any future development or redevelopment within this zone, except otherwise specified, is subject to a maximum building height of 3 storeys (8.23m) or the height of the existing building(s), whichever is the greater. To provide flexibility for innovative design adapted to the characteristics of particular sites, minor relaxation of the building height restriction may be considered by the Board through the planning permission system. Each proposal will be considered on its individual planning merits.
- 8.7.3 This zoning covers the existing villages including Tseung Kwan O Village in Area 7, Mau Wu Tsai Village in Area 123 and Boon Kin Village in Area 109. It also includes the Yau Yue Wan Village resite area in Area 22, the Hang Hau Village resite area in Area 31, the Fat Tau Chau and Tin Ha Wan Village resite areas in Area 35. Besides, a site in Area 8 is reserved for the future expansion of Tseung Kwan O Village.

## 8.8 "Government, Institution or Community" ("G/IC"): Total Area 141.73 142.77 ha

8.8.1 This zone is intended primarily for the provision of Government, institution or community facilities serving the needs of the local

residents and/or a wider district, region or the territory. It is also intended to provide land for uses directly related to or in support of the work of the Government, organizations providing social services to meet community needs, and other institutional establishments.

8.8.2 There are a number of sub-areas under this zone, each with its own specific building height restriction to ensure that developments within these sub-areas are in line with the overall urban design concept of the New Town:

## (a) "Government, Institution or Community (1)" ("G/IC(1)"): 5.16 ha

Development within this sub-area is restricted to a maximum building height of 75m. A piece of land in Area 67 which is reserved for the development of a Civic Node falls within this sub-area. The Civic Node will comprise a cultural complex/town hall, Government offices, lorry park and public car parking facilities. Landmark buildings should be developed within this site to create a symbolic 'gateway' at this prominent location. This site, together with the proposed GIC cluster to the west of Road P2 in Area 72, will form the western gateway of the New Town.

(b) "Government, Institution or Community (2)" ("G/IC(2)"): 2.42 ha

Development within this sub-area is restricted to a maximum building height of 55m. The existing Vocational Training Council Design Institute and Hong Kong Institute of Vocational Education (Lee Wai Lee) Campus to the south of Choi Ming Court in Area 74 falls within this sub-area.

(c) "Government, Institution or Community (3)" ("G/IC(3)"): 2.50 ha

Development within this sub-area is restricted to a maximum building height of 45m. Two sites are within this sub-area. A site located immediately to the northwest of the MTR Tiu Keng Leng Station in Area 73 is reserved for the development of two post-secondary colleges. Another site in Area 65 is reserved for the development of a government complex, possibly for recreational and other uses.

(d) "Government, Institution or Community (4)" ("G/IC(4)"): 8.13
8.09 ha

Development within this sub-area is restricted to a maximum building height of 40m. There are four sites within this sub-area. One of them is located to the west of Road P2 in Area 72, which is reserved for the development of a GIC cluster comprising a clinic, a police station, a fire station cum ambulance depot and a refuse collection point. The

architecture of buildings within this GIC cluster should be distinctive and compatible with the Civic Node in Area 67 to create a landmark gateway at this location. Another site, which is located in Area 106 and to the east of "G/IC(8)" sub-area in Area 78, is for the development of Government uses to meet future needs. The remaining two sites are located at Town Centre South comprising an existing primary school and a through-train primary cum secondary school in Area 65 and two planned secondary schools in Area 67.

## (e) "Government, Institution or Community (5)" ("G/IC(5)"): 0.33 ha

Development within this sub-area is restricted to a maximum building height of 10m. A piece of land in Area 68, which is reserved for the development of a telephone exchange, is within this sub-area. Another site at the south-eastern portion of Area 77 is within this sub-area. It accommodates an existing gas and leachate management compound which serves to extract the gas and leachate in the Tseung Kwan O Stage I Landfill thereby keeping these substances down to acceptable levels.

## (f) "Government, Institution or Community (6)" ("G/IC(6)"): 0.05 ha

Development within this sub-area is restricted to a maximum building height of 5m. A site in Area 77, which is reserved for the development of a sewage pumping station, is within this sub-area. This pumping station serves to convey the collected sewage from the Tseung Kwan O Stage I Landfill to the existing trunk sewer under Wan Po Road.

## (g) "Government, Institution or Community (7)" ("G/IC(7)"): 16.11 ha

A site in Pak Shing Kok (Area 78) reserved for Fire Services Training School cum Driving Training School is within this subarea. Development in Area (a) of this sub-area is restricted to a maximum building height of 100 mPD, except a fire services rescue training tower up to 114 mPD. Development in Area (b) of this sub-area is restricted to a maximum building height of 120 mPD.

## (h) "Government, Institution or Community (8)" ("G/IC(8)"): 6.05 ha

Development within this sub-area is restricted to a maximum building height of 106 mPD. A site in Pak Shing Kok (Area 78) reserved for a private hospital and future GIC uses is within this sub-area. (i) "Government, Institution or Community (9)" ("G/IC(9)"): 5.78
6.87 ha

Development within this sub-area is restricted to a maximum building height of 60 mPD, except a communications tower up to 76 mPD. A site in Area 85 reserved for a new Radio Television Hong Kong broadcasting house and future GIC uses is within this sub-area. Due to proximity To create a clustering effect of this sub-area to the areas for broadcasting, innovation and technology industries in Tseung Kwan O, information technology and telecommunications related uses may beare permitted in this sub-area on application to the Board.

- 8.8.3 Specific building height restrictions for the "G/IC" sub-areas in terms of m or mPD, which mainly reflect the planned building heights of developments, have been incorporated into the Plan to provide visual and spatial relief to the Area.
- 8.8.4 To provide flexibility for innovative design adapted to the characteristics of particular sites, minor relaxation of the building height restriction of the sub-areas may be considered by the Board through the planning permission system. Each proposal will be considered on its individual planning merits.
- 8.8.5 Apart from the above, other major GIC facilities provided or planned in the Area include:
  - existing and proposed primary and secondary schools distributed in various areas;
  - a wide range of community facilities such as town hall, libraries, indoor recreation centres, community centres, care and attention homes and religious institutions in various areas;
  - (c) hospitals in Areas 27 and 32;
  - (d) clinics in Areas 22, 44, 56, and 72;
  - (e) police stations in Areas 21 and 72;
  - (f) fire stations and/or ambulance depots in Areas 10, 72 and 87;
  - (g) Government staff quarters in Area 22;
  - (h) YMCA Youth Camp in Area 122;
  - electricity substations in Areas 11, 24, 39, 56 and 115;
  - (j) telephone exchanges in Areas 26 and 68;

- (k) water pumping stations in Areas 5 and 120;
- (l) service reservoirs in various areas; and
- (m) film studio in Area 106.

## 8.9 "Open Space" ("O"): Total Area 192.42 190.80 ha

- 8.9.1 This zone is intended primarily for the provision of outdoor public open-air space for active and/or passive recreational uses serving the needs of local residents as well as the general public.
- 8.9.2 Two sites in Areas 72, 125 and 128 along Road P2 are proposed for the development of Tiu Keng Leng Park which includes two landscaped pedestrian decks spanning across the depressed Road P2. This open space will provide some visual relief to the adjacent high density developments and will link up with the waterfront park in Area 68 via a waterfront promenade.
- 8.9.3 The central part of Area 68 fronting Junk Bay is proposed for a waterfront park which will link up with a town plaza proposed to its north in Area 66. The proposed waterfront park is intended predominantly for passive recreation with a high quality landscaping design to promote a unique identity for the New Town. The town plaza is proposed to primarily serve as an urban civic space with provision for public gatherings and other activities.
- 8.9.4 A semi-circular area in Area 66 south of Po Yap Road and the MTR TKO Station is proposed to be developed as an open/green plaza serving as a recreational space for nearby residents and visitors and a buffer between the MTR TKO Station and the future residential developments in Area 66.
- 8.9.5 A Central Avenue at Area 66 is proposed between the open/green plaza south of Po Yap Road and the town plaza which will form a major linkage between Town Centre North and the waterfront area. The proposed Central Avenue is intended primarily for the provision of a landscaped corridor in the form of open space, which would be flanked by retail development edges on both sides of the adjacent R(A) zones and landscaped to a high quality. Shop, services and eating place including alfresco dining may be considered by the Board through the planning permission system.
- 8.9.6 A riverine park is proposed along the Eastern Channel in Area 65 and a waterfront promenade is proposed along Junk Bay in Area 68. The sites will provide a range of water-related and passive recreational facilities and opportunities. Alfresco dining may be considered by the Board through the planning permission system. A boardwalk may be provided on the water's edge.

- 8.9.7 The landfill site in Area 105 has been decommissioned and restored. The landfill sites in Areas 101 and 137 will be developed into major open spaces upon completion of the landfill. However, any development proposals within the 250m Consultation Zone of these landfills will need to include a Landfill Gas Hazard Assessment to the satisfaction of the Environmental Protection Department.
- 8.9.8 Other open spaces are also planned in Areas 12, 24, 25, 37, 40, 51, 73 and 74 to provide recreational outlets for the nearby residential neighbourhood.

## "Open Space (1)" ("O(1)"): 16.79 ha

8.9.9 In "O(1)", 'Place of Recreation, Sports or Culture' and 'Library' uses are always permitted. A town park which will provide a variety of active and passive recreational facilities is proposed in Area 45, a sports ground and an indoor velodrome cum sports centre (IVSC) will be provided within this open space. A sports centre together with a library (SCL) will be provided in the open space in Area 74. The zoning of this sub-area would allow locational and design flexibility for the provision of IVSC in Area 45 and SCL in Area 74. The proposed IVSC in Area 45 and the proposed SCL in Area 74 should not exceed a building height of 30m above ground.

## "Open Space (2)" ("O(2)"): 100.54 ha

- 8.9.10 The landfill sites in Areas 101 and 137 fall within the "O(2)" sub-area. The "O(2)" zoning is to reflect the long-term planning intention of open space use of the landfill sites after the decommissioning and restoration of the landfill, while permitting landfill use in the interim.
- 8.9.11 Upon detailed planning, additional local open spaces will be provided in the residential zones. These open spaces are however not shown on this Plan.

## 8.10 "Recreation" ("REC"): Total Area 65.85 ha

- 8.10.1 The planning intention of this zone is primarily for recreational developments for the use of the general public. It encourages the development of active and/or passive recreation and tourism/ eco-tourism. Uses in support of the recreational developments may be permitted subject to planning permission. The Tseung Kwan O Stage I Landfill in Area 77 is within this zone.
- 8.10.2 Given the development constraints associated with landfill sites, development within this zone is restricted to a maximum PR of 0.1 and a maximum building height of 1 storey. To provide design flexibility, minor relaxation of the PR/building height restrictions may be considered by the Board through the planning permission system.

Each proposal will be considered on its individual planning merits. Moreover, similar to other landfill sites, any development proposals within the 250m Consultation Zone of the landfill will need to include a Landfill Gas Hazard Assessment to the satisfaction of the Environmental Protection Department.

## 8.11 "Other Specified Uses" ("OU"): Total Area 235.39 225.40 ha

- 8.11.1 This zone denotes land allocated or reserved for specific uses, including the following:
  - (a) a waterfront site at the toe of the Tseung Kwan O Stage I Landfill in Area 77 is reserved for water sports and recreational facilities. Given the prominent location of this site and the constraints associated with landfill sites, development within this zone is restricted to a maximum PR of 0.5, a maximum SC of 50% and a maximum building height of 1 storey. To provide design flexibility, minor relaxation of the PR/SC/building height restrictions may be considered by the Board through the planning permission system;
  - a pair of finger piers at the waterfront of Area 68 is proposed to (b) cater for the berthing of recreational/pleasure vessels and kaidos thereby serving the needs of the community and to enhance the water-borne recreation and tourism potential of Junk Bay as well as the New Town. Structures to be accommodated are intended as low-intensity low-rise developments generally of one storey high, depending on the design. Dining, including alfresco dining, and recreation and tourism related commercial facilities may be considered by the Board through the planning permission system. Each proposal will be considered on its individual planning merits. addition, special and/or atypical design of these piers is encouraged to allow the creation of a place of attraction, resting and recreation and/or focal and vantage point for visitors;
  - (c) a commercial development with public transport interchange in Area 56. This site is intended as an entertainment node within the New Town and will comprise a range of entertainment, leisure and commercial uses. Some residential elements within the site is allowed subject to planning permission from the Board;
  - (d) commercial/residential developments with public transport interchange on sites in Areas 17, 38 and 73;
  - the Tseung Kwan O Industrial Estate in Area 87, which enjoys the advantage of marine frontage as well as proximity to the Hong Kong University of Science and Technology;

- (f) deep-waterfront industry in Area 137 for industries which require marine access;
- (g) a bus depot in Area 26;
- (h) an explosive store in Area 124;
- petrol filling stations in Areas 10 and 16 which may include vehicle repair workshops subject to planning permission of the Board;
- (j) the proposed landing steps in Area 68;
- (k) the sewage treatment works in Area 85;
- a cemetery in Area 130 with access from Ko Chiu Road in East Kowloon;
- (m) an underground desilting compound in Area 68; and
- (n) the proposed toll plaza, ventilation building and associated facilities for the Tseung Kwan O – Lam Tin Tunnel in Area 128.

## 8.12 "Green Belt" ("GB"): Total Area 758.69 760.13ha

The planning intention of this zone is primarily for defining the limits of urban and sub-urban development areas by natural features and to contain urban sprawl as well as to provide passive recreational outlets. There is a general presumption against development within this zone. Development within this zone will be strictly controlled and development proposals will be considered on individual merits taking into account the relevant Town Planning Board Guidelines.

## COMMUNICATIONS

## 9.1 Roads

- 9.1.1 Only the major road networks, which comprise trunk roads, primary and district distributors, are shown on the Plan. As the Plan is drawn at a small scale, design details of major road junctions and local access roads are not indicated.
- 9.1.2 The Tseung Kwan O Lam Tin Tunnel and Cross Bay Link, Tseung Kwan O road schemes were authorized by the CE in C on 29 April 2014 and 2 September 2014. Pursuant to section 13A of the Ordinance, the road schemes authorized by the CE in C under the Roads (Works, Use and Compensation) Ordinance (Chapter 370) shall deem to be approved under the Ordinance and the road schemes are shown on the Plan for information only.

- 9.1.2 External access to and from the Area will be mainly via Tseung Kwan O Tunnel and the proposed—Tseung Kwan O\_—\_Lam Tin Tunnel, supplemented by Po Lam Road as well as Ying Yip Road and Hang Hau Road connecting to Clear Water Bay Road.
- 9.1.3 Within the Area, a number of primary and district distributors and local roads have been planned to provide access between the various planning areas as well as access to each locality. In particular, two new major distributor roads, namely Cross Bay Link and Road P2 are proposed. The Cross Bay Link would be provided as a feature bridge and provide direct access from Tseung Kwan O-Lam Tin Tunnel to Area 86, Tseung Kwan O Industrial Estate in Area 87 and the special industrial area in Area 137. Road P2 will provide a link from the Tseung Kwan O-Lam Tin Tunnel directly into the town centre. A section of Road P2 will be depressed to reduce its environmental impact as well as to allow the provision of an at-grade pedestrian crossing in the form of landscaped decks above the depressed Road P2, which facilitates pedestrian movement from the waterfront park to Tiu Keng Leng Park.

#### 9.2 Mass Transit Railway

- Apart from Tseung Kwan O Tunnel and the proposed Tseung Kwan O-Lam Tin Tunnel, external access is complemented by an extension of the MTR line from Lam Tin to Tseung Kwan O. Phase I of the MTR Tseung Kwan O Extension project comprising four stations in Tseung Kwan O, namely Tiu Keng Leng, Tseung Kwan O, Hang Hau and Po Lam, commenced operation in August 2002. The MTR tracks are primarily underground, except for the section between Ho Ming Court and Po Shun Road, which are at grade and enclosed by structures with a landscaped bund on top to eliminate any noise impact caused by the MTR operation on the adjacent residential areas. Phase II of the project includes a spur line to Tseung Kwan O South with a depot and the LOHAS Park Station in Area 86. The depot has been completed and the station commenced operation in July 2009. The railway scheme and its amendments have been authorized by the CE in C on 20 October 1998 and 14 September 1999 respectively and amended on 9 May 2005 by the then Secretary for Environment, Transport and Works.
- 9.2.2 Pursuant to section 13A of the Town Planning Ordinance, the railway scheme authorized by the CE in C under the Railways Ordinance (Cap. 519) shall be deemed to be approved under the Town Planning Ordinance. The railway alignment, stations, tunnels, depot and structures (including an infeed traction substation in Area 45, ventilation shafts in Area 73, MTR related facility in Area 74, a ventilation building in Area 108 and an open track section in Area 106) within the Area, as described in the authorized railway scheme and amendments, are shown on the Plan for information only.

#### 9.3 Public Transport

Franchised buses, taxis, green mini-buses and ferries will be the main modes of public transport in addition to the MTR. Public transport interchange facilities are/will be provided at strategic locations.

#### 9.4 Pedestrian and Cycle Networks

The cycle track and pedestrian walkway networks will be designed to facilitate convenient cycle and pedestrian movements within the Area. Grade-separated pedestrian and cycle crossings will be provided at major pedestrian and cycle crossing points.

#### UTILITY SERVICES

#### 10.1 Water Supply

- 10.1.1 A water supply and distribution system has been implemented to meet the demand arising from the development in Tseung Kwan O.
- 10.1.2 Apart from the existing fresh water service reservoirs in Areas 1, 2, 3, 106, 113 and 125, an extension of fresh water service reservoir is proposed in Area 113 to cater for further development of the Area. Moreover, there is an existing fresh water pumping station in Area 120.
- 10.1.3 Apart from the existing salt water service reservoirs in Areas 1 and 5 and the existing salt water pumping stations in Areas 5 and 86, additional salt water service reservoir and pumping station will be reserved to cater for supply of flushing water.

#### 10.2 Drainage and Sewage Collection

Surface water will be channeled into two main culverts for discharge into the sea. An overland drainage and flood path system will cater for very heavy rain and possible blockage of culverts. Sewage will be conveyed via a network of sewers and a sewer tunnel through Areas 108 and 78 to the sewage treatment works in Area 85 for treatment before being discharged into the Harbour Area Treatment Scheme Stage I deep tunnel conveyance system. There will be sufficient capacity to serve the currently planned developments.

#### 10.3 Electricity

10.3.1 Electricity will be supplied to the Area through a new distribution network. Sites in Areas 11, 24, 39, 56, 86, 87 and 115 have been developed into electricity substations. Adequate sites have been reserved in Areas 72 and 137 for future electricity substations to meet the demand in the short and long terms.

10.3.2 The facility at the site in Area 115 is a 400kV electricity substation. Stringent pollution control measures have been imposed in order to ensure that the adjacent residential neighbourhood will not be adversely affected.

#### 10.4 Town Gas

The network for supplying town gas to the developments in the Area has been extended from Kowloon via Po Lam Road North, via Tseung Kwan O Tunnel and via Clear Water Bay Road.

#### 10.5 Telephone

Telephone service is available through the telephone exchanges in Areas 26 and 87. An additional telephone exchange is reserved in Area 68 to cater for future demand.

#### CULTURAL HERITAGE

- 11.1 Several buildings/structures which are of historical significance and archaeological interest are located within the Area. They include Site of the Chinese Customs Station on Fat Tau Chau (Junk Island) (Fat Tau Chau is now known as Fat Tong Chau) in Area 135, which is a Declared Monument under the Antiquities and Monuments Ordinance, Fat Tau Chau Archaeological Site, Fat Tau Chau Qing Dynasty Grave Stone and Fat Tau Chau House Ruin also in Area 135, Yau Yue Wan Kiln in Area 22, Tin Hau Temple at Hang Hau in Area 35 which is a Grade 3 historic building, Observation Post at Mau Wu Shan in Area 125 which is a Grade 1 historic structure as well as Fortifications at Devil's Peak in Area 132 which is a Grade 2 historic structure.
- On 19 March 2009, the Antiquities Advisory Board (AAB) released the list of 1,444 historical buildings, in which some buildings/structures within the Area were also given proposed gradings. Details of these historical buildings/structures have been uploaded onto the official website of the Antiquities and Monuments Office (AMO) of the Leisure and Cultural Services Department (LCSD) at http://www.amo.gov.hk. The proposed gradings of historical buildings/structures are now under the review of AAB for finalization. The proposed gradings, once endorsed by AAB, will be published on AMO's official website. All the above site of archaeological interest and graded historical buildings/structures are worthy of preservation. Prior consultation with the AMO of LCSD should be made if any development, redevelopment or rezoning proposal might affect the above site of archaeological interest and graded historical buildings/structures-and-their-immediate environs. If disturbance-of-the site of archaeological interest or other areas of archaeological potential is unavoidable, a detailed Archaeological Impact Assessment (AIA) conducted by a qualified archaeologist is required. The archaeologist shall apply for a licence to conduct the AIA under the Antiquities and Monuments Ordinance (Cap. 53). A proposal for the AIA shall be submitted to the AMO for agreement prior to applying for a licence, have

been accorded gradings. The AAB also released a number of new items in addition to the list of 1,444 historic buildings. These items are subject to the grading assessment by the AAB. Details of the list of 1,444 historic buildings and its new items have been uploaded onto the official website of the AAB at http://www.aab.gov.hk.

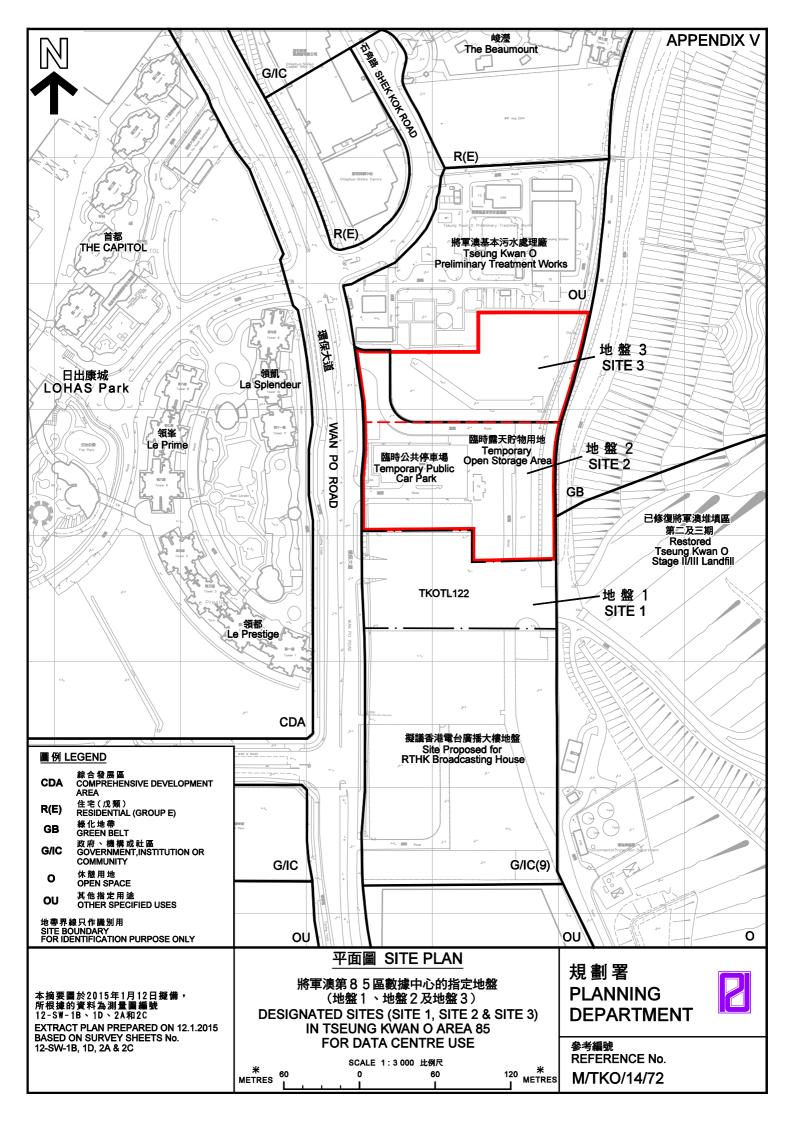
Prior consultation with the Antiquities and Monuments Office (AMO) of the Leisure and Cultural Services Department should be made if any development, redevelopment or rezoning proposals that might affect the above sites of archaeological interest, graded/proposed graded historic buildings/structures, new items pending grading assessment and their immediate environs. If disturbance of the site of archaeological interest or other areas of archaeological potential is unavoidable, a detailed Archaeological Impact Assessment (AIA) conducted by a qualified archaeologist is required. The archaeologist shall apply for a licence to conduct the AIA under the Antiquities and Monuments Ordinance (Cap. 53). A proposal for the AIA shall be submitted to the AMO for agreement prior to applying for a licence.

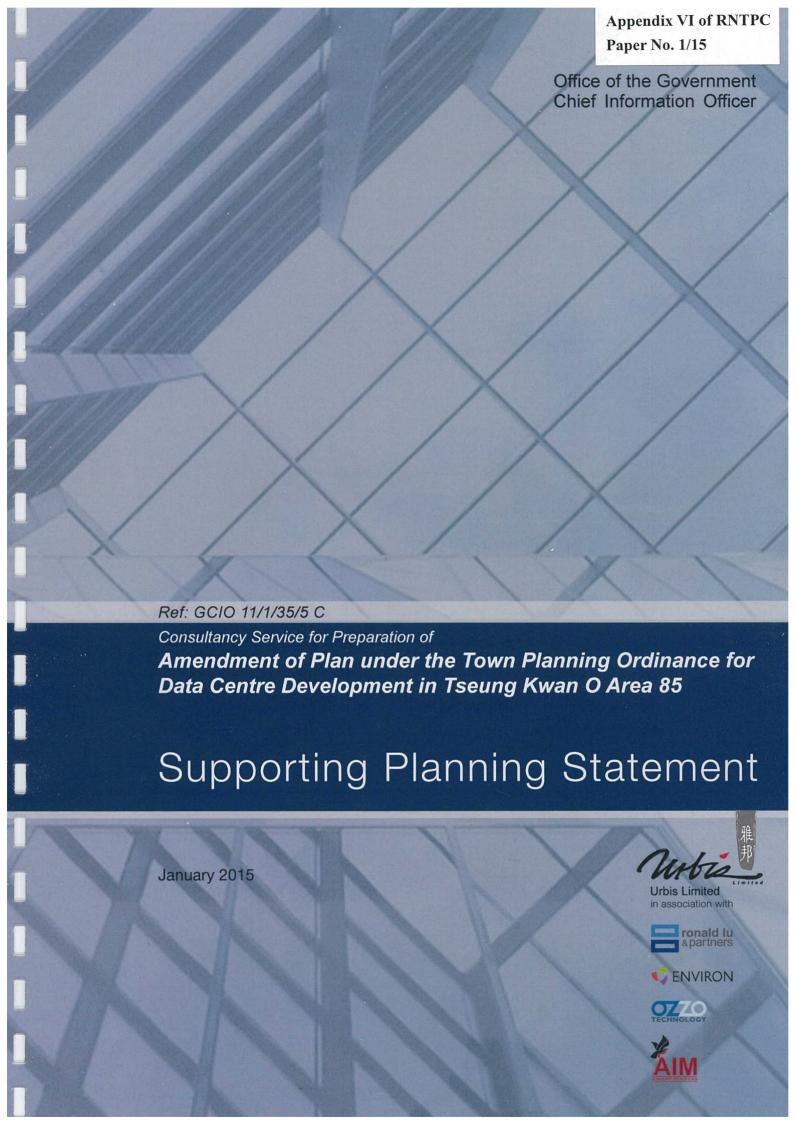
#### IMPLEMENTATION

- 12.1 Although existing uses non-conforming to the statutory zonings are tolerated, any material change of use and any other development/redevelopment must be always permitted in terms of the Plan or, if permission is required, in accordance with the permission granted by the Board. The Board has published a set of guidelines for the interpretation of existing use in the urban and new town areas. Any person who intends to claim an "existing use right" should refer to the guidelines and will need to provide sufficient evidence to support his claim. The enforcement of the zonings mainly rests with the Buildings Department, the Lands Department and the various licensing authorities.
- 12.2 The Plan provides a broad land use framework within which more detailed nonstatutory plans for the Area are prepared by the Planning Department. These
  detailed plans are used as the basis for public works planning and site
  reservation within the Government. Disposal of sites is undertaken by the
  Lands Department. Public works projects are co-ordinated by the Civil
  Engineering and Development Department in conjunction with the client
  departments and the works departments, such as the Highways Department
  and the Architectural Services Department. Implementation of these public
  works projects will be subject to the availability of resources. In the course of
  implementation of the Plan, the Sai Kung District Council will also be consulted
  as appropriate.
- 12.3 Planning applications to the Board will be assessed on individual merits. In general, the Board, in considering planning applications, will take into account all relevant planning considerations which may include the departmental outline development plans/layout plans and the Guidelines published by the Board. The outline development plans and the layout plans are available for public

inspection at the Planning Department. Guidelines published by the Board are available from the Board's website, the Secretariat of the Board and the Planning Department. Application forms and Guidance Notes for planning applications can be downloaded from the Board's website and are available from the Secretariat of the Board, and the Technical Services Division and the relevant District Planning Office of the Planning Department. Applications should be supported by such materials as the Board thinks appropriate to enable it to consider the applications.

TOWN PLANNING BOARD APRIL 2012 FEBRUARY 2015







# CONSULTANCY SERVICE FOR PREPARATION OF AMENDMENT OF PLAN UNDER THE TOWN PLANNING ORDINANCE FOR DATA CENTRE DEVELOPMENT IN TSEUNG KWAN O AREA 85 Supporting Planning Statement

(Doc. Ref. No.: 008)

#### **URBIS LIMITED**

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#### 1. INTRODUCTION AND BACKGROUND

#### 1.1 THE PROPOSAL

This application seeks permission from the Town Planning Board (the TPB) for the rezoning of the Application Site (the Site) to facilitate Data Centre Uses with a size of about 12,400m²1 along Wan Po Road in Tseung Kwan O (TKO). Following the announcement of cloud computing initiatives in the 2011-12 Policy Address, a site search for data centre development has started and the application site has been identified as one of the most suitable sites for High Tier Data Centre Development.

The Site currently straddles two zones depicted on the approved TKO Outline Zoning Plan No. S/TKO/20 (the OZP) (Figure 1.1), namely about 10,900m² zoned "Other Specified Uses" annotated "Sewage Treatment Works ("OU(STW)") and about 1,500m² zoned "Government, Institution or Community (9)" ("G/IC(9)")(Figure 1.1). In order to facilitate the sale of the site for a high-tier data centre development, it is proposed to rezone the Site to an appropriate zone to be advised by Planning Department (PlanD) as a proposed amendment of the OZP under the Town Planning Ordinance (Cap.131) (the Ordinance). The proposed zoning for the Site is intended to provide appropriate planning control to guide High Tier Data Centre development on the Site to integrate with existing development in the surrounding area. The nullah area to the east of the Application Site of about 1150m² and the proposed share access road of about 400 m² will also be included under this rezoning application.

#### 1.2 THE DEFINITION OF DATA CENTRE

For the purposes of the application, a data centre is a facility for housing computer systems, servers, telecommunications equipment, and associated support components in a secured and controlled environment. The support components, depending on the scale, typically include electrical and mechanical facilities such as uninterruptible power supply, power distribution, standby power generation, heat rejection, computer room air-conditioning, fire suppression, environmental control and security control. A high-tier data centre is a data centre designed to support concurrent maintenance such that the data centre services will not be interrupted during planned maintenance of the component(s) in the data centre. It is also designed for high availability of operation and services to a level as generally accepted by the industry. A high-tier data centre is generally equipped with dedicated and redundant support components as described in the next section.

#### 1.3 CLASSIFICATION OF DATA CENTRE

Data centres are usually classified into four tiers according to serviceability levels and building requirements. High-tier data centres encompass those classified as Tier 3 and above. They are designed for high operational availability and the provision of a servicing level of over 99% as is generally demanded by the industry. A high-tier data centre generally includes the following functions and features:

- Redundant telecommunications access;
- Redundant support components, including but not limited to power generator and cooling equipment;
- Redundant power and cooling distribution paths;
- Dedicated and environmentally controlled space for the computer room;

<sup>&</sup>lt;sup>1</sup> Site area about 12,400m<sup>2</sup> include area of about 1150 m<sup>2</sup> of open channel and the proposed share access road of 400m<sup>2</sup>.2 Functions of OGCIO under the Digital 21 Strategy. To spearhead the development of Hong Kong as a knowledge-based society and Asia's leading digital city.



- Dedicated cooling equipment;
- Dedicated power generator and associated fuel tank;
- Support for concurrent maintenance such that the services for computing and storage or transmission of digital data to be performed by the High-tier Data Centre will not be interrupted during any planned maintenance to the High-tier Data Centre;
- The Redundant System shall be able to take over the functions of the primary system to ensure the uninterrupted operation of the High-tier Data Centre; and
- The Dedicated Equipment shall be used solely for the operation of the High-tier Data Centre.

#### 1.4 CONTRIBUTION OF DATA CENTRE

Data centres are essential infrastructure underpinning Hong Kong's economic development, notably our pillar industries including financial services, and logistics and trading sectors. Facilitating the development of high-tier data centres will help sustain and enhance the competitive edge of these industries, thus contributing to the continuous economic development of Hong Kong.

On the other hand, with the increasing reliance of our businesses on information and communications technology (ICT), together with the high frequency stock trading, cloud computing, and e-commerce, the demand of data centre services is surging. Co-location of critical business operations and supporting data centres can greatly increase business efficiency. Therefore, many multinational enterprises prefer to have their data centres located in the city of their mission-critical operations, and many regional data centres are located where their regional headquarters are. Due to the strategic importance of data centres in supporting economic development, competition to attract data centres is keen in the region.

Hong Kong is a strategic and prime location in the region for setting up data centres, with its reliable power supply, robust telecommunications infrastructure, free flow of information, strong data privacy protection, pro-business environment, low risk of natural disasters and proximity to the Mainland market. The data centre sector has been growing rapidly in Hong Kong in recent years and it is anticipated that the demand for data centres will continue to grow in the coming years. The Government fully supports the development of data centres in Hong Kong as the backbone to our economic growth. This policy is integral to the Digital 21 Strategy in developing Hong Kong into a regional ICT hub.

#### 1.5 LAND DEMAND OF DATA CENTRE

According to a consultancy study commissioned by the Office of the Government Chief Information Officer (OGCIO) in 2011, it was estimated that the demand for data centres in Hong Kong would grow by a compound annual growth rate of 9.8% from 2009 and 2015, and the demand will continue to grow beyond 2015. The growth rate in 2011 alone exceeded 18%.

Over the past few years, there had been a keen demand of data centres. The Government has been adopting a multi-pronged approach, as described below, to support the development of data centres, but they are not without limitation and cannot fully address the demand for data centre development:

#### a) Industrial Estates (IEs)

Since 2010, the Hong Kong Science and Technology Parks Corporation has made available over 10 hectares of land in the Tseung Kwan O IE (TKO IE) for the development of high-tier



data centres. However, new sites or assignment cases offering opportunities for bidding are very limited. Besides, data centres within IEs are bound by the cap on plot ratio (2.5), those outside the IEs tend to be built up to around 10-15 storeys. The IE admission policy of not allowing "subletting" is a further constraint towards meeting the needs of data centre operators.

#### b) Government land sale programme

Data centre developers may acquire government sites allowing data centre use on the Government's Land Sale Programme or acquire such sites in the private property market. However, industry feedback has been less than lukewarm because only few sites are technically suitable for data centre development, and of these sites, competing uses (such as offices and other commercial uses) are likely to out-bid data centres in financial terms.

#### c) Industrial buildings

The Government has introduced facilitation measures to encourage optimisation of industrial buildings to develop data centre. There are also time-limited special arrangements for calculating land premium to facilitate development of high-tier data centre on an industrial lot involving lease modification. However, the difficulty in identifying eligible industrial buildings or lots still pose a challenge in satisfying the surging market demand.

#### d) Redevelopment of Industrial Buildings for Other Uses

To provide readily available premises to meet Hong Kong's changing economic and social needs, the Government announced in October 2009 an optimisation scheme with a package of measures to optimise the use of existing industrial buildings through encouraging redevelopment of industrial buildings situated in non-industrial zones and conversion of entire existing industrial buildings.

For development of industrial buildings, subject to the zoning of the site in question in non-industrial zones, the following measures under the optimisation scheme are also applicable to data centres:

- a) Lowering the application threshold for compulsory sale orders under the Land (Compulsory Sale for Redevelopment) Ordinance from 90% to 80% of ownership for industrial buildings. These industrial buildings should be at least 30 years old and situated in non-industrial zones.
- b) Allowing tailor-made lease modifications at "pay for what you build" premium (i.e. assess premium based on the optimal use and proposed development intensity of the redevelopment) for redevelopment of industrial buildings situated in non-industrial zones.
- c) Allowing owners to modify the land lease for redevelopment of industrial buildings to opt for payment of 80% of the land premium by annual instalments up to five years at a fixed rate of interest, if the premium for the lease modification exceeds \$20 million.

To benefit from measures (b) or (c), building owners need to submit valid applications before 31 March 2016. Applicants should ensure that data centre use is consistent with the planned zoning of the subject site under the relevant statutory town plan.



As noted above the progressive increase in high-tier data centre development in Hong Kong and limited land availability has provoked the government to commit more land to sustain and enhance Hong Kong's competitiveness in the region. The Government fully supports the development of data centres. This policy is integral to the Digital 21 Strategy in developing Hong Kong into a regional ICT hub. However, the existing mechanism for data centre development has to go through a rather complicated process as it does not have its own specific zoning. Data centre developer often face challenges and out bided by other competing uses such as commercial uses and industrial uses. Since the Application Site has been identified as one of the most suitable sites for data centre development, it is proposed to rezone the application land with an appropriate zoning to be advised by PlanD to ensure the site is sold for high tier data centre development that will not be out bided by other uses.

#### 1.6 RESERVATION OF LAND FOR DATA CENTRE DEVELOPMENT

To foster development of data centres in Hong Kong, the Government announced in the 2011-12 Policy Address that about two hectares of land have been reserved for high-tier data centre development. In addition, another adjacent site of about one hectare could also be made available for data centre use after 2013. The Application Site which will be available for open bidding in the 2015/2016 after the rezoning process.

Site 3 (the Application Site) is the third of three sites the Government earmarked in Tseung Kwan O (TKO) Area 85 for the development of high-tier data centres. Site 1 and Site 2 is zoned "Government, Institution or Community (9)" ("G/IC(9)") on the approved TKO Outline Zoning Plan No. S/TKO/20 (the OZP). The first site (Site 1) (TKOTL 122) was granted planning permission for proposed information technology and telecommunications industries (data centre) uses from the Rural and New Town Planning Committee on October 2012 under Application No. A/TKO/93 and was sold in October 2013. Site 2 will be sold subject to clearance of the existing temporary uses and upon receiving planning approval from the Town Planning Board.

Other than the two sites, Site 3, which is no longer required for a sewage treatment works, is located to the immediate north of Site 2. The site is also considered suitable for high-tier data centre development. Therefore, the Site is seeking rezoning approval from the Town Planning Board to rezone the Site from "Government, Institution or Community (9)" ("G/IC(9)") "Other Specified Uses" annotated "Sewage Treatment Works" ("OU(STW)") to an appropriate zone to be advised by PlanD under this application to provide more land dedicated for high-tier data centre development in Hong Kong. Locations of Site 1, Site 2 and Site 3 are shown in **Figure 1.2.** 

The Application Site, which is about 1.24 ha in size, is located in an area where power supply is ready, connection to high-bandwidth telecommunications networks is available and risk from natural disasters is low. The Application Site is capable to meet the stringent site requirements of data centres as mentioned in Chapter 2 in this planning statement. It is also located near the TKO IE where a cluster of data centres is located. All the above concludes that the Application Site is suitable for data centre development to meet surging demand and to facilitate Hong Kong's growth as a digital city.

#### 1.7 PROPOSED DATA CENTRE APPLICATION

The development parameters for the proposed data centre under this application have been derived from a detailed architectural feasibility study with technical specifications provided by



the Office of the Government Chief Information Officer (2OGCIO) for a typical state-of-the art high tier data centre demanded by the market while taking into consideration the site characteristics and any prevailing standards and requirements applicable to the site and proposed use.

The Site is a readily available vacant land for development and it is not reserved for any STW or G/IC development and would not adversely affect the provision of G/IC facilities in the district on a long-term basis. Subject to the rezoning approval of the TPB, the application site will be available for open bidding for data centre use in late 2015/ early 2016. While the high-tier data centre to be developed on the site will be subjected to the detailed design of the successful bidder of the site, the development parameters and impacts of the proposed data centre on the surrounding areas shall not exceed those presented in this statement to facilitate the rezoning and amendment to the approved TKO Outline Zoning Plan No. S/TKO/20. Relevant approval conditions may be imposed by the TPB to ensure that the data centre will be developed to the satisfaction of relevant departments such as the maintenance of the existing open channel of about 1,150 m² to the east of the Site and the construction and maintenance of the proposed shared access of about 1200 m² for Site 2 and Site 3. About 400 m² of the proposed shared access road fall within Site 3 boundary.

#### 1.8 STRUCTURE OF THE SUPPLEMENTARY PLANNING STATEMENT

This Supporting Planning Statement is to provide members of the TPB with the relevant information in support of the rezoning and OZP amendment and is divided into the following sections:

- Section 2: The Application Site and its Surrounding Context
- Section 3: Summary of Findings of the Technical Assessments
- Section 4: Planning Justifications in Support of The Rezoning Planning Application

<sup>2</sup> Functions of OGCIO under the Digital 21 Strategy. To spearhead the development of Hong Kong as a knowledge-based society and Asia's leading digital city.



#### 2. THE APPLICATION SITE AND ITS SURROUNDING CONTEXT

#### 2.1 THE APPLICATION SITE

#### Location and Proposed Rezoning Amendments

The Application Site (the Site), with an area of about **12,400** m², is located along Wan Po Road to the immediate north of Site 1 and Site 2 in Area 85, TKO. Please refer to **Figure 2.1** for the location and boundary of the Site. At present, the Site is being occupied by the Drainage Services Department, an area of about **10,900m²** is zoned "Other Specified Uses" annotated "Sewage Treatment Works ("OU(STW)") and a small portion of about 1,500 m² to the east of the Site is zoned "Government, Institution or Community (9)" ("G/IC(9)") on the approved TKO Outline Zoning Plan No. S/TKO/20. It is the government intention to create a Data Centre hub in TKO Area 85 for comprehensive high-tier data centre development. The rezoning is intended to facilitate appropriate planning control over the development mix, plot ratio, scale, height, design and layout of development, taking account of various environmental, traffic, infrastructure and other considerations.

Please refer to **Figure 2.2** for the proposed rezoning amendment for the approved Tseung Kwan O OZP No. S/TKO/20.

#### 2.2 CURRENT LAND STATUS, TOPOGRAPHY AND ACCESS

#### **Current Land Status and Topography**

The Site is currently vacant. It is relatively flat with no buildings or structures. It is confirmed that the Site is a redevelopment site as a lagoon structure was built and demolished in 2009. The spot height of the eastern part of the site is 5.5mPD, which is approximately 0.3m lower than the western side and about 0.1m below the level of Wan Po Road. A section of an existing open channel is located at the eastern part of the Site. Please refer to **Figure 2.1** for more details.

#### Access to the Application Site

Access to the Site is via Wan Po Road (**Figure 2.3**). The Site is well served by public transport facilities including franchised buses (298E Hang Hau MTR Sation <-> Tseung Kwan O Industrial Estate; 797M Tseung Kwan O MTR Station <-> Tseung Kwan O Industrial Estate; 796X/ 796P LOHAS Park MTR Station <-> Tsim Sha Tsui East; 98D/ 98S Mei Foo <-> LOHAS Park), minibuses (112M/ 112S LOHAS Park MTR Station <-> Tseung Kwan O Industrial Estate), and taxis. In addition, an MTR Station, the LOHAS Park Station, is located in Area 86, which is within a 1km walking distance from the Site.

#### 2.3 SURROUNDING LAND USES

The Site is located in TKO abutting the mountain backdrop to the east of Ha Yeung Shan. A Tseung Kwan O Preliminary Treatment Works (TKOPTW) is located to the immediate north of the Application Site. TKOPTW is currently operated by the Drainage Services Department. A cluster of residential developments is located in the vicinity of the Application Site with the closest block of La Splendeur (LOHAS Park) located 50m away from the proposed development at the Site. The Beaumont and the two proposed residential developments covered by planning applications nos. A/TKO/59 and A/TKO/87 are located to the north of the Site in which these sites were previously under a rezoning application (Application No. K/TKO/P3) from "Industrial" to "Residential (Group E)" uses that was approved by the Rural and New Town Planning Committee of the TPB on 10.9.1999. Please refer to Figure 2.4 for the location of the approved applications and the existing developments in the vicinity of the application site.



A comprehensive commercial and residential development, the LOHAS Park, is located to the west of the Site (Figure 2.5 VP2). The residential blocks are located on podium level. Phases 1 and 2 are situated near Wan Po Road and the majority of them are completed. Phase 3 is located at the north of the comprehensive development area. Among the residential blocks in the LOHAS Park, La Splendeur is located in the closest proximity to the Site with 50m apart from each other while Le Prestige and Le Prime are located further east and The Capital located in the northeast of the Site.

Given that the data centre is subsumed under "Information Technology and Telecommunication Industries" according to the Town Planning Board's Definitions of Terms and no impacts from air ventilation, environmental, drainage, sewerage, water supply, and traffic perspectives are envisaged as demonstrated on the technical assessments, it is not likely that the proposed data centre would create I/R interface problem. The proposed development is considered compatible with the adjacent residential developments in this regard.

Site 2 is a "G/IC(9)" zone with a maximum building height of 60mPD located in the immediate south of the Site, the area is planned for Data Centre development and it is currently occupied by a temporary uses including a public car park and some recycling uses. Site 1 located at the south of the Site is a "G/IC(9)" zone with a maximum building height of 60mPD in which a proposed Information Technology and Telecommunications Industries (Data Centre) development (Application No. A/TKO/93) was approved under the Rural and New Town Planning Committee of the TPB on 19.10.2012.

In the further south of the Site, the area is reserved for the relocation of the Radio Television Hong Kong (RTHK) broadcasting house and is currently vacant. The building height of the proposed data centre would be kept under 60mPD which would be in conformity to the adjacent "GIC(9)" zone. With regards that the HKCOLO Data Centre is also located in the vicinity of the Site, the proposed data centre development is compatible with the surrounding Information Technology and Telecommunications Industries uses. In addition, the Tseung Kwan O Industrial Estate is located further south from the Site (Figure 2.4) in which the Industrial Estate is mainly for clean industrial uses with some media technology industrial uses, such as Sing Tao Daily, Next Media and Next Media Apple Daily. The proposed data centre development is compatible with the industrial use in the vicinity of the Site.

According to the approved the OZP, the area located to the east of the Site is zoned "Green Belt" (Figure 2.5 VP5) and an area to the southeast is zoned "Open Space". The Clear Water Bay Country Park is located further east to the Site. However, the proposed development would not encroach into the boundary of the Green Belt zone and thus would not create any adverse impacts on the Green Belt zone as well as the amenity of the Open Space and the Clear Water Bay Country Park areas.

The proposed high-tier data centre is considered compatible with the surrounding development with an undesignated G/IC use to its immediate south and a recent approved Data Centre development to further south in Site 1 (A/TKO/93). An area reserved for the relocation of RTHK broadcasting house to further south. To the west across Wan Po Road, a residential development complex namely LOHAS Park Phase 1, Phase 2 and Phase 3 with a CDA development to its further west under application A/TKO86-4. To the immediate north lies an un-operated sewage treatment plant and several residential developments to further north. To the east lies the open channel and the restored TKO Stages II and III Landfill which the proposed data centre will neither be susceptible to nor a source of environmental nuisance. The location of the Site at the periphery of the industrial area and adjacent to an existing sewage treatment plants avoids sensitive interfaces.



#### 2.4 THE PROPOSED DATA CENTRE DEVELOPMENT

#### The Proposed Data Centre

The Site is reserved for high-tier data centre development. The Site is capable of meeting the unique and demanding site requirements of high-tier data centres, including sizeable site area with dual sources of power supply; superb telecommunications network connection; and minimal exposure to risks, such as flooding, neighbouring hazardous industries and natural disasters. It is also capable of accommodating stand-alone fuel tanks for emergency power generation, and required security features as well as very stringent floor loading, floor-to-ceiling height and power supply specifications.

#### 2.5 BUILDING DESIGN

The building design focuses on the compatibility with the surrounding development, therefore a maximum building height of 60mPD with not less than 50% of site coverage is proposed for the Application Site. The proposed data centre is an enclosed, centrally ventilated building for housing computer systems as defined in section 1.3. Due to the operation nature of the Data Centre, there will be no significant noise, air emission or any other pollution generated from the proposed development. It is envisaged the building design of the proposed high-tier data centre is able to ensure the environmental comfort of its end-users as well as no adverse impact for the surrounding sensitive receivers. In this regard, green areas can be provided on both ends of the Site to maximise available floor space on the lower floor for supporting facilities, roof top and vertical greening is also recommended for the proposed development as a one the visual mitigation measure. Parking can be provided in the basement to maximise available floor space for other supporting facilities on the ground floor. A 10m setback from southern boundary of the Site is recommended as a non-building area (NBA) for Air Ventilation purposes. (Refer to **Annex A, Figures 2.1 and 2.2** for the alignment and extent of the proposed NBA.)

An architectural technical feasibility study has been carried out to establish the basic development parameters of the proposed data centre. While maximising the development potential of the Site, due considerations have also been given to the special requirements of data centre uses, existing site conditions, green coverage requirement, the building height restrictions on the OZP, and other standard requirements in deriving the optimal development parameters.

In particular, the specific design elements and assumptions adopted for the proposed data centre include:

- 60mPD maximum building height;
- Not more than 50% site coverage;
- 20% green coverage with no less than 10% to be provided at grade;
- Carpark is put underground to allow flexibility in terms of layout;
- A 10m setback from southern boundary of the Application Site (Refer to Figures 2.1 and 2.2);
- Stand-alone fuel tanks for emergency power generation;
- 3m clearance from the existing open channel (Refer to **Annex A**) to ensure unrestricted access to the channel for repair and maintenance by the Drainage Services Department; and
- Emergency vehicular access surrounding the building.



Please refer to **Annex A** for the planning parameters and road plan which show a viable development scheme (hereinafter referred to as the "Indicative Scheme") for the proposed high-tier data centre on the Site. Whilst the final layout and design of high-tier data centre will be subject to detailed design, the basic development parameters for the proposed data centre are summarized as follows:

Site Area of the proposed high-tier data	Net Site Area about 10,836 m² (excluding		
centre on the Application Site for PR	nullah of about 1150 m² to the east and the proposed		
Canoniano.	shared road access of about 400 m² (refer to Annex A)		
Proposed Data Centre			
- Gross Floor Area (GFA)	About 50, 000 m <sup>2</sup>		
- Plot Ratio (PR)	About 4.5		
Site Coverage (SC)	Not More than 50%		
Building Height (BH)	Not more than 60 mPD (about 10 storeys including underground car parking and fuel tanks) ("G/IC (9)")		
Greening Coverage – According to PNAP 152	Not less than 20% (with not less than 10% at grade)		
Greening Requirement – Estimated 260 Workers to be employed			

There will be minor adjustments and refinements in the design and layout of the proposed scheme by the ultimate user of the Site. Future developments on the Site shall not exceed the development parameters as presented above and would not pose any additional adverse impacts on air ventilation, environmental, drainage, traffic and water supply beyond what have been identified, if any, under the technical assessments as detailed in Section 4.

The proposed design of the data centre has an aim to create a harmonious built environment that comply with all relevant guidelines, regulations and standards. These includes conformity with the principles set out in the OZP, the <sup>3</sup>HKPSG, the latest <sup>4</sup>AQO; the <sup>5</sup>PNAP 152, the <sup>6</sup>Building Ordinance Cap 132 (BD) and the <sup>7</sup>Building (Planning) Regulations (B(P)R) etc. These have been referred to as a tool to extract an optimal development arrangement on the application site and therefore it is considered the proposed development is compatible with the surrounding uses.

<sup>&</sup>lt;sup>3</sup> The Hong Kong Planning Standards and Guidelines (HKPSG) the Urban Design Guidelines (UDG), Practice Note for Authorised Person (PNAP)

<sup>&</sup>lt;sup>4</sup> The Air Pollution Control Ordinance (Cap. 311) sets out Air Quality Objectives (AQOs) in 2014 and provides for the periodic review of the AQO sat least once every five years with a view to promoting the conservation and best use of air in the public interest.

<sup>&</sup>lt;sup>5</sup> The Practice Note for Authorized Persons 152. This practice note promulgates guidelines on building design which will enhance the quality and sustainability of the built environment in Hong Kong.

<sup>&</sup>lt;sup>6</sup> To provide for the planning, design and construction of buildings and associated works; to make provision for the rendering safe of dangerous buildings and land; to make provision for regular inspections of buildings and the associated repairs to prevent the buildings from becoming unsafe; and to make provision for matters connected therewith.

<sup>&</sup>lt;sup>7</sup> Code Of Practice For The Provision Of Means Of Access For Firefighting And Rescue Purposes. Fire safety in a building is determined by a number of factors one of which is the means of access to it to enable firefighting personnel to effect rescue and fight fire. Requirements for means of access to buildings are laid down in regulations 41A, 41B, 41C and 41D of the Building (Planning) Regulations (B(P)R).



#### 2.6 LANDSCAPE DESIGN

The landscape design for the proposed data centre is also subject to the detailed design by the future developer.

As shown on **Figures 2.6, 2.7, 2.8, 2.9 and 2.10**, around 80 nos. of trees (TG1) identified on site are recommended to be retained with only about 20 nos. of existing trees (T1-T20) in fair or poor conditions are identified on site and will be recommended to be fell.

Compensatory planting may be carried out on both the eastern and western ends of the Application Site (Figure 2.15 and Figure 2.16). The average height of these trees will be from 4.25m to 4.5m. Planting of a mixture of flowering tree species like Elaeocarpus hainanensis, Plumeria Rubra Var. acutifolia, and native trees like Macaranga Tanarius, and shrubs found in the residential areas like Alocasia odora, Pittosporum tobira and Rhapis excelsa. Flowering shrubs like Lagerstroemia indica and shrubs that can be trim into geometric form like Murraya paniculata, on all surrounding. These flowering trees will be planted along the site boundary which is facing the residential area to provide a vibrant colour simulation during flowering season and dense screen to the neighbouring sites. The provision of landscaping on the Application Site will help enhance the streetscape of Wan Po Road and will also provide a high quality working environment. The roof garden on the 8th floor in the data centre will serve as a common area for staff to gather during lunch or office events. To reduce the amount of soil use and loading on the roof garden, succulent, climbers, groundcover and shrubs plants will be used in the of the roof garden to create maximum visibility from all angles on the roof. Shading will be provided within the roof garden by means of a canopy. (Refer to Figure 2.15) for the proposed Landscape Design.)

The design concept was to take advantage of the geometric square and rectangular form inspired from the architecture of the data centre and translating it into the landscape of its surrounding from the roof garden to the ground level so they would have a similar design language.

To accommodate the entrance and surrounding, a carefully selected palette of shrubs and trees will be planted outside the buildings. The result is a building will integrate in alongside with some nearby residential and surrounding landscape. It is recommended that a tree preservation clause and landscaping clause to be stipulated in the land lease to govern its greening implementation under the lease conditions.

#### 2.7 ACCESS ARRANGEMENT AND VEHICLE PARKING PROVISION

In order to minimise the number of ingress/ egress points along Wan Po Road, a local access road with shared access arrangement is proposed to serve both the development in Site 2 and Site 3. The proposed shared access is via Wan Po Road to the west of the Application Site and appropriate lane markings will be provided in the centre of the turnaround to guide vehicles turning at the turnaround facility. (Refer **Figure 2.3** for the proposed access arrangements and lane marking on the hatched areas). The number of parking and pick-up/drop-off for private cars and motor-cycles are provided in accordance with the requirements as stipulated in the Hong Kong Planning Standard and Guidelines (HKPSG). As there is no parking and loading/unloading guidelines for goods vehicle under HKPSG for Data Centre land use, the goods vehicle parking and loading/ unloading provisions follow and accord with the "Studying Requirements of Goods Vehicle Parking and Loading/Unloading for Data Centres in Hong Kong (ref: N98/DE8/2011)"commissioned by OGCIO which correspond to the standards for Data Centre by Transport Department (4 May 2012). Underground parking for



private car, motorcycles as well as light goods vehicles are proposed, while those for medium/heavy goods vehicles are placed on the ground level.

The number of parking spaces to be provided on site are is as follows: (Refer to **Annex B** for TIA Report)

Proposed Car Parking Space for Site 3 (the Site)	No. of Space Required and Provided
Private Car Parking Spaces	67
Motorcycle Parking Spaces	7
Light Goods Vehicle Parking Spaces	4
Light Goods Vehicle Loading/Unloading Bays	5
Medium/ Heavy Goods Vehicle Parking Spaces	1
Medium/ Heavy Goods Vehicle Loading/Unloading Bays	3

#### 2.8 POWER SUPPLY TO THE PROPOSED DATA CENTRE

The proposed data centre will be designed to provide fail-proof and non-stop operations in a secured manner. High tier data centres require all computer hardware with dual power inputs with back-up and resilience facilities that are equipped to eliminate the risk of disruption to the operations. The proposed data centre will be connected to the existing power supply network. CLP has confirmed in June 2012 that a new substation will be built by 2014 to cope with the surging power demand by data centres in TKO IE and the surrounding areas including the subject site. It is expected that the proposed data centre will not cause adverse impacts to the existing system.

All of the above planning and design principles were taken into account in the formulation of the proposed development Scheme. (Refer to Appendix A for the Indicative Architectural Drawings for the Proposed Data Centre). They served to dictate the proposed access locations, disposition and height of buildings, quantum of development and land use compatibility etc.



#### 3. TECHNICAL ASSESSMENTS ON THE PROPOSED DATA CENTRE DEVELOPMENT

#### 3.1 INTRODUCTION

Assuming that the Site will be developed to its maximum as a high-tier data centre with all the necessary supporting facilities. Technical assessments have been carried out to examine the potential impacts of the proposed data centre on the surrounding areas in terms of air ventilation, environmental, drainage, traffic and water supply. Relevant legislation, standards and guidelines are followed when carrying out the impact assessments. The findings are presented in **Annexes B to G** and summarised below for easy reference.

#### 3.2 AIR VENTILATION ASSESSMENT

Under the design objective of providing a compatible design with minimal impacts to the surrounding area, a 60m PD height restriction with no more than 50% site coverage are proposed for the Application Site for mitigation purposes. A 10m non-building area (NBA) from southern boundary of the Application Site is recommended for Air Ventilation purposes. (Refer to **Annex A, Figures 2.1 and 2.2** for the alignment and extent of the proposed NBA.) Moreover, an Expert Evaluation (EE) was carried out based on the Indicative Scheme to evaluate qualitatively the potential air ventilation impact of the proposed data centre on the area, to identify any potential air ventilation problem and to recommend measures to mitigate against any adverse impacts on the wind environment in the surrounding area.

Weather data from both the Hong Kong Observatory and MM5 has been reviewed in order to understand the wind environment of the study area. Findings of the AVA show that the proposed bulk of the data centre will not adversely affect the wind dispersion to the surrounding environment and there will be no adverse air ventilation impact associated with the proposed data centre. Please refer to **Annex F** for details of the AVA.

#### 3.3 ENVIRONMENTAL ASSESSMENT

Various environmental assessments were carried out, including noise, air quality and landfill gas. Please refer to **Annex E** for details of the environmental assessment, which are also summarised below:

#### 3.4 NOISE

The nearest Noise Sensitive Receivers (NSRs) within 300m of the Application Site are identified (Refer to **Figure 2** under **Annex E**) and La Splendeur of LOHAS Park is the closest NSR in the closest proximity to the Application Site with 50m. The noise impact generated during the construction and operational phases of the proposed data centre are studied and evaluated under this application.

The major construction activities involved in the proposed data centre will include foundation, superstructure works, drilling and excavation. With the implementation of the mitigation measures recommended, adverse construction noise impact is not anticipated.

Potential noisy equipment will include the back-up generator, transformers and chillers/radiators. The back-up generators will be used for emergency electricity supply once there is power outage. The electricity supply in Hong Kong is stable and reliable. Frequent and prolonged use of the back-up generators is not anticipated. Moreover, these equipment will be fully enclosed within the building with concrete wall and proper acoustics design (e.g. use of acoustics louvre and adoption of silencer). Therefore, no insurmountable fixed noise impact on the surrounding NSRs is anticipated.



#### 3.5 AIR QUALITY

Representative Air Sensitive Receivers (ASRs) within 500m of the Application Site are identified (refer to **Annex E Figures 2 and 3**). Same as Noise Impact Assessment, impacts during the construction and operational phases were assessed.

As suggested in the assessment, relevant mitigation measures recommended in the Air Pollution Control (Construction Dust) Regulation will be adopted to minimise the impact on the ASRs during the construction phase. Air quality on the ASRs during the construction phase of the proposed development is considered acceptable. Since fresh air intakes for the proposed development are away from the vehicular emissions from Wan Po Road and installation/operation of back-up generators will follow relevant Government requirements and legislation, it is anticipated that there will be no adverse air quality impact on and from the proposed development during the operation phase.

The operation nature of data centre with IT equipment and plant uses only has no odour sources. The offsite odour emission sources identified within the vicinity of the Application Sites are the existing TKO Preliminary Treatment Works, existing South East New Territories (SENT) Landfill and planned SENT Landfill Extension. TKO Preliminary Treatment Work is equipped with adequate odour mitigation measures. Assessment results have demonstrated that the predicted odour level at the proposed data centre comply with the relevant HKPSG standard, and the occupants of the proposed data centre would not be subject to unacceptable odour impact. The existing SENT Landfill will be closed when the proposed data centre is in operation. [please confirm this is the case] Should there be any extension of landfill site, for the South East New Territories (SENT) Landfill Extension (AEIAR-117/2008), according to the approved EIA report, the odour level will still be within the statutory limits. Hence, it is anticipated that there will be no adverse odour impact from the identified odour emission sources on the proposed data centre during operational phase.

#### 3.6 LANDFILL GAS

A landfill gas hazard assessment is carried out as the application site falls within the 250m Consultation Zone of the TKO Stage II/III Landfill. With reference to the Environmental Protection Department's guidance notes, structures/rooms on the basement and ground floors of the building are generally identified as targets of landfill gas hazards. Although high level of risk is predicted during construction phase and operation phase, with the implementation of the recommended protection measures as detailed in the environmental assessment report, no adverse impacts on the proposed data centre are anticipated during both the construction and operation phase. A detailed landfill gas hazard assessment report will need to be submitted for EPD approval during the detailed design stage of the proposed development.

#### 3.7 WATER SUPPLY

A Water Supply Impact Assessment (WSIA) has been conducted to determine the water demand supply of the proposed data centre. As indicated in the WSIA, the preliminary estimate of fresh water and salt water requirements for the proposed data centre are about 262m3/day and 14m3/day respectively.

The proposed data centre falls within the supply zone of TKO East Low Level Fresh Water Services Reservoir and it is anticipated that the TKO East Low Level Fresh Water Services Reservoir could meet the required fresh water needs of the proposed data centre. With reference to the existing Waterworks Record Plans and subject to agreement with Water Supplies Department (WSD), fresh water and salt water mains can be connected to the site. A



minor local realignment is likely to be required. Please refer to **Annex D** for details of the WSIA.

#### 3.8 SEWERAGE

An Environment Impact Assessment (EIA) Sewerage Impact Assessment (SIA) has been conducted to evaluate the possible impacts of the proposed data centre on the local sewerage network. The major source of sewage generation from the proposed data centre will be the employees working inside the proposed data centre. The SIA indicates that the peak flow arising from the proposed data centre is about 0.07% to 0.63% 0.1% of the capacity of the existing public server along Wan Po Road. Due to the minimal increase in flow, no significant sewerage impact arising from the proposed data centre on the existing sewerage system is anticipated. Please refer to **Annex E** for details of the EIA SIA.

#### 3.9 DRAINAGE

The capacities of the existing drains have been calculated to evaluate the impact of the proposed data centre on the existing stormwater drainage network. Since the Application Site is already paved and the catchment characteristics of the Application Site will be maintained, it is estimated that there will be no increase in stormwater runoff as a result of the proposed data centre and no adverse drainage impact as a result of the proposed development. A preliminary drainage proposal has been formulated to ensure that all runoff from the Site will be collected and conveyed to an adjacent open channel. Please refer to **Annex C** for details of the drainage proposal.

#### 3.10 TRAFFIC

A Traffic Impact Assessment (TIA) has been conducted to assess the existing traffic conditions in the vicinity of the Application Site as well as the traffic impact due to the proposed data centre. Year 2021 has been adopted for traffic capacity assessment. It is estimated that the trip generation/attraction to the Application Site at AM and PM peaks are 43/83 and 87/29 (unit: pcu/hr) respectively. It is anticipated that about 260 workers will be employed within the Application Site Data Centre Development.

Based on the results of the TIA, it is concluded that the traffic impact generated by the proposed data centre is minimal and the proposed development will not lead to traffic issues on the adjacent road network. Please refer to **Annex B** for details of the TIA.

#### 3.11 VISUAL

The Application Site is located at the toe of the restored green slope under "O". In respect to the backdrop of the slope and surrounding development, a maximum of 60mPD height is proposed for the Application Site to minimise visual impact to surrounding development. The proposed height limit of maximum of 60mPD should be provided is considered comparable to the proposed Data centre and industrial development to the south of the Application Site along the same back drop. A Visual Impact Assessment has carried out this this assignment and the methodology for deriving the magnitude of change upon the Public Viewer's and the significance of the visual impacts is described in **Sections 1.6 and 1.9** under **Annex G**.

VP1: Viewpoint from the Open Space at Wan Po Road: The presence of the proposed development would result in an Intermediate magnitude of change to the views experienced by the key sensitive public receivers at the Open Space at Wan Po Road, which, when taken



together with the High sensitivity of these receivers, will result in a visual impact significance considered Moderately Adverse.

**VP2:** Viewpoint from the Podium of Le Prestige: The presence of the proposed development would result in an Intermediate magnitude of change to the views experienced by the key sensitive public receivers at the Podium of Le Prestige, which, when taken together with the High sensitivity of these receivers, will result in a visual impact significance considered Moderately Adverse.

#### VP3: Viewpoint from High Junk peak

The presence of the proposed development would result in a Negligible magnitude of change to the views experienced by the key sensitive public receivers at High Junk Peak, which, when taken together with the High sensitivity of these receivers, will result in a visual impact significance considered Insubstantial. Vertical greening and a 10m NBA to the south of the Application Site as visual mitigation measures would significantly reduce impact to the surrounding development.

#### 3.12 SUMMARY

Based on the technical assessments carried out, it is concluded that the proposed data centre will not pose any significant adverse impacts on the surrounding areas from air ventilation, environmental, drainage, sewerage, visual, water supply, and traffic perspectives.



## 4. PLANNING JUSTIFICATIONS IN SUPPORT OF THE REZONNING PLANNING APPLICATION

#### 4.1 CURRENT ZONING NO LONGER RELEVANT

Although the majority of the Application Site (about 10,900m²) is being occupied by the Drainage Services Department zoned "Other Specified Uses" annotated "Sewage Treatment Works ("OU(STW)"), this area was originally reserved for future expansion of the existing Sewage Treatment Plan. The expansion plan was then terminated due to introduction of the 8Harbour Area Treatment Scheme Stage 1 deep tunnel conveyance system. Therefore, the area is no longer required for sewage treatment use and the Government has given police support to earmark the Site for sale for data centre development. The subject site use is considered compatible with the surrounding development.

The remaining area of approximately 1,500m² to the west of the Application Site is zoned "Government, Institution or Community (9)" ("G/IC(9)") and is "intended primarily for the provision of Government, institution or community facilities serving the needs of the local residents and/or a wider district, region or the territory. It is stated in the Explanatory Statement of the OZP that due to proximity of this sub-area (the "G/IC(9)"zone) to the areas for broadcasting, innovation and technology industries in TKO, information technology and telecommunications related uses may be permitted in this sub-area upon application to the Board. It is proposed to combine this small piece of "G/IC(9)" land together with the "OU(STW)" land to the east and rezone it together to an appropriate zone to be advised by PlanD to ensure Data Centre Development will not be out bided by other uses.

Hence, the proposed data centre is proposed to be rezoned from the existing zoning of ("OU(STW)") and ("G/IC(9)") to an appropriate zoning to be advised by PlanD.

#### 4.2 PROPOSED "OU (DATA CENTRE)" ZONE WITH MAXIMUM HEIGHT OF 60MPD

The proposed data centre, which requires a clean environment, will not be a source of environmental nuisance with no odour or noise sources. It is considered compatible with the surrounding residential and GIC uses, including LOHAS Park to its west and a reserved Site 2 for data centre development to its immediate south with the approved Data Centre Development in Site 1, the undesignated G/IC uses to its north and the TKO IE in its vicinity. (Refer to Figure 2.1) The adoption of 20% green coverage on the Application Site will also be able to soften the building bulk and enhance the townscape. (Refer Figures 2.14 and Annex A for the proposed design and greening coverage calculation)

<sup>&</sup>lt;sup>8</sup> Harbour Area Treatment Scheme (HATS) is a major Government infrastructure project in Hong Kong. It is being implemented in stages to combat water pollution caused by urban development around Victoria Harbour. HATS Stage 1 was commissioned in December 2001 providing treatment to about 75% of sewage from urban areas around the harbour, significantly improving water quality to the eastern and central parts of our harbour. HATS Stage 2 will be implemented in two phases, Stage 2A and Stage 2B. Stage 2A will provide treatment to the remaining 25% of sewage from the northern and south western parts of Hong Kong Island.



### 4.3 WILL NOT CAUSE SIGNIFICANT ADVERSE VISUAL IMPACT TO ITS SURROUNDING USES

Through imposing a maximum building height of 60mPD with no more than 50% site coverage for the Application Site, it can be ensured that the future development will be similar in scale as the future development in the adjoining GIC(9) zone stipulated on the OZP. The Key Public Viewers from the Open Space at Wan Po Road and from the podium of Le Prestige (50m away from the Proposed Development) would likely encounter visual impacts of Moderate significance and experience unobstructed sightlines of the proposed development and the obstruction of the existing mountainous backdrop. The views from High Junk Peak would likely experience visual impacts of Insubstantial Significance as a large portion of the proposed development is obstructed by the existing natural hillside. (Refer **Figures 2.12-2.14**)

Overall, the visual impact significance of the proposed development would be considered Moderately Adverse. Proposed visual mitigation measures, such as provision green roofs, vertical greening and a 10m NBA to the south of the Application Site would reduce impact to the surrounding development. A summary of degree of impacts to key public viewing points is provided in the attached VIA report under **Annex G**.

#### 4.4 WILL NOT CAUSE ADVERSE TRAFFIC IMPACTS

A TIA was carried out to assess the traffic implications of the proposed data centre on the surrounding road network to ensure that there will not be any adverse traffic impact.

Based on the results of the TIA, it is concluded that the traffic impact generated by the proposed data centre is minimal and the proposed development will not impose traffic issues on the adjacent road network. (Refer **Annex B** for TIA report)

#### 4.5 WILL NOT BE SUSCEPTIBLE TO OR CAUSE ADVERSE ENVIRONMENTAL IMPACTS

As stated in Section 3.3, an Environmental Assessment was carried out to assess the noise, air quality and landfill gas impacts of the proposed data centre.

Based on the results of the Environmental Assessment, it is concluded that the proposed data centre will not generate adverse noise and air quality impacts on the neighbouring sensitive receivers. With the implementation of the proposed mitigation measures, the landfill gas hazard on the proposed data centre is considered acceptable. (Refer **Annex E** for EIA report)

#### 4.6 WILL NOT CAUSE ADVERSE AIR VENTILATION IMPACTS

Since the development parameters of the proposed data centre has taken into account air ventilation impact, amongst others, the findings of the AVA, as stated in Section 3.2, conclude that adverse air ventilation impact is not anticipated. (Refer **Annex F** for AVA report)



#### 4.7 WILL NOT CAUSE ADVERSE DRAINAGE IMPACTS

As described in Section 3.9, there will be no increase in stormwater runoff. With the implementation of the drainage proposal, no adverse drainage impacts will arise as a result of the proposed development. (Refer **Annex C** for DIA report)

#### 4.8 WILL NOT CAUSE ADVERSE WATER IMPACTS

As stated in Section 3.7, a WSIA has been conducted to determine the water requirements of the proposed data centre. It is stated in the WSIA that adequate water mains to serve the need arising from the data centre, as well as firefighting purposes, are available, as well as adequate Service Reservoir capacity. (Refer **Annex D** for WIA report)

#### 4.9 WILL NOT CAUSE ADVERSE SEWERAGE IMPACTS

As stated in Section 3.8, a EIA has been conducted to evaluate the possible impacts of the proposed data centre on the local sewerage network. It is stated that no significant sewerage impact arising from the proposed data centre on the existing sewerage system is anticipated. (Refer **Annex D** for SIA report)

#### 4.10 CONCLUSION

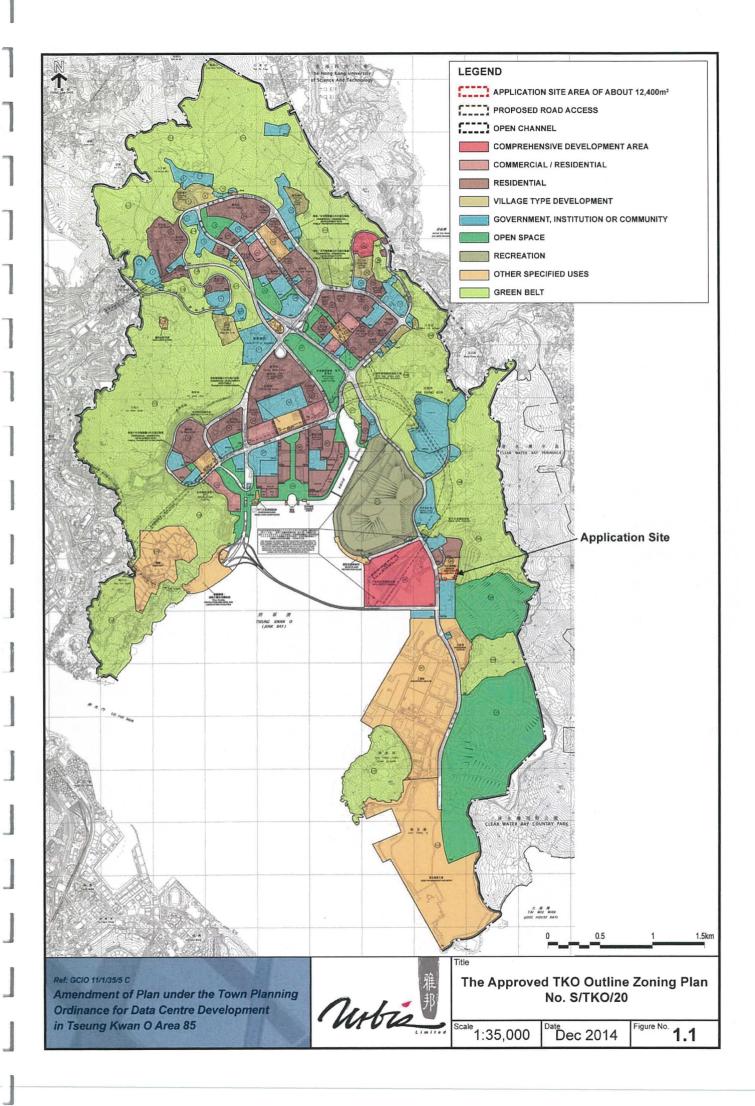
As demonstrated in the earlier sections, the intensity of a data centre development within the Application Site is compatible with the land uses in the surrounding areas and the approval of the application will not set an undesirable precedent. The proposed rezoning is premised on the basis of the preliminary assessments for the Application Site, the proposed land use does not have any adverse impact. The rezoning is intended to facilitate appropriate planning control over the development scale, design and layout of development, taking account of various planning, environmental, traffic, infrastructure and other considerations.

The future project proponent of the Application Site will be responsible for the maintenance and construction of the site formation works, construction and maintenance and management of the proposed shared access road and maintenance of the open channel. These planning conditions will be under an entrusted work arrangement to be included under the lease condition.

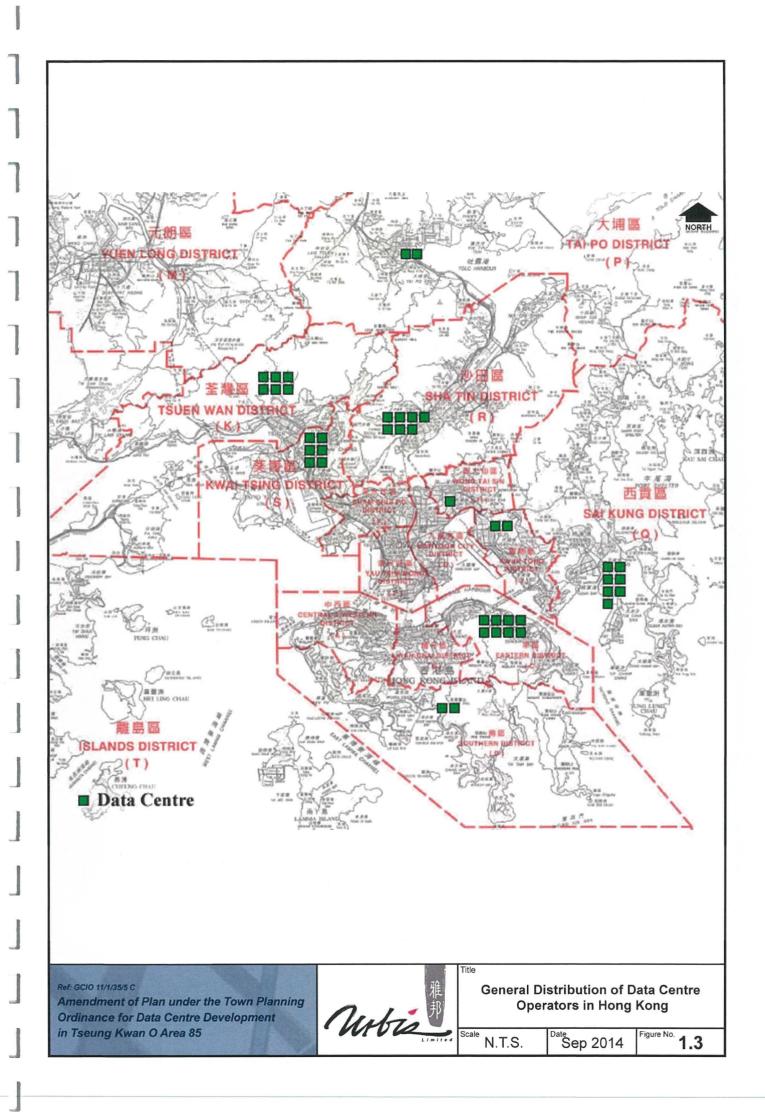
#### 4.11 DECISION SOUGHT

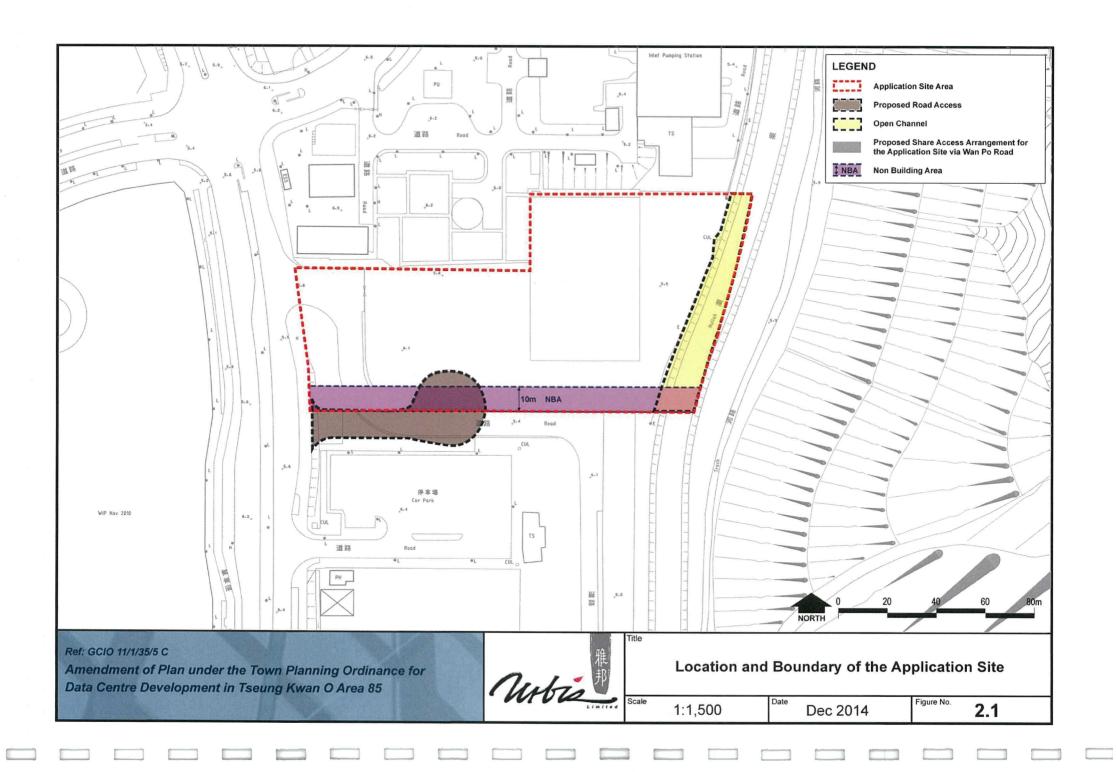
The Committee is invited to consider the Application Site and decide whether to agree, partially agree, or not agree to the rezoning application. Preparation for the disposal of the Site(s) is recommended to be undertaken in parallel with the processing of the relevant town planning procedures, including the proposed land use zoning amendments to the OZP.

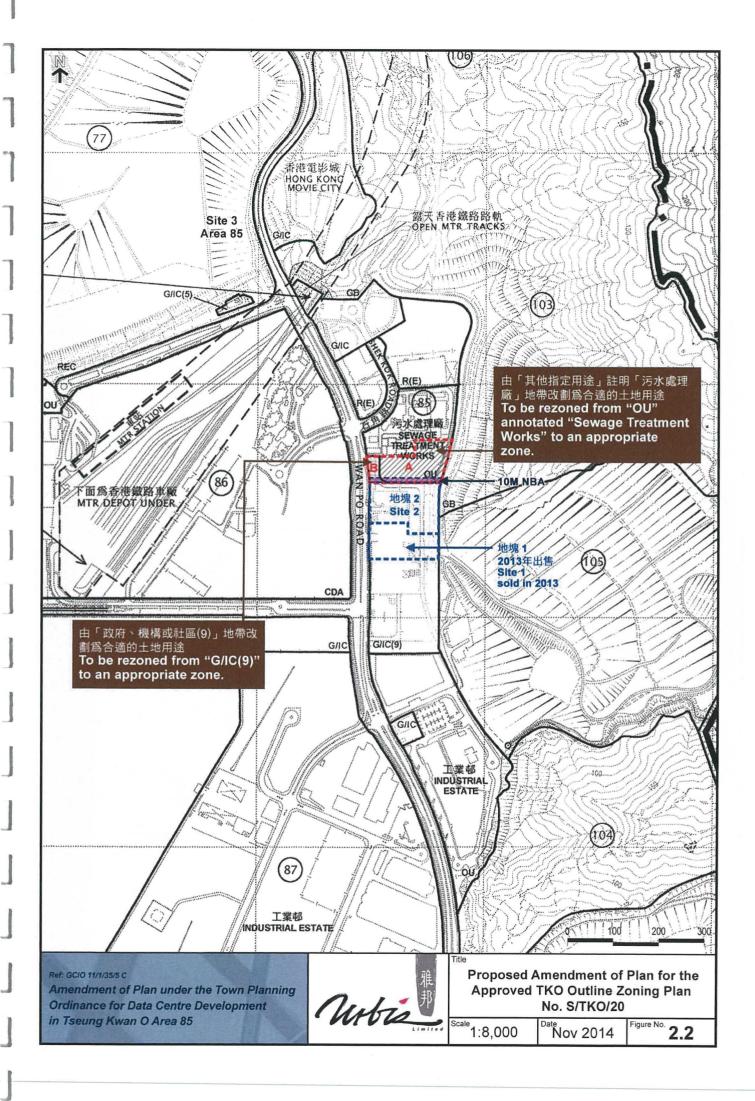
Should the Committee decide not to agree or to partly agree to the rezoning application, Members are invited to advise what reason(s) for the decision should be given to OGCIO.

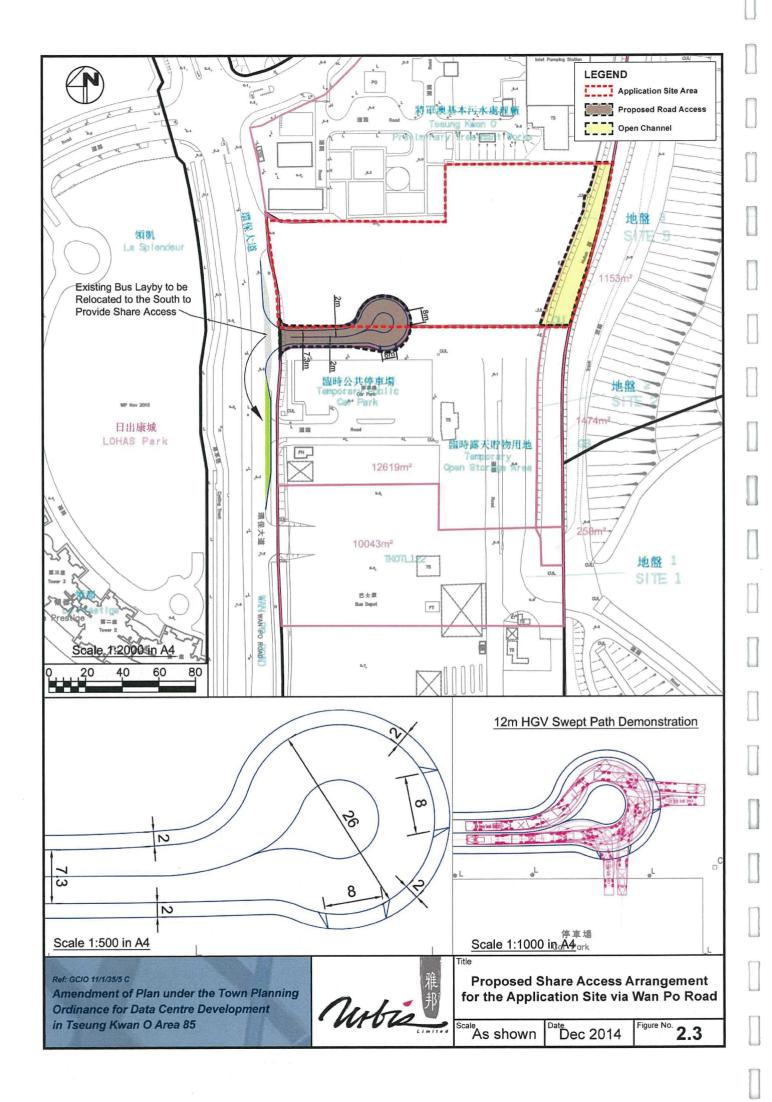


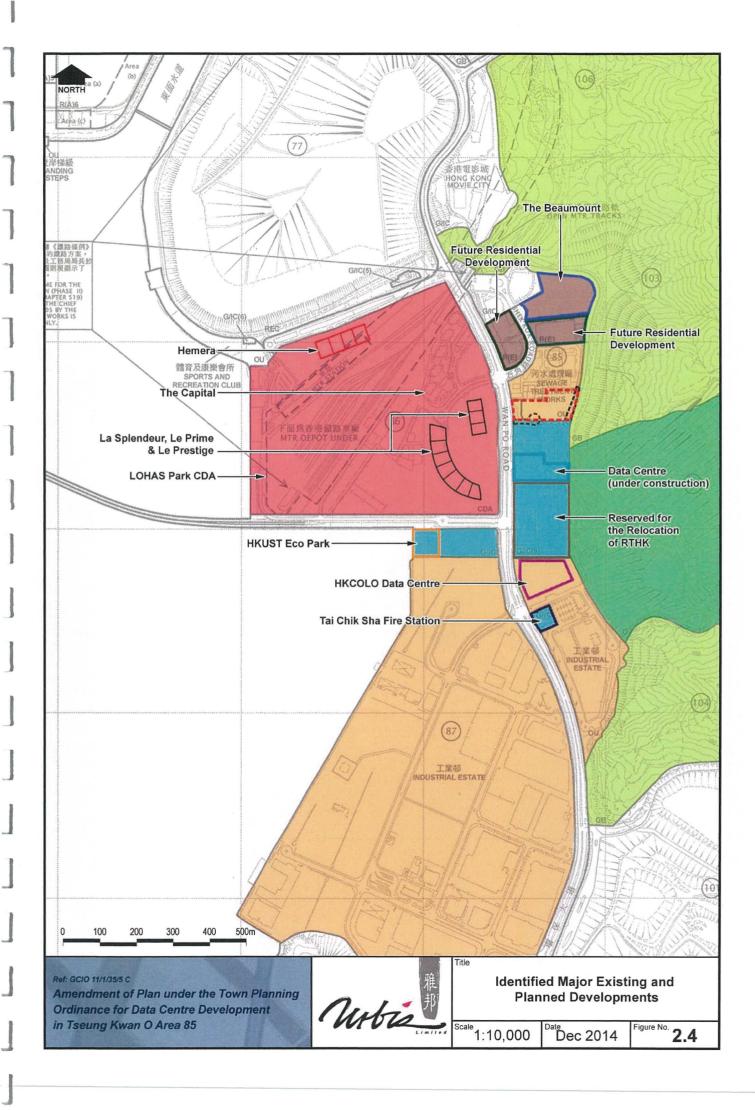


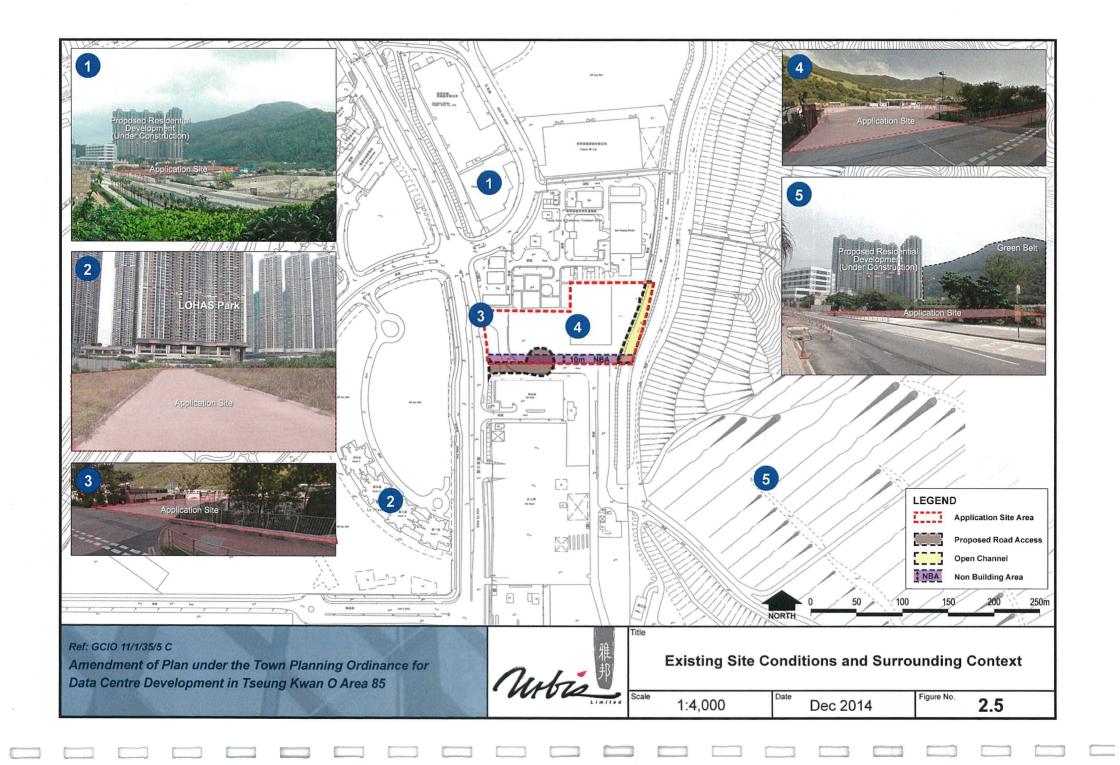


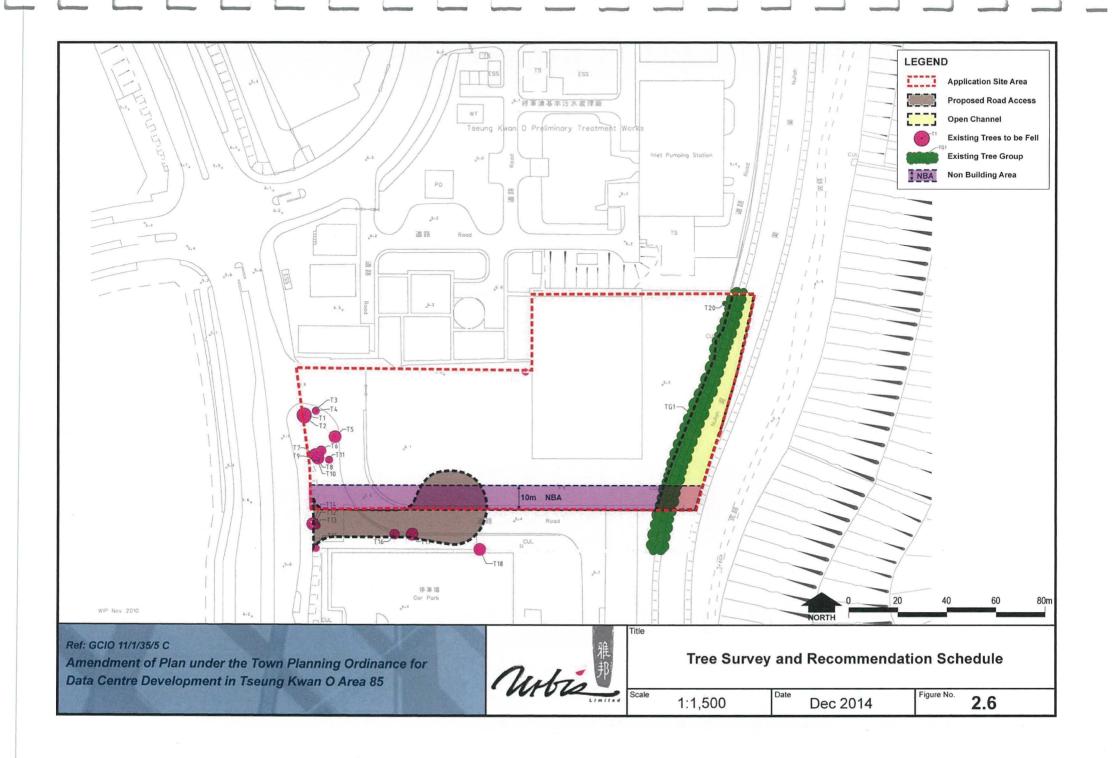














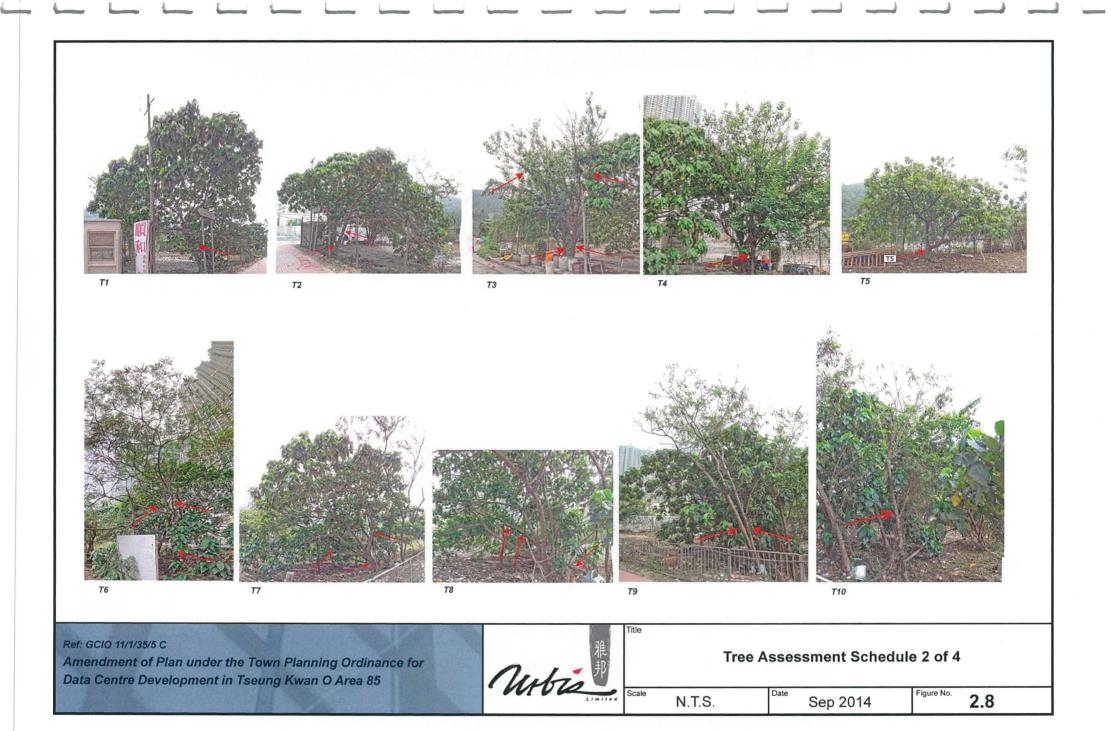
Ref: GCIO 11/1/35/5 C

Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85



Tree Assessment Schedule 1 of 4

N.T.S. Date Sep 2014 Figure No. 2.7



#### Tree Group Assessment Schedule

Project Title: Date of Tree Survey: Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85

4 Apr 2014

Surveyed by: Teresa Wong Wing Yee <ISA CA # HK-0532A>

Tree Group	Species			Approxima	ate		Measurement	5	Amenity value	Form	Health condition	Structural condition	Suitability for transplanting		Conservation	Recommendation
No.	Scientific name	Chinese name	Total nos. of trees	Nos. of trees	% in Group	height (m)	DBH (mm)	crown spread (m)	(good/fair/ poor)	(good/fair/ poor)	(good/fair/ poor)	(good/fair/ poor)	(high/medium/ low)	Remarks	status	(retain/ transplant/fell)
	Acacia confusa	台灣相思		6	10%	6-8	150-500	3-9	Fair	Fair	Fair	Fair	Low	- Growing on sloping bank along a nullah,	-	
	Leucaena leucocephala	銀合歡		45	75%	5-6	100-200	3-5	Poor	Poor - Fair	Poor - Fair	Fair	Low	closed to other trees, preparation of	-	
TG1	Macaranga tanarius var. tomemtosa	血桐	60	8	13%	4-5	100-200	3-5	Poor - Fair	Poor - Fair	Poor - Fair	Fair	Low	reasonable size rootball impractical - Species of undesirable tree or short life	-	Retain
	Sapium sebiferum	烏桕		1	2%	5	150	3	Fair	Fair	Fair	Fair	Low	span trees, not appropriate to be transplanted		



TG1

Ref: GCIO 11/1/35/5 C

Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85



Tree Assessment Schedule 3 of 4

N.T.S.

Sep 2014

Figure No.

#### Tree Assessment Schedule

Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85
4 Apr 2014 Surveyed by: Teresa Wong Wing Yee «ISA CA # HK-0532A» Project Title: Date of Tree Survey:

Tree No.	Species		1987	Measurement	S E CONTRACT	Amenity value	Form	Health condition	Structural		Suitability for transplanting	Conservation	Recommendation	Department to provide expert	
	Scientific same	Chinese mane	height (m)	DEH (mm)	crown spread (m)	(goodfairi poor)	(good/fair/ poor)	(good/fair/ poor)	(good/fain/ poor)	(high/medium/	Remarks	status	(retain/transplantfell)	advice to LandsD	
T1	Macaranga tanarius var. tomemtosa	血桐	50	160	60	Poor	Poor	Fair	Fair	Low	Short life span species, poor form	-	felt		Between concrete pavement & pedestrian path, slightly leaning, dead branches & stubs, bark cracks on frunk, closed to T2
T2	Macaranga tanarius var. tomentosa	血桐	40	170	5.0	Poor	Poor	Fair	Fair	Low	Short life span species, poor form		feli		2 frunks, between concrete pavement & pedestrian path, cavities o frunk, bent branches, bark cracks on trunk & root flare, dead branches & stubs, closed to T1
Т3	Morus alba	桑樹	50	170	2.0	Poor	Poor	Fair	Poor	Low	Short life span species, poor form & structure		fell		3 funks, between concrete pavement & foolpath, trunk diameter measured at 1.1m, multiple cracks & wounds on trunk & branches, dead branches, dead slubs, crossed branches, closed to T4, branc crossed with T4
T4	Morus alba	集樹	5.0	150	3.0	Poor	Poor	Fair	Poor	Low	Short life span species, poor form & structure	-	fell		3 frunks, between concrete pavement & footpath, multiple cracks & wounds on trunk & branches, dead stubs, closed to T3, branch crossed with T3
T5	Macaranga tanarius var. tomemtosa	血桐	4.0	160	5.0	Poor	Poor	Fair	Poor	Low	Short life span species, poor form & structure		fell		3 trunks, cavilies & wounds on trunk & branches, dead stubs, bark cracks on trunk & branches, cracks on branches
T6	Leucaena leucocephala	銀合数	50	100	4.0	Poor	Poor	Fair	Poor	Low	Undesirable tree species, poor form & structure		feli		Large wound on trunk base with dead wood exposed, wounds on branch & trunk, branch crossed with T8 with rubbing wound, bent trunk, unbalanced crown
T7	Macaranga tanarius var tomemtosa	血桐	40	190	5.0	Poor	Poor	Fair	Poor	Low	Short life span species, poor form & structure	18	feli		Multi-trunks, slightly leaning, wounds on exposed root & branches, watersprouts on trunk & branches, dead branches, broken branch
тө	Leucaena leucocephala	銀合歡	3.0	110	5.0	Poor	Poor	Fair	Poor	Low	Undesirable tree species, poor form & structure		fell		Seriously leaning, unbalanced crown, branch crossed with T6 with rubbing wound
T9	Leucaena leucocaphala	組合数	40	120	2.0	Poor	Poor	Far	Poor	Low	Undesirable tree species, poor form & shucture	-	fell		2 trunks of which one trunk dieback with borer holes, wounds on trunk, dead stubs
T10	Leucaena leucocephala	銀合數	40	100	20	Poor	Poor	Fair	Fair	Low	Undesirable tree species, poor form		feli		Wounds on trunk & branches, dead stubs, climber growing up on tree
T11	Morus alba	乘樹	3.0	130	3.0	Poor	Poor	Fair	Poor	Low	Short life span species, poor form & structure		fell		Multi-trunks, leaning, cracks & wounds on trunk, large cavity on trunk, dead stub with decaying wood, crossed branches, broken branches, covered by climber
T12	Leucsens leucocephals	銀合數	20	100	0.5	Poor	Poor	Poor	Poor	Low	Undesirable free species, poor form, health & shucture		fell		On slope, main trunk broken, leaving large forn wound on trunk, watersprouts regrow on trunk
T13	Leucaena leucocephala	級合歡	6.0	160	3.0	Poor	Poor	Fair	Poor	Low	Undesirable tree species, poor form & structure		fell		2 frunks, on slope, crossed branches, dead branches, dead slub, rope embedded in branch, closely grown frunks with included bark
T14	Macaranga tanarius var. tomemtosa	血桐	5.0	220	5.0	Poor	Poor	Fair	Fair	Low	Short life span species, poor form		fell		4 frunks, on slope, beside pedestrian path, topped frunks with watersprouts regrow, wounds on branches & frunk, dead stubs, crossed frunks
T15	Leucaena leucocephala	銀合数	40	100	3.0	Poor	Poor	Fair	Poor	Low	Undesirable free species, poor form & shucture	-	fell		On slope, bent trunk, unbalanced crown, crossed branches, dead stubs
T16	Macaranga tanarius var. tomemtosa	血桐	4.0	200	4.0	Poor	Poor	Fair	Fair	Low	Short life span species, poor form		fell		2 frunks, wounds on frunk & branches with dead wood exposed, crossed branches with rubbing wounds, dead branches, closely grown frunks with included bark
T17	Macaranga tanarius var tomemtosa	血桐	30	220	5.0	Poor	Poor	Fair	Poor	Low	Short life span species, poor form & structure		fell		Multi-trunks, large wounds on trunk & branches with dead wood exposed, long dead stub, closely grown trunks with included bank
T18	Macaranga tanarius ver. Iomemtosa	血桐	3.0	200	5.0	Poor	Poor	Fair	Poor	Low	Short life span species, poor form & structure		feli		Near u-channel & drainage structure, bark cracks on frunk, large wounds on branches, wound on frunk base, large cavity on frunk with broken dead wood exposed, dead stubs
T19	Morus alba	景樹	50	200	3.0	Poor	Poor	Fair	Poor	Low	Short life span species, poor form & structure		fell	J.	2 trunks, long cavities on trunk, dead branches, multiple cracks & wounds on trunk & branches, fungal fruiting bodies on trunk, closel grown trunks with included bank
T20	Leucaena leucocephala	銀合数	4.0	340	20	Poor	Poor	Poor	Poor	Low	Undesirable free species, poor form, health & structure		felt		3 trunks, uproofed, leaning, main trunks broken, leaving large form wounds & cavities on trunk, watersprouts regrow on trunk, closely grown trunks with included bank

Summary of Tree Recommendation		
	Nos.	DBH(mn
To Be Retained	60	)
To Be Felled	20	)
Total Number of existing Trees Surveyed	80	)

Ref: GCIO 11/1/35/5 C

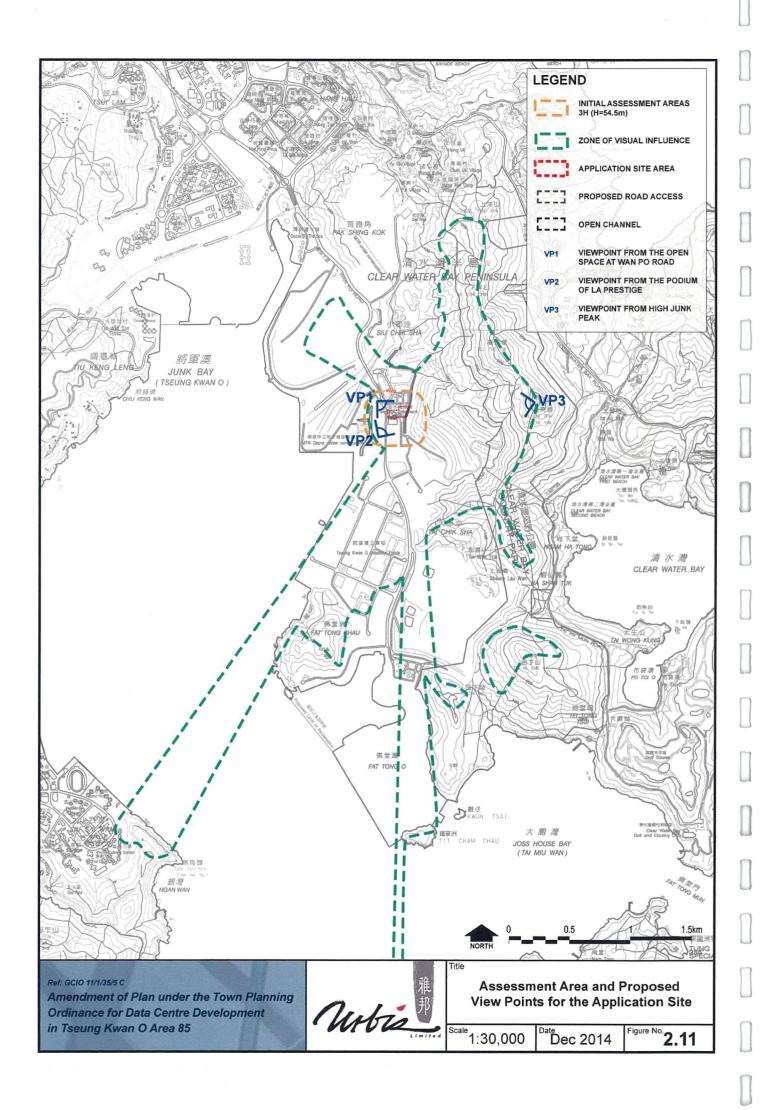
Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85



### Tree Assessment Schedule 4 of 4

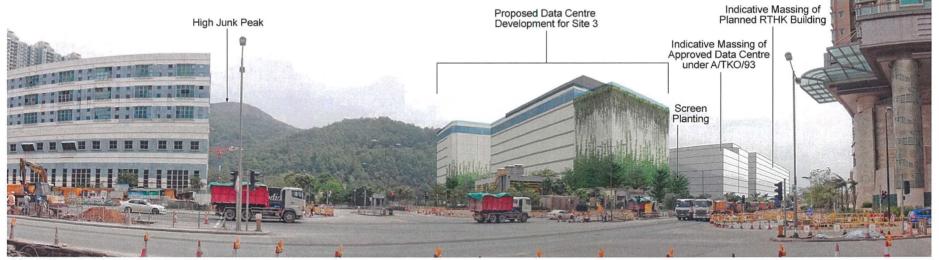
N.T.S.

Sep 2014





Before



After with mitigation measures

Ref: GCIO 11/1/35/5 C

Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85



Title

Viewpoint 1 from the Open Space at Wan Po Road

N.T.S. Jan 2015

Figure No.





Before



After with mitigation measures

#### Ref: GCIO 11/1/35/5 C

Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85



Title

### Viewpoint 2 from the Podium of La Prestige

Scale

N.T.S.

Jan 2015

Figure No.





Before



After with mitigation measures

Ref: GCIO 11/1/35/5 C

Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85



Title

Viewpoint 3 from the High Junk Peak

Jan 2015

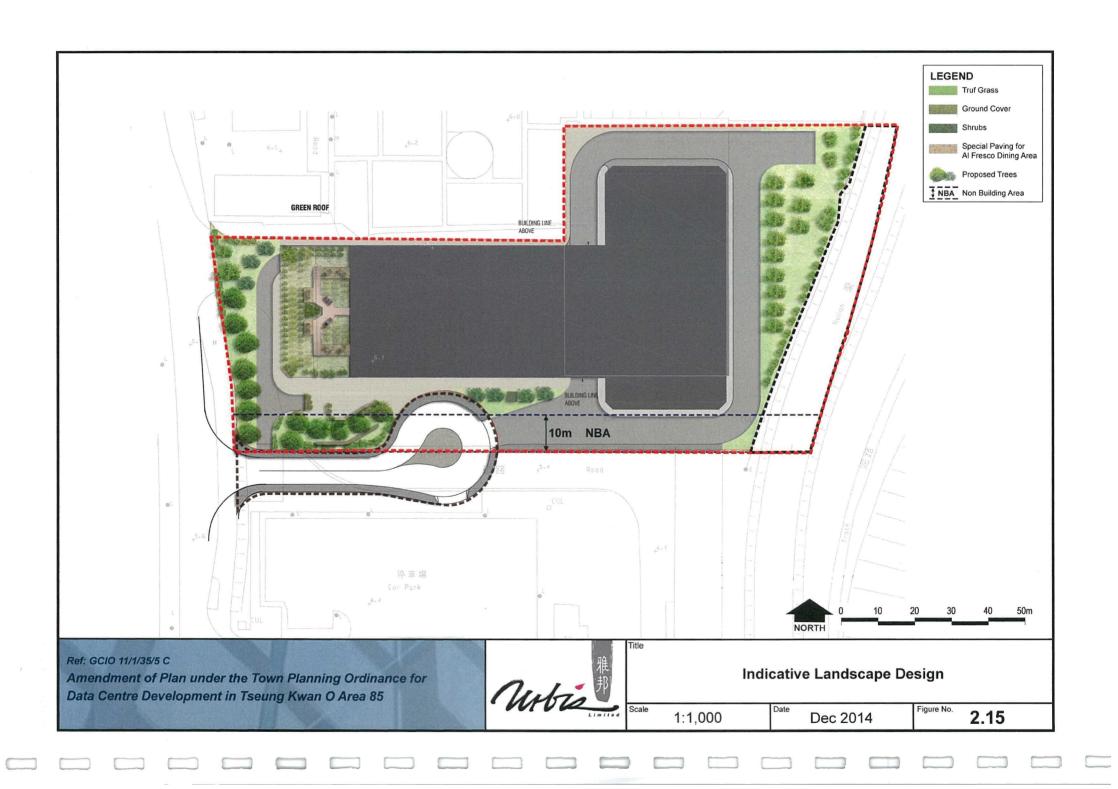
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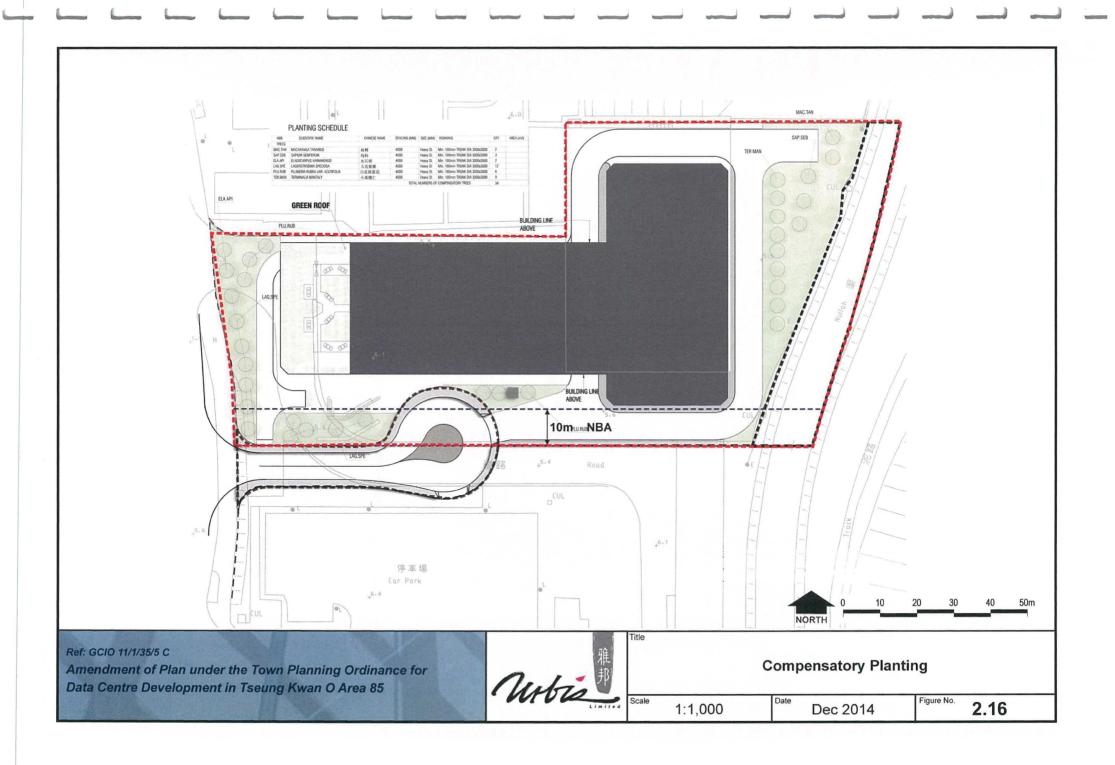
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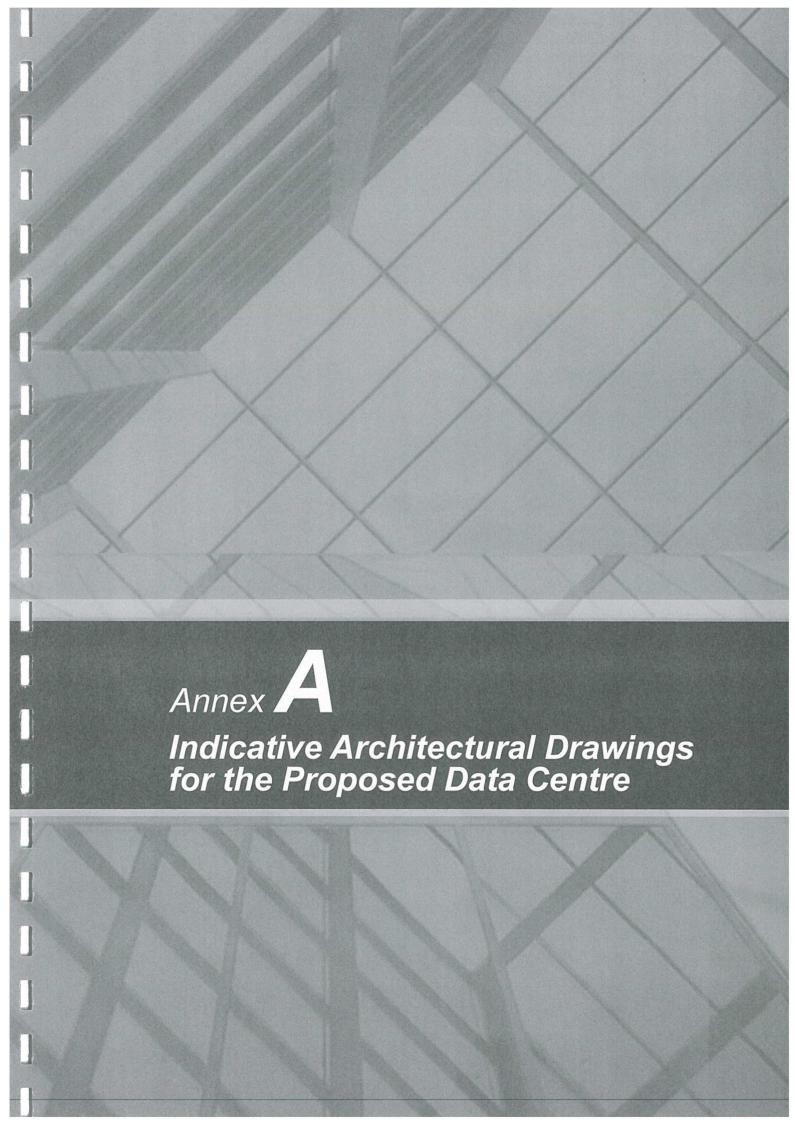
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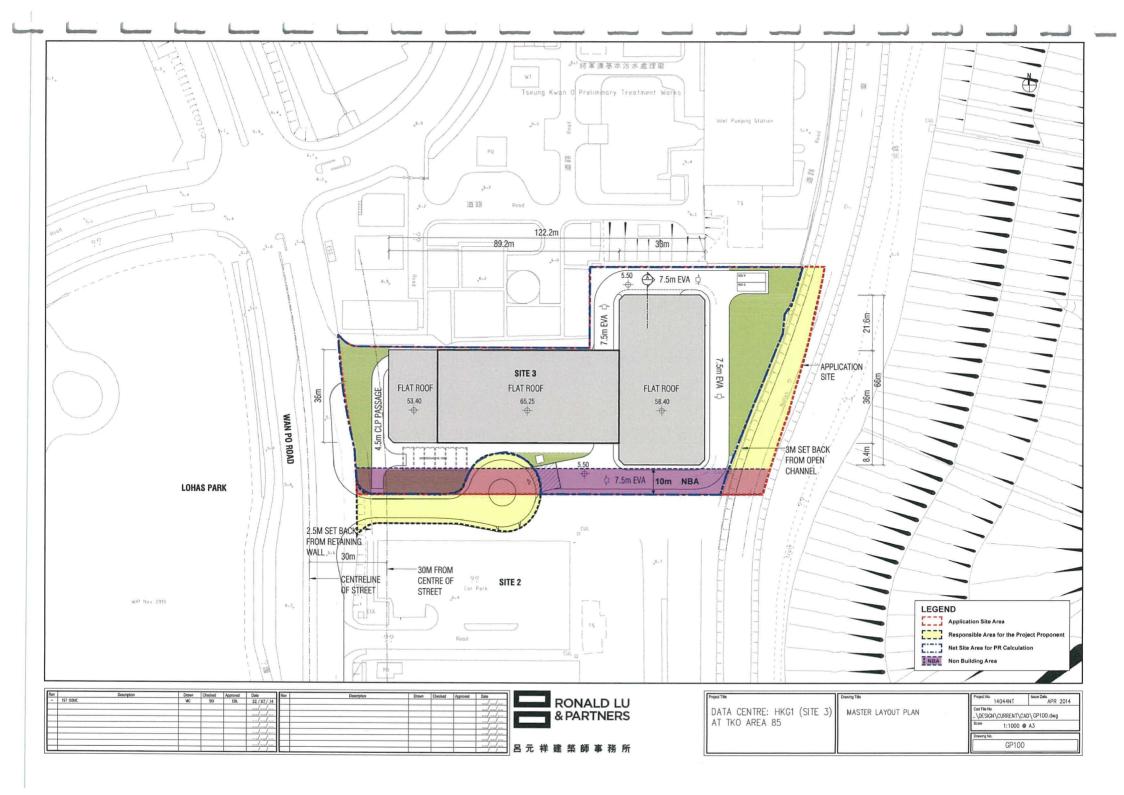
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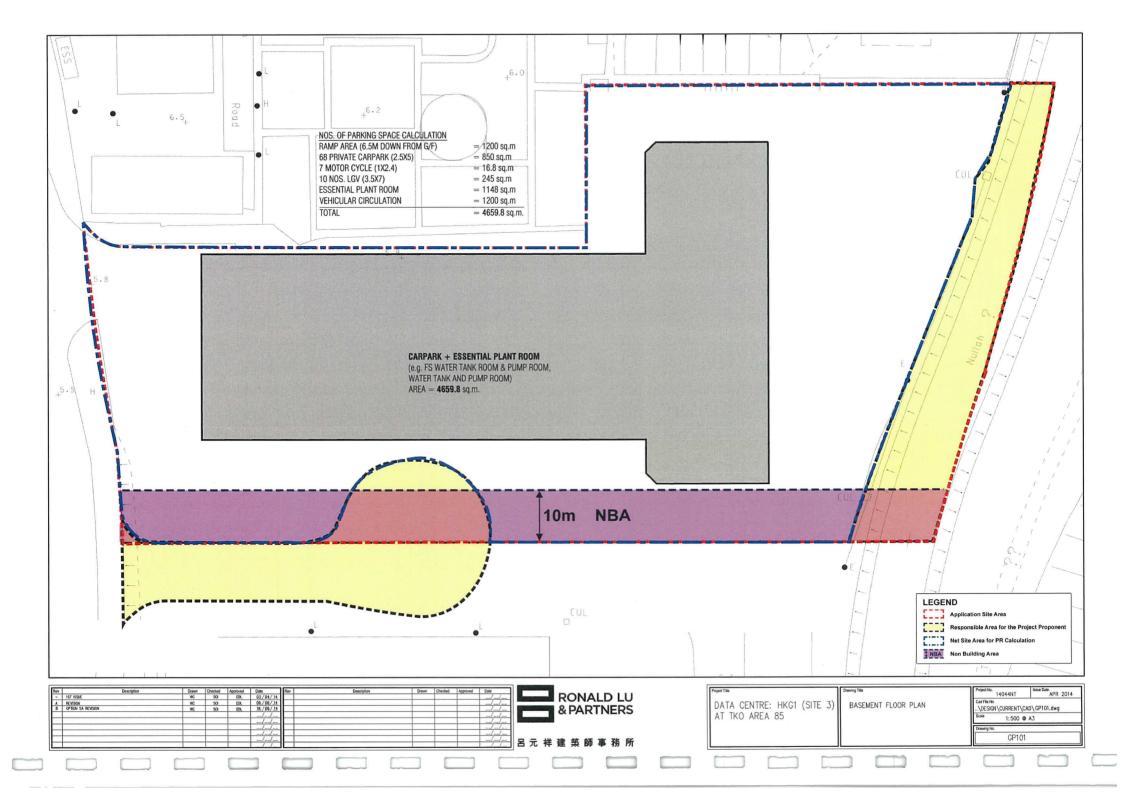
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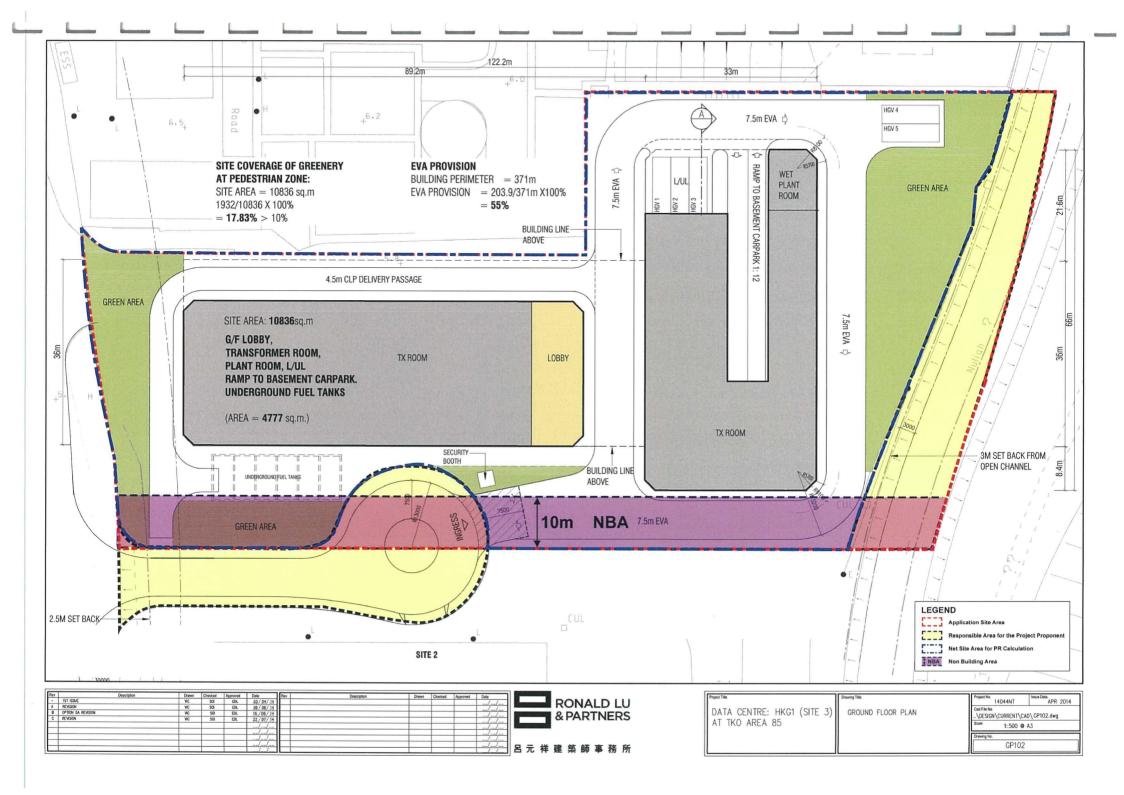


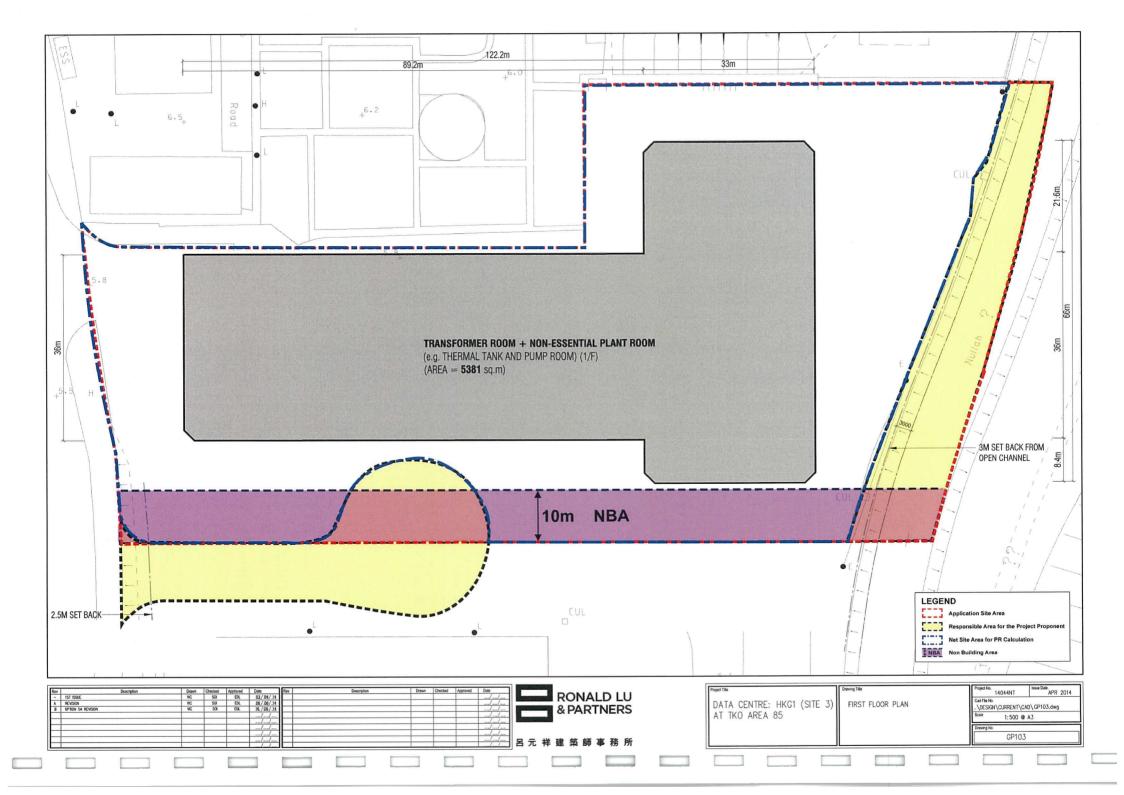


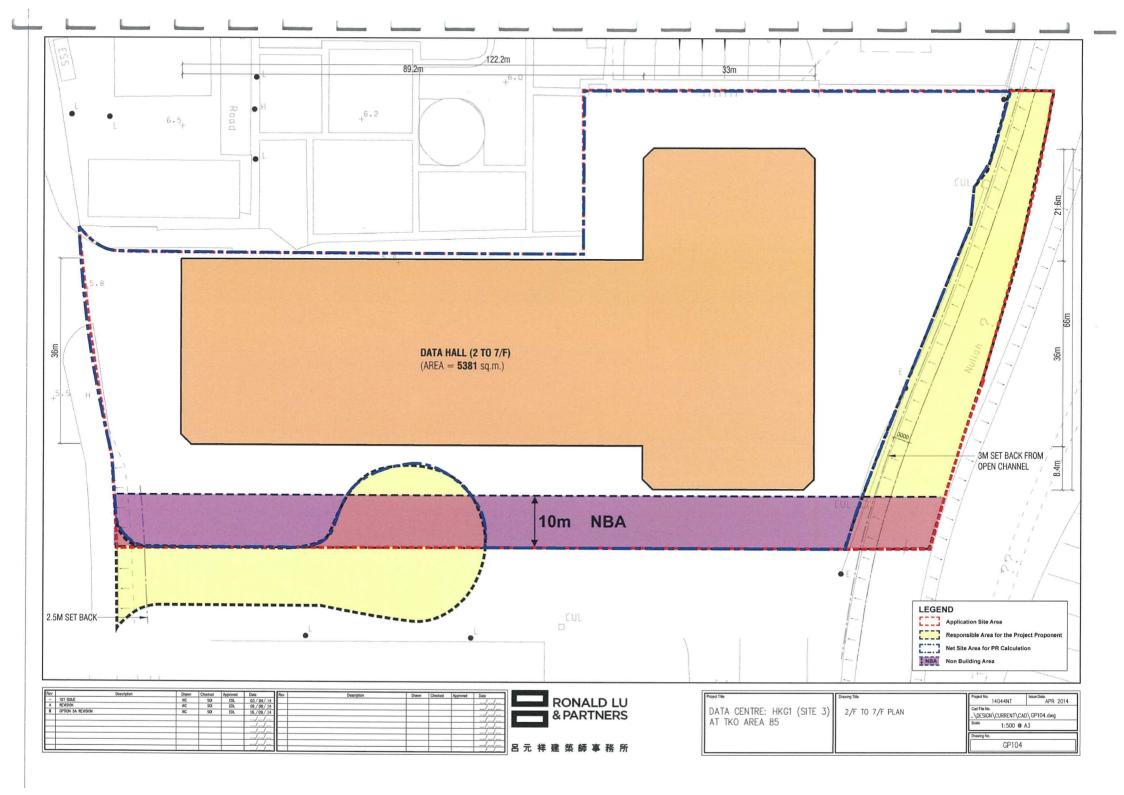


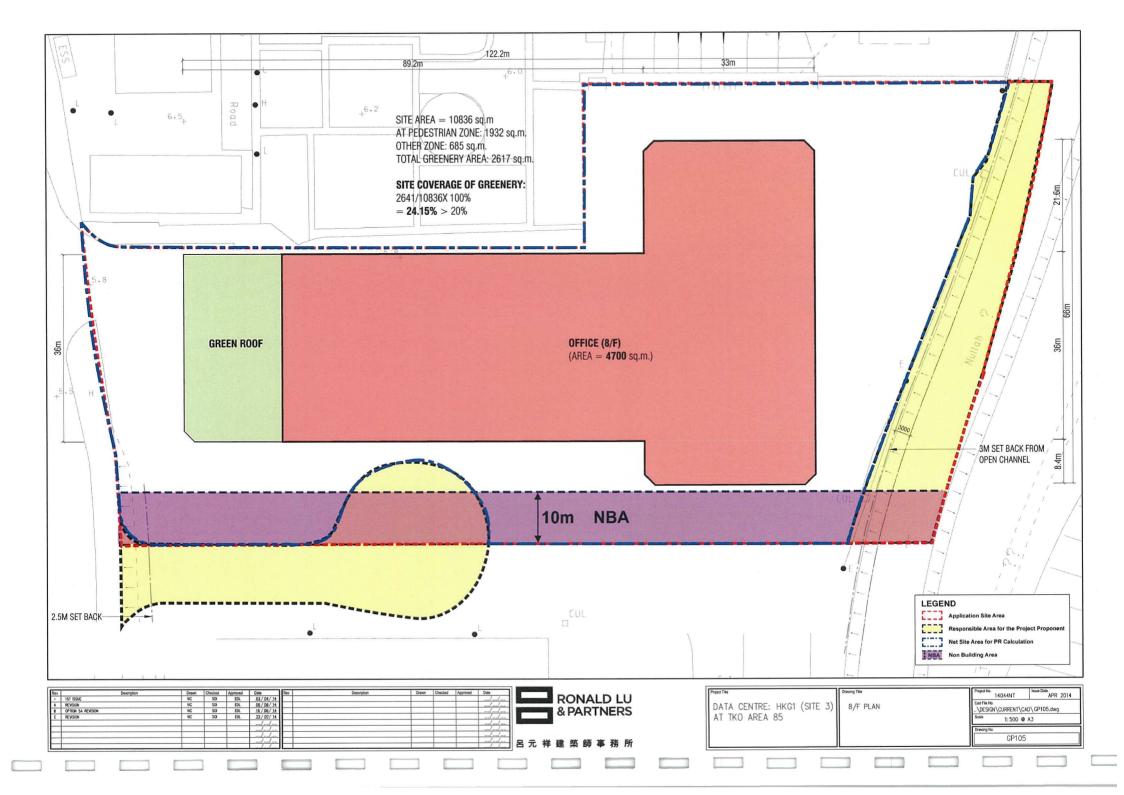


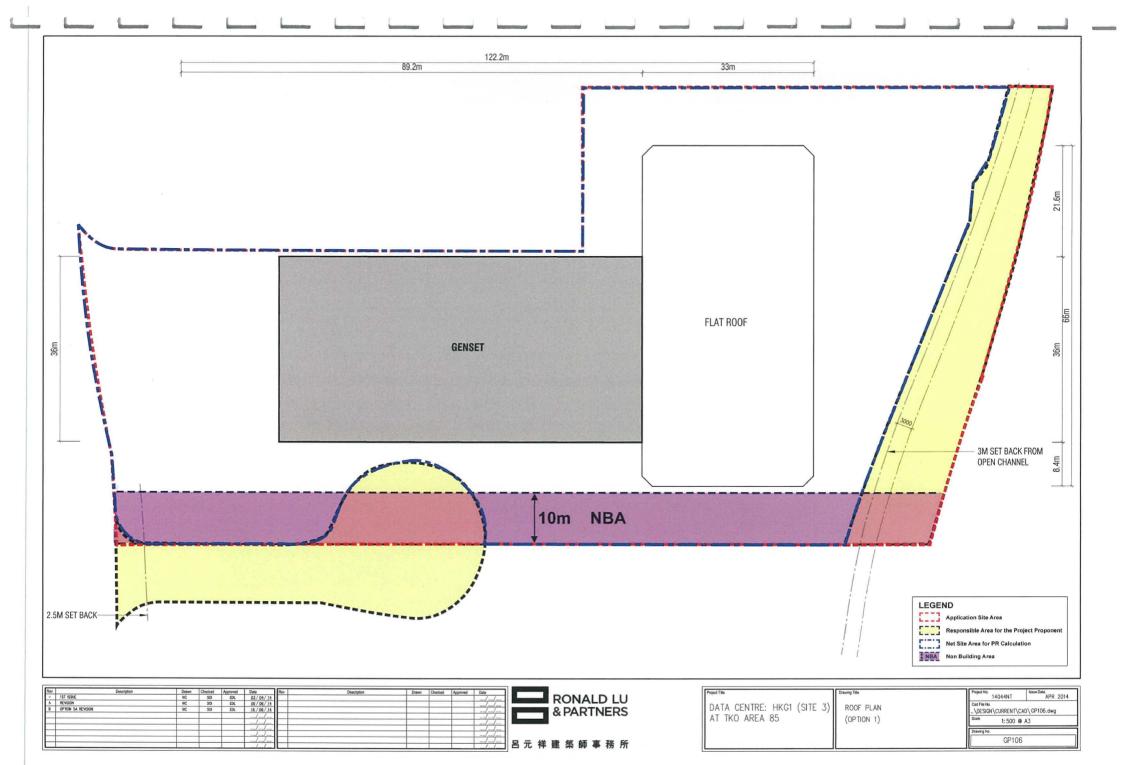


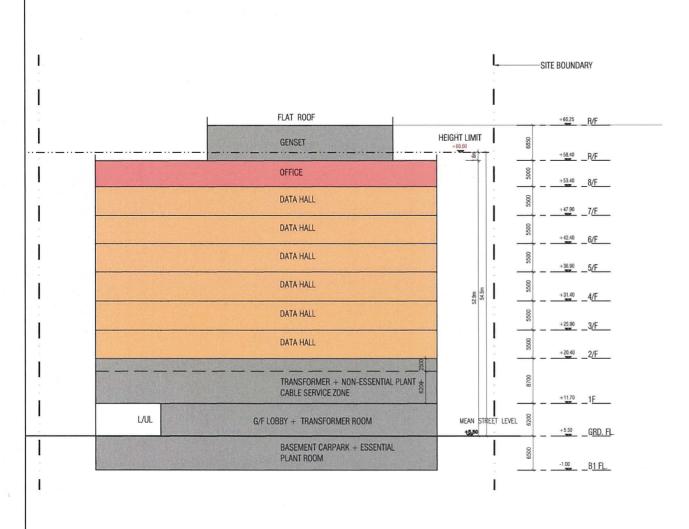












#### **FSTIMATED GFA AND SITE COVERAGE** SITE AREA = 10836 sq.m PERMITTED GFA = 10836 X 5 = 54180 sq.mSITE COVERAGE < 50% PERMITTED SITE COVERAGE = 10836 X 50% = 5418 sg.mESTIMATED ACCOUNTABLE GFA (sq.m) ASUMMED NON-ACCOUNTABLE GFA R/F GENSET 2450 1 TX ROOM W/ 2 TX = 150 sq.m.= 100 sq.m. 8/F 4700 FSI GENSET 7/F 5381 LOADING/ UNLOADING = 159 sg.m.PLANT ROOM\* = 195 sg.m.6/F 5381 SUB-TOTAL = 604 sq.m.(B) 5/F 5381 4/F 5381 3/F 5381 2/F 5381 1/F 5381 G/F 5381-(B) = 4777 UNDERGROUND 224 FUEL TANK SUB-TOTAL: 49818 sq.m. (A) ESTIMATED GFA = (A) = 49818 SQ.M.

\*SUBJECT TO MEETING PNAP APP-151 & 152 CRITERIA

ESTIMATED SITE COVERAGE = (5381/10836) X 100%

= **49818** / 10836

= 4.5975

= 49.66%

ESTIMATED PLOT RATIO

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roject Title	Drawing Title	Project No. 14044NT	Issue Date. APR 2014
DATA CENTRE: HKG1 (SITE 3) AT TKO AREA 85	SCHEMATIC SECTION & CALCULATION	Cad File No\DESIGN\CURRENT\CA	
		Drawing No.	

Annex B

Traffic Impact Assessment



Proposal for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85

Traffic Impact Assessment Study Final Report January 2015



# Proposal for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85

Traffic Impact Assessment Study Final Report January 2015

### Contents Amendment Record

This report has been issued and amended as follows:

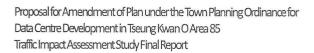
Revision	Description	Prepared / Date	Approved / Date
0	Final Study Report	MM 20/8/2014	OC 21/8/2014
1	Final Study Report	MM 26/1/2015	OC 26/1/2015





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4.1 4.2 4.3 4.4 4.5	TRAFFIC FORECAST  Design Year  Methodology  Reference Flows  Development Trip Generations  Design Flows	8 8 9 11 12
<b>5</b> 5.1 5.2	TRAFFIC IMPACT ASSESSMENT With CBL Scenario Without CBL Scenario	<b>13</b> 13 13
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Appendix C Transport Department's Circular 6/2012

Appendix D 2021 Junction Calculation Sheets

Proposal for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85 Traffic Impact Assessment Study Final Report



### 1 Introduction

### 1.1 Background

- 1.1.1 To facilitate the development of high-tier data centres in Hong Kong, the Government considered a site at Tsuen Kwan O (TKO) Area 85 (hereafter referred as "the Site") for the development of data centres.
- 1.1.2 Ozzo Technology (HK) Limited has been commissioned to undertake a Traffic Impact Assessment (TIA) Study to assess the traffic impact to be induced by the proposed development.

### 1.2 Objectives

- 1.2.1 The objectives of the TIA study are as follows:
  - To review the existing traffic conditions of the adjacent road network;
  - To estimate the traffic generations to be induced by the proposed data centre development;
  - To assess the future traffic situation in the surrounding road network;
  - To appraise the potential traffic impact of the proposed development on the surrounding road network and to recommend road improvement proposals if required; and
  - To propose access arrangement and advise on the internal transport provisions.

### 1.3 Report Structure

- 1.3.1 Following the introduction, this report contains the following sections:
  - Chapter 2 summarizes the existing traffic condition nearby the Site;
  - Chapter 3 describes the proposed development;
  - Chapter 4 provides the traffic forecast;
  - Chapter 5 reports the traffic impact assessment results; and
  - Chapter 6 presents the findings and conclusions of this study.



## 2 Existing Traffic Condition

### 2.1 Study Area and Site Location

- 2.1.1 The Site, currently being occupied by Drainage Services Department, is zoned "Other Specified Uses" annotated "Seweage Treatment Works" for most of the site with a small portion zoned "G/IC(9)" on the approved TKO Ouline Zoning Plan (the OZP).
- 2.1.2 **Figure 2-1** shows the location of the Subject Site, Site 3, situated in Area 85 in Tseung Kwan O and the proposed Study Area which includes the key roads and junctions in the vicinity of the Subject Site.

### 2.2 Existing Road Network

- 2.2.1 Figure 2-1 also shows the road network in the vicinity of the Site. The Site is located on the eastern side of Wan Po Road between Shek Kok Road and Wan O Road.
- 2.2.2 Wan Po Road north of Chiu Shun Road is classified as a District Distributor Road which with Tseung Kwan O Tunnel Road, an urban trunk road, at its northern end connecting Tseung Kwan O and East Kowloon.
- 2.2.3 The section of Wan Po Road in the vicinity of the Site is a dual-two carriageway road running in north-south direction connecting Tseung Kwan O Tunnel to the north and Tseung Kwan O Industrial Estate in the south. The concerned section of road is classified as a local distributor road providing accesses to developments along both sides of the road and linking the Site with other parts of Tseung Kwan O District.

### 2.3 Existing Public Transport Services

2.3.1 Figure 2-2 shows the existing public transport provisions in the vicinity of the Site which is well served by public transport services. MTR Lohas Park Station is within 1 km from the Site and there are numerous franchised bus and mini-bus services running along the section of Wan Po Road within close proximity of the Site. Figure 2-2 also shows the locations of the busstops in the vicinity of the Site and details of the existing public transport services are summarised in Table 2-1.



Table 2-1 Existing Bus and GMB Services

Route No.	From	То	Frequency (min.)							
	Franchis	sed Bus (KMB & NWFB)								
98D	Lohas Park MTR Station	Tsim Sha Tsui East	1 service on weekday AM Peak Only							
98S	Mei Fu	Lohas Park (Wan Po Road)	8 services on weekday AM and PM Peak Only							
298E	Hang Hau MTR Station	Tseung Kwan O Industrial Estate	12-20							
796P	Lohas Park MTR Station	Tsim Sha Tsui East	3 services on weekday AM Peak Only							
796X	Lohas Park MTR Station	Tsim Sha Tsui East	6-25							
797M	Tseung Kwan O MTR Station	Tseung Kwan O Industrial Estate	30							
	Green Mini Bus									
112M	Lohas Park MTR Station	Tseung Kwan O Industrial Estate	10-17							
1128	Lohas Park MTR Station	Tseung Kwan O Industrial Estate	Mid-night services							

### 2.4 Existing Junction Performance

- 2.4.1 In order to appraise the existing traffic conditions in the area during a typical weekday, classified turning movement counts were carried out at the key junctions within the Study Area as indicated in **Figure 2-3.** The traffic surveys were undertaken on 2<sup>nd</sup> April 2014 (Wednesday) over the peak periods of 8:00 and 11:00 and 14:00 to 19:00.
- 2.4.2 All vehicle flows in the subsequent analysis are converted to passenger car unit (PCU) based on the PCU factors for traffic singal as indicated in Table 2.3.1.1 of Volume 2 of TPDM and shown in **Table 2-2**.

Table 2-2 Passenger Car Unit Conversion Factors

Vehicle Type	PCU Conversion Factor
Car / Taxi	1.00
Public Light Bus / Minibus	1.50
Light Goods Vehicle	1.50
Medium/ Heavy Goods Vehicle	1.75
Bus / Coach	2.00



- 2.4.3 By applying the above PCU factors, vehicular traffic flows in PCUs are calculated and the AM and PM peak hours are identified to occur at 8:45 to 9:45 and 14:00 to 15:00 respectively. **Figure 2-4** presents the observed peak hour traffic flows on the road network in the vicinity of the Site.
- 2.4.4 Based on the existing traffic flows, the peak hour performance of the key junctions in the vicinity of the Site on a typical weekday was assessed. The results are summarised in **Table 2-3** and detailed calculation sheets are given in **Appendix A**.

Table 2-3 2014 Peak Hour Performance at Key Junctions

No.	Junction	Junction	Capacity Index <sup>(1)</sup>			
	Junction	Type	AM	PM		
J1	Wan Po Road / Lohas Park Road	Signal	100%+	100%+		
J2	Wan Po Road / Shek Kok Road	Signal	22.9%	29.8%		
J3	Wan Po Road / Wan O Road	Signal	78.1%	100%+		
J4	Wan Po Road / Chun Yat Street	Signal	72.7%	52.5%		

Notes: (1)

The capacity index for signalised junction is reserve capacity (RC).

2.4.5 The assessment results indicate that all of the key junctions in the vicinity of the Site operate satisfactorily during the peak periods of a typical weekday. It is noted that the junction of Wan Po Road and Shek Kok Road (J2) is approaching capacity in the morning peak hour.



## 3 The Proposed Development

### 3.1 The Proposed Data Centre

3.1.1 The site has a proposed GFA of 49,818 m² based a conceptual design of the data centre with an EVA of 7.5 m wide, among others. The GFA of the data centre and ancillary office is 45,118 m² and 4,700 m² respectively.

### 3.2 Access Arrangement

- 3.2.1 **Figure 3-1** shows the vehicular access arrangement for the proposed Data Centre at the Subject Site. The vehicular ingress/egress point is connected with a new local access road off the southbound carriageway of Wan Po Road.
- 3.2.2 The new access road will be located about 50m to the south of the Junction of Wan Po Road and Shek Kok Road and will be operating under a "Left-in Left-out" arrangement on the southbound carriageway of Wan Po Road. The access road, a 7.3m wide single-2 lane carriagway road with 2m footpaths on both sides of the carriageway, will be shard used by the site to the immediate south of the proposed Data Centre. A turnaround is provided at the eastern end of the road sufficient for 12m HGV and fire engine.
- 3.2.3 In order to provide this new access, the existing bus lay-by will need to be shifted about 20m towards the south.

### 3.3 On-site Car and Motorcycle Parking Provisions

3.3.1 According to Hong Kong Planning Standard and Guidelines (HKPSG), the internal car and motorcycle parking provisions for General Industrial Use (GIU)- Industrial/Office Uses (I/O) are shown in **Table 3-1**.

Table 3-1 Car and Motorcyle Parking Requirements by HKPSG

Vehicle Type	Parking Requirements	Size	Proposed Provisions		
		(L x W x H)*	Office (4700m²)	Data Centre (45118m²)	
Car	1 : 750m <sup>2</sup>	5m x 2.5m x 2.4m	7	60	
Motorcycle	1 per 10 car parking spaces	2.4m x 1m x n.a.	1	6	

\*Notes: L = Length, W = Width, H= Headroom



- 3.3.2 A total of 67 car parking spaces and 7 motorcycle parking spaces will be provided.
  - 3.4 On-site Goods Vehicle Parking and Loading/Unloading Provisions
- 3.4.1 The parking and loading/unloading provision for goods vehicles for office use is in accord with the Hong Kong Planning Standard and Guidelines (HKPSG) for General Industrial Use (GIU)- Industrial/Office Uses (I/O). Table 3-2 shows the proposed parking and loading/unloading provisions for "Office" use within the proposed development. To accord with the requirements, 3 nos. of goods vehicle bays will be provided (1 no. of LGV bay for parking, 1 LGV plus 1 HGV bays for loading and unloading.)

Table 3-2 Goods Vehicle Parking and Loading/Unloading Requirements and Provisions for Office Use

Office (4700m²)	HKPSG Requirements Industrial/ Office (I/O) Buildings	Proposed Provisions		
Total GV Bays	1 : 1000-1200m <sup>2</sup> of 50% of GFA	4700 m <sup>2</sup> x 50% = 2350 m <sup>2</sup> 2350 m <sup>2</sup> /2 bays = 1: 1175 m <sup>2</sup>		
Requirements	1 : 2000-3000m <sup>2</sup> of remaining GFA	2350 m² /1 bay = 1: 2350 m²		
		(Total = 3 nos. of GV Bays)		
LGV/HGV proportion	65% LGV and 35% HGV	3 x 65% = 2 LGV 3 x 35% = 1 HGV		
No. of Parking GV	50% of all the above required goods vehicle bays shall be for parking of goods vehicles.	3 x 50% = 1.5  Hence, 1 no. of LGV is proposed for Parkin  The remaining 1LGV and 1HGV for Loading/Unloading		
No. of Container Vehicle loading/unloading bay	One container vehicle loading/unloading bay with turning circle of 11.6m outer radius should be provided for a site with dimensions not less than 45m x 40m	As only the "Office" part adopts this standard, (the "Data Centre" part adopts the standard in TD Departmental Circular No. 6/2012), it is considered not necessary to provide container vehicle bay		



- 3.4.2 For the proposed data centre land use, reference was made to Transport Department's Circular 6/2012. A copy of the standards is attached in **Appendix C**.
- 3.4.3 **Table 3-3** shows the proposed parking and loading/unloading provisions for "Data Centre" use within the proposed development. A total of 10 goods vehicle bays, 4 for parking and 6 for loading/unloading purposes, will be provided. Among these 7 of them are LGV bays and 3 are HGV bays. The proposed provision level is similar to those being adopted at Site 1 which has a total of 11 goods vehicle bays.

Table 3-3 Goods Vehicle Parking and Loading/Unloading Requirements and Provisions for Data Centre Use

Data Centre (45,118m²)	Transport Department Requirements Circular 6/2012	Proposed Provisions			
	First 20,000 m² GFA 1 : 3400 – 3800 m²	20000 m² /5.5 bays = 1: 3636 m²			
Total GV Bays Requirements	Remaining GFA 1 : 5500 - 6100m <sup>2</sup>	45118 - 20000 = 25118 m <sup>2</sup> 25118 m <sup>2</sup> /4.5 bays = 1: 5582 m <sup>2</sup>			
		(Total = 10 nos. of GV Bays)			
LGV/HGV proportion	65 % LGV and 35 % HGV	10 x 65% = 6.5 LGV 10 x 35% = 3.5 HGV			
Loading/Unloading and	60% of the above required spaces shall be for loading/unloading and the	Loading/unloading LGV = 6.5 x 60% = 3.9 => 4  Loading/unloading HGV = 3.5 x 60% = 2.1 => 2			
Parking Proportion	remaining shall be for parking	Parking LGV = 6.5 x 40% = 2.6 => 3  Parking HGV = 3.5 x 40% = 1.4 => 1			

3.4.4 Dimensions of goods vehicle bay should follow HKPSG as follows:

	Length	Width	Minimum Headroom
Goods Vehicle Bay for	<u>(m)</u>	<u>(m)</u>	<u>(m)</u>
LGV	7	3.5	3.6
M/HGV	11	3.5	4.7



### 4 TRAFFIC FORECAST

### 4.1 Design Year

4.1.1 The "Design Year" for this study is set as 2021, 3 years from the planned operation year of 2018 for the proposed Data Centre.

### 4.2 Methodology

- 4.2.1 The 2008 AM and PM peak hour matrices from BDTM and the 2011-based Territorial Population and Employment Data Matrices (TPEDM) by Planning Department are adopted to develop the 2014 peak hour matrices to replicate the 2014 observed peak hour flows.
- 4.2.2 The 2014 peak hour matrices and the latest 2021 planning data from the 2011-based TPEDM are then used to adjust the 2021 BDTM peak hour matrices for estimation of 2021 peak hour Reference Flows (i.e. without Development Flows).
- 4.2.3 It is noted that Cross Bay Link (CBL) is included in the 2021 road network of the BDTM. Due to the uncertainty of the operation year of CBL, traffic assessments for both the scenario of 'with CBL' and 'without CBL' will be undertaken for both the "Reference" and "Design" as described below:

2021 Reference Flows = 2021 BDTM Flows adjusted to reflect

2011-based TPEDM

2021 Design Flows = 2021 Reference Flows + Development Flows by the proposed Data Centre

4.2.4 The traffic impact to be induced by the proposed Data Centre will be assessed by comparing the Reference flows against the Design flows for both the 'with CBL' and 'without CBL' scenarios.



### 4.3 Reference Flows

#### Planning Data

4.3.1 The 2011-based TPEDM is used in the development of the 2014 and 2021 peak hour matrices by adjusting the 2008-based BDTM accordingly. **Table 4-1** shows the 2011-based TPEDM planning data in Tseung Kwai O District. The locations of the planning zones are shown in **Appendix B**.

Table 4-1 2011-Based TPEDM Planning Assumptions in Tseung Kwan O District

PDZ No.	Population			Employment				
	2011	2014(1)	2016	2021	2011	2014(1)	2016	2021
220	100	100	100	100	300	269	250	250
221	91900	91178	90700	89150	16250	16872	17300	17550
222	0	0	0	0	100	128	150	100
223	42450	41665	41150	39950	4250	4250	4250	4300
224	0	0	0	0	0	0	0	0
225/451	25150	29169	32200	49500	3150	4156	5000	6600
262	26550	26700	26800	27050	2400	2400	2400	2450
263	0	0	0	0	200	229	250	150
264	72450	71486	70850	68500	12000	12149	12250	12350
267	0	0	0	0	0	100	150	0
324/444	93300	95503	97000	95100	15550	15187	14950	15100
329	0	0	0	0	350	286	250	200
391	1100	21071	31550	62013(2)	7900	11255	14250	15400
392	0	0	0	0	3850	3698	3600	3450
394	9350	9290	9250	9000	4050	3614	3350	3400
TOTAL	372750	388665	399650	440363	70350	74593	78450	81350

Notes:

- (1) 2014 figures are derived by applying average growth rate between 2011 2016.
- (2) The population in PDZ 391 (Lohas Park) is increased from 55,500 to 62,013 for 21,500 housing units.
- 4.3.2 It is noted that the forecast population of around 55,500 in PDZ 391 (i.e. Lohas Park Development) is maintained from Year 2021 to 2036 in the 2011-based TPEDM, hence, it is assumed that Lohas Park Development has achieved its full phase of development in 2021.
- 4.3.3 It is also noted that the forecast population in PDZ 391 (i.e. Lohas Park Development) has reduced from 62,013 in the 2006-based TPEDM to 55,550 in the 2011-based TPEDM. To provide conservative estimates, however, the forecast population of 62,013 is adopted in this study to conform with the proposed no. of housing units (21,500 units) as approved by the Town Planning Board.



- 4.3.4 The 2008 BDTM traffic flows are adjusted taking into account the planning data in 2014 to replicate the 2014 peak hour observed flows. **Figure 4.1** compares the 2014 modelled and observed AM peak hour flows and the corresponding figures for PM peak are showin in **Figure 4.2**.
- 4.3.5 The 2021 Reference Flows are derived by adjusting the 2021 BDTM AM and PM peak hour matrices based on the latest planning data from the 2011-based TPEDM and the 2014 BDTM peak hour matrices.

#### Wth CBL Scenario

4.3.6 It is noted that the CBL is included in the 2021 BDTM road network and, in addition, the following upgrading works are assumed at the junction of Wan Po Road and Shek Kok Road (J2) and the junction of Wan Po Road/ Wan O Road (J3) with the Study Area of this TIA Study:

J2 - Junction of Wan Po Road and Shek Kok Road

- The private road will allow one left lane and one right turn lane and no straight ahead movement is allowed.
- Four lanes on northbound exit, hence, adding two through traffic lanes on Wan Po Road northbound carriageway
- Four lanes on southbound exit, hence, adding one through traffic lane on Wan Po Road southbound carriageway.

J3 - Junction of Wan Po Road/ Wan O Road

- Adding one right turn lane on Wan Po Road soutbound approach
- Adding one left turn lane on Wan Po Road northbound approach.
- 4.3.7 Apart from the above, the configurations and layouts of all the key junctions and road links within the Study Area in the 2021 BDTM are the same as the existing situation. **Figure 4-3** shows the Reference Peak Hour Flows for the "with CBL" scenario.

#### Wthout CBL Scenario

4.3.8 Due to the uncertainty of the construction programme for CBL, a sensitivity test for the "without CBL" scenario will be undertaken for the 2021 model. If CBL is not in operation, the only external road link connecting Tseung Kwan O District and East Kowloon is Tsueng Kwan O Tunnel. In this regard, the CBL is removed from the 2021 BDTM road network and the peak hour trip matrices are adjusted by re-assigning the traffic flows on CBL to Tseung Kwan O Tunnel. **Figure 4-3** shows the Reference Peak Hour Flows for the "without CBL" scenario.



4.3.9 Comparing Figure 4-3 (with CBL) and 4-4 (without CBL), it is noted that the traffic volume on Wan O Road, a major connector link to CBL, is lower if CBL is not in place in 2021. On the other hand, the traffic volume on Wan Po Road is higher as traffic is diverted to Tseung Kwan O Tunnel via Wan Po Road if CBL is not in place.

### 4.4 Development Trip Generations

4.4.1 In order to estimate the trip generation to be induced by the proposed Data Centre, reference was made to the existing trip generation rates by similar types of data centres in Tseung Kwan O District. **Table 4-2** shows the obserbed trip rates and the most conservative trip rates are adopted in deriving the development traffic to be generated by the proposed data centre.

Table 4-2 Existing Data Centre Trip Rates

		Trip Rate (p	cu/hr/100m²)								
Data Centre Total GFA	AM	AM Peak PM Peak									
I Otal GI A	Out	ln .	Out	ln							
(1) 56,500 m <sup>2</sup>	0.087	0.166	0.175	0.058							
(2) 33,445 m <sup>2</sup>	0.003	0.009	0.006	0.021							

Notes: (1) Source: S16 Planning Application for the Proposed Information Technology & Telecommunications Industries – Data Centre, on a site in Area 85, Tseung Kwan O, Hong Kong. Traffic Impact Assessment Report dated August 2012.

(2) HKCOLO, No. 2 Chun Yat Street, Tsueng Kwan O.

4.4.2 The higher trip rates in Table 4-2 are adopted in estimating the trip generations for the proposed Data Centre and the resulting development trips are summarized in **Table 4-3**.

Table 4-3 Estimated Peak Hour Development Trips

The Proposed Centre	AM Pea	ak Hour	PM Pea	ak Hour
(49,818 m²)	Out	ln	Out	ln .
Trip Rate (pcu/hr/100m²)	0.087	0.166	0.175	0.058
Trips (pcu/hr)	43	83	87	29

4.4.3 As indicated in Table 4-3, the proposed data centre would generate around a total two-way flows of 126 pcu's (43 in and 83 out) in the AM peak hour and 116 pcu's (87 out and 29 in) during the PM peak hour.



### 4.5 Design Flows

4.5.1 The development traffic in Table 4-3 are added to the 2021 Peak Hour Reference Flows to derive the 2021 peak hour Design Flows for both the "With CBL" and "Without CBL" respectively. **Figure 4-5** shows the 2021 Peak Hour Design Flows with CBL and **Figure 4-6** for the without CBL scenario.



### 5 TRAFFIC IMPACT ASSESSMENT

#### 5.1 With CBL Scenario

5.1.1 Based on the 2021 Reference Flows and Design Flows for the "With CBL" scenario as shown in Figure 4-3 and Figure 4-5 respectively, junction capacity assessments are carried out for the peak hours on a typical weekday. The results are presented in **Table 5-1** with detailed calculation sheets given in **Appendix D.** 

Table 5-1 2021 Peak Hour Junction Performance With CBL

No.	Junction	Junction	AM I	Peak	PM Peak				
MO.	Junction	Type <sup>1</sup>	Ref	Design	Ref	Design			
J1	Wan Po Road / Lohas Park Road	Signal	100%+	100%+	100%+	100%+			
J2	Wan Po Road / Shek Kok Road	Signal	57.6%	50.8%	100%+	100%+			
J3	Wan Po Road / Wan O Road	Signal	49.0%	46.6%	72.4%	64.7%			
J4	Wan Po Road / Chun Yat Street	Signal	12.4%	12.0%	19.4%	19.0%			

Notes: 1.

The capacity index for signalised junction is reserve capacity (RC).

5.1.2 The assessment results shown in **Table 5-1** indicate that all of the key junctions in the road network in the vicinity of the Subject Site would perform satisfactorily. By comparing the junction performance of the 2021 Reference and Design Flows, it is identified that the impact to be induced by the proposed data centre is not significant and would not create adverse traffic impact on the network within the Study Area.

#### 5.2 Without CBL Scenario

5.2.1 Based on the 2021 Reference Flows and Design Flows for the "Without CBL" scenario as shown in Figure 4-4 and Figure 4-6 respectively, junction capacity assessments are carried out for the peak hours on a typical weekday. The results are presented in **Table 5-2** with detailed calculation sheets given in **Appendix D.** 



Table 5-2 2021 Peak Hour Junction Performance Without CBL

No.	Junction	Junction	AM	Peak	PM Peak		
NO.	Junction	Type <sup>1</sup>	Ref	Design	Ref	Design	
J1	Wan Po Road / Lohas Park Road	Signal	27.5%	23.9%	40.3%	38.6%	
J2	Wan Po Road / Shek Kok Road	Signal <sup>2</sup>	3.4%	1.3%	20.8%	19.6%	
J3	Wan Po Road / Wan O Road	Signal	52.2%	47.0%	64.3%	55.7%	
J4	Wan Po Road / Chun Yat Street	Signal	12.5%	10.9%	19.4%	19.0%	

Notes: 1. The capacity index for signalised junction is reserve capacity (RC)

- 5.2.2 By comparing the results shown in Table 5-1 (with CBL) and Table 5-2 (without CBL), it is noted that, with the exception of Junction 3, the reserve capcities of the key junctions in the area would be reduced in general as traffic volume on Wan Po Road would increase if CBL is not in place in 2021. All the key junctions would perform satisfactorily during the peak hour periods with Junction 2 is expected to approach capacity in the AM Peak if CBL is not in operation in 2021.
- 5.2.3 By comparing the junction performance of the 2021 Reference and Design Flows, it is identified that the impact to be induced by the proposed data centre is not significant and would not create adverse traffic impact on the network within the Study Area.



### 6 Summary and Conclusions

# 6.1 Summary6.1.1 To facilitate to

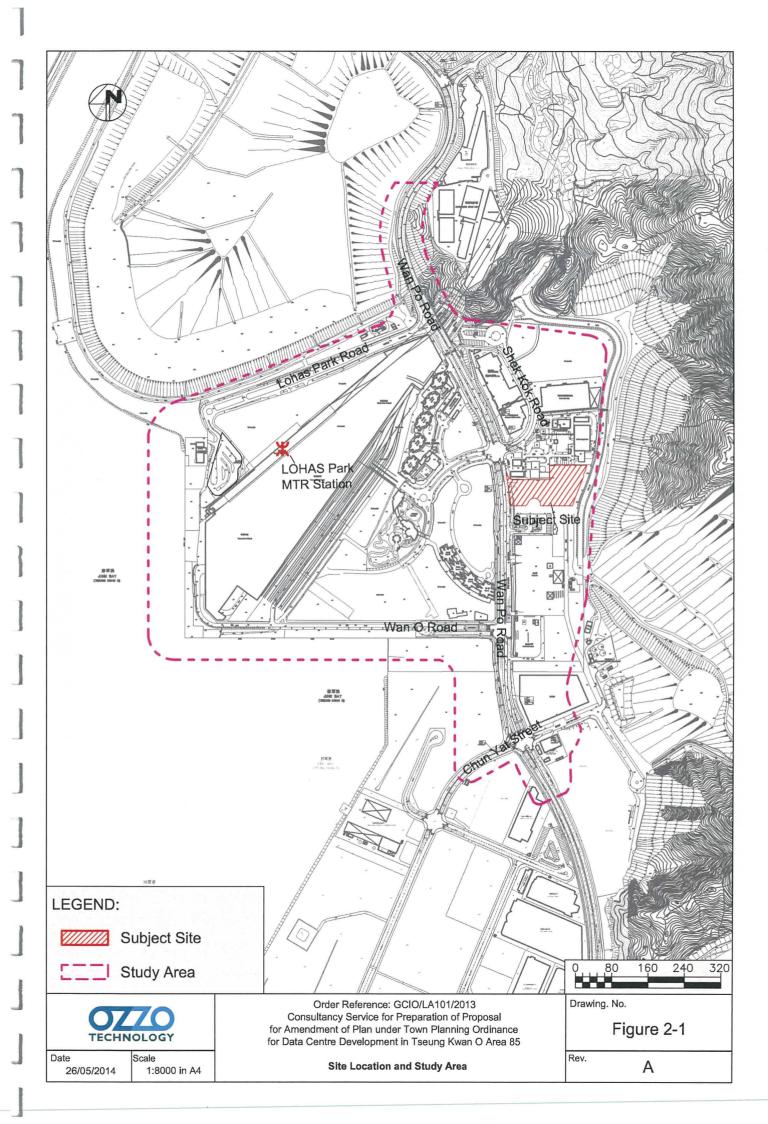
- To facilitate the development of high-tier data centres in Hong Kong, the Government considered a site at Tsuen Kwan O (TKO) Area 85 for a data centre development with a total GFA of 49,818 m<sup>2</sup>, with 4,700 m<sup>2</sup> for office use and 45,118m<sup>2</sup> for data centre.
- In order to appraise the existing traffic conditions in the vicinity of the proposed data centre, classified turning movement counts were carried out at the key junctions over the AM and PM peak periods. The AM and PM peak hours are identified to occur at 8:45 to 09:45 and 14:00 to 15:00 respectively.
- Junction capacity assessments were carried out for all the key junctions in the study area. The results indicate that, at present, all junctions perform satisfactorily during the peak periods of a normal weekday.
- 6.1.4 The design year for traffic impact assessment is 2021 which is 3 years after the operation year of the proposed development in 2018. The BDTM are adjusted to derive 2021 Reference Traffic (i.e. without the development) taking into account the observed flows and the latest planning data in Tseung Kwan O District from the 2011-based TPEDM.
- The Site can be accessed via a new local access road off the southbound carriageway of Wan Po Road.
- 6.1.6 A total of 67 car parking spaces and 13 goods vehicle bays for parking and loading / unloading purposes will be provided.
- Reference was made to the trip rates by existing data centre development which possesses similar characteristics as the proposed data centre. It is estimated that the proposed data centre would generate a two-way traffic of 126 pcus and 116 pcus in the AM and PM peak hour respectively. The additional development traffic was added to the 2021 Reference Traffic Flows to derive the 2021 Design Traffic Flows (i.e. with the development).
- 6.1.8 Traffic impact assessments were undertaken by comparing the 2021 Reference and Design Traffic Flows. The results indicate that all key junctions in the study area would perform satisfactorily during the AM and PM peak hours.

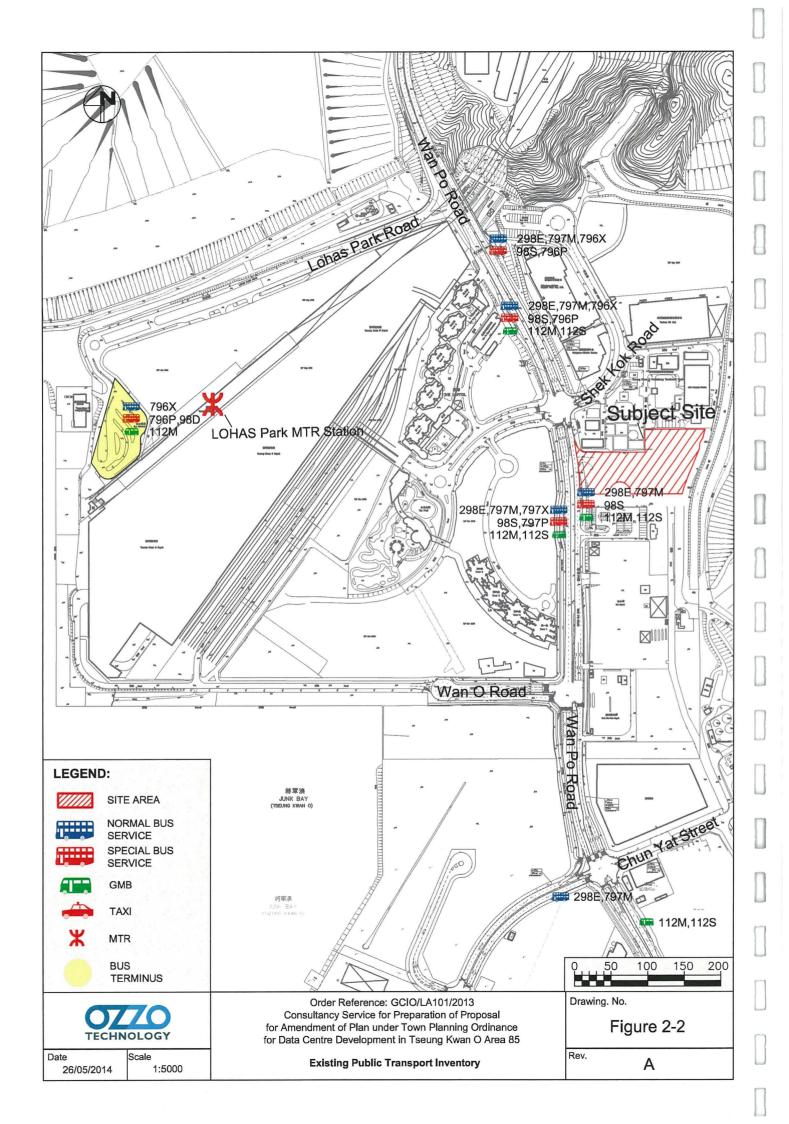


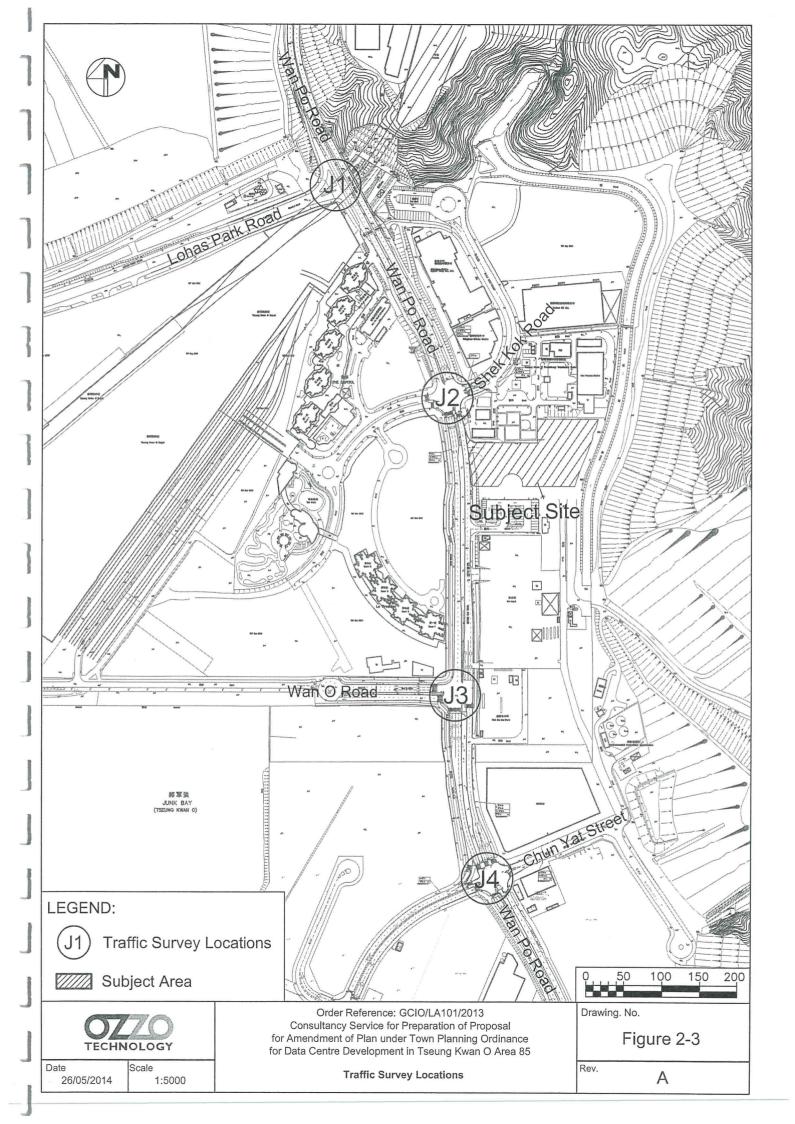
- 6.1.9 A sensitivity test was also undertaken by assuming the Cross Bay Link is not in place in 2021. The results indicate that, with the exception of the junction of Wan Po Road and Shek Kok Street, all key junctions in the study area would perform satisfactorily during the AM and PM peak hours.
- 6.2 Conclusion
- 6.2.1 The assessment results indicate that the traffic impact to be induced by the proposed Data centre is not significant and woud not create adverse traffic impact on the road network in the vicinity of the Subject Site. The key junctions in the study area would perform satisfactorily in the design year of 2021 even with the proposed Data Centre development.

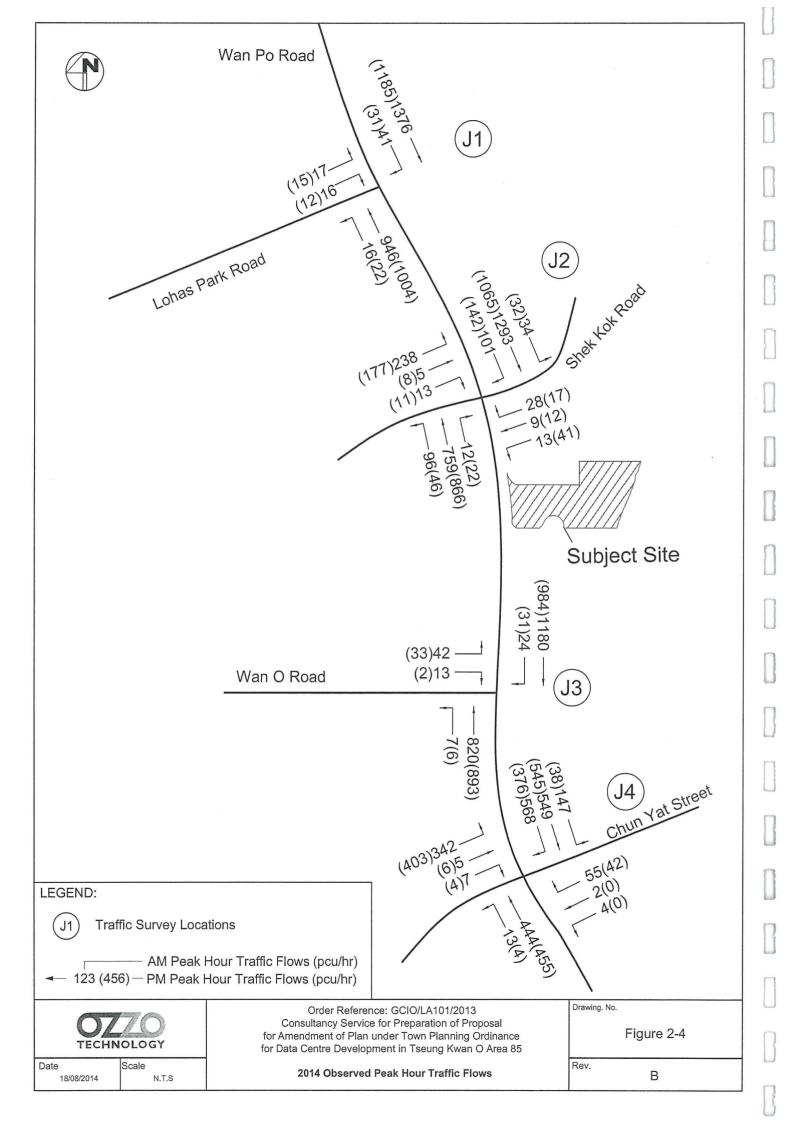


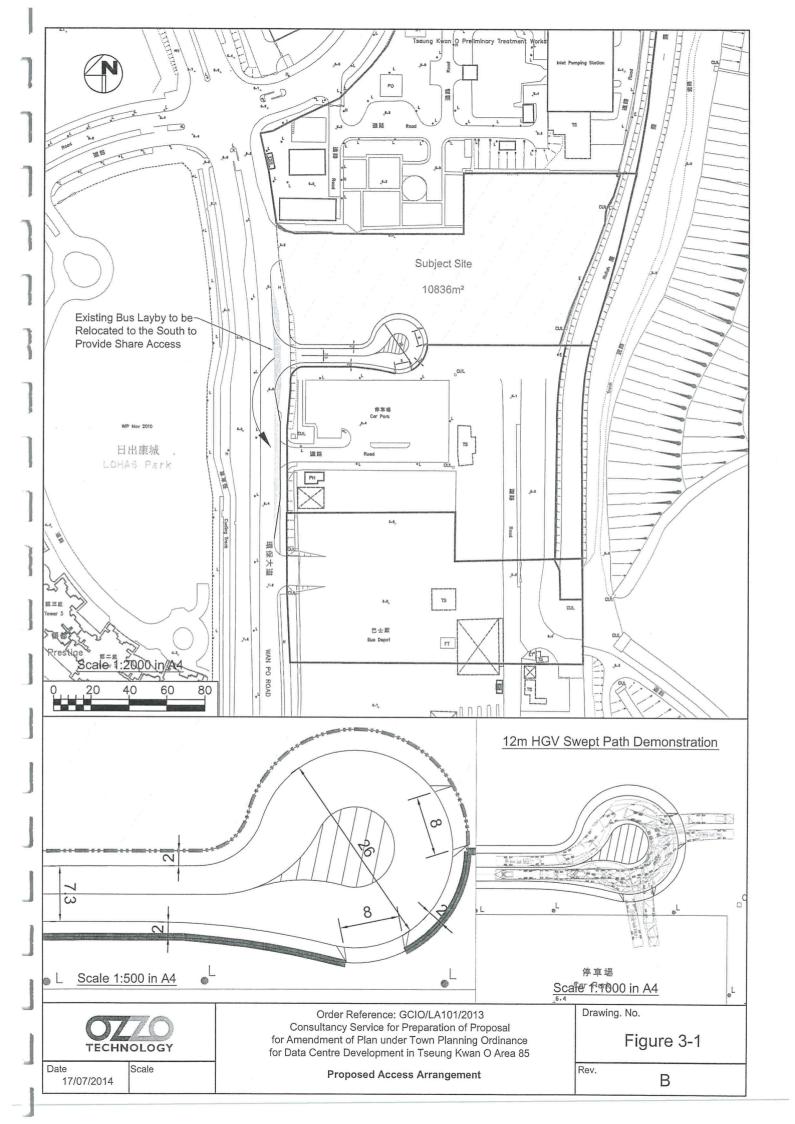
### **Figures**

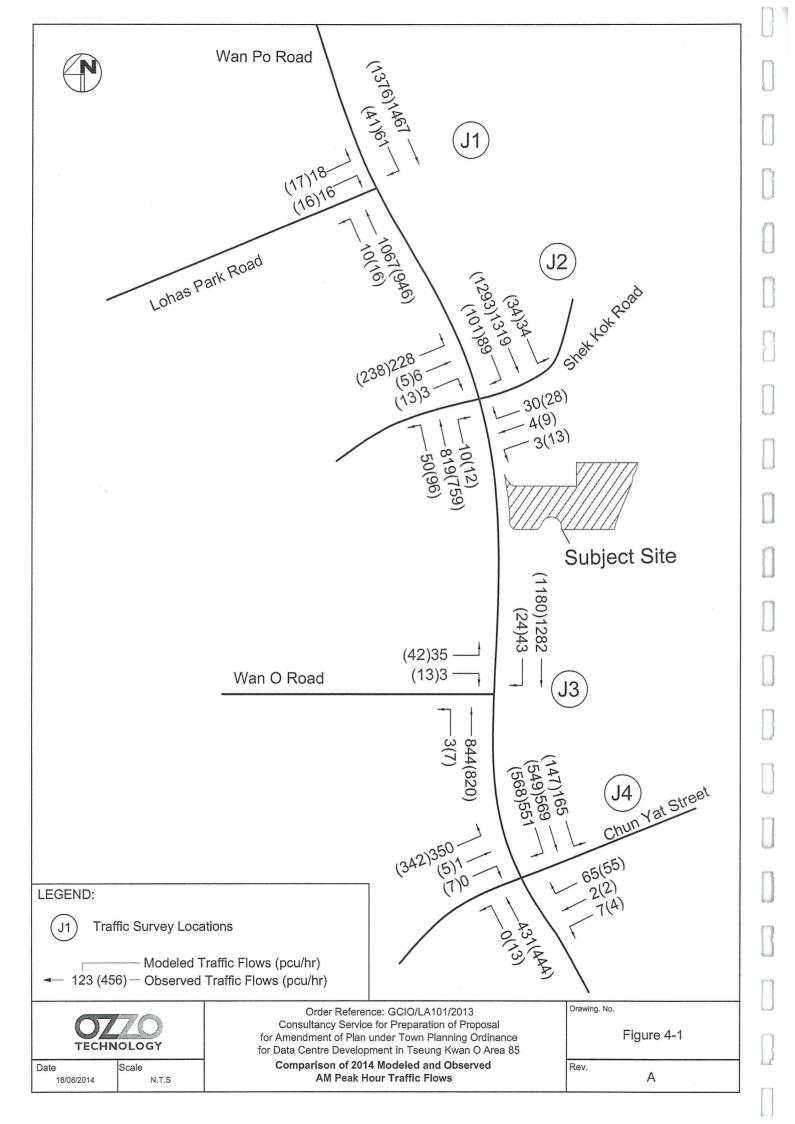


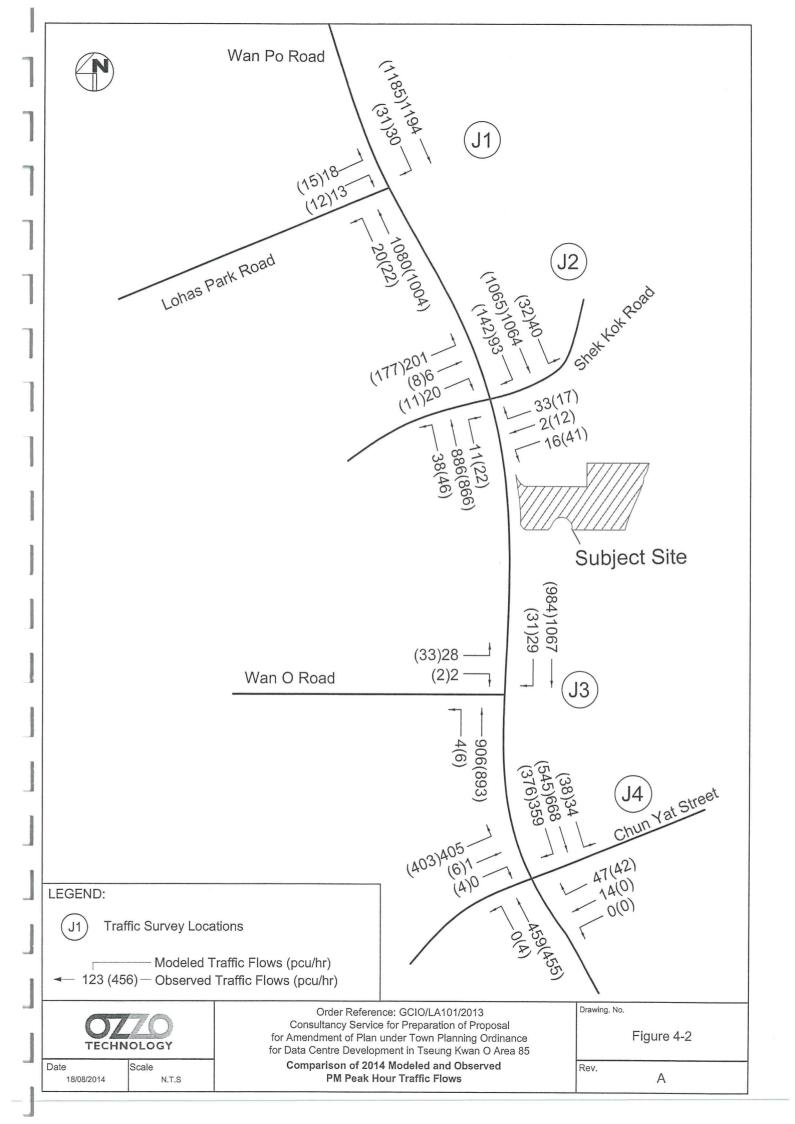


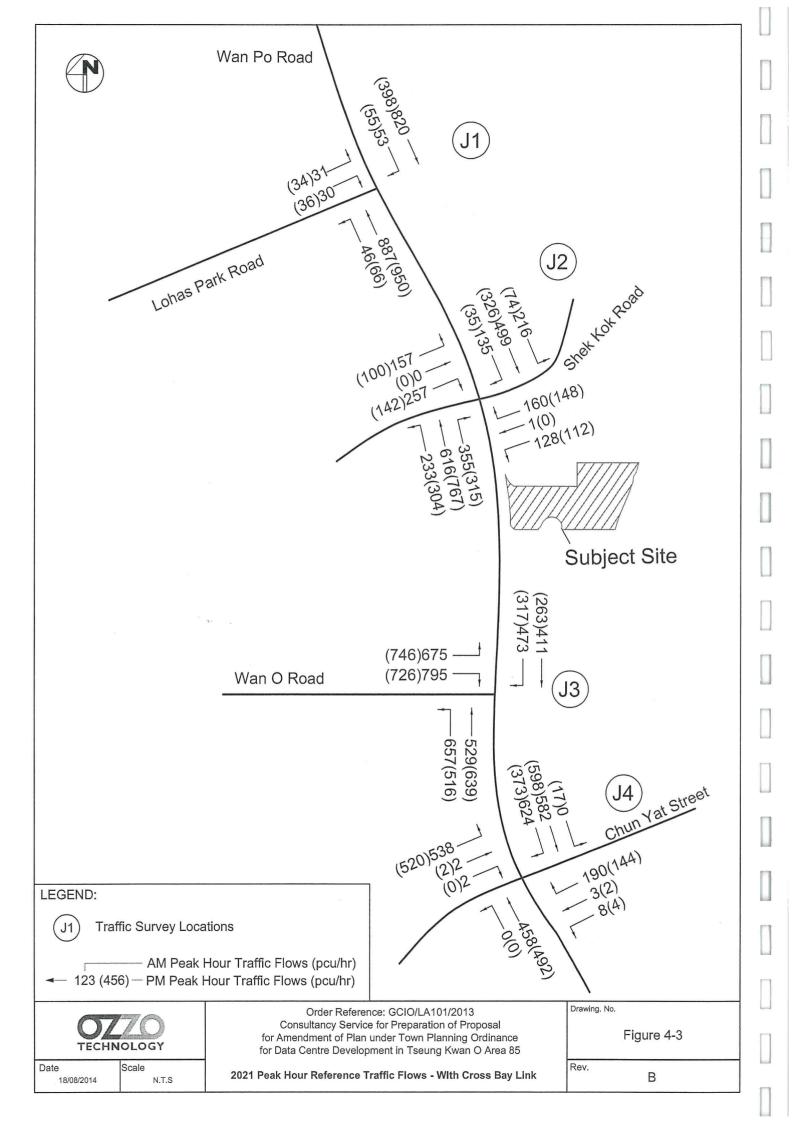


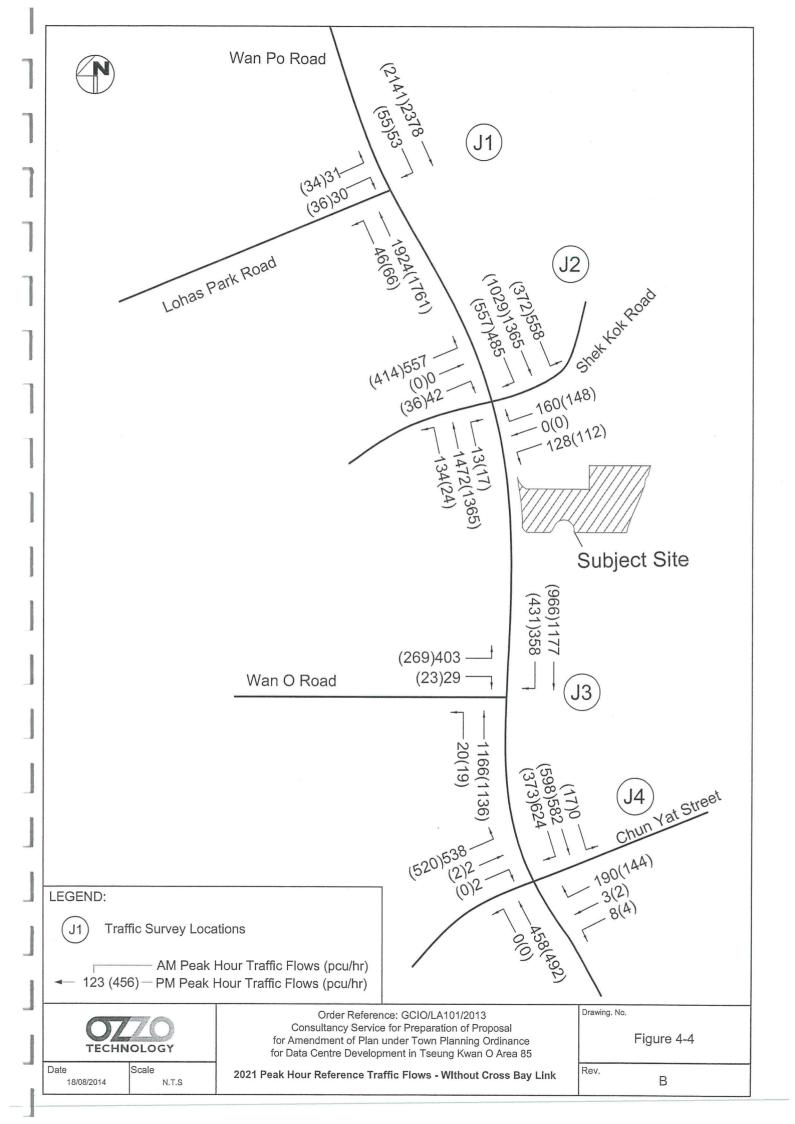


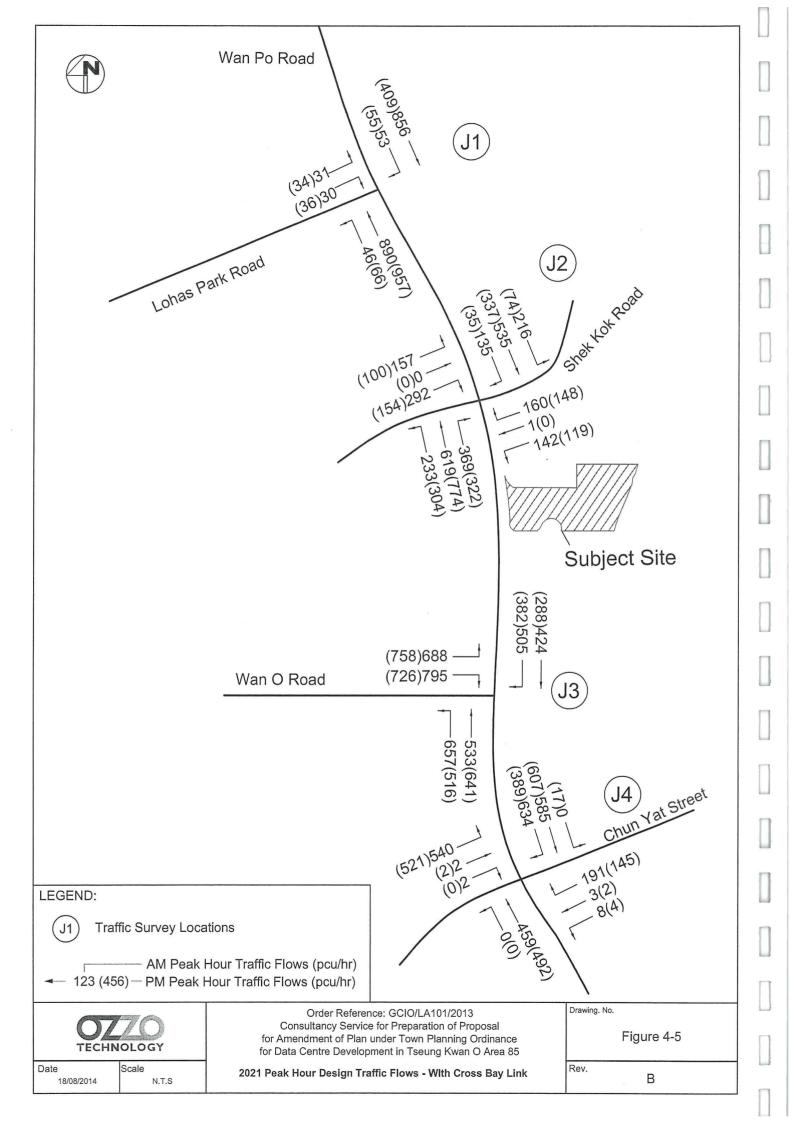


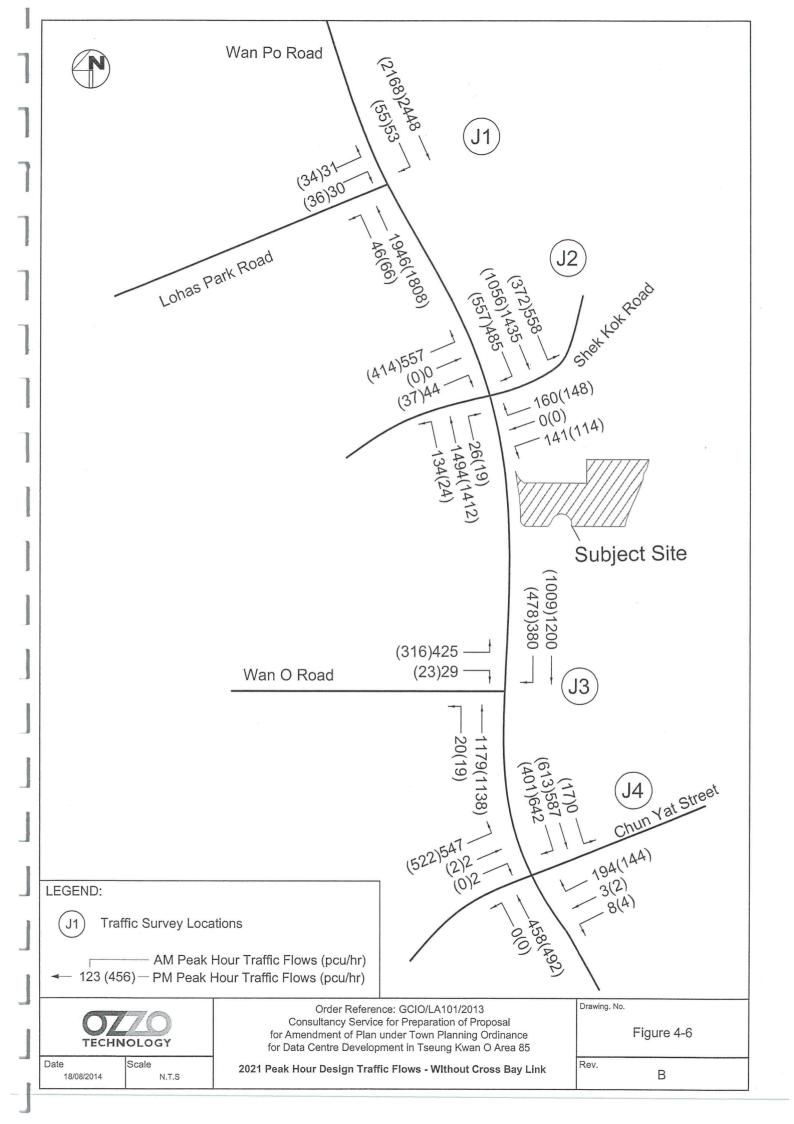










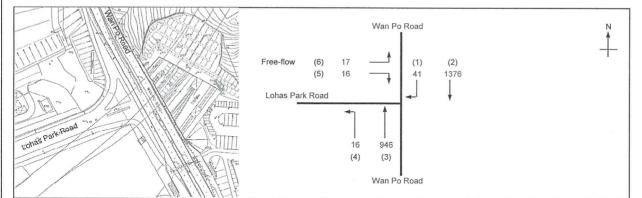




## Appendix A

2014 Junction Calculation Sheets





			Existing (	Cycle Time	
No. of stage	s per cycle	N =	3		
Cycle time		C =	115	sec	
Sum(y)		Y =	0.344	l	
Loss time		L =	18	sec	
Total Flow		=	2395	pcu	
Co	= (1.5*L+5)/(1-Y)	=	48.8	sec	
Cm	= L/(1-Y)	=	27.4	sec	
Yult		=	0.765		
R.C.ult	= (Yult-Y)/Y*100%	=	122.3	%	
Ср	= 0.9*L/(0.9-Y)	=	29.1	sec	
Ymax	= 1-L/C	=	0.843		
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	120.6	%	

(2) (2) (6) (4) (3)	(6) (1) (2)	(6) ————————————————————————————————————		Stage 1 2 3	75 15 10
Stage 1 Int = 6	Stage 2 Int = 6	Stage 3 Int = 6	Stage 4 Int =	1	

Pedestrian	Stage	Width	Green	n Time Requ	uired (s)	Green Time	Provided (s)
Phase		(m)	SG	FG	Delay	SG	FG
1							
						1	
1							
		1 1					

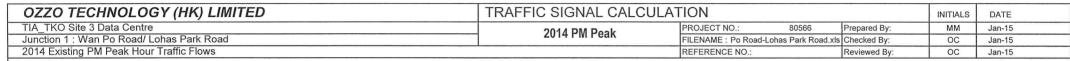
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	1	Movemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds)
																				16					COLUMN TO SERVICE
3	1	3.65	Α	3				6360		946		946	0.00	6360			6360	0.149			42	75	0.228	20	7
4	1	3.65	Α	1	12		N	1980	16			16	1.00	1760			1760	0.009			2	75 75	0.014	0	6
2	1,2	3.65	В	2			N	4100		1376		1376	0.00	4100	1		4100	0.336	0.336	2	95	96	0.402	21	2
1	2	3.65	С	1	16			2120			41	41	1.00	1938			1938	0.021			6	15	0.162	6	41
5	3	3.65	D	1	14			2120			16	16	1.00	1915			1915	0.008	0.008		2	10	0.098	0	45
	1																								
																					7			<b>经验价</b> 集	
									_												1.0				
																							<b>化学规则</b>	<b>阿利斯</b>	

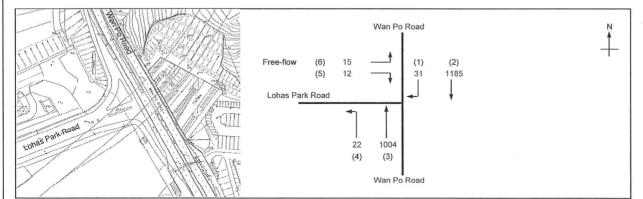
N - NEAR SIDE LANE

SG - STEADY GREEN

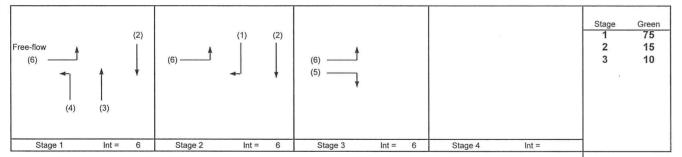
FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





			Existing C	ycle Time	
No. of stage	s per cycle	N =	3		
Cycle time		C =	115	sec	
Sum(y)		Y =	0.295		
Loss time		L =	18	sec	
Total Flow		=	2255	pcu	
Co	= (1.5*L+5)/(1-Y)	=	45.4	sec	
Cm	= L/(1-Y)	=	25.5	sec	
Yult		1=	0.765		
R.C.ult	= (Yult-Y)/Y*100%	=	159.0	%	
Ср	= 0.9 L/(0.9-Y)	=	26.8	sec	
Ymax	= 1-L/C	=	0.843		
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	157.0	%	



Pedestrian	Stage	Width	Gree	n Time Requ	uired (s)	Green Time	Provided (s)
Phase		(m)	SG	FG	Delay	SG	FG
		1 1					
		1 1					
		1					

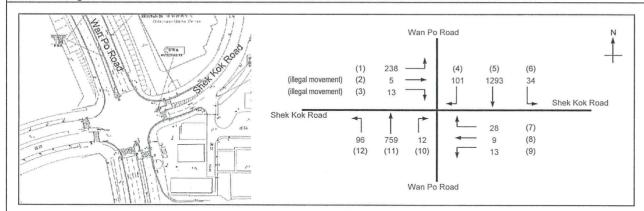
Move	Stag	e Lane	Phase	No. of	Radius	0	N	Straight-	1	Movemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width	1	lane		1	1	Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																				16			Service Service		
3	1	3.65	Α	3			1	6360		1004		1004	0.00	6360	1 1		6360	0.158			52	75	0.242	22	8
4	1	3.65	A	1	12	1	N	1980	22			22	1.00	1760			1760	0.013			4	75	0.019	0	6
2	1,2	3.65	В	2			N	4100		1185		1185	0.00	4100			4100	0.289	0.289	2	95	96	0.346	18	2
1	2	3.65	С	1	16		1	2120			31	31	1.00	1938			1938	0.016			5	15	0.123	0	41
5	3	3.65	D	1	14			2120			12	12	1.00	1915	1 1		1915	0.006	0.006		2	10	0.074	0	44
																		No. of the							
		1		1																			<b>建设建设</b>		
				1													1								
				1	1	l																			
				1.00																					
				1																					
			1																						
															1 1								<b>建设建筑</b>		
																							05,015,000		

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s

#### OZZO TECHNOLOGY (HK) LIMITED TRAFFIC SIGNAL CALCULATION INITIALS DATE TIA TKO Site 3 Data Centre PROJECT NO .: 80566 Prepared By: MM Jan-15 2014 AM Peak Junction 2 : Wan Po Road/ Shek Kok Road FILENAME : Shek Kok Road 20141006.xls Checked By: OC Jan-15 2014 Existing AM Peak Hour Traffic Flows REFERENCE NO.: Reviewed By: ОС Jan-15



			Existing Cycle	Γime	
No. of sta	ges per cycle	N =	4		
Cycle time	e	C =	115 sec		
Sum(y)		Y =	0.614		
Loss time		L =	19 sec		
Total Flow	t .	=	2599 pcu		
Co	= (1.5*L+5)/(1-Y)	=	86.7 sec		
Cm	= L/(1-Y)	=	49.2 sec		
Yult		=	0.758		
R.C.ult	= (Yult-Y)/Y*100%	=	23.4 %	9	
Ср	= 0.9*L/(0.9-Y)	=	59.7 sec		
Ymax	= 1-L/C	=	0.835		
				- 1	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	22.4 %	-	

(1)	(P1) <> (P2)	(P4)  (P5) (P3)	(4) (P2)	(5)   	(6) (A) (P5)	(P6) ↑ ↓ (P2)	£ .	(7) (8) (9)	(P6)	(11)	(10)	(P5) (P3)
Sta	age 1 Int	=	Stage 2	Int =	6	Stage 3	Int =	6	Stage	4	Int =	5

Phase         Phase         (m)         SG         FG         Delay           P1         P1         1         7         5         6         5           P2         P2         2,3,4         11         5         10         2           P3         P3         1,4         7.3         5         7         6           P4         P4         1         4         5         4         5	FG 6	Delay 5
P2 P2 2,3,4 11 5 10 2 P3 P3 1,4 7.3 5 7 6		E
P3 P3 1,4 7.3 5 7 6		5
	10	2
P4 P4 1 4 5 4 5	7	6
	4	5
P5 P5 1,2,4 7.3 5 7 2	7	2
P6 P6 3,4 7.3 5 7 2	7	2
2		7

								,																	
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	1	Moveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																				13	1 1		<b>美洲</b> 加斯维		
1,2,3	1	3.65		2	25		N	4100	238	5	13	256	0.98	3872			3872	0.066	0.066	6	10	16	0.465	21	43
4	2	3.65		1	25			2120			101	101	1.00	2000			2000	0.051		1	8	48	0.121	6	19
5,6	2	3.65		2	25		N	4100	34	1293		1326	0.03	4094	1		4094	0.324	0.324		51	48	0.776	72	29
7	3	3.65		1	25			2120			28	28	1.00	2000			2000	0.014	0.014		2	6	0.266	6 72 0	53
8,9	3	3.65		1	25		N	1980	13	9	0.000	22	0.58	1913			1913	0.011			2	6	0.215	0	51
10	4	3.65		1	25			2120			12	12	1.00	2000			2000	0.006			1	32	0.021	0	27
11,12	4	3.65		2	25		N	4100	96	759	0.000	855	0.11	4073			4073	0.210	0.210		33	32	0.754	57	38
														10.0			10.0	0.2.10	0.2.10		"				
																					1				
																						<b>经</b> 公益品	能增加		
																							为其他知识		
				L										L									<b>发现的影响和</b>	探察問題的語	TERRESPOND

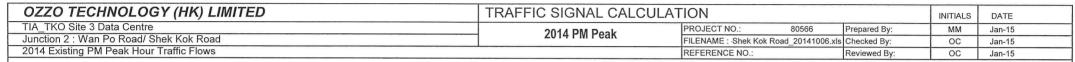
NOTE: O - OPPOSING TRAFFIC

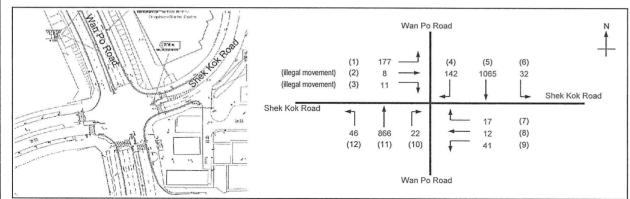
N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





			Existing (	Cycle Time
No. of sta	ges per cycle	N =	4	
Cycle time	е	C =	115	sec
Sum(y)		Y =	0.569	
Loss time		L =	21	sec
Total Flow	v	=	2437	pcu
Co	= (1.5*L+5)/(1-Y)	=	84.7	sec
Cm	= L/(1-Y)	=	48.7	sec
Yult		=	0.743	
R.C.ult	= (Yult-Y)/Y*100%	=	30.5	%
Ср	= 0.9*L/(0.9-Y)	=	57.1	sec
Ymax	= 1-L/C	=	0.817	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	29.3	%

-		(P4)   (P5)  (P2)  (P2)	(4) > (P2)	(5) (6) (5) (7) (7) (7) (7) (7) (7) (7) (7) (7) (7	(P6) 	(7) (8) (9)	(P6)	(10)
L	Stage 1	Int =	Stage 2	Int = 6	Stage 3	Int = 6	Stage 4	Int = 5

Phase         Phase         (m)         SG           P1         P1         1         7         5           P2         P2         2,3,4         11         5           P3         P3         1,4         7.3         5	FG 6 10	Delay 5 2	5 86	FG 6	Delay 5
P2 P2 2,3,4 11 5	10				5
		2	96		
P3 P3 1,4 7.3 5			00	10	2
	7	6	44	7	6
P4 P4 1 4 5	5	5	6	5	5
P5 P5 1,2,4 7.3 5	7	2	91	7	2
P6 P6 3,4 7.3 5	7	2	40	7	2

Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-		Moveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment	1	Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Χ -	(m / lane)	(seconds)
					1															13				A POPULATION OF THE PARTY OF TH	
1,2,3	1	3.65		2	25		N	4100	177	8	11	196	0.96	3877			3877	0.050	0.050	8	8	16	0.355	15	42
4	2	3.65		1	25			2120			142	142	1.00	2000			2000	0.071			12	43	0.190	12	22
5,6	2	3.65		2	25		N	4100	32	1065		1097	0.03	4093			4093	0.268	0.268		44	43	0.716	63	22 30
7	3	3.65		1	25			2120			17	17	1.00	2000			2000	0.009			1	7	0.140	0	48
8,9	3	3.65		1	25		N	1980	41	12		52	0.78	1892			1892	0.027	0.027		5	7	0.452	6	59
10	4	3.65		1	25			2120			22	22	1.00	2000	1		2000	0.011			2	36	0.034	0	25
11,12	4	3.65		2	25		N	4100	46	866		912	0.05	4088			4088	0.223	0.223		37	36	0.713	60	35
		1																							
		l .																							
		1																							

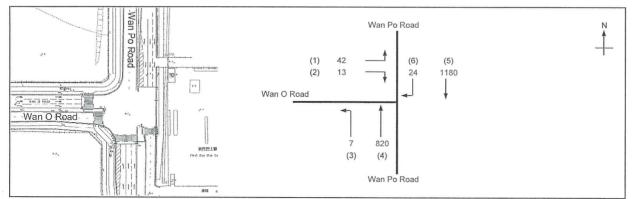
N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





			Existing C	Cycle Time	
No. of stag	es per cycle	N =	3		
Cycle time		C =	115	sec	-
Sum(y)		Y =	0.329		
Loss time		L =	40	sec	
Total Flow		=	2085	pcu	
Co	= (1.5*L+5)/(1-Y)	=	96.9	sec	
Cm	= L/(1-Y)	=	59.7	sec	
Yult		=	0.600		
R.C.ult	= (Yult-Y)/Y*100%	=	82.1	%	
Ср	= 0.9*L/(0.9-Y)	=	63.1	sec	
Ymax	= 1-L/C	=	0.652		
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	78.1	%	

(1)	(P3) ↑		(5)	(P3) ↑	(6)				
$ \uparrow \\ \downarrow \\ (P1) \qquad (P2) $	-	(3) (4)		<->	<->→				
Stage 1 Int =	9 Stage	2 Int =	6	Stage 3	Int =	6	Stage 4	Int =	

Pedestrian	Stage	Width	Greer	Time Re	quired (s)	Greer	Time Provi	ded (s)
Phase		(m)	SG	FG	Delay	SG	FG	Delay
P1	1	7.3	5	6	10	8	6	10
P2	1,3	11	5	9	2	24	9	2
P3	2,3	7.3	5	6	6	73	6	6
P4	3	11	5	9	2	9	9	2

Move-	Stage	Lane	Phase	No. of	Radius	0	N-	Straight-	٨	1ovemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																				21		46为86			And South
1,2	1	3.65		1	20		N	1980	42		13	54	1.00	1842			1842	0.029	0.029	8	7	15	0.225	6	42
5	2	3.65		2			N	4100		1180		1180	0.00	4100			4100	0.288	0.288		66	65	0.509	48	14
4	2	3.65		2				4240		820		820	0.00	4240			4240	0.193			44	65	0.342	33	12
3	2	3.65		1	20		N	1980	7			7	1.00	1842			1842	0.004			1	65	0.006	0	10
6	3	3.65		1	20			2120			24	24	1.00	1972			1972	0.012	0.012	11	3	14	0.101	0	41
																					- 1				
																						12.71		100000000000000000000000000000000000000	

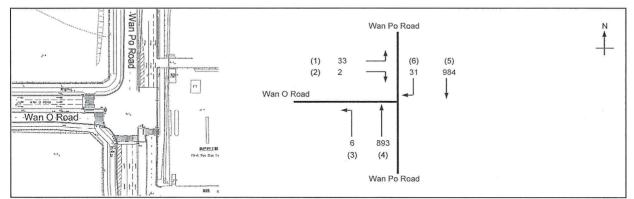
N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





		[	Existing C	Cycle Time		_
No. of stag	ges per cycle	N =	3	Ē		
Cycle time	e	C =	115	sec	1	
Sum(y)		Y =	0.275			
Loss time		L=	41	sec		
Total Flow	r	=	1948	pcu	1	
Co	= (1.5*L+5)/(1-Y)	=	91.7	sec		
Cm	= L/(1-Y)	=	56.5	sec		
Yult		=	0.593		1	
R.C.ult	= (Yult-Y)/Y*100%	=	115.8	%		
Ср	= 0.9*L/(0.9-Y)	=	59.0	sec		
Ymax	= 1-L/C	=	0.643			
		1				
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	110.9	%		

(1)	(P3) ↑ ↓		(5)	(P3) ↑	(6)		
↑   V (P1) (P2)	(3)	(4)		<->→	<->→ (P4)		
Stage 1 Int = 9	Stage 2	Int =	6	Stage 3	Int = 6	Stage 4	Int =

Pedestrian	Stage	Width	Greer	Time Re	equired (s)	Green	Time Provi	ded (s)
Phase		(m)	SG	FG	Delay	SG	FG	Delay
P1	1	7.3	5	6	10	8	6	10
P2	1,3	11	5	9	2	24	9	2
P3	2,3	7.3	5	6	6	73	6	6
P4	3	11	5	9	2	9	9	2

Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	V	Moveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(second
																				21					
1,2	1	3.65		1	20		N	1980	33		2	35	1.00	1842	1 1		1842	0.019	0.019	10	5	15	0.145	0	41
5	2	3.65		2			N	4100		984		984	0.00	4100			4100	0.240	0.240		65	65	0.424	39	13
4	2	3.65		2				4240		893		893	0.00	4240			4240	0.211			57	65	0.373	36	13
3	2	3.65		1	20		N	1980	6			6	1.00	1842	1 1		1842	0.003			1	65	0.006	0	10
6	3	3.65		1	20			2120			31	31	1.00	1972			1972	0.016	0.016	10	4	14	0.130	0	42
																					-				

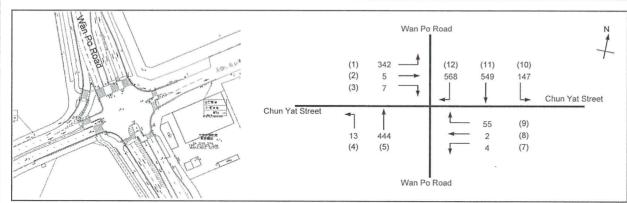
N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s

OZZO TECHNOLOGY (HK) LIMITED	TRAFFIC SIGNAL CALCU	LATION		INITIALS	DATE
TIA_TKO Site 3 Data Centre	2014 AM Peak	PROJECT NO.: 80566	Prepared By:	MM	Jan-15
Junction 4 : Wan Po Road/ Chun Yat Street	2014 AIVI Fedit	FILENAME : n Po Road-Chun Yat Street.xls	Checked By:	ОС	Jan-15
2014 Existing AM Peak Hour Traffic Flows		REFERENCE NO.:	Reviewed By:	ОС	Jan-15



				All and the second seco	
			Existing Cyc	cle Time	 
No. of stag	es per cycle	N =	5		
Cycle time		C =	115 se	ec	
Sum(y)		Y =	0.326		
Loss time		L=	43 se	ec	
Total Flow		=	2134 pc	cu	
Co	= (1.5*L+5)/(1-Y)	=	103.2 se	ec	
Cm	= L/(1-Y)	=	63.8 se	ec	
Yult		=	0.578	1	
R.C.ult	= (Yult-Y)/Y*100%	=	77.0 %	.	
Ср	= 0.9*L/(0.9-Y)	=	67.5 se	ec	
Ymax	= 1-L/C	=	0.626		
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	72.7 %	.	

	(11) (10)									Pedestrian	Stage	Width	Green	Time Red	quired (s)	Green	Time Provid	ded (s)
(P1)		(12)	(11) (10)		12) (P7)		(P8)	(P1)		Phase		(m)	SG	FG	Delay	SG	FG	Delay
I Fig.	<b>♦</b>	(1)		(1)			<b>&lt;</b> ·····>	Pri.		P1	1,5	4	5	5	5	36	5	5
1 3		<b> </b>	<b>†</b>		7 &	(1) —J		Ä	<b>A</b>	P2	1,2,3,5	3.5	5	5	5	89	5	5
<b>A</b>	A	<b>^</b>	A	<b>^</b>	A	(2)	<b>A</b>	<b>A</b>	(9)	P3	4	7.3	5	6	9	6	6	9
(P2) 🕏	<b>V</b>	(P2) 🕏	<b>.</b>	(P2) 🕏	(P6)₩	(3)	(P6)₩	(P2) 🕏	<b>←</b> (8)	P4	2,3,4,5	11	5	9	2	78	9	2
	(P6)		(P6)			A *			(7)	P5	3	7.3	5	6	7	40	6	7
- →	<b>A</b>					₩			*	P6	1,2,3,4	5	5	5	2	79	5	2
		<b>⟨</b> >		<>	<>	(P3) <b>&lt;</b> ····>		4		P7	3	5	5	5	5	43	5	5
(4) (	5)	(P4)		(P4)	(P5)	(P4)		(P4)		P8	4	7.3	5	6	2	13	6	2
						, ,								-	_	1,5	-	_
Stage 1	Int = 7	Stage 2	Int = 9	Stage 3 Int =	:	Stage 4	Int = 5	Stage 5 I	nt = 9						1			

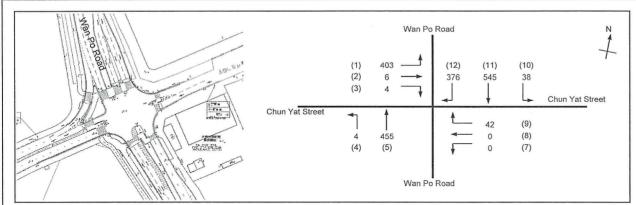
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	1	Movemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised		1		а	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds)
																				26		SCHOOL SECTION	Na Walley	物的原则	
1	2,3,4	3.65		1	30		N	1980	342			342	1.00	1886			1886	0.181	0.181		40	53	0.393	30	20
2,3	4	3.65		1	20			2120		5	7	12	0.60	2029	1 1		2029	0.006		15	1	16	0.042	0	39
4,5	1	3.65		1	15		N	1980	13	208		221	0.06	1969			1969	0.112	0.112		25	26	0.495	30	38
5	1	3.65		1				2120	ŀ	236		236	0.00	2120			2120	0.111			25	26	0.493	30	38 49
7,8,9	5	4.00		1	13		N	2015	4	2	55	60	0.97	1813	1 1		1813	0.033	0.033	2	7 -	11	0.347	6	49
10,11	1,2	3.65		1	11		N	1980	147	180		327	0.45	1866			1866	0.175			39	44	0.457	36	26
11	1,2	3.65		1				2120		369		369	0.00	2120			2120	0.174			38	44	0.455	42	26
12	2,3	3.65		2	20			4240			568	568	1.00	3944			3944	0.144			32	35	0.473	36	30

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s

OZZO TECHNOLOGY (HK) LIMITED	TRAFFIC SIGNAL CALCULA	TION			INITIALS	DATE
TIA_TKO Site 3 Data Centre	2014 PM Peak	PROJECT NO.: 8056	6 F	Prepared By:	MM	Jan-15
Junction 4 : Wan Po Road/ Chun Yat Street	2014 FWI FEAK	FILENAME : n Po Road-Chun Yat :	Street.xls C	Checked By:	ОС	Jan-15
2014 Existing PM Peak Hour Traffic Flows		REFERENCE NO.:	F	Reviewed By:	oc	Jan-15



			Existing (	Cycle Time		
No. of stages	s per cycle	N =	5			
Cycle time		C =	115	sec		
Sum(y)		Y =	0.349			
Loss time		L =	47	sec		
Total Flow		=	1871	pcu	i	
Co	= (1.5*L+5)/(1-Y)	=	116.0	sec		
Cm	= L/(1-Y)	=	72.2	sec		
Yult		=	0.548		1	
R.C.ult	= (Yult-Y)/Y*100%	=	56.9	%		
Ср	= 0.9*L/(0.9-Y)	=	76.8	sec	1	
Ymax	= 1-L/C	=	0.591		1	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	52.5	%		

	(11) (10)									Pedestrian	Stage	Width	Greer	Time Re	quired (s)	Green	Time Provid	led (s)
(P1)	1 1	(12)	(11) (10)	(12	(P7)		(P8)	(P1)		Phase		(m)	SG	FG	Delay	SG	FG	Delay
I.	<b>↓</b> L <sub>►</sub>	(1)		(1) 🛦			<b>←&gt;</b>	Fig.		P1	1,5	4	5	5	5	36	5	5
Ä			<b>♦ L</b> ►		₩	(1)		Ä	<b>A</b>	P2	1,2,3,5	3.5	5	5	5	89	5	5
<b>A</b>	A	A	A	A	A	(2) →	A	A	(9)	P3	4	7.3	5	6	9	6	6	9
(P2) V	V	(P2) 😾	V	(P2) ¥	(P6)V	(3)	(P6)₩	(P2) 😾	<b>◄</b> (8)	P4	2,3,4,5	11	5	9	2	78	9	2
	(P6)		(P6)			A *			(7)	P5	3	7.3	5	6	7	40	6	7
- ◆1	<b>A</b>					₩			*	P6	1,2,3,4	5	5	5	2	79	5	2
		<b>←</b> →		<>	<b>&lt;</b> ····>	(P3) <b>←</b> ···>		<b>←</b> >		P7	3	5	5	5	5	43	5	5
(4) (	5)	(P4)		(P4)	(P5)	(P4)		(P4)		P8	4	7.3	5	6	2	13	6	2
		0.00		1000 AV				Nº 51										
Stage 1	Int = 7	Stage 2	Int = 9	Stage 3 Int =		Stage 4	Int = 5	Stage 5 In	nt = 9									

Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-		Moveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																				26					<b>建端</b>
1	2,3,4	3.65		1	30		N	1980	403	1		403	1.00	1886			1886	0.214	0.214		42	53	0.464	36	21
2,3	4	3.65		1	20			2120		6	4	9	0.38	2061	1 1		2061	0.004		15	1	16	0.032	0	39
4,5	1	3.65		1	15		N	1980	4	218		222	0.02	1977			1977	0.112	0.112		22	26	0.496	30	38
5	1	3.65		1				2120		237		237	0.00	2120			2120	0.112			22	26	0.494	30	38
7,8,9	5	4.00		1	13	l	N	2015	0	0	42	42	1.00	1807	1		1807	0.023	0.023	6	5	11	0.242	6	46
10,11	1,2	3.65		1	11		N	1980	38	242		280	0.13	1944			1944	0.144			28	44	0.376	30	24
11	1,2	3.65		1				2120		303		303	0.00	2120			2120	0.143			28	44	0.374	30	24
12	2,3	3.65		2	20			4240		ł	376	376	1.00	3944			3944	0.095			19	35	0.313	24	28

N - NEAR SIDE LANE

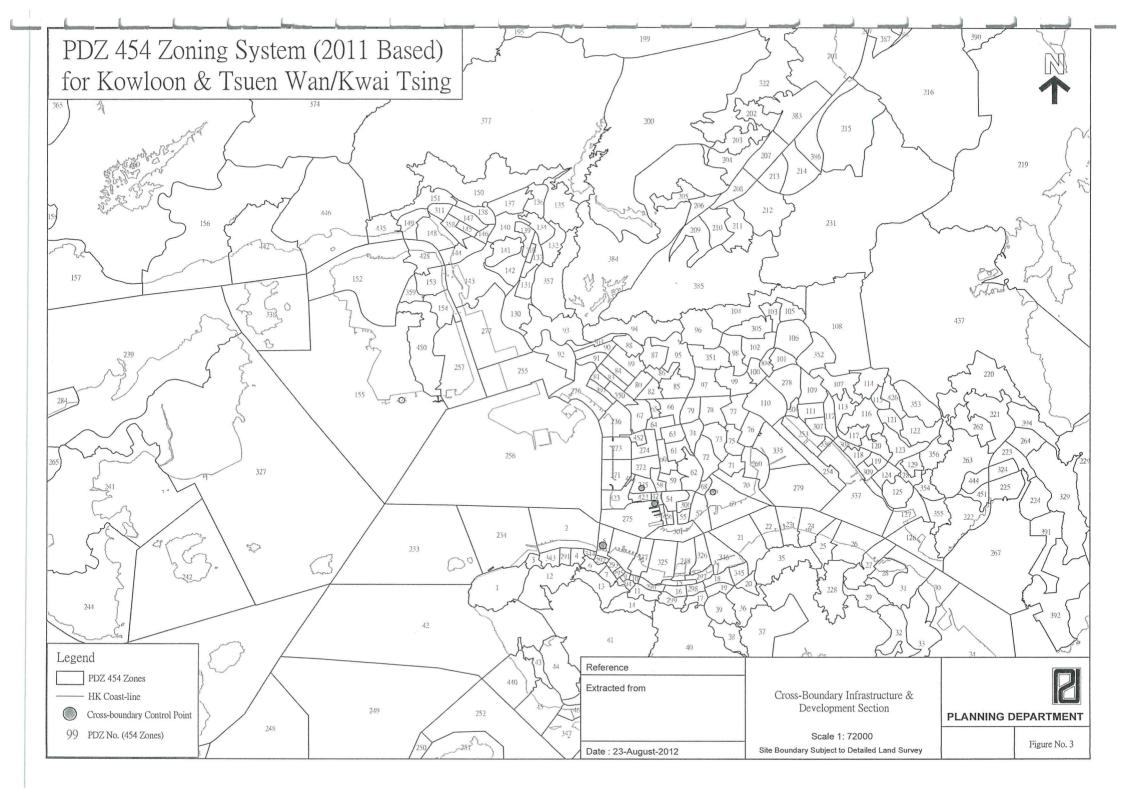
SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s



### Appendix B

TPEDM PDZ Zoning Map





### Appendix C

Tranposrt Department Circular 6/2012

### Standards for Goods Vehicle Parking and Loading/Unloading for Data Centres

Type of Development	Standards	Remarks
Data Centre	- For the first 20,000 m <sup>2</sup> GFA: 1 goods vehicle bay per 3,400- 3,800m <sup>2</sup> GFA	Refer to Notes i - vii
	- For the floor space above 20,000 m <sup>2</sup> GFA: 1 goods vehicle bay per 5,500-6,100m <sup>2</sup> GFA	

#### Notes:

- i. At least one goods vehicle bay for M/HGV should be provided at each building block.
- ii. Factors including road traffic conditions in the vicinity, nearby supply/demand of GV parking and loading/unloading spaces, and proximity and convenience of access to public transport etc., will be considered in finalizing the exact requirements, which shall be within the range specified in the above table.
- iii. Provision referring to gross floor area (GFA) includes part thereof of the specified m<sup>2</sup> GFA.
- iv. 60% of the above required spaces shall be for loading/unloading and the remaining 40% shall be for parking.
- v. 65% of the above required spaces shall be for LGV and the remaining 35% shall be for M/HGV.
- vi. Dimensions of goods vehicle bay should follow HKPSG as follows:

Goods Vehicle Bay for	Length (m)	Width (m)	Minimum Headroom (m)
LGV	7	3.5	3.6
M/HGV	11	3.5	4.7

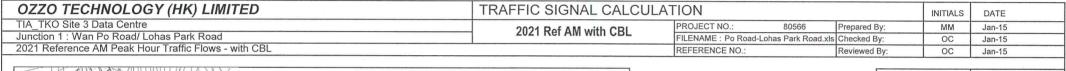
vii. Any future change of land use from the intended use for data centres may result in a different parking and loading/unloading requirements. Prior to approving such a change of land use, the developer must demonstrate to the satisfaction of C for T that adequate parking and loading/unloading facilities in accordance with prevailing HKPSG will be provided as part of the proposed development associated with the change of land use.

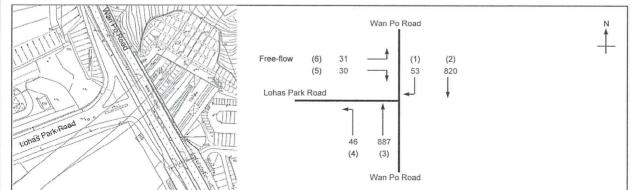
Transport Department 4 May 2012



### Appendix D

2021 Junction Calculation Sheets





			Existing (	Cycle Time
No. of stage	es per cycle	N =	3	
Cycle time		C =	115	sec
Sum(y)		Y =	0.216	
Loss time		L =	18	sec
Total Flow		=	1836	pcu
Co	= (1.5*L+5)/(1-Y)	=	40.8	sec
Cm	= L/(1-Y)	=	22.9	sec
Yult		=	0.765	
R.C.ult	= (Yult-Y)/Y*100%	=	254.7	%
Ср	$= 0.9 \times L/(0.9 - Y)$	=	23.7	sec
Ymax	= 1-L/C	=	0.843	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	252.0	%

Free-flow (6) (4)	(3)	(2)	(6)	(1)	(2)	(6) <b>1</b> (5) <b>1</b>					Stage 1 2 3	Green 75 15 10
Stage 1	Int =	6	Stage 2	Int =	6	Stage 3	Int =	6	Stage 4	Int =		

Pedestrian	Stage	Width	Gree	n Time Req	uired (s)	Green Time	Provided (s)
Phase		(m)	SG	FG	Delay	SG	FG
						1	

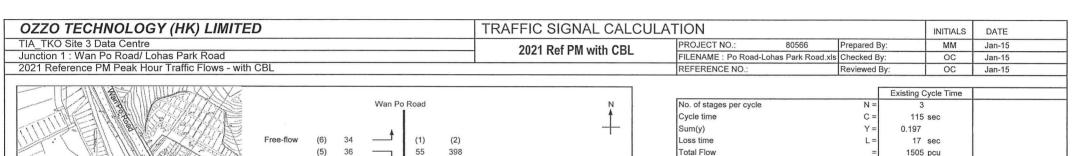
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	1	Moveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width	1	lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																				16					CONTRACTOR OF THE PARTY OF THE
3	1	3.65	A	3				6360		887		887	0.00	6360	1 1		6360	0.139			63	75	0.214	18	7
4	1	3.65	A	1	12		N	1980	46			46	1.00	1760	1 1		1760	0.026			12	75	0.040	0	6
2	1,2	3.65	В	2			N	4100		820		820	0.00	4100	1 1		4100	0.200	0.200	2	90	96	0.240	12	2
1	2	3.65	С	1	16			2120			53	53	1.00	1938	1 1		1938	0.027			12	15	0.210	6	42
5	3	3.65	D	1	14			2120			30	30	1.00	1915	1 1		1915	0.016	0.016		7	10	0.180	0	46
																								10 mm	
																	l l								
												9													
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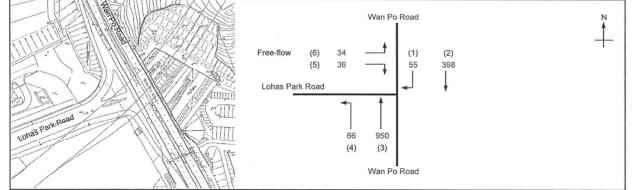
N - NEAR SIDE LANE

SG - STEADY GREEN

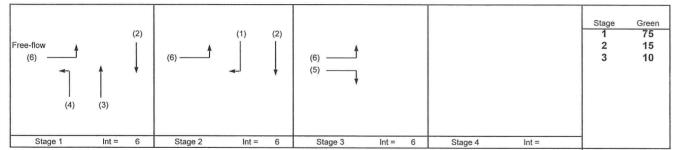
FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





		1		
			Existing 0	Cycle Time
No. of stag	es per cycle	N =	3	
Cycle time		C =	115	sec
Sum(y)		Y =	0.197	
Loss time		L =	17	sec
Total Flow		=	1505	pcu
Co	= (1.5*L+5)/(1-Y)	=	38.0	sec
Cm	= L/(1-Y)	=	21.2	sec
Yult		=	0.773	
R.C.ult	= (Yult-Y)/Y*100%	=	293.0	%
Ср	= 0.9*L/(0.9-Y)	=	21.7	sec
Ymax	= 1-L/C	=	0.852	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	290.2	%



Pedestrian	Stage	Width	Green	n Time Requ	Green Time Provided (s)					
Phase		(m)	SG	FG	Delay	SG	FG			

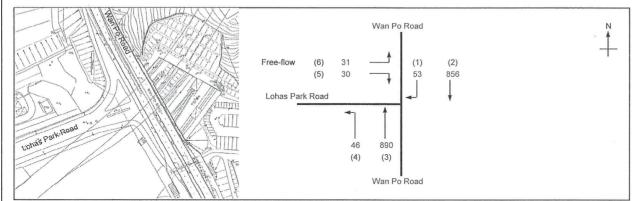
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-		Movemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane	1			Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds)
																				15					
3	1	3.65	Α	3				6360		950		950	0.00	6360	1		6360	0.149	0.149		74	75	0.229	20	7
4	1	3.65	Α	1	12		N	1980	66			66	1.00	1760			1760	0.038			19	75	0.058	0	-7
2	1,2	3.65	В	2			N	4100		398		398	0.00	4100			4100	0.097		2	48	96	0.116	6	2
1	2	3.65	С	1	16			2120			55	55	1.00	1938			1938	0.028	0.028		14	15	0.218	6	42
5	3	3.65	D	1	14			2120			36	36	1.00	1915			1915	0.019	0.019		9	10	0.216	6	47
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																							*		

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





			Existing (	Cycle Time
No. of stage	es per cycle	N =	3	
Cycle time		C =	115	sec
Sum(y)		Y =	0.224	
Loss time		L =	18	sec
Total Flow		=	1875	pcu
Co	= (1.5*L+5)/(1-Y)	=	41.3	sec
Cm	= L/(1-Y)	=	23.2	sec
Yult		=	0.765	
R.C.ult	= (Yult-Y)/Y*100%	=	240.8	%
Ср	= 0.9*L/(0.9-Y)	=	24.0	sec
Ymax	= 1-L/C	=	0.843	
		i		
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	238.2	%

Free-flow (2) (6) (4) (3)	(6) (1) (2)	(6) ————————————————————————————————————		Stage Green 1 75 2 15 3 10
Stage 1 Int = 6	Stage 2 Int = 6	Stage 3 Int = 6	Stage 4 Int =	

Pedestrian	Stage	Width	Gree	n Time Requ	uired (s)	Green Time	Provided (s)
Phase		(m)	SG	FG	Delay	SG	FG

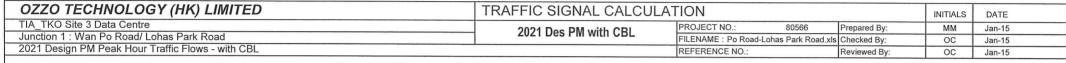
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	N	/lovemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds)
																				16			<b>1000 AND TO THE PARTY OF THE P</b>		
3	1	3.65	Α	3				6360		890		890	0.00	6360			6360	0.140			60	75	0.215	18	7
4	1	3.65	Α	1	12		N	1980	46			46	1.00	1760			1760	0.026			11	75	0.040	0	6
2	1,2	3.65	В	2			N	4100		856		856	0.00	4100			4100	0.209	0.209	2	90	96	0.250	12	2
1	2	3.65	С	1	16			2120			53	53	1.00	1938	1 1		1938	0.027			12	15	0.210	6	42
5	3	3.65	D	1	14			2120			30	30	1.00	1915			1915	0.016	0.016		7	10	0.180	0	46
	6																								
1																									
1			1					1																	

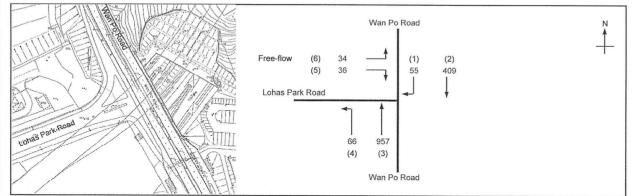
N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





			Existing C	Cycle Time	
No. of stag	ges per cycle	N =	3		
Cycle time		C =	115	sec	
Sum(y)		Y =	0.198	1	
Loss time		L =	17	sec	
Total Flow		=	1523	pcu	
Co	= (1.5*L+5)/(1-Y)	=	38.0	sec	
Cm	= L/(1-Y)	=	21.2	sec	
Yult		=	0.773	1	
R.C.ult	= (Yult-Y)/Y*100%	=	290.8	%	
Ср	= 0.9 L/(0.9 Y)	=	21.8	sec	
Ymax	= 1-L/C	=	0.852	1	
				1	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	288.0	%	

Free-flow (6)  (4)	(3)	(2)	(6)	(1)	(2)	(6) <b>1</b> (5) <b>1</b>					Stage 1 2 3	75 15 10
Stage 1	Int =	6	Stage 2	Int =	6	Stage 3	Int =	6	Stage 4	Int =	-	

Pedestrian	Stage	Width	Gree	n Time Requ	uired (s)	Green Time	Provided (s)
Phase		(m)	SG	FG	Delay	SG	FG

Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-		Anuama		Tatal	Descrition	0-4	F	01									
	Otage	Width	1 Hase	1. NOVE 1/1 1905	Madius		"			Moveme		Total	Proportion	Sat.	Flare lane	Share	Revised		1		9	g	Degree of	Queue	Average
ment		***************************************		lane				Ahead		Straight	-	FLow	of Turning	Flow	Length	Effect	Sat. Flow	У	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds)
																				15					
3	1	3.65	Α	3				6360		957		957	0.00	6360			6360	0.150	0.150		75	75	0.231	20	7
4	1	3.65	Α	1	12		N	1980	66			66	1.00	1760			1760	0.038			19	75	0.058	0	7
2	1,2	3.65	В	2			N	4100		409		409	0.00	4100			4100	0.100		2	49	96	0.119	6	2
1	2	3.65	С	1	16			2120			55	55	1.00	1938			1938	0.028	0.028		14	15	0.218	6	42
5	3	3.65	D	1	14			2120			36	36	1.00	1915			1915	0.019	0.019		9	10	0.216	6	47
													-												

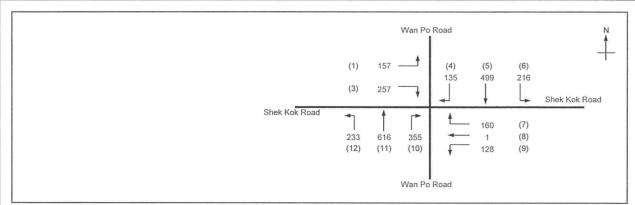
N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s

OZZO TECHNOLOGY (HK) LIMITED	TRAFFIC SIGNAL CALCU	LATION			INITIALS	DATE
TIA_TKO Site 3 Data Centre	2021 Ref AM with CBL	PROJECT NO.:	80566	Prepared By:	MM	Jan-15
Junction 2 : Wan Po Road/ Shek Kok Road	ZOZI Nei AW WILLI CDL	FILENAME : Shek Kol	Road_20141006.xls	Checked By:	ОС	Jan-15
2021 Reference AM Peak Hour Traffic Flows - with CBL		REFERENCE NO.:		Reviewed By:	ОС	Jan-15



			Existing (	Cycle Time	
No. of sta	ges per cycle	N =	4		
Cycle time	э	C =	115	sec	
Sum(y)		Y =	0.482		
Loss time		L=	18	sec	
Total Flow	<i>I</i>	=	2757	pcu	
Co	= (1.5*L+5)/(1-Y)	=	61.7	sec	
Cm	= L/(1-Y)	=	34.7	sec	
Yult		=	0.765		
R.C.ult	= (Yult-Y)/Y*100%	=	58.9	%	
Ср	= 0.9*L/(0.9-Y)	=	38.7	sec	
Ymax	= 1-L/C	=	0.843		
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	57.6	%	

(1) — (3) —		(P4)	(4) > (P2)		(P6) (P6) (P6) (P6) (P6) (P6) (P6) (P6) (P6) (P6) (P6) (P6)	4	(7) (8) (9)	(P6)	(10)	(P5) (P3)
Stage 1	Int =	5	Stage 2	Int =	6 Stage 3	Int =	6	Stage 4	Int =	5

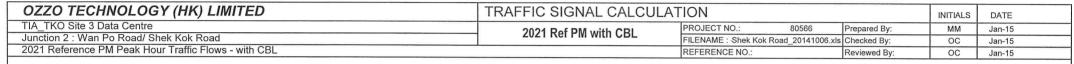
Pedestrian	Pedestrian	Stage	Width	Green	Time Re	equired (s)	Green	n Time Provi	ded (s)
Phase	Phase		(m)	SG	FG	Delay	SG	FG	Delay
P1	P1	1	7	5	6	5	16	6	5
P2	P2	2,3,4	11	5	10	2	75	10	2
P3	P3	1,4	7.3	5	7	6	49	7	6
P4	P4	1	4	5	5	5	17	5	5
P5	P5	1,2,4	7.3	5	7	2	82	7	2
P6	P6	3,4	7.3	5	7	2	49	7	2

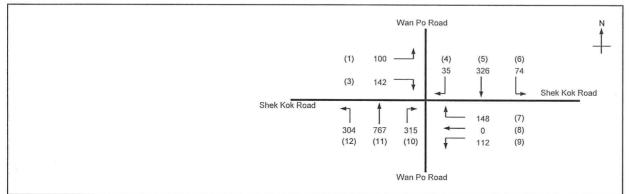
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-		Moveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width	l	lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	У	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds)
																				18		A PARTY			
1,3	1	3.65		2	25		N	4100	157		257	414	1.00	3868	1 1		3868	0.107	0.107		22	22	0.571	30	41
4	2	3.65	1	1	25			2120		1	135	135	1.00	2000	1 1		2000	0.068			14	24	0.329	18	37
5,6	2	3.65		3	25		N	6220	216	499		715	0.30	6109	1 1		6109	0.117	0.117		24	24	0.571	36	39
7	3	3.65		1	25			2120			160	160	1.00	2000			2000	0.080	0.080		16	16	0.571	24	49
8,9	3	3.65		1	25		N	1980	128	1		129	0.99	1869	1 1		1869	0.069			14	16	0.493	18	47
10	4	3.65		1	25			2120			355	355	1.00	2000			2000	0.178	0.178		36	36	0.571	42	33
11,12	4	3.65		3	25		N	6220	233	616		849	0.27	6119	1 1		6119	0.139			28	36	0.446	36	33 29
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			ļ												1 1										

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





			Existing (	Cycle Time
No. of stag	ges per cycle	N =	4	
Cycle time	9	C =	115	sec
Sum(y)		Y =	0.372	
Loss time		L=	18	sec
Total Flow	,	=	2323	pcu
Co	= (1.5*L+5)/(1-Y)	=	51.0	sec
Cm	= L/(1-Y)	=	28.7	sec
Yult		=	0.765	
R.C.ult	= (Yult-Y)/Y*100%	=	105.5	%
Ср	$= 0.9 \times L/(0.9 - Y)$	=	30.7	sec
Ymax	= 1-L/C	=	0.843	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	104.0	%

(1)		≪…≫ (P2)	(P4)	(4) 	(5)	(6)  (P5)	(P6) ↑ ↓ ↓ (P2)	<u>↓</u>	(7) (8) (9)	(P6)	<b>†</b> (11)	(10)	(P5) (P3)
Stag	ge 1	Int =	5	Stage 2	Int =	6	Stage 3	Int =	6	Stage 4		Int =	5

Pedestrian	Pedestrian	Stage	Width	Greer	Time Re	equired (s)	Greei	n Time Provid	ded (s)
Phase	Phase		(m)	SG	FG	Delay	SG	FG	Delay
P1	P1	1	7	5	6	5	10	6	5
P2	P2	2,3,4	11	5	10	2	81	10	2
P3	P3	1,4	7.3	5	7	6	53	7	6
P4	P4	1	4	5	5	5	11	5	5
P5	P5	1,2,4	7.3	5	7	2	79	7	2
P6	P6	3,4	7.3	5	7	2	61	7	2

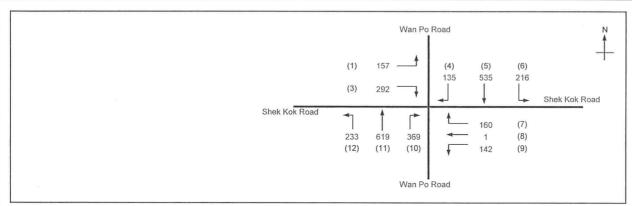
									_																	
Move	e- Stag			e No	o. of	Radius	0	N	Straight-		Moveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
men	t	Widt	h	la	ane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.				m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds)
																					18					
1,3	1	3.65	1		2	25		N	4100	100		142	242	1.00	3868	1 1		3868	0.063	0.063		16	16	0.441	18	43
4	2	3.65			1	25			2120			35	35	1.00	2000	1 1		2000	0.018			5	17	0.119	0	39
5,6	2	3.65			3	25		N	6220	74	326		400	0.19	6152			6152	0.065	0.065		17	17	0.441	20	42
7	3	3.65			1	25			2120			148	148	1.00	2000			2000	0.074	0.074		19	19	0.441	18	43
8,9	3	3.65			1	25		N	1980	112	0		112	1.00	1868			1868	0.060			16	19	0.358	12	41
10	4	3.65			1	25		1	2120		28	315	343	0.92	2009			2009	0.171			44	44	0.442	36	25
11,1	2 4	3.65			3	25		N	6220	304	739		1043	0.29	6113			6113	0.171	0.171		44	44	0.441	40	24

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s

OZZO TECHNOLOGY (HK) LIMITED	TRAFFIC SIGNAL CALCUL	ATION			INITIALS	DATE
TIA_TKO Site 3 Data Centre	2021 Des AM with CBL	PROJECT NO.:	80566	Prepared By:	MM	Jan-15
Junction 2 : Wan Po Road/ Shek Kok Road	2021 Des AW WILLI CBL	FILENAME : Shek Kok	Road_20141006.xl	s Checked By:	ОС	Jan-15
2021 Design AM Peak Hour Traffic Flows - with CBL		REFERENCE NO.:		Reviewed By:	ОС	Jan-15



			Existing (	Cycle Time
No. of stag	jes per cycle	N =	4	
Cycle time		C =	115	sec
Sum(y)		Y =	0.503	
Loss time		L=	18	sec
Total Flow		=	2859	pcu
Co	= (1.5*L+5)/(1-Y)	=	64.4	sec
Cm	= L/(1-Y)	=	36.2	sec
Yult		=	0.765	
R.C.ult	= (Yult-Y)/Y*100%	=	52.0	%
Ср	= 0.9 L/(0.9 Y)	=	40.8	sec
Ymax	= 1-L/C	=	0.843	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	50.8	%

(1) (3) (P1)	<> (P2)	(P4)	(4) > (P2)	(5)	(6) (P5)	(P6) ♠ ∀ (P2)	<u>↓</u>	(7) (8) (9)	(P6)	(11)	(10)	(P5) (P3)
Stage 1	Int =	5	Stage 2	Int =	6	Stage 3	Int =	6	Stage 4	ļ	Int =	5

Pedestrian	Pedestrian	Stage	Width	Green	Time Re	equired (s)	Green	Time Provi	ded (s)
Phase	Phase		(m)	SG	FG	Delay	SG	FG	Delay
P1	P1	1	7	5	6	5	16	6	5
P2	P2	2,3,4	11	5	10	2	75	10	2
P3	P3	1,4	7.3	5	7	6	50	7	6
P4	P4	1	4	5	5	5	17	5	5
P5	P5	1,2,4	7.3	5	7	2	83	7	2
P6	P6	3,4	7.3	5	7	2	48	7	2

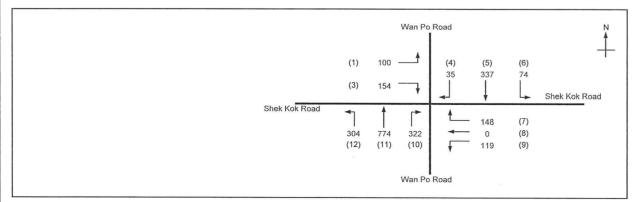
_					·																					
	Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-		Moveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
	ment		Width		lane		1		Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	У	Greater	L	(required)	(input)	Saturation	Length	Delay
L			m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																	,				18			<b>他然能够</b>	NAME OF STREET	
П	1,3	1	3.65		2	25		N	4100	157	0	292	449	1.00	3868	1		3868	0.116	0.116		22	22	0.597	33	41
	4	2	3.65		1	25			2120			135	135	1.00	2000			2000	0.068			13	24	0.328	18	37
	5,6	2	3.65		3	25		N	6220	216	535		751	0.29	6114			6114	0.123	0.123		24	24	0.597	38	39
	7	3	3.65		1	25			2120			160	160	1.00	2000	1		2000	0.080	0.080		15	15	0.597	24	51
	8,9	3	3.65		1	25		N	1980	142	1		143	0.99	1869			1869	0.077			15	15	0.571	18	51
	10	4	3.65		1	25			2120			369	369	1.00	2000	1 1		2000	0.185	0.185		36	36	0.597	48	34
	11,12	4	3.65		3	25		N	6220	233	619		852	0.27	6120			6120	0.139			27	36	0.450	36	29
					1																			Self-Self-Self-Self-Self-Self-Self-Self-		
L																										

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s

OZZO TECHNOLOGY (HK) LIMITED	TRAFFIC SIGNAL CALCUI	LATION	INITIALS	DATE
TIA_TKO Site 3 Data Centre	2021 Des PM with CBL	PROJECT NO.: 80566 Prepared By	MM	Jan-15
Junction 2 : Wan Po Road/ Shek Kok Road	2021 Des Pivi With CDL	FILENAME: Shek Kok Road_20141006.xls Checked By:	ОС	Jan-15
2021 Design PM Peak Hour Traffic Flows - with CBL		REFERENCE NO.: Reviewed By	: OC	Jan-15



			Existing Cycl	e Time	***	
No. of stag	ges per cycle	N =	4			
Cycle time	9	C =	115 sec	С		
Sum(y)		Y =	0.379	1		
Loss time		L =	18 sec	c		
Total Flow	1	=	2367 pci	u		
Co	= (1.5*L+5)/(1-Y)	=	51.5 sec	c		
Cm	= L/(1-Y)	=	29.0 sec	С		
Yult		=	0.765	1		
R.C.ult	= (Yult-Y)/Y*100%	=	101.9 %	1		
Ср	$= 0.9 \times L/(0.9 - Y)$	=	31.1 sec	c		
Ymax	= 1-L/C	=	0.843			
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	100.4 %			

(1)	(P1)	<> (P2)	(P4)	(4) > (P2)	<b>\</b>	(6)  (P5)	(P6)	<u>↓</u>	(7) (8) (9)	(P6)	(11)	(10) «···»	(P5) (P3)
	Stage 1	Int =	5	Stage 2	Int =	6	Stage 3	Int =	6	Stage	e 4	Int =	5

Pedestrian	Pedestrian	Stage	Width	Green	Time Re	equired (s)	Green	n Time Provi	ded (s)
Phase	Phase		(m)	SG	FG	Delay	SG	FG	Delay
P1	P1	1	7	5	6	5	11	6	5
P2	P2	2,3,4	11	5	10	2	80	10	2
P3	P3	1,4	7.3	5	7	6	53	7	6
P4	P4	1	4	5	5	5	12	5	5
P5	P5	1,2,4	7.3	5	7	2	79	7	2
P6	P6	3,4	7.3	5	7	2	60	7	2
			1						

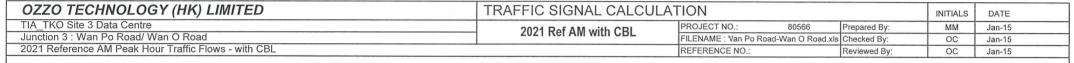
		_																							
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	N	Movemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width	1	lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	х	(m / lane)	(seconds)
									3											18				STATE OF THE PARTY	
1,3	1	3.65		2	25		N	4100	100		154	254	1.00	3868			3868	0.066	0.066		17	17	0.449	18	43
. 4	2	3.65		1	25			2120			35	35	1.00	2000			2000	0.018			4	17	0.118	0	39
5,6	2	3.65	İ	3	25		N	6220	74	337		411	0.18	6154			6154	0.067	0.067		17	17	0.449	22	42
7	3	3.65	İ	1	25			2120			148	148	1.00	2000			2000	0.074	0.074		19	19	0.449	18	43
8,9	3	3.65		1	25		N	1980	119	0		119	1.00	1868			1868	0.064			16	19	0.387	18	42
10	4	3.65		1	25			2120		24	322	346	0.93	2008			2008	0.172			44	44	0.449	36	25
11,12	4	3.65	1	3	25		N	6220	304	750		1054	0.29	6114			6114	0.172	0.172		44	44	0.449	40	24
																							12 / 19 F		
				İ																					
		1																							

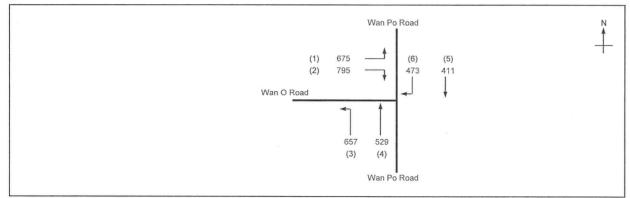
N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





		1		-	
			Existing (	Cycle Time	
No. of stage	s per cycle	N =	3	ti.	
Cycle time		C =	115	sec	
Sum(y)		Y =	0.494		
Loss time		L=	21	sec	
Total Flow		=	3540	pcu	
Co	= (1.5*L+5)/(1-Y)	=	72.1	sec	
Cm	= L/(1-Y)	=	41.5	sec	
Yult		=	0.743		
R.C.ult	= (Yult-Y)/Y*100%	=	50.4	%	
Ср	= 0.9*L/(0.9-Y)	=	46.5	sec	
Ymax	= 1-L/C	=	0.817		
1					
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	49.0	%	

(1)	(P3) ↑	(5)	(P3) ↑ ↓	(6)		
↑ ↓ ↓ (P1) (P2)	(3)	(a)	<-> →	<->→		
Stage 1 Int = 9	Stage 2	Int = 6	Stage 3	Int = 6	Stage 4	Int =

Pedestrian	Stage	Width	Greer	Time Re	equired (s)	Greer	Time Provi	ded (s)
Phase		(m)	SG	FG	Delay	SG	FG	Delay
P1	1	7.3	5	5	10	32	5	10
P2	1,3	11	5	9	2	66	9	2
P3	2,3	7.3	5	6	6	60	6	6
P4	3	11	5	9	2	28	9	2

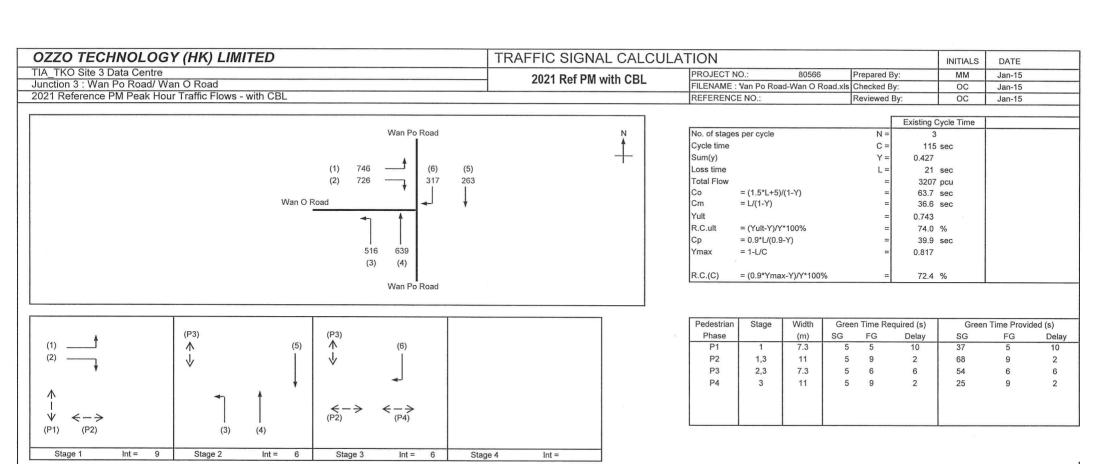
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-		Movemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds
																				21				語と発展	
1	1	3.65		2	20		N	4100	675			675	1.00	3814			3814	0.177			34	38	0.530	42	29
2	1	3.65		2	20			4240			795	795	1.00	3944			3944	0.202	0.202		38	38	0.604	48	31
5	2	3.65		2			N	4100		411		411	0.00	4100			4100	0.100			19	33	0.352	27	30
4	2	3.65		2				4240		529		529	0.00	4240			4240	0.125			24	33	0.437	36	31
3	2	3.65		2	20		N	4100	657		1	657	1.00	3814			3814	0.172	0.172		33	33	0.604	45	34
6	3	3.65		2	20			4240			473	473	1.00	3944			3944	0.120	0.120		23	23	0.604	36	41
													,												

N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s



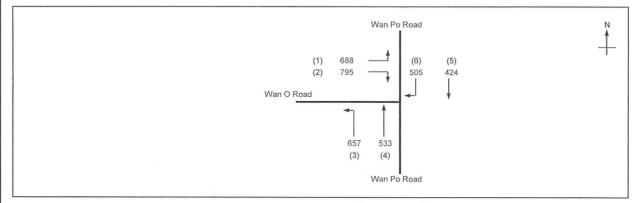
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	V	Noveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane			1	Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds
																				21		1783		是其他能	
1	1	3.65		2	20		N	4100	746			746	1.00	3814	1		3814	0.196	0.196		43	43	0.522	42	26
2	1	3.65		2	20			4240			726	726	1.00	3944	1		3944	0.184			41	43	0.491	42	26 31
5	2	3.65		2			N	4100		263		263	0.00	4100			4100	0.064			14	30	0.247	18	31
4	2	3.65		2				4240		639		639	0.00	4240			4240	0.151			33	30	0.581	45	35
3	2	3.65		2	20		N	4100	516			516	1.00	3814	1		3814	0.135	0.151		30	30	0.522	36	35
6	3	3.65		2	20			4240			317	317	1.00	3944			3944	0.080	0.080		18	18	0.522	24	43
															1								DI BUS		
					1 1																			HE SE	

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





			Existing Cycle Time
No. of stage	es per cycle	N =	3
Cycle time		C =	115 sec
Sum(y)		Υ =	0.502
Loss time		L =	21 sec
Total Flow		=	3602 pcu
Co	= (1.5*L+5)/(1-Y)	=	73.3 sec
Cm	= L/(1-Y)	=	42.2 sec
Yult		=	0.743
R.C.ult	= (Yult-Y)/Y*100%	=	47.9 %
Ср	= 0.9*L/(0.9-Y)	=	47.5 sec
Ymax	= 1-L/C	=	0.817
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	46.6 %

(1)		(P3) ↑ ↓		(5)	(P3) ↑ ↓	(6)				
↑ ↓ ↓ (P1) ←-> (P2)		(3)	(4)	5	<->→	<->> (P4)				
Stage 1 Int =	9	Stage 2	Int =	6	Stage 3	Int =	6	Stage 4	Int =	

Pedestrian	Stage	Width	Green	Time Re	equired (s)	Green	Time Provid	ded (s)
Phase		(m)	SG	FG	Delay	SG	FG	Delay
P1	1	7.3	5	5	10	32	5	10
P2	1,3	11	5	9	2	65	9	2
P3	2,3	7.3	5	6	6	58	6	6
P4	3	11	5	9	2	27	9	2
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					1			
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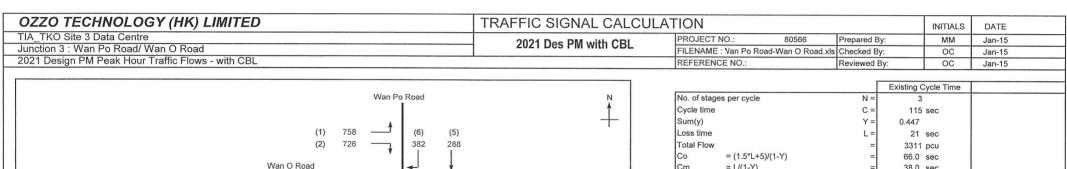
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	Λ	/loveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Averag
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(second
																				21					
1	1	3.65		2	20		Ν	4100	688			688	1.00	3814			3814	0.180			34	38	0.549	42	30
2	1	3.65		2	20			4240			795	795	1.00	3944			3944	0.202	0.202		38	38	0.614	51	31
5	2	3.65		2			N	4100		424		424	0.00	4100			4100	0.103			19	32	0.369	27	31
4	2	3.65		2				4240		533		533	0.00	4240			4240	0.126			24	32	0.448	36	32
3	2	3.65		2	20		N	4100	657			657	1.00	3814			3814	0.172	0.172		32	32	0.614	45	35
6	3	3.65		2	20			4240			505	505	1.00	3944			3944	0.128	0.128		24	24	0.614	36	40
																	-21				1 1				

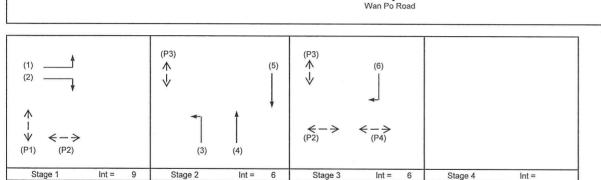
N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





516

(3)

641

(4)

			Existing Cycle Time	
No. of stag	ges per cycle	N =	3	
Cycle time		C =	115 sec	
Sum(y)		Y =	0.447	
Loss time		L=	21 sec	
Total Flow		=	3311 pcu	
Co	= (1.5*L+5)/(1-Y)	=	66.0 sec	
Cm	= L/(1-Y)	=	38.0 sec	
Yult		=	0.743	
R.C.ult	= (Yult-Y)/Y*100%	=	66.2 %	
Ср	= 0.9 L/(0.9 Y)	=	41.7 sec	
Ymax	= 1-L/C	=	0.817	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	64.7 %	

Phase         (m)         SG         FG         Delay         SG         FG           P1         1         7.3         5         5         10         36         5           P2         1,3         11         5         9         2         65         9           P3         2,3         7.3         5         6         6         51         6	7.3 5 5 10 36 5 10 3 11 5 9 2 65 9 2 3 7.3 5 6 6 51 6 6	Pedestrian	Stage	Width	Greer	Time Re	quired (s)	Green	Time Provi	ded (s)
P2 1,3 11 5 9 2 65 9	3 11 5 9 2 65 9 2 3 7.3 5 6 6 51 6 6	Phase		(m)	SG	FG	Delay	SG	FG	Delay
	3 7.3 5 6 6 51 6 6	P1	1	7.3	5	5	10	36	5	10
P3 2,3 7.3 5 6 6 51 6	25 27 26 200 200 200	P2	1,3	11	5	9	2	65	9	2
	11 5 9 2 23 9 2	P3	2,3	7.3	5	6	6	51	6	6
P4 3 11 5 9 2 23 9	1 1	P4	3	11	5	9	2	23	9	2
							1			

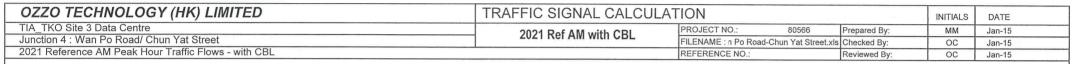
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	N	/lovemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds
																				21		生 经 电			
1	1	3.65		2	20		N	4100	758		1	758	1.00	3814			3814	0.199	0.199		42	42	0.547	45	28
2	1	3.65		2	20			4240			726	726	1.00	3944			3944	0.184			39	42	0.506	42	27
5	2	3.65		2			N	4100		288		288	0.00	4100			4100	0.070			15	28	0.284	18	32
4	2	3.65		2				4240		641		641	0.00	4240			4240	0.151			32	28	0.611	45	37
3	2	3.65		2	20		N	4100	516			516	1.00	3814			3814	0.135	0.151		28	28	0.547	36	36
6	3	3.65		2	20			4240			382	382	1.00	3944			3944	0.097	0.097		20	20	0.547	30	42
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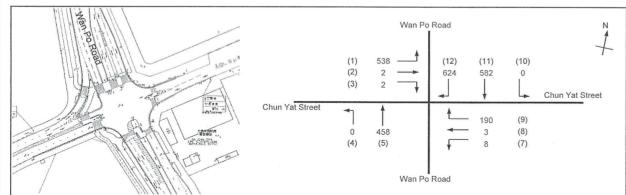
NOTE: O - OPPOSING TRAFFIC

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





			Existing (	Cycle Time		
No. of stage	es per cycle	N =	5	i		
Cycle time		C =	115	sec		
Sum(y)		Y =	0.508			
Loss time		L=	42	sec		
Total Flow		=	2407	pcu		
Co	= (1.5*L+5)/(1-Y)	=	138.3	sec		
Cm	= L/(1-Y)	=	85.4	sec		
Yult		=	0.585		1	
R.C.ult	= (Yult-Y)/Y*100%	=	15.1	%	1	
Ср	$= 0.9 \times L/(0.9 - Y)$	=	96.5	sec		
Ymax	= 1-L/C	=	0.635			
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	12.4	%		

20.00	(11) (10)									Pedestrian	Stage	Width	Green	Time Re	quired (s)	Green	Time Provid	led (s)
(P1)		(12)	(11) (10)		(12) (P7)		(P8)	(P1)		Phase		(m)	SG	FG	Delay	SG	FG	Delay
15.	<b>♦</b>	(1)		(1)			<>	le.		P1	1,5	4	5	5	5	31	5	5
4			¥ L>		✓ ∀	(1) —		Ä	<b>A</b>	P2	1,2,3,5	3.5	5	5	5	89	5	5
<b>1</b>	A	<b>^</b>	A	<b>^</b>	<b>^</b>	(2) →	<b>^</b>	<b>^</b>	L (9)	P3	4	7.3	5	6	9	6	6	9
(P2) 😾	Ŵ	(P2) 😾	₩	(P2) 🔖	(P6) <b>∜</b>	(3)	(P6) <b>∛</b>	(P2) 🔆	<b>◄</b> (8)	P4	2,3,4,5	11	5	9	2	88	9	2
	(P6)		(P6)			<b>∧</b> ▼			(7)	P5	3	7.3	5	6	7	35	6	7
₹1	<b>A</b>					₩			*	P6	1,2,3,4	5	5	5	2	73	5	2
	1	<>		€	→	(P3) <b>&lt;····</b> ≫		4.5		P7	3	5	5	5	5	38	5	5
(4)	(5)	(P4)		(P4)	) (P5)	(P4)		(P4)		P8	4	7.3	5	6	2	13	6	2
Stage 1	Int = 7	Stage 2	Int = 9	Stage 3	Int =	Stage 4	Int = 5	Stage 5	Int = 9									

Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	1	Movemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds
																				26			<b>基本的基础</b>	NATIONAL AND ADDRESS OF THE PARTY OF THE PAR	
1	2,3,4	3.65		1	30		N	1980	538			538	1.00	1886	1 1		1886	0.285	0.285		41	57	0.576	48	21
2,3	4	3.65		1	20			2120		2	2	4	0.00	2120			2120	0.002		16	0	16	0.014	0	10
4,5	1	3.65		1	15		N	1980	0	221		221	0.00	1980			1980	0.112			16	16	0.801	42	67
5	1	3.65		1				2120		237		237	0.00	2120	1 1		2120	0.112	0.112		16	16	0.802	42	65
7,8,9	5	4.00		1	13		N	2015	8	3	190	201	0.99	1809			1809	0.111	0.111		16	16	0.801	36	69
10,11	1,2	3.65		1	11		N	1980	0	282		282	0.00	1980			1980	0.142			20	43	0.377	30	25
11	1,2	3.65		1				2120		300		300	0.00	2120		- 6	2120	0.142			20	43	0.374	30	25
12	2,3	3.65		2	20			4240			624	624	1.00	3944	1		3944	0.158			23	50	0.364	33	20
																					- 1				
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										1 1					1							<b>建筑是</b>		艺术, 200	TO SERVE OF THE PARTY OF THE PA

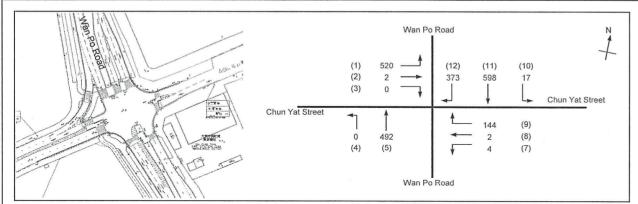
N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s

OZZO TECHNOLOGY (HK) LIMITED	TRAFFIC SIGNAL CALCULA	ATION			INITIALS	DATE
TIA_TKO Site 3 Data Centre	2021 Ref PM with CBL	PROJECT NO.:	80566	Prepared By:	MM	Jan-15
Junction 4 : Wan Po Road/ Chun Yat Street	2021 Rei Fiw With CDL	FILENAME : n Po Road-C	hun Yat Street.xls	Checked By:	ОС	Jan-15
2021 Reference PM Peak Hour Traffic Flows - with CBL		REFERENCE NO.:		Reviewed By:	ОС	Jan-15



ļ			Existing (	Cycle Time	
No. of stage	s per cycle	N =	5		
Cycle time		C =	115	sec	
Sum(y)		Y =	0.478		
Loss time		L =	42	sec	
Total Flow		=	2152	pcu	
Co	= (1.5*L+5)/(1-Y)	=	130.4	sec	
Cm	= L/(1-Y)	=	80.5	sec	
Yult		=	0.585		
R.C.ult	= (Yult-Y)/Y*100%	=	22.3	%	
Ср	= 0.9*L/(0.9-Y)	=	89.7	sec	
Ymax	= 1-L/C	=	0.635		
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	19.4	%	

	(11) (10)		12-11-11-11-11-11-11-11-11-11-11-11-11-1	Y 200 31/10/11/2 11/10/2000	wh					Pedestrian	Stage	Width	Green	Time Re	equired (s)	Green	Time Provid	ded (s)
(P1)		(12)	(11) (10)	(*	12) (P7)		(P8)	(P1)		Phase		(m)	SG	FG	Delay	SG	FG	Delay
I.	<b>↓</b>	(1)		(1)			<b>&lt;&gt;</b>	F.		P1	1,5	4	5	5	5	30	5	5
1 3		<b>─</b> →	<b>♦</b>		] 🦞	(1)		Ä	<b>A</b>	P2	1,2,3,5	3.5	5	5	5	89	5	5
<b>A</b>	A	A	A	A	A	(2) →	<b>A</b>	A	L (9)	P3	4	7.3	5	6	9	6	6	9
(P2) 🕏	. ↓	(P2) 😲	. ↓	(P2) 😲	(P6) <b>∜</b>	(3)	(P6) <b>∜</b>	(P2) 😾	<b>←</b> (8)	P4	2,3,4,5	11	5	9	2	85	9	2
	(P6)		(P6)			A *			(7)	P5	3	7.3	5	6	7	34	6	7
- 4	<b>A</b>				No.	V			<b>†</b>	P6	1,2,3,4	5	5	5	2	76	5	2
		<>		<>	<b>&lt;</b> >	(P3) <b>&lt;····&gt;</b>		<b>⟨</b> ⟩		P7	3	5	5	5	5	37	5	5
(4)	(5)	(P4)		(P4)	(P5)	(P4)		(P4)		P8	4	7.3	5	6	2	13	6	2
																		-
Stage 1	Int = 7	Stage 2	Int = 9	Stage 3 Int =		Stage 4	Int = 5	Stage 5	Int = 9									

			_											,		···									
Move-	Stage	110000000000000000000000000000000000000	Phase	No. of	Radius	0	N	Straight-		Movemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width	1	lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																				26			<b>克探问题</b>		
1	2,3,4	3.65	1	1	30		N	1980	520			520	1.00	1886	1		1886	0.276	0.276		42	58	0.547	48	20
2,3	4	3.65	l	1	20	1		2120		2	0	2	0.00	2120	1 1		2120	0.001		16	0	16	0.007	- 6	0
4,5	1	3.65	1	1	15		N	1980	0	238		238	0.00	1980	1		1980	0.120			18	18	0.754	36	57
5	1	3.65	1	1				2120		254		254	0.00	2120			2120	0.120	0.120		18	18	0.751	42	56
7,8,9	5	4.00	1	1	13		N	2015	4	2	144	150	0.99	1809	1		1809	0.083	0.083		13	13	0.754	30	70
10,11	1,2	3.65		1	11		N	1980	17	279		296	0.06	1965	1 1		1965	0.151			23	48	0.359	30	22
11	1,2	3.65	1	1				2120		319		319	0.00	2120	1 1		2120	0.150			23	48	0.358	30	21
12	2,3	3.65		2	20			4240			373	373	1.00	3944			3944	0.095			14	51	0.213	18	18
	-,-			_				12.10			0,0	070	1.00	0044			3344	0.033			14		0.2		
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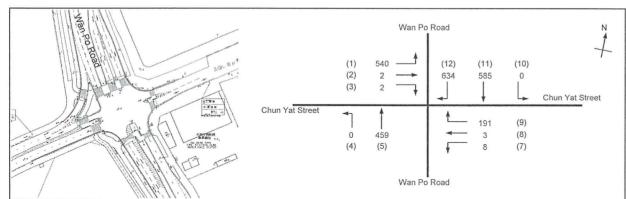
N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s

OZZO TECHNOLOGY (HK) LIMITED	TRAFFIC SIGNAL CALCUL	ATION		INITIALS	DATE
TIA_TKO Site 3 Data Centre	2021 Des AM with CBL	PROJECT NO.: 80566	Prepared By:	MM	Jan-15
Junction 4 : Wan Po Road/ Chun Yat Street	2021 Des Aivi With CDL	FILENAME : n Po Road-Chun Yat Street.x	s Checked By:	. oc	Jan-15
2021 Design AM Peak Hour Traffic Flows - with CBL		REFERENCE NO.:	Reviewed By:	OC	Jan-15



			Existing (	Cycle Time	
No. of stage	s per cycle	N =	5		
Cycle time		C =	115	sec	1
Sum(y)		Y =	0.510		1.
Loss time		L =	42	sec	
Total Flow		=	2424	pcu	
Co	= (1.5*L+5)/(1-Y)	=	138.8	sec	
Cm	= L/(1-Y)	=	85.7	sec	
Yult		=	0.585		
R.C.ult	= (Yult-Y)/Y*100%	=	14.7	%	1
Ср	$= 0.9 \times L/(0.9 - Y)$	=	97.0	sec	1
Ymax	= 1-L/C	=	0.635		
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	12.0	%	

		(11) (10)													Pedestrian	Stage	Width	Green	Time Re	quired (s)	Green	Time Provid	ded (s)
(P1)				(12)	(11)	(10)		(12)	(P7)		(P8)	(P1)			Phase		(m)	SG	FG	Delay	SG	FG	Delay
E		<b>↓</b>	(1)	- 1			(1)	A			<b>&lt;</b> ·····>	F.			P1	1,5	4	5	5	5	31	5	5
	Ü			4	*	L->		, 4	₩.	(1)		7	<b>A</b>		P2	1,2,3,5	3.5	5	5	5	89	5	5
	A	A	<b>A</b>			A	^		A	(2)	<b>^</b>	<b>A</b>	L (9)		P3	4	7.3	5	6	9	6	6	9
(P2)	Ÿ	. ↓	(P2) 😲			<b>V</b>	(P2) 🕏	<i>'</i>	(P6)¥	(3)	(P6)	(P2) 😾	<b>◄</b> (8)		P4	2,3,4,5	11	5	9	2	88	9	2
		(P6)			(P	6)				A *			(7)		P5	3	7.3	5	6	7	35	6	7
	1 4									₩			<b>*</b>		P6	1,2,3,4	5	5	5	2	73	5	2
			€	·->				<b>&lt;</b> ⋯>	<b>&lt;&gt;</b>	(P3) <b>&lt;····&gt;</b>		€>			P7	3	5	5	5	5	38	5	5
(4	(5)		(F	94)				(P4)	(P5)	(P4)		(P4)			P8	4	7.3	5	6	2	13	6	2
Stage	1 In	nt =	Stage 2		Int =	9	Stage 3	Int =		Stage 4	Int = 5	Stage 5	Int = 9	1									

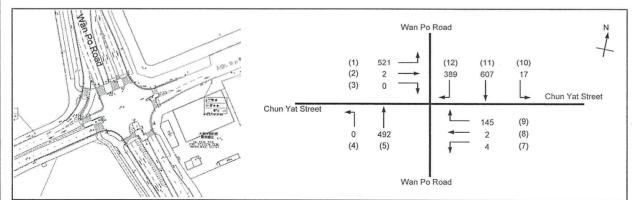
Move-	Ctogo	Lane	Phase	No. of	Radius	0	NI.	Chrainht		1		Tatal	Desertion	0-4	I Floor Inno I	Observe	Devileral						I D		A
	Stage	0.00	Phase		Radius	0	N	Straight-		Noveme		Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead		Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	У	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																				26		A STATE OF	是主要音樂		
1	2,3,4	3.65		1	30		N	1980	540			540	1.00	1886			1886	0.286	0.286		41	57	0.578	48	21
2,3	4	3.65		1	20			2120		2	2	4	0.00	2120			2120	0.002		16	0	16	0.014	0.44	0
4,5	1	3.65		1	15		N	1980	0	222		222	0.00	1980			1980	0.112	0.112		16	16	0.804	42	67
5	1	3.65		1				2120		237		237	0.00	2120			2120	0.112			16	16	0.801	42	65
7,8,9	5	4.00		1	13		N	2015	8	3	191	202	0.99	1809	- 1		1809	0.112	0.112		16	16	0.804	36	70
10,11	1,2	3.65		1	11		N	1980	0	283		283	0.00	1980			1980	0.143			20	43	0.378	30	25
11	1,2	3.65		1				2120		302		302	0.00	2120			2120	0.142			20	43	0.377	30	25
12	2,3	3.65		2	20			4240			634	634	1.00	3944	1 1		3944	0.161			23	50	0.370	33	20
																æ					11.0				

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s

OZZO TECHNOLOGY (HK) LIMITED	TRAFFIC SIGNAL CALCULA	ATION		INITIALS	DATE
TIA_TKO Site 3 Data Centre	2021 Des PM with CBL	PROJECT NO.: 80566	Prepared By:	MM	Jan-15
Junction 4 : Wan Po Road/ Chun Yat Street	2021 Des Pivi Witti CDL	FILENAME: n Po Road-Chun Yat Stree	t.xls Checked By:	ОС	Jan-15
2021 Design PM Peak Hour Traffic Flows - with CBL		REFERENCE NO.:	Reviewed By:	ОС	Jan-15



			Existing (	Cycle Time
No. of stage	es per cycle	N =	5	
Cycle time		C =	115	sec
Sum(y)		Y =	0.480	
Loss time		L =	42	sec
Total Flow		=	2179	pcu
Co	= (1.5*L+5)/(1-Y)	=	130.8	sec
Cm	= L/(1-Y)	=	80.8	sec
Yult		=	0.585	
R.C.ult	= (Yult-Y)/Y*100%	=	21.9	%
Ср	= 0.9 L/(0.9 Y)	=	90.0	sec
Ymax	= 1-L/C	=	0.635	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	19.0	%

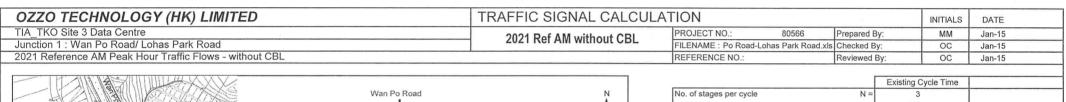
	(11) (10)									Pedestrian	Stage	Width	Green	Time Req	uired (s)	Green	Time Provid	led (s)
(P1)		(12)	(11) (10)		(12) (P7)		(P8)	(P1)		Phase		(m)	SG	FG	Delay	SG	FG	Delay
I Fig.	<b>↓</b>	(1) 🛕		(1)			<b>&lt;&gt;</b>	Fig.		P1	1,5	4	5	5	5	30	5	5
1 3			<b>♦ L</b> ►		IJ ₩	(1)		Ü	<b>A</b>	P2	1,2,3,5	3.5	5	5	5	89	5	5
<b>A</b>	A	A	A	A	A	(2) →	A	A	(9)	P3	4	7.3	5	6	9	6	6	9
(P2) 🕏	V	(P2) 😾	V	(P2) 😾	(P6) <b>√</b>	(3)	(P6) <b>\</b>	(P2) 🖫	<b>←</b> (8)	P4	2,3,4,5	11	5	9	2	86	9	2
	(P6) *		(P6)	200		A *			(7)	P5	3	7.3	5	6	7	34	6	7
	<b>A</b>			1	10. 10.	1			<b>*</b>	P6	1,2,3,4	5	5	5	2	76	5	2
		€>		€>	<b>←</b> >	(P3) <b>←</b> ···>		<b>←</b> →		P7	3	5	5	5	5	37	5	5
(4)	5)	(P4)		(P4)	(P5)	(P4)		(P4)		P8	4	7.3	5	6	2	13	6	2
						2 7		2 2										
Stage 1	Int = 7	Stage 2	Int = 9	Stage 3 Int :	=	Stage 4	Int = 5	Stage 5	nt = 9	1								

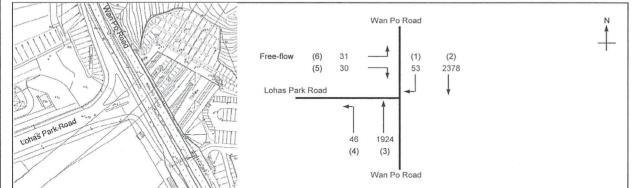
					,				_																
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	1	Moveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	×	(m / lane)	(seconds)
																				26					
1	2,3,4	3.65		1	30		N	1980	521			521	1.00	1886	1		1886	0.276	0.276		42	58	0.548	48	20
2,3	4	3.65		1	20			2120		2	0	2	0.00	2120	1 1		2120	0.001		16	0	16	0.007	100	200
4,5	1	3.65		1	15		N	1980	0	238		238	0.00	1980	1		1980	0.120	0.120		18	18	0.756	42	58
5	1	3.65		1				2120		254		254	0.00	2120			2120	0.120			18	18	0.754	42	56
7,8,9	5	4.00		1	13		N	2015	4	2	145	151	0.99	1809	1 1		1809	0.083	0.083		13	13	0.756	30	70
10,11	1,2	3.65		1	11		N	1980	17	283		300	0.06	1965	1 1		1965	0.153			23	49	0.362	30	- 22
11	1,2	3.65		1				2120		324		324	0.00	2120			2120	0.153			23	49	0.362	30	21
12	2,3	3.65		2	20			4240			389	389	1.00	3944	1 1		3944	0.099			15	51	0.222	18	18
												, 100 / 100													
						L																0.00			10%

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





			Existing (	Cycle Time	
No. of stag	ges per cycle	N =	3	1	
Cycle time	9	C =	115	sec	
Sum(y)		Y =	0.596		
Loss time		L=	18	sec	
Total Flow	1	=	4431	pcu	
Co	= (1.5*L+5)/(1-Y)	=	79.1	sec	
Cm	= L/(1-Y)	=	44.5	sec	
Yult		=	0.765		
R.C.ult	= (Yult-Y)/Y*100%	=	28.4	%	
Ср	= 0.9*L/(0.9-Y)	=	53.2	sec	
Ymax	= 1-L/C	=	0.843		
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	27.4	%	

Free-flow (6)	(2)	(6)	(1)	(2)	(6) ————————————————————————————————————				Stage 1 2 3	Green 75 15 10
Stage 1 Int =	6	Stage 2	Int =	6	Stage 3	Int =	6	Stage 4 Int =		

Pedestrian	Stage	Width	Gree	n Time Requ	uired (s)	Green Time	Provided (s)
Phase		(m)	SG	FG	Delay	SG	FG

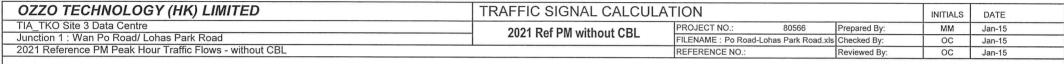
Mo	ve-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-		Moveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
me	ent		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
			m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																					16			<b>法教训练</b>	<b>3000000000000000000000000000000000000</b>	<b>经</b> 性数据
3	3	1	3.65	Α	3				6360		1924		1924	0.00	6360			6360	0.303			49	75	0.464	42	9
4	4	1	3.65	Α	1	12		N	1980	46			46	1.00	1760			1760	0.026			4	75	0.040	0	6
2	2	1,2	3.65	В	2			N	4100		2378		2378	0.00	4100			4100	0.580	0.580	2	94	96	0.695	36	- 4
	1	2	3.65	С	1	16			2120			53	53	1.00	1938			1938	0.027			4	15 10	0.210	6	42 46
	5	3	3.65	D	1	14			2120			30	30	1.00	1915			1915	0.016	0.016		3	10	0.180	0	46
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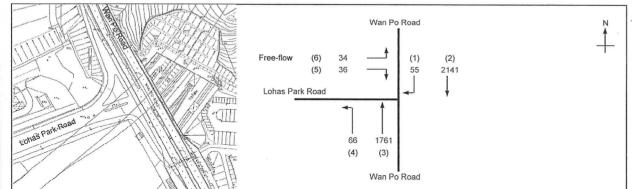
N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





		-		
			Existing (	Cycle Time
No. of stag	ges per cycle	N =	3	
Cycle time		C =	115	sec
Sum(y)		Y =	0.541	
Loss time		L=	18	sec
Total Flow		=	4059	pcu
Co	= (1.5*L+5)/(1-Y)	=	69.7	sec
Cm	= L/(1-Y)	=	39.2	sec
Yult		=	0.765	
R.C.ult	= (Yult-Y)/Y*100%	=	41.4	%
Ср	= 0.9 L/(0.9 Y)	=	45.1	sec
Ymax	= 1-L/C	=	0.843	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	40.3	%

(6) (4) (5)	3)	(2)	(6)	(1)	(2)	(6) <b>1</b> (5) <b>1</b>				Stage 1 2 3	Green 75 15 10
Stage 1	Int =	6	Stage 2	Int =	6	Stage 3	Int =	6	Stage 4 Int =		

Stage	Width	Gree	n Time Requ	uired (s)	Green Time	Provided (s)
	(m)	SG	FG	SG	FG	
					1	
	Stage		•		,	, , ,

Move-	Stag	e Lane	Phase	No. of	Radius	0	N	Straight-	1	Moveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Widtl	1	lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds)
																				16		<b>经过多证</b>	<b>以</b>		
3	1	3.65	Α	3				6360		1761		1761	0.00	6360			6360	0.277	,		50	75	0.425	38	9
4	1	3.65	Α	1	12		N	1980	66			66	1.00	1760			1760	0.038			7	75	0.058	0	7
2	1,2	3.65	В	2			N	4100		2141		2141	0.00	4100			4100	0.522	0.522	2	94	96	0.626	0 33	4
1	2	3.65	С	1	16			2120			55	55	1.00	1938			1938	0.028			- 5	15	0.218	6	42
5	3	3.65	D	1	14			2120			36	36	1.00	1915			1915	0.019	0.019		3	10	0.216	6	47
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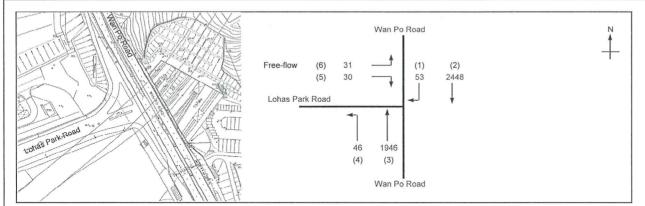
N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s

OZZO TECHNOLOGY (HK) LIMITED	TRAFFIC SIGNAL CALCULA	ΓΙΟΝ			INITIALS	DATE
TIA_TKO Site 3 Data Centre	2021 Des AM without CBL	PROJECT NO.: 8056	3	Prepared By:	MM	Jan-15
Junction 1 : Wan Po Road/ Lohas Park Road	2021 Des Aim Without CDL	FILENAME : Po Road-Lohas Park	Road.xls	Checked By:	oc	Jan-15
2021 Design AM Peak Hour Traffic Flows - without CBL		REFERENCE NO.:		Reviewed By:	ОС	Jan-15



			Existing Cycle Time	
No. of stag	ges per cycle	N =	3	
Cycle time	•	C =	115 sec	
Sum(y)		Y =	0.613	
Loss time		L =	18 sec	
Total Flow		=	4523 pcu	
Co	= (1.5*L+5)/(1-Y)	=	82.6 sec	
Cm	= L/(1-Y)	=	46.5 sec	
Yult		=	0.765	
R.C.ult	= (Yult-Y)/Y*100%	=	24.8 %	
Ср	= 0.9 L/(0.9 - Y)	=	56.4 sec	
Ymax	= 1-L/C	=	0.843	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	23.9 %	

Free-flow (6) (4)	(3)	(2)	(6)	(1)	(2)	(6)					Stage 1 2 3	Green 75 15 10
Stage 1	Int =	6	Stage 2	Int =	6	Stage 3	Int =	6	Stage 4	Int =		

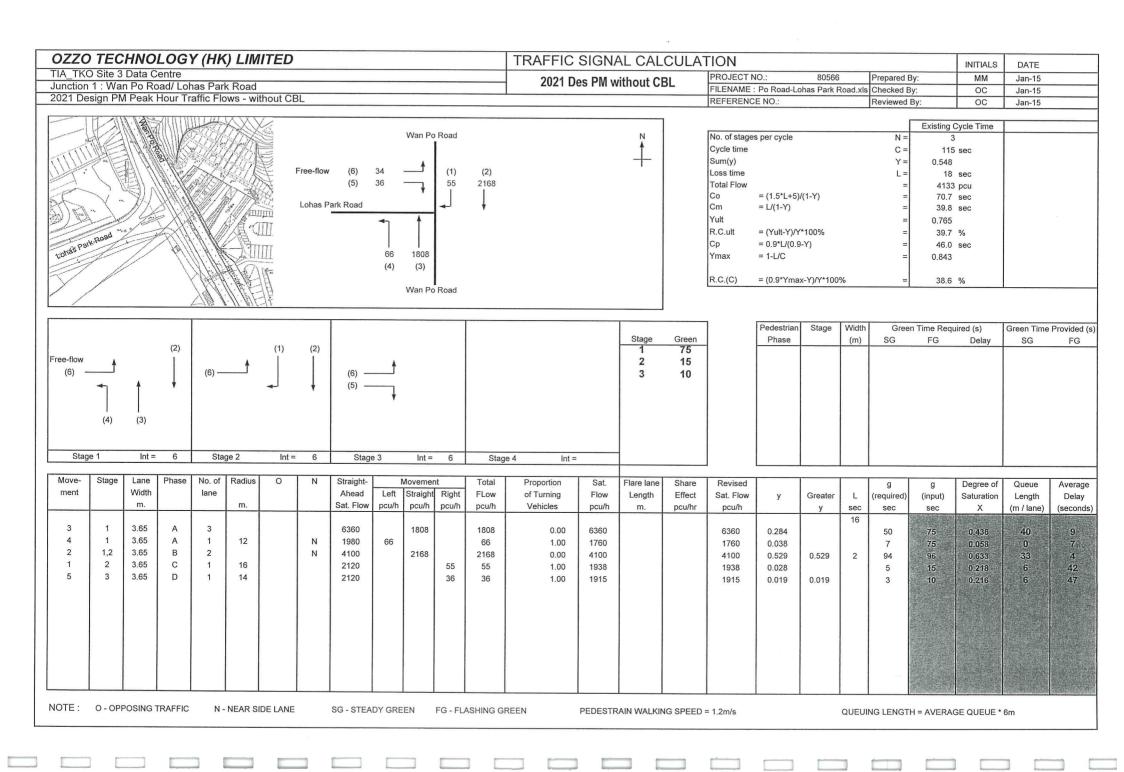
Pedestrian	Stage	Width	Greei	n Time Requ	uired (s)	Green Time	Provided (s)
Phase		(m)	SG	FG	Delay	SG	FG
		1 1				1	

																1.00									
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	1	Movemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	У	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds)
																				16					
3	1	3.65	A	3				6360		1946		1946	0.00	6360			6360	0.306			48	75	0.469	42	9
4	1	3.65	Α	1	12		N	1980	46			46	1.00	1760	1 1		1760	0.026			4	75	0.040	0	6
2	1,2	3.65	В	2			N	4100		2448		2448	0.00	4100			4100	0.597	0.597	2	95	96	0.715	36	5
1	2	3.65	С	1	16			2120			53	53	1.00	1938	1 1		1938	0.027			4	15	0.210	6	42
5	3	3.65	D	1	14			2120			30	30	1.00	1915	1		1915	0.016	0.016		2	10	0.180	0	46
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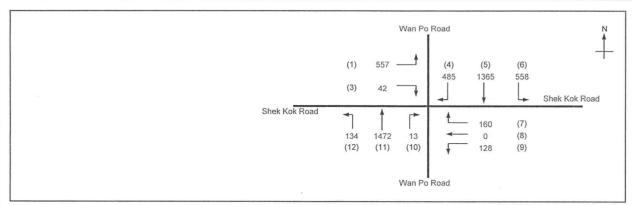
N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s



OZZO TECHNOLOGY (HK) LIMITED	TRAFFIC SIGNAL CALCULA	TION		INITIALS	DATE
TIA_TKO Site 3 Data Centre	2021 Ref AM without CBL	PROJECT NO.: 80566	Prepared By:	MM	Jan-15
Junction 2 : Wan Po Road/ Shek Kok Road	2021 Rel AM WILHOUT CDL	FILENAME: Shek Kok Road_20141006	ds Checked By:	ОС	Jan-15
2021 Reference AM Peak Hour Traffic Flows - without CBL		REFERENCE NO.:	Reviewed By:	ос	Jan-15



		[	Existing (	Cycle Time	
No. of stag	ges per cycle	N =	4		
Cycle time		C =	125	sec	The state of the s
Sum(y)		Y =	0.745		
Loss time		L=	18	sec	
Total Flow	•	=	4914	pcu	
Co	= (1.5*L+5)/(1-Y)	=	125.4	sec	
Cm	= L/(1-Y)	=	70.5	sec	
Yult		=	0.765		
R.C.ult	= (Yult-Y)/Y*100%	=	2.7	%	
Ср	= 0.9 L/(0.9 Y)	=	104.4	sec	
Ymax	= 1-L/C	=	0.856		
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	3.4	%	

	(1) (3) (P1)	<b>←</b> > (P2)	(P4)	(/- <b>←</b> (P2)	(5)	(6) (P5)	(P6)	<u>↓</u>	(7) (8) (9)	(P6)	(11)	(10)	(P5) (P3)
1	Stage 1	Int =	5	Stage 2	Int :	= 6	Stage 3	Int =	6	Stage 4		Int =	5

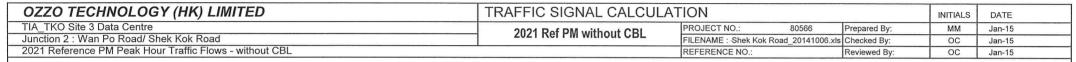
Pedestrian	Pedestrian	Stage	Width	Green	Time Re	equired (s)	Green	n Time Provi	ded (s)
Phase	Phase		(m)	SG	FG	Delay	SG	FG	Delay
P1	P1	1	7	5	6	5	16	6	5
P2	P2	2,3,4	11	5	10	2	90	10	2
. P3	P3	1,4	7.3	5	7	6	48	7	6
P4	P4	1	4	5	4	5	18	4	5
P5	P5	1,2,4	7.3	5	7	2	103	7	2
P6	P6	3,4	7.3	5	7	2	43	7	2
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			1						

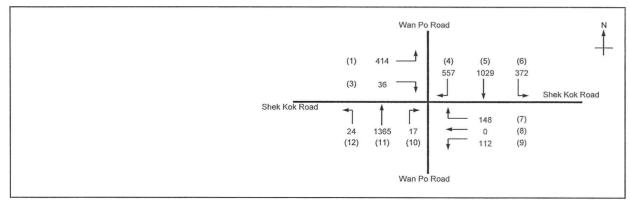
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Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-		Moveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																				18					
1,3	1	3.65		2	25		N	4100	557		42	599	1.00	3868	1 1		3868	0.155	0.155		22	22	0.870	54	51
4	2	3.65		1	25			2120			485	485	1.00	2000	1		2000	0.243			35	45	0.671	60	35
5,6	2	3.65		3	25		N	6220	558	1365		1923	0.29	6114	1 1		6114	0.315	0.315		45	45	0.870	84	55
7	3	3.65		1	25			2120			160	160	1.00	2000			2000	0.080	0.080		11	11	0.870	42	54
8,9	3	3.65		1	25		N	1980	128	0		128	1.00	1868	1 1		1868	0.069			10	11	0.745	24	77
10	4	3.65		1	25			2120		399	13	412	0.03	2116			2116	0.195			28	28	0.867	72	42
11,12	4	3.65		3	25		N	6220	134	1073		1207	0.11	6179			6179	0.195	0.195		28	28	0.870	64	57
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N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





			Existing (	Cycle Time
No. of stag	ges per cycle	N =	4	
Cycle time		C =	125	sec
Sum(y)		Y =	0.638	
Loss time		L=	18	sec
Total Flow		=	4074	pcu
Co	= (1.5*L+5)/(1-Y)	=	88.4	sec
Cm	= L/(1-Y)	=	49.7	sec
Yult		=	0.765	
R.C.ult	= (Yult-Y)/Y*100%	=	19.9	%
Ср	= 0.9*L/(0.9-Y)	=	61.8	sec
Ymax	= 1-L/C	=	0.856	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	20.8	%

	(1) (3) (P1)	<b>€&gt;</b> (P2)	(P4)	(4) > (P2)	Ţ,	(6) 	(P6) 	£	(7) (8) (9)	(P6)	(11)	(10) «···»	
L	Stage 1	Int =	5	Stage 2	Int =	6	Stage 3	Int =	6	Stage	e 4	Int =	5

P1         P1         1         7         5         6         5         14         6         5           P2         P2         2,3,4         11         5         10         2         87         10         2           P3         P3         1,4         7.3         5         7         6         40         7         6           P4         P4         1         4         5         4         5         16         4         5           P5         P5         1,2,4         7.3         5         7         2         96         7         2	Pedestrian	Pedestrian	Stage	Width	Green	n Time Re	equired (s)	Green	Time Provi	ded (s)
P2         P2         2,3,4         11         5         10         2         87         10         2           P3         P3         1,4         7.3         5         7         6         40         7         6           P4         P4         1         4         5         4         5         16         4         5           P5         P5         1,2,4         7.3         5         7         2         96         7         2	Phase	Phase		(m)	SG	FG	Delay	SG	FG	Delay
P3         P3         1,4         7.3         5         7         6         40         7         6           P4         P4         1         4         5         4         5         16         4         5           P5         P5         1,2,4         7.3         5         7         2         96         7         2	P1	P1	1	7	5	6	5	14	6	5
P4         P4         1         4         5         4         5         16         4         5           P5         P5         1,2,4         7.3         5         7         2         96         7         2	P2	P2	2,3,4	11	5	10	2	87	10	2
P5 P5 1,2,4 7.3 5 7 2 96 7 2	P3	P3	1,4	7.3	5	7	6	40	7	6
	P4	P4	1	4	5	4	5	16	4	5
P6   P6   3.4   7.3   5 7 2   38 7 2	P5	P5	1,2,4	7.3	5	7	2	96	7	
	P6	P6	3,4	7.3	5	7	2	38	7	2

	,	,			-																	W. 100 D. 10			
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-		Moveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane			l	Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h	***	у	sec	sec	sec	Х	(m / lane)	(seconds)
																				18			14		
1,3	1	3.65		2	25		N	4100	414	1	36	450	1.00	3868			3868	0.116	0.116	1	20	20	0.745	39	53
4	2	3.65		1	25		1	2120		l	557	557	1.00	2000			2000	0.279	0.279		47	47	0.745	72	37
5,6	2	3.65		3	25		N	6220	372	1029		1401	0.27	6122			6122	0.229			38	47	0.612	60	30
7	3	3.65		1	25		1	2120			148	148	1.00	2000			2000	0.074	0.074		12	12	0.745	30	30 73
8,9	3	3.65		1	25		N	1980	112	0		112	1.00	1868			1868	0.060			10	12	0.604	18	62
10	4	3.65		1	25			2120		339	17	356	0.05	2114			2114	0.168			28	28	0.742	54	50
11,12	4	3.65		3	25		N	6220	24	1026		1050	0.02	6211			6211	0.169	0.169		28	28	0.745	56	44
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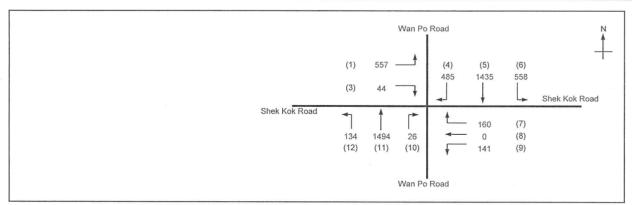
N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s

OZZO TECHNOLOGY (HK) LIMITED	TRAFFIC SIGNAL CALCULA	TION			INITIALS	DATE
TIA_TKO Site 3 Data Centre	2021 Des AM without CBL	PROJECT NO.: 8056	36	Prepared By:	MM	Jan-15
Junction 2 : Wan Po Road/ Shek Kok Road	2021 Des AW Without CDL	FILENAME : Shek Kok Road_201	41006.xls	Checked By:	ОС	Jan-15
2021 Design AM Peak Hour Traffic Flows - without CBL		REFERENCE NO.:		Reviewed By:	ОС	Jan-15



			Existing	Cycle Time
No. of stag	es per cycle	N =	4	1
Cycle time		C =	125	sec
Sum(y)		Y =	0.761	
Loss time		L=	18	sec
Total Flow		=	5034	1 pcu
Co	= (1.5*L+5)/(1-Y)	=	133.7	sec
Cm	= L/(1-Y)	=	75.2	sec
Yult		=	0.765	
R.C.ult	= (Yult-Y)/Y*100%	=	0.6	%
Ср	$= 0.9 \times L/(0.9 - Y)$	=	116.3	sec
Ymax	= 1-L/C	=	0.856	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%		1.3	%

(3	(P1)	<> (P2)	(P4) \(\big\) \(\big\) \(\pi\) (P5)	(4) > (P2)	(5)	(6) 	(P6) ↑ ↓ √ (P2)	<u>↓</u>	(7) (8) (9)	(P6)	(11)	(10)	` .
	Stage 1	Int =	5	Stage 2	Int =	6	Stage 3	Int =	6	Stage	e 4	Int =	5

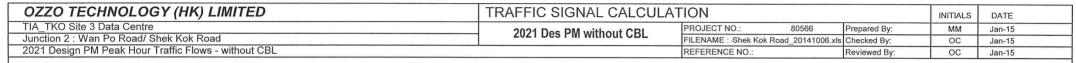
Phase         Phase         (m)         SG         FG         Delay         SG         FG         Delay           P1         P1         1         7         5         6         5         16         6         5           P2         P2         2,3,4         11         5         10         2         85         10         2           P3         P3         1,4         7.3         5         7         6         42         7         6           P4         P4         1         4         5         5         5         17         5         5           P5         P5         1,2,4         7.3         5         7         2         97         7         2           P6         P6         3,4         7.3         5         7         2         36         7         2	Pedestrian	Pedestrian	Stage	Width	Green	Time Re	equired (s)	Green	Time Provi	ded (s)
P2         P2         2,3,4         11         5         10         2         85         10         2           P3         P3         1,4         7,3         5         7         6         42         7         6           P4         P4         1         4         5         5         5         17         5         5           P5         P5         1,2,4         7,3         5         7         2         97         7         2	Phase	Phase		(m)	SG	FG	Delay	SG	FG	Delay
P3         P3         1,4         7,3         5         7         6         42         7         6           P4         P4         1         4         5         5         5         17         5         5           P5         P5         1,2,4         7,3         5         7         2         97         7         2	P1	P1	1	7	5	6	5	16	6	5
P4 P4 1 4 5 5 5 17 5 5 P5 P5 1,2,4 7.3 5 7 2 97 7 2	P2	P2	2,3,4	11	5	10	2	85	10	2
P5 P5 1,2,4 7.3 5 7 2 97 7 2	P3	P3	1,4	7.3	5	7	6	42	7	6
	P4	P4	1	4	5	5	5	17	5	5
P6 P6 3,4 7.3 5 7 2 36 7 2	P5	P5	1,2,4	7.3	5	7	2	97	7	2
	P6	P6	3,4	7.3	5	7	2	36	7	2

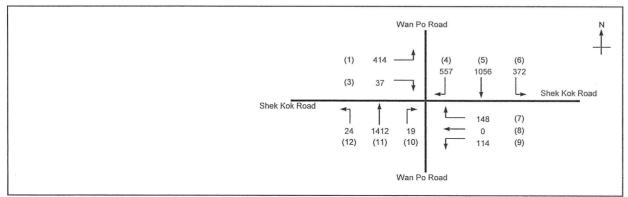
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	1	Moveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	У	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			· m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																				18			<b>建设有效的设计</b>		的建筑家
1,3	1	3.65		2	25		N	4100	557	0	44	601	1.00	3868			3868	0.155	0.155		22	22	0.889	57	51
4	2	3.65		1	25			2120			485	485	1.00	2000	1 1		2000	0.243			34	46	0.661	60	34
5,6	2	3.65		3	25		N	6220	558	1435		1993	0.28	6117	1 1		6117	0.326	0.326		46	46	0.889	86	56
7	3	3.65		1	25			2120			160	160	1.00	2000	1 1		2000	0.080	0.080		11	11	0.889	42	54
8,9	3	3.65		1	25		N	1980	141	0		141	1.00	1868	1 1		1868	0.075			11	11	0.839	36	100
10	4	3.65		1	25			2120		395	26	421	0.06	2112			2112	0.199			28	28	0.888	78	43
11,12	4	3.65		3	25		N	6220	134	1099		1233	0.11	6180	1 1		6180	0.200	0.200		28	28	0.889	68	57
													(X)					-			e 815				

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





		Γ	Existing (	Cycle Time
No. of sta	ges per cycle	N =	4	
Cycle time	9	C =	125	sec
Sum(y)		Y =	0.644	
Loss time		L =	18	sec
Total Flow	,	=	4153	pcu
Co	= (1.5*L+5)/(1-Y)	=	89.9	sec
Cm	= L/(1-Y)	=	50.6	sec
Yult		=	0.765	
R.C.ult	= (Yult-Y)/Y*100%	=	18.8	%
Ср	= 0.9*L/(0.9-Y)	=	63.3	sec
Ymax	= 1-L/C	=	0.856	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	19.6	%

	€> (P2)	(P4) (P5)	(4) 	<b>\</b>	(6) 	(P6) ↑ ↓ (P2)	<b>↓</b>	(7) (8) (9)	(P6)	<b>←</b> }	(P5) >> (P3)
Stage 1	Int =	5	Stage 2	Int =	6	Stage 3	Int =	6	Stage 4	Int =	5

Phase P1	Phase P1	1	(m)	SG	FG	Delay	SG	FG	D. L.
20.000	P1	1	7				00	FG	Delay
			,	5	6	5	13	6	5
P2	P2	2,3,4	11	5	10	2	93	10	2
P3	P3	1,4	7.3	5	7	6	46	7	6
P4	P4	1	4	5	5	5	14	5	5
P5	P5	1,2,4	7.3	5	7	2	102	7	2
P6	P6	3,4	7.3	5	7	2	44	7	2

		,																							
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	1	Moveme	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane	1			Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																				18				<b>建筑器建</b>	A CONTRACTOR
1,3	1	3.65		2	25		N	4100	414		37	451	1.00	3868	1		3868	0.117	0.117		19	19	0.752	39	54
4	2	3.65		1	25			2120			557	557	1.00	2000			2000	0.279	0.279		46	46	0.752	72	54 38
5,6	2	3.65		3	25		N	6220	372	1056		1428	0.26	6124			6124	0.233			39	46	0.630	62	30
7	3	3.65		1	25			2120			148	148	1.00	2000	1 1		2000	0.074	0.074		12	12	0.752	30	74
8,9	3	3.65		1	25		N	1980	114	0		114	1.00	1868	1 1		1868	0.061			10	12	0.620	18	63
10	4	3.65		1	25			2120		350	19	369	0.05	2113			2113	0.175			29	29	0.751	60	50
11,12	4	3.65		3	25		N	6220	24	1062		1086	0.02	6212			6212	0.175	0.175		29	29	0.752	56	44
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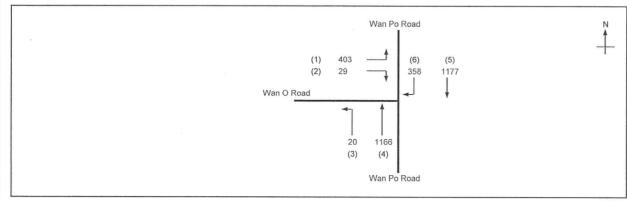
N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





		I	Existing (	Cycle Time
No. of stag	jes per cycle	N =	3	
Cycle time		C =	115	sec
Sum(y)		Y =	0.484	
Loss time		L =	21	sec
Total Flow		=	3153	pcu
Co	= (1.5*L+5)/(1-Y)	=	70.7	sec
Cm	= L/(1-Y)	=	40.7	sec
Yult		=	0.743	
R.C.ult	= (Yult-Y)/Y*100%	=	53.6	%
Ср	= 0.9*L/(0.9-Y)	=	45.4	sec
Ymax	= 1-L/C	=	0.817	
9				
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	52.2	%

(1)	(P3) ↑	(5)	(P3) ↑ ↓	(6)		
↑   ↓   ↓   ← →   (P1) (P2)	(3)	(4)	<->	<->→		
Stage 1 Int = 9	Stage 2	Int = 6	Stage 3	Int = 6	Stage 4	Int =

Pedestrian	Stage	Width	Green	Time Re	equired (s)	Green	Time Provid	ded (s)
Phase		(m)	SG	FG	Delay	SG	FG	Delay
P1	1	7.3	5	5	10	15	5	10
P2	1,3	11	5	9	2	71	9	2
P3	2,3	7.3	5	6	6	106	6	6
P4	3	11	5	9	2	51	9	2

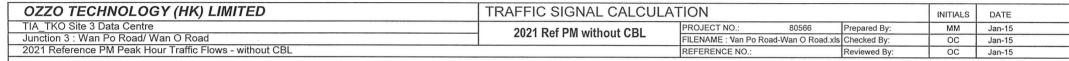
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Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	1	Movemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																				21		AND BAR			
1	1	3.65		2	20		N	4100	403			403	1.00	3814			3814	0.106	0.106		21	21	0.592	30	42
2	1	3.65		2	20			4240			29	29	1.00	3944			3944	0.007			1	21	0.041	0	35
5	2	3.65		2			N	4100		1177		1177	0.00	4100			4100	0.287	0.287		56	56	0.592	57	20
4	2	3.65		2				4240		1166		1166	0.00	4240			4240	0.275			53	56	0.567	57	20
3	2	3.65		2	20		N	4100	20			20	1.00	3814			3814	0.005			1	56	0.011	0	14
6	3	3.65		2	20			4240			358	358	1.00	3944			3944	0.091	0.091		18	18	0.592	27	45
																						1225			
																					1.27				
	1																								

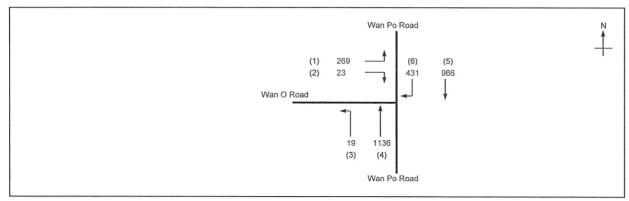
N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





			Existing Cycle Time
No. of sta	ges per cycle	N =	3
Cycle time	е	C =	115 sec
Sum(y)		Y =	0.448
Loss time		L =	21 sec
Total Flow	V	=	2844 pcu
Co	= (1.5*L+5)/(1-Y)	=	66.1 sec
Cm	= L/(1-Y)	=	38.0 sec
Yult		=	0.743
R.C.ult	= (Yult-Y)/Y*100%	=	65.8 %
Ср	= 0.9*L/(0.9-Y)	=	41.8 sec
Ymax	= 1-L/C	=	0.817
		1	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	64.3 %

(1)	(P3) ↑ ↓	(5)	(P3) ↑ ↓	(6)		
↑     \frac{1}{\psi} \cdot \equiv \e	(3) (4)		<->	$<$ $\stackrel{>}{\sim}$ $\stackrel{>}{\sim}$		
Stage 1 Int = 9	Stage 2 Int	= 6	Stage 3	Int = 6	Stage 4	Int =

Pedestrian	Stage	Width	Greer	Time Re	equired (s)	Green	Time Provid	ded (s)
Phase		(m)	SG	FG	Delay	SG	FG	Delay
P1	1	7.3	5	5	10	9	5	10
P2	1,3	11	5	9	2	59	9	2
P3	2,3	7.3	5	6	6	93	6	6
P4	3	11	5	9	2	44	9	2

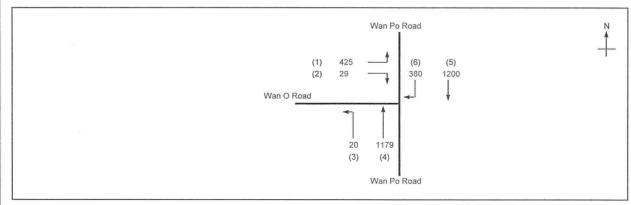
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Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-		/loveme		Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane			1	Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																				21		<b>机造物器</b>	1000		
1	1	3.65		2	20		N	4100	269			269	1.00	3814			3814	0.071	0.071		15	15	0.548	21	46
2	1	3.65		2	20			4240			23	23	1.00	3944			3944	0.006			1	- 15	0.045	0	40
5	2	3.65		2			N	4100		966		966	0.00	4100			4100	0.236	0.268		49	49	0.548	51	23
4	2	3.65		2				4240		1136		1136	0.00	4240	1 1		4240	0.268			56	49	0.623	60	24
3	2	3.65		2	20		N	4100	19			19	1.00	3814			3814	0.005			1	49	0.012	0	. 17
6	3	3.65		2	20			4240			431	431	1.00	3944			3944	0.109	0.109	-	23	23	0.548	33	40

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





		i	m 1 11 1	
			Existing (	Cycle Time
No. of sta	ges per cycle	N =	3	
Cycle time	e	C =	115	sec
Sum(y)		Y =	0.500	
Loss time		L =	21	sec
Total Flov	v	=	3233	pcu
Co	= (1.5*L+5)/(1-Y)	=	73.1	sec
Cm	= L/(1-Y)	=	42.0	sec
Yult		=	0.743	
R.C.ult	= (Yult-Y)/Y*100%	=	48.4	%
Ср	$= 0.9 \times L/(0.9 - Y)$	=	47.3	sec
Ymax	= 1-L/C	=	0.817	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	47.0	%

(1)	(P3) ↑	(5)	(P3) ↑	(6)		
↑ ↓ ↓ (P1) ←-> (P2)	(3)	(4)	<->→	<->> (P4)		
Stage 1 Int = 9	Stage 2	Int = 6	Stage 3	Int = 6	Stage 4	Int =

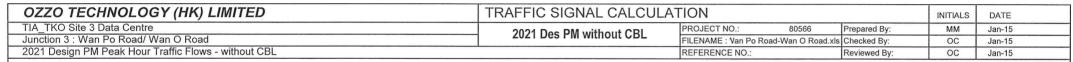
P1         1         7.3         5         5         10         15         5         10           P2         1,3         11         5         9         2         71         9         2           P3         2,3         7.3         5         6         6         104         6         6	(3)	Time Provid	Green	quired (s)	Time Re	Green	Width	Stage	Pedestrian
P2         1,3         11         5         9         2         71         9         2           P3         2,3         7.3         5         6         6         104         6         6	Delay	FG	SG	Delay	FG	SG	(m)		Phase
P3 2,3 7.3 5 6 6 104 6 6	10	5	15	10	5	5	7.3	1	P1
	2	9	71	2	9	5	11	1,3	P2
P4 3 11 5 9 2 50 9 2	6	6	104	6	6	5	7.3	2,3	P3
	2	9	50	2	9	5	11	3	P4

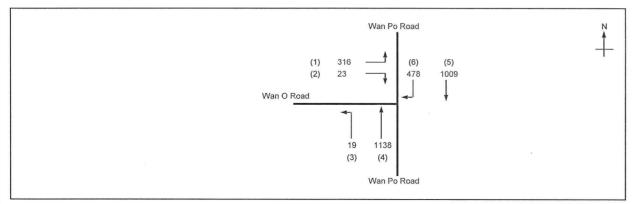
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	N.	Novemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																				21					
1	1	3.65		2	20		N	4100	425			425	1.00	3814			3814	0.111	0.111		21	21	0.612	33	43
2	1	3.65		2	20			4240			29	29	1.00	3944			3944	0.007			1	21	0.040	0	35
5	2	3.65		2			N	4100		1200		1200	0.00	4100			4100	0.293	0.293		55	55	0.612	60	21
4	2	3.65		2				4240		1179		1179	0.00	4240	1 1		4240	0.278			52	55	0.582	57	21
3	2	3.65		2	20		N	4100	20			20	1.00	3814			3814	0.005			1	55	0.011	0	14
6	3	3.65		2	20			4240			380	380	1.00	3944			3944	0.096	0.096		18	18	0.612	30	45
																					7.77			To the	
																					14.5		<b>多花园</b>		
																					113				
																					- 1				

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





			Existing (	Cycle Time
No. of stag	ges per cycle	N =	3	
Cycle time		C =	115	sec
Sum(y)		Y =	0.472	
Loss time		L=	21	sec
Total Flow		=	2983	pcu
Co	= (1.5*L+5)/(1-Y)	=	69.2	sec
Cm	= L/(1-Y)	=	39.8	sec
Yult		=	0.743	
R.C.ult	= (Yult-Y)/Y*100%	=	57.2	%
Ср	$= 0.9 \times L/(0.9 - Y)$	=	44.2	sec
Ymax	= 1-L/C	=	0.817	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	55.7	%

(1)			(P3) ↑ ↓		(5)	(P3) ↑ ↓	(6)				
↑ ↓ ↓ (P1) (P2)			(3)	(4)		<->→	<->> (P4)				
Stage 1	Int =	9	Stage 2	Int =	6	Stage 3	Int =	6	Stage 4	Int =	

Pedestrian	Stage	Width	Greer	Time Re	equired (s)	Green	n Time Provi	ded (s)
Phase		(m)	SG	FG	Delay	SG	FG	Delay
P1	1	7.3	5	5	10	10	5	10
P2	1,3	11	5	9	2	60	9	2
P3	2,3	7.3	5	6	6	92	6	6
P4	3	11	5	9	2	44	9	2
					1			

Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	N	/lovemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds)
																				21					G 12.51
1	1	3.65		2	20		N	4100	316		>	316	1.00	3814	1 1		3814	0.083	0.083		16	16	0.578	24	45
2	1	3.65		2	20			4240			23	23	1.00	3944			3944	0.006			1	16	0.041	0	38
5	2	3.65		2			N	4100		1009		1009	0.00	4100	1		4100	0.246	0.268		49	49	0.578	54	24
4	2	3.65		2				4240		1138		1138	0.00	4240			4240	0.268			53	49	0.630	60	25 17
3	2	3.65		2	20		N	4100	19			19	1.00	3814	1 1		3814	0.005			1	49	0.012	0	17
6	3	3.65		2	20			4240			478	478	1.00	3944	1 1		3944	0.121	0.121		24	24	0.578	36	39
																					-				

N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s

## OZZO TECHNOLOGY (HK) LIMITED

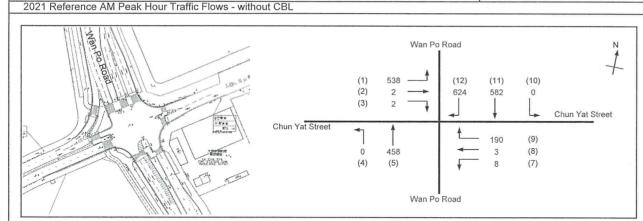
TIA TKO Site 3 Data Centre

Junction 4: Wan Po Road/ Chun Yat Street

## TRAFFIC SIGNAL CALCULATION

2021 Ref AM without CBL

ION			INITIALS	DATE	
PROJECT NO.:	80566	Prepared By:	MM	Jan-15	
FILENAME : n Po Roa	d-Chun Yat Street.xls	Checked By:	ОС	Jan-15	
REFERENCE NO.:		Reviewed By:	ОС	Jan-15	



			Existing C	Cycle Time
No. of stag	ges per cycle	N =	5	
Cycle time		C =	115	sec
Sum(y)		Y =	0.508	
Loss time		L=	42	sec
Total Flow		=	2407	pcu
Co	= (1.5*L+5)/(1-Y)	=	138.2	sec
Cm	= L/(1-Y)	=	85.4	sec
Yult		=	0.585	
R.C.ult	= (Yult-Y)/Y*100%	=	15.2	%
Ср	= 0.9*L/(0.9-Y)	=	96.4	sec
Ymax	= 1-L/C	=	0.635	
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	12.5	%

	(1	1) (10)									Pedestrian	Stage	Width	Green	Time Re	equired (s)	Greer	Time Provid	led (s)
(P1)			(12)	(11) (10)		(12) (P7)		(P8)	(P1)		Phase		(m)	SG	FG	Delay	SG	FG	Delay
1	. 1	<b>/ L</b> ▶	(1)		(1)			<>	I.		P1	1,5	4	5	5	5	31	5	5
.	7			* -		<b>→</b> ∨	(1)		7	<b>†</b>	P2	1,2,3,5	3.5	5	5	5	89	5	5
	A	A	<b>^</b>	A	<b>^</b>	<b>^</b>	(2)	A	<b>^</b>	(9)	P3	4	7.3	5	6	9	6	6	9
(P2)	Ÿ.	V	(P2) 🕏	<b>V</b>	(P2) 😲	(P6)₩	(3)	(P6) <b>∜</b>	(P2) 🔆	<b>←</b> (8)	P4	2,3,4,5	11	5	9	2	88	9	2
1		(P6)		(P6)			A *			(7)	P5	3	7.3	5	6	7	36	6	7
4	<b>A</b>					100 100	₩			*	P6	1,2,3,4	5	5	5	2	73	5	2
			<>		<b>←</b> ;	» «···»	(P3) <b>&lt;····&gt;</b>		<b>←</b> >		P7	3	5	5	5	5	39	5	5
(4)	(5)		(P4)		(P4)	(P5)	(P4)		(P4)		P8	4	7.3	5	6	2	13	6	2
Stage	1 Int =	. 7	Stage 2	Int = 9	Stage 3 In	t =	Stage 4	Int = 5	Stage 5	Int = 9									

Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	1	Novemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Averag
ment		Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(second
																				26					
1	2,3,4	3.65		1	30		N	1980	538			538	1.00	1886			1886	0.285	0.285		41	57	0.576	48	21
2,3	4	3.65		1	20			2120		2	2	4	0.00	2120			2120	0.002		16	0	16	0.014	000	6
4,5	1	3.65		1	15		N	1980	0	221		221	0.00	1980			1980	0.112	0.112		16	16	0.800	42	67
5	1	3.65		1				2120		237		237	0.00	2120			2120	0.112			16	16	0.802	42	65
7,8,9	5	4.00		1	13		N	2015	8	3	190	201	0.99	1809			1809	0.111	0.111		16	16	0.800	36	69
10,11	1,2	3.65		1	11		N	1980	0	281		281	0.00	1980			1980	0.142			20	43	0.376	30	25
11	1,2	3.65		1				2120		301		301	0.00	2120			2120	0.142			20	43	0.376	30	25
12	2,3	3.65		2	20			4240			624	624	1.00	3944			3944	0.158			23	50	0.364	33	20

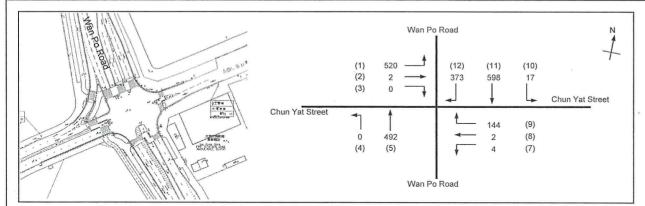
NOTE: O - OPPOSING TRAFFIC

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s

OZZO TECHNOLOGY (HK) LIMITED	TRAFFIC SIGNAL CALCULA	ATION			INITIALS	DATE
TIA_TKO Site 3 Data Centre	2021 Ref PM without CBL	PROJECT NO.:	80566	Prepared By:	MM	Jan-15
Junction 4 : Wan Po Road/ Chun Yat Street	2021 Rei Fiw Without GDL	FILENAME : n Po Road-Ch	un Yat Street.xls	Checked By:	ОС	Jan-15
2021 Reference PM Peak Hour Traffic Flows - without CBL		REFERENCE NO.:		Reviewed By:	ОС	Jan-15



			Existing C	Cycle Time		
No. of stag	ges per cycle	N =	5			
Cycle time		C =	115	sec		
Sum(y)		Y =	0.478			
Loss time		L =	42	sec		
Total Flow		=	2152	pcu		
Co	= (1.5*L+5)/(1-Y)	=	130.4	sec		
Cm	= L/(1-Y)	=	80.5	sec		
Yult		=	0.585			
R.C.ult	= (Yult-Y)/Y*100%	=	22.3	%		
Ср	= 0.9 L/(0.9 Y)	=	89.7	sec		
Ymax	= 1-L/C	=	0.635			
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	19.4	0/_		

	(11) (10)										Pedestrian	Stage	Width	Green	Time Re	quired (s)	Green	Time Provid	ded (s)
(P1)		(12)	(11) (10)	(1	2) (P7)		(P8)	(P1)			Phase		(m)	SG	FG	Delay	SG	FG	Delay
I Fig.	<b>♦ L</b> ►	(1)		(1)			<b>←&gt;</b>	F.			P1	1,5	4	5	5	5	30	5	5
1			<b>♦</b>	<b> </b>	V	(1)		Ä	<b>A</b>		P2	1,2,3,5	3.5	5	5	5	89	5	5
^	A	A	A	A	A	(2) ──►	<b>^</b>	<b>A</b>	L (9)		P3	4	7.3	5	6	9	6	6	9
(P2) 😲	₩	(P2) 🔖	₩	(P2) 😲	(P6)₩	(3)	(P6)₩	(P2) 🖫	<b>◄</b> (8)		P4	2,3,4,5	11	5	9	2	85	9	2
	(P6)		(P6)			A *			(7)		P5	3	7.3	5	6	7	34	6	7
∢η	<b>A</b>					\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			*		P6	1,2,3,4	5	5	5	2	76	5	2
		<>		<>	<b>←</b> >	(P3) <b>&lt;</b> ····>		<b></b>			P7	3	5	5	5	5	37	5	5
(4)	(5)	(P4)		(P4)	(P5)	(P4)		<> (P4)			P8	4	7.3	5	6	2	13	6	2
					35. 2														
Stage 1	Int = 7	Stage 2	Int = 9	Stage 3 Int =		Stage 4	Int = 5	Stage 5 In	nt = 9	1									

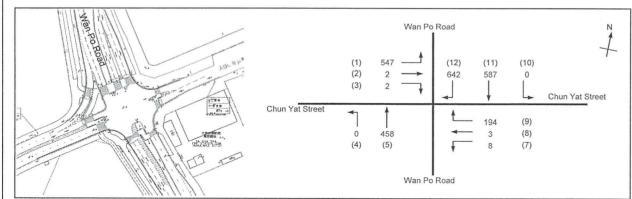
Maria	04	Laws	l Di	N	I D. U.			0							I										
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-		Noveme		Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane		1		Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	У	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds)
																				26			7 4		328.00
1	2,3,4	3.65		1	30	ĺ	N	1980	520			520	1.00	1886	1 1		1886	0.276	0.276		42	58	0.547	48	20
2,3	4	3.65		1	20			2120		2	0	2	0.00	2120	1		2120	0.001		16	0	16	0.007	0	0.0
4,5	1	3.65		1	15		N	1980	0	238		238	0.00	1980	1		1980	0.120			18	18	0.754	36	57
5	1	3.65		1		l		2120		254		254	0.00	2120	1		2120	0.120	0.120		18	18	0.751	42	56
7,8,9	5	4.00		1	13		N	2015	4	2	144	150	0.99	1809			1809	0.083	0.083		13	13	0.754	30	70
10,11	1,2	3.65		1	11		N	1980	17	278		295	0.06	1965	1 1		1965	0.150			23	48	0.358	30	22
11	1,2	3.65		1				2120		320		320	0.00	2120			2120	0.151			23	48	0.360	30	22
12	2,3	3.65		2	20			4240			373	373	1.00	3944			3944	0.095			14	51	0.213	18	18
																									7.7

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





			Existing (	Cycle Time		
No. of stage	es per cycle	N =	5			
Cycle time		C =	115	sec		
Sum(y)		Y =	0.515			
Loss time		L =	42	sec		
Total Flow		=	2443	pcu		
Co	= (1.5*L+5)/(1-Y)	=	140.2	sec		
Cm	= L/(1-Y)	=	86.6	sec		
Yult		=	0.585			
R.C.ult	= (Yult-Y)/Y*100%	=	13.6	%		
Ср	= 0.9 L/(0.9-Y)	=	98.2	sec		
Ymax	= 1-L/C	=	0.635			
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	10.9	%		

	(11) (10)				4					Pedestrian	Stage	Width	Green	Time Red	quired (s)	Green	Time Provid	ed (s)
(P1)		(12)	(11) (10)	(12	) (P7)		(P8)	(P1)		Phase		(m)	SG	FG	Delay	SG	FG	Delay
Fig	<b>♦                                    </b>	(1)		(1)	()	A	<>	I.		P1	1,5	4	5	5	5	31	5	5
4		<b>─</b> →	*		V	(1)		7	<b>†</b>	P2	1,2,3,5	3.5	5	5	5	89	5	5
	A	<u> </u>	A	<u>^</u>	A	(2)	<b>^</b>	<u>^</u>	L (9)	P3	4	7.3	5	6	9	6	6	9
(P2) \	V	(P2) 🕏	₩	(P2) 😾	(P6)₩	(3)	(P6) <b>∜</b>	(P2) ₩	<b>◄</b> (8)	P4	2,3,4,5	11	5	9	2	88	9	2
	(P6)		(P6)			A *			(7)	P5	3	7.3	5	6	7	36	6	7
◆	<b>†</b>					₩			*	P6	1,2,3,4	5	5	5	2	73	5	2
		<>		<>	<>	(P3) <b>&lt;····&gt;</b>		€>		P7	3	5	5	5	5	39	5	5
(4)	(5)	(P4)		(P4)	(P5)	(P4)		(P4)		P8	4	7.3	5	6	2	13	6	2
																		-
Stage 1	Int = 7	Stage 2	Int = 9	Stage 3 Int =		Stage 4	Int = 5	Stage 5	Int = 9									

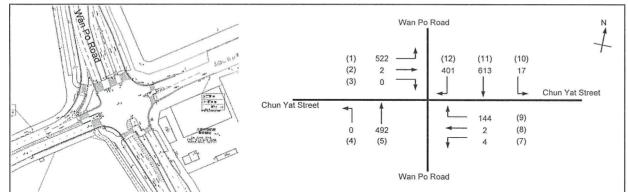
								,																	
Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-	1	Movemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment		Width		lane	1			Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	у	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	Х	(m / lane)	(seconds)
																				26		<b>经营业经济</b>		Service Co.	Contract Contract
1	2,3,4	3.65		1	30		N	1980	547			547	1.00	1886			1886	0.290	0.290		41	57	0.584	48	21
2,3	4	3.65		1	20			2120		2	2	4	0.00	2120	1 1		2120	0.002		16	0	16	0.014	0	200 m
4,5	1	3.65		1	15	İ	N	1980	0	221		221	0.00	1980			1980	0.112	0.112		16	16	0.811	42	69
5	1	3.65		1				2120		237		237	0.00	2120	1 1		2120	0.112			16	16	0.813	42	67
7,8,9	5	4.00		1	13		N	2015	8	3	194	205	0.99	1809	1 1		1809	0.113	0.113		16	16	0.811	36	71
10,11	1,2	3.65		1	11		N	1980	0	284		284	0.00	1980			1980	0.143	0.110		20	43	0.382	30	25
11	1,2	3.65		1				2120		303		303	0.00	2120			2120	0.143			20	43	0.381	36	25
12	2,3	3.65		2	20			4240		""	642	642	1.00	3944			3944	0.143			23	50	0.373	33	20
1								12.10			0.12	012	1.00	0044			3344	0.105			25				
																					100		<b>在</b> 是1000年		
																					'- <del> </del>	<b>建建筑建设</b>			
							L		L													10000000000000000000000000000000000000			Kateday Stro

N - NEAR SIDE LANE

SG - STEADY GREEN FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s





			Existing (	Cycle Time		
No. of stage	es per cycle	N =	5			
Cycle time		C =	115	sec		
Sum(y)		Y =	0.480			
Loss time		L=	42	sec		
Total Flow		=	2197	pcu		
Co	= (1.5*L+5)/(1-Y)	=	130.8	sec		
Cm	= L/(1-Y)	=	80.8	sec		
Yult		=	0.585			
R.C.ult	= (Yult-Y)/Y*100%	=	21.9	%		
Ср	= 0.9 L/(0.9 Y)	=	90.0	sec	1	
Ymax	= 1-L/C	=	0.635			
R.C.(C)	= (0.9*Ymax-Y)/Y*100%	=	19.0	%		

Г		(11)	(10)												 Pedestrian	Stage	Width	Green	Time Re	quired (s)	Green	Time Provid	led (s)
(	21)	- 1	1 1		(12)	(11)	(10)		(12)	(P7)		(P8)	(P1)		Phase		(m)	SG	FG	Delay	SG	FG	Delay
	15.	<b>\psi</b>	L-	<b>(1) ★</b>			I	(1)				<b>←&gt;</b>	F.		P1	1,5	4	5	5	5	30	5	5
	7		- 1		-	*	-		4	₩.	(1)		7	<b>A</b>	P2	1,2,3,5	3.5	5	5	5	89	5	5
11	A		A	A			A	A		A	(2) →	A	<b>A</b>	L (9)	P3	4	7.3	5	6	9	6	6	9
(	P2) 🔖		V	(P2) 🔖			V	(P2) 🕏		(P6)₩	(3)	(P6) <b>∜</b>	(P2) 🖖	<b>←</b> (8)	P4	2,3,4,5	11	5	9	2	86	9	2
		(P	P6)			(	P6)				<b>↑</b>			(7)	P5	3	7.3	5	6	7	34	6	7
	47	<b>A</b>	1								₩			*	P6	1,2,3,4	5	5	5	2	76	5	2
	1	1		<	····>				<b>&lt;····</b> >	<b>&gt;</b>	(P3) <b>&lt;····&gt;</b>		€>		P7	3	5	5	5	5	37	5	5
	(4)	(5)			(P4)			(	P4)	(P5)	(P4)		(P4)		P8	4	7.3	5	6	2	13	6	2
ΙL			i																				
5	tage 1	Int =	7	Stage 2		Int =	9	Stage 3	Int =		Stage 4	Int = 5	Stage 5	Int = 9									

Move-	Stage	Lane	Phase	No. of	Radius	0	N	Straight-		Movemer	nt	Total	Proportion	Sat.	Flare lane	Share	Revised				g	g	Degree of	Queue	Average
ment	1	Width		lane				Ahead	Left	Straight	Right	FLow	of Turning	Flow	Length	Effect	Sat. Flow	У	Greater	L	(required)	(input)	Saturation	Length	Delay
		m.			m.			Sat. Flow	pcu/h	pcu/h	pcu/h	pcu/h	Vehicles	pcu/h	m.	pcu/hr	pcu/h		у	sec	sec	sec	X	(m / lane)	(seconds)
																				26					
1	2,3,4	3.65		1	30		N	1980	522			522	1.00	1886	1 1		1886	0.277	0.277		42	58	0.548	48	20
2,3	4	3.65		1	20			2120		2	0	2	0.00	2120	1 1		2120	0.001		16	0	16	0.007	0.0	0
4,5	1	3.65		1	15		N	1980	0	238		238	0.00	1980	1 1		1980	0.120	0.120		18	18	0.756	42	0 58
5	1	3.65		1				2120		254		254	0.00	2120	1 1		2120	0.120			18	18	0.754	42	56
7,8,9	5	4.00		1	13		N	2015	4	2	144	150	0.99	1809	1 1		1809	0.083	0.083		13	13	0.756	30	70
10,11	1,2	3.65		1	11		N	1980	17	286		303	0.06	1965	1 1		1965	0.154			23	49	0.364	30	21
11	1,2	3.65		1				2120		327		327	0.00	2120	1 - 1		2120	0.154			23	49	0.364	36	21
12	2,3	3.65		2	20			4240			401	401	1.00	3944	1 1		3944	0.102			15	51	0.229	21	18
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N - NEAR SIDE LANE

SG - STEADY GREEN

FG - FLASHING GREEN

PEDESTRAIN WALKING SPEED = 1.2m/s

Proposal for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85 Traffic Impact Assessment Study Draft Final Report



## Annex A

Video Record Snap Shots

2014.04.02 08:56:12



Junction 1 – Junction of Wan Po Road and Lohas Park Road (AM)



Junction 1 – Junction of Wan Po Road and Lohas Park Road (PM)



Junction 2 – Junction of Wan Po Road and Shek Kok Road (AM)



Junction 2 – Junction of Wan Po Road and Shek Kok Road (PM)



Junction 3 – Junction of Wan Po Road and Wan O Road (AM)



Junction 3 - Junction of Wan Po Road and Wan O Road (PM)



Junction 4 – Junction of Wan Po Road and Chun Yat Street (Cam No.1 - AM)



Junction 4 - Junction of Wan Po Road and Chun Yat Street (Cam No.1 - PM)



Junction 4 – Junction of Wan Po Road and Chun Yat Street (Cam No.2 - AM)



Junction 4 – Junction of Wan Po Road and Chun Yat Street (Cam No.2 - PM)



Junction 4 – Junction of Wan Po Road and Chun Yat Street (Cam No.2 - AM)



Junction 4 - Junction of Wan Po Road and Chun Yat Street (Cam No.2 - PM)

Annex C

Drainage Proposal



# Office of the Government Chief Information Officer

# Data Centre Development in Tseung Kwan O Area 85 – Site 3

Drainage Proposal

Project Profile Report

July 2014



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4	3.1 3.2	Drainage Impact	4 5	

### **APPENDICES**

## Appendix A

Master Layout Plan

## Appendix B

**Runoff Calculations** 

## Appendix C

Hydraulic Calculations

## Appendix D

Figures

Figure 1 - Site Location Plan

Figure 2 - Existing Drainage Arrangement

Figure 3 - Proposed Drainage Arrangement

# 1.1 Background

- 1.1.1 AIM Group Limited has been commissioned to complete a Drainage Proposal in support of a rezoning application for a Data Centre Development in Tseung Kwan O Area 85 Site 3.
- 1.1.2 The proposed development involves a new multi-storey data centre at Site 3, which is immediately to the south of the Tseung Kwan O Preliminary Treatment Works and to the east of Wan Po Road (hereafter referred to as the "Site"). The Site location is shown on Figure 1.
- 1.1.3 This report assesses the drainage arrangements in the vicinity of the Site and the proposed drainage arrangements for the Site after development.

## 1.2 Site Description

- 1.2.1 The Application Site is immediately to the south of the Tseung Kwan O Preliminary Treatment Works and to the east of Wan Po Road. The Site for the development has an area of approximately 10,836m², although the overall area includes an open nullah to the east of the Site and an access cul-de-sac (approximately 1,204m²) to the south of the Site.
- 1.2.2 The Site, which is currently occupied by Drainage Services Department (DSD), is currently zoned "Other Specified Uses" annotated "Sewage Treatment Works ("OU(STW)") for most of the site, and a small portion zoned "G/IC(9)" on the approved TKO Outline Zoning Plan No. S/TKO/20 (the OZP).
- 1.2.3 The Site (and surrounding areas) is already mostly developed (paved) and the characteristics will not be greatly affected by the proposed development, i.e. there will be paving and some soft landscaping. It is therefore concluded that there will be no significant change to the runoff from the Site as a result of the development.

## 1.3 Project Description

- 1.3.1 The proposed development will involve the following elements (a Site Master Plan is included in Appendix A for reference):
  - An eight-storey data centre building, with plant rooms and a basement car park.
  - · Access roads, with loading/unloading areas.
  - Soft landscaping covering an area of approximately 1,956m<sup>2</sup>.

## 1.4 Reference Material

1.4.1 For the preparation of this Drainage Proposal, reference has been made to the DSD Stormwater Drainage Manual and DSD Drainage Record Sheet Number 12-SW-1D, covering the Site and surrounding areas.

# 2 Description of Existing Condition and Methodology

## 2.1 Site Location and Topography

2.1.1 The Site is immediately to the south of the Tseung Kwan O Preliminary Treatment Works and to the east of Wan Po Road. The Site for the development has an area of approximately 10,836m<sup>2</sup>. The Site is quite flat and is mostly paved.

## 2.2 Existing Baseline Condition

- 2.2.1 The existing drainage arrangements for the Site have been assessed from the DSD Record Plan for the area and these are shown on Figure 2.
- 2.2.2 As shown on Figure 2, overland runoff from the Site discharges via one of two connection pipes to the 11.1m wide nullah which runs from north to south along the eastern boundary of the Site, within a 18m wide Drainage Reserve. The northern portion of the Site is served by manhole SCH4004600, which discharges into the nullah via a 600mm diameter pipe at SGJ4007775. The southern portion of the Site is served by

manhole SCH4004602, which discharges into the nullah via a 600mm diameter pipe at SGJ4007778.

## 2.3 Approach and Methodology

2.3.1 The stormwater runoff from the Site will be collected by on-Site drainage systems and discharged via the existing connection points to the nullah.

## 2.4 Drainage Design Methodology

- 2.4.1 The assessment standard complies with the DSD Stormwater Drainage Manual (SDM) (2000 Edition) and a 1 in 50 year storm return period has been adopted for the assessment, i.e. an urban drainage branch system, as defined in the SDM.
- 2.4.2 The catchment runoff has been calculated using the "Rational Method", as outlined in the DSD SDM:

Q = 0.278 CiA

Where:  $Q = \text{peak runoff in m}^3/\text{s}$ 

C = runoff coefficient (dimensionless)

*i* = rainfall intensity in mm/hr

 $A = \text{catchment area in km}^2$ 

- 2.4.3 For the building and paved areas, a runoff coefficient of 0.9 has been adopted. The soft-landscaped areas will be mostly flat grass and a runoff coefficient of 0.25 has been adopted. For simplicity, an assumed time of concentration of 5 minutes has been adopted.
- 2.4.4 Pipe capacities have been assessed using the Colebrook-White Equation.

# 3 Preliminary Drainage Design

## 3.1 Drainage Impact

3.1.1 Since the Application Site is already largely urbanized (paved) and the overall catchment characteristics of the Site will be generally maintained, it is concluded that there will be no significant change in stormwater runoff as a result of the proposed data centre and, hence, the

Page 4

development will not result in any adverse drainage impact to the existing drainage system.

## 3.2 Proposed Drainage Arrangement

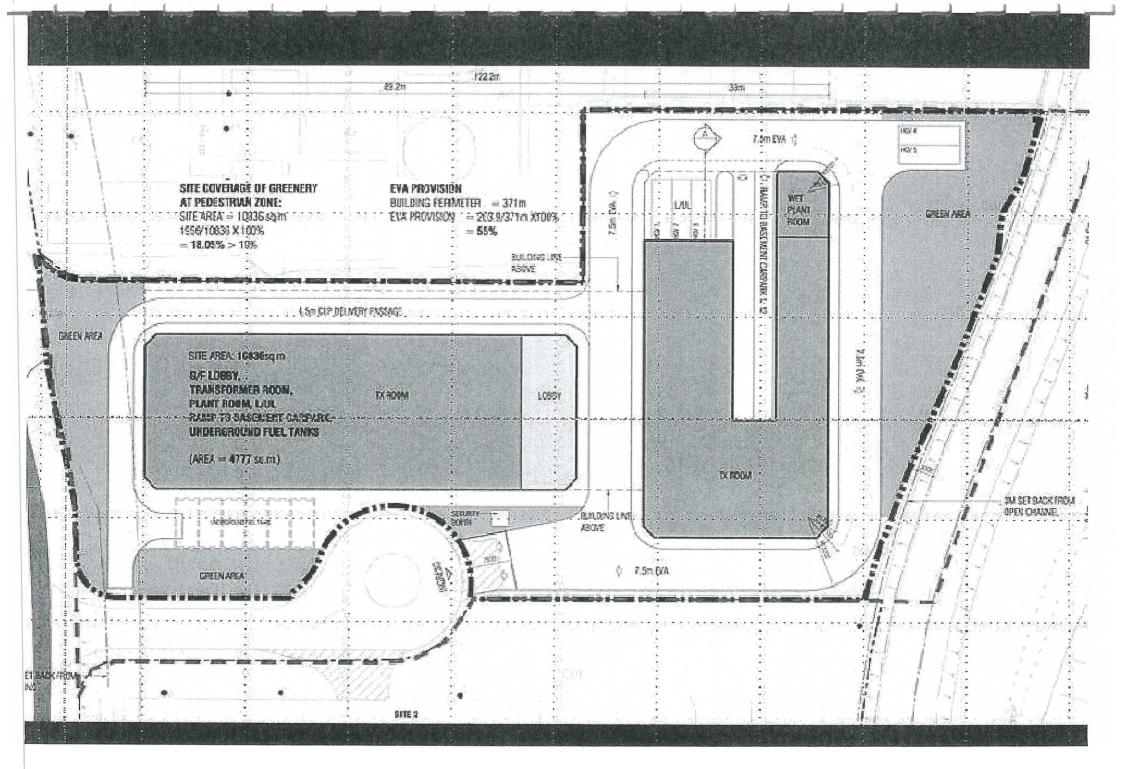
- 3.2.1 Runoff calculations are included in Appendix B and these demonstrate that the overall runoff from the Site will be approximately 0.72 m³/s. The Site will be drained to the nullah via the two existing connection points. An indicative drainage arrangement, with two separate systems, is shown on Figure 3, although this may be modified in later, more detailed, stages of implementation, to suit the actual Site layout. However, it would be reasonable to assume that each system (and therefore each discharge point) would need to accommodate approximately half the Site runoff, i.e. at least 0.36m³/s. Pipes would be 300mm to 600mm diameter. Road gulleys would also be provided.
- 3.2.2 Pipe capacity calculations are included in Appendix C. The two existing discharge connections have similar hydraulic arrangements, with each connection having a capacity (including allowance for siltation) of just over 0.62m³/s, i.e. well in excess of the peak runoff to each system (0.36m³/s).

## 4 Conclusions

- 4.1.1 The existing Site is well developed (paved) and drains to the adjacent nullah via two discharge points.
- 4.1.2 The proposed development will not significantly affect the runoff characteristics for the Site, so there will be no adverse impacts to the public drainage system.
- 4.1.3 The Site will be drained to the existing discharge points via dedicated systems. The discharge connections have adequate capacity for the expected peak runoff.

# Appendix A

Master Layout Plan



# Appendix B

Runoff Calculations

# C79 - Data Centre Development at Tsueng Kwan O Area 85 - Site 3 Catchment Areas and Run-off (1 in 50 Year)

### Refer:

DSD Stormwater Drainage Manual

## Notes:

Site development will involve construction of buildings and paving; C = 1.00. Unpaved (landscaped) Catchments are small, so Rational Method is appropriate

Intensity=

 $a/(t_c+b)^c$ 

b

С

687

a

4.2

0.42

Catchment		Area	Total t <sub>c</sub>	Intensity	Runoff	Run-off
		÷		No.	Coefficient	
		(m <sup>2</sup> )	(min)	(mm/h)		(m³/s)
Proposed	The Site plus cul-de-sac	12,040	5.0	270		
	Paved	10,084	5.0	210	0.90	0.68
	Unpaved	1,956			0.25	0.04
						0.72
	Total Runoff					0.72

# Appendix C

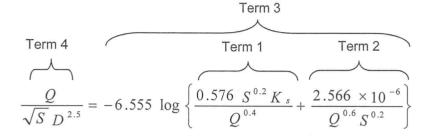
Hydraulic Calculations

# C79 - Data Centre Development at Tsueng Kwan O Area 85 - Site 3 Existing Drainage Capacity Northern Connection

Colebrook-white Equation in SI units, simplified for solution for D

US IL 2.69 mPD (Existing SCH4004600)
DS IL 2.64 mPD (Existing SGJ4007775)
0.05 m

L 5.00 m Gradient, S (1 in) 100



D 0.600 m 600 mm S (1 in) 100 0.01 Ks 0.6 mm 0.0006 m

 Term 1
 0.000159589

 Term 2
 8.0519E-06

 Term 3
 24.7491973

Term 4 24.74868266

Diff 0 Should be zero for solution

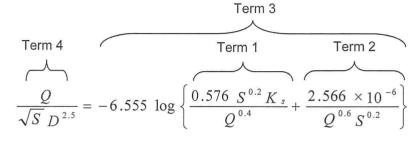
Capacity, Q 0.690 m<sup>3</sup>/s

With 10% flow area allowance for sedimentation, assume 10% reduction in capacity:

Capacity,  $Q_{silt} = 0.621 \text{ m}^3/\text{s}$ 

# C79 - Data Centre Development at Tsueng Kwan O Area 85 - Site 3 Existing Drainage Capacity Southern Connection

Colebrook-white Equation in SI units, simplified for solution for D



Term 4 24.74868266

24.74000200

Diff 0 Should be zero for solution

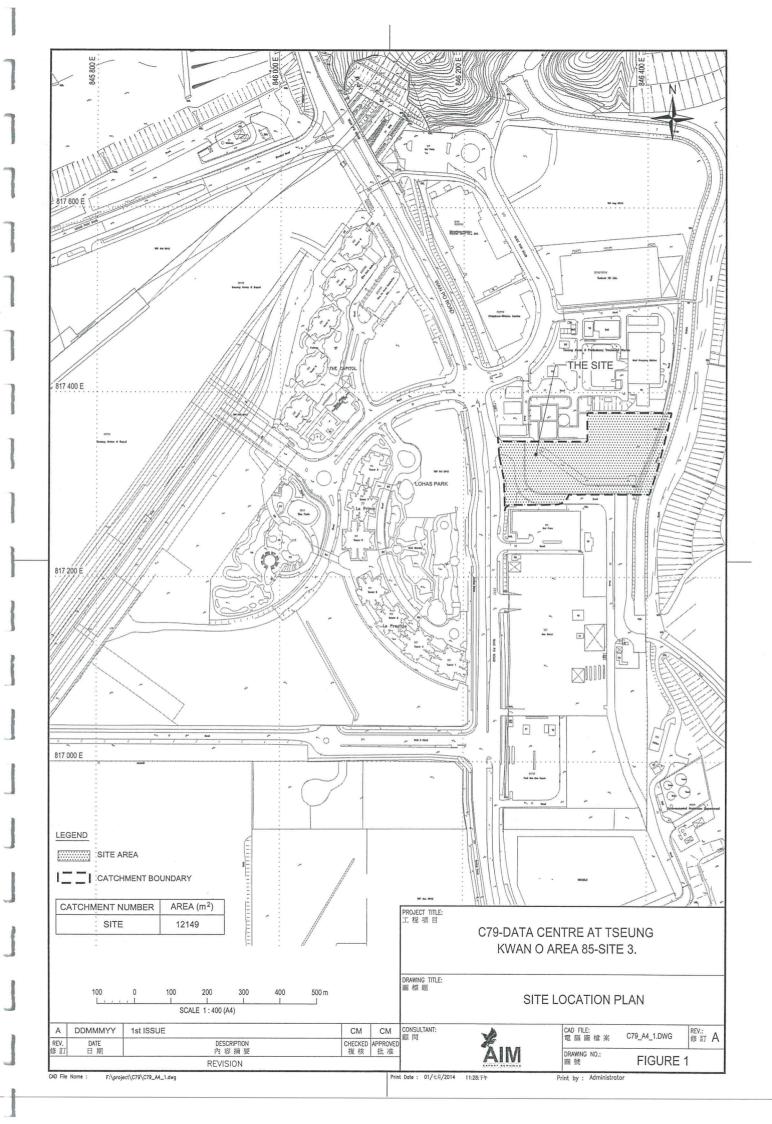
Capacity, Q 0.690 m<sup>3</sup>/s

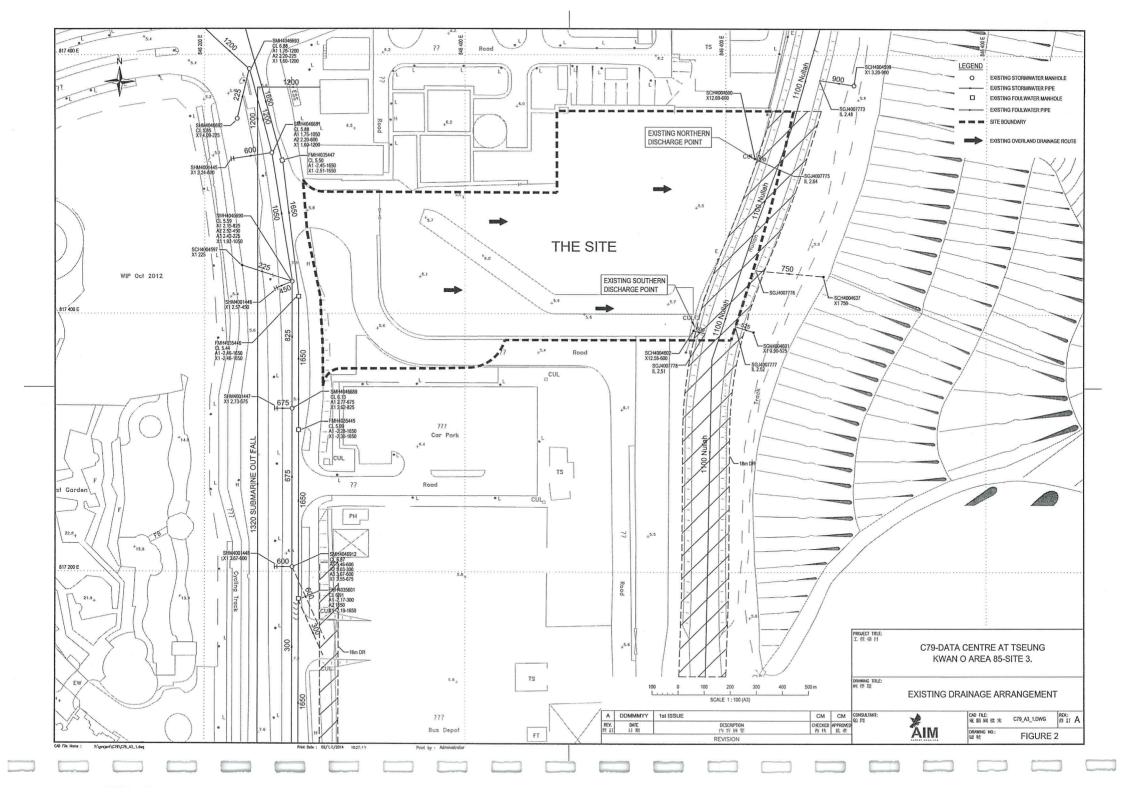
With 10% flow area allowance for sedimentation, assume 10% reduction in capacity:

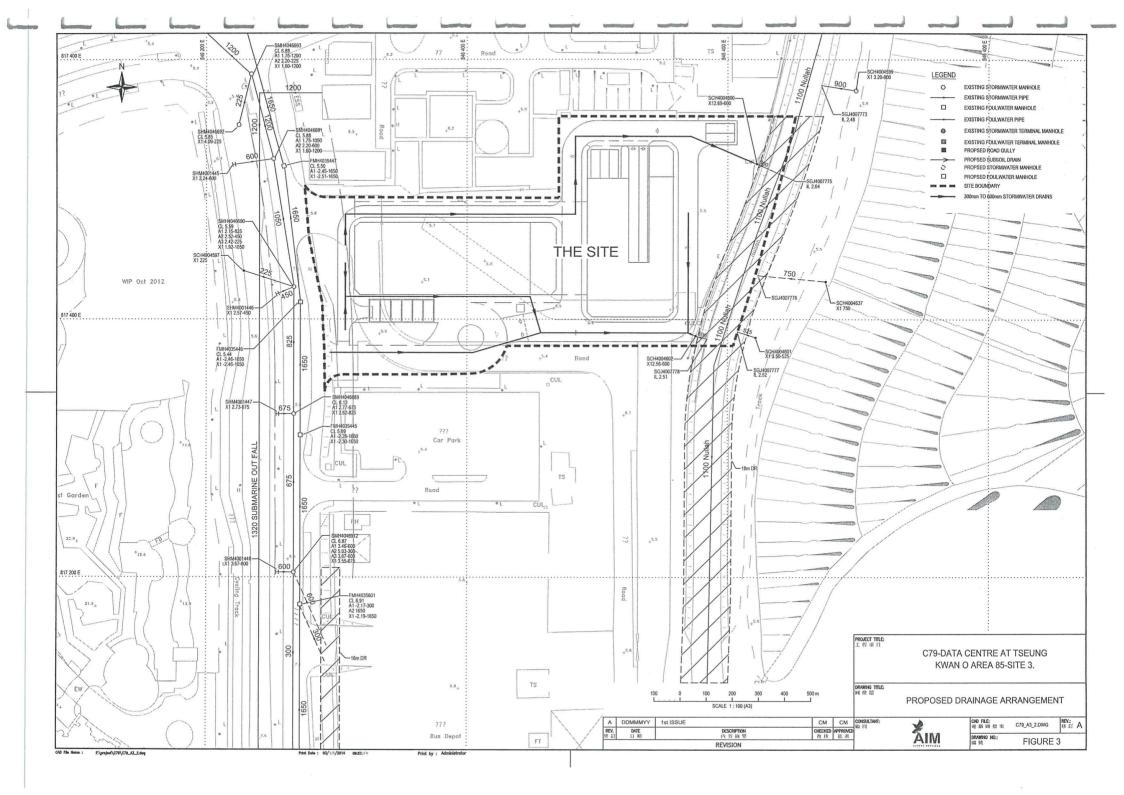
Capacity,  $Q_{silt} = 0.621 \text{ m}^3/\text{s}$ 

# Appendix D

Figures







Annex D

Water Supply Impact Assessment



# Office of the Government Chief Information Officer

# Data Centre Development in Tseung Kwan O Area 85 – Site 3

Water Supply Impact Assessment

Project Report

July 2014



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		Figure 2 -	Existing Watermains Layout Plan				

Proposed Watermains Layout Plan

Figure 3 -

## 1 Introduction

## 1.1 Background

- 1.1.1 AIM Group Limited has been commissioned to complete a Water Supply Impact Assessment (WSIA) in support of a rezoning application for a Data Centre Development in Tseung Kwan O Area 85 Site 3.
- 1.1.2 The proposed development involves a new multi-storey data centre at Site 3, which is immediately to the south of the Tseung Kwan O Preliminary Treatment Works and to the east of Wan Po Road (hereafter referred to as the "Site"). The Site location is shown on Figure 1.
- 1.1.3 This report assesses the water supply arrangements in the vicinity of the Site and the proposed water supply arrangements for the Site after development.

## 1.2 Site Description

- 1.2.1 The Application Site is immediately to the south of the Tseung Kwan O Preliminary Treatment Works and to the east of Wan Po Road. The Site for the development has an area of approximately 10,836m², although the overall area includes an open nullah to the east of the Site and an access cul-de-sac to the south of the Site.
- 1.2.2 The Site, which is currently occupied by Drainage Services Department (DSD), is currently zoned "Other Specified Uses" annotated "Sewage Treatment Works ("OU(STW)") for most of the site, and a small portion zoned "G/IC(9)" on the approved TKO Outline Zoning Plan No. S/TKO/20 (the OZP).
- 1.2.3 The Site (and surrounding areas) is already mostly developed (paved) and the characteristics will not be greatly affected by the proposed development, i.e. there will be paving and some soft landscaping. It is therefore concluded that there will be no significant change to the runoff from the Site as a result of the development.

1.3 Project Description
-------------------------

- 1.3.1 The proposed development will involve the following elements (a Site Master Plan is included in Appendix A for reference):
  - An eight-storey data centre building, with plant rooms and a basement car park.
  - · Access roads, with loading/unloading areas.
  - Soft landscaping covering an area of approximately 1,956m<sup>2</sup>.

## 1.4 Reference Material

1.4.1 For the preparation of this WSIA Report, reference has been made to the WSD Existing Waterworks Plans covering the Site and surrounding areas.

# 2 Description of Existing Condition and Methodology

## 2.1 Site Location and Topography

2.1.1 The Site is immediately to the south of the Tseung Kwan O Preliminary Treatment Works and to the east of Wan Po Road. The Site for the development has an area of approximately 10,836m<sup>2</sup>.

## 2.2 Existing Baseline Condition

- 2.2.1 The existing water supply arrangements for the Site have been assessed from the existing waterworks plans for the area and these are shown on Figure 2.
- 2.2.2 As shown on Figure 2, there is an 80mm diameter freshwater main running through the Site. There is also a 150mm diameter saltwater connection in Wan Po Road.
- 2.2.3 The Site falls within the supply zone of Tseung Kwan O East Low Level Service Reservoir (TKO East LL FWSR), which has a capacity of 35,600m<sup>3</sup>.

Page 3

## 3 Water Demand Estimation

## 3.1 Build Up of Water Demands

- 3.1.1 The water demands for the Project include fresh and flushing water for the employees and evaporative cooling water for the Air-Conditioning (AC) towers.
- 3.1.2 The employee water demands have been derived from WSD Departmental Instruction 1309 (DI 1309) and the Environmental Protection Department Guidelines for the Estimation of Sewage Flows for Sewage Infrastructure Planning (GESF), with reference to the Drainage Services Department Sewerage Manual Part 1 (DSD SM1).
- 3.1.3 The irrigation demand has been based on a peak usage of 5mm/day.
- 3.1.4 The AC demand has been calculated from basic parameters. This demand is related to the Usable Floor Area, which is 12,914m² for the data storage and 3,290m² for office use.

## 3.2 Water Demand Estimation

3.2.1 The approach to the estimation of water demands for the employees adopted for this assessment is essentially a "back-calculation" from sewage flows. The GESF contains unit sewage flow factors for Commercial Employees and, as there is no real "Commercial Activity" associated with the Data Centre, the flow factor for employees (80 l/h/d) would be applicable. The DSD SM1 notes that the global unit flow factors are based on approximately 80% of the mean daily water demands, while figures from DI 1309 indicate that the split between fresh and flushing water is approximately 74%/26%. Combining these factors with the expected employee population generates daily demands for fresh and flushing water, as set out in Appendix B.

3.2.2 The overall water demands can be summarised as follows, in Table 1.

Category	Mean Daily Demands (m³/d)		
	Fresh Water	Salt Water	
Employees - Fresh	38.6	-	
Employees – Flushing	-	13.6	
Irrigation	9.8	-	
Evaporative AC	213.6	-	
TOTAL	262.0	13.6	

Table 1 - Mean Daily Water Demands for the Data Centre

3.2.3 In summary, the mean daily fresh and flushing water demands are approximately 262m³/d and 14m³/d.

# 4 Impacts of Proposed Data Centre on Existing Water Supply System

- 4.1.1 The Site falls within the supply zone of TKO East LL FWSR, which has a capacity of 35,600m<sup>3</sup>.
- 4.1.2 The estimated daily freshwater demand of 262m³/d represents approximately 0.7% of the TKO East LL FWSR capacity and it is expected that the existing reservoir capacity will be adequate. However, further, more detailed assessments will be carried out in later stages of implementation to confirm this. It should be noted that the proposed development and associated water demands are likely to be further refined as the project develops.
- 4.1.3 The freshwater connection to the Site is 80mm diameter and this main also appears to supply areas to the south of the Site. More detailed assessments will be carried out during later stages of implementation, including the effects of cumulative demands from adjacent sites, and, if necessary, upgrading works will be developed, for implementation by the Project Proponent.
- 4.1.4 As noted above, the freshwater supply main currently continues through the Site. Depending on the final Site layout, it is likely that at least some lengths of the existing main will need to be realigned and/or replaced to

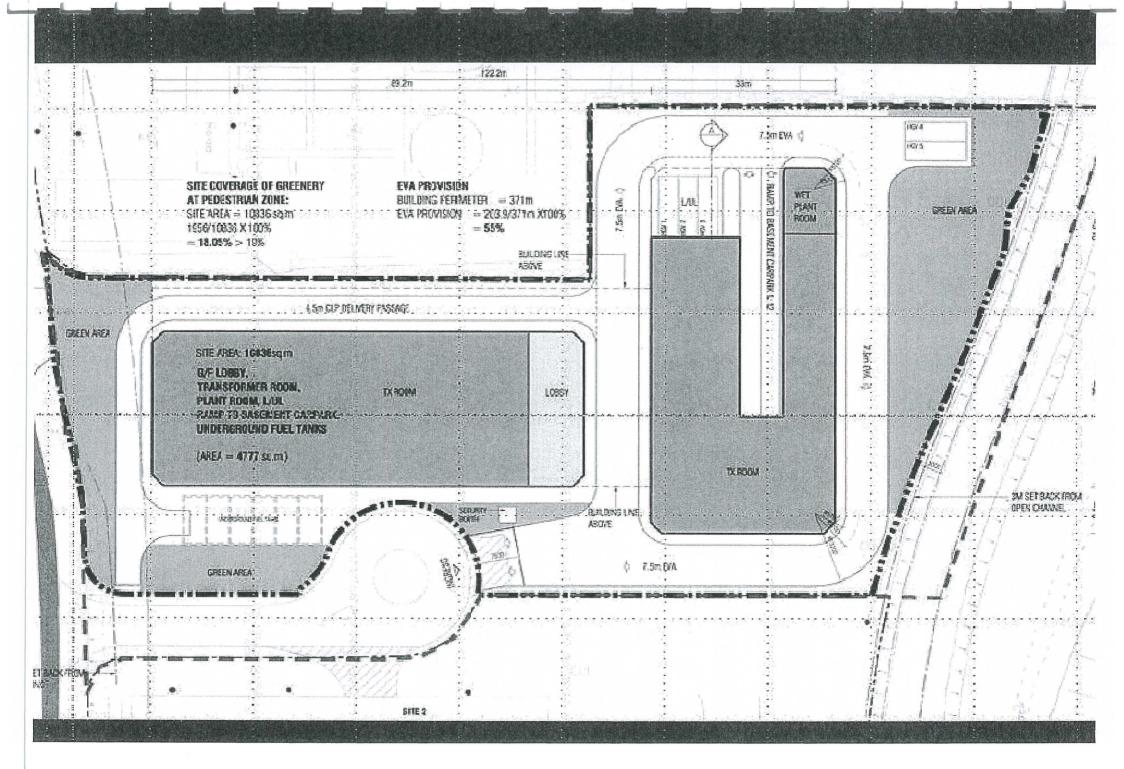
- avoid conflict. Again, this would be the responsibility of the Project Proponent.
- 4.1.5 There is an existing 150mm diameter saltwater connection to the Site in Wan Po Road and this would appear to be adequate for the fairly small flushing demand for the Site.
- 4.1.6 In addition to the fresh and salt water demands for the Data Centre, there will also be a requirement for adequate fire hydrants in and around the Site. Suitable facilities, in accordance with the Code of Practice for Minimum Fire Service Installations, will be provided. As with other aspects of the water supply, further details will be developed in later stages of project implementation.

## 5 Conclusions

- 5.1.1 A WSIA has been carried out to assess the potential impacts from the proposed Data Centre on the existing fresh and salt water supply facilities.
- 5.1.2 The overall fresh and salt water supply facilities in the area appear to be generally adequate for the potential demands from the Data Centre. However, further, more detailed, assessments will be required in later stages of implementation, when details of the actual development will be available.

# Appendix A

Master Layout Plan



# Appendix B

Water Demand Calculations

# C79 - Data Centre in Tsueng Kwan O Area 85 - Site 3 Water Demands

#### 1. Design Criteria and Approach

#### Criteria

- a. Water Supplies Department Departmental Instruction 1309 (DI 1309)
- b. Environmental Protection Department Guidelines for the Estimation of Sewage Flows for Sewage Infrastructure Planning (GESF)
- c. Drainage Services Department Sewerage Manual, Part 1 (SM1)

#### <u>Approach</u>

- i. The SM1 notes that the global unit flow factors for commercial operations are based on 80% of the mean daily water demands
- ii. GESF provides unit flow factors for commercial employment categories. There is no water using "commercial activity" at the centre, so only the Commercial Empoyee Factor is applicable.

5 mm/d

9.8 m<sup>3</sup>/d

- iii. Sample figures for commercial areas indicate that flushing water represents approximately 26% of the overall water demand.
- iv. Irrigation based on 5mm per day.

#### 2. Employee Numbers

The Data Centre will accommodate approximately 522 employees.

#### 3. Water Demand Calculations

#### 3.1 Employees

GESF Unit Sewage Flow Rate for Commercial Emplyees		80 l/h/d
No. of Employees		522 h
Total Sewage Generation		41760 l/d
	=	41.76 m <sup>3</sup> /d
@80% of Water Deman, Overall Daily Water Demand	=	52.2 m <sup>3</sup> /d
Of which:		
Daily Fresh Water Demand @ 74% of Overall Demand	=	38.6 m <sup>3</sup> /d
Daily Flushing Water Demand @ 26% of Overall Demand	=	13.6 m <sup>3</sup> /d
3.2 Irrigation		
Area to be irrigated		1956 m²

#### 3.3 Evaporative AC

Irrigation Amount

Irrigation rate

Overall AC Water Demand (see separate calculations) = 213.6 m<sup>3</sup>/day

#### 4 Summary of Water Demands

Category	Estimated Mean Daily Water Demand
	(m <sup>3</sup> /d)
Fresh Water	38.6
Flushing Water	13.6
Irrigation Water	9.8
Evaporative AC	213.6

# C79 - Data Centre in Tsueng Kwan O Area 85 - Site 3 Evaporative AC Water Demand

### 1. Total Heat Rejection Capacity, HRC

Unit Cooling Load for Data Centre:	180 W/m <sup>2</sup>
Usable Floor Area - Data Storage	12914 m <sup>2</sup>
Usable Floor Area - Office	3290 m <sup>2</sup>
Total Usable Floor Area:	16,204 m <sup>2</sup>
Total Cooling Load for Data Centre:	2916720 W
Heat Rejection Capacity for Data Centre:	3645.9 kW

### 2. Data Centre

### 2.1 Cooling Tower

Heat Rejection Capacity for Data Centre, HRC	3645.9 kW
Wet Bulb Temperature	28 deg C
Entering Water Temperature, T <sub>ent</sub>	37 deg C
Leaving Water Temperature, T <sub>lea</sub>	32 deg C
Specific Heat Capacity of Water at 40 deg C, cp	4.18 kJ/(kg.K)
Density of Water at 40 deg C	1000 kg/m³
Condenser Water Flowrate = 1000*HRC/(T <sub>ent</sub> -T <sub>lea</sub> )/cp/density	174 l/s

## 2.2 Evaporation Loss, E

### Calculation 1

Specific Enthalpy of Water at 40 deg C, h <sub>fg</sub>	2400 kJ/kg <sub>w</sub>
Rate of Evaporation = 1000*HRC/h <sub>fg</sub> /density	1.52 l/s

### Calculation 2

Rate of Evaporation = Flow Rate/100* $((T_{ent} - T_{lea})/7)$	2.44 l/s
----------------------------------------------------------------	----------

Evaporation Loss, E (larger figure) = 
$$\underline{2.44}$$
  $\underline{l/s}$ 

### 2.3 Drift Loss, D

Assumed %age for Drift Loss	0.005 %
Drift Loss, D	0.009 l/s

### 2.4 Blowdown Rate, B

$$B = \frac{E * ((CyC - 1)*D)}{(CyC - 1)} = 0.021 \text{ l/s}$$

$$(CyC = 6)$$

### 2.5 Make-Up Water Rate, M

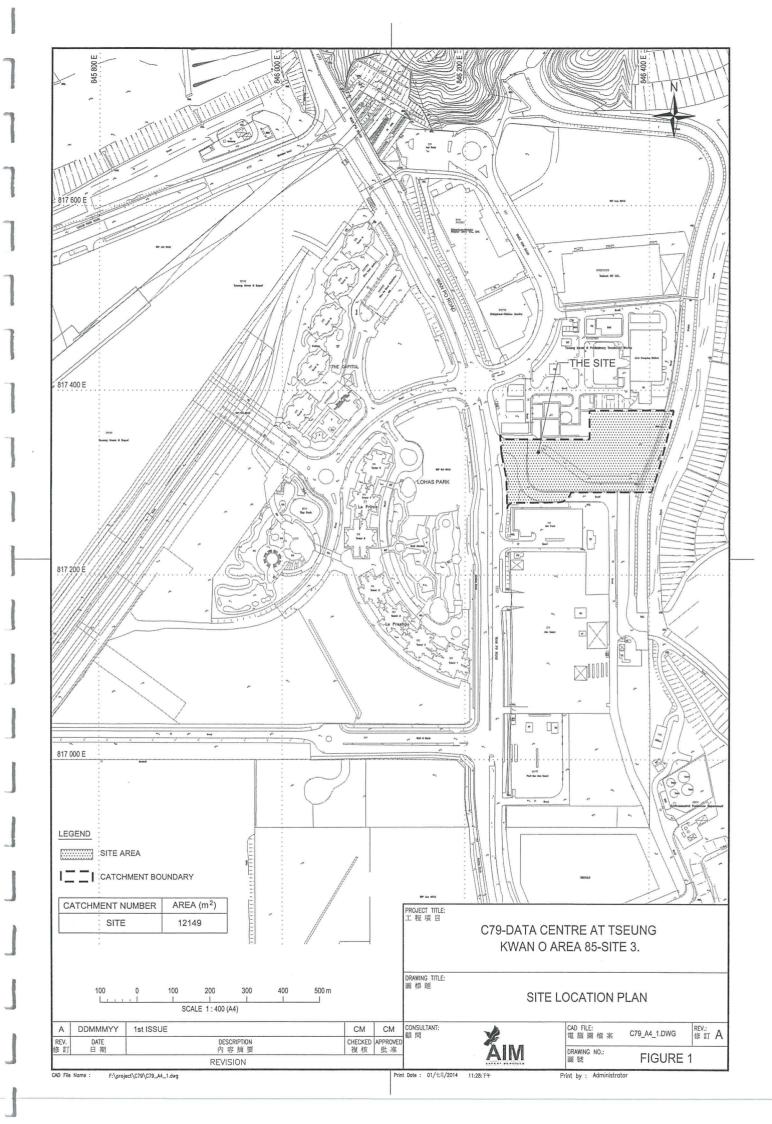
$$M = E + D + B =$$
 = 2.47 l/s

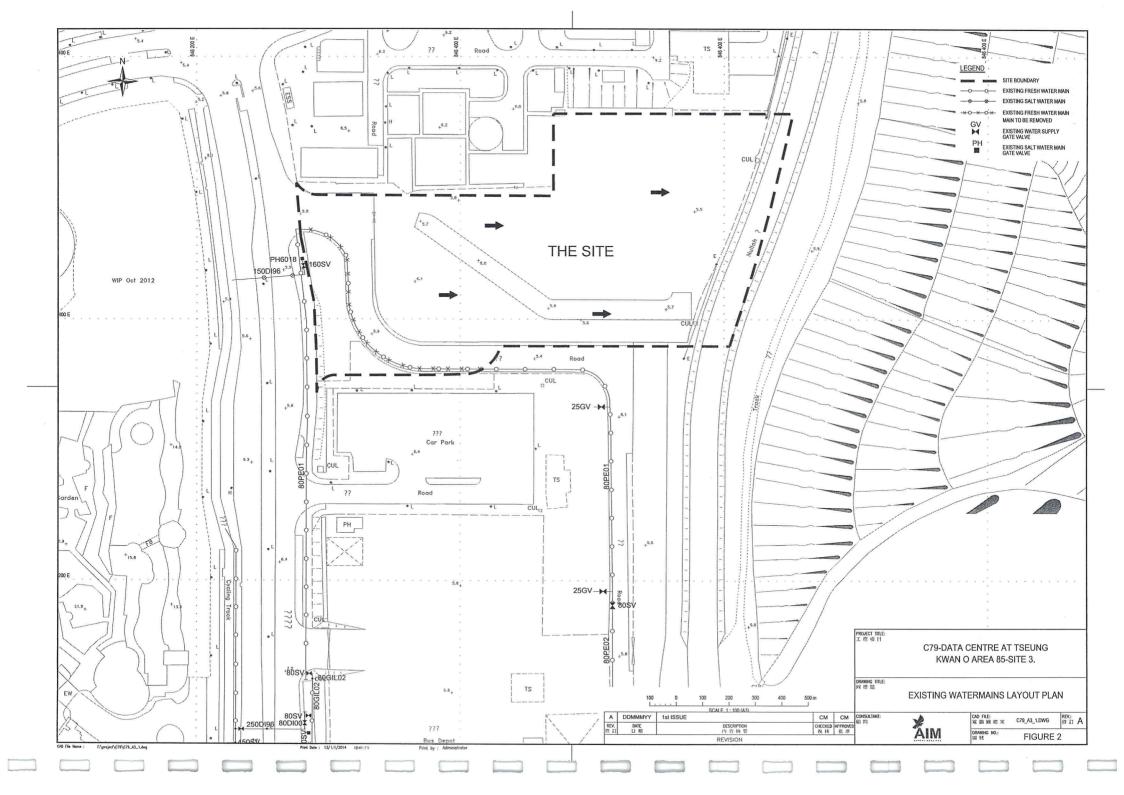
### 2.6 Overall Demand

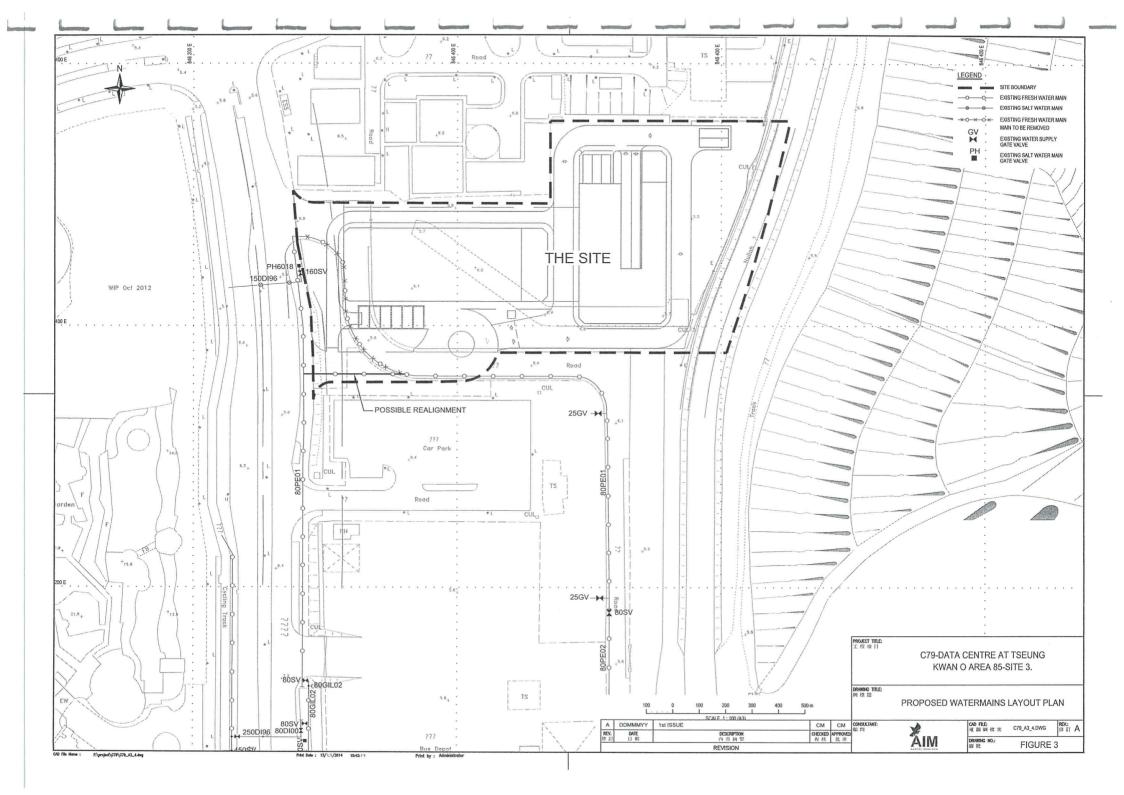
Mean Daily Water Consumption Rate for Evaporative AC = M x 24 x 3600/1000

# Appendix C

Figures

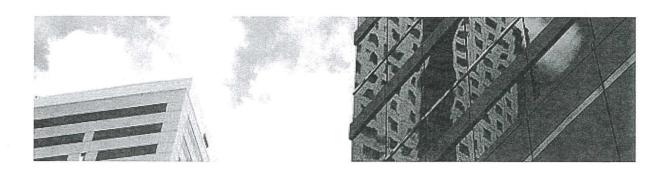






Annex E

Environmental Assessment Report



Environmental Assessment for Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85

Prepared for: Urbis Limited

Prepared by: ENVIRON Hong Kong Limited Hong Kong SAR

Date: Sep 2014

Report Number: R3857\_V1.1

Environmental Assessment for Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85

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# 1.0 Introduction

# 1.1 Project Background

The proposed development is located at Tseung Kwan O - Site 3. The Subject Site has a total size of about 10800 m<sup>2</sup>.

The site, which is being occupied by the Drainage Services Department, is currently zoned "Other Specified Uses" annotated "Sewage Treatment Works ("OU(STW)") for most of the site, and a small portion zoned "G/IC(9)" on the OZP. To convert the use of Site 3 to high-tier data centre development, it is required to rezone Site 3 to "Other Specified Uses" annotated "Data Centre" ("OU(DC)").

ENVIRON Hong Kong Limited is commissioned by Urbis Limited to prepare the Environmental Assessment (EA) report based on the indicated layout plan support the rezoning proposal. The EA report shall perform and address the following scope:

- Noise impact;
- Air quality impact;
- Landfill gas hazard, and
- Sewage impact.

According to the information provided by Drainage Services Department, there is no contamination issue at the subject site. The relevant confirmation is attached in **Appendix H**.

#### 1.2 Project Location

The proposed data centre development is located at Tseung Kwan O Area 85. The Application Site is currently vacant. The noise climate in the vicinity is dominated by road traffic noise from Wan Po Road. To the west of the site is Wan Po Road. To the north of the site is TKO Preliminary Treatment Works. To the south of the site is HKCOLO. To the east of the site is the TKO Stage II/III Landfill.

Figure 1 shows the location of the Subject Site and its environs.

#### 1.3 Proposed Development

The proposed data centre consists 9-storeys building from G Floor to 8 Floor (60 mPD). The proposed data centre will be a temperature-controlled building with purpose-built redundant supporting components for accommodating large-capacity server computers, equipped with multiple high-capacity power supply sources and links to high-bandwidth network.

The ground floor of the data centre is used as transformer rooms and plant rooms. The first floor is used as transformer room and non-essential plant room. The 2 Floor to 7 Floor will be used as data halls. The highest floor (8 Floor) of the building will be served as office and green roof. Basement carpark and underground fuel tanks is at L/UL.

# 2.0 Noise Impact Assessment

#### 2.1 Legislation and Standard

The noise impact assessment shall make reference to the following legislation, standards and guidelines:

- 1) Noise Control Ordinance (NCO) (Cap. 400) Provides the major statutory framework for noise control in Hong Kong. Assessment procedures and standards are set out in the respective Technical Memoranda (TMs). The following TMs are applicable to the assessment and control of noise impact including fixed noise and construction noise:
- TM on Noise from Places other than Domestic Premises, Public Places or Construction Sites;
- TM on Noise from Construction Work other than Percussive Piling (TMGW);
- TM on Noise from Percussive Piling (TM-PP); and
- TM on Noise on Construction Work in Designated Areas (TM-DA).
- 2) Noise from Construction Activities Non-Statutory Controls (ProPECC PN 2/93)
- Set out the assessment criteria as well as requirements relating to construction noise not currently controlled under the NCO.
- 3) Hong Kong Planning Standards and Guidelines (HKPSG)
- Provides stipulations on various noise sources such as road traffic, rail, aircraft, helicopter and fixed noise sources during the operation of a project. **Table 1** summarizes the noise standard relevant to this study.

Table 1: Noise standards for operational phase

COMMON USES	NOISE STANDARDS [1]	
	Road Traffic Noise L10 (1hour) dB(A)	Fixed Noise Sources
All domestic premises including temporary housing accommodation	70	5dB(A) below the appropriate Acceptable Noise Levels (ANL)
Hotels and hostels	70	shown in Table 2 of the
Offices	70	Technical Memorandum for the
Educational institutions including kindergartens, nurseries and all others where unaided voice communication is required	65	Assessment of Noise from Places Other than Domestic Premises, Public Places or Construction Sites, and The prevailing
Places of public worship and courts of law	65	background noise levels [2]
Hospitals, clinics, convalescences and residential care homes for the elderly - diagnostic rooms - wards	55	

Notes:

- [1] The above standards apply to uses that rely on opened windows for ventilation.
- [2] The prevailing background noise is subject to measurement.

#### 2.2 Noise Sensitive Receivers

According to the latest building plan, office at 8 Floor is identified as noise sensitive receivers within the data centre. Nevertheless, since central air conditioning will be provided to the data centre, any office within the data centre will not rely on openable windows for ventilation. Hence, the offices, if any, in the proposed data centre itself are not considered as assessment points.

Key representative NSRs within 300m study area of the Application Site are given in **Figure 2** and are summarized in **Table 2**. There may be planned development to the west of Le Prestige and at distances over 300m from the Application Site. Since Le Prestige is the first layer of noise sensitive receivers close to the application site and will provide acoustic shielding to the planned development to the west of Le Prestige, the residential dwellings in the planned development to the west of Le Prestige were not considered as representative NSRs according to the proposed data centre.

Table 2: Summary of representative NSRs within 300m study area

Receiver Id	Name	Distance From the boundary of the Application Site (m)
NSR1	Le Prime Tower 8	~ 135
NSR2	Le Prime Tower 7	~ 156
NSR3	Le Prime Tower 6	~ 183
NSR4	Le Prestiage Tower 5	~ 185
NSR5	Le Prestiage Tower 3	~ 165
NSR6	Le Prestiage Tower 2	~ 156
NSR7	Le Prestiage Tower 1	~ 160
NSR8	Le Prestiage Towe 9	~ 57
NSR9	Le Prestiage Tower 10	~ 54
NSR10	Le Prestiage Tower 11	~ 56
NSR11	Planned Tung Wah Hospital School	~ 206
NSR 12	Future Residential Development at Site B of Area 85	~ 116

Key representative noise sensitive receivers include Le Prime Towers, Le Prestige Towers and La Splendeur Towers in the LOHAS Park, the planned Tung Wah Hospital School and the future residential development at Site B of Area 85.

For NSRs at LOHAS Park, planned Tung Wah Hospital School and the future residential development at Site B of Area 85, they are located within an area comprising high density residential area consisting of high—rise development mainly. According to the Technical Memorandum (TM) for

the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites, the area containing these NSRs does not tally with the definition of "rural area", "low density residential area consisting of low-rise or isolated high rise development" and "urban area". Therefore, this area is considered fallen with the category of "area other than those above" based on the TM. Since these NSRs are indirectly affected by the TKO Industrial Estate, the Area Sensitivity Ratings for LOHAS Park and planned school are assigned as "B".

With reference to the TM for the Assessment of Noise from Places Other than Domestic Premises, Public Places or Construction Sites, the daytime and night-time Acceptable Noise Levels (ANLs) due to fixed noise sources would be 65dB(A) and 55dB(A) for "B". **Table 3** summarises the ANL noise level and ANL-5 noise level.

Table 3: Recommended fixed plant noise criteria

AREA SENSITIVITY RATING	TIME PERIOD	ANL,DB(A)	ANL-5,DB(A)
В	Day & Evening (0700-2300)	65	60
	Night-time (2300 – 0700)	55	50

To determine the fixed noise criteria of NSRs, the measured prevailing background noise level and ANL-5 will be compared in the future. The lowest noise level is selected as the fixed noise criteria.

# 2.3 Design of the Maximum Noise Level of the Noise Source at Tower 1 and Tower 2

According to the **Table 2** above, the nearest NSR is NSR 9 (Le Prestiage Tower 10). It is found that it is about 54m from NSR 10 to the building edge of the subject site. In order to fulfil the HKPSG requirement on the fixed noise source that there is no adverse impact upon the nearby NSRs, the design of the noise emission sources should be based on the following equation.

ANL-5 dB(A) + Distance Correction – façade correction

Where

ANL - 5 dB(A) = 50 dB(A) as ASR is classified as "B".

Distance Correction = 20\*log(Buffer Distance) + 8

Façade correction = 3 dB(A)

Based on the above equation, the maximum noise level of the building ( $\sim 54$ m) should be about 89.6 dB(A).

#### 2.4 Construction Phase Impact Assessment and Mitigation Measures

Considering the small scale of the projects, the major construction activities involved in the proposed data centre will include foundation, superstructure works, drilling and excavation. With the

implementation of the following mitigation measures, adverse construction noise impact is not anticipated:

- Use silenced PME if possible;
- Schedule similar works to be performed together to minimize the total number of PME operating simultaneously;
- Use noise barriers or enclosure for the PME if appropriate;
- Implement good house-keeping and regular maintenance of the PME; and
- Spot check resultant noise levels at nearby noise sensitive receivers.

Inadequate maintenance and improper use of the PME would result in a deterioration of the plant performance and would generate excessive noise. It is the responsibility of the contractors to maintain and to ensure good performance of the PME.

Under the NCO, construction noise permits (CNP) are required for all construction works during restricted hours except percussive piling which requires CNP at all times. The coverage of the restricted hour is between 7 p.m. and 7 a.m. or at any time on a general holiday (including Sunday).

#### 2.5 Operational Phase Impact Assessment and Mitigation Measures

Since central air conditioning will be provided to the offices and the offices do not rely on openable windows for ventilation, no assessment point for the proposed data centre itself will be identified for the operational phase noise impact assessment.

Potential noisy equipment will include the back-up generator, transformers and chillers/radiators. The back-up generators will be used for emergency electricity supply once there is power outage. The electricity supply in Hong Kong is stable and reliable. Frequent and prolonged use of the back-up generators is not anticipated.

The back-up generator, transformers and chillers/radiators will be located within the plant rooms and transformer rooms in ground floor and first floor. These equipment will be fully enclosed within the building with concrete wall and proper acoustics design (e.g. use of acoustics louvre and adoption of silencer). Moreover, all ventilation exhausts and intake will be acoustically treated, facing east and away from the NSRs in LOHAS Park. Therefore, no insurmountable fixed noise impact on the surrounding NSRs is anticipated. Nevertheless, the future developer is required to demonstrate in the design and construction stage that the overall noise levels from the data centre will be fully complied with the noise criteria stipulated in HKPSG and NCO.

As the development is in small scale, there will be minor increase in road traffic flow. With reference to the latest traffic census 2013, the AADT of the Wan Po Road in 2013 is 31,750 vehicles (**Appendix I**). The estimated peak flow along the Wan Po Road is 2222 vehicles per hour with the peak flow being about 7% of the AADT (reference is made to Core Station 5021, see **Appendix I**). The proposed data centre would generate 90 vehicles per hour as there are only 75 vehicle parking spaces with 15 heavy vehicle parking provided. In view of the office type of the development with no commercial and shop, there are only vehicles for the staff as well as for the transporting the large equipment. The proposed data centre would unlikely induce additional traffic.

Therefore, the increase of the traffic flow would be only about 4% or less of the traffic travelling along Wan Po Road based on the 2013 traffic data. The traffic at the Wan Po Road will be increasing due to the natural growth. According to the traffic census 2013, there is a 31.9% increment of the traffic flow at Wan Po Road. With more and more residential developments to be operated along Wan Po Road, there will be further increase of the traffic flow along Wan Po Road. Thus, the percentage increase of the traffic data due to the data centre will be getting less after the operation of the proposed data centre.

Therefore, it is expected that increase of traffic flow generated from the proposed data centre would be much less than 1 dB(A).

# 3.0 Air Quality Impact Assessment

#### 3.1 Legislation and Standard

The proposed data centre is not air pollutants emitter. Chapter 9 of the HKPSG outlines environmental requirements that need to be considered in land use planning. In particular, buffer distances for various pollution uses are listed. The guidelines of buffer distance on usage of open space site are summarized in **Table 4**.

Table 4: Guidelines on usage of open space site

Pollution Source	Parameter	Buffer Distance [1]	Permitted Uses [2]	
	Type of Road			
		>20m	Active and Passive recreation uses	
	Trunk Road and Primary Distributor	3-20m	Passive recreational uses	
		<3m	Amenity areas	
Dood and Highways	District Distributor  Local Distributor		>10m	Active and Passive recreation uses
Road and Highways		<10m	Passive recreational uses	
		>5m	Active and Passive recreation uses	
		Local Distributor	<5m	Active and Passive recreation uses
	Under Flyovers	<5m	Passive recreational uses	

#### Notes:

[1] The buffer distance is the horizontal, shortest distance from the boundary of the industrial lot, the position of existing chimneys or the edge of road kerb, to the boundary of open space sites;

[2] Amenity areas are permitted in any situation.

#### 3.2 Air Sensitive Receivers

Since central air conditioning will be provided to the proposed data centre, potential Air Sensitive Receivers (ASRs) within the proposed building will be the fresh air intake points.

Key representative ASRs within 500m study area are given in Figure 3 and summarized in Table 5.

There may be planned development to the west of Le Prestige from the Application Site. Since Le Prestige is the first layer of air sensitive receivers and is close to the application site, the planned development to the west of Le Prestige was not considered as representative NSR.

Table 5: Summary of key representative ASRs (500m)

Receiver ID	Name	Distance from the Project Site (m)
ASR1	Le Prime Tower 8	~ 135
ASR2	Le Prime Tower 7	~ 156
ASR3	Le Prime Tower 6	~ 183
ASR4	Le Prestiage Tower 5	~ 185
ASR5	Le Prestiage Tower 3	~ 165
ASR6	Le Prestiage Tower 2	~ 156
ASR7	Le Prestiage Tower 1	~ 160
ASR8	Le Prestiage Towe 9	~ 57
ASR9	Le Prestiage Tower 10	~ 54
ASR10	Le Prestiage Tower 11	~ 56
ASR11	Planned Tung Wah Hospital School	~ 206
ASR12	HKCOLO (Fresh Air Intake)	~ 365
ASR13	The Beaumont	~ 128
ASR 14	Future Residential Development at Site B of Area 85	~116

#### 3.3 Construction Phase Impact Assessment and Mitigation Measures

Construction dust will be generated from the construction activities including open site erosion, excavation, material handling and truck movement. The closest existing ASR is Le Prestiage Tower 10which is at a distance of about 54m from the construction site. Considering the small scale of the project, no significant fugitive dust impact is anticipated with the implementation of relevant mitigation measures recommended in the Air Pollution Control (Construction Dust) Regulation:

- Use of regular watering to reduce dust emissions from exposed site surfaces, unpaved roads, dusty construction areas;
- Adoption of side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, watering shall be used to aggregate fines;
- Open stockpiles shall be avoided or covered. Prevent placing dusty material storage piles near ASRs;
- All dusty vehicle loads transported to, from and between site locations shall be covered by Tarpaulin;
- Vehicle wheel and body washing facilities shall be established at the exit points of the site;

- Loading, unloading, transfer, handling or storage of bulk cement or dry pulverised fuel ash shall be carried out in a totally enclosed system or facility, and any vent or exhaust shall be fitted with an effective fabric filter or equivalent air pollution control system; and
- Travelling speeds should be controlled to reduce traffic induced dust dispersion and re-suspension within the site from the operating dump trucks.

# 3.4 Operational Phase Impact Assessment and Mitigation Measures

Vehicular emissions from Wan Po Road may pose potential air quality impacts on the proposed development. According to the Traffic Census 2012 issued by the Transport Department, the section of Wan Po Road between Chiu Shun Road and Chun Yat Road is classified as local distributor. Based on the guidelines on the Usage of Open Space Site stipulated in the HKPSG (shown in **Table 4**), the shortest horizontal buffer distance from the edge of a road kerb of a local distributor to a sensitive receiver is 5m. **Figure 4** indicates the buffer distance required for the fresh air intake to the existing Wan Po Road. With the fresh air intakes located outside the buffer distance shown in **Figure 4**, adverse vehicular impact on the proposed data centre is not anticipated.

Back-up generators will be used for emergency electricity supply once there is power outage. However, the electricity supply in Hong Kong is stable and reliable. Frequent and prolonged use of the back-up generators is not anticipated. In addition, the design and installation of the back-up generator and associated facilities will follow the requirements under the Guidelines on Application for Installation of Emergency Generators issued by Environmental Protection Department:

- Ultra low sulphur diesel will be used in order to minimize the pollutant emitted;
- The chimney for the waste gas will be located at the rooftop of the data centre; and
- The chimney for the waste gas will be located away from the air sensitive receiver with good ventilation.

The emission of the generator will be governed by Air Pollution Control (Furnaces, Ovens and Chimney) Regulation. With the implementation of the mentioned measures, no adverse air quality impact from the back-up generators is anticipated.

Based on the on-site survey carried out on Sep 2014, there are no chimneys identified within 500m from the proposed development. Further, the nearby buildings are residential buildings such as Le Prestiage and Le Prime, neither odour nor fugitive emission identified from the nearby buildings during the site visit. As such, the proposed development would not be subject to unacceptable industrial emission.

#### 3.4.1 Odour Impact Assessment

For odour impact, the odour emission sources identified within the vicinity of the Application Sites are the existing TKO Preliminary Treatment Works, existing South East New Territories (SENT) Landfill and planned SENT Landfill Extension.

The proposed data centre is expected to be operated after 2014. According to the information from EPD website on 7 July 2014, the existing SENT Landfill will be operating up to about 2015. However, the buffer distance from the proposed data centre to the SENT Landfill is over 1km, adverse odour

impact from the SENT Landfill Extension on the proposed data centre is not anticipated in view of the large buffer distance.

There is an office at 8/F. However, the office is totally enclosed and central air conditioning will be provided to the data centre, it will not rely on openable windows for ventilation. Therefore, it is anticipated workers in the office would not be subject to adverse air impact. Nevertheless, the predicted odour level of the representative ASRs is shown in Appendix B.

The existing TKO Preliminary Treatment Work is situated to the immediate north of the Application Site. According to the contract specification of the "Upgrading of Existing Preliminary Treatment Works" provided by the plant operator, odour control measures are already in place for the odour sources in the upgraded works under HATS Stage 1. The deodorisation equipment installed onsite is required to be capable of reducing hydrogen sulphide concentration in the air stream of all exhaust outlets from a range of 0.5 - 3 ppm down to 0.005 ppm. It is understood from DSD and the planning applications for the future residential development at Site B of Area 85 immediate north of the STW that the present operation of the TKOPTW is in accordance with the designed odour control specifications. As observed in several site visits onsite, there is no odour detected.

Furthermore, the aerated lagoon of TKPOTW has already abandoned on 7 December 2001 after the commissioning of the HATS Stage I.

An assessment following the methodology of the odour emission impact assessment for Site B of Area 85 was carried out to identify any odour impact upon the proposed data centre. It must be noted that the data centre will be equipped with central air conditioning; and the air quality of the fresh air intake of the proposed data centre should be located at the area where the air quality including odour level comply with the relevant Air Quality Objectives.

#### Assessment Criteria

A limit value of 5 odour units (based on an averaging time of 5 seconds), as stipulated in Annex 4 "Criteria for Evaluating Air Quality Impact and Hazard to Life" of the Technical Memorandum on Environmental Impact Assessment Process has been adopted throughout this assessment.

#### Conversion of 1-Hour Average to 5-second Average

Due to the short exposure period tolerable by human, odour impact assessment is based on a 5-second average level. However, the shortest result period of ISCST is 1-hour. Conversion of model output from 1-hour average to the required 5-second average is needed. The 1-hour average odour concentration is first converted to 3-minute average by the power law relationship which is related to the stability. To further convert 3-minutes average to 5 second average, a further multiplying factor of 10 was applied for those hours with stability classes A to B, and a factor of 5 for those hours with stability classes C to F. **Table 6** shows the odour level conversion factor. The conversion factors are input in the ISCST model directly.

Table 6: Odour Level Conversion Factors

Stability Class	Conversion Factors		
Stability Class	1 hr to 3-min average (A)	3-min to 5-sec average (B)	Overall (A X B)
A	2.23	10	22.3
В	2.23	10	22.3
С	1.70	5	8.50
D	1.38	5	6.90
E	1.31	5	6.55
F	1.31	5	6.55

# Modelling Assumption

The following table shows the modelling assumption used in the Odour Impact Assessment

Table 7: Modelling Assumption in Odour Impact Assessment

Meteorological Data	PATH model Grid (36, 26), height of anemometer: 10m
Dispersion Option	Rural
Elevation of Emission Point	Exhaust stack below ground level
Chimney Location *	X: 846386.5, Y: 817405.0, Z: 2m above ground where is 5 mPD
Chimney Diameters *	1.93m
Flux Gas Characteristics *	Odour Emission Rate: 80 OU
	Efflux velocity: 2.7 ms <sup>-1</sup>
	Exit Temperature : 298K
Elevation of Discrete Receptors	7.5 to 62.5 mPD

#### Note:

\*: The emission rate information is extracted from the model for the Environmental Assessment for the Proposed Residential Development at "R(E)" zone (Site B), Tseung Kwan O Area 85 (R0957 V2.3, dated Oct 2010)

#### Representative Air Sensitive Receivers

The proposed data centre will be equipped with central air conditioning. Representative Air Sensitive Receivers of the proposed data centre is shown in **Figure 5**.

# Predicted Odour Level

Table in **Appendix B** shows the predicted odour level of the representative ASRs. The maximum odour level at the representative ASRs is  $\sim 7.09$  OU at the ground level of the proposed data centre,

which not comply with the relevant odour standard of 5 OU; and the odour concentration is getting lower with the increase of buffer distance.

Nevertheless, the fresh air intake of the data centre is usually located at the roof top of the building, where the predicted odour level is less than 1 OU and is well below the criteria. The occupants of the proposed data centre would not be subject to unacceptable odour impact.

# 4.0 Landfill Gas Hazard Assessment

# 4.1 Legislation and Standard

The landfill gas hazard assessment shall make reference to the following standard and guidelines:

- Landfill Gas Hazard Assessment Guidance Note (1997) (EPD/TR8/97); and
- Landfill Gas Hazard Assessment for Development Adjacent to Landfills (ProPECC PN 3/96).

These guidance notes recommend that, in general, a qualitative assessment of the risk posed by LFG will be required for a development within the 250m Consultation Zone of a landfill site to ensure appropriate precautionary measures would be designed and implemented to safeguard the development.

As shown in **Figure 6**, the proposed data centre falls within the 250m Consultation Zone of Restored Tseung Kwan O Stage II/III Landfill (TKOL-II/III). Hence, a qualitative landfill gas hazard assessment shall be undertaken to evaluate the potential risk due to landfill gas migration from the TKOL-II/III and recommend the appropriate mitigation measures during the construction and operation of the proposed data centre as necessary.

# 4.2 Scope of the Assessment

In accordance with the procedures stipulated in EPD's guidance notes, the following tasks have been undertaken to allow a full consideration of the potential risk of landfill gas.

- Review the background information and studies related to the TKOL-II/III;
- Identification of the nature and extent of the sources, including the likely concentrations and/or
  amounts of hazardous emissions which might have the potential impacts on the proposed data
  centre;
- Identification of possible pathways through the ground, underground cavities, utilities or groundwater, and the nature of these pathways through which hazardous emissions must traverse if they were to reach the proposed data centre;
- Identification of the potential targets which are sensitive to the impacts of the hazardous emissions;
- Qualitative assessment on the degree of risk which the hazardous emissions may impose on the targets; and
- Identify any landfill gas precautionary measures that would need to be taken into consideration.

# 4.3 Desktop Review

## 4.3.1 Desktop Study

The information and documents which have been used as background materials for the preparation of this assessment include the following:

- Agreement No. CE 87/2001 (CE). Further Development of Tseung Kwan O Feasibility Study: Environmental Impact Assessment Report, Maunsell Consultants Asia Ltd, July 2005;
- Landfill gas monitoring data for the TKOL-II/III provided by EPD; and
- Geology Map, Hong Kong Geological Survey, GEO / Planning Division

#### 4.3.2 Background Information

#### History of Tseung Kwan O Stage II/III Landfill

Based on the information in the approved EIA report of Agreement No. CE 87/2001 (CE) – Further Development of Tseung Kwan O Feasibility Study, a review of the existing conditions at and around the TKOL-II/III is given in this section.

TKOL-II/III is located at TKO Development Area 105 on the eastern shoreline of Junk Bay. It is a valley landfill sited in a coastal location approximately 1km southeast of TKO Stage I Landfill (TKOL-I). The site covers an area of about 42 hectares. To the east of the site lies the Clear Water Bay Country Park; to the west lies reclaimed land which contains the comprehensive development area (e.g. Lohas Park and MTR Depot) and the TKOIE.

Engineering preparation works were carried out prior to the start of landfilling in 1988. A permanent seawall on a dredged foundation was constructed to the seaward boundary. There is a 15m wide margin of completely decomposed volcanic (CDV) material behind the seawall, and between this and the waste deposit there is a 3m wide trench constructed in coarse aggregate with a continuous length of perforated pipe. The trench forms a leachate interception and collection zone, together with a vent trench for landfill gas. The collected leachate was treated on-site prior to discharge into the public sewer.

Inert materials were used to raise the formation of the landfill base above sea level. The site was not totally lined, although discrete areas of low permeability membrane were laid, which drain leachate into the leachate collection system. TKOL-II/III actual operation to receive waste began in 1988 and ended in 1994. Deposited waste at this site included municipal, construction, industrial and chemical waste. It is estimated that the landfill has received 17 million tonnes of wastes and the density of the deposited waste is approximately 1.3 tonne/m<sup>3</sup>. The site was temporarily restored by the end of 1995 with an interim cap of 1m of inert cover, hydroseeded, with surface and sub-surface drains installed. Proper landfill gas and leachate management systems were not established at that time.

#### Restoration Works and Aftercare

The restoration works of TKOL-II/III commenced in July 1997 and completed in January 1999. The restoration works generally included installation of an engineered capping layer, a landfill gas collection system with flaring and electricity generation, a leachate collection and treatment system,

surface and sub-surface drainage systems, and works to improve geotechnical stability and landscaping of the site. A site plan on completion of final cap is illustrated in **Appendix C**.

The engineered capping layer (with low permeability) and surface water drainage system are installed to reduce infiltration of rain water into the waste mass thereby reducing the amount of leachate to be treated. Typical details of a restoration capping system are shown in Detail 2 and Detail 5 of **Appendix C**. The components of the landfill restoration capping system include the following (from top to bottom):

- General Cover Layer: A 850 mm thick soil layer comprising CDV material or completely decomposed granite (CDG); an additional 650 mm CDV is also provided in the location where trees or shrubs are provided;
- Filtration Geotextile-Geonet Composites: A subsoil drainage layer comprising a synthetic drainage medium, surrounded by suitable geotextile filters.
- Geomembrane and Cushion Geotextile: An impermeable layer (anchored in CDV at the perimeter) comprising a 1mm thick linear low density polyethylene (LLDPE) geomembrane; and
- Final intermediate Cover: A well compacted 500 mm thick soil, free from stones or other sharp particles, above the waste.

The landfill gas management system consists of active extraction wells, electricity generation from landfill gas, flaring system for landfill gas, passive vent trenches/ pipes, and monitoring of landfill gas both on and off-site. The gas extraction system is integrated with the leachate management system. Landfill gas is collected from the landfill by active gas extraction. It is transferred to the on-site gas utilization plants for electricity generation and used for heating in the leachate treatment process. The system aims to control landfill gas from migrating off-site in sub-surface layer.

Leachate management system comprises a leachate collection system and a leachate treatment works. Leachate generated at TKOL-II/III is intercepted by the leachate collection system which then transfers the collected leachate to the on-site leachate treatment works. Leachate is treated at the treatment plant to meet the discharge standards prior to discharge at the public sewer.

The aftercare period commenced from February 1999 onwards. Environmental monitoring work for the landfill may continue for more than two decades or up to 30 years. The methane content in the landfill gas remained fairly constant at 44%-48% between 1999 and 2003. Such landfill gas quantity and methane content levels still require monitoring as the landfills could only be considered as fully restored from the perspective of landfill gas safety when the methane content is reduced to 1% or below. The site has been an open space / green zone as its tentative afteruse.

# 4.3.3 Geological Conditions at Tseung Kwan O Stage II/III Landfill and the Proposed Development

According to the Hong Kong Geological Survey Map, the geological formation at the west of the landfill is mainly superficial deposits of fill of Holocene Age. On top of which is the extension of reclaimed land towards Junk Bay. At the north and south of the landfill is mainly undivided tuffaceous mud stone, siltstone and breccias of Upper Jurassic Age. At the east of the landfill is mainly trachydacite lava of Upper Jurassic Age, and at the centre is mainly alluvium (clay/silt, sand, and gravel) of Holocene Age.

# 4.4 Potential Hazard and Properties of Landfill Gas

Methane is odourless and colourless, and typically associated with numerous highly odoriferous compounds in landfill gas which will give some warning of its presence. However, the absence of odour should not be taken to mean that there is no methane – this can only be confirmed by using appropriately calibrated methane detectors. Methane is a flammable gas and will burn when mixed with air between approximately 5% and 15% by volume, the Lower Explosive Limit (LEL) and Upper Explosive Limit (UEL) respectively. A mixture of methane and air with a composition between the LEL and UEL ignited in a confined space could lead to an explosion. Methane is also an asphyxiant.

Carbon Dioxide, which is another major component of landfill gas, could induce asphyxia and adverse health effects. The long-term eight hour Occupational Exposure Limit (OEL) is 0.5% by volume. Similar to methane, it is also odourless and colourless and can only be detected using appropriately calibrated detectors.

Gas Buoyancy: Methane is lighter than air whereas carbon dioxide is heavier than air. Typical mixtures of landfill gas are likely to have a density close to or equal to that of air. However, site conditions may result in a ratio of methane to carbon dioxide which may make the gas mixture lighter than air or heavier than air. As a result, landfill gas may be concentrated in the bottoms of trenches or excavations, or may rise up and accumulate beneath structures and foundations.

#### 4.5 Assessment Criteria

In accordance with the EPD's guidance notes, the risk due to landfill gas may be evaluated based upon the following three criteria. Each of these criteria is further described in the subsequent sections:

Source

Location, nature and likely quantities/concentrations of landfill gas which has the potential to affect the Application Site;

Pathway

The nature and length of potential pathways through which landfill gas must pass to reach the Application Site; and

**Target** 

- Elements of the Application Site that are sensitive to the effects of landfill gas.

#### **4.5.1** Source

The classification of the Source (i.e. the landfill) is determined as follows:

Major:

Recently filled landfill site at which there is little or no control to prevent migration of gas or at which the efficacy of the gas control measures has not been assessed; or

Any landfill site at which monitoring has demonstrated that there is significant migration of gas beyond the site boundary.

Medium:

Landfill site at which some form of gas control has been installed (e.g. lined site or one where vents or barriers have been retrospectively installed) but where there are only limited monitoring data to demonstrate its efficacy to prevent migration of gas; or

Landfill site where comprehensive monitoring has demonstrated that there is no

migration of gas beyond the landfill boundary but where the control of gas relies solely on an active gas extraction system or any other single control system which is vulnerable to failure.

Minor:

Landfill sites at which gas controls have been installed and proven to be effective by comprehensive monitoring which has demonstrated that there is no migration of gas beyond the landfill boundary (or any specific control measures) and at which control of gas does not rely solely on an active gas extraction system or any other single control measure which is vulnerable to failure; or

Old landfill sites where the maximum concentration of methane within the waste, as measured at several locations across the landfill and on at least four occasions over a period of at least 6 months, is less than 5% (v/v).

# 4.5.2 Pathway

Generally, three types of pathway are considered for the transmission of landfill gas. They are:

- Man-made pathways e.g. utility connections, stormwater channels, etc.;
- Natural pathways such as rock jointing planes, fissures and other naturally occurring phenomena which may promote or give rise to the transmission of gas over distances; and
- A combination of the previous categories. An example of the latter may be, for instance, where a specific geological feature promotes gas transmission but which stops short of directly linking the landfill and target. A man made connection, however may also co-exist near the edge of the geological feature, which in combination with the former, may act to link the two sites. In this instance, careful assessment of the likelihood of the mechanism acting to link the two pathways needs to be undertaken before assigning an appropriate pathway classification.

The broad classification of the Pathway is as follows:

Very short / direct: Path length of less than 50m for unsaturated permeable strata and

fissured rock or less than 100m for man-made conduits.

**Moderately short/ direct:** Path length of 50 to 100m for unsaturated permeable soil or fissured

rock or 100 to 250m for man-made conduits.

Long / indirect: Path length of 100 to 250m for unsaturated permeable soil and

fissured rock.

In classifying the pathway, however, adjustment to the above general guidelines will often be required to take account of other factors which will affect the extent of gas migration including the following:

- permeability of the soil;
- spacing, tightness and direction of the fissures/joints;
- topography;

- depth and thickness of the medium through which the gas may migrate (which may be affected by groundwater level);
- the nature of the strata over the potential pathway;
- the number of different media involved; and
- depth to groundwater table and groundwater flow patterns.

#### 4.5.3 Target

Different types of targets may be broadly classified as follows:

**Highly Sensitive:** 

-Buildings and structures with ground level or below ground rooms / voids or into which services enter directly from the ground and to which members of the general public have unrestricted access or which contain sources for ignition.

-This would include any developments where there is a possibility of additional structures being erected directly on the ground on an ad hoc basis and thereby without due regard to the potential risks.

Medium Sensitivity:

-Other buildings, structures or service voids where there is access only by authorized, well trained personnel, such as the staff of utility companies, who have been briefed on the potential hazards relating to landfill gas and the specific safety procedures to be followed.

-Deep excavations.

Low Sensitivity:

-Buildings and structures which are less prone to gas ingress by virtue of their design (such as those with a raised floor slab).

-Shallow excavations.

-Developments which involve essentially outdoor activities but where evolution of gas could pose potential problems.

The above examples of different categories within each criteria are to be used as a general guide only and specific aspects of a development may render it more or less sensitive than indicated. Account needs to be taken of any particular circumstances when assigning a target to one of the three indicated categories.

#### 4.6 Assessment Methodology

Following the determination of the categories of source, pathway and target in which the combination of landfill, pathway and development fall, a qualitative assessment of the overall risk is undertaken with reference to **Table 8**. The potential implications associated with the various qualitative risk categories are summarised in **Table 9**.

Table 8: Classification of risk categories

Source	Pathway	Target Sensitivity	Risk Category
		High	Very high
	Very short/direct	Medium	High
		Low	Medium
	Madamataly	High	High
Major	Moderately short/direct	Medium	Medium
	Short/direct	Low	Low
		High	High
	Long/Indirect	Medium	Medium
		Low	Low
	Very short/direct	High	High
		Medium	Medium
		Low	Low
	Moderately short/direct  Long/Indirect	High	High
Medium		Medium	Medium
		Low	Low
		High	Medium
		Medium	Low
		Low	Very Low
		High	High
	Very short/direct	Medium	Medium
		Low	Low
	Moderately	High	Medium
Minor	Moderately short/direct	Medium	Low
	snort/direct	Low	Very Low
		High	Medium
	Long/Indirect	Medium	Low
		Low	Very Low

Table 9: General Categorisation of Risks

Category	Level of Risk	Implication
A	Very high (undesirable)	The type of development being proposed is very undesirable and a less sensitive form of development should be considered. At the very least, extensive engineering measures, alarm systems and emergency action plans are likely to be required.
В	High	Significant engineering measures will be required to protect the planned development.
С	Medium	Engineering measures will be required to protect the proposed development.
D	Low	Some precautionary measures will be required to ensure that the planned development is safe.
Е	Very low (insignificant)	The risk is so low that no precautionary measures are required.

Five generic forms of protection will be used in mitigating the hazards to developments. These generic forms corresponding to the five risk levels are set out in **Table 10**. The terms used in **Table 10** are defined in **Table 11**.

Table 10: Generic protection measures for planning stage categorization

Category	Generic Protection Measures
A	For the planned development active control of gas, supported by barriers and detection systems. Another, less sensitive form of development should also be considered.
В	Active control of gas, including barriers and detection systems (1)
С	Use of "semi active" or enhanced passive controls. Detection systems in some situations.
D	Passive control of gas only.
Е	No precautionary measures required.

Notes:

(1) The gas protection measures required to allow the safe development of Category A risk development will need to be more extensive than those for a Category B risk development.

Table 11: Definition of control terms

Term	Definition		
Active control	Control of gas by mechanical means e.g. ventilation of spaces with air to dilute		
	gas, or extraction of gas from the development site using fans or blowers.		
"Semi active" control	Use of wind driven cowls and other devices which assist in the ventilation of		
	gas but do not rely on electrically powered fans.		
Passive control	Provision of barriers to the movement of gas e.g. membranes in floors or walls,		
	or in trenches, coupled with high permeability vents such as no-fines gravel in		
	trenches or voids/permeable layers below structures.		
Detection systems	Electronic systems based upon, for example, catalytic oxidation or infra-red		
	measurement principles, which can detect low concentrations of gas in the		
	atmosphere and can be linked to alarms and/or telemetry systems.		

#### 4.7 Qualitative Risk Assessment

#### **4.7.1** Source

As mentioned in **Section 4.3.2**, TKOL-II/III is a closed landfill with its restoration works commenced in July 1997. A post-restoration monitoring programme also began in July 1997 under the restoration contract of TKOL-II/III. Landfill gas management system was installed to control gas emission and prevent off-site gas migration. 16 monitoring wells were installed within and outside the boundary of the landfill where landfill gas (mainly methane and carbon dioxide) and oxygen were monitored. Among all these 16 monitoring wells, 3 of which (2DG1, 2DG2 and 2DG3) are located close to the proposed data centre (as shown in **Figure 7**). 2 years of the gas monitoring data of these 3 monitoring wells between Jan 2012 and Dec 2013, i.e. the aftercare period of the landfill, has been obtained from EPD and reviewed. The data are tabulated in **Appendix D** and are summarised in **Table 12**.

Table 12: Summary of landfill gas monitoring data at TKOL-II/III (Jan 2012 – Dec 2013)

Monitoring	Methane (%)		Carbon Dioxide (%)		Oxygen (%)	
wells	Range	Average	Range	Average	Range	Average
2DG1	0.0-0.0	0.0	0.0-3.0	0.7	16.1-20.5	19.4
2DG2	0.0-0.0	0.0	0.0-4.4	1.5	16.5-20.5	18.8
2DG3	0.0-0.0	0.0	0.2-5.0	1.4	14.5-20.6	18.8

Notes:

As summarised in **Table 12**, an average zero level of methane has been detected at most monitoring wells. The carbon dioxide levels varied from 0.0% to 5.0% at the 3 monitoring wells with an average of 0.7% to 1.5% recorded. The maximum concentration of 5.0% at the monitoring well 2DG3, where is the monitoring location furthest away from the application site, was detected on 21 September

<sup>1.</sup> All information is provided by EPD.

<sup>2.</sup> The background level of methane is taken to be 0.0% v/v and the background level of carbon dioxide is below the instrument detection limit of 0.1% v/v.

<sup>3.</sup> Standard compliance level of methane is taken to be 1% v/v and that of carbon dioxide is 1.5% v/v above natural background level. As stated in EPD's guidance notes, it should be assumed that concentrations of greater than 1% v/v methane or 1.5% v/v carbon dioxide (above background levels in each case) indicate less than adequate control of the gas at source. In addition, any concentration of methane or carbon dioxide greater than 5% v/v above background levels in any monitoring well outside the landfill's boundary indicates significant migration.

2012. According to EPD's guidance notes, a carbon dioxide concentration >5% v/v above background levels in any monitoring well outside the landfill's boundary indicates significant migration. As the carbon dioxide levels measured at the two nearest monitoring wells are less than 5%, it is considered that there would not have significant migration.

Nevertheless, taking into account the multiple landfill gas control measures installed in the landfill and the zero level of methane detected between Jan 2012 and Dec 2013, the landfill gas source of TKOL-II/III would be classified as **Medium**.

#### 4.7.2 Pathways

#### Natural Pathway

According to the Hong Kong Geological Survey Map ((scale 1:20,000) (published by Geotechnical Control Office in 1989)), the geological formation beneath TKOL-II/III and beneath the proposed data centre mainly comprises of superficial deposits of fill. There are no fault lines or cracks exist in the TKOL-II/III. Nevertheless, taking into consideration of the precautionary assumption of the permeability and the path length between the landfill and the proposed data centre, which is <50m, the natural pathway is categorised as Very short/ direct.

#### Man-made Pathway

Other potential pathways for the migration of landfill gas formed by the provision of utility services have also been considered. Although the utility plan is not available, general utility infrastructure such as cable ducts, sewage and drainage pipes have the potential for direct connections to the proposed data centre. Since void within ducts provide a preferential pathway for landfill gas to migration, as a matter of prudence, the man-made pathway is classified as **Very short/ direct**.

# 4.7.3 Targets

The potential targets of landfill gas hazard identified during the construction and operational phase are described below.

#### Construction phase

Targets associated with the construction of the proposed data centre are anticipated to include the following:

- Excavation works;
- Utilities installation;
- Foundation works;
- Building works & E&M works; and
- Temporary office.

Since the Application Site would be occupied by well-trained construction workers who would have been briefed on the potential hazards relating to landfill gas and the specific safety procedures to be followed, the potential targets listed above during the construction phase is categorised as **Medium Sensitive**.

#### Operational phase

With reference to the EPD's guidance notes, structures/ rooms in the building basement and ground floor are generally identified as targets of landfill gas hazards. The targets identified at the proposed data centre and the respective sensitivities are summarised in **Table 13**.

Table 13: Sensitivity of the operational phase targets

Targets	Descriptions	Sensitivity
Security booth (located outside the proposed data centre)	Located outside the proposed data centre. Sufficient air ventilation is expected.	Low
All rooms and structures on the ground floor of the proposed data centre such as plant rooms and transformer rooms.	Access would be restricted to authorised persons who will be aware of landfill gas hazard.	Medium
Underground fuel tanks (located outside the proposed data centre)	Located underground. According to the latest design, space of the underground tank will be filled up with sand, i.e. no access to the underground tank.	Medium
Lift shafts within the building	Access would be restricted to authorised persons who will be aware of landfill gas hazard.	Medium
Entrance lobby	There will be daily staff access to the entrance lobby who may not be aware of the landfill gas hazard.	High
Basement Carpark	Located underground and contains sources of ignition	High

# 4.7.4 Summary of the Source-Pathway-Target Analysis

Based on the information above, a source-pathway-target analysis has been undertaken and the results are summarised in **Table 14**. According to the analysis, the risk level of most areas of the Proposed Data Centre during the construction phase and operational phase was categorised as **Medium** and **High** respectively for both natural and man-made pathways.

According to EPD's guidance notes, for the purposes of categorising the proposed data centre, the category will be based upon the highest level of risk nominated for any of the potential impacts identified. As a result, the **overall risk level** for the proposed development should be **High (Category B)** where "significant engineering measures would be required to protect the proposed development" including use of barriers and detection systems.

Table 14: Qualitative source-pathway-target analysis of the proposed data centre

Source	Pathway	Target	Hazard
TKOL-II/III is a closed landfill with its restoration works commenced in July 1997. A post-restoration monitoring programme also began in July 1997 under the TKOLII/ III restoration contract. Landfill gas management system was installed to control gas emission and prevent off-site gas migration. 16 monitoring wells were installed within and outside the boundary of the landfill where landfill gas (mainly methane and carbon dioxide) and oxygen were monitored. Among all these 16 monitoring wells, 3 of which (2DG1, 2DG2, 2DG3) are	Natural Pathway The geological formation beneath TKOL-II/III and beneath the Application Site mainly comprises of superficial deposits of fill. There are no fault lines or cracks exist in the TKOLII/ III. Nevertheless, taking into consideration of the precautionary assumption of the permeability and the path length between the landfill and the proposed data centre, which is <50m, it is considered that the natural pathway should be categorised as Very short/ direct.	Construction Phase It is expected that foundation work, utilities installation, and temporary site office would be involved during construction phase. Since the site would be occupied by well-trained construction workers who would have been briefed on the potential hazards relating to landfill gas and the specific safety procedures to be followed, the potential targets listed above during the construction phase is categorised as Medium Sensitive.	Medium
located close to the proposed data centre (as shown in <b>Figure</b> 7). 2 years of the gas monitoring data of these 3 monitoring wells between Jan 2012 and Dec 2013, i.e. the aftercare period of the landfill, has been obtained from EPD and reviewed.  According to the monitoring data, an average zero level of methane was detected at the monitoring wells installed along the boundary of the landfill in the vicinity of the proposed development in recent years. The carbon dioxide levels varied from 0.0% to 5.0% at the 3 monitoring wells. Elevated carbon dioxide concentrations (>5% v/v) were recorded at 2DG3 with maximum concentrations of 5.0 detected on 21 September 2012.	Man-made Pathway Other potential pathways for the migration of landfill gas formed by the provision of utility services have also been considered. Although the utility plan is not available, general utility infrastructure such as cable ducts, sewage and drainage pipes have the potential for direct connections to the proposed data centre. Since void within ducts provide a preferential pathway for landfill gas to migration, as a matter of prudence, the manmade pathway would be classified as Very short/ direct.	Operational Phase According to the layout plan, the entire data centre encroaches within the Consultation Zone. With reference to the EPD's guidance notes, structures/ rooms in the building basement and ground floor are generally identified as targets of landfill gas hazards.  Based on the layout plan, ground floor of the proposed data centre would consist of plant rooms, transformer rooms, and entrance lobby. Four underground fuel tanks would be located outside the data centre. As access to the plant rooms, transformer rooms, underground fuel tanks and the lift shafts would be restricted to authorised persons who will be aware of landfill gas hazard, these targets are categorised as Medium Sensitive.	High
According to EPD's guidance notes, a carbon dioxide concentration >5% v/v above background levels in any monitoring well outside		For the entrance lobby, since there will be daily staff access, to err on the side of caution, the lobby is categorised as <b>Highly Sensitive</b> .	

the landfill's boundary indicates significance		
migration. Hence the potential of off-site	For the basement carpark, since it is located	
migration of landfill gas cannot be eliminated.	underground and contain sources of ignition (e.g.	
	engine), it is categorised as Highly Sensitive.	
Although potential gas migration may still occur		
at some locations, particularly 2DG3 due to		
occasional <5% v/v carbon dioxide		
concentrations measured, in view of the		
insignificant evidence of off-site methane		
migration and that the landfill site has multiple		
landfill gas control measures (such as vents and		
barriers), the landfill gas source of TKOL-II/III	H .	
would be classified as Medium.		

# 4.8 Recommended Precautionary and Protective Measures

The source-pathway-target analysis as summarised in **Table 14** concluded that the overall risk level is **High** for the proposed data centre during both construction and operational phase. With reference to **Tables 10 and 11**, for high risk targets, significant engineering measures would be required to protect the proposed developments which include use of active control of gas including barriers and detection systems.

The following sections provide general advice and recommendations for the avoidance of environmental impacts related to landfill gas during the construction and operational phases. Where applicable, specific measures for handling the hazards identified during the construction and operational phases will also be addressed to further reduce the likelihood of incidents and increase the level of safety to the workers and the public.

#### 4.8.1 Construction Phase

#### General Hazards of Landfill Gas

The developer should be aware of, and should inform construction contractors accordingly, that methane and carbon dioxide are always likely to be present in the soil voids. In addition the developer should be aware of the potential hazards and other properties of landfill gas as described in **Section 4.4**.

#### Outline of Safety Requirements

During construction, safety procedures should be implemented to minimise the risks of:

- Fires and explosions;
- Asphyxiation of worker; and
- Toxicity effects

Precautions should be clearly laid down and rigidly adhered to with respect to:

- Trenching and excavation; and
- Creation of confined spaces at, near to or below ground level

In addition to normal site safety procedures, gas detection equipment and appropriate breathing apparatus should be available and used when entering confined spaces.

#### Additional General Requirements

#### Appointment of Safety Officer

A safety officer, trained in the use of gas detection equipment and landfill gas related hazards, should be present on site throughout the ground works phase. The Safety Officer should be provided with an intrinsically safe portable instrument, which is appropriately calibrated and able to measure the following gases in the ranges indicated below:

Methane

0-100% LEL and 1-100% v/v

Carbon dioxide

0-100%

Oxygen

0-21%

#### Safety Measures

All personnel who work on site and all visitors to the site should be made aware of the possibility of ignition of gas in the vicinity of the works, the possible presence of contaminated water and the need to avoid physical contact with it.

Those staff who work in, or have responsibility for "at risk" areas, including all excavation workers, supervisors and engineers working within the consultation zone, should receive appropriate training on working in areas susceptible to landfill gas hazards.

An excavation procedure or code of practice to minimise landfill gas related risk should be devised and carried out by the project proponent. No worker should be allowed to work alone at any time in or near to any excavation. At least one other worker should be available to assist with a rescue if needed.

Ground level construction plant should be fitted with vertical exhausts at least 0.6m above ground level and with spark arrestors.

During piping assembly or conduiting construction, all valves/seals should be closed immediately after installation. As construction progresses, all valves/seals should be closed as installed to prevent the migration of gases through the pipeline/conduit. All piping / conduiting should be capped at the end of each working day.

Mobile offices, equipment stores, mess rooms etc. should be located on an area which has been proven to be gas free (by survey with portable gas detectors) and ongoing monitoring should be carried out to ensure that these areas remain gas free. Alternatively, such buildings should be raised clear of the ground. If buildings are raised clear of the ground, a minimum, clear separation distance (as measured from the highest point on the ground surface to the underside of the lowest floor joist) should be 500mm. However, in this case, it is highly recommended that all the site offices, equipment stores and mess rooms should be located outside the 250m Consultation Zone.

Smoking and naked flames should be prohibited within confined spaces. "No Smoking" and "No Naked Flame" notices in Chinese and English should be posted prominently around the construction site. Safety notices should be posted warning of the potential hazards.

Welding, flame-cutting or other hot works may only be carried out in confined spaces when controlled by a "permit to work" procedure, properly authorized by the Safety Officer.

The permit to work procedure should set down clearly the requirements for continuous monitoring of methane, carbon dioxide and oxygen throughout the period during which the hot works are in progress. The procedure should also require the presence of a competent environmental specialist who shall be responsible for reviewing the gas measurements as they are made, and who shall have executive responsibility for suspending the work in the event of unacceptable or hazardous conditions. Only those workers who are appropriately trained and fully aware of the potentially hazardous conditions which may arise should be permitted to carry out hot works in confined areas.

During the construction works, adequate fire extinguishers and breathing apparatus sets should be made available on site and appropriate training given in their use.

Fire drills should be organised at not less than six monthly intervals.

The developer should formulate a health and safety policy standards and instructions for site personnel to follow.

#### Monitoring

Routine monitoring should be carried out in all excavations, manholes, chambers and any other confined spaces that may have been created. All measurements in excavations should be made with the extended monitoring tube located not more than 10 mm from the exposed ground surface.

Monitoring should be performed properly to make sure that the area is free of landfill gas before any man enters into the area.

For excavations deeper than 1m, measurements should be carried out:

- at the ground surface before excavation commences;
- immediately before any worker enters the excavation;
- at the beginning of each working day for the entire period the excavation remains open; and
- periodically throughout the working day whilst workers are in the excavation.

For excavations between 0.3m and 1m deep, measurements should be carried out:

- directly after the excavation has been completed; and
- periodically whilst the excavation remains open

For excavations less than 0.3m deep, monitoring may be omitted, at the discretion of the Safety Officer or other appropriately competent environmental specialist.

Depending on the results of the measurements, actions required will vary and should be set down by the Safety Officer or other appropriately competent environmental specialist. As a minimum these should encompass those actions specified in **Table 15**.

Table 15: Actions in the event of landfill gas being detected in excavations

Parameter	Monitoring Results	Actions	
Oxygen	<19%v/v	• Ventilation to restore oxygen to >19% v/v	
	<18%v/v	• Stop work;	

		Evacuate all personnel/prohibit entry
		• Increase ventilation to restore oxygen level to >19%
Methane	>10% LEL	Prohibit hot works
	(i.e. >0.5% by volume)	• Ventilate to restore Methane to <10% LEL
	>20% LEL	Stop works
	(i.e. >1% by volume)	Evacuate all personnel/prohibit entry
		• Increase ventilation to restore Methane to <10% LEL
Carbon	>0.5% v/v	• Ventilate to restore carbon dioxide to <0.5% v/v
dioxide	>1.5% v/v	Stop works
		Evacuate all personnel/prohibit entry
		• Increase ventilation to restore carbon dioxide to <0.5%

#### **Emergency Management**

To ensure that evacuation procedures are implemented in the event of the trigger levels specified in **Table 13** above being exceeded, it is recommended that a person, such as the Safety Officer, is nominated, with deputies, to be responsible for dealing with any emergency which may occur due to landfill gas.

In an emergency situation the nominated person, or his deputies, shall have the necessary authority and shall ensure that the confined space is evacuated and the necessary works implemented for reducing the concentrations of gas. The following organizations should also be contacted as appropriate:

- Hong Kong Police Force;
- Fire Services Department;
- Environmental Protection Department.

#### Construction Works during Operational Phase

Should construction works are to be carried out during the operational phase (e.g. further extension works), the precautionary measures mentioned in **Section 4.8** should be followed.

# 4.9 Recommended Precautionary and Protective Measures

#### 4.9.1 Building Protection Design Measures

#### Gas Barrier

To prevent gas from entering the Application Site, a "gas barrier" should be built on the eastern and southern edge of the Application Site which is closest to TKOL-II/III (refer to **Figure 15** for the indicative location of the gas barrier). The dimension of the gas barrier is approximate to be about 180m long, 1m width with the depth down to at least 0.1m below the bottom of the pile cap of the proposed data centre. The details of the gas barrier will be subject to the detail design of the proposed data centre. Any gas barriers used for this purpose should be engineered to be effectively impermeable to gas transport and, as such, for natural material barriers (e.g. soil bentonite mixes), the permeability (hydraulic conductivity) should be  $10^{-9}$  ms<sup>-1</sup> or lower and for membrane liners the hydraulic conductivity should be  $10^{-12}$  ms<sup>-1</sup> or lower.

The presence of a gas barrier to the movement of gas may lead to a gradual build-up of gas on the landfill side of the barrier if the gas migration pathway is covered by low permeability materials. To relieve the potential build up of gas, it may be necessary to install additional measures for venting the gas such as trenches filled with no-fines, granular material, such as gravel, connected to venting pipes which will provide a preferential pathway for the release of gas to the atmosphere. An outline of a gas barrier wall is shown in **Figure 8** and the cross-section of a typical gas barrier wall is shown in **Figure 9**.

#### Vent Pipe

For the underground fuel tanks, in addition to the gas proof membrane, vent pipe should be installed to avoid gas accumulation.

#### Active Ventilation

For the basement carpark and rooms on the ground floor (e.g. transformer rooms, plant rooms, etc.), 24-hour mechanical ventilation should be provided. Such mechanical ventilation system should be connected with emergency power supply so that ventilation can be resumed within a short period of time to prevent any potential accumulation of gas, if any.

The HDPE membrane plus the water resistance concrete will stop the migration of the methane gas into the basement. A back calculation of methane concentration with the permeability of  $10^{-9}$  m/s, the concentration of the methane within the basement carpark with a 1 air change ventilation rate is about 1.4 E-4% which is well below the requirement of 0.5% (**Appendix D**).

#### Automatic Gas Detector

Landfill gas detection system should be installed in rooms/ structures where accumulation of gas is likely e.g. basement carpark, less ventilated areas (such as corridors and staircases). The detection system should be maintained and calibrated on a regular basis. Example of the gas detector is also included in the **Appendix E**.

# 4.9.2 Design Measures for Sub-surface Building Services

For the sub-surface building services such as power cable, water mains, telecom cables and foul sewer etc, the following general protection measures are recommended.

#### Gas barriers

Gas barriers are most readily applied to service trenches at a point between the source of the gas and building (or development) itself. A barrier to gas movement may be achieved by using clay (or clayrich soils), betonite or polymeric membranes (such as HDPE). The gas barrier may form part of a more extensive barrier to prevent general migration towards the development. The design detail at the point where the service penetrates the membrane is important and, in the case of HDPE membranes, pre-formed shrouds are often available.

A schematic of a natural material cut-off barrier, including sealing of a service trench is shown in **Figure 10** and a schematic for an HDPE flexible membrane cut-off is shown in **Figure 11**.

In the case of water pipes and sewers which are not always fully filled, water traps, such as U-bends, should be provided to effectively seal off the conduit and prevent gas-phase transport. An example of a U-bend water seal is shown in **Figure 12**.

#### Gas Vents

Vent pipes or gridded manhole covers may be used to avoid build-up of gas in underground utilities manholes. Venting stacks may be built into inspection chambers. A typical vented manhole arrangement and vent pipes is shown in **Figure 13**.

# 4.9.3 Guidance for Entry Into Manholes and Chambers

During the operational phase, any service voids, manholes, chambers or culvert within the proposed site, which is large enough to permit access to personnel should be subject to entry safety procedures. Works in confined spaces are controlled by the Factories and Industrial Undertakings (Confined Spaces) Regulation of the Factories and Industrial Undertakings Ordinance and the Safety Guide to Working in Confined Spaces should be followed to ensure compliance with the Regulation.

In general, when work is being undertaken in confined spaces, sufficient approved resuscitation equipment, breathing apparatus and safety torches should be made available. Persons involved in or supervising such work should be trained and practiced in the use of such equipment. A permit-to-work system for entry into confined spaces should be developed by an appropriately qualified person and the system should be consistently employed. The safety measures recommended in Chapter 8 of Landfill Gas Hazard Assessment Guidance Note should also be strictly followed.

All access to confined spaces should be restricted only to authorized personnel who are aware of the landfill gas hazard. No general public should be permitted or allowed to access the service voids, manholes, chambers or wells.

#### 4.9.4 Routine Landfill Gas Monitoring

Regular monitoring of landfill gas should be conducted to verify the effectiveness of the implemented protection measures. As a general recommendation, monitoring locations are suggested to be at the underground service voids and manholes, but the actual monitoring locations are subjected to EPD's agreement.

Monitoring should be conducted by an environmental consultant who are trained in the use of gas detection equipment and landfill gas-related hazards. The operation staff should be provided with an intrinsically safe portable instrument, which is appropriately calibrated and able to measure the following gases in the ranges indicated below:

Mathane

0-100% LEL and 1-100% v/v

Carbon dioxide

0-100%

Oxygen

0-21%

Depending on the results of the measurements, actions required will vary and should be set down by an environmental consultant. As a minimum these should encompass actions specified in **Table 16**.

Table 16: Actions in the event of landfill gas being detected in the building structure

Parameter	Monitoring Results	Actions
Oxygen	<19% v/v	Inform the nominated person
		Advise the occupants of the affected areas of the building
		• Ventilation to restore oxygen to >19% v/v
	<18% v/v	Inform the nominated person
		Advise and evacuate occupants/prohibit entry to the affected areas of the building
		• Increase ventilation to restore oxygen level to >19%
Methane	>10% LEL	Inform EPD and the nominated person
	(i.e. >0.5% by volume)	Advise the occupants of the affected areas of the building
		Remove all sources of ignition from the affected areas of the building
		• Ventilate to restore methane to <10% LEL
		<ul> <li>Seek specialist to review the existing precautionary measures to ensure the continue safety of the occupants</li> </ul>
	>20% LEL	Inform EPD and the nominated person
	(i.e. >1% by volume)	Advise and evacuate occupants/prohibit entry to the affected areas of the building
		Remove all sources of ignition from the affected areas of the building
		• Increase ventilation to restore methane to <10% LEL
		Seek specialist to review the existing precautionary measures to ensure the continue safety of the occupants

Parameter	Monitoring Results	Actions	
Carbon	>0.5% v/v	Inform EPD and the nominated person	
dioxide		• Advise the occupants of the affected areas of the building	
		• Ventilate to restore carbon dioxide to <0.5% v/v	
	>1.5% v/v	Inform EPD and the nominated person	
		• Advise and evacuate occupants/prohibit entry to the affected areas of the building	
	• Increase ventilation to restore carbon <0.5%		
		• Seek specialist to review the existing precautionary measures to ensure the continue safety of the occupants	

# 4.10 Detailed Landfill Gas Hazard Assessment

At this stage, the landfill gas hazard risk assessment is carried out based on the preliminary design of the proposed development. A detailed landfill gas hazard risk assessment will be prepared during the detailed design stage and submitted to EPD for approval, which will cover details of the precautionary and protective measures and the Landfill Gas Monitoring Plan for the operational stage of the proposed data centre. In addition, detailed landfill gas monitoring plan should be prepared during the detailed design stage and included in the detailed landfill gas hazard assessment.

# 5.0 Sewerage Impact Assessment

#### 5.1 Scope of Work

The aim of this study is to assess whether the capacity of the existing sewerage networking to the Subject Site is sufficient to cope with the sewage flow from the proposed conversion.

# 5.2 Assessment Criteria and Methodology

According to the Drainage Record obtained from the Drainage Services Department, there is a public sewer network serving the Subject Site and the surrounding environment. The Drainage Record is shown in **Appendix G**.

Environmental Protection Department's (EPD's) Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning, Version 1 is referred to estimate the quantity of the sewage generated from the proposed development and the existing building. Sewage flow parameters and global peaking factors in this document are adopted.

According to the Table T-2 of the said EPD Guideline, the unit flow factors of Office in Table T-2 of GESF is  $0.08 \mathrm{m}^3/\mathrm{day}$ .

# 5.3 Assessment of Sewage Impact

Wastewater arising from the proposed conversion will be contributed by office. The estimated peak flow from Proposed Development is 1.4 litre/sec, which is given in **Table 17**.

Table 17: Estimated Sewage Flow from the Proposed Development

Calculation for Sewage Generation Rate of the	Proposed 1	Develop	oment
1. Proposed Office (8/F)			
1a. Assumed used Area	=	4700	m <sup>2</sup>
1b. Total number of employees	=	188	Employee (25 m2 per employee)
1c. Design flow	=	80	litre/person/day (based on Table T-2 of GESF)
1d. Sewage generation rate	=	15.0	m³/day
Total Flow			
Flow Rate	=	15.0	m <sup>3</sup> /day
Peaking Factor	=	8	(for population <1000 including stormwater allowance)
Peak Flow	=	1.4	litre/sec

#### 5.4 Discussion

According to the Drainage Records obtained from the DSD, there is a public sewer network serving the subject site and the surrounding environment. Sewage from the Proposed Development will be designed to discharge to the public sewers as shown in **Figure 14**. It is assumed that the sewage generated by the Proposed Development will be connected to the sewer at the upstream of manhole S1 (FMH4035446) located at Wan Po Road. The estimated capacity of the said existing sewer sections and the amount of the sewage entering each segment of the said sewer network are calculated and shown in **Appendix F**.

The potential sewerage impact due to the Proposed Development has been quantitatively addressed. Based on the sewage generation rate estimated from the Proposed Development (**Appendix F**), the average and peak flow rates from the Proposed Development are about 15m³/day and 1.4litre/sec, respectively. It is found that the capacity of the existing sewers serving the area would be generally sufficient to cater for the sewage generation from the Proposed Development. No upgrading of the public sewer is required.

### 5.5 Conclusion

The potential sewerage impact due to the Proposed Development has been quantitatively addressed. The sewage flow generated from the Proposed Development is estimated to be approximately  $15 \text{m}^3$ /day for average condition and 1.4litre/sec for peak flow.

Based on the evaluated above, it is concluded that sewerage impact due to the Proposed Development is insignificant to the existing sewer segments.

# 6.0 Overall Conclusion

An environmental assessment has been conducted for the proposed data centre in TKO.

During the construction phase, the development is unlikely to cause any unacceptable construction dust impact and construction noise impact on the ASR/NSR with the proposed mitigation measures implemented.

The major noisy equipment of the proposed will include the cooling towers at the roof of the two towers. All the back-up generators and transformers will be located within the building. The back-up generators will be used for emergency electricity supply once there is power outage. The electricity supply in Hong Kong is stable and reliable. Frequent and prolonged use of the back-up generators is not anticipated. The back-up generators, transformers and chillers/radiators will be located within the plant rooms and transformer rooms in ground floor, first floor and roof floor. These equipment will be fully enclosed within the building with concrete wall and proper acoustics design (e.g. use of acoustics louvre and adoption of silencer). Moreover, all ventilation exhausts and intake will be acoustically treated. The maximum allowable sound power level of noisy equipment at the proposed data centre has been calculated. With proper design of the noisy equipment with sufficient mitigation measures, no insurmountable fixed noise impact on the surrounding NSRs is anticipated.

For those NSRs in the vicinity of the site, as the induced road traffic flow from the data centre is low, adverse road traffic noise impact due to the induced road traffic flow by the proposed data centre on those NSRs is not anticipated.

For vehicular emission, the horizontal buffer distance of the fresh air intakes of the proposed data centre shall be designed based on the HKPSG requirement to avoid air quality impact.

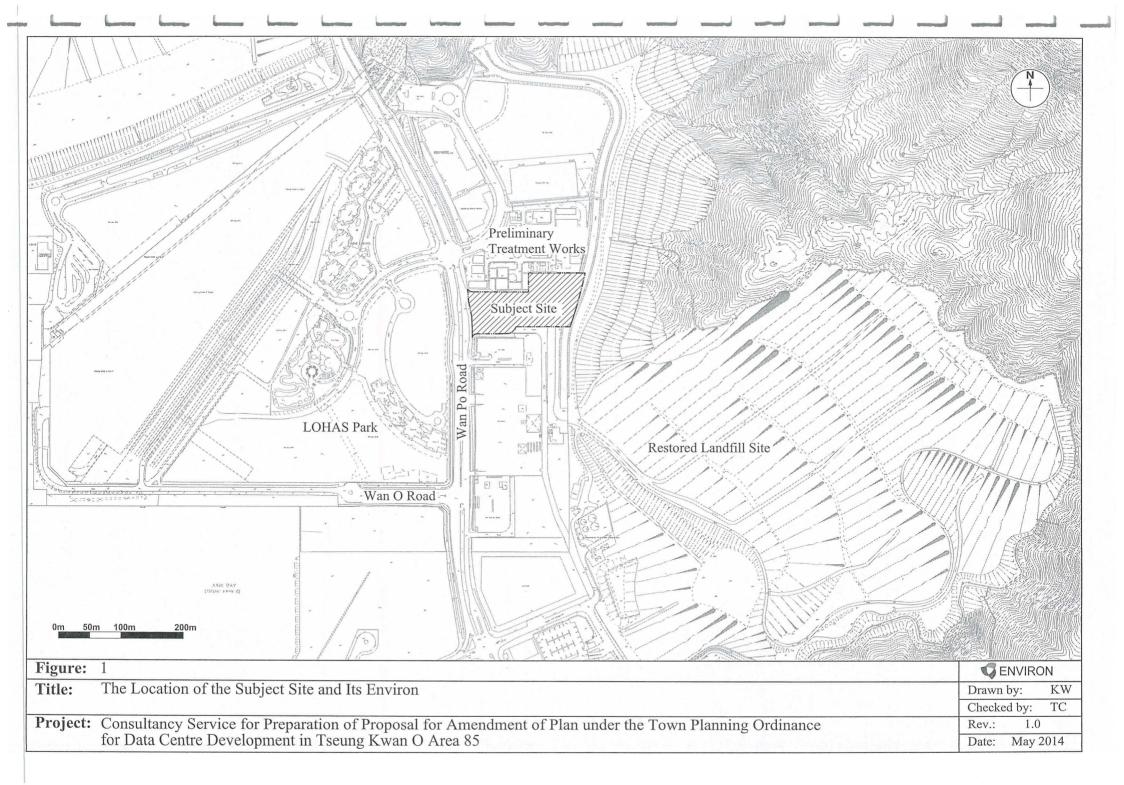
The back-up generators are for emergency use. No frequent and prolonged use of the back-up generators is expected. With the use of ultra low sulphur diesel and proper design of the chimney locations, adverse air quality impact from the backup generators is not anticipated.

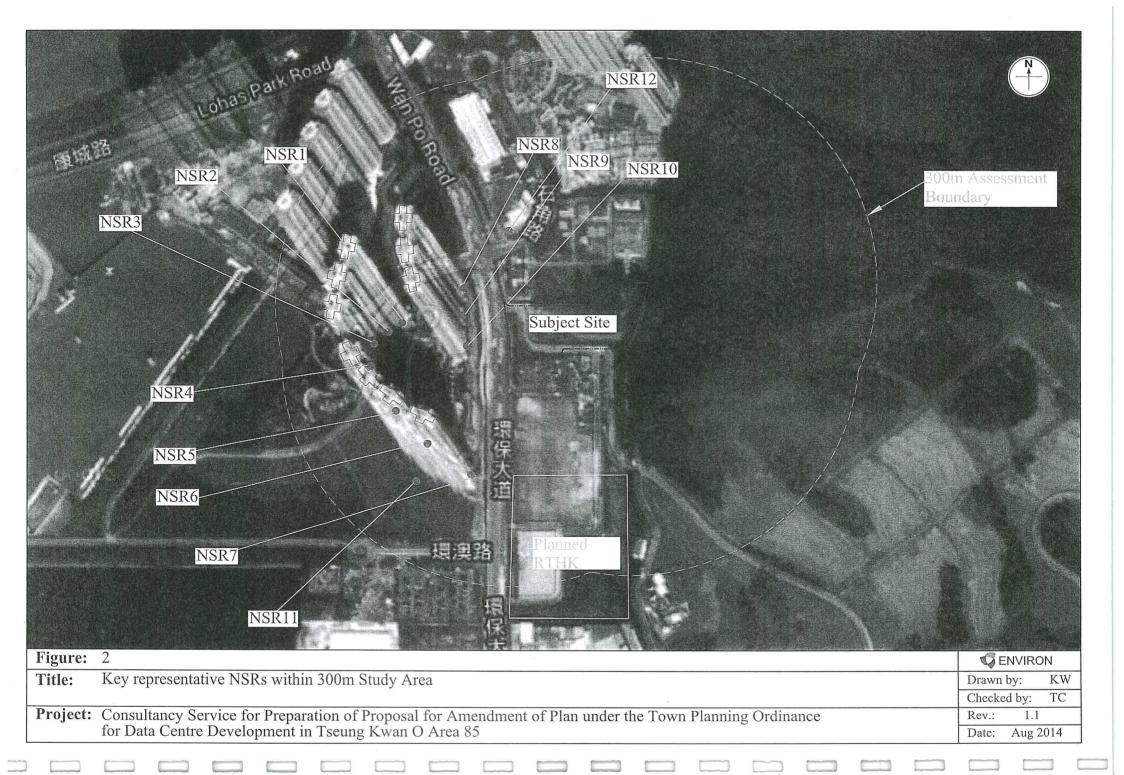
For odour impact, the odour emission sources identified within the vicinity of the Application Sites are the existing TKO Preliminary Treatment Works, existing SENT Landfill and planned SENT Landfill Extension. TKO Preliminary Treatment Works is equipped with adequate odour mitigation measures. Therefore, no adverse odour impact from the existing TKO Preliminary Treatment Works would be expected based on the assessment. With the over 1km buffer distance, adverse odour impact form the SENT Landfill upon the proposed data centre is not expected. It must be noted that there is no office proposed within the data centre.

For the landfill gas hazard assessment, a qualitative risk assessment based on source-pathway-target analysis has been undertaken for the latest building plan. The results indicate that the overall risk level during the construction and operational phase of the proposed data centre is High. Appropriate protective measures have been proposed to minimise the landfill gas hazards imposed on the proposed data centre during both the construction and operational phase. With the implementation of the recommended protection measures, no adverse impacts on the proposed data centre are anticipated.

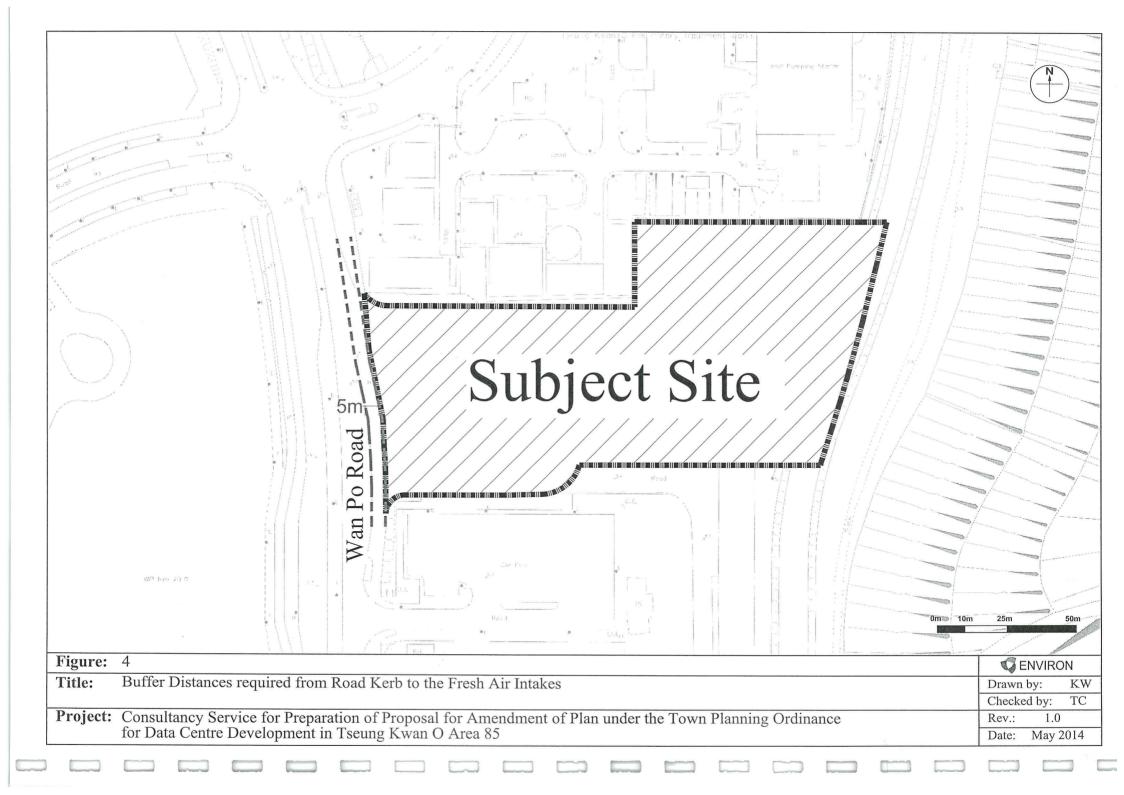
The sewerage impact due to the proposed development has been quantitative assessed. The proposed data centre will be connected to the public sewer along Wan Po Road. The assessment shows that the capacity of the public sewer serving the proposed data centre is sufficient. No upgrading of the public sewer is required.

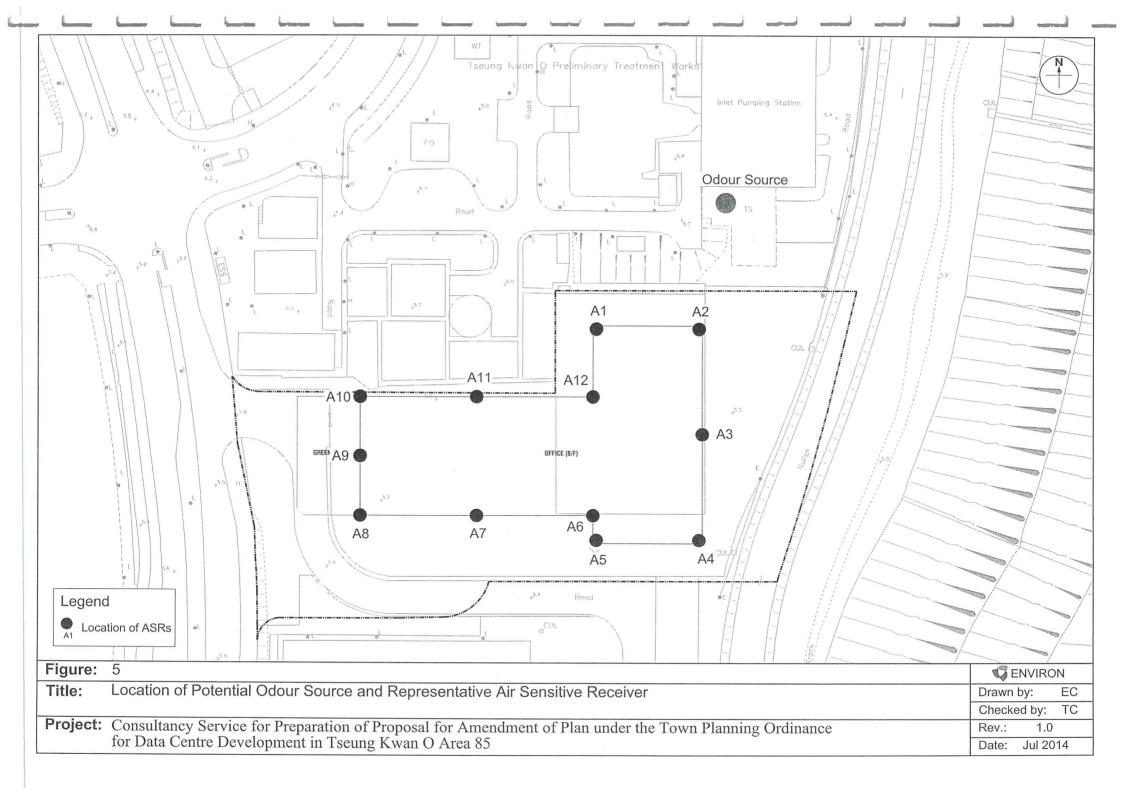
Figure

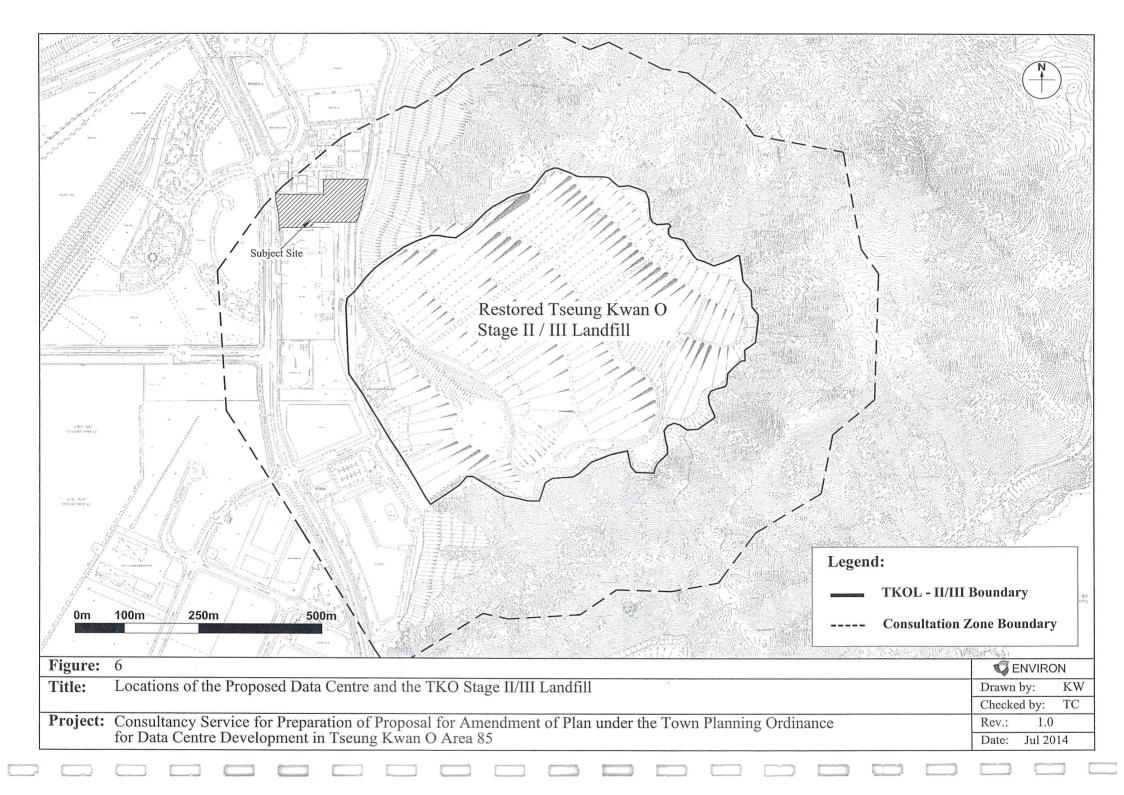


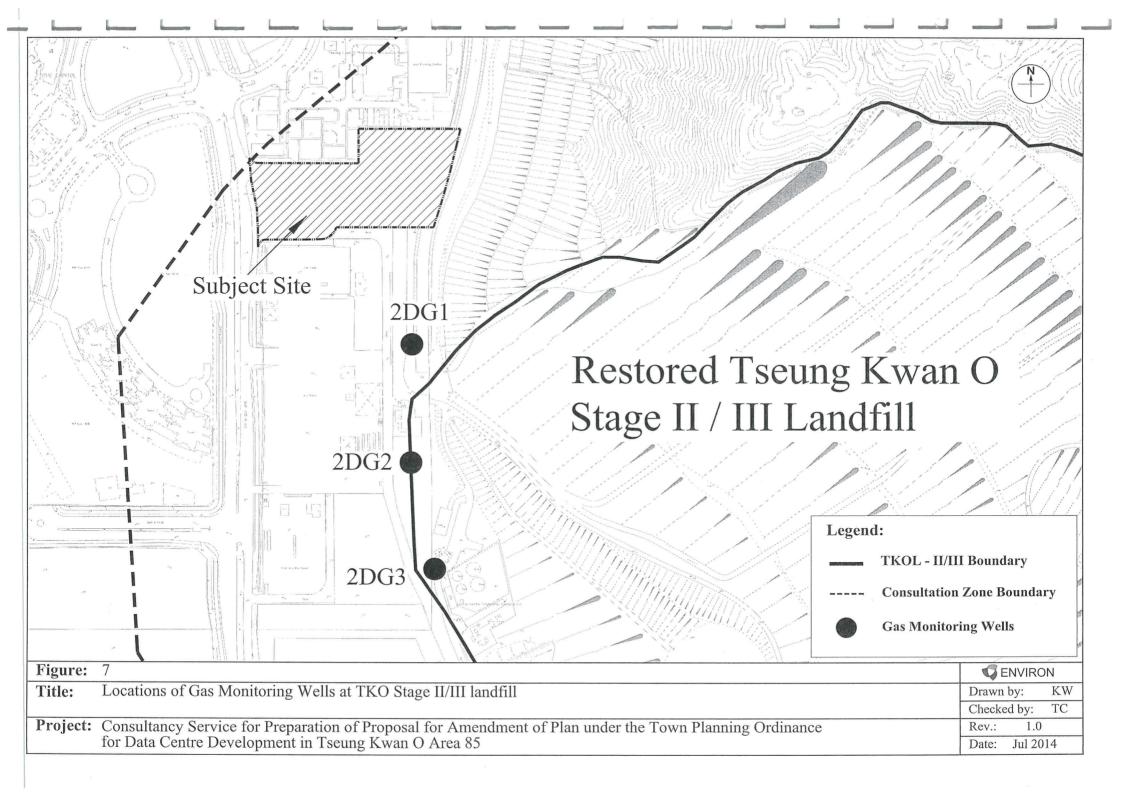












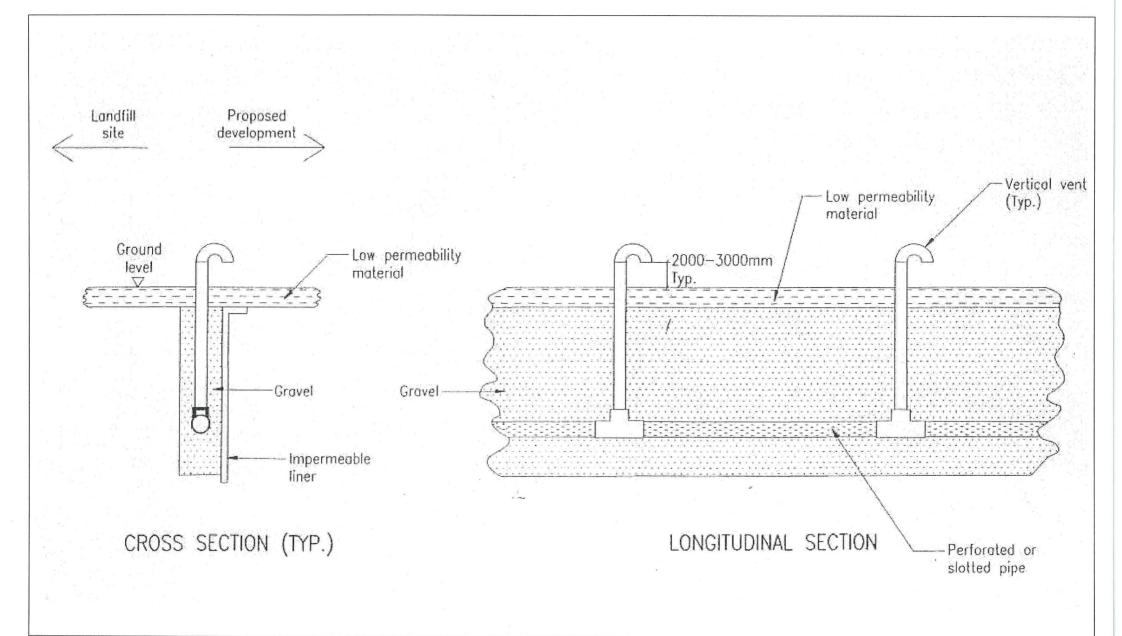
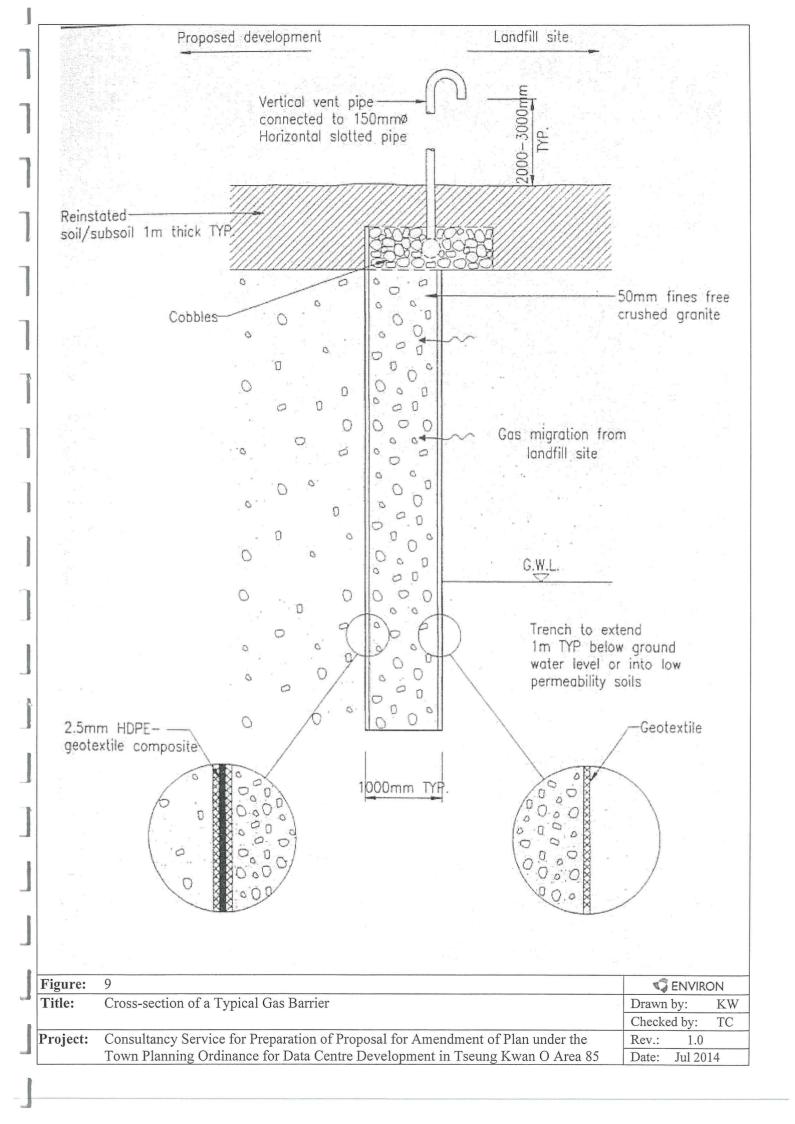


Figure:	8	<b>ENVIRON</b>
Title:	Outline of a Gas Barrier	Drawn by: KW
		Checked by: TC
Project:	Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance	Rev.: 1.0
	for Data Centre Development in Tseung Kwan O Area 85	Date: Jul 2014



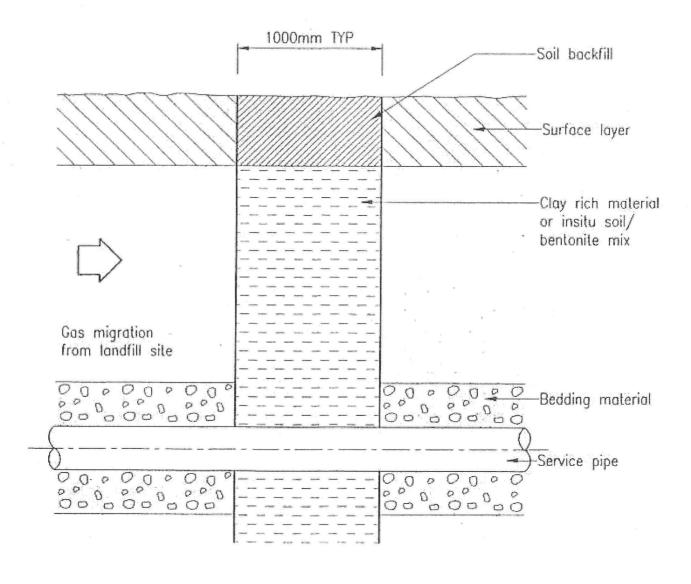


Figure:	10	<b>ENVIRON</b>
Title:	Natural Material Cut-off Barrier	Drawn by: KW
		Checked by: TC
Project:	Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance	Rev.: 1.0
	for Data Centre Development in Tseung Kwan O Area 85	Date: Jul 2014

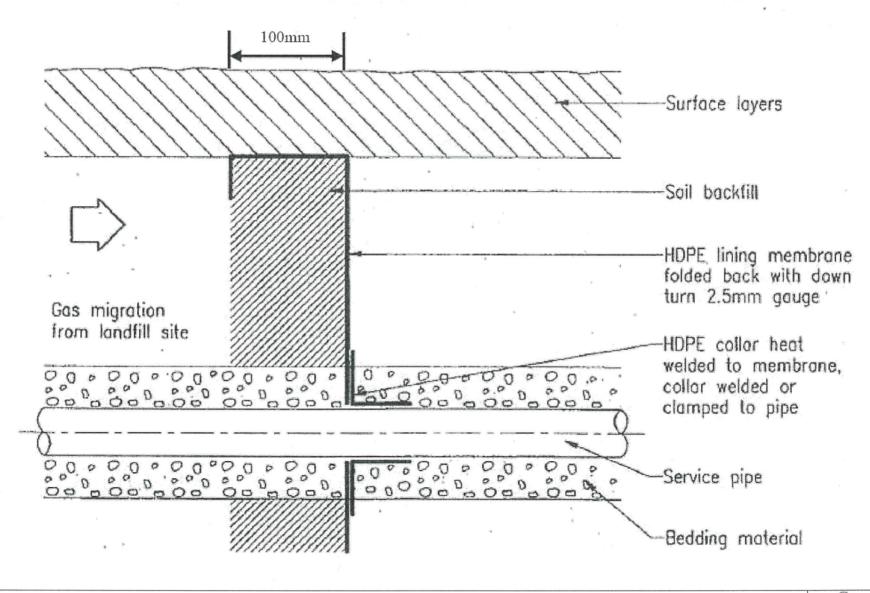


Figure:	11	<b>ENVIRON</b>
Title:	Flexible Membrane Cut-off	Drawn by: KW
		Checked by: TC
Project:	Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance	Rev.: 1.0
	for Data Centre Development in Tseung Kwan O Area 85	Date: Jul 2014

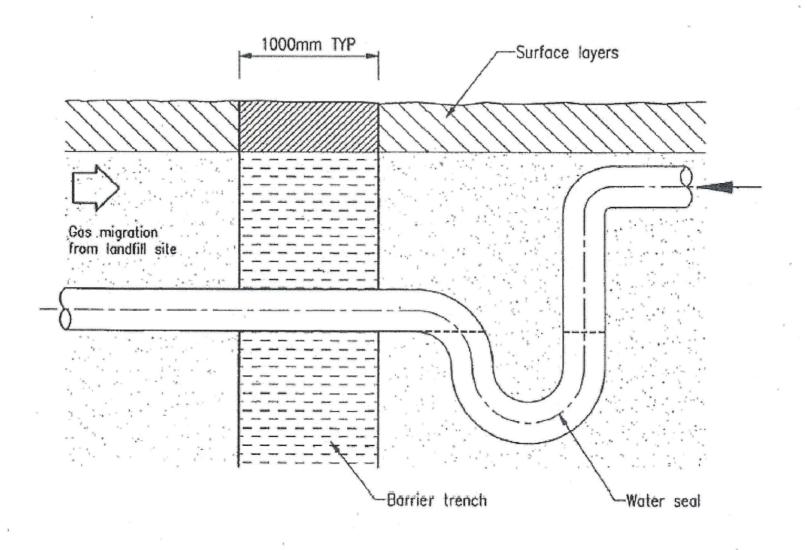


Figure:	12	<b>ENVIRON</b>
Title:	Open Conduct Protection by Water Seal (Longitudinal Section)	Drawn by: KW
		Checked by: TC
Project:	Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance	Rev.: 1.0
	for Data Centre Development in Tseung Kwan O Area 85	Date: Jul 2014

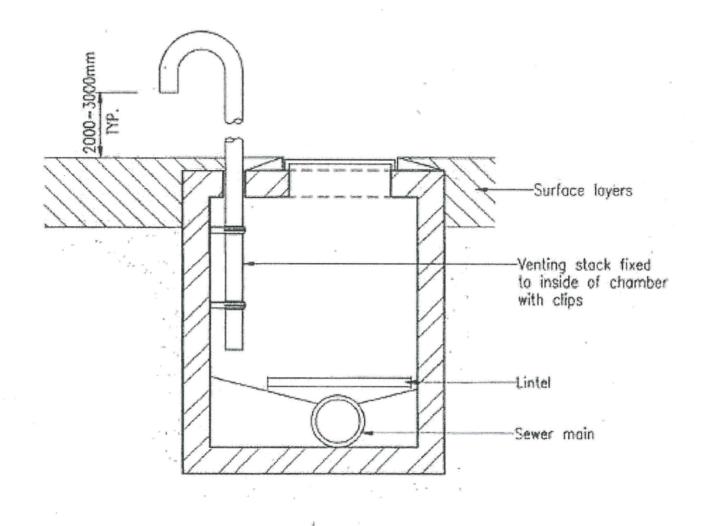
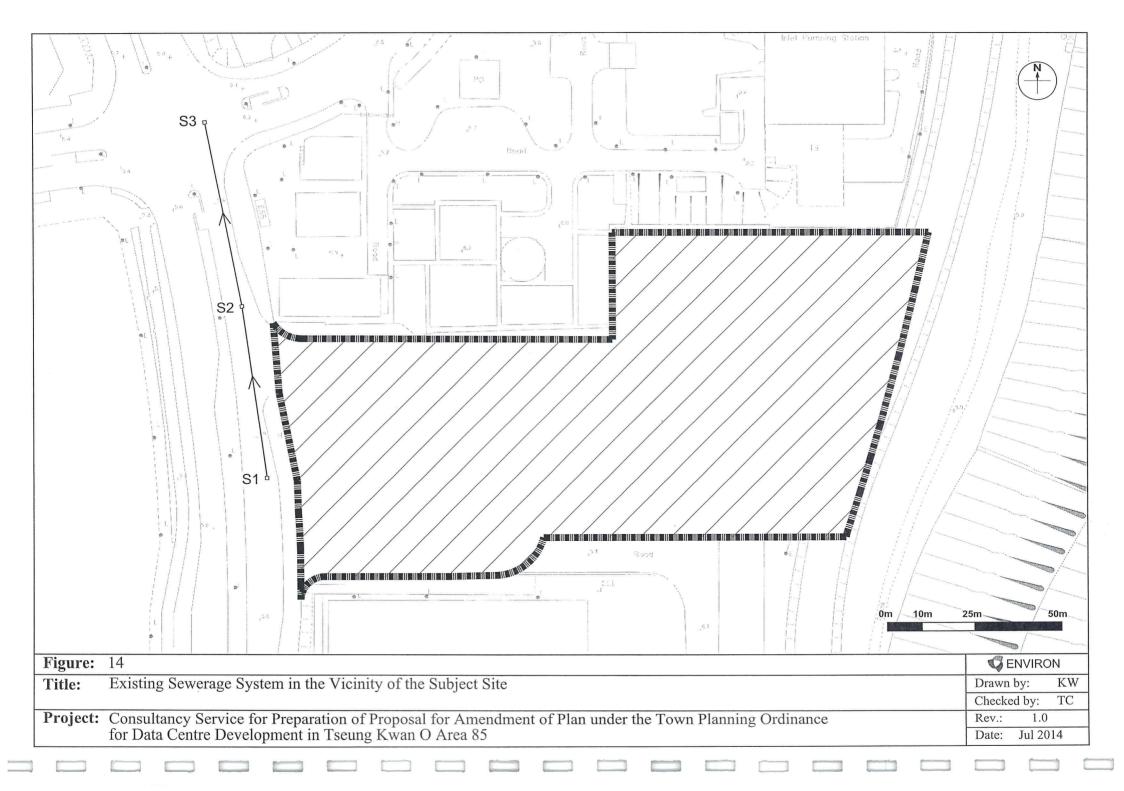
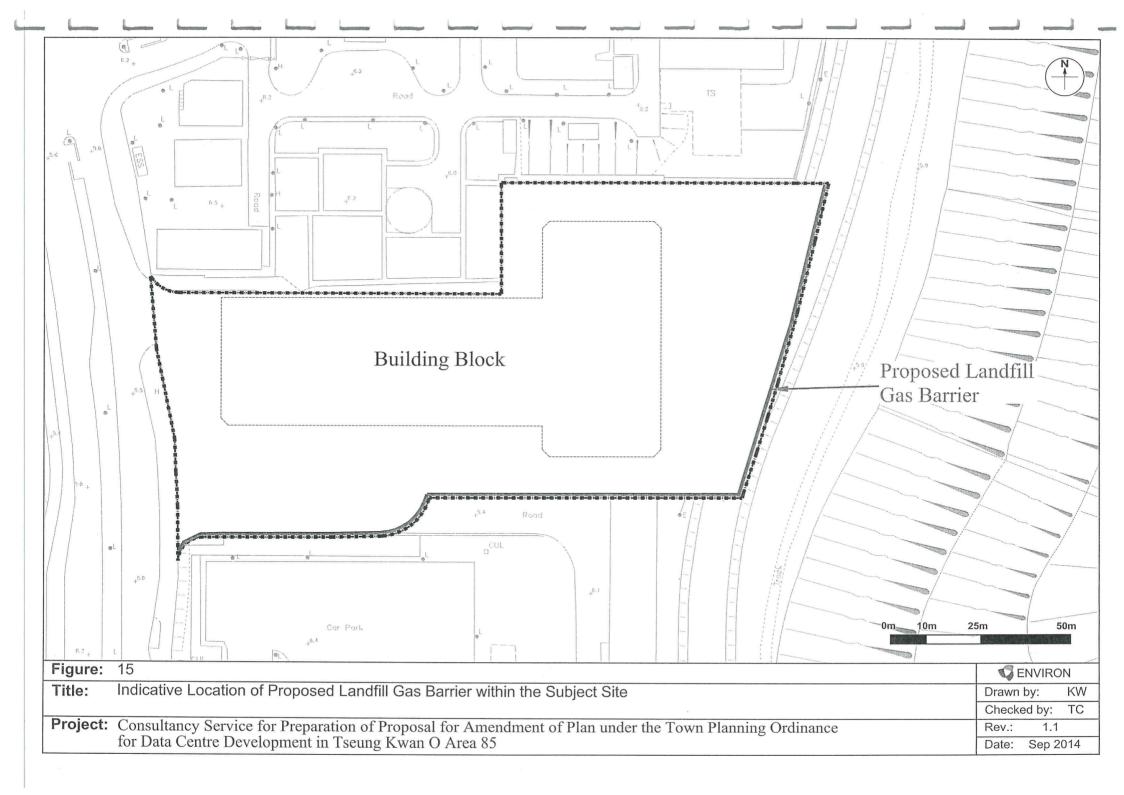
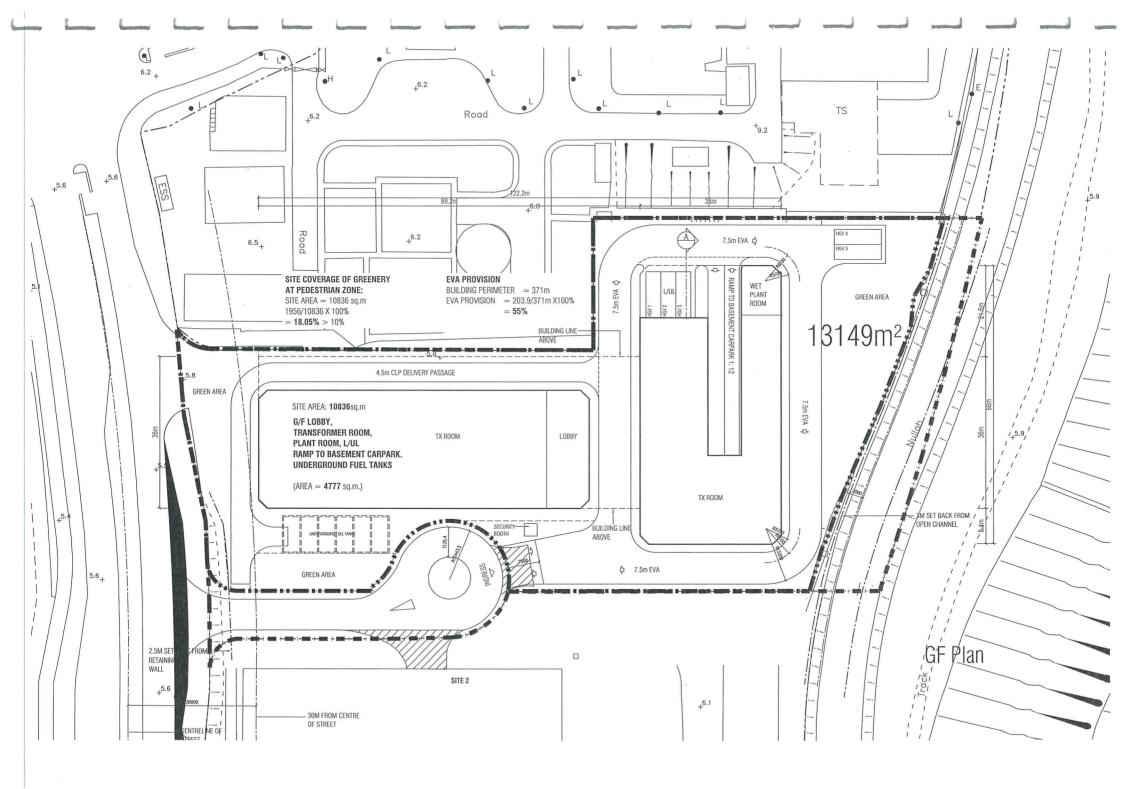


Figure:	13	<b>ENVIRON</b>
Title:	Vented Manhole (Cross-section)	Drawn by: KW
		Checked by: TC
Project:	Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance	Rev.: 1.0
	for Data Centre Development in Tseung Kwan O Area 85	Date: Jul 2014

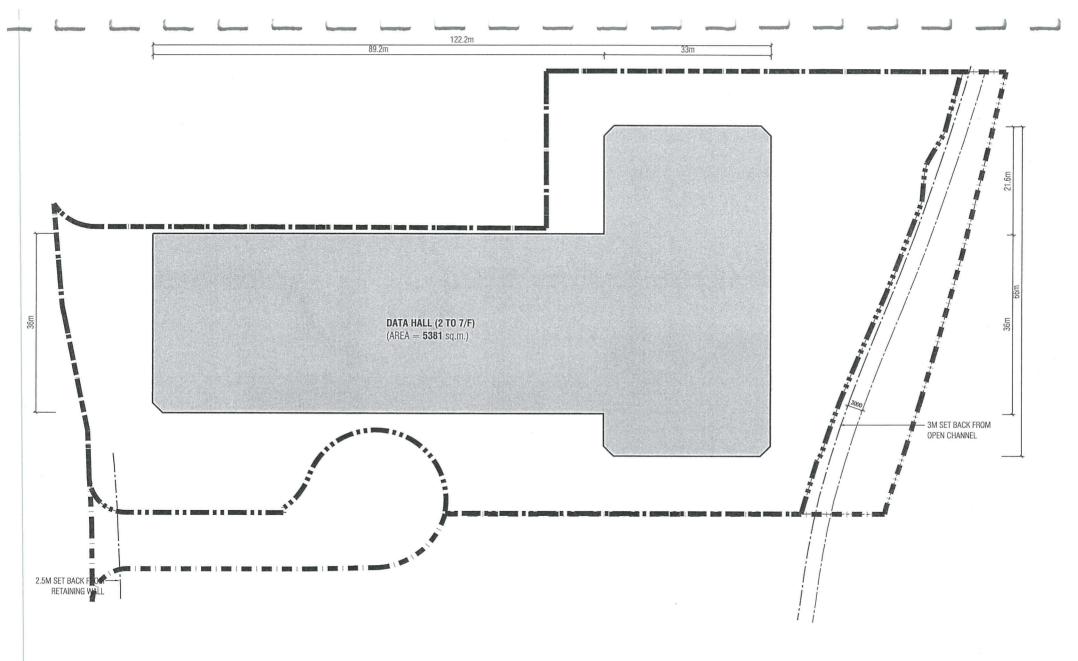




Appendix A: Development Plan of Proposed Development



1F Plan



2F-7F Plan

8F Plan

Appendix B: Odour Impact Assessment Result

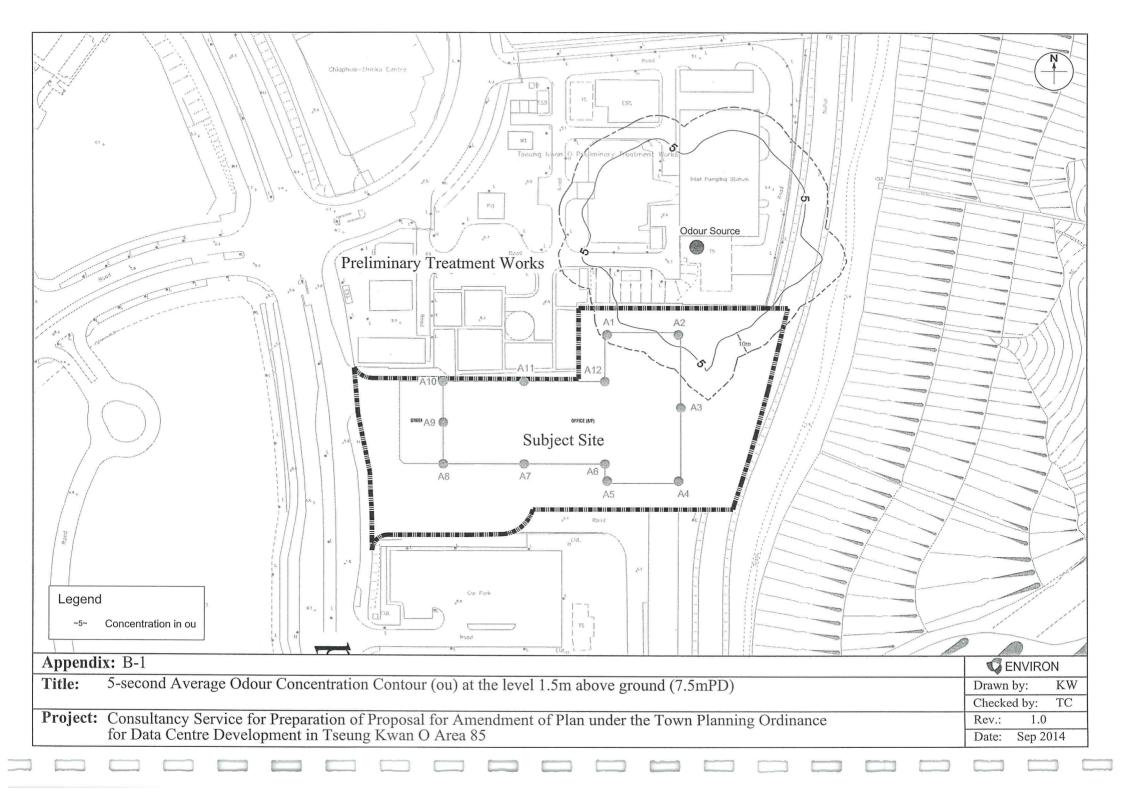
#### Predicted 5-second Average Odour Concentration

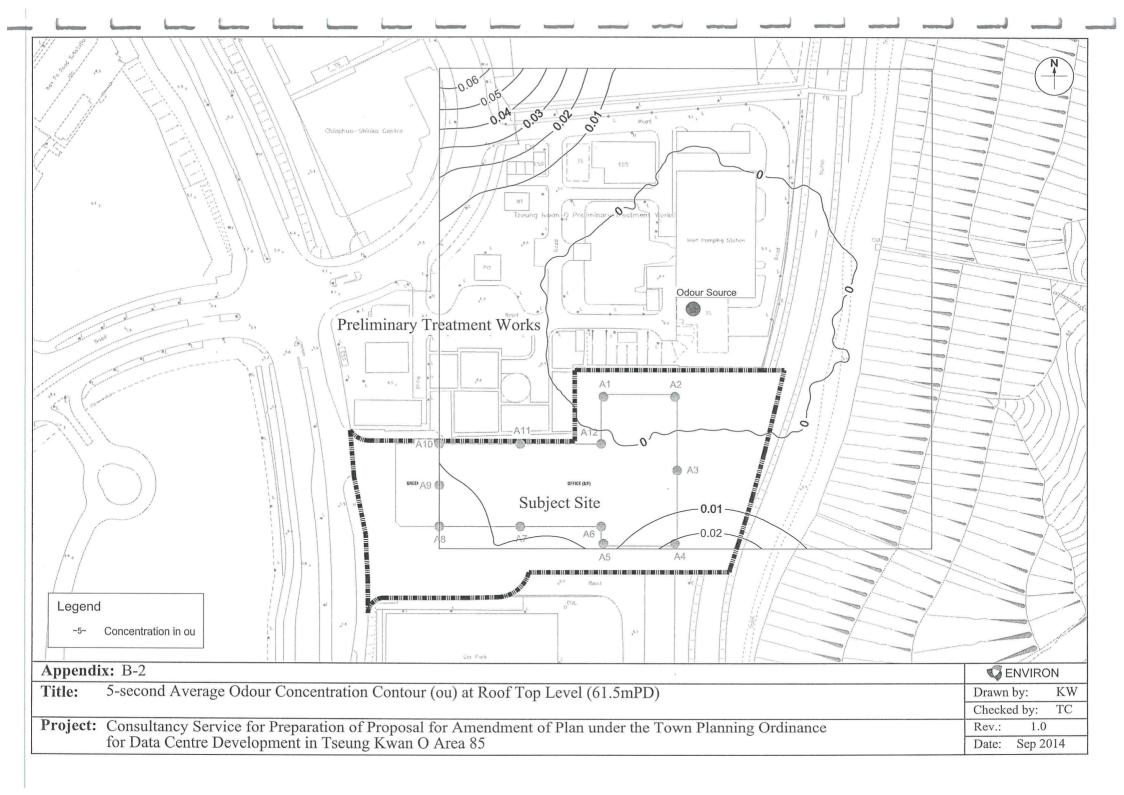
	Ground	T .		
	Level			Odour unit
ASR	(mPD)	mAG	mPD	(5s)
A1	6	1.5	7.5	4.71
A2	6	1.5	7.5	7.09
A3	6	1.5	7.5	2.15
A4	6	1.5	7.5	1.42
A5	6	1.5	7.5	1.71
A6	6	1.5	7.5	1.91
A7	6	1.5	7.5	0.79
A8	6	1.5	7.5	1.28
A9	6	1.5	7.5	1.13
A10	6	1.5	7.5	1.80
A11	6	1.5	7.5	1.69
A12	6	1.5	7.5	3.19
A1	6	6.5	12.5	3.51
A2	6	6.5	12.5	6.82
A3	6	6.5	12.5	3.12
A4	6	6.5	12.5	2.35
A5	6	6.5	12.5	2.85
A6	6	6.5	12.5	3.06
A7	6	6.5	12.5	1.94
A8	6	6.5	12.5	1.13
A9	6	6.5	12.5	2.19
A10	6	6.5	12.5	1.96
A11	6	6.5	12.5	1.78
A12	6	6.5	12.5	2.87
A1	6	11.5	17.5	3.96
A2	6	11.5	17.5	6.46
А3	6	11.5	17.5	4.74
A4	6	11.5	17.5	3.25
A5	6	11.5	17.5	2.89
A6	6	11.5	17.5	3.44
A7	6	11.5	17.5	1.84
A8	6	11.5	17.5	0.78
A9	6	11.5	17.5	1.94
A10	6	11.5	17.5	2.52
A11	6	11.5	17.5	1.37
A12	6	11.5	17.5	2.24

	Ground			T
	Level			Odour unit
ASR	(mPD)	mAG	mPD	(5s)
A1	6	16.5	22.5	2.78
A2	6	16.5	22.5	4.35
A3	6	16.5	22.5	2.58
A4	6	16.5	22.5	2.34
A5	6	16.5	22.5	1.78
A6	6	16.5	22.5	1.95
A7	6	16.5	22.5	1.75
A8	6	16.5	22.5	1.50
A9	6	16.5	22.5	1.56
A10	6	16.5	22.5	1.68
A11	6	16.5	22.5	2.36
A12	6	16.5	22.5	2.22
A1	6	21.5	27.5	1.74
A2	6	21.5	27.5	1.72
A3	6	21.5	27.5	2.08
A4	6	21.5	27.5	1.89
A5	6	21.5	27.5	1.94
A6	6	21.5	27.5	2.01
A7	6	21.5	27.5	1.68
A8	6	21.5	27.5	1.42
A9	6	21.5	27.5	1.66
A10	6	21.5	27.5	1.76
A11	6	21.5	27.5	2.00
A12	6	21.5	27.5	2.13
A1	6	26.5	32.5	0.67
A2	6	26.5	32.5	0.34
A3	6	26.5	32.5	1.56
A4	6	26.5	32.5	1.42
A5	6	26.5	32.5	1.20
A6	6	26.5	32.5	1.01
A7	6	26.5	32.5	0.79
A8	6	26.5	32.5	0.67
A9	6	26.5	32.5	0.89
A10	6	26.5	32.5	0.99
A11	6	26.5	32.5	0.89
A12	6	26.5	32.5	1.44

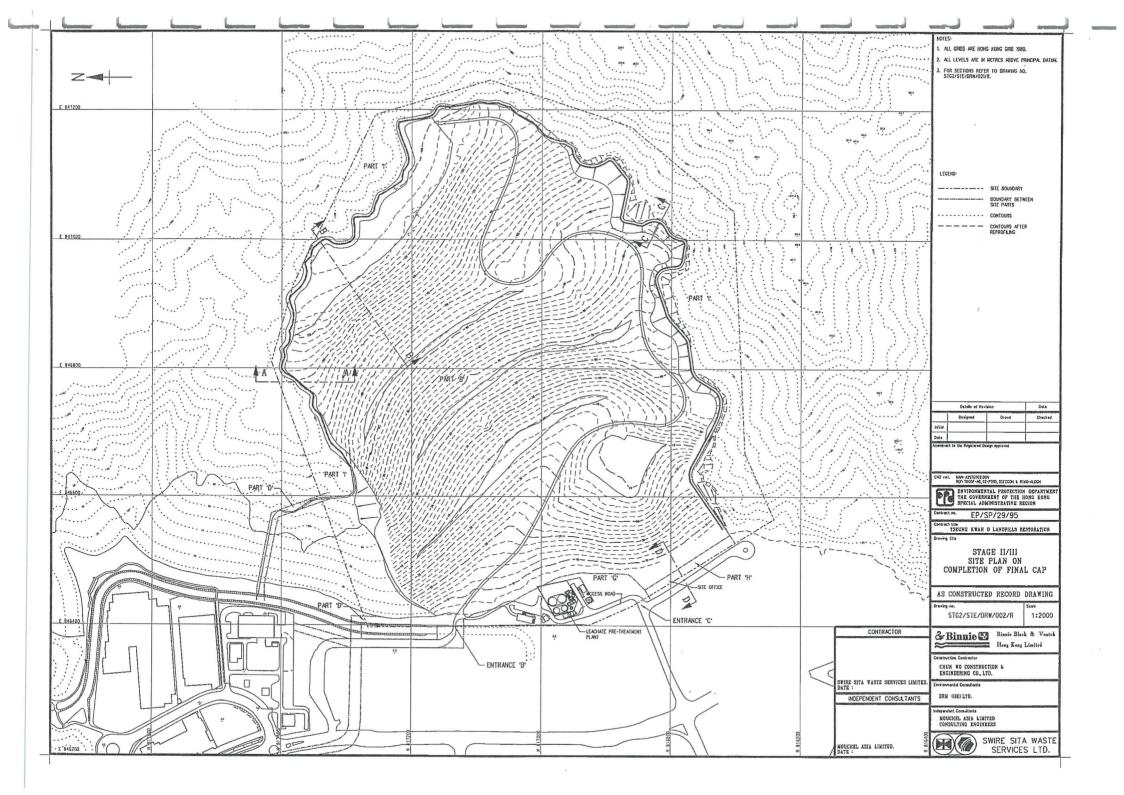
	Ground Level			Odour unit
ASR	(mPD)	mAG	mPD	Odour unit (5s)
A1	6	31.5	37.5	0.16
A2	6	31.5	37.5	0.10
A3	6	31.5	37.5	0.02
A4	6	31.5	37.5	0.72
A5	6	31.5	37.5	0.68
A6	6	31.5	37.5	0.46
A7	6	31.5	37.5	0.37
A8	6	31.5	37.5	0.27
A9	6	31.5	37.5	0.33
A10	6	31.5	37.5	0.33
A11	6	31.5	37.5	0.37
A12	6		37.5	0.40
A12	6	31.5 36.5		
A2	6		42.5	0.02
A3	6	36.5 36.5	42.5 42.5	0.00
				0.18
A4	6	36.5	42.5	0.26
A5	6	36.5	42.5	0.26
A6	6	36.5	42.5	0.27
A7	6	36.5	42.5	0.17
A8	6	36.5	42.5	0.24
A9	6	36.5	42.5	0.21
A10	6	36.5	42.5	0.12
A11	6	36.5	42.5	0.18
A12	6	36.5	42.5	0.09
A1	6	41.5	47.5	0.00
A2	6	41.5	47.5	0.00
A3	6	41.5	47.5	0.06
A4	6	41.5	47.5	0.16
A5	6	41.5	47.5	0.13
A6	6	41.5	47.5	0.12
A7	6	41.5	47.5	0.09
A8	6	41.5	47.5	0.15
A9	6	41.5	47.5	0.12
A10	6	41.5	47.5	0.06
A11	6	41.5	47.5	0.07
A12	6	41.5	47.5	0.02

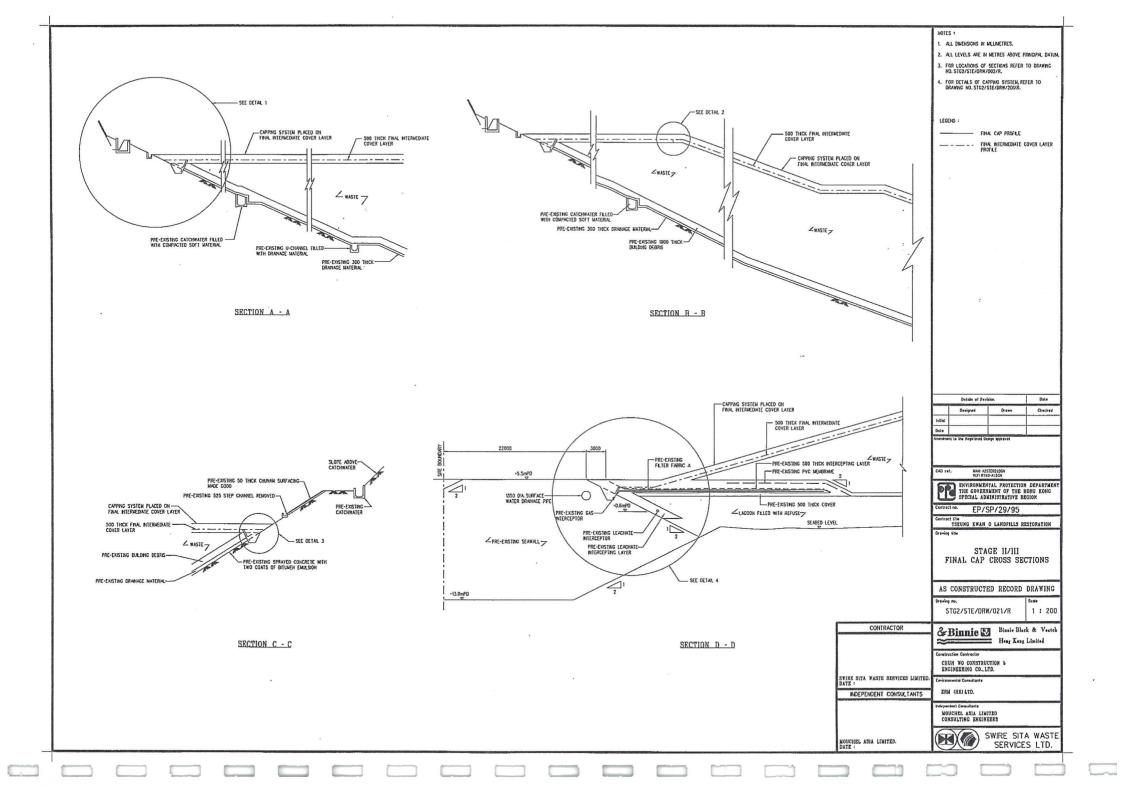
	T 0			
	Ground			
	Level			Odour unit
ASR	(mPD)	mAG	mPD	(5s)
A1	6	46.5	52.5	0.00
A2	6	46.5	52.5	0.00
A3	6	46.5	52.5	0.02
A4	6	46.5	52.5	0.08
A5	6	46.5	52.5	0.05
A6	6	46.5	52.5	0.05
A7	6	46.5	52.5	0.04
A8	6	46.5	52.5	0.08
A9	6	46.5	52.5	0.06
A10	6	46.5	52.5	0.03
A11	6	46.5	52.5	0.02
A12	6	46.5	52.5	0.00
A1	6	51.5	57.5	0.00
A2	6	51.5	57.5	0.00
A3	6	51.5	57.5	0.00
A4	6	51.5	57.5	0.04
A5	6	51.5	57.5	0.02
A6	6	51.5	57.5	0.01
A7	6	51.5	57.5	0.02
A8	6	51.5	57.5	0.04
A9	6	51.5	57.5	0.03
A10	6	51.5	57.5	0.02
A11	6	51.5	57.5	0.00
A12	6	51.5	57.5	0.00
A1	6	55.5	61.5	0.00
A2	6	55.5	61.5	0.00
A3	6	55.5	61.5	0.00
A4	6	55.5	61.5	0.02
A5	6	55.5	61.5	0.01
A6	6	55.5	61.5	0.00
A7	6	55.5	61.5	0.01
A8	6	55.5	61.5	0.02
A9	6	55.5	61.5	0.01
A10	6	55.5	61.5	0.01
A11	6	55.5	61.5	0.00
A12	6	55.5	61.5	0.00
		Maximum	Odour Unit	7.09

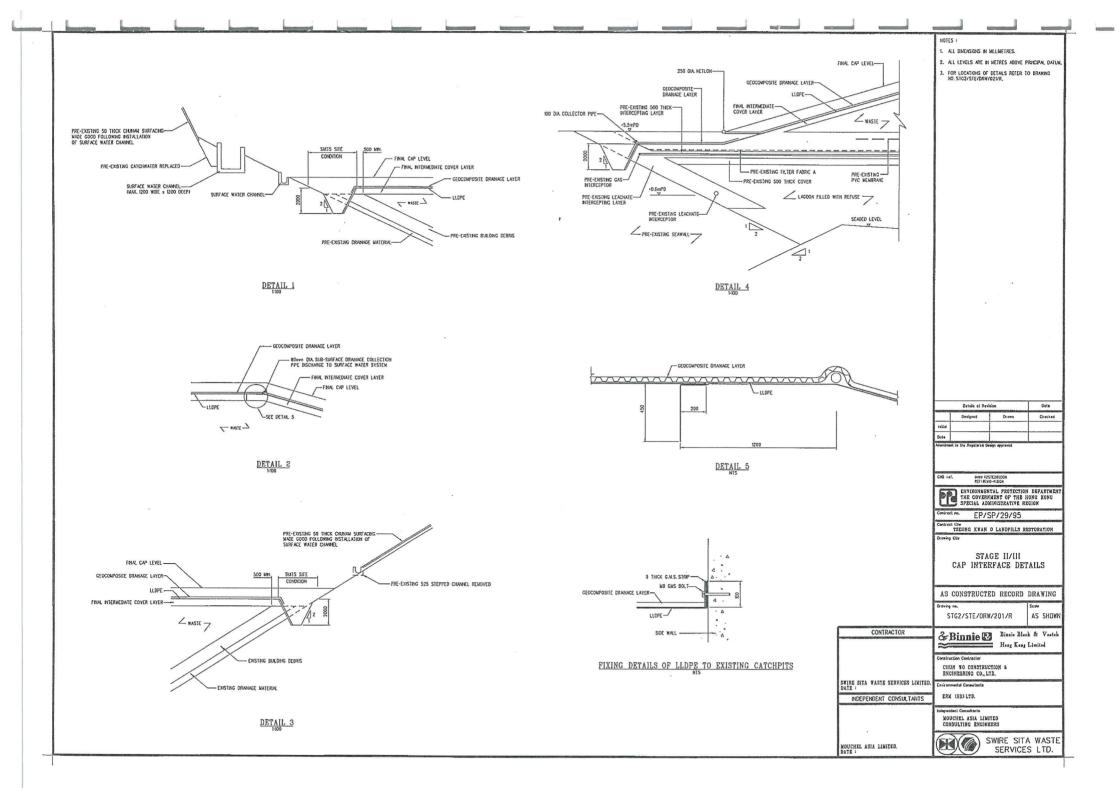




Appendix C:
Tseung Kwan O Landfills Restoration
Stage II/III Final
Cap Site Plan







Appendix D: Landfill Gas Monitoring Data at Tseung Kwan O Stage II/III Landfill

TKO Stage II/III Landfill Migration Gas Wells Monitoring Data - 2/DG1

Date	CO <sub>2</sub>	Methane	O <sub>2</sub>		
Date	(%)	(%)	(%)		
4-Jan-12	3.0	0.0	17.7		
7-Feb-12	3.0	0.0	17.3		
13-Mar-12	0.0	0.0	20.2		
13-Apr-12	0.0	0.0	19.9		
9-May-12	0.4	0.0	19.4		
14-Jun-12	0.7	0.0	18.9		
6-Jul-12	2.4	0.0	17.1		
15-Aug-12	0.0	0.0	20.0		
24-Sep-12	0.5	0.0	19.6		
3-Oct-12	0.5	0.0	20.1		
21-Nov-12	0.5	0.0	19.7		
17-Dec-12	0.0	0.0	20.4		
10-Jan-13	0.5	0.0	20.0		
6-Feb-13	6-Feb-13 0.0		20.5		
5-Mar-13	0.1	0.0	20.2		
5-Apr-13	0.0	0.0	20.2		
14-May-13	2.0	0.0	16.1		
7-Jun-13	1.1	0.0	18.7		
5-Jul-13	0.2	0.0	20.0		
9-Aug-13	0.0	0.0	20.0		
18-Sep-13	0.0	0.0	20.1		
16-Oct-13	0.8	0.0	19.3		
9-Nov-13	0.7	0.0	19.5		
19-Dec-13	0.4	0.0	20.1		

TKO Stage II/III Landfill Migration Gas Wells Monitoring Data - 2/DG3

Date	CO <sub>2</sub>	Methane	O <sub>2</sub>		
Date	(%)	(%)	(%)		
6-Jan-12	0.4	0.0	20.6		
22-Feb-12	1.1	0.0	19.2		
13-Mar-12	4.5	0.0	14.5		
13-Apr-12	0.7	0.0	19.1		
22-May-12	0.5	0.0	20.0		
14-Jun-12	1.4	0.0	18.3		
6-Jul-12	0.7	0.0	19.3		
7-Aug-12	0.3	0.0	19.5		
21-Sep-12	5.0	0.0	15.1		
3-Oct-12	2.7	0.0	18.7		
20-Nov-12	0.3	0.0	20.5		
18-Dec-12	4.5	0.0	15.8		
24-Jan-13	24-Jan-13 0.3		20.4		
8-Feb-13	1.2	0.0	18.9		
18-Mar-13	0.3	0.0	19.8		
5-Apr-13	0.9	0.0	19.0		
23-May-13	0.8	0.0	19.8		
7-Jun-13	0.9	0.0	19.1		
5-Jul-13	0.5	0.0	19.7		
5-Aug-13	0.3	0.0	19.9		
26-Sep-13	0.2	0.0	19.8		
10-Oct-13	1.3	0.0	19.1		
7-Nov-13	0.2	0.0	20.2		
21-Dec-13	3.5	0.0	15.8		

#### TKO Stage II/III Landfill Migration Gas Wells Monitoring Data - 2/DG2

Date	CO <sub>2</sub>	Methane	O <sub>2</sub>		
Date	(%)	(%)	(%)		
6-Jan-12	1.3	0.0	19.6		
22-Feb-12	2.8	0.0	17.0		
9-Mar-12	2.9	0.0	16.7		
13-Apr-12	0.4	0.0	19.3		
10-May-12	0.7	0.0	19.8		
14-Jun-12	3.9	0.0	16.5		
11-Jul-12	0.0	0.0	20.2		
7-Aug-12	0.2	0.0	19.7		
24-Sep-12	4.4	0.0	17.5		
3-Oct-12	1.0	0.0	19.7		
20-Nov-12	0.2	0.0	20.5		
18-Dec-12	2.8	0.0	18.0		
24-Jan-13	0.4	0.0	20.4		
8-Feb-13	0.6	0.0	19.7		
5-Mar-13	0.1	0.0	20.3		
5-Apr-13	2.4	0.0	17.3		
14-May-13	1.5	0.0	18.2		
7-Jun-13	1.8	0.0	18.4		
5-Jul-13	2.5	0.0	18.5		
5-Aug-13	0.1	0.0	20.3		
5-Sep-13	1.7	0.0	18.5		
10-Oct-13	3.9	0.0	17.2		
7-Nov-13	0.1	0.0	20.3		
21-Dec-13	1.2	0.0	18.0		

Appendix E: Example of the Gas Detector



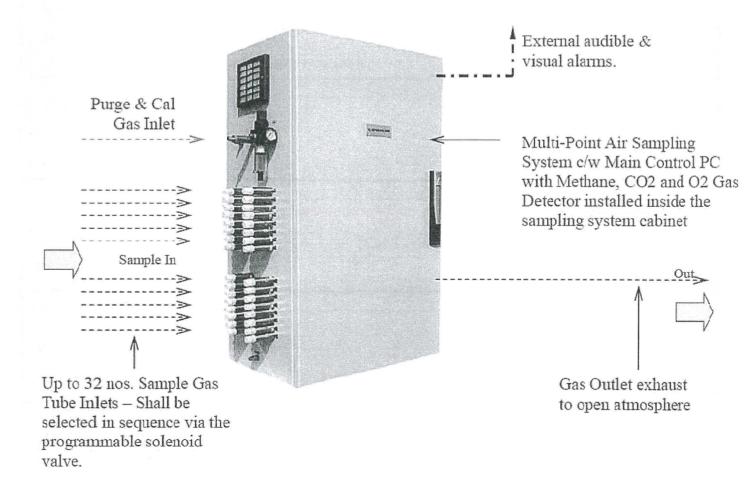
# The Crowcon Landfill Gas Monitoring System Proposed Residential Development Project At N.K.I.L. 6350 Ngau Chi Wan

# (1) Crowcon PGSi – Landfill Gas Monitoring System

Crowcon PGSi – Landfill Gas Monitoring System is a programmable air gas sample system designed for Landfill Gas Monitoring including Methane, Carbon Dioxide and Oxygen levels within air samples taken from remote points. The PGSi Programmable Sampling System is a microprocessor-controlled system for monitoring gas concentrations from up to 32 remote points by means of sample draw techniques. The system utilises a Windows XP based PC which controls all sampling and alarming functions including pump operation, sampling sequence, and alarm relay drives. The operating PC is factory fitted by Crowcon.

The system is supplied complete with all necessary sample-conditioning components, such as particulate filters and water barriers, to ensure a consistently clean and dry sample at the detectors.

# (2) Overview of Landfill Gas Monitoring System





### (3) Summary of The Protected Areas

**Protected Areas:** 

Basement 3/F = 25nos.

Basement 2/F = 24nos.

Basement 1/F = 25nos.

otal = 74nos.

Location of

**Control Panel:** 

1/F Caretaker Office

# (4) Layout of The Protected Areas and Detection Points

Proposed Residential Development Project At N.K.I.L. 6350 Ngau Chi Wan Schematic Diagram – PGSi – Multi Point Landfill Gas Air Sampling System

3 set of PGSi – Multi Point Landfill Gas Air Sampling System located at Caretaker Office 1/F Caretaker Office 25 x Individual 10mm HDPE Air Sample Tube shall 25 x Air Sampling Point / Protected Areas at Basement 1/F be run from PGSi Controller to the protected area Basement 1/F 24 x Air Sampling Point / 24 x Individual 10mm HDPE Air Sample Tube shall be run from PGSi Controller to the protected area Protected Areas at Basement 2/F Basement 2/F 25 x Air Sampling Point / 25 x Individual 10mm HDPE Air Sample Tube shall be run from PGSi Controller to the protected area Protected Areas at Basement 3/F Basement 3/F





# (5) System Configurations and Characteristics

#### (5.1) Equipment Summary

	Basement 3/F = 25nos. Protected Area	Basement 2/F = 24nos. Protected Area	Basement 1/F = 25nos. Protected Area
Total Number of Air Sampling Point - One for Each Protected Area	25nos.	24nos.	25nos.
Number of PGSi Air Sampling System Required	1 set	1 set	1 set
Sampling Frequency of the Air Sampling System	Continuous	Continuous	Continuous
Sampling Time for Each Sampling Point / Protected Area	60 seconds	60 seconds	60 seconds
Sampling Frequency for Each Sampling Point / Protected Area	30 minutes	28 minutes	30 minutes
Others Equipment	Portable	Landfill Gas Detector	- 1 sets

### (5.2) System Configuration and Type of Alarms

		Alarm	Туре		
	Measuring Range	1 <sup>st</sup> Gas Alarm Level	2 <sup>nd</sup> Gas Alarm Level		
Methane Detector	0 to 100% LEL (5% vv)	10% LEL (0.5% vv)	20% LEL (1.0% vv)		
CO2 Detector	0 to 2% vv	0.5% vv 1.5%			
Oxygen Detector	0 to 25% vv	19.0% vv	18.0% vv		
=		Pump Failure Alarm			
Air Sampling Pump	NA	Pump Failure Alarm signal shall be activated when either air sample line blockage or pump failure.			
		Flow Alarm			
Flow Across Sensors	NA	Flow Alarm signal sha flow across the senso			



#### (5.3) Gas Detection Alarms and Follow Up Procedures

#### For 1st Gas Alarm Level

When 1st alarm is detected (means 10% LEL methane, 0.5%vv CO2 or 19.0%vvO2 is reached):-

- Built in buzzer of the Crowcon PGSi Sampling System Control Unit shall be actuated automatically.
- Location of gas detector and gas concentration detected shall be displayed on the Crowcon PGSi Sampling System Control Unit.
- Staff inside the Management Office shall attend & verify the alarm by using a portable landfill gas detector.
- If gas concentration drops back to safe level, alarm shall be reset automatically and system shall be set back to normal accordingly. No manual reset at the Crowcon panel is required.

#### For 2<sup>nd</sup> Gas Alarm Level

When gas is continuously detected and reaches the 2<sup>nd</sup> alarm level (means 20% LEL methane, 1.5%vv CO2 or 18.0%vvO2 is reached):-

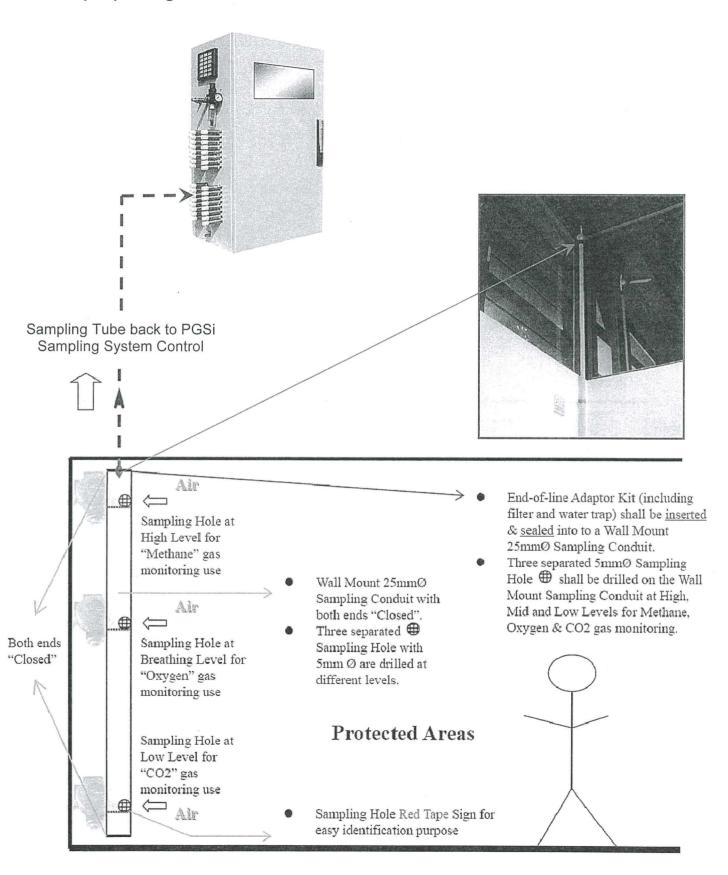
- Location of gas detector and gas concentration detected shall be displayed on the Crowcon PGSi Sampling System Control Unit.
- Staff inside the Management Office shall attend & verify the alarm by using a portable landfill gas detector.
- No unauthorized entrance to the alarmed premise will be allowed.
- If gas concentration drops back to safe level, alarm shall be reset automatically and system shall be set back to normal accordingly. No manual reset at the Crowcon panel is required.





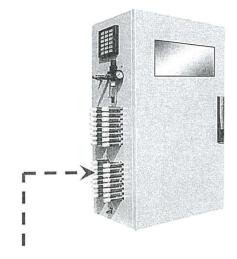
# (6) Design Installation of Air Sampling Pipe

## (6.1) Design Installation For E&M Rooms

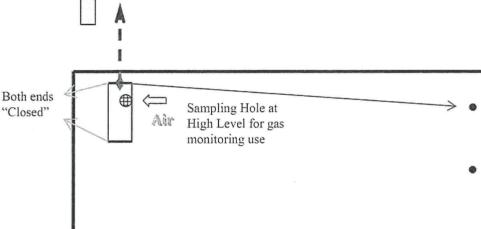




# (6.2) Design Installation For Car Parks and Lift Lobby Areas



Sampling Tube back to PGSi Sampling System Control



- End-of-line Adaptor Kit (including filter and water trap) shall be inserted & sealed into to a Wall Mount 25mmØ Sampling Conduit.
- A 5mmØ Sampling Hole ⊕ shall be drilled on the Wall Mount Sampling Conduit at High Levels for gas monitoring.



- For Car Park & Lift Lobby Areas





### (7) Annual Maintenance & Replacement of Spares

Maintenance & calibration service for landfill gas monitoring systems are required to be carried out at least every 12 months interval in order to ensure the systems work in good condition. Calibration Certificate shall be issued by the authorized party after completion of service for end user record. Some spares require to be replaced annually during the maintenance. Details are summarized below:-

Service / Spare Replacement	Shall be done / replaced
Annual Calibration Service	Every 12 months
Dust filters and water trap filter element	Every 12 months
Oxygen Sensor Element	Every 12 months
Methane Pellistor Sensor Element	Every 2 to 3 years *
Carbon Dioxide IR Sensor Element	Every 5 years *

<sup>\*</sup> Estimation only and is subject to final site service.



# (8) Major Job Reference List – Crowcon Landfill Gas Detection Systems in Hong Kong

- Laguna City
- Seneway Garden
- Nim Wan Leachate Treatment Plant / Station
- ASD Clean Water Bay Shing Tak School
- DSD Ting Kok Road Pumping Station
- CLP Tseung Kwan O Wan Po Road Substation
- CLP Tseung Kwan O Junk Bay Road Substation
- HSBC Tseung Kwan O Building
- ASD Lam Tin Park Toilet Block
- ASD Ngau Chi Wan & Wong Tai Sin Recreation Facilities
- CLP Castle Peak Cable Tunnel In Progress
- ASD Jordon Valley Park In Progress





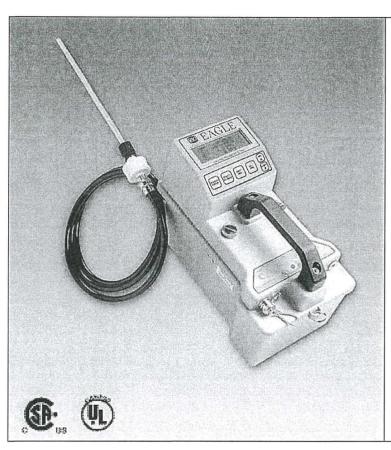
- (8) Data Sheet
- RKI Eagle Portable Landfill Gas Detector
- Crowcon PGSi Air Sampling System



# ONE TO SIX GAS PORTABLE MONITOR

Gas Detection For Life

**EAGLE™** Model



#### **Features**

- Simultaneous detection of up to 6 different gases
- Over 350 gas monitoring configurations
- · Wide range of toxic gases
- PPM / LEL hydrocarbon detection
- Powerful long-life pump up to 125' range with filters
- · Low flow pump shut off and alarm
- Methane elimination switch for environmental use
- · Security "Adjustment Lockout Switch"
- · Up to 30 hours of continuous operation
- Alkaline or Ni-Cad capability
- IR Sensors available for CO2, % LEL CH4 or HC, % volume CH4 or HC
- · Transformer testing version available
- Datalogging option
- Autocalibration
- · Dual hydrophobic filters (most versions)
- Ergonomic RFI / EMI / chemical / weather resistant enclosure
- Intrinsically safe design, CSA (C / US) & UL Classified (most versions)

RKI is proud to offer the most versatile portable gas detector on the market. Equipped with features that are not available on most competitive units, the EAGLE is a powerful instrument that does more than just offer the standard confined space protection for LEL, O2, H2S and CO. Detection combinations never before offered in a portable gas monitor are now available featuring the industry's widest selection of high quality, long life and field proven sensors.

Unique EAGLE features include PPM or LEL hydrocarbon detection at the push of a button; infrared sensors for CO2, methane or isobutane in LEL and % volume ranges; a methane elimination switch for environmental applications, a long list of super toxic gases and measurable ranges, and dual hydrophobic filters that increases its water resistant performance. The EAGLE has a strong internal pump with a low flow auto shut off and alarm, which can draw samples from up to 125 feet even with the dual hydrophobic filters in place. This allows for quick response and recovery from distant sampling locations. The EAGLE will continuously operate for over 30 hours on alkaline batteries or 18 hours on Ni-Cads. A variety of accessories are also available to help satisfy almost any application such as long sample hoses, special float probes for tank testing, datalogging, continuous operation adapters, remote alarms and strobes, and dilution fittings, just to name a few.

With its ergonomic design and large glove friendly buttons, the EAGLE offers easy access to controls such as autocalibration, alarm silence, demand zero, peak hold and a wide variety of other features. Each channel has two alarm levels plus TWA and STEL alarms for toxic channels. The two alarm levels are user adjustable and can be latching or self resetting. Rugged, reliable, easy to operate and maintain, the EAGLE is the solution for just about any portable gas monitoring situation.

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# **EAGLE™** Model

without damage. Ergonomically balanced with rugged top mounted handle.  10.5" L x 5.9" W x 7" H  5 lbs  Catalytic combustion, electrochemical cell, galvanic cell, and infrared.  2 years under normal conditions.  Powerful, long-life pump (over 6,000 hours) can draw samples over 125 feet. Flow rate approximately 2.0 SCFH.  4 x 20 LCD readout. Viewed through window in case top. Displays eadings & status of 4 channels simultaneously. Backlight, automatic	Hydrocarbons (CH Oxygen (O <sub>2</sub> ) Carbon Monoxide Hydrogen Sulfide Super Toxics Ammonia (NH <sub>3</sub> ) Arsine (AsH <sub>6</sub> )
Catalytic combustion, electrochemical cell, galvanic cell, and infrared.  2 years under normal conditions.  2 owerful, long-life pump (over 6,000 hours) can draw samples over 125 feet. Flow rate approximately 2.0 SCFH.  4 x 20 LCD readout. Viewed through window in case top. Displays eadings & status of 4 channels simultaneously. Backlight, automatic	Carbon Monoxide Hydrogen Sulfide Super Toxics Ammonia (NH <sub>3</sub> ) Arsine (AsH <sub>6</sub> )
Catalytic combustion, electrochemical cell, galvanic cell, and infrared.  2 years under normal conditions.  Powerful, long-life pump (over 6,000 hours) can draw samples over 125 feet. Flow rate approximately 2.0 SCFH.  4 x 20 LCD readout. Viewed through window in case top. Displays eadings & status of 4 channels simultaneously. Backlight, automatic	Hydrogen Sulfide  Super Toxics  Ammonia (NH <sub>3</sub> )  Arsine (AsH <sub>2</sub> )
2 years under normal conditions.  Powerful, long-life pump (over 6,000 hours) can draw samples over 125 feet. Flow rate approximately 2.0 SCFH.  4 x 20 LCD readout. Viewed through window in case top. Displays eadings & status of 4 channels simultaneously. Backlight, automatic	Super Toxics Ammonia (NH <sub>3</sub> )  Arsine (AsH <sub>2</sub> )
2 years under normal conditions.  Powerful, long-life pump (over 6,000 hours) can draw samples over 125 feet. Flow rate approximately 2.0 SCFH.  4 x 20 LCD readout. Viewed through window in case top. Displays eadings & status of 4 channels simultaneously. Backlight, automatic	Ammonia (NH <sub>3</sub> )  Arsine (AsH <sub>2</sub> )
Powerful, long-life pump (over 6,000 hours) can draw samples over 125 feet. Flow rate approximately 2.0 SCFH.  4 x 20 LCD readout. Viewed through window in case top. Displays eadings & status of 4 channels simultaneously. Backlight, automatic	Arsine (AsH <sub>a</sub> )
25 feet. Flow rate approximately 2.0 SCFH.  4 x 20 LCD readout. Viewed through window in case top. Displays eadings & status of 4 channels simultaneously. Backlight, automatic	Arsine (AsH <sub>3</sub> )
eadings & status of 4 channels simultaneously. Backlight, automatic	
or alarms and by demand with adjustable time.	
2 alarms per channel plus TWA and STEL alarms for toxics. The two	
alarms are fully adjustable for levels, latching or self reset and silenceable.	Chlorine Dioxide (
Buzzer 85 dB at 30 cm, dual high intensity LEDs, and flashing display.	Fluorine (F <sub>2</sub> )
S external glove friendly push buttons for operation, demand zero, and	Hydrogen Fluoride
autocalibration. Buttons also access LEL / ppm, alarm silence, peak	Hydrogen Chlorid
loid, TWA751EL values, battery status and many other features.	Hydrogen Cyanide
80 hours minimum using alkaline batteries, or 18 hours using Ni-Cads.	Hydrogen Sulfide
alkaline or Ni-Cad, size D batteries. Charger has alkaline recognition o prevent battery damage if charging is attempted with alkalines.	Methane (CH <sub>4</sub> ) (IR Sensor)
10°C to 40°C (14°F to 104°F), 0 to 95% RH, non-condensing.	Isobutane (C <sub>4</sub> H <sub>10</sub> ) (IR Sensor)
Maximum variance +/- 5% of full scale.	Nitrogen Dioxide (
10 cocondo to 000/ (for most moses) using standard 5 th hose	Nitric Oxide (NO)
to seconds to 90% (for most gases) using standard 5 ft nose.	Ozone (O <sub>3</sub> )
ntrinsically Safe, Class I, Division 1, Groups A, B, C and D.	Phosphine (PH <sub>3</sub> )
	Silane (SiH <sub>4</sub> )
nternal hydrophobic filter (most versions) (certain toxic versions) equipped with special probe, inlet fitting and 3' teflon hose. For HF and	Sulfur Dioxide (SC
03 versions, 3' teflon hose used without probe).	The EAGLE can be sensors including a
Datalogging of up to 4 gases (No datalogging possible on 5 or 6 gas versions or versions with more than 2 toxic sensors) Remote alarms Dilution fitting (50/50) Ni-Cad batteries Battery charger, 115 VAC, 220 VAC, or 12 VDC Continuous operation adapter, 115 VAC or 12 VDC	from the above list.  Specia  Low flow alarm sl damage to instrur Hydrophobic filter Internal hydrophob Single gas calibra
3 1 2 3	old, TWA / STEL values, battery status and many other features.  O hours minimum using alkaline batteries, or 18 hours using Ni-Cads.  alkaline or Ni-Cad, size D batteries. Charger has alkaline recognition or prevent battery damage if charging is attempted with alkalines.  10°C to 40°C (14°F to 104°F), 0 to 95% RH, non-condensing.  faximum variance +/- 5% of full scale.  O seconds to 90% (for most gases) using standard 5 ft hose.  Atrinsically Safe, Class I, Division 1, Groups A, B, C and D.  SA (C / US) & UL Classified (most versions).  Houlder strap, alkaline batteries, hydrophobic probe and 5 foot hose, nternal hydrophobic filter (most versions) (certain toxic versions quipped with special probe, inlet fitting and 3' teflon hose. For HF and 3' versions, 3' teflon hose used without probe).  Datalogging of up to 4 gases (No datalogging possible on 5 or 6 gas versions or versions with more than 2 toxic sensors)  Remote alarms  Dilution fitting (50/50)  Ni-Cad batteries  Battery charger, 115 VAC, 220 VAC, or 12 VDC

Gases & Detectal	ole Ranges
Standard Confined S	pace Gases
Hydrocarbons (CH <sub>4</sub> , std)	0 - 100% LEL 0 - 50,000 ppm
Oxygen (O <sub>2</sub> )	0 - 40% Vol.
Carbon Monoxide (CO)	0 - 500 ppm
Hydrogen Sulfide (H <sub>2</sub> S)	0 - 100 ppm
Super Toxics and O	ther Gases
Ammonia (NH <sub>3</sub> )	0 - 75 ppm
Arsine (AsH <sub>3</sub> )	0 - 1 ppm 0 - 200 ppb
Carbon Dioxide (CO <sub>2</sub> ) (I R Sensor)	0 - 5,000 ppm 0 - 10,000 ppm 0 - 5% Vol. 0 - 20% Vol. 0 - 60% Vol.
Chlorine (Cl <sub>2</sub> )	0 - 3 ppm
Chlorine Dioxide (CIO <sub>2</sub> )	0 - 1 ppm
Fluorine (F <sub>2</sub> )	0 - 5 ppm
Hydrogen Fluoride (HF)	0 - 9 ppm
Hydrogen Chloride (HCI)	0 - 15 ppm
Hydrogen Cyanide (HCN)	0 - 30 ppm
Hydrogen Sulfide (H <sub>2</sub> S)	0 - 1 ppm 0 - 30 ppm
Methane (CH <sub>4</sub> ) (IR Sensor)	0 - 100% LEL 0 - 100% Vol.
Isobutane (C <sub>4</sub> H <sub>10</sub> ) (IR Sensor)	0 - 100% LEL 0 - 30% Vol.
Nitrogen Dioxide (NO <sub>2</sub> )	0 - 15 ppm
Nitric Oxide (NO)	0 - 100 ppm
Ozone (O <sub>3</sub> )	0 - 1 ppm
Phosphine (PH <sub>3</sub> )	0 - 1 ppm
Silane (SiH <sub>4</sub> )	0 - 15 ppm
Sulfur Dioxide (SO <sub>2</sub> )	0 - 10 ppm 0 - 30 ppm

e configured with up to 6 gas a maximum of 2 super toxics t.

#### ial Features

- shuts pump off to avoid ument.
- er disc in probe.
- nobic filter (most versions).
- ration capability.
- ation switch for environmental applications.
- Security "Adjustment Lockout Switch".
- Confirmation beep (silenceable).
- Meets EPA Method 21 protocol for fugitive emissions testing (most applications).

ecifications subject to change without notice.



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· Large internal hydrophobic filter

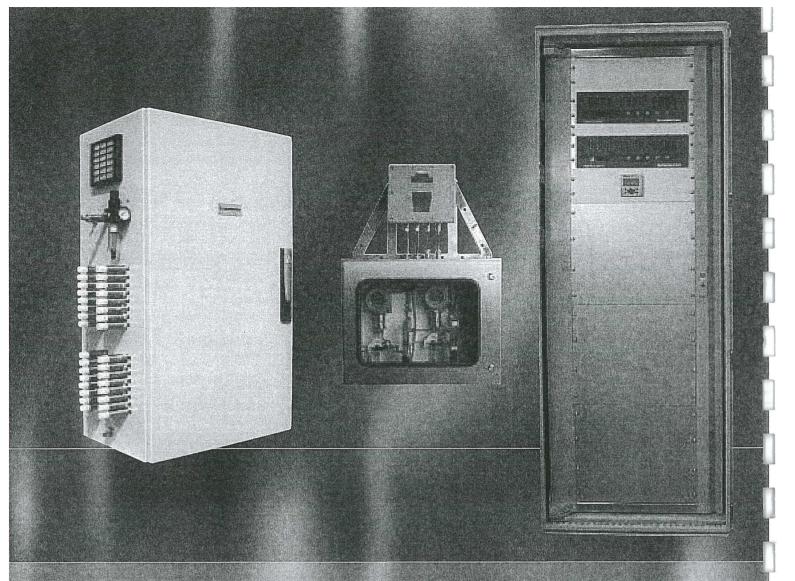
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Gas detection and monitoring systems

# Sampling Systems

Single Point Sample System

Multi Point Sample System

PGSi Programmable Sample System

Air Aspirated Sample System

Mill-Gard CO Detection System



# Sampling Systems

Sampling systems provide the ideal solution for permanently monitoring toxic and/or flammable gases in environments where fixed-point detectors may prove impractical. Typical applications include:

- · Landfill Borehole Monitoring
- Gas Monitoring in Biogas Pipelines
- Flammable Gas Detection in Printing and Painting Processes
- · Coal Mill Fire Detection

- . Building Protection
- · Coal-Gas Monitoring
- CO<sub>2</sub> monitoring in Breweries/Distilleries
- Gas Turbine Protection
- . CO Detection in Car Parks and Tunnels

All systems are designed to minimise purchase, installation, operating and maintenance costs:

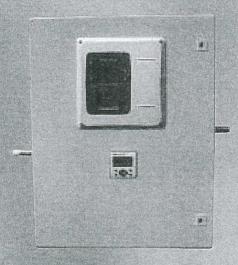
- · Low purchase cost: multiple points can be monitored using one gas sensor
- Low installation cost: sample pipes are inexpensive to buy and easy to install
- · Low cost of ownership: minimal number of gas sensors to be maintained
- Self-cleaning operation: all systems contain dust/water filters, with auto-drain function on most models

# Single Point Sample System

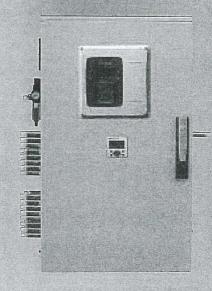
The single point system is designed to monitor gas samples from pipelines or processes. A powerful high-flow pump extracts and transports gas samples to the system where they are conditioned to remove dust and moisture. The conditioned sample gas is then passed across one and four gas sensors before being either exhausted to atmosphere or returned to the supply pipe/process.

System integrity is maintained at all times using flow-fail monitoring devices, sample line flame arrestors and an internal flammable gas detector which shuts the system down in the event of a gas leak within the system cabinet. The system is controlled by a programmable timer which sequences sample and purge/drain cycles. The current operating mode is clearly displayed and sample/purge times are fully adjustable.

The gas sensors are monitored by a Gasmaster control panel which provides gas level display, alarm and fault indication, relay outputs and 4-20mA outputs for each sensor plus RS-485 Modbus communications. Alternatively the system can be supplied without the Gasmaster and provide a 4-20mA signal from each sensor plus a system fault contact.



# Multi Point Sample System



The multi-point system uses the same sampling arrangement as the single point system, but can monitor up to 16 separate sample lines on a sequential basis. The multi-point system provides a cost effective and low maintenance solution for monitoring gas hazards in buildings, pumping stations, storage areas etc.

Each sample line is monitored for one minute on a sequential basis, and the samples are passed across one to four gas sensors. Filters, flow-fail devices, internal gas leak detectors and flame arrestors are fitted to ensure safe and reliable operation at all times. Sample and purge times are fully adjustable, and a specific sample line can be selected and held at any time using buttons mounted on the front panel.

The gas sensors are monitored by a Gasmaster control panel which provides gas level display, alarm and fault indication, relay outputs and 4-20mA outputs for each sensor plus RS-485 Modbus communications. Alternatively the system can be supplied without the Gasmaster and provide a 4-20mA signal from each sensor plus a system fault contact.

# Ampling Systems

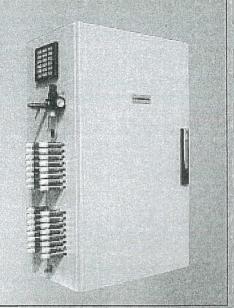
# PGSi Programmable Sample System

The PGSi is a highly versatile system that can monitor up to 32 separate sample lines on a sequential basis. Operating from Windows XP™ based software, the PGSi system is the ideal solution for monitoring landfill gas in boreholes, or for protecting buildings such as retail parks, hospitals and schools built on landfill sites. The system can be adapted to meet virtually any building or personnel protection needs.

The sample times for each point are individually adjustable, and can be sequenced in any order. A dual-pump arrangement ensures that samples are presented to the gas sensors as quickly as possible.

Filters, flow-fail devices, internal gas leak detectors and flame arrestors are fitted to ensure safe and reliable operation at all times.

The system is controlled by an industrial PC, which displays individual sample locations and gas levels, alarms, operates up to 16 relays and provides comprehensive datalogging facilities. Gas data can be displayed in tabular or graphical format. The system PC can be interrogated remotely via an optional modem to check status and upload datalog files. The system can be supplied complete with a PC fitted, or can operate from a PC supplied by the user.



# Air Aspirated Sample System



Designed for use in Zone 1 or Zone 2 hazardous areas, the air aspirated system uses a compressed air driven vacuum generator to draw a gas sample from a single point. Explosion-proof gas detectors are fitted to monitor for flammable gases, toxic gases or oxygen. Each detector provides a 4-20mA output. An intrinsically safe flow-fail device warns if the sample flow is lost due to supply air failure or sample line blockage.

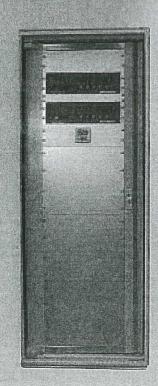
The system is ideally suited for monitoring flammable gas leaks within turbine enclosures, solvent detection in painting or printing processes or monitoring oxygen levels in industrial processes.

# Mill-Gard CO Detection System

The Mill-Gard CO detection system provides early warning of a fire within coal pulversizers and silo's. Designed specifically for use in coal-fired power stations, the system uses powerful pumps to extract air samples from the coal mill via hardened sample probes. The air samples are conditioned and passed over industrial grade C.O. (carbon monoxide) sensors to quickly detect an increase in C.O. gas levels. Any increase in C.O. levels provides an early indication of the onset of fire.

#### Key features:

- Can monitor 1 to 15 separate mill sampling probes
- · High flow pumps provide fast response
- Conditions the mill samples to remove coal dust and contaminants
- · Adjustable sample and purge times
- Sample line back-purge facility
- · Gas level display for all sample points
- 3 adjustable levels of alarm
- · Can be fitted with up to 24 programmable relays
- · Dual sensor option
- RS-485 Modbus communications
- · Can be tailored to suit any application



# Sampling Systems



#### Specifications

Model	Single Point	Multi-Point	PGSi	Air Aspirator	Mill-Gard	
Sample lines	1	1-16	1-32	1 or 2	1-15	
Gas sensors	1-4	1-4	1-4	1 per sample line	1 per sample line	
Dimensions (excluding pipe fittings)	760 x 600 x 350mm (30 x 23.5 x 14 inches)	1000 x 600 x 400mm (39.3 x 23.5 x 16 inches)	1000 x 600 x 400mm (39.3 x 23.5 x 16 inches)	1010 x 712 x 285mm (40 x 28 x 11 inches)	2100 x 800* x 800mm (83 x 31.5 x 31.5 inches) *1600mm for 5-15 point systems	
Ingress protection	Indoor use only	Indoor use only	Indoor use only	IP65	Indoor use only	
Sample Pipe Specification	10mm o/d, 8mm i/d (1/2" o/d optional) HDPE or PTFE	10mm o/d, 8mm i/d (1/2" o/d optional) HDPE or PTFE	10mm o/d, 8mm i/d (1/2" o/d optional) HDPE or PTFE	6mm o/d, 4mm i/d (1/4" o/d optional) Stainless Steel	10mm o/d, 8mm i/d (1/2" o/d optional) Stainless Steel	
Max. line length	1Km (0.62 mile)	1Km (0.62 mile)	1Km (0.62 mile)	100m (110yds)	1Km (0.62 mile)	
Sensor type	Electrochemical, Pellistor, IR, TC	Electrochemical, Pellistor, IR, TC	Electrochemical, Pellistor, IR, TC	Electrochemical, Pellistor	Electrochemical	
System operating temperature	0 to +35°C (32 to 95°F)	Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor (11976)  Indoor (100m  Indoor (100m  Indoor use only  Indoor use only  Indoor use only  Indoor use only  Indoor (100m  Indoor (100m  Indoor (100m  Indoor (100m  Indoor (100m  Indoor (100m  Indoor use only  Indoor use only  Indoor (100m  Indoor (100m  Indoor (100m  Indoor (100m  Indoor (100m  Indoor (110yds)  Indoor (110yds)  Indoor (110yds)  Indoor (110yds)  Indoor (110yds)  Indoor (110yds)  Indoor (110yds)  Indoor (110yds)  Indoor (110yds)  Indoor (110yds)  Indoor (110yds)  Indoor (110yds)  Indoor (110yds)  Indoor (110yds)  Indoor (110yds)  Indoor (110yds)  Indoor (110y		0 to +35°C (32 to 95°F)		
Sampling performance	Suitable for sampling from -600mbar(g) to +250mbar(g)	-600mbar(g) to	-600mbar(g)	-350mbar(g) to	Suitable for sampling from -600mbar(g) to +250mbar(g)	
Operating Voltage	110V or 230Vac	110V or 230Vac	110V or 230Vac	24Vdc to sensors	110V or 230Vac	
Outputs	System only: 4-20mA for each sensor plus a fault contact With Gasmaster control system: High and Low alarm relays per sensor, Fault relay, 4-20mA per sensor plus RS-485 Modbus communications. Relays rated 8A 250Vac	each sensor plus a fault contact With Gasmaster control system: High and Low alarm relays per sensor, Fault relay, 4-20mA per sensor plus RS-485 Modbus communications.	at 5A 250Vac. Can be set for any alarm level from any sensor or sample line. Fault relay also provided. Unit can be interrogated	<ul> <li>Statistical substitution of the state of the</li></ul>	8-32 SPCO Relays rated at 5A 250Vac. Can be set for any alarm level from any sensor. Fault relay also provided. RS-485 Modbus communications. Remote display/datalogging software available.	
Display	LCD for pneumatic functions. Optional Gasmaster shows gas levels, alarms and sensor status via a large LCD display.	functions. Optional Gasmaster	levels in tabular or graphical format, alarms,	fitted; LCD gas level	LCD for pneumatic functions. LED display for gas levels, alarms and faults. Comprehensive remote display software available with site mimic option.	
ensor options H2, CH4 & HC's: 0-100%LE CO: 0-100, 250, 500 or 1000 CO2: 0-3, 5, 10, 30 or 100%		0ppm 6 vol. *, 1000*ppm (*high range H29	S at additional cost)	H2, CH4 & HC's: 0-100%LEL CO: 0-100, 250, 500 or 1000ppm H2S: 0-10, 25, 50ppm O2: 0-25% vol.	CO: 0-100, 250, 500 or 1000ppm	
Approvals	Safe area use only	Safe area use only	Safe area use only	Certified for use in Zone 1 or Zone 2 hazardous areas	Safe area use only	

Note: systems can be engineered to suit virtually any application. Crowcon require that a Sample System Questionnaire is completed prior quotation to ensure the specified system meets site requirements. Contact Crowcon for details.

Accessories

Borehole probe: End of line filter for wet or dusty environments

Cooling Coil: To reduce sample gas temperature from hot processes

10mm HDPE Sample tube: Available by the metre

HALMA GROUP COMPANY

P07012 Issue 3 05/06

Appendix F: Detailed Sewerage Impact Assessment Calculations

#### Table 1 Calculation for Sewage Generation Rate of the Proposed Conversion

Proposed Development		Remarks
1. Office at 8/F		
1a. Assumed used Area	=	4700 m <sup>2</sup>
1b. Assumed floor area per employee	=	25 m <sup>2</sup> per employee
1c. Total number of employees	=	188 employees
1d. Design flow for commercial employee and activities	=	80 litre/employee/day (refer to Table T-2 of GESF)
1e. Sewage Generation rate	=	$15.0 \text{ m}^3/\text{day}$
Total Flow (S1)		
Flow Rate	=	$15.0 \text{ m}^3/\text{day}$
Population	=	188 persons
Peaking factor	=	8 Refer to Table T-5 of GESF for population <1,000 including stormwater allowance
Peak Flow	= _	1.4 litre/sec

Table 2 Hydraulic Capacity at Existing Sewers at Wan Po Road

Segment	Manhole	Manhole	Pipe Dia.	Pipe Length	Invert Level 1	Invert Level 2	g	$k_s$	S	v	V	Area	Q	Estimated Capacity
Segment	Reference	Reference	mm	m	mPD	mPD	m/s <sup>2</sup>	m		m <sup>2</sup> /s	m/s	m <sup>2</sup>	m <sup>3</sup> /s	L/s
S1-S2	FMH4035446	FMH4035447	1650	49.4	-2.46	-2.51	9.81	0.006	0.001	0.000001	1.09	2.14	2.33	2325
S2-S3	FMH4035447	FMH4035593	1650	54.0	-2.51	-2.52	9.81	0.006	0.000	0.000001	0.46	2.14	0.99	993

Remarks: (1) g=gravitational acceleration; k<sub>s</sub>=equivalent sand roughness; s=gradient; v=kinematic viscosity of water; V=mean velocity

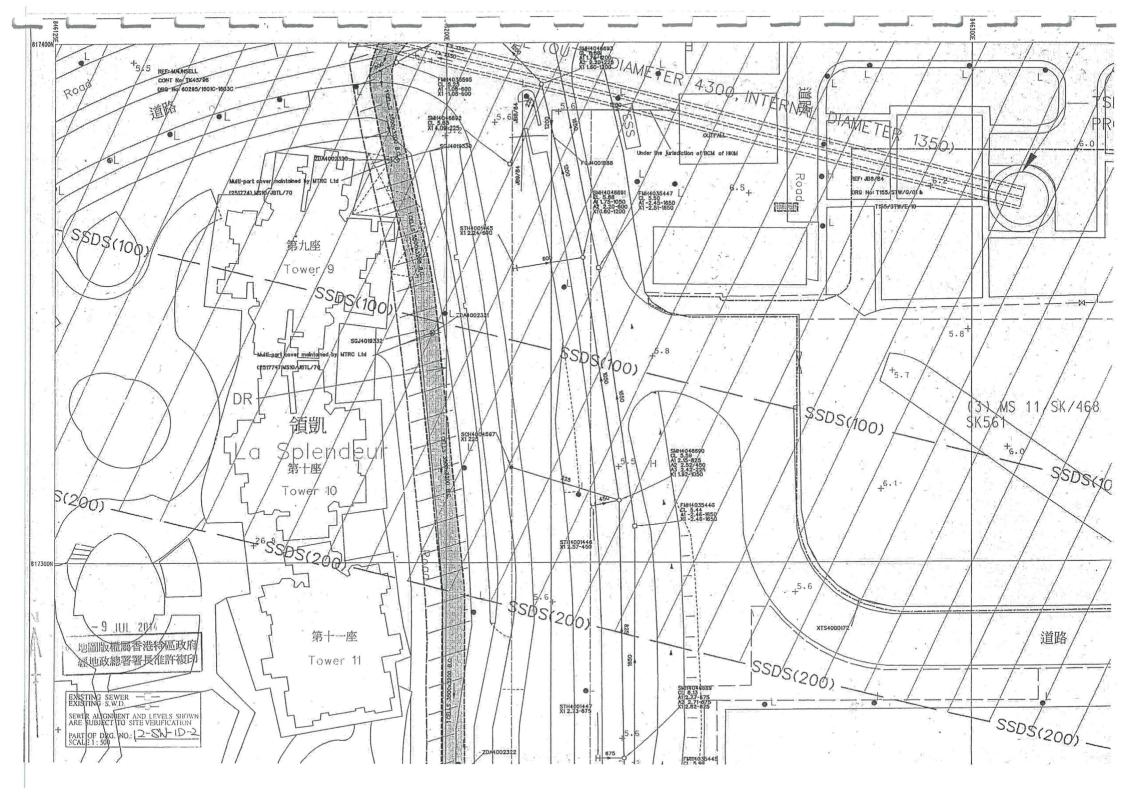
- (2) The value of  $k_s = 6$ mm is used for the calculation of concrete sewer (based on Table 5: Recommended roughness values in Sewerage Manual)
- (3) The value of velocity (V) is referred to the Tables for the hydraulic design of pipes, sewers and channels (8th edition)

(4) Equation used: 
$$V = -\sqrt{(8gDs)}\log(\frac{k_s}{3.7D} + \frac{2.51v}{D\sqrt{(2gDs)}})$$

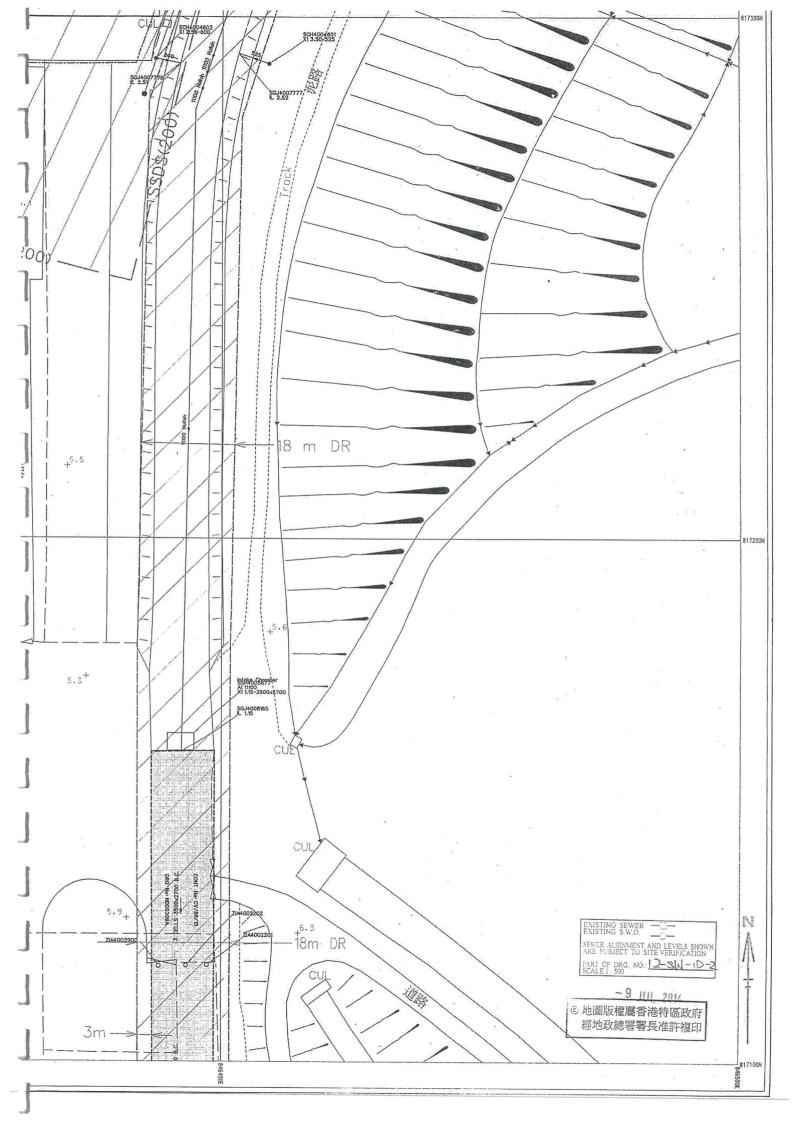
Table 3 Comparision of the Hydraulic Capacity of Existing Sewers for Sewerage generated from the Proposed Development only

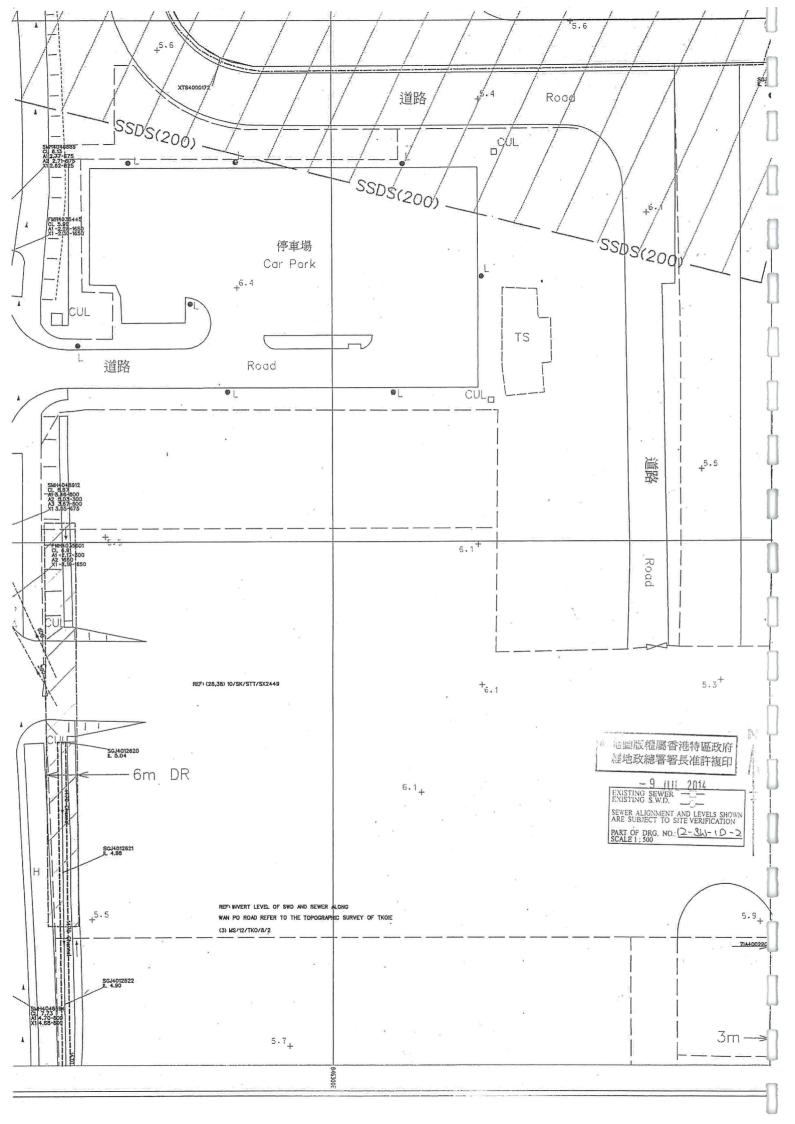
Segment		Pipe Length (m)		Capacity	Estimated Flow including the Proposed Development only (L/s)	Contributed by the Proposed Development only (%)	Status
S1-S2	1650	49.4	0.0010	2325.3	1.4	0.1%	OK
S2-S3	1650	54.0	0.0002	993.0	1.4	0.1%	OK

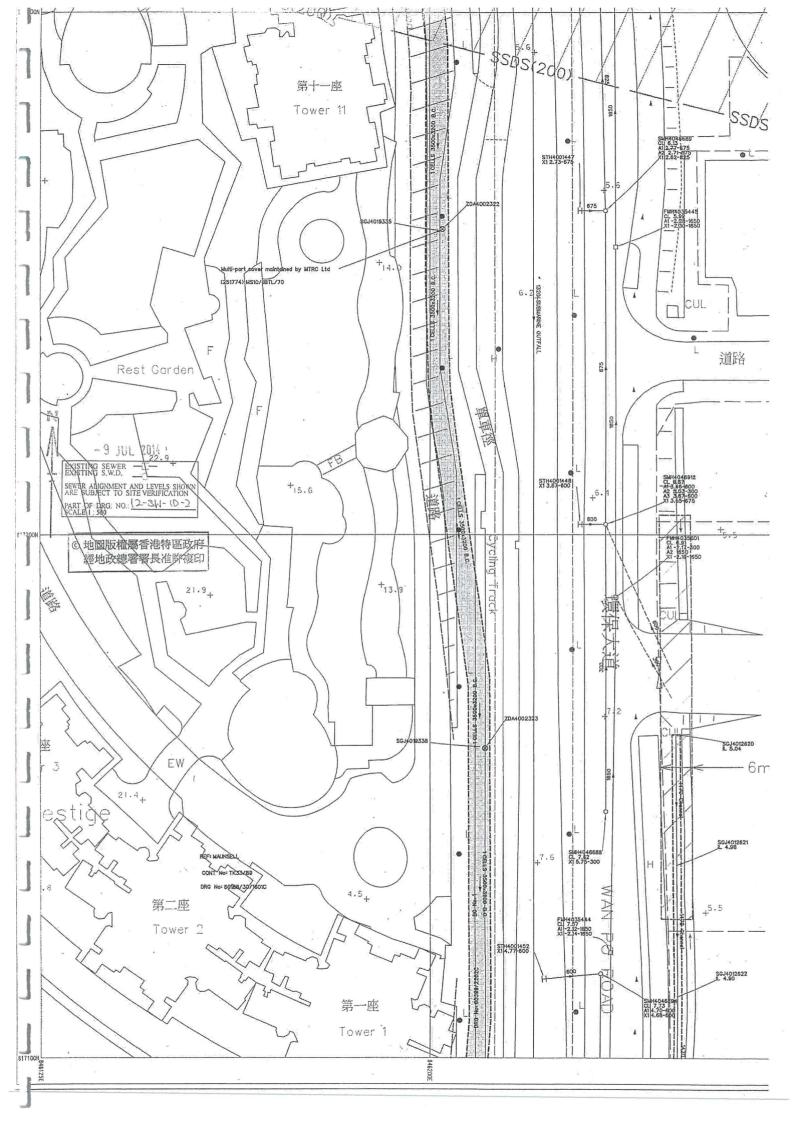
Appendix G: Drainage Record Plan obtained from Drainage Service Department











Appendix H: EPD Memo On Land Contamination

Ву	Fax	Only	
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No. (Section 1)	Т		minime.

From	Director of Environmental Protection						
Ref.	(44)	_in_	EP 1/TKO/85-OT/10 (Pt.2)				
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To Chief Engineer/					Dau		
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Your Ri	ef	()	_ in	DS	D ST2 9	/GEN	/06
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Total P	aces	1		/			

#### Proposed Surrendered Portion of Land Within Tseung Kwan O Preliminary Treatment Works at Shek Kok Road (PGLA SK – 561)

I refer to your memo under the above reference attaching the revised "documentary justifications" to confirm no contamination issues at the above subject site.

2. Please be advised that we have no further comment on the "documentary justifications" and the findings and conclusions in the document are agreeable to us.

(Ms. Jolitta Chan)
Environmental Protection Officer
for Director of Environmental Protection

C.C.

Senior Estate Surveyor, DLO/SK (Attn. Mr. Joseph Kwun)

CSPM/OGCIO (Attn.: Mr. K.W. Chan)

Internal: S(RA)3, E(RA)41

By Fax: 2792 0706

By Fax: 2802 4549

Appendix I: Extract Information from Annual Traffic Census 2013

Appendix C - AADT of Counting Stations - ordered by Road Names

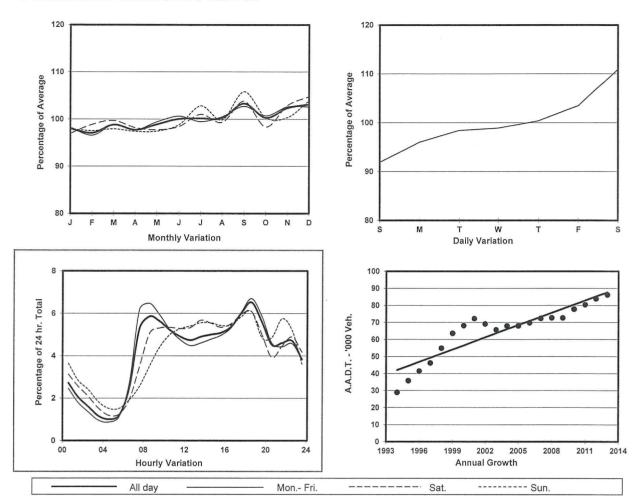
Road Name	From	m	Stn. No.	Road Type	Stn. Type	AADT		Change of 2013 as % of 2012
Road Name	From	То	110.	Type	Type	2012	2013	01 2012
Wan Chai Rd	Johnston Rd	Morrison Hill Rd	1627	DD	С	14,270 *	13,770 *	-3.5
Wan Chai Rd	Johnston Rd	Queen's Rd E	2646	LD	С	6,030	5,700	-5.4
Wan Hang Rd	Mau Yip Rd	Po Hong Rd	5494	DD	С	6,700 *	6,800 *	+1.5
Wan Lung Rd	Po Hong Rd	Wan Hang Rd	5471	DD	С	4,000 *	4,050 *	+1.5
Wan Po Rd	Chiu Shun Rd	Chun Yat St	5304	LD	С	24,060 *	31,750	+31.9
Wan Po Rd	Po Shun Rd	Chiu Shun Rd	6103	DD	С	30,520	30,460	-0.2
Wan Tau St	Kwong Fuk Rd	Tai Po Heung Sze Wui Rd	5845	DD	С	9,680	9,760 *	+0.8
Wan Wah St	Tsz Wah Shan Rd	Wai Wah St	4078	LD	C	7,720	13,000	+68.3
Wan Wah St	Wai Wah St	Sheung Fung St	3879	LD	С	9,370	9,280 *	-0.9
Wang Chau Rd	Yuen Long On Ning Rd	Yuen Long On Lok Rd	5011	LD	A	5,380	5,240	-2.6
Wang Chiu Rd	Kai Cheung Rd	Sheung Yuet Rd	3273	DD	C	17,460 *	15,560	-10.9
Wang Chiu Rd	Wang Kwong Rd	Kai Lok St	4646	LD	С	3,550	3,820	+7.7
Wang Chiu Rd & Wang Kwong Rd	Kai Cheung Rd	Kai Cheung Rd	3884	LD	С	9,180	8,950 *	-2.5
Wang Kwong Rd	Kai Fuk Rd	Kai Cheung Rd	4083	LD	C	9,580	8,720	-9.0
Wang Lok St	Wang Tat Rd	Wang Lee St	6628	LD	С	14,980	15,100	+0.8
Wang Tat Rd & Ma Wang Rd	Ma Miu Rd	Castle Peak Rd - Ping Shan	5413	PD	С	19,310 *	20,120 *	+4.2
Wang Tat Rd, Ma Wang Rd, Long Yip Rd & Yuen Long On Lok Rd	Wang Lok St	Ma Miu Rd	5611	PD	С	14,370 *	14,970 *	+4.2
Wang Tau Hom E Rd	Junction Rd	Wang Tau Hom N Rd	4647	LD	С	6,440	6,280	-2.5
Wang Tau St	Heung Sze Wui St	Nam Wan Rd	5474	DD	C	11,620 *	11,720 *	+0.8
Water St	Connaught Rd W	Des Voeux Rd W	1838	DD	С	8,450	8,150 *	-3.5
Water St	Des Voeux Rd W	Queen's Rd W	1621	DD	C	9,030 *	8,720 *	-3.5
Waterloo Rd	Ede Rd	Lung Cheung Rd	3802	UT	C	68,740	70,110 *	+2.0
Waterloo Rd	Hereford Rd	Lancashire Rd	3425	PD	С	83,560 *	82,840 *	-0.9
Waterloo Rd	Hereford Rd	Suffolk Rd	3621	PD	С	77,110 *	76,440 *	-0.9
Waterloo Rd	Lancashire Rd	Flint Rd	3223	PD	C	91,320 *	94,500	+3.5
Waterloo Rd	Lung Cheung Rd	Lion Rock Tunnel Rd	4002	UT	С	70,160	73,990	+5.5
Waterloo Rd	Nathan Rd	Shanghai St	3613	PD	С	20,800 *	20,620 *	-0.9
Waterloo Rd	Nathan Rd	Yim Po Fong St	3813	PD	С	38,830	38,490 *	-0.9
Waterloo Rd	Pui Ching Rd	Argyle St	4011	PD	C	29,440	29,100	-1.2
Waterloo Rd	Shanghai St	Ferry St	3418	DD	C	25,350 *	25,130 *	-0.9
Waterloo Rd	Yim Po Fong St	Pui Ching Rd	4205	PD	В	36,630	35,670	-2.6
Waterloo Rd & FO <k12 &="" k44=""></k12>	Argyle St	Prince Edward Rd W	3402	UT	С	99,300 *	106,470 *	+7.2
Waterloo Rd & FO <k44></k44>	Flint Rd	Boundary St	3404	UT	С	99,320 *	106,500 *	+7.2

<sup>\*</sup> AADT estimated by Growth Factor

LINK

TSEUNG KWAN O TUNNEL (from TOLL PLAZA to TSEUNG KWAN O TUNNEL RD RA)

#### 1. TRAFFIC FLOW VARIATION AND GROWTH



#### 2. TRAFFIC CHARACTERISTICS (BY DIRECTION)

	ž.			
Parameter	All - Day	Mon Fri.	Sat.	Sun.
EAST BOUND				
A.A.D.T.	43930	43920	48590	40500
R 12 / 24 - %	60.6	61.4	60.4	56.5
R 16 / 24 - %	83.1	84.4	80.7	79.2
AM Peak Hour	0900-1000	0800-0900	0900-1000	0900-1000
One-way flow at AM peak hour	2160	2380	2190	1430
T - % (AM)		12.8	-	-
PM Peak Hour	1800-1900	1800-1900	1800-1900	1800-1900
One-way flow at PM peak hour	3070	3230	2990	2440
T - % (PM)	_	9.4	-	-
Prop.of commercial vehicles - 16 hr.	~	13.7	-	
WEST BOUND				
A.A.D.T.	42240	42110	47340	38940
R 12 / 24 - %	68.6	69.7	67.6	63.9
R 16 / 24 - %	84.8	85.5	83.7	82.4
AM Peak Hour	0800-0900	0700-0800	0900-1000	0900-1000
One-way flow at AM peak hour	2910	3200	2910	2080
T - % (AM)		21.5		-
PM Peak Hour	1800-1900	1700-1800	1800-1900	1800-1900
One-way flow at PM peak hour	2550	2570	2860	2400
T - % (PM)	-	13.1	•	-
Prop. of commercial vehicles - 16 hr.		13.1	-	-

#### 3. OTHER INFORMATION AND COMMENT

## 4. Vehicle classification and occupancy - Monday to Friday

Time	Class of vehicle										
		Motor	Private	Taxi	Private	PLB	Good	ls veh. Non		Fr. Bus	
		Cycle	Car		LB		Light	М&Н	Fr. Bus	SD	DD
0700-0800	Pro	4.0	48.0	15.1	2.0	3.9	11.9	7.5	5.0	0.1	2.5
	Ocp	1.0	1.4	2.2	5.7	12.6	1.4	1.3	24.0	28.7	41.5
0800-0900	Pro	4.1	50.6	15.0	0.7	2.5	13.9	7.7	2.9	0.1	2.5
	Ocp	1.1	1.4	2.0	10.9	14.1	1.6	1.2	21.0	19.8	42.8
0900-1000	Pro	3.1	41.3	21.7	0.4	3.3	15.3	11.0	1.2	0.1	2.5
	Оср	1.1	1.4	1.7	5.2	9.9	1.5	1.2	13.3	12.8	18.0
1000-1100	Pro	2.2	38.1	20.7	0.6	3.2	20.0	12.0	0.6	0.1	2.4
	Ocp	1.0	1.4	1.9	2.3	9.1	1.4	1.1	5.7	16.3	17.7
1100-1200	Pro	2.1	33.0	19.2	1.6	3.6	23.4	13.8	0.4	0.3	2.6
	Ocp	1.1	1.3	1.9	1.5	8.6	1.5	1.2	1.0	10.5	16.2
1200-1300	Pro	1.2	36.0	15.0	2.1	4.7	21.3	14.1	2.3	0.3	3.0
	Ocp	1.0	1.4	2.0	5.7	6.9	1.6	1.6	11.3	14.3	17.1
1300-1400	Pro	2.1	35.3	14.8	1.4	4.6	23.0	14.5	1.4	0.1	2.8
	Ocp	1.2	1.4	2.0	3.9	7.3	1.4	1.3	17.2	11.0	18.9
1400-1500	Pro	2.5	37.1	12.6	0.9	3.3	27.1	12.7	1.2	0.2	2.4
	Ocp	1.1	1.6	2.1	3.2	7.8	1.5	1.2	4.6	12.3	15.8
1500-1600	Pro	2.2	36.6	17.0	1.6	3.3	19.7	14.4	2.5	0.2	2.6
	Ocp	1.0	1.5	2.1	3.9	7.9	1.4	1.3	9.0	10.8	17.4
1600-1700	Pro	2.0	36.9	17.4	2.4	2.9	22.0	11.2	2.6	0.1	2.6
	Ocp	1.0	1.5	1.9	3.5	9.3	1.5	1.2	5.1	12.2	24.4
1700-1800	Pro	3.1	41.3	16.7	0.9	3.5	17.2	10.7	3.9	0.1	2.7
	Ocp	1.1	1.5	1.9	2.8	11.1	1.4	1.3	18.7	17.3	29.5
1800-1900	Pro	4.1	55.2	15.1	1.0	4.5	11.9	4.3	1.5	0.1	2.3
Peak hour	Ocp	1.1	1.5	2.2	3.2	12.0	1.3	1.2	23.0	23.8	45.0
1900-2000	Pro	3.3	56.6	19.0	0.2	3.8	9.1	2.8	2.4	0.1	2.6
	Ocp	1.1	1.4	2.0	1.7	11.1	1.5	1.1	17.2	19.0	36.6
2000-2100	Pro	3.1	54.9	24.7	0.1	4.6	6.5	2.3	0.7	0.1	3.1
	Ocp	1.1	1.6	2.1	2.0	9.5	1.2	1.2	6.0	11.0	21.5
2100-2200	Pro	2.2	47.0	30.8	0.6	3.9	8.4	2.9	0.9	0.1	3.2
	Ocp	1.2	1.5	2.0	1.5	9.3	1.4	1.2	1.9	11.3	23.3
2200-2300	Pro	3.2	49.9	33.1	0.1	3.7	5.0	1.8	0.1	0.1	3.0
	Ocp	1.0	1.6	1.9	1.0	12.6	1.4	1.2	1.0	14.0	20.9
16 hours	Pro	2.9	44.3	19.0	1.0	3.7	15.7	8.7	1.9	0.1	2.6
	Ocp	1.1	1.5	2.0	4.1	10.1	1.5	1.3	15.9	14.4	26.4

Legend

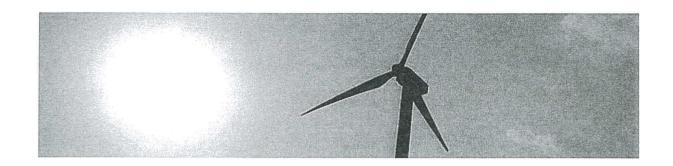
Pro. Proportion of vehicles in % (Sum may not add up to 100% due to figure rounding)

Ocp. Average occupancy of vehicles

M&H Medium and Heavy

Annex F

Air Ventilation Assessment –
Expert Evaluation Report



S16 Planning Application for the Proposed Information Technology & Telecommunications Industries-Data Centre on a site in Area 85 Tseung Kwan O Site 3

Air Ventilation Assessment Expert Evaluation

Prepared for: Urbis Limited

Prepared by: ENVIRON Hong Kong Limited

Date: **Jan 2015** 

Project Number: URBTKODAEI00

Reference: R3860\_V1.4



Proposed Data Co	entre at TKO Site 3
Air Ventilation Assessment	- Expert Evaluation

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- Figure 5: Topography and Building Morphology of the Area in the Vicinity
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Annex A: Master Layout Plan of the Proposed Data Centre



# 1.0 Introduction

The proposed development is located at Tseung Kwan O – Site 3. The Subject Site has a total size of about  $10800 \text{ m}^2$ . The indicative plot ratio of the proposed development is about 4.5.

The site, which is being occupied by the Drainage Services Department, is currently zoned "Other Specified Uses" annotated "Sewage Treatment Works ("OU(STW)") for most of the site, and a small portion zoned "G/IC(9)" on the OZP. To convert the use of Site 3 to high-tier data centre development, it is required to rezone Site 3 to "Other Specified Uses" annotated "Data Centre" ("OU(DC)").

ENVIRON Hong Kong Limited is commissioned by Urbis Limited to prepare the Air Ventilation Assessment (AVA) Study report based on the indicated layout plan support the rezoning proposal.

Architectural drawings and technical information on the Proposed Development are provided by the project team members.

# 1.1 Methodology

This Expert Evaluation (EE) is undertaken based on the framework set out in Technical Circular No. 1/06 – Air Ventilation Assessments jointly issued by Housing, Planning and Lands Bureau, and Environment, Transport and Works Bureau and its Annex A – Technical Guide for Air Ventilation Assessment for Developments in Hong Kong.

In this EE, weather data from both MM5 and Hong Kong Observatory (HKO) have been reviewed to understand the wind environment of the Subject Site. Besides, the wind data from previous AVA studies in the vicinity of the Subject Site has also been reviewed, and the previous AVA studies include the Redevelopment of Fire Services Training School cum Re-provisioning of Driving Training School (AVR/G/42), Town Park, Indoor velodrome-cum-Sports Centre in Area 45, Tseung Kwan O (AVG/G/35) and the AVA report for the Proposed Information Technology & Telecommunications Industries – Data Centre on a site in Area 85 Tseung Kwan O, Hong Kong.

# 1.2 Subject site and its Environs

Figure 1 shows the location of the Subject site and its environs.

The subject site is located at inner part of the Tseung Kwan O area. Wan Po Road is located immediate west of the subject site; and the private residential development (the LOHAS Park) is located further west of the subject site. To the north of the subject site is the Tseung Kwan O (TKO) Preliminary Treatment Works. To the south of the subject site is vacant land. A future Data Centre is located further south of the subject site. The closed TKO landfill site and the Clear Water Bay Country Park, which is a hilly slope, are located to the east of the subject site. The hill, High Junk Peak with the top level of about 340 mPD is located further east of the subject site.

# 1.3 Proposed Development

The proposed data centre consists 9-storeys building from G Floor to 8 Floor (60mPD). The proposed data centre will be a temperature-controlled building with purpose-built redundant supporting components for accommodating large-capacity server computers, equipped with multiple high—capacity power supply sources and links to high-bandwidth network.

The ground floor of the data centre is used as transformer rooms and plant rooms. According to the ground floor plan, there will be a ramp to the basement carpark. The first floor is used as transformer room and non-essential plant room. The 2 Floor to 7 Floor will be used as data halls. The highest floor (8 Floor) of the building will be served as office and green roof. Basement carpark and underground fuel tanks is at L/UL.

Figure 2 shows the master layout plan of the proposed development.

# 2.0 Site Wind Availability

# 2.1 Site Wind Availability Data

Based on the recorded wind data from Hong Kong Observatory, the northerly wind, north-easterly wind and easterly wind would be dominated in the non-summer period. During the summer period, the south-westerly wind, southerly wind and south-easterly wind would be dominated. Throughout the year, the most dominant wind would come from north-eastern direction, eastern direction, northern direction and south-western direction. **Figure 3** shows the wind roses at the TKO Weather Station. The data obtained from TKO Weather station with was also referenced in the *Town Park, Indoor velodrome-cum-Sports Centre in Area 45, Tseung Kwan O* (AVG/G/35). It is also identified in the AVG/G/35 AVA report that dominant annual wind mostly come from the northeast quadrant while wind from south-southwest are the dominate wind during summer period.

For wind data from MM5, the Subject Site falls within the grid of (35, 25); and the annual wind rose of this grid is shown in **Figure 4.** From the wind rose, the dominant wind direction is from east-northeast with the mean wind speed of 7.4 m/s at 596 m above the terrain level. The MM5 wind data from the *Redevelopment of Fire Services Training School cum Re-provisioning of Driving Training School* (AVR/G/42) which is obtained from MM5 at the grid of (35,26) as well as that at the grid of (33,27) where the *Indoor velodrome-cum-Sports Centre in Area 45 located* is also reviewed. The windrose of the adjacent grids also show that the dominant wind direction is from east to northeast.

The windrose result represents wind environment over urban canopy and least affected by topography and buildings. **Table 1** shows the summary of the simulated site wind availability data including probability of occurrence and average wind speed based on MM5 data at 596m above the terrain level of Grid (35, 25).

Table 1 Summary of Simulated Site Wind Availability Data  $(V\infty)$  and Wind Direction for Initial Study

Wind Direction	% of Occurrence (%)	Wind Direction	% of Occurrence (%)
N	3.7	S	3.6
NNE	6.4	SSW	5.5
NE	13.1	SW	5.4
ENE	18.9	WSW	2.9
Е	14.9	W	1.8
ESE	8.5	WNW	1.3
SE	5.9	NW	1.1
SSE	4.8	NNW	2.0
		Total	100

To conclude, the annual prevailing wind directions would come from north-eastern direction, eastern direction, northern direction and south-western direction based on both MM5 and TKO Weather Station; while the summer prevailing wind direction would come from south-west, south and southeast direction based on the wind data obtained from TKO Weather Station.

As mentioned in section 1.2, the hilly slope of Clear Water Bay Country Park and the closed TKO landfill is located to the east of the subject site; and the hill High Junk Peak (top level at 340 mPD) is located further east of the subject site, i.e. the subject site is closed to the hill. Thus, katabatic wind is also expected to come from the hillside.

# 3.0 Expert Evaluation

# 3.1 Prevailing Wind Environment of the Area

Figure 5 shows the topography and building morphology of the area under concern. After reviewing the site topography, building features and road pattern, the major wind corridors in the vicinity would be following the two major roads, Wan Po Road and Wan O Road. In addition, a wind corridor would be aligned between the LOHAS Park and the Tsueng Kwan O Industrial Estate from northeast to southwest.

The major road, Wan Po Road and Wan O Road are in fairly straight alignment surrounding the largest high-rise comprehensive residential development LOHAS Park. These two roads are considered as the major wind corridors in this district.

The buildings to the north and west of the Subject Site are high rise residential buildings. The Beaumount consist of 6 blocks of buildings with about 140 mPD and it is located to the north of the Subject Site. LOHAS Park locates to the west of the Subject Site, and it consists of buildings of 46 to 59 storeys with podium. These compact developments would be less permeable to air flow.

Clear Water Country Park is located to the northeast, east and southeast of the Subject Site with the hill top of 155mPD, 177 mPD and 198 mPD respectively. The hilly terrain would decelerate the wind flow from north-eastern, eastern and south-eastern direction.

### **Annual Condition**

Based on the windrose from HKO and MM5, the annual prevailing winds are from the north, northeast and south-west of the Subject Site. The Beaumount to the north of the Subject Site would block or reduce the wind from north direction. The wind from north direction, therefore, would flow follow the Wan Po Road which is the major corridor of this area (**Figure 6**).

As hilly slopes are located to the northeast, east and southeast of the Subject Site, wind from the north-east and east will flow downhill from the Clear Water Country Park, pass over the decommissioned Tseung Kwan O landfill and join into Wan Po Road. For the area to the south of the LOHAS Park, the wind from east will flow downhill, then flow along the Wan O Road to the water front area.

For the prevailing wind from south-west, the wind will flow along Wan O Road, then Wan Po Road, the future Data Centre at Site 1 and flow uphill.

### **Summer Condition**

As mentioned in section 2.1, during the summer period, the prevailing winds are from the south-west, south and south-east.

For the wind from south-west, the wind will flow along the southern portion of the LOHAS Park, along the Wan O Road, then to the Wan Po Road and pass the Site 1 data centre, and flow uphill. (Figure 7) For the wind from south, Wan Po Road is the corridor to channelize the wind to the northern part of the area. For the wind from south-east, the wind will pass the Tsueng Kwan O Landfill, and enter the LOHAS Park.

# 3.2 Wind Environment at the Subject Site

### Annual Condition

As mentioned in section 2.1, the annual prevailing winds are from north, north-east, east and south-west.

The compact development Beaumount is located to the north of the subject site. The Beaumount would block the northern wind for the Subject Site. However, Wan Po Road would channelize the northern wind to the southern part of the area. Since the Subject Site would not encroach to the Wan Po Road, it has no obstruction to the main air corridor.

Katabatic winds come from hillsides, which are located to the north-eastern, eastern and south-eastern side of the subject site, would reach the subject site. The large compact and podium development LOHAS Park would further reduce the wind flow passing the LOHAS Park to the waterfront area to the west of the LOHAS Park.

For the south-westerly wind, the wind will pass along the southern part of the LOHAS Park, Wan O Road to the Data Centre at Site 1. The subject site is located at the leeward of the LOHAS Park for the south-westerly wind. Therefore, it is expected there would not have much wind reaching the subject site from this wind direction.

# Summer Condition

During summer period, the prevailing winds are from the south-west, south and south-east.

For the south-westerly wind, the wind will pass along the southern part of the LOHAS Park, Wan O Road to the Data Centre at Site 1. The subject site is located at the leeward of the LOHAS Park for the south-westerly wind. Therefore, it is expected there would not have much wind reaching the subject site from this wind direction.

For the south wind, the subject site would not encroach into the main air corridor, Wan Po Road.

For the south-easterly wind, the wind will flow along the hillside and reach the subject site. The wind speed will be reduced when the wind reach the subject site.

# 3.3 Wind Environment with Proposed Data Centre

The Subject Site does not located at any air corridors of the area, i.e. Wan Po Road, Wan O Road and the area between the LOHAS Park and the Tseung Kwan O Industrial Centre. Therefore, it is considered that, after the development of the Data Centre, the overall air ventilation performance of the area will not be affected.



Considerations have been made in the design of the proposed data center to minimize the impact on the local wind environment. Some of the design considerations are discussed.

- The building layout and footprint are kept minimal to reduce the bulk effect. Basement carpark is proposed such that podium is not required. The height of the proposed data centre is kept to be as low as possible with 9 storeys only (60mPD). Its height is much lower than the adjacent buildings in LOHAS Park (~ 150 mPD) and Beaumount (~140 mPD).
- There is a ~10m setback of the proposed data centre to the southern boundary of the subject site. The wind from east direction will pass through the data centre through this localized air corridor (Figure 8).

In considering the location of the subject site, the height and scale of the proposed data centre, it is anticipated that no adverse air ventilation impact to the TKO area.

The compact development Beaumount is located to further north of the proposed data centre with the existing Preliminary Treatment Works located in between. The Beaumount would block the northern wind. However, Wan Po Road would channelize the northern wind to the southern part of the area. Since the proposed data centre would not encroach to the Wan Po Road, it has no obstruction to the main air corridor. During the summer condition, the prevailing winds are from the south-west, south and south-east. The Beaumount and the Preliminary Treatment Works will be located as the downwind area of the proposed data centre for the south wind direction. Therefore, the proposed data may have some reduction in the wind speed for these areas.

For the north-easterly wind, the wind will disperse downstream of the subject site after flowing around or above the proposed data centre. Due to the small scale of the proposed data centre, significant obstruction to the wind is not anticipated. However, there may be still some localized impact on the LOHAS Park. Therefore, it is proposed to have a 10m setback of the data centre from the southern boundary which would help to reduce the potential localized impact on LOHAS Park from the north-easterly wind.

For the easterly wind, similar to the north-easterly, the wind will disperse downstream of the subject site after flowing around or above the proposed data centre. A  $\sim$  10m setback from the southern boundary will further enhance the flow of the easterly wind over the proposed data centre to the leeward area, particular the LOHAS Park. Also, the proposed data centre is oriented in the E-W direction, the wind will pass around the proposed data centre to the downstream area.

For the south-easterly wind, the Wan Po Road would channel the wind to the northern portion of the area. The proposed data center does not encroach into the main air corridor; and so it has no obstruction to the main air corridor. Also, due to the small scale of the proposed data centre, significant obstruction to the wind is not anticipated.

For the southerly wind, the wind will flow along the Wan Po Road. The proposed data centre does not encroach into the main air corridor; and so it has no obstruction to the main air corridor.

The proposed data is the downstream of the LOHAS Park under the southwesterly wind. The proposed data centre will not have any significant impact to its downstream area in comparing its

scale and height with the LOHAS Park. Also, it does not encroach into the air corridor between the LOHAS Park and the Tsueng Kwan O Industrial Area.

# 4.0 Conclusion

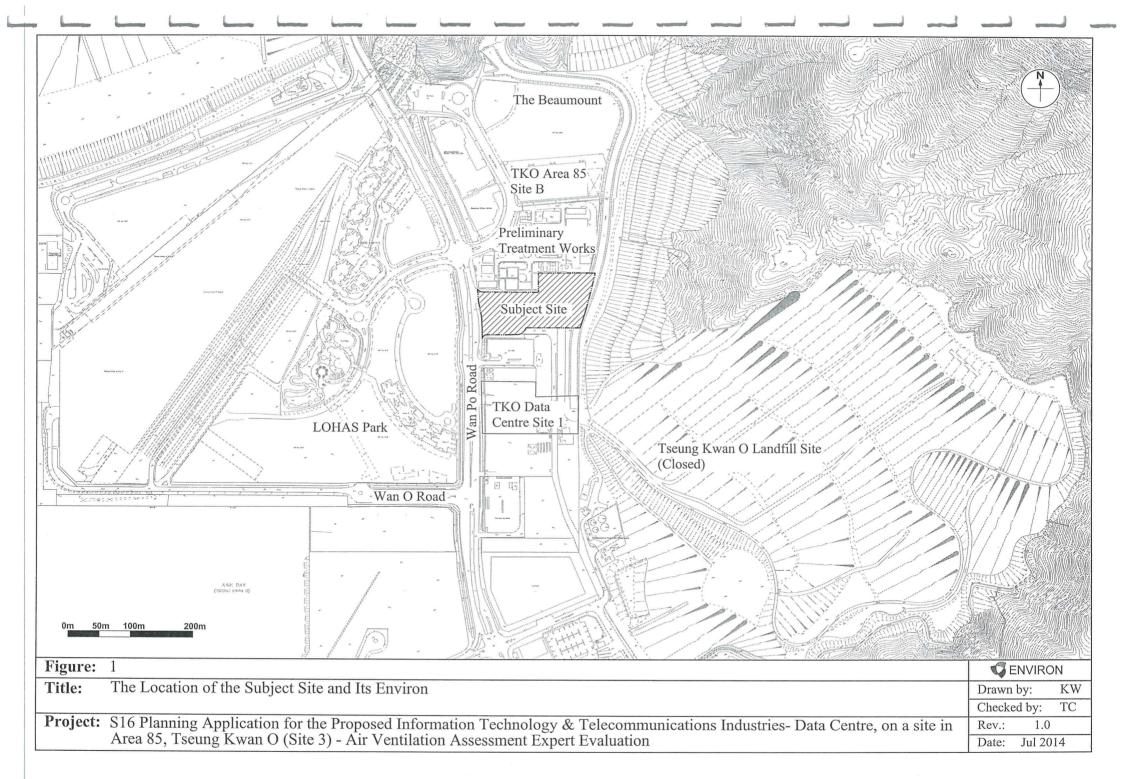
An Expert Evaluation on air ventilation assessment has been carried out in accordance with ETWB Technical Circular No. 1/06 AVA and Chapter 11 of the HKPSG.

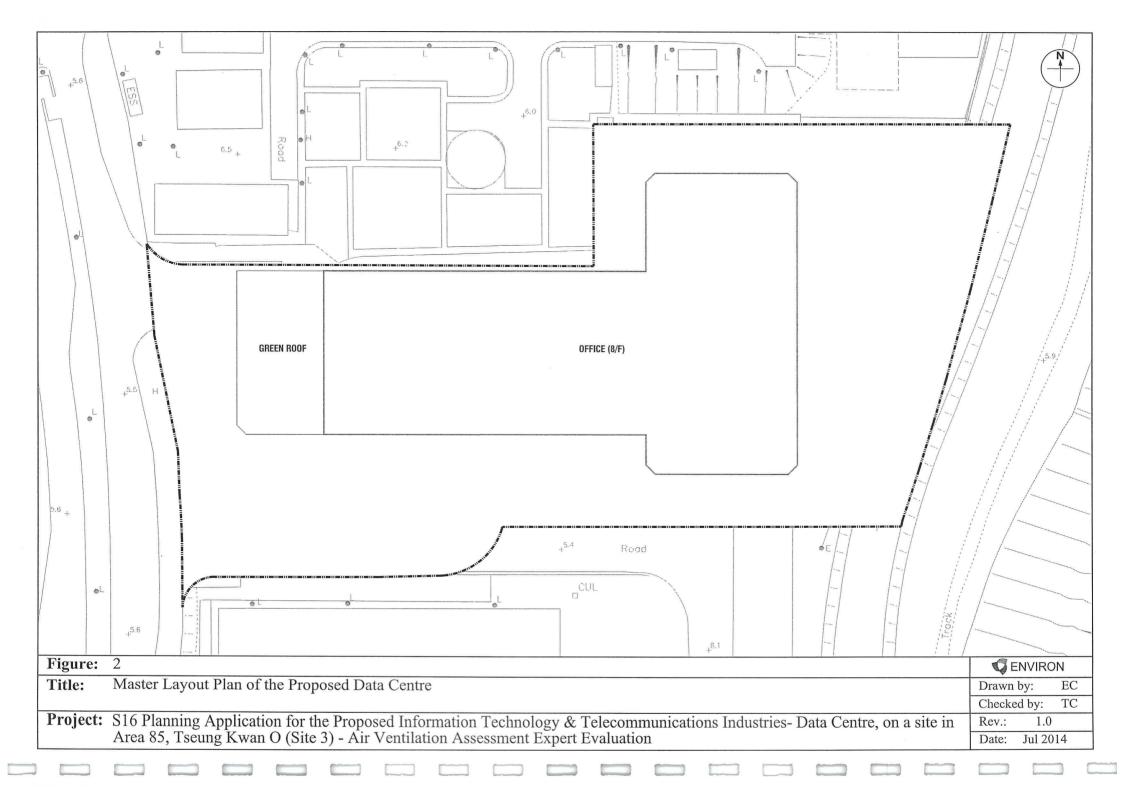
With reference to the wind rose, annual prevailing winds in the area are from the north, north-east, east and southwest. During summer condition, the prevailing winds are from the south-west, south and south-east.

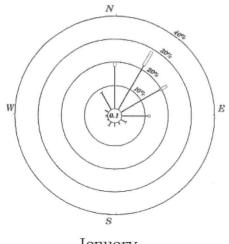
The proposed data centre does not encroach into any air corridors of the area. To enhance air ventilation performance, considerations have been given to the design of the proposed data centre. 10m width setbacks along southern boundary as well as eastern and western of the subject site are recommended as mitigation measures to minimize the potential localized impact to the surroundings. In considering the location of the subject site, the height and scale of the proposed data centre, it is anticipated that no adverse air ventilation impact to the local area.

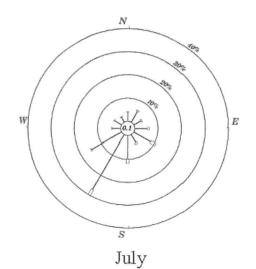
Figures



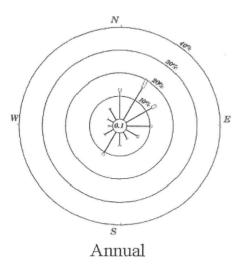












# Wind Speed

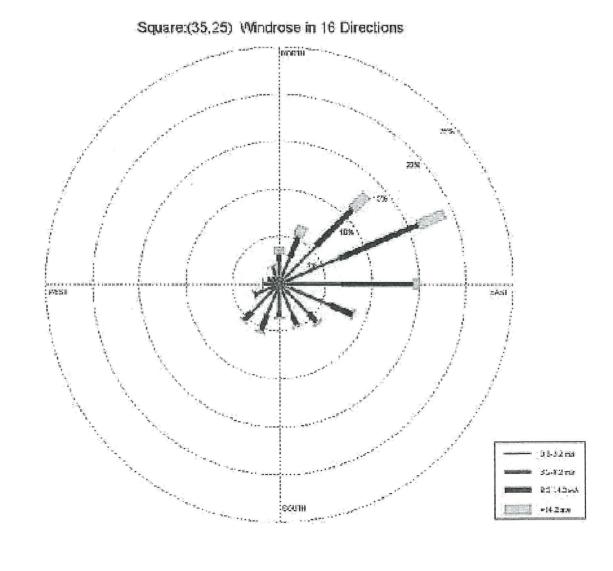
(F1) (F2) (F3) (F4) 0.1-3.2 3.3-8.2 5.3-14.2 214.2 m/s 1-2 3-4 5-6 >6 Beaufort force

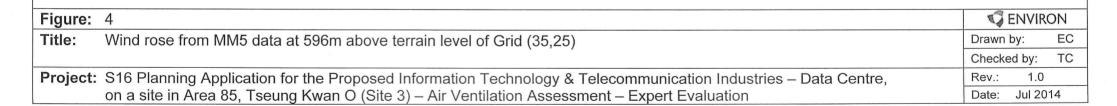
# Percentage Frequency

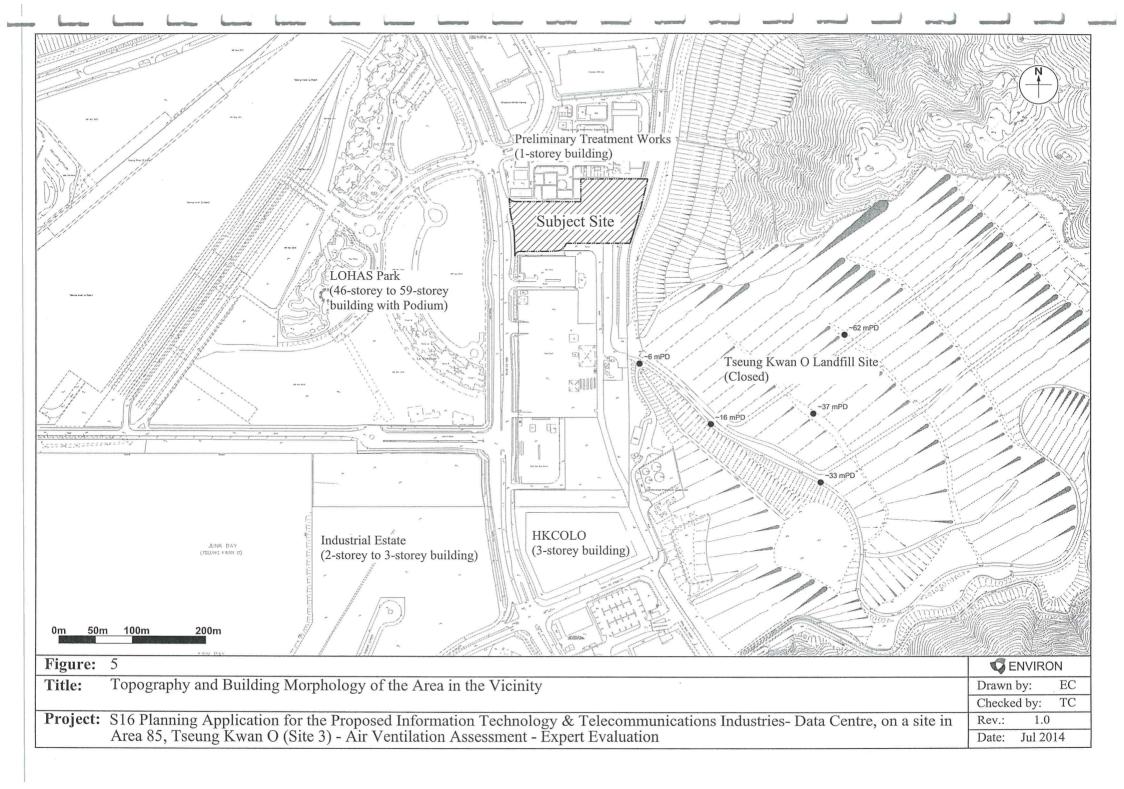
0 10 20 30 40

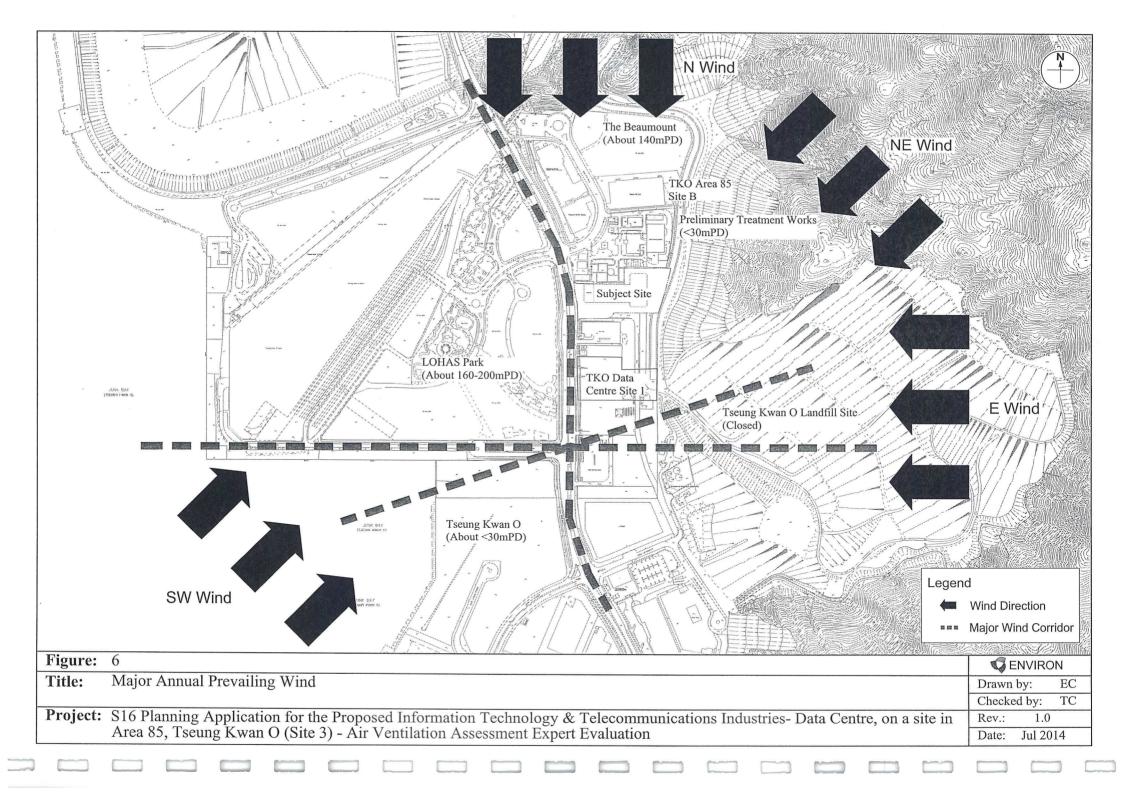
The number in the inner circle is the percentage frequency of accurrence of calm and variable winds.

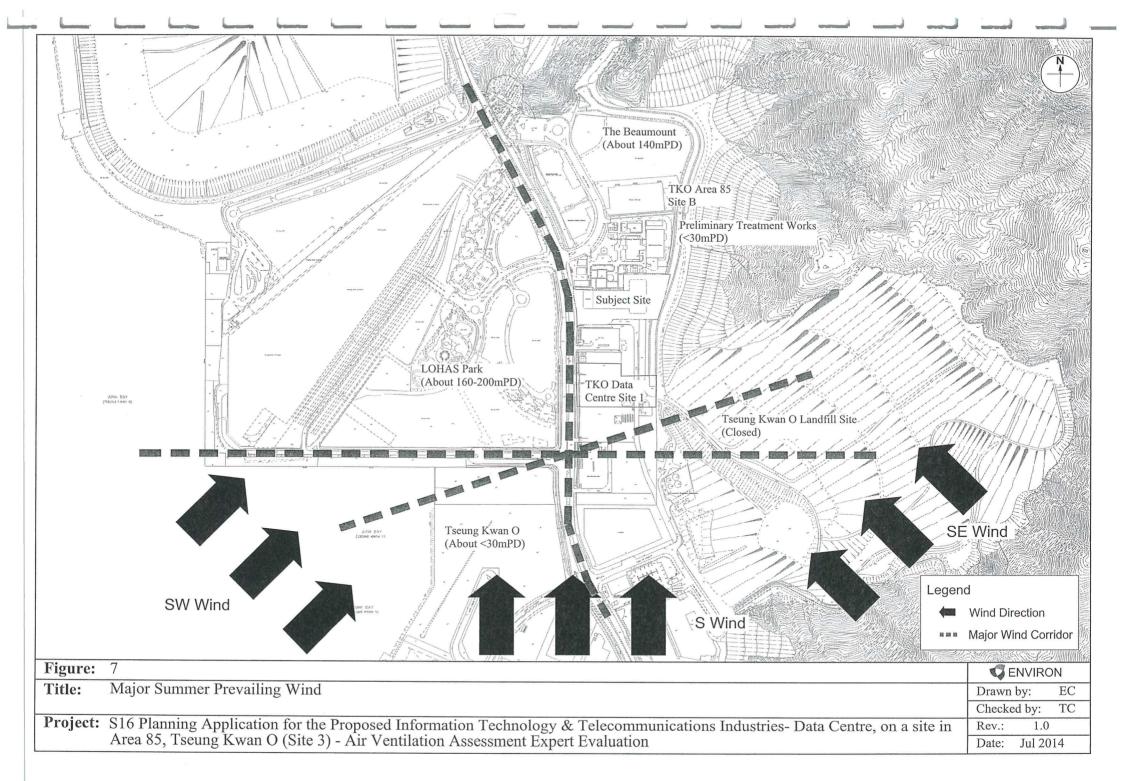
Figure:	3	S ENVIR	ON
Title:	Wind rose at Tseung Kwan O Weather Station	Drawn by:	EC
		Checked by:	TC
Project:	S16 Planning Application for the Proposed Information Technology & Telecommunication Industries – Data Centre,	Rev.: 1.0	
	on a site in Area 85, Tseung Kwan O (Site 3) – Air Ventilation Assessment – Expert Evaluation	Date: Jul 20	14

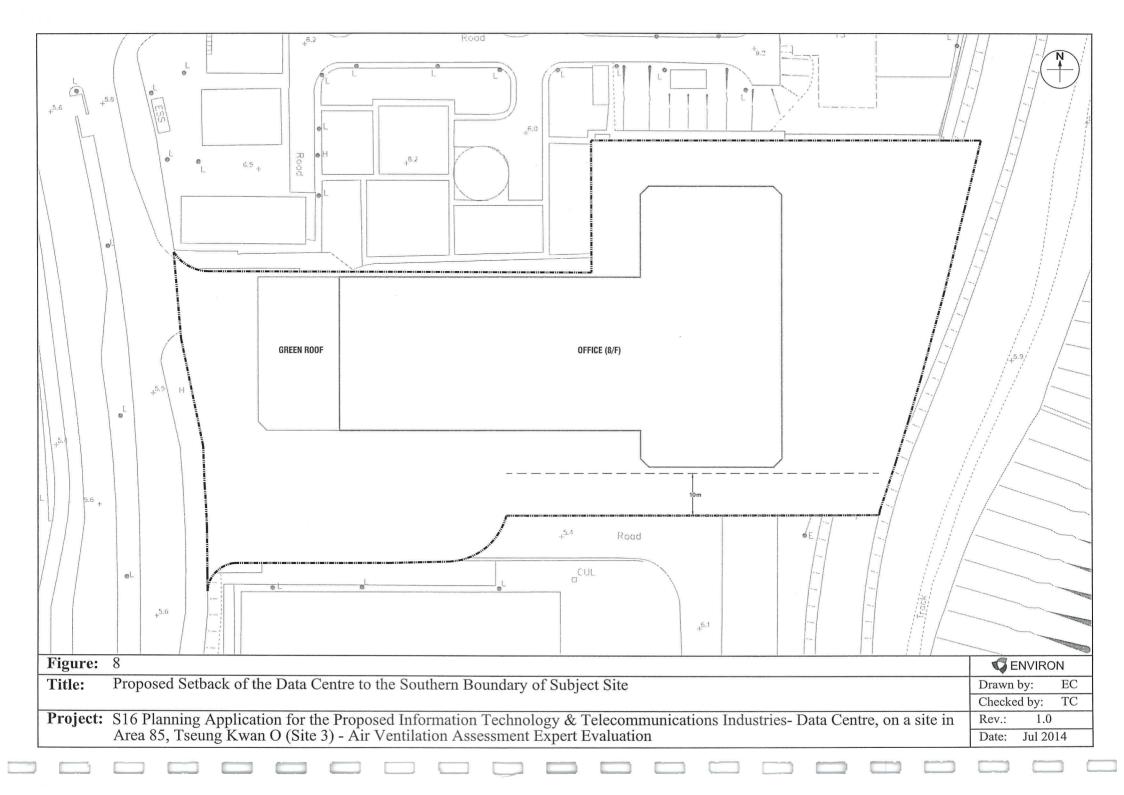




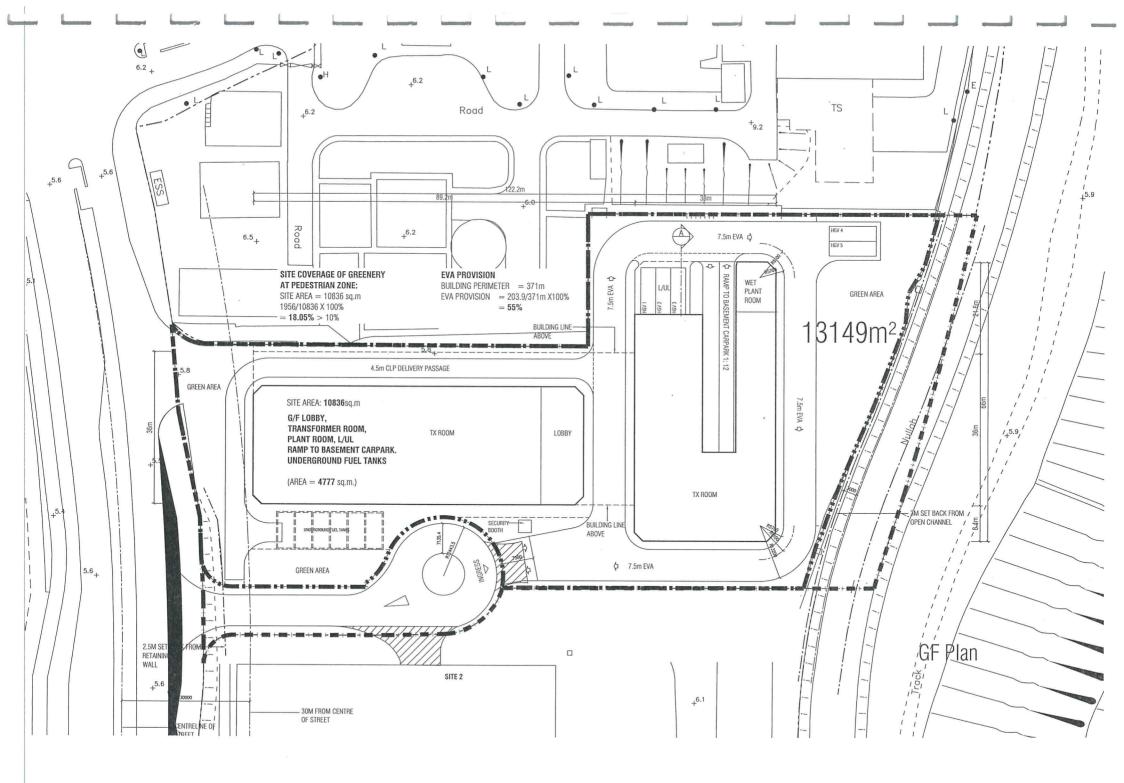




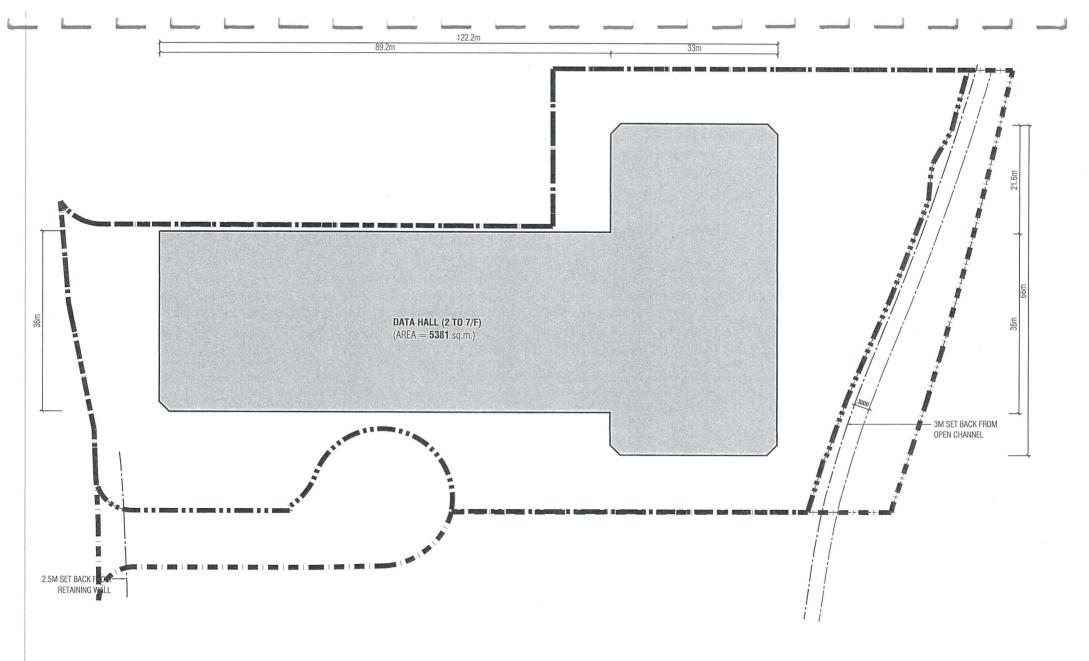




Annex A: Master Layout Plan of the Proposed Development



1F Plan



2F-7F Plan

Annex **G** 

Visual Impact Assessment

# CONSULTANCY SERVICE FOR PREPARATION OF AMENDMENT OF PLAN UNDER THE TOWN PLANNING ORDINANCE FOR DATA CENTRE DEVELOPMENT IN TSEUNG KWAN O AREA 85

**Visual Impact Assessment** 

(Doc. Ref. No.: 141997)

# **URBIS LIMITED**

Prepared by :	Karl O'Brien		Jan 2015	
		LA	Date	
Checked by :	Alan Macdonald		Jan 2015	
	/	PM	Date	
Approved for Issue by:	1 Hura		Jan 2015	
•	+IV NUN	DD	Data	



### 1 METHODOLOGY FOR THE APPRAISAL OF VISUAL IMPACT

### 1.1 Introduction

- 1.1.1 This methodology follows the requirements set out in TPB PG-No.41.
- 1.1.2 Appraisal of visual impacts is not an objective science but is based upon a structured and reasoned evaluation of predicted impacts, informed by professional judgment and experience.
- 1.1.3 The methodology adopted for this visual assessment consists of:
  - Identification of Baseline Conditions (Assessment Area, Visual Elements and Resources and Viewing Points);
  - Identification of Potential Sources of Impacts;
  - Identification of Potential Mitigation Measures;
  - Appraisal of Significance of Visual Impacts; and
  - Evaluation of Overall Visual Impact
- 1.1.4 These stages are described in more detail below.

### 1.2 Identification of Baseline Visual Conditions

- 1.2.1 In order to identify clearly the visual impacts of a proposed development, it is necessary to establish the existing baseline visual conditions of the surrounding environment. For these purposes, the project Study Area is defined by reference to the projects Assessment Area (see below).
- 1.2.2 During the identification of baseline visual conditions, the following issues are defined:
  - The Existing Site Conditions and Assessment Area of the Proposed Project;
  - Visual Elements and Resources: and
  - Viewing Points:
- 1.2.3 The identification of these conditions is the product of both desk-top research and field survey.

### 1.3 Assessment Area

- 1.3.1 The assessment area is the visual envelope within which the proposed development is pronouncedly visible from key sensitive viewers. The extent of the assessment area varies case by case depending on the size of development, the site context and the distance and location of the sensitive viewers. A larger building will more likely give a more distinct visual impact than a smaller building at the same distance. Groups of buildings seen at a farther distance may be visually less distinct than the close-up views of individual buildings.
- 1.3.2 The assessment area will be determined having regard to the size of the proposed development, the distance of the development and its potential visibility from the selected viewing points. The visual envelope forms the Assessment Area for the purposes of VIA. As stated in the TPB PG No. 41, "When the viewer is at a distance equal to three times the height of the building, the viewer will tend to see the building as part of a group rather than a single building. This may be used as an initial reference in approximating the extent of assessment area".

### 1.4 Visual Elements and Resources

1.4.1 Visual Elements and Resources are the components/features of a landscape or townscape which shape its appearance and visual character to those who see it. Key Visual Elements

Consultancy Service for Preparation of Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85 Visual Impact Assessment



and Resources may include major physical structures, visual resources or attractors (e.g. Victoria Harbour, natural coastline, ridgeline, mountain backdrop, woodland, streams, etc.) and/or visual eyesores or detractors (e.g. pylons, sewage treatment plants, refuse collection points, ventilation shaft buildings, quarries, etc.) that currently exist or are known to be planned within the assessment area should be reported.

- 1.4.2 Different Visual Elements and Resources may enhance, degrade or neutralize the overall visual impact of the development being assessed. Victoria Harbour and its ridgelines are recognized as particularly important Visual Elements in the Hong Kong context.
- 1.4.3 Different aspects of Visual Elements and Resources give the landscape its visual character, including their scale (e.g. buildings, topographic features, etc.), variety of visual texture, pattern, form and colour. These features affect the visual character of a landscape and the type of development that can be accommodated within it without significantly changing this visual character.
- 1.4.4 Where committed future major development falls within the Assessment Area, its Visual Elements and Resources are also considered; in as far they are known.

# 1.5 Public Viewing Points

- 1.5.1 TPB PG-No.41 notes, "in the highly developed context of Hong Kong, it is not practical to protect private views without stifling development opportunity and balancing other relevant considerations. In the interest of the public, it is far more important to protect public views, particularly those easily accessible and popular to the public or tourists. VIA should primarily assess the impact on sensitive public viewers from the most affected viewing points. The viewing points could be kinetic or static. They include key pedestrian nodes, popular areas used by the public or tourists for outdoor activities, recreation, rest, sitting-out, leisure, walking, sight-seeing, and prominent travel routes where travellers' visual attention may be caught by the proposed development."
- 1.5.2 The TPG continues "For identification of key public viewing points, the applicants may refer to Chapter 11 on Urban Design Guidelines in the Hong Kong Planning Standards and Guidelines (HKPSG), the Explanatory Statements of relevant statutory plans, adopted outline development plans and layout plans, and completed planning studies available for public reference. Local viewpoints should be determined with reference to the setting of the project and views of local significance".

## 1.6 Appraisal of Visual Change

- 1.6.1 Under the TPG, the effects of the visual changes on the assessment area and sensitive public viewers shall be appraised. Visual changes may be positive or negative and they are not necessarily mutually exclusive. The visual appraisal will take into account the following aspects:
  - Visual Composition;
  - Visual Obstruction;
  - Effect on Public Viewers; and
  - Effect on Visual Resources.
- 1.6.2 The magnitude of the change depends on a number of factors including the physical extent of the change, the landscape and visual context of the change i.e. a set circumstance/facts surrounding the change, the compatibility of the project with the surrounding landscape; and the time-scale of the change i.e. whether it is temporary (short, medium or long term), permanent but potentially reversible, or permanent and irreversible

# 1.7 Identification of Sources of Impact

1.7.1 Next, the key sources of visual impact of the proposed development are identified. These will



generally be matters such as the completed building itself, associated structures and infrastructure works, such as highways, pumping stations, electricity substations etc., used to service the development. It should be noted that Sources of Impact may be Positive or Negative.

# 1.8 Mitigation Proposals

1.8.1 Sources of visual impact are where possible, subject to specific mitigation proposals so that the significance of impacts is reduced. Mitigation measures can be part of the project design (e.g. the location of buildings; colour treatment of building facades) or can be added to the basic project design (e.g. tree planting to screen a development).

# 1.9 Evaluation of Overall Visual Impact

- 1.9.1 The overall visual impact of the proposed development, taking into account the sensitivity of the key public viewers, visual resources and visual amenities likely to be affected, the magnitude, extent and duration of impact and any resultant improvement or degradation in the visual quality and character of the surroundings area, and planning intention and know planned development of the area.
- 1.9.2 Impacts are assessed upon completion of the projects (as construction stage impacts are not required under the TPG). Impacts are also assessed on the assumption that mitigation measures are in place (and planting fully mature). Figure 1.1 below shows the matrix used to assess visual impacts. The matrix is a means of subdividing and categorizing the continuous spectrum of potential impacts from zero impact at the bottom left of the figure to the maximum possible impact at the top right.

Figure 1.1 Relationship between Receptor Sensitivity and Magnitude of Change in Defining Impact Significance

MA		Low	Medium	High
MAGNITUDE	Negligible	Insubstantial	Insubstantial	Insubstantial
	Small	Insubstantial or Slight	Slight or Moderate	Slight or Moderate
OF CH/	Intermediate	Slight or Moderate	Moderate	Moderate or Substantial
CHANGE	Large	Slight or Moderate	Moderate or Substantial	Substantial

### SENSITIVITY OF PUBLIC VIEWER

Note: The Magnitude of Change may be Positive or Adverse.

- 1.9.3 The significance of impacts are assessed as 'Significant Adverse' or 'Significant Positive', 'Moderate Adverse' or 'Moderate Positive', 'Slight Adverse' or 'Slight Positive' and 'Negligible'. 'Negligible' impacts are deemed to make no significant difference to the character of views, even though the Project Site and development may be physically visible in them.
- 1.9.4 Finally, a single summary assessment of the impacts is made based on the following thresholds stated in the TPG:
- 1.9.5 **enhanced** if the proposed development in overall term will improve the visual quality and complement the visual character of its setting from most of the identified key public viewing points;
- 1.9.6 **partly enhanced/partly adverse** if the proposed development will exhibit enhanced visual effects to some of the identified key public viewing points and at the same time, with or without mitigation measures, exhibit adverse visual effects to some other key public viewing

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points;

- 1.9.7 **negligible** if the proposed development will, with or without mitigation measures, in overall term have insignificant visual effects to most of the identified key public viewing points, or the visual, effects would be screened or filtered by other distracting visual elements in the assessment area;
- 1.9.8 **slightly adverse** if the proposed development will, with or without mitigation measures, result in overall term some negative visual effects to most of the identified key public viewing points;
- 1.9.9 **moderately adverse** if the proposed development will, with or without mitigation measures, result in overall term negative visual effects to most of the key identified key public viewing points; and
- 1.9.10 **significantly adverse** if the proposed development will in overall term cause serious and detrimental visual effects to most of the identified key public viewing points even with mitigation measures.



### 2 IDENTIFICATION OF BASELINE VISUAL CONDITION

# 2.1 Existing Site Condition

2.2 The Application Site (the Site), with an area of about 10,836 m², is located along Wan Po Road to the immediate north of site 2 and site 3 in Area 85, TKO. Please refer to Figure 2.1 for the location and boundary of the Site. At present, the site is being occupied by the Drainage Services Department, a area of about 9,357m² is partly zoned "Other Specified Uses" annotated "Sewage Treatment Works ("OU(STW)") and a small portion of about 1,499m² to the east of the Site is zoned "Government, Institution or Community (9)" ("G/IC(9)") on the approved TKO Outline Zoning Plan No. S/TKO/20. Figures 2.1, 2.2, and 2.3 illustrate the existing conditions and context of the application site.

### 2.3 Assessment Area

- 2.3.1 The assessment area is the Visual Envelope within which the proposed development is pronouncedly visible from key sensitive public viewers and is shown is **Figure 2.4**. **Figure 2.4** also shows the Initial Assessment Area defined, in accordance with TPB GN-41, by the distance 3H from the development boundary, where H is the proposed height of the development.
- 2.3.2 The Initial Assessment Area for the development site encompasses the eastern portion of LOHAS Park, a portion of the Beaumont Development north of the development site and vacant land south of the development site. A small portion of the natural hillside is also within initial assessment area to the west.
- 2.3.3 The Visual Envelope extends beyond the Initial Assessment Area because the development will be visible to key sensitive public viewers along the major view corridors that extend outwards from the Development into the surrounding hinterland. To the north and east of the development, the Visual Envelope will be largely defined by the existing developments of LOHAS Park and The Beaumont. To the south and west of the development, the Visual Envelope will extend further afield, and is largely defined by existing topography.

# 2.4 Visual Elements

2.4.1 The visual outlook is shaped by the combined composition of all the visual elements which come into sight of the viewers. All key visual elements, including any major physical structures, visual resources or attractors/detractors have been identified and are listed below;

### 2.4.2 Key Positive Visual Elements:

- Victoria Harbour;
- High Junk Peak ridgeline;
- Clear Water Bay Country Park;
- Harbour Traffic Ferries, Traditional Fishing Vessels and Private Vessels.

# 2.4.3 Key Negative Visual Elements;

- Ongoing Major Development Landscape This is a transitional landscape which is currently awaiting large scale development;
- Existing Developments within TKO; and
- Harbour Traffic Off Shore Construction and Container Vessels.

### 2.5 Viewing Points



# VP1: Viewpoint from the Open Space at Wan Po Road

- 2.5.1 The Open Space at Wan Po Road is an amenity landscape at the entrance to LOHAS Park.
- 2.5.2 The public viewers at VP1 are considered to have high sensitivity to visual change.

### VP2: Viewpoint from the Podium of Le Prestige

- 2.5.3 LOHAS Park is a planned mass residential development of the MTR Corporation, situated in Tseung Kwan O Area 86, New Territories, Hong Kong. Upon its completion, it will be the largest residential development in the territory.
- 2.5.4 Le Prestige belongs to the Phase IIA of LOHAS Park, launched in late 2009. It was jointly developed by Cheung Kong Holdings and MTR Corporation and Nan Fung Development. The first phase of Le Prestige, which comprises four blocks, offers a total of 1,688 homes.
- 2.5.5 The public viewers at VP2 are considered to have high sensitivity to visual change.

### VP3: Viewpoint from High Junk peak

- 2.5.6 Towering 344 metres above the lowlands, High Junk Peak is one of the three treacherous peaks in Hong Kong. It is the number one attraction of Clear Water Bay Country Park located in the Clear Water Bay Peninsula. High Junk Peak Country Trail runs north-south along the peninsula.
- 2.5.7 The public viewers at VP3 are considered to have high sensitivity to visual change.

### 3 VISUAL APPRAISAL

### 3.1 Introduction

- 3.1.1 The visual impacts of the Proposed Development on the Key Public Viewing Points are summarised in **Table 4.1** and are described briefly below with reference to the four aspects listed in TPB-GN41. The locations of the Viewing Points are shown on **Figure 2.4.**
- 3.2 VP1: Viewpoint from the Open Space at Wan Po Road (Figure 3.1)
- 3.2.1 The view from the Open Space at Wan Po Road will be dominated by views of the low-rise Data Centre in the middle round which will block views beyond to the natural hillside.
- 3.2.2 <u>Effects on Visual Composition</u>: The presence of the proposed development will result in medium-rise building in the fore-front of the view, resulting in a slightly more imposing effect on the viewer.
- 3.2.3 <u>Effects on Visual Obstruction and Visual Permeability</u>: The presence of the proposed development will cause visual obstruction of the natural hillside. The visual permeability will be reduced somewhat due to the presence of the proposed development however sightlines are still maintained to the distant hillside.
- 3.2.4 <u>Effects on Visual Elements/Resources</u>: When viewed from the Open Space at Wan Po Road the proposed development would obstruct a portion of the Clear Water Bay Country Park, no other impact is anticipated.
- 3.2.5 Effects on Public Viewers: The public's perception of the view from the Open Space at Wan Po Road would generally be of high value, as it consists of a natural hillside, subsequently enhancing the perception of the quality of Public Viewers life. The Public Viewers will have permanent and continuous full views towards the site at distances of approximately 100m. The change in Visual Composition described above, combined with the relative close proximity of these changes to the viewer, will cause an intermediate magnitude of change. This intermediate magnitude of change when combined with the high sensitivity of the public viewers will result in a visual impact significance considered to be Moderate Adverse.



# 3.3 VP2: Viewpoint from the Podium of Le Prestige (Figure 3.2)

- 3.3.1 The view from the Podium of Le Prestige offers a views of High Junk Peak, however, this view will be dominated by the high-rise buildings of LOHAS Park in the foreground and midground.
- 3.3.2 <u>Effects on Visual Composition</u>: The presence of the proposed development density will result in medium-rise building located in front of existing high rise developments.
- 3.3.3 <u>Effects on Visual Obstruction and Visual Permeability</u>: The presence of the proposed development will cause visual obstruction of the existing high-rise developments as well as a small portion of the natural hillside. The visual permeability will be reduced somewhat due to the presence of the proposed development however sightlines are still maintained to the Junk Peak.
- 3.3.4 <u>Effects on Visual Elements/Resources</u>: When viewed from the Podium of Le Prestige the proposed development would obstruct a portion of the Clear Water Bay Country Park, no other impact is anticipated.
- 3.3.5 <u>Effects on Public Viewers</u>: The public's perception of the view from the Podium of Le Prestige would generally be of high value, as it consists of a natural hillside, subsequently enhancing the perception of the quality of Public Viewers life. The Public Viewers will have permanent and continuous full views towards the site at distances of approximately 250m. The change in Visual Composition described above, combined with the relative close proximity of these changes to the viewer, will cause an Intermediate magnitude of change. This Intermediate magnitude of change when combined with the high sensitivity of the public viewers will result in a visual impact significance considered to be Moderate Adverse.

# 3.4 VP3: Viewpoint from High Junk peak (Figure 3.3)

- 3.4.1 The view from High Junk Peak would offer a wide panoramic view of Tseung Kwan O and Hong Kong Island East; the developments of LOHAS Park dominate the mid-ground portion of this view.
- 3.4.2 <u>Effects on Visual Composition</u>: The presence of the proposed development will result in a new building profile that will have a negligible effect from this viewpoint, because of the distance from the viewer and the low-rise profile of the proposed development.
- 3.4.3 <u>Effects on Visual Obstruction and Visual Permeability</u>: The presence of the proposed development density would have no change on the visual permeability or visual obstruction of the view, due to the distance from the viewer and the low-rise profile of the proposed development.
- 3.4.4 <u>Effects on Visual Elements/Resources</u> There would be no impact upon the Visual Element/Resources when view from High junk Peak.
- 3.4.5 Effects on Public Viewers: The public's perception of the view from the High Junk Peak would generally be of high value, as it consists of a natural hillside, subsequently enhancing the perception of the quality of Public Viewers life. The Public Viewers will have permanent and continuous full views towards the site at distances of approximately 800m. The change in Visual Composition described above, combined with the proximity of these changes to the viewer, will cause a negligible magnitude of change. This s negligible magnitude of change when combined with the high sensitivity of the public viewers will result in a visual impact significance considered to be Insubstantial.

### 3.5 Mitigation Proposals

3.5.1 Mitigation proposals seek to reduce or eliminate the visual impacts of the proposed Project. The following mitigation proposals will be introduced as part of the development of the Project. Figure 3.4 illustrates the proposals of provision of green roofs, vertical greening and a 10m NBA to the south of the Application Site as visual mitigation measures would significantly reduce impact to the surrounding development.



ID No.	Visual Mitigation Measures
OM1	Small building footprints
OM2	Stepped height profile
OM3	Sensitive architectural and chromatic treatment
OM4	Extensive NBA's and landscaped areas
OM5	Aesthetic improvement planting of NBAs and landscaped areas
OM6	Implementation of green roofs and vertical greening

- 3.5.2 **OM1** Building footprints within the site has been adjusted to reduce visual obstruction.
- 3.5.3 **OM2** Height profiles have been designed so to appear less visually intrusive.
- 3.5.4 **OM3** Building finishes shall be in recessive or neutral colours and shall not include visually intrusive colours.
- 3.5.5 **OM4** A 10 NBA to the south and landscaped areas have been introduced within the site to enhance visual permeability.
- 3.5.6 **OM5** Tree and shrub planting within NBA's and landscaped areas where possible to mitigate the scale and impact of the buildings, and improve the quality of the streetscape environment.
- 3.5.7 **OM6** Provision of green roofs and vertical greening where feasible and appropriate to mitigate visual impact of buildings.
- 3.5.8 Planting will take a number of years to establish and so the full effects of mitigation will not be seen until some 10 years after completion of the project.



### 4 CONCLUSION AND SUMMARY OF IMPACTS

# 4.1 Impacts on Viewing Points/Public Visually Sensitive Receivers

4.1.1 The methodology for deriving the magnitude of change upon the Public Viewer's and the significance of the visual impacts is described in **Sections 1.6** and **1.9**.

# VP1: Viewpoint from the Open Space at Wan Po Road

4.1.2 The presence of the proposed development would result in an **Intermediate** magnitude of change to the views experienced by the key sensitive public receivers at the Open Space at Wan Po Road, which, when taken together with the **High** sensitivity of these receivers, will result in a visual impact significance considered **Moderately Adverse**.

# VP2: Viewpoint from the Podium of Le Prestige

4.1.3 The presence of the proposed development would result in a **Intermediate** magnitude of change to the views experienced by the key sensitive public receivers at the Podium of Le Prestige, which, when taken together with the **High** sensitivity of these receivers, will result in a visual impact significance considered **Moderately Adverse**.

# VP3: Viewpoint from High Junk peak

4.1.4 The presence of the proposed development would result in a **Negligible** magnitude of change to the views experienced by the key sensitive public receivers at High Junk Peak, which, when taken together with the **High** sensitivity of these receivers, will result in a visual impact significance considered **Insubstantial**.

# 4.2 Overall Assessment of Visual Impacts

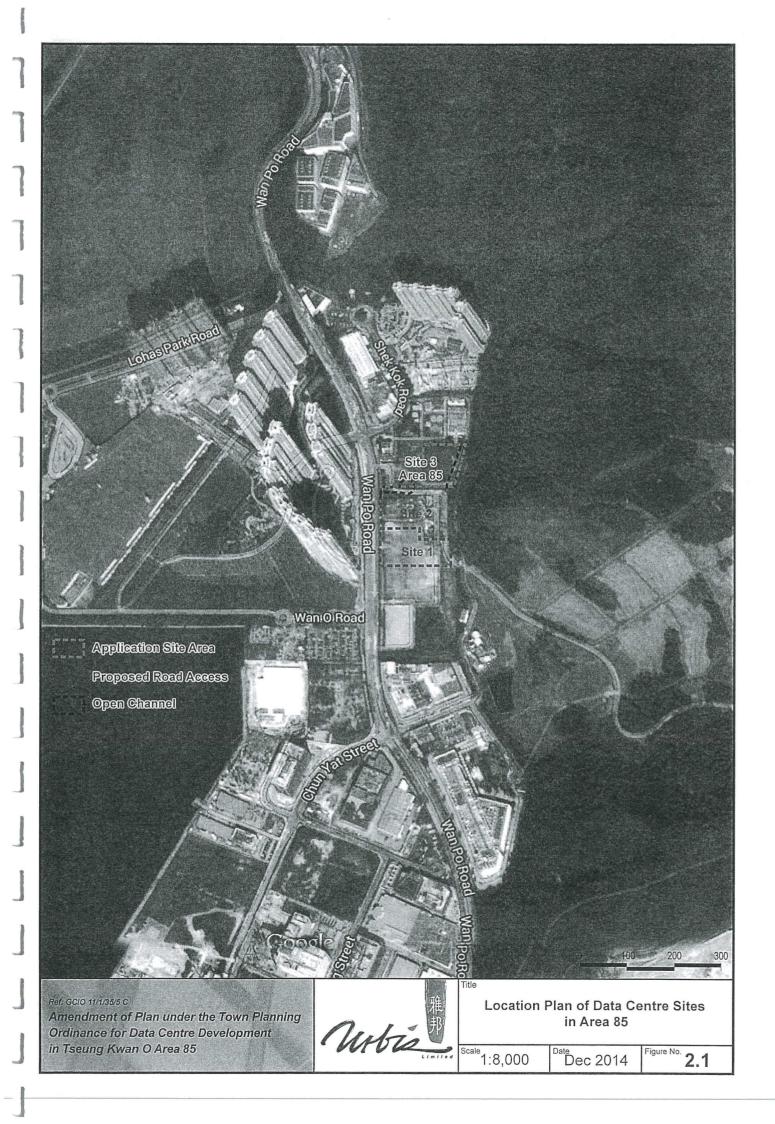
4.2.1 In overview, the visual impact significance of the proposed development, as shown in **Figures 3.1 to 3.3**, would be considered **Slightly Adverse**. The recommendation of green roofs, vertical greening and a 10m NBA to the south of the Application Site as visual mitigation measures would significantly reduce impact to the surrounding development. A summary of degree of impacts to key public viewing points is provided in **Table 4.1**.

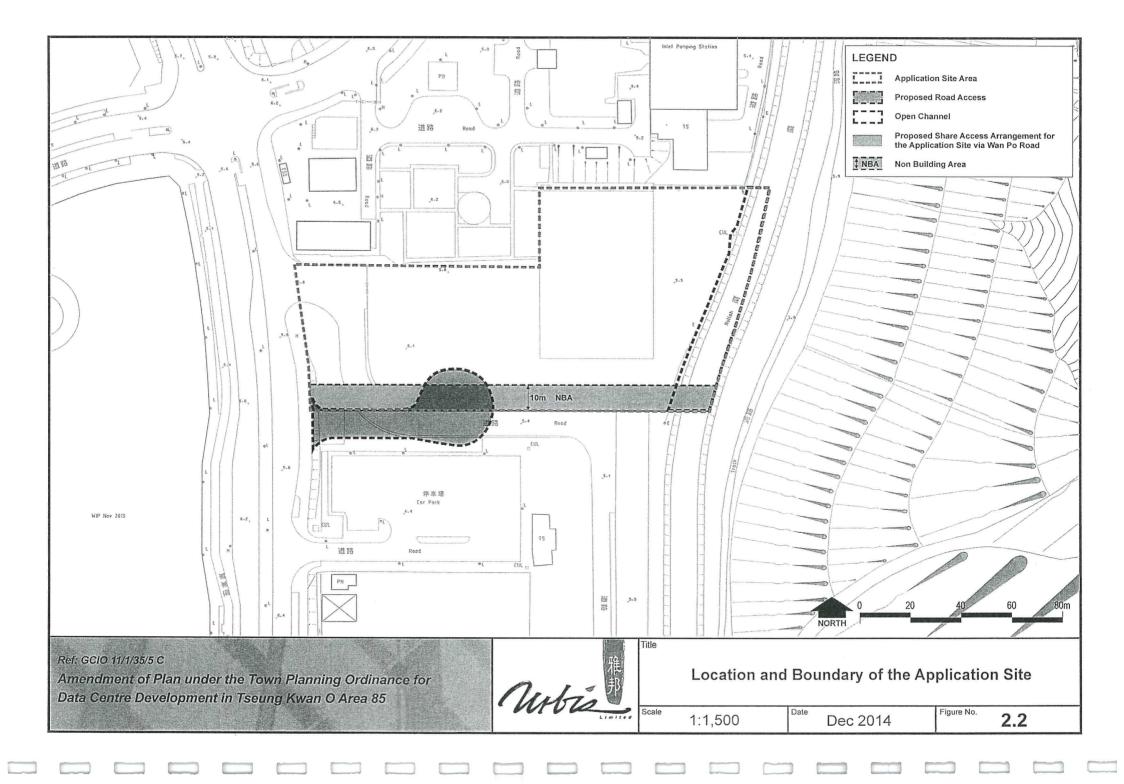
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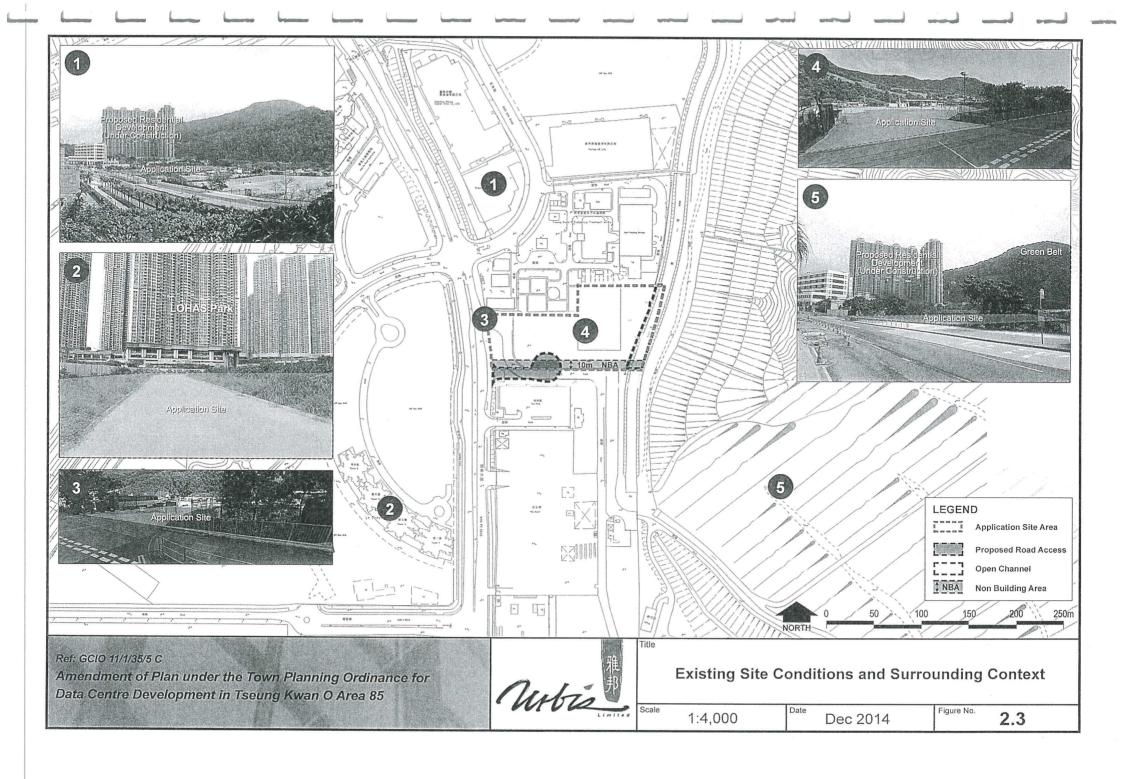


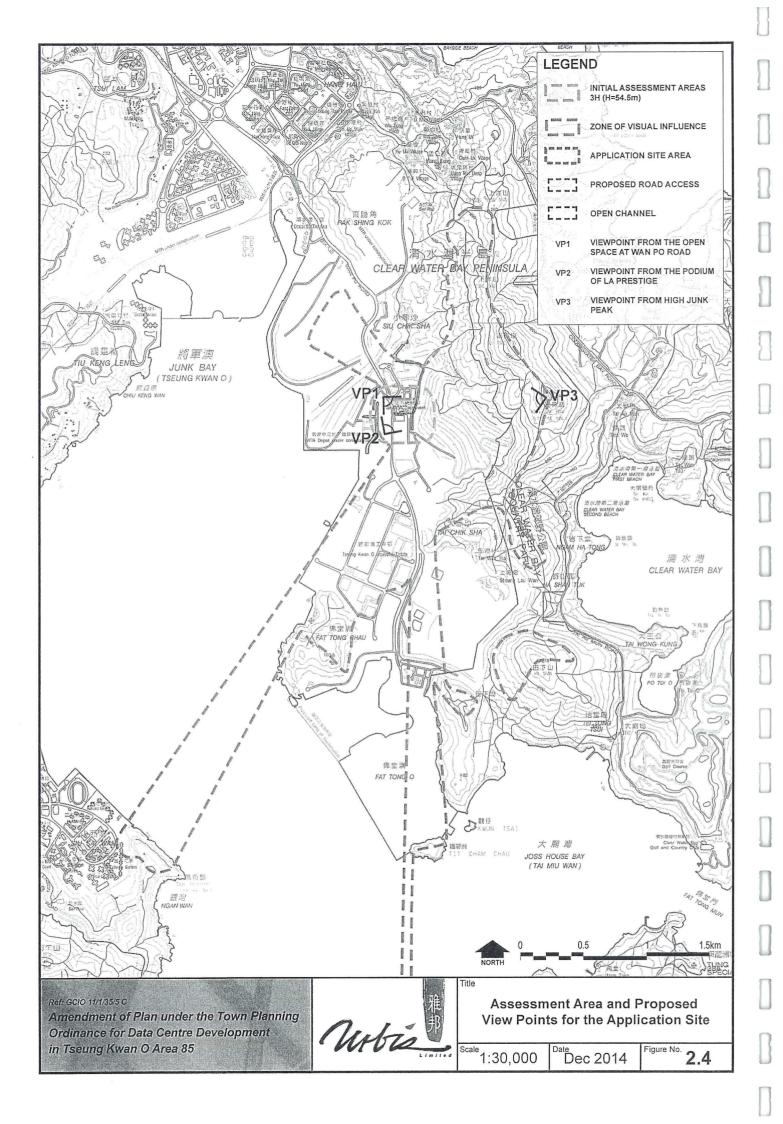
**Table 4.1: Significance of Visual Impacts** 

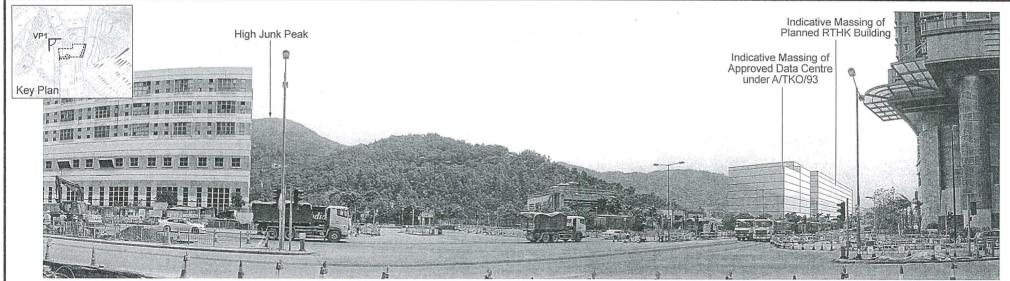
VP	Degree of Visibility of Source(s) of Visual Impact (Full, Partial, Obscured)	Approx. Distance Between VSR & Nearest Source(s) of Impact	Magnitude of Change (Large, Intermediate, Small, Negligible)	Receptor Sensitivity (Low, Medium, High)	Receptor Number (Very Few, Few, Many, Very Many)	Impact Significance during Operation Phase (Substantial, Moderate, Slight, Insubstantial)
VP1	Full	~100m	Intermediate	High	Very Many	Moderate Adverse
VP2	Full	~250m	Intermediate	High	Very Many	Moderate Adverse
VP3	Partial	~800m	Negligible	High	Few	Insubstantial



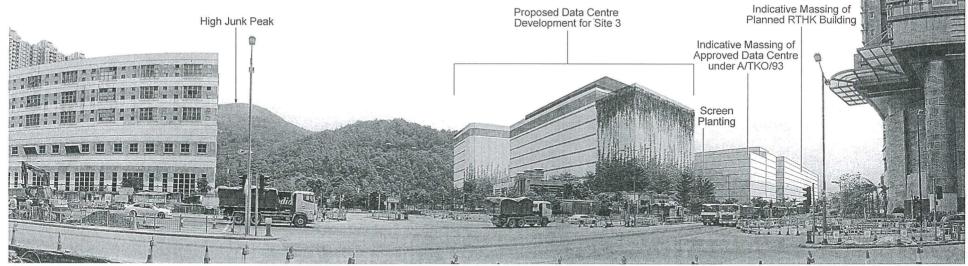








Before



After with mitigation measures

Ref: GCIO 11/1/35/5 C

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Titl

Viewpoint 1 from the Open Space at Wan Po Road

Scale

N.T.S.

Date

Jan 2015

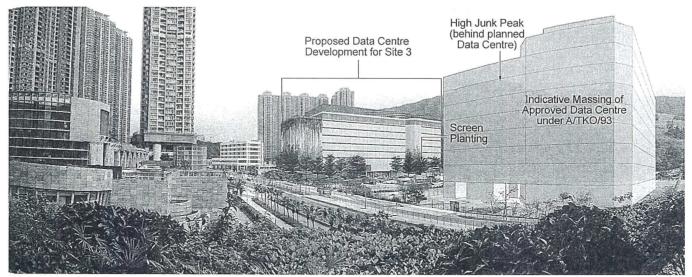
Figure No.

3.1





Before



After with mitigation measures

Ref: GCIO 11/1/35/5 C

Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85



Tit

Viewpoint 2 from the Podium of La Prestige

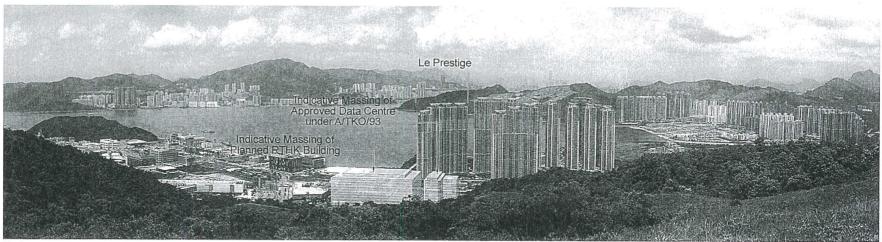
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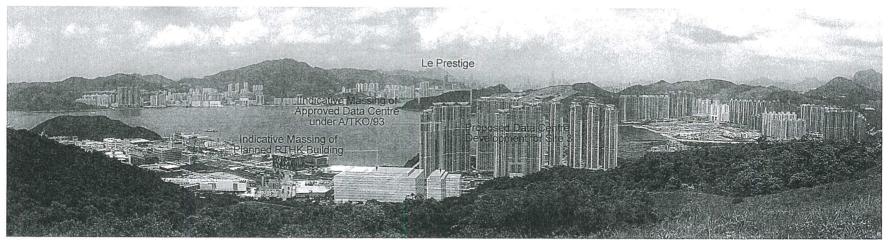
Figure No.

3.2





Before



After with mitigation measures

Ref: GCIO 11/1/35/5 C

Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85



Title

Viewpoint 3 from the High Junk Peak

Scale

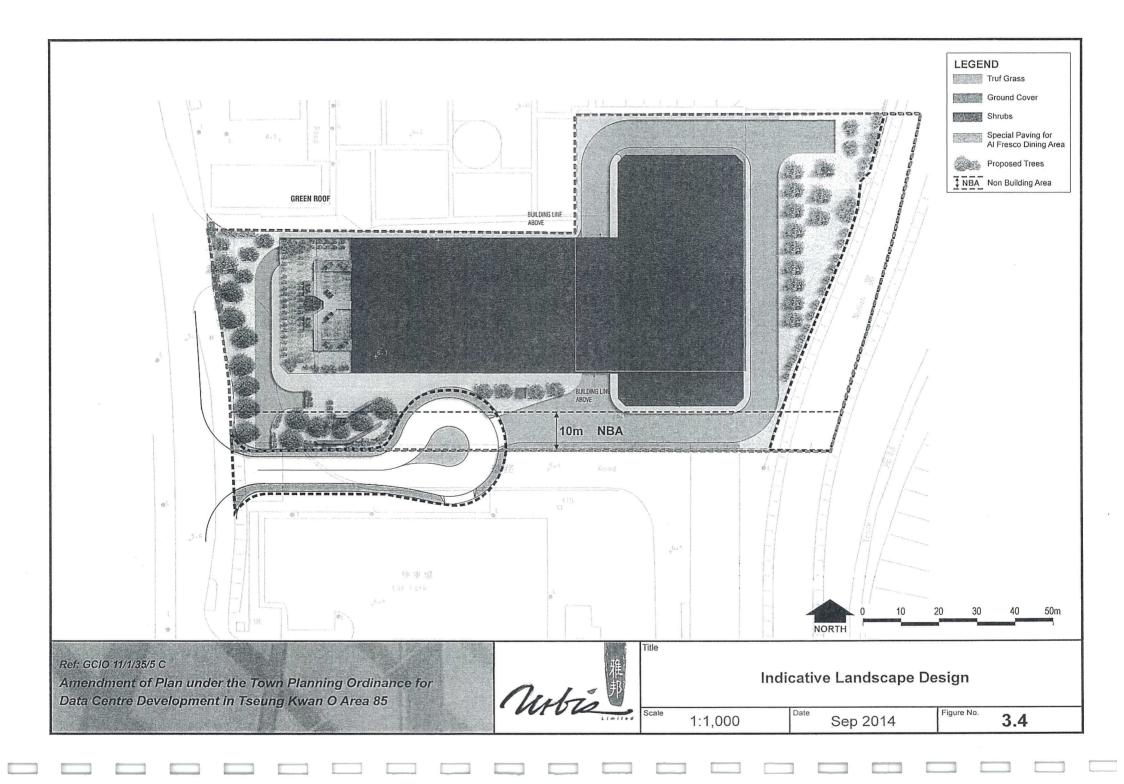
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Date

Jan 2015

Figure No.

3.3



(獲通過的會議記錄)

# 西寅區議會 房屋及環境衞生委員會 二〇一四年第五次會議記錄

日期:二○一四年九月十一日(星期四)

時間:上午九時三十分 地點:西質區議會會議室

出席者	出席時間	離席時間
凌文海先生,BBS,MH(主席)	上午九時三十分	下午一時三十三分
簡兆祺先生(副主席)	上午九時三十分	下午一時三十三分
陳繼偉先生	上午九時三十分	下午一時三十三分
周賢明先生, BBS, MH	上午九時三十分	下午一時三十三分
張國強先生	上午九時三十分	下午一時三十三分
鍾錦麟先生	上午九時三十分	下午一時三十三分
范國威議員	上午九時三十分	下午十二時二分
方國珊女士	上午九時三十分	下午一時三十三分
何民傑先生	上午十時三十分	下午一時三十三分
林少忠先生	上午九時三十分	下午一時三十三分
林咏然先生	上午九時四十八分	下午十二時一分
劉偉章先生,MH	上午九時三十分	下午一時三十三分
梁里先生	上午十時六分	下午一時三十三分
李家良先生	上午九時三十分	下午一時三十三分
陸平才先生	上午九時四十六分	下午十二時三十分
吳雪山先生	上午九時三十分	下午一時三十三分
邱玉麟先生	上午九時三十五分	下午一時二十分
陳浩怡女士 (秘書)	西貢民政事務處行政	主任(區議會)1

## 列席者

尹尚謙先生 西貢民政事務處民政事務助理專員(2) 劉丹女士 西貢民政事務處高級行政主任(區議會) 陳翠薇女士 西賈民政事務處聯絡主任主管(將軍澳)中 梁徐美施女士 房屋署高級房屋事務經理(馬鞍山及將軍澳) 黎兆光先生 食物環境衞生署衞生總督察 陳思敏女士 食物環境衞生署衞生督察(防治蟲鼠) 羅雲騰先生 康樂及文化事務署西賈區副康樂事務經理 2 程健宏先生 環境保護署高級環境保護主任(區域東)4 麥偉坤先生 西貢地政處行政助理(地政)

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郭家城先生

水務署助理工程師/顧問工程管理(14)

朱景熙先生

博威工程顧問有限公司駐地盤工程師

## (一) 歡迎詞

主席歡迎委員以及部門代表出席西賈區議會房屋及環境衞生委員會(下稱「委員會」)二〇一四年第五次會議。

- 2. 主席表示議員在會議期間需留在席上,如在討論某項動議或討論事項時,提出的議員不在席上,有關動議或討論事項將延至下次會議上才討論。為了有效進行討論,每位委員在每個議題上可發言兩次,每次兩分鐘。各位委員需嚴格遵守上述規則,以及不應濫用「跟進問題」作為發言多於兩次的原因。
- 3. <u>主席</u>報告,區能發先生、陳國旗先生、陳博智先生、何觀順先生、駱水 生先生及溫悅昌先生因不在港以致未能出席是次會議,他們已於事前按規定 提交缺席會議通知書。由於沒有委員反對,<u>主席</u>表示根據西賈區議會會議常 規第 51(1)條批准缺席申請。

## (二) 通過上次會議記錄

- 4. 主席請委員參閱房屋及環境衞生委員會二○一四年第四次會議記錄。
- 5. 秘書表示於會議當天早上約7時收到方國珊女士的電郵,表示希望就會議記錄當中兩個部分作出修訂。修訂內容包括會議記錄第25段第8行,把「她批評現時日出康城現約有十萬居民居住」改為「她批評現時日出康城及環保區規劃約有十萬居民居住」,以及會議記錄第108段第9行,「她指根據土木工程拓展署提供進入本區填料庫的車輛資料顯示,2014年6月共有1,320架次,比2014年2月的1,200架次更多,但污染物卻減少了」把當中的「但污染物

- 21. 主席續提出另一個案以作澄清,他指區議會副主席陳國旗先生並沒有出席上一次委員會會議,會後其秘書致電向他表示已為陳先生以書面方式提交缺席申請,他亦清楚回覆必須依照規則辦事,因秘書處於會議後才收到陳先生的缺席申請,故此陳國旗先生上次會議的缺席申請並不獲委員會批准。陳國旗先生的秘書於本次會議前一天再次致電他表示陳先生申請缺席是日會議,他亦即時向秘書處查詢是否已收到有關缺席申請才作出回覆。主席強調自己辦事清楚分明,方國珊女士不應轉移視線,且以委員缺席申請一事指摘他處事不公亦屬無理及不實。主席就有關修訂建議作出裁決,方女士並沒有遵守各委員共同訂立的規矩。
- 22. <u>陳繼偉先生</u>表示應按規矩一視同仁地辦事,如委員違反規矩,秘書處無需把有關事宜放到會議上討論,即如委員於不足 14 天前提出動議,秘書處已可直接拒絕委員,無需諮詢委員會意見。他認為委員會無需浪費會議時間,爭論應否接納修訂建議,他指自己沒有重聽有關錄音,亦不希望於會議內重聽,故他建議主席授權秘書處於會後重聽有關錄音,如發現修訂內容與委員當日的發言吻合便予以修正,若不符合則不作任何修改,以節省會議時間。
- 23. 主席表示他不會於會議上播放上次會議的錄音,惟因有關修訂建議並無按照規定於會議前一個工作天提出,故主席裁決有關修訂建議並不成立。主席指秘書處只是把會議相關的事情安排到會議上討論,最終仍需交由主席作出裁決,故他宣布有關修訂建議不被接納。主席宣布上述會議記錄在沒有修訂下獲得通過。

## (三)新議事項

## <u>將軍澳第85區的數據中心發展</u> (SKDC(HEHC)文件第100/14號)

- 24. <u>主席</u>歡迎商務及經濟發展局政府資訊科技總監辦公室總系統經理麥之 駒先生、高級項目經理陳京華先生及規劃署高級城市規劃師鄭禮森女士出席 會議。
- 25. 主席請委員參閱 SKDC(HEHC)文件第 100/14 號, 備悉軍澳第 85 區的數據中心發展文件。
- 26. <u>麥之駒先生</u>按有關文件向委員簡介將軍澳第 85 區的數據中心發展計劃 的詳情,並希望可聽取委員的寶貴意見,及得到各委員支持此有利香港長遠 發展的計劃。

- 27. <u>李家良先生</u>表示若政府資訊科技總監辦公室(下稱「資科辦」)到區議會簡介計劃時,可提供更多資料,例如選址的地點及地圖等,可有助委員理解。雖然他歡迎香港建立更多數據中心,但因過往的委員會會議已討論於將軍澳設立數據中心,現時再增設另一個數據中心,他擔心各數據中心的位置會否過於集中。他指數年前台灣曾經發生地震,地震對海底電纜造成破壞,亦令香港對外輸出的數據出現問題。他查詢若部門計劃於將軍澳工業區建立數據中心,其網絡連線會否採用獨立分開的設計,以及供電設備方面會否有兩套不同的系統,以避免其中一間數據中心出現問題時影響其他數據中心的運作。
- 28. 主席表示署方有提供選址的地點及地圖等資料。
- 29. <u>張國強先生</u>表示將軍澳人口稠密,擔心污水處理廠或有機會需要擴建,故希望了解何以渠務署會把土地交還政府。他並查詢資科辦會否使用海底電纜連接數據中心作資料傳輸,把資料輸送到各地,或新的數據中心會否只作備分之用,用以連接現有的數據中心,以擴大其儲存量及作其他用途。若為前者,因數據中心必需要有連接系統傳送資料,他希望了解資科辦會否以微波或海底電纜作傳送。因為根據地圖位置,數據中心的選址地點並不接近海邊,若以海路傳輸或會出現問題,故他希望了解資科辦是否另有計劃,並希望資科辦可提供更多資料。
- 30. <u>麥之駒先生</u>表示西貢區的供電系統是由中華電力有限公司(下稱「中電」) 負責,主要以電纜連接供電,而非委員剛才提及的微波系統,各個數據中心 的供電獨立運作,而高端數據中心一般會有兩個不同的供電源,使其可不斷 運作。至於數據傳輸方面,由於新的數據中心項目會以公開招標方式予業界 競投,目前難以估計中標者誰屬,故數據中心的最終發展以及將交由哪一公 司使用亦屬未知之數,惟根據以往的數據顯示,香港的高端數據中心的主要 發展為支援香港金融貿易業,並以銀行業為主。
- 31. <u>方國珊女士</u>表示她曾於 2009 年建議渠務署把將軍澳(環保選區)第 85 區 污水處理廠的曝氣池拆除,並騰出上述約一公頃的土地供社區/地區使用,如增設日常配套設施,以配合第 85 區及 86 區日出康城社區及峻瀅居民的需要。對於資科辦建議興建數據中心,她認為有關用地並不合適。她表示於中秋前數天收到有關文件後的一星期內,自己馬不停蹄收集居民的意見,並收到區內數百戶居民踴躍表達的意見,他們指上述土地位於康城社區對面的馬路,現時該處已有一個由新意網持有的數據中心,故她建議把有關土地預留作社區之用,如興建市政大樓、乾濕貨街市、停車場或圖書館等等具迫切需要的民生配套設施。她表示支持政府增加數據中心,並建議政府可考慮選址工業邨或其他地方,至於與民居接近的政府用地則應提早預留予社區之用。她預計康城區仍需 6 至 7 年的發展才會有商場落成,現時居民最需要的為生活上

的配套設施,故她期望渠務署交還的土地可於短期內改作臨時車位用途,而 長遠則可發展為市政大樓以及其他配套設施。

- 32. <u>周賢明先生</u>表示他支持香港需要進一步加強競爭,特別是加設數據中心 此類設施,因為政府在數年前於將軍澳舗設海底電訊管道時已預計會進行相 關的發展。他認為如何在環境上與社區協調為最重要的事,現時該位置旁的 土地屬渠務署範圍,他關心署方將來會否需要進行其他發展。其次,政府、 機構或社區設施用地是否等同市政大樓或圖書館,他認為需待規劃署作出補 充,因為根據《香港規劃標準與準則》,本區應難以符合有關要求,故於該處 興建市政大樓或圖書館的可能性不大。他認為如把珍貴的土地丟空,政府將 來或會於該處興建更多住宅樓宇,但他認為香港除發展住宅樓宇外,亦應同 時進行其他發展。至於將軍澳第 85 區及 86 區本身為綜合發展區,故當中已有 相應的設計,以 86 區為例,該處於第一期發展時已預留土地作室內運動場設 施,可見綜合發展區已預留土地作相應設施發展,故委員應小心運用區外土 地興建合適的設施。
- 33. <u>陳繼偉先生</u>查詢將軍澳工業邨是否尚有其他土地可供數據中心使用。他並指現時擬使用的土地涉及部份政府、機構或社區設施用地,由於將軍澳人口不斷上升,有關用地已十分罕有,故應盡量用作興建設施予市民使用,至於興建的具體項目可再作討論,惟委員不應輕易同意把有關用地交還政府並與污水廠的用地合併興建數據中心。他認為如只涉及污水處理廠所在的土地尚可接受,但不應動用任何政府、機構或社區設施用地。
- 34. <u>麥之駒先生</u>解釋選址於將軍澳第 85 區,是由於高端數據中心的用地有特別的要求,如選址需有極高效的電訊網、可以提供穩定而大量的電力供應、不可距離商業中心區太遠、交通設施及附近環境設施亦不可構成風險。他表示資科辦過往一直與規劃署合作尋找合適的土地發展數據中心,而將軍澳第 85 區的土地為經過詳細評估後認為合適的地點。他指政府明白社區設施的重要性,並已根據《香港規劃標準與準則》,於將軍澳預留多幅土地作為政府、機構或社區設施的用途。因此,為了香港整體的發展,資料辦認為於上述土地作數據中心發展會更適合。

## 35. 鄭禮森女士的回應如下:

有關污水處理方面,渠務署以往曾把有關土地作曝氣池之用,使署方可以不同方法處理污水,惟現時將軍澳的污水全被輸送到昂船洲一併處理,故已無需有關土地作污水處理用途,因此渠務署把土地交回政府。

- 有關市政及康樂設施方面,正如麥之駒先生所述,署方一向根據《香港規劃標準與準則》預留足夠的土地予將軍澳市民使用,如需再預留其他土地,署方需得到有關政策局方面的支持。
- 有關街市及其他康樂設施方面,食物環境衞生署(下稱「食環署」) 已以書面方式詳細解釋目前未有政策支持政府興建街市,至於其他 康樂社區設施,如剛才所言,署方已預留足夠的土地予將軍澳居民 使用。
- 36. <u>邱玉麟先生</u>支持政府於上述地點設立數據中心,以顧及香港將來整體發展的需要。
- 37. <u>主席</u>表示有委員贊成,亦有委員反對有關計劃,故需以舉手形式進行表 決。
- 方國珊女士表示位於將軍澳環保選區的日出康城及峻瀅,現時約有三萬 人口居住,預計將來會增至十萬人口,而工業邨亦有兩萬名員工,惟這區涵 蓋的人口雖多,但卻沒有任何食肆,亦缺乏地方停泊車輛。她相信各委員亦 認同將軍澳規劃的車位比例嚴重不足,故她認為有需要預留一些市民可於合 理距内離步行到達的土地,優先設立可解決市民生活急需的設施。雖然預留 土地以興建街市、多層停車場、室內運動場、圖書館或其他發展規劃等需要 有關政策局的支持,但委員仍可就其發展用途從長計議,惟若區內減少了一 幅社區用地,發展社區設施的機會便相對減少了。她指邱玉麟先生曾建議於 將軍澳村旁興建多層停車場,有關建議亦需要改變某些土地的用途,同樣若 把區內的社區用地改作數據中心發展,該區居民便需要到很遠的地方購物或 停泊車輛。她理解各個政策局都有各自的政策,不少部門高層都不會經常到 區內視察及了解區內民情,惟她相信西貢區議會的議員都具備良好素質,定 可理解到若減少了一幅土地便沒有機會與政府討價還價,不能為居民爭取更 多的民生改善設施,故此,她呼籲各委員支持保留有關土地予居民優先使用, 至於土地實際用途方面則可再從長計議。她總結自己支持數據中心於工業邨 内興建,而非於現時資科辦建議的選址。
- 39. <u>李家良先生</u>表示自己原支持興建數據中心,惟仔細閱讀文件了解數據中心的位置後,認同方國珊女士提出的意見,因有關位置較為接近民居,加上現時未有數據中心的具體設計,故他不贊成政府把兩個數據中心建於毗鄰,若需進行投票表決,他亦會投反對票。
- 40. <u>周賢明先生</u>表示將軍澳第 85 區北面尚有一幅政府、機構或社區設施用 地,而政府去年所拍賣的土地以南位置亦有同樣土地用途的用地,雖然政府、

機構或社區設施用地的詳細用途仍需待規劃署提供進一步的資料確定,但原則上他支持於本區設立第二個數據中心。對於有委員指若有關土地用作興建數據中心,便會失去於民居對面設立街市的機會,他認為有關說法只是為居民帶來一個錯誤的期望。他指於現有的政策下興建街市可說是十分困難,即使政府打算興建街市,情況亦將與他們當年要求於將軍澳第15區毓雅里附近的一幅政府、機構或社區設施用地上的社區中心興建街市一樣,雖然附近屋邨一同爭取興建街市以解決寶琳街市擠迫問題,惟事情稍有眉目便遭到位於街市附近的屋苑極力反對。同樣,他相信未來若成功爭取於將軍澳86區對面興建街市,亦會招徕該處鄰近屋苑的反對。至於其他地區需要,如停泊車輛問題,議員一直催促當局改善85區及86區的規劃處理,或於鄰近地方提供臨時泊位,他指香港整體的泊車位供求失衡,特別是商業車輛更難覓得泊車位,議員一直爭取興建多層停車場,並會與規劃署繼續商討有關位置。他總結自己原則上十分支持於區內設立數據中心。

- 41. <u>劉偉章先生</u>表示支持周賢明先生的論點。他指現時難以要求政府興建街市,特別是不少市民因街市環境較為濕滑難行而改往超級市場購物,以致對街市的需求大大減少了,亦正因此將軍澳第 15 區寶林邨附近加建街市一事拖拉多時亦未有結果。此外,若香港放棄金融業發展,不興建數據中心,或因爭論持續以致遲遲未能落實興建,便會削弱香港與鄰近地區的競爭力,故他支持於本區興建第二個數據中心。
- 42. 何民傑先生表示現時無論使用網上銀行,或任何網上處理的事都需要數據中心的支援,然而於香港營商最困難的地方就是欠缺土地,若土地方面未能配合,便會促使數據中心遷移到廣州及菲律賓等地,當地的英文水平不但不俗,土地價格亦相對便宜,故最終只會令香港的競爭力下跌。他表示數據中心選址何處固然是關鍵所在,但他不知其他委員是否曾到污水處理廠進行實地視察。他表示自己曾於數年前到該處視察,印象十分深刻,他指有關污水並非一般洗手的污水,而是坐廁遺留的剩糞,可說是近乎厭惡性的設施。文件並沒有提到上述設施會關閉,即有關設施仍然存在,署方只是交還設施附近剩餘的土地作數據中心發展。在上述污水處理設施不會關閉的前提下,設施旁的土地應不適宜興建住宅,興建街市亦不符合衞生。有關設施對未來於數據中心辦公的員工健康亦不理想,甚至可能影響租值。不過平衡各方面的利弊後,他認為與其丟空上述土地,倒不如早點發展數據中心。
- 43. <u>麥之駒先生</u>澄清有關污水處理廠於是次發展會進行遷拆,換言之整幅土 地將變成數據中心。
- 44. <u>主席</u>表示由於委員持不同意見,故此需要進行表決,他請委員以舉手方式表達支持或反對有關計劃。

- 45. <u>張國強先生</u>表示文件最後的地圖,以紅色框標示數據中心所在的地方, 若第 85 區污水處理廠整個遷拆後,便會有一幅很大的土地,他希望了解有關 土地是否會劃為政府、機構或社區設施用地,並希望規劃署可詳細解釋上述 土地的未來發展。
- 46. <u>鄭禮森女士</u>回應指污水處理廠仍會保留於原址,只有地圖上以紅色方框顯示,即擬興建數據中心的土地會被騰空。她表示現時污水處理廠主要是以密封式運作經地下管道及海底管道把污水輸送到昂船洲污水處理廠一併處理,故對附近環境及市民健康沒有不良影響。
- 47. 主席請各委員以舉手形式進行表決。
- 48. 方國珊女士要求以投票機進行表決。
- 49. 表決結果為 9 票贊成, 2 票反對, 及 2 票棄權。有關表決結果即時顯示於螢光幕上。
- 50. 主席表示委員會通過支持是項工程計劃及其選址。

(討論完畢,主席請商務及經濟發展局政府資訊科技總監辦公室代表及規劃署 代表先行離席。)

# 食物環境衞生署二零一四年西貢區滅蚊運動(第三期)

## (SKDC(HEHC)文件第 101/14 號)

- 51. <u>主席</u>表示由於食環署的滅蚊運動於 2014 年 8 月 18 日至 10 月 10 日期間舉行,故署方已於 8 月初提供相關文件及通知委員有關安排。
- 52. <u>主席</u>並請委員參閱 SKDC(HEHC)文件第 101/14 號, 備悉食環署提交的文件。

## 委員提出的四項識案

要求善明邨盡快加設乒乓球球枱

(SKDC(HEHC)文件第 102/14 號)

(SKDC(HEHC)文件第 126/14 號)

- 53. <u>主席</u>表示為了有效進行討論,提出動議或討論事項的議員,應只在有必需要作補充時才發言,如有關發言內容已包含在動議文件上,不應重申一次。
- 54. 主席表示動議由何民傑先生提出,並由梁里先生和議。

## Proposed Data Centre at TKO Site 2 & Site 3 Air Ventilation Assessment – Preliminary Observation

## 1 Introduction

- 1.1 The Subject Sites, Site 2 and Site 3, are located at Tseung Kwan O with site areas of 12,600m<sup>2</sup> and 10,800m<sup>2</sup> respectively (see Figure 1).
- 1.2 For Site 2, it is currently an open parking area and zoned "Government, Institution or Community(9)" ("G/IC(9)") on the Approved Tseung Kwan O Outline Zoning Plan (OZP) No. S/TKO/20. For Site 3, it is currently vacant and zoned "Other Specified Uses" annotated "Sewage Treatment Works ("OU(STW)") for most of the site, and a small portion zoned "G/IC(9)" on the subject OZP.
- 1.3 In order to facilitate the use of both Site 2 and Site 3 for high-tier data centre development, it is required to rezone Site 3 to "G/IC (9)" and amend the Notes of the OZP for the "G/IC" zone by transferring the use 'Information Technology and Telecommunications Industries (within "G/IC(9)" only)' from Column 2 to Column 1 under the Schedule of Uses of the zone.
- 1.4 The Subject Sites are located at the south-eastern side of Tseung Kwan O Town Centre (see Figure 1) which are bounded by Tseung Kwan O Preliminary Treatment Works to the north with a high-density residential development, The Beaumount, to the further north, a nullah to the east, High Junk Peak to the further east, a committed data centre development on Site 1 of Area 85 to the south, Wan Po Road to the west and a comprehensive high-rise residential developments (i.e. LOHAS Park) to the further west.

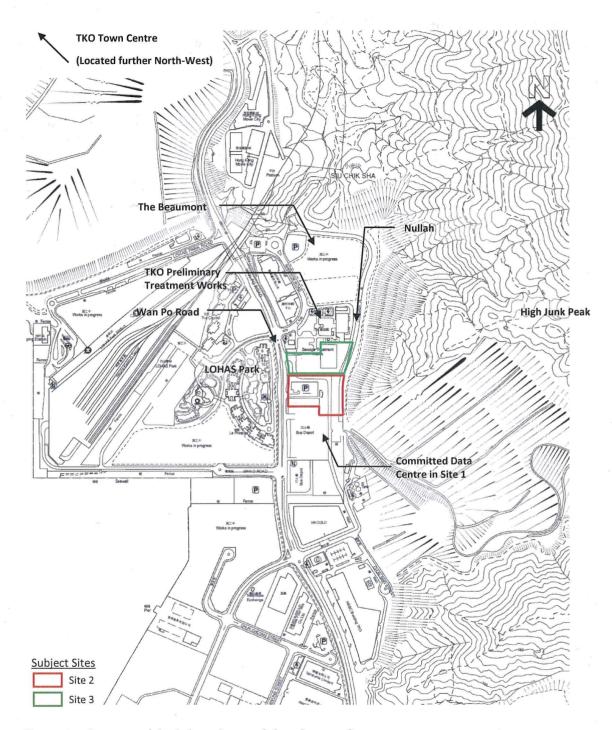


Figure 1 Location of the Subject Sites and their Surroundings

## 2 Site Wind Availability

## Measured wind data from Tseung Kwan O Weather Station of HKO

2.1 Referring to the wind data from Tseung Kwan O (TKO) Weather Station of Hong Kong Observatory (HKO), the prevailing winds are coming from NE, ENE, E and SW under annual condition (see Figure 2), while the summer prevailing winds are coming from NE, SE, S and SW directions (see Figure 3).

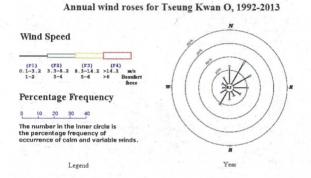


Figure 2 Wind data from TKO weather station of HKO (downloaded from http://www.hko.gov.hk/cis/region\_climat/JKB/JKB\_windrose\_year\_e.htm)

Monthly wind roses for Tseung Kwan O from July to September ,1992-2013

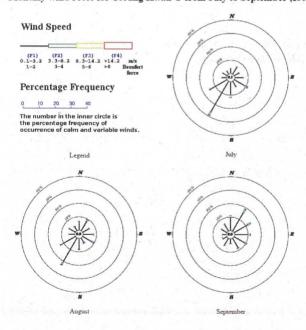


Figure 3 Wind data from TKO weather station of HKO (downloaded from http://www.hko.gov.hk/cis/region\_climat/JKB/JKB\_windrose\_\_0709\_e.htm)

## MM5 simulated wind data from PlanD's website

According to the MM5 wind data (at the height 596m above terrain) on the Planning Department's website, the most prevailing winds for the Subject Sites are mainly coming from the ENE (18.9%), E (14.9%) and NE (13.1%), among the annual wind frequency (see Figure 4).

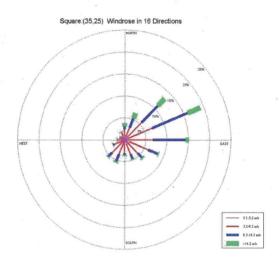


Figure 4 MM5 wind rose at 596m above terrain level of Grid (35,25) (extracted from PlanD's website)

## Experimental site wind data from Experimental Site Wind Study for Tseung Kwan O

2.3 In accordance with the experimental site wind study for Tseung Kwan O dated August 2009, although the measurement location is not exactly at the current Subject Sites, it provides both annual and summer experimental wind data as reference.

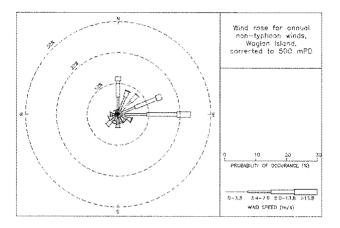


Figure 5 Annual wind rose at 500m above terrain level at TKO (extracted from Experimental Site Wind Study for TKO in August 2009)

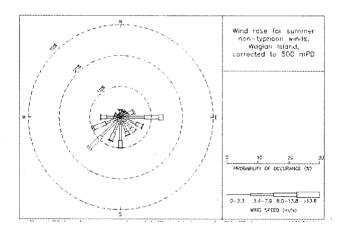


Figure 6 Summer wind rose at 500m above terrain level at TKO (extracted from Experimental Site Wind Study for TKO in August 2009)

2.4 It is shown that annual prevailing winds are mainly coming from **NE** quadrant (see Figure 5), while the summer prevailing winds are coming from **E**, **S** and **SW** directions (see Figure 6).

2.5 In summary of the above wind data, the annual prevailing winds are NE, ENE and E winds, while the summer prevailing winds are SE, S and SW winds around the Subject Sites.

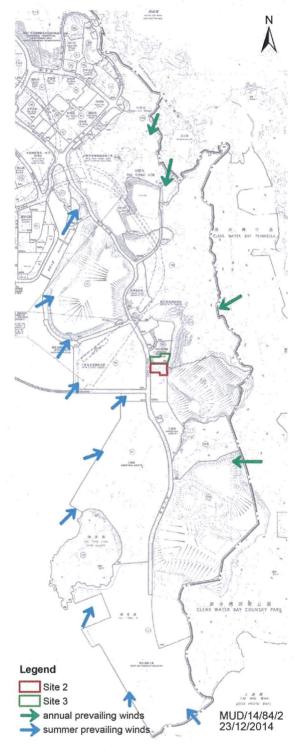


Figure 7 Annual and summer prevailing winds around the Subject Sites

## 3 Existing Wind Environment

- 3.1 Topographically, the Subject Sites are situated on a flat land (with a mean site formation level of about 6mPD) at the foothill of High Junk Peak (i.e. 340mPD). A number of vegetated slopes zoned "Green Belt" and "Open Space" are found to the east of the Sites. These spaces allow the prevailing NE, ENE, E and SE winds to reach the Subject Sites freely.
- 3.2 Wind penetration in this area around the Subject Sites would mainly rely on Wan Po Road and the nullah to the east of the Subject Sites which are identified as the major breezeways. The existing condition with open parking in Site 2 and vacant site in Site 3 is relatively open in nature to allow wind penetration through the Subject Sites in the east-west direction effectively.

## 4 Expert Evaluation of the Proposed Data Centres

- As mentioned, the site areas of the proposed data centres at Site 2 and Site 3 are 12,600m<sup>2</sup> and 10,800m<sup>2</sup> respectively, with building height of 60mPD for both sites.
- 4.2 Generally, a building with building height of H would create a wake area of about 1H in radius measured from the building footprint. Considering the relatively low building height (i.e. 60mPD) of the proposed data centres, they would create a relatively small wake area (see Figure 8) with impact most notably around Wan Po Road and a limited part of the LOHAS Park residential development.

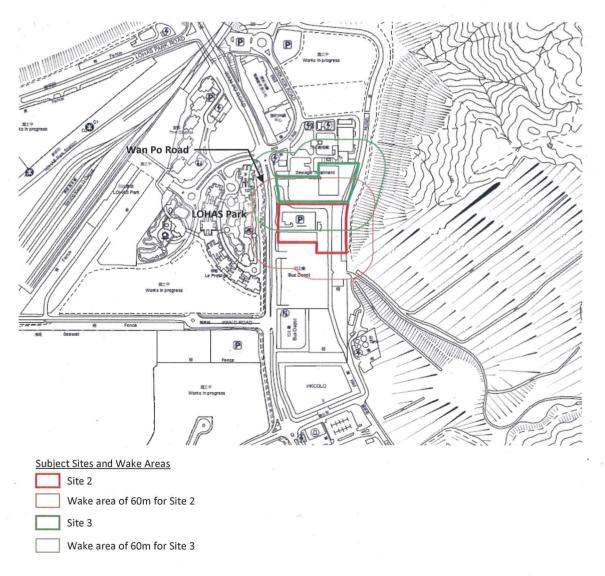


Figure 8 Subject Sites and their wake areas

- 4.3 As aforementioned, the Subject Sites do not lie within the major breezeways and localised air paths. It is anticipated that such proposed data centres would not significantly affect the north-south wind penetration along Wan Po Road and nullah near the foothill of High Junk Peak.
- 4.4 Given that both Sites 2 and 3 are located adjacent to each other, they will form continuous frontages of some 140m and 200m in lengths on the west and east respectively. It is recommended that a non-building area (NBA) aligning in the east-west direction be incorporated for allowing east wind and katabatic wind particularly to reach the existing residential developments (i.e. LOHAS Park) in the downstream area. The NBA is proposed to have a total effective width of 20m. For consideration of design flexibility allowed for the proposed data centre within each site, the 20m NBA could comprise a 10m-wide NBA each measured from the southern boundary of Site 3 and from the northern boundary of Site 2 (see Figure 9).

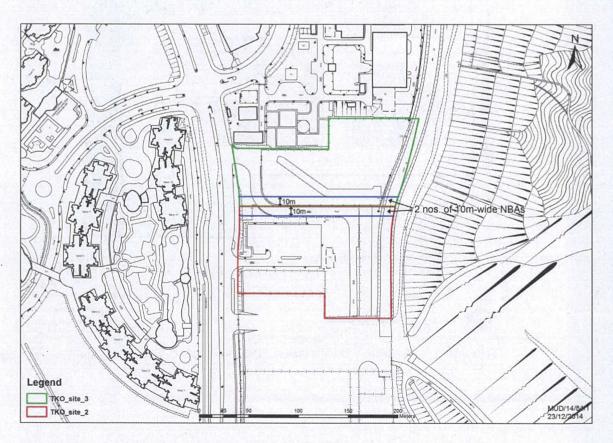


Figure 9 Location of the Proposed 20m-wide NBA

4.5 In response to the proposed 20m-wide NBA, indicative schemes of the proposed data centre developments in Sites 2 and 3 are represented in Figure 10 and Figure 11 below.

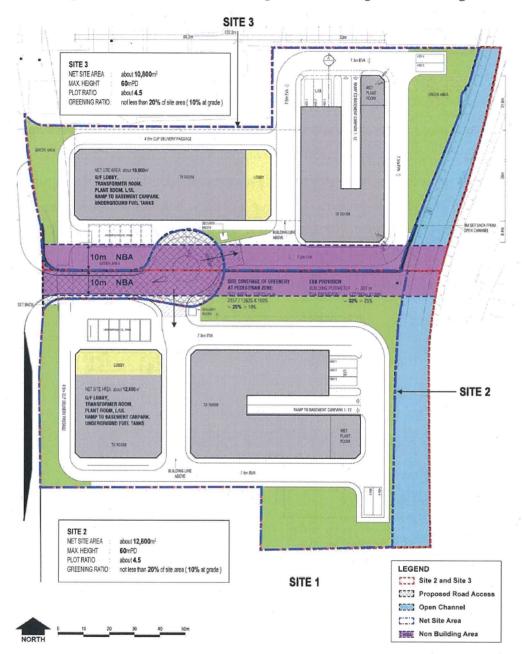


Figure 10 Indicative Layout Plans of Proposed Data Centres (G/F) and Proposed 20m-wide NBA

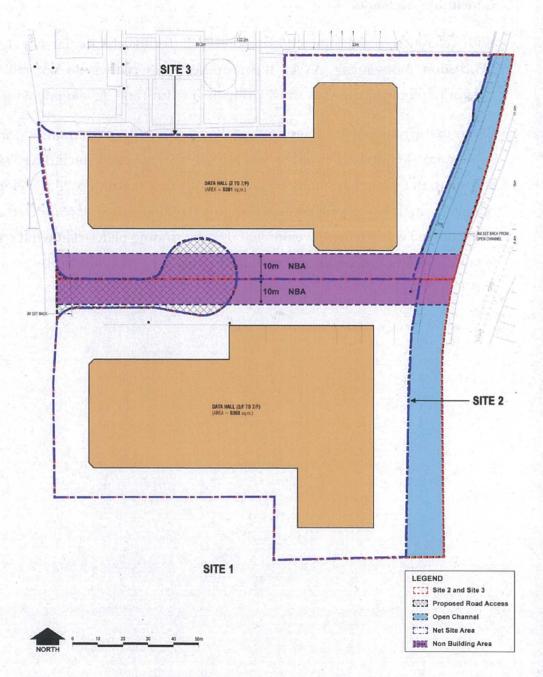


Figure 11 Layout Plans of Proposed Data Centres (Typical Floor) and Proposed 20m-wide NBA

4.6 It is anticipated that the proposed data centres, with the NBA as an enhancement measure, would not create significant adverse air ventilation impact on the existing pedestrian wind environment.

## 5 Concluding Remarks

- With reference to the joint HPLB and ETWB Technical Circular No. 1/06 on Air Ventilation Assessment (AVA), the proposed data centres do not fall within the categories requiring an AVA considering their nature and development scale.
- 5.2 Given that (i) the Subject Sites are largely surrounded by open areas (including the open space of High Junk Peak) to the east; (ii)major air paths (including Wan Po Road and the nullah) remain unobstructed; and (iii) that the proposed developments are relatively small in massing and only up to a building height of 60mPD, the impact of the proposed data centre development on surrounding pedestrian wind environment is not expected to be significant with the provision of 20m-wide NBA between Sites 2 and 3.

# Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85

# **Tree Survey Report**

(Rev. 0)

Prepared by :		22 October 2014		
•	Freddy Wan	Date		
Checked by :			22 October 2014	
	Winona Ip		Date	
Approved for issue by :			22 October 2014	
•	Alan Macdonald		Date	

# **LIST OF CONTENTS**

- 1 Introduction
- 2 Description of Survey Area
- 3 Tree Survey Methodology
- 4 Findings of Tree Survey

Appendix A Tree Assessment Schedule

Appendix B Tree Survey Plan

Appendix C Tree Survey Photographs

## 1 INTRODUCTION

## 1.1 Background

1.1.1 Urbis Ltd. has been commissioned by the Office of the Government Chief Information Officer (OGCIO) in 2014 of the proposed data centre to undertake the tree survey services and preparation of tree survey report for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85.

## 1.2 Content of Report

- 1.2.1 This Tree Survey Report contains the following information:
  - description of the survey area (Section 2)
  - description of tree survey methodology (Section 3);
  - findings of tree survey (Section 4);
  - Tree Survey Schedule (Appendix A);
  - Tree Survey Plan showing the location of the tree survey boundary, the location of each tree surveyed and its reference number (Appendix B).

## 1.3 Relevant Legislation and Guidelines

- 1.3.1 In preparation of the Report, reference has been made to the following technical circulars, practice notes and publications:
  - Environment, Transport and Works Bureau Technical Circular (Works) No. 2/2004 --Maintenance of Vegetation and Hard Landscape Features;
  - Environment, Transport and Works Bureau Technical Circular (Works) No. 29/2004 –
     Registration of Old and Valuable Trees, and Guidelines for their Preservation;
  - Environment, Transport and Works Bureau Technical Circular (Works) No. 10/2005 Planting on Footbridges and Flyovers;
  - Development Bureau Technical Circular (Works) No. 10/2013 Tree Preservation;
  - Forests and Countryside Ordinance (Cap.96);
  - Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586);
  - Agriculture, Fisheries and Conservation Department Publication 'Check List of Hong Kong Plants 2012' (2012);
  - Country Parks Ordinance (Cap. 208);
  - General Regulation (GR) 740;
  - Agriculture, Fisheries and Conservation Department Publication 'Rare and Precious Plants of Hong Kong' (2003);

## 2 DESCRIPTION OF SURVEY AREA

2.1 The tree survey area is within Site 2 for a land at Tseung Kwan O (TKO) Area 85 Data Centre Development Area where will be affected by future developments and infrastructure. Site 2, is currently zoned "Government, Institution or Community (9)" ("G/IC(9)") under the provisions of the approved TKO Outline Zoning Plan No. S/TKO/20 (the OZP), has an area of about 1.26 ha

with a maximum building height of 60mPD located in the immediate south of Site 3 and north of Site 1, the area is planned for Data Centre development and it is currently occupied by a temporary uses including a public car park and some recycling uses.

## 3 TREE SURVEY METHODOLOGY

## 3.1 Individual Tree Survey Methodology

- 3.1.1 Where practical, all trees are surveyed individually, in which case the following information is identified for each individual tree:
  - tree number:
  - botanical name:
  - height;
  - crown spread;
  - trunk diameter (measured 1.3 metre from the ground);
  - an assessment of health (good / fair / poor);
  - whether the tree is included in the Register of Old and Valuable Trees promulgated under ETWB TC(W) 29/2004;
  - whether the tree is potentially registrable in accordance with the criteria as set out in ETWB TC(W) No. 29/2004;
  - whether the tree species is protected under local legislations, including the Forests and Countryside Ordinance (Cap. 96) and the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586);
  - whether the tree species is included in the latest edition of the publication 'Rare and Precious Plants of Hong Kong' issued by AFCD;
  - additional remarks are provided for trees to which special importance is ascribed due to special attributes such as protected status; rarity; age over 100 years, outstanding size or form; and cultural or historical significance; and
  - photographic records.

## 3.2 Tree Assessment

## 3.2.1 Tree Form

The form of all trees surveyed is evaluated as good, fair or poor taking account of the following criteria:

- whether the tree is a good example of the typical form and shape of that species;
- the degree to which the tree possesses a well-balanced, attractive shape;
- the presence / absence of dead, damaged or broken limbs, branches, stumps; and
- the presence / absence of crossing, tangled branches.

### 3.2.2 Tree Health

The health of all trees surveyed is evaluated as good, fair or poor taking account of the following criteria:

- foliage poor leaf colour or small leaf size may indicate damage to roots; deep green and dense foliage indicates good health of tree.
- twigs poor shoot growth and die-back of twigs in the crown are often symptoms of root problems;
- branches Dead, broken or crossing branches will be noted, as well as splits and cavities; and
- trunk cavities or internal rot can be revealed by discoloured bark, moisture seeping through the bark and bracket fungi. Open cavities and bark damage will be noted
- root the lifting of the root plate will be noted, Root severance by trenches and cuttings, or burial of the roots by adding fill and of soil compaction and paving up to the trunk will be noted.

## 3.2.3 Suitability for Transplanting

The suitability for transplanting is evaluated as high, medium or low taking account of the following criteria:

- the typical ability of that species to survive transplanting;
- the individual tree size, form and health condition;
- the presence of any physical impediments to the preparation of root balls and tree lifting operation, such as wall, utilities, manholes, rocks, foundations etc.; and
- the inclined angle of the tree roots.

## 3.2.4 Amenity Value

The amenity value of all trees surveyed is evaluated as good, fair or poor, taking account of the following criteria (based on Development Bureau Technical Circular (Works) No. 10/2013 – Tree Preservation):

- the functional values for shade, shelter, screening;
- the functional values for reduction of pollution and noise; and
- the tree's fung shui significance.

## 4 FINDINGS OF TREE SURVEY

- 4.1 The tree survey was carried out on 15 and 16 October 2014 for all trees within the survey area, and immediate to the boundary with the position of the trees as shown on Drawing HKG1-ADD1/TS01 under Appendix B.
- 4.2 A total of **57** trees were surveyed, consisting of **4** tree species. The general conditions of the trees were found to be variable, ranging from poor to good. Generally, the trees found in the surveyed area can be classified as common tree species. The tree species were found to be *Psidium guajava, Macaranga tanarius* var. *tomentosa, Leucaena leucocephala and Litchi chinensis*.
- 4.3 There were **2** dead trees.
- 4.4 No trees surveyed are noted in the book 'Rare and Precious Plants of Hong Kong' (2003) published by Agriculture, Fisheries and Conservation Department, as "near threatened; or are recorded in China Plant Red Data Book and Illustrations of Rare & Endangered Plants in Guangdong Province."; or are listed under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).
- 4.5 No trees surveyed are included in the Register of Old and Valuable Trees promulgated under ETWB TC(W) 29/2004. Furthermore, no trees surveyed are potentially registrable in accordance with the criteria as set out in ETWB TC(W) No. 29/2004.
- 4.6 Undersized trees (i.e. with a trunk diameter of less than 95 mm measured at 1300 mm height) are not included in this report.
- 4.7 The species of surveyed trees and number of each tree species are summarized in the following table:

Table 4.1 – Summary of Tree Species and Number of Trees:

Botanical Name	Chinese Common Name	Number of Trees	
Leucaena leucocephala	銀合歡	29	
Litchi chinensis	荔枝	1	
Macaranga tanarius var. tomentosa	血桐	23	
Psidium guajava	番石榴	2	
Dead Tree	枯樹	2 .	
	Total	57	

Appendix A
Tree Assessment Schedule

#### Tree Assessment Schedule

Project Title:

Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85

Date of Tree Survey:

15-16/10/2014

Surveyed by: Andre Le Claire & Felix Kwan

Tree No.	Species	Measurements			Amenity value	Form	Health condition	Structural condition	S	ultability for transplanting	Additional Remarks	
	Scientific name	Chinese name	height (m)	DBH (mm)	crown spread (m)		(góc	od/fair/poor)	a Calbridge	(high/ medium /low)	Remarks	Adultiolid Reliadas
T1	Leucaena leucocephala	銀合歡	6.5	. 102	6.0	Poor	Poor	Fair	Poor	Low	Undesirable, invasive species	Located in a area surrounded by debris
T2	Macaranga tanarius var. tomentosa	血桐	6.0	181	7.0	Poor	Fair	Good	Fair	Low	Not a valued specimen	Broad, healthy specimen
T3	Leucaena leucocephala	. 銀合歡	6.0	175	6.0	Poor	Fair	Fair	Fair_	Low	Undesirable, invasive species	No basal flare due to tying from the tree surround
T4	Leucaena leucocephala	銀合歡	6.5	183	8.0	Poor	Poor	Fair	Poor	Low	Undesirable, invasive species	Multi-stemmed tree
T5	Leucaena leucocephala	銀合歡	6.5	134	8.0	Poor	Fair	Good	Fair	Low	Undesirable, invasive species	Red fire ant nest at base of this tree
T6	Leucaena leucocephala	銀合歡	6.0	111	7,0	Poor	Fair	Good	Fair	Low	Undesirable, invasive species	Located in a area surrounded by debris
17	Macaranga tananus var. tomentosa	血桐	5.0	137	5.0	Poor	Poor	Good	Poor	Low	Asymmetrical canopy	Over-topped by adjacent tree
T8	Macaranga tanarius var. tomentosa	血桐	5.0	188	5.0	Poor	Fair	Good	Fair	Low	Not a valued specimen	Most dominant of the two Macaranga growing in very close proximity
T9	Leucaena leucocephala	銀合歡	4.0	111	9.0	Poor	Poor	Good	Poor	Low	Undesirable, invasive species	Completely rotated tree. DBH measured at 0.5m
T10	Leucaena leucocephala	銀合歡	5.0	99	4.0	Poor	Poor	Good	Poor	Low	Undesirable, invasive species	Heavily leaning tree
T11	Macaranga tanarius var. tomentosa	血桐	5.5	223	5.5	Poor	Fair	Fair	Fair	Low	Physically damaged	Completely surrounded by concrete. Impact damage
T12	Macaranga tanarius var. tomentosa	血桐	4.0	255	8.0	Poor	Fair	Fair	Fair	Low	Located under light	Growing immediately under the light pole. DBH measured at 0.3m
Т13	Leucaena leucocephala	銀合歡	4.0	99	8.0	Poor	Fair	Fair	Poor	Low	Undesirable, invasive species	Growing through metal fencing. Physical damage
T14	Leucaena leucocephala	銀合歡	4.5	99	5.0	Poor	Poor	Fair	Poor	Low	Undesirable, invasive species	Partially rotated tree
T15	Leucaena leucocephala	銀合歡	4.0	111	3.5	Poor	Fair	Fair	Poor	Low	Undesirable, invasive species	Sparsely foliated specimen
T16	. Leucaena leucocephala	銀合歡	4.0	180	5.0	Poor .	Poor	Fair	Poor	Low	Undesirable, invasive species	Numerous previous failures
T17	Leucaena leucocephala	銀合歡	2.5	115	6.0	Poor	Poor	Poor	Poor	Low	Undesirable, invasive species	Damaged tree. Alive through epicormic growth
T18 .	Leucaena leucocephala	銀合歡	3.0	99	5.0	Poor	Poor	Fair	Poor	Low	Undesirable, invasive species	Completely rotated tree. DBH measured at 0.3m
T19	Leucaena leucocephala	銀合歡	5.5	131	6.0	Poor	Fair	Fair	Poor	Low	Undesirable, invasive species	Bifurcating tree. Both trunks with wounds
T20	Leucaena leucocephala	銀合歡	5.5	105	6.0	Poor	Fair	Fair	Poor	Low	Undesirable, invasive species	Small trunk wound
T21	Leucaena leucocephala	銀合歡	4.5	191	6.0	Poor	Fair	Fair	Poor	Low	Undesirable, invasive species	Very poor branch union. DBH measured at 0.4m
T22	Leucaena leucocephala	銀合歡	5.5	151	6.0	Poor	Poor	Fair	Poor	Low	Undesirable, invasive species	Severely damaged specimen
T23	Leucaena leucocephala	銀合歡	5.5	143	6.0	Poor	Poor	Fair	Poor	Low	Undesirable, invasive species	Previous failures observed
T24	Leucaena leucocephala	銀合歡	5,5	111	6.0	Poor	Fair	Fair	Poor	Low	Undesirable, invasive species	Very poor branch union
T25	Litchi chinensis	荔枝	5.0	121	6.0	Poor	Fair	Fair	Poor	Low	Confined root area	Fruit tree species. Access limitations, therefore dimensions are estimated
T26	Psidium guajava	番石榴	5.0	172	7.0	Poor	Fair	Fair	Fair	Low	Located on a sloping area	Fruit tree species. Access limitations, therefore dimensions are estimated
T27	Psidium guajava	番石榴	5.0	127	6.0	Poor	Poor	Poor	Poor	Low	Located on a sloping area	Fruit tree species. Access limitations, therefore dimensions are estimated. Poorer of the two

## Tree Assessment Schedule

Project Title:

Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85

Date of Tree Survey:

15-16/10/2014

Surveyed by: Andre Le Claire & Felix Kwan

Tree No.	Species		N	leasuremer	nts	Amenity value	Form	Health condition	Structural condition	Si	ultability for transplanting	Additional Remarks
	Scientific name	Chinese name	height (m)	DBH (mm)	crown spread (m)		(goc	od/fair/poor)		(high/ medium /low)	Remarks	
T28	Leucaena leucocephala	銀合歡	6.0	105	5.0	Poor	Fair	Fair	Poor	Low	Undesirable, invasive species	Red fire ant nest at base of this tree
T29	Macaranga tanarius var. tomentosa	血桐	4	121	5.0	Poor	Poor	Fair	Poor	Low	Located on a sloping area	Wrapped in wire which has become included within the tree
T30	Leucaena leucocephala	銀合歡	8	99	4.0	Poor	Poor	Poor	Poor	Low	Undesirable, invasive species	Damaged by a wind thrown tree
T31	Leucaena leucocephala	銀合歡	4	105	3.0	Poor	Poor	Fair	Poor	Low	Undesirable, invasive species	Damaged by a wind thrown tree
T32	Macaranga tanarius var. tomentosa	血桐	6	127	6.0	Poor	Poor	Fair	Poor	Low	Asymmetrical canopy	Heavily leaning tree
T33	Macaranga tanarius var. tomentosa	血桐	6	143	6.0	Poor	Poor	Fair	Poor	Low	Asymmetrical canopy	Damaged by a wind thrown tree
T34	Leucaena leucocephala	銀合歡	6	150	6.0	Poor	Poor	Fair	Роог	Low	Undesirable, invasive species	Damaged by a wind thrown tree
T35	Macaranga tanarius var. tomentosa	血桐	9	150	5.0	Poor	Poor	Fair	Poor	Low	Asymmetrical canopy	Damaged by a wind thrown tree
T36	Leucaena leucocephala	銀合歡	5	131	3.0	Poor	Poor	Poor	Poor	Low	Undesirable, invasive species	Apical leader broken out by wind thrown tree
T37	Leucaena leucocephala	銀合歡	6	121	3.5	Poor	Poor	Fair	Poor	Low	Undesirable, invasive species	Alive through epicormic development
T38	Macaranga tanarius var. tomentosa	血桐	8	223	12.0	Poor	Poor	Fair	Poor	Low	Located on a sloping area	Dominant tree in the group
T39	Macaranga tanarius var. tomentosa	血桐	6	143	8.0	Poor	Poor	Fair	Poor	Low	Located on a sloping area	Severely asymmetrical
T40	Macaranga tanarius var. tomentosa	血桐	5	185	10.0	Poor	Poor	Fair	Poor	Low	Located on a sloping area	Severely asymmetrical
T41	Leucaena leucocephala	銀合歡	8	131	7.0	Poor	Poor	Poor	Роог	Low	Undesirable, invasive species	Asymmetrical canopy. Low live crown ratio
T42	Leucaena leucocephala	銀合歡	7	251	9.0	Poor	Poor	Poor	Poor	Low	Undesirable, invasive species	Wind thrown tree
T43	Leucaena leucocephala	銀合歡	7	95	4.0	Poor	Fair	Fair	Poor	Low	Undesirable, invasive species	Leaning tree
T44	Macaranga tanarius var. tomentosa	m桐	12	318	10.0	Poor	Poor	Fair	Poor	Low	Located on a sloping area	Damaged tree. Appears to have been vandalised
T45	Macaranga tanarius var. tomentosa	血桐	10	255	8.0	Poor	Poor	Fair	Poor	Low	Located on a sloping area	Severely asymmetrical canopy through phototropism
T46	Dead Tree	枯樹	4	133	3.0	-	-	-		-	-	Dead tree
T47	Dead Tree	枯樹	· 6	286	5.0	-	•	-	-	-	-	Dead tree
T48	Macaranga tanarius var. tomentosa	血桐	10	322	10.0	Poor	Poor	Good	Poor	Low	Located on a sloping area	Multi-stemmed. Large tree
T49	Macaranga tanarius var. tomentosa	血桐	9	361	12.0	Poor	Fair	Fair	Poor	Low	Located on a sloping area	Veteran age-class. Trunk wound
T50	Leucaena leucocephala	銀合歡	9	102	5.0	Poor	Poor	Fair	Poor	Low	Undesirable, invasive species	Low live crown ratio
T51	Macaranga tanarius var. tomentosa	血桐	7	175	8.0	Роог	Fair	Fair	Poor	Low	Located on a sloping area	Poor branching structure
T52	Macaranga tanarius var. tomentosa	血桐	6	131	6.0	Poor	Poor	Good	Fair	Low	Located on a sloping area	Juvenile, bifurcating tree
T53	Macaranga tanarius var. tomentosa	血桐	5	105	4.5	Poor	Poor	Good	Poor	Low	Located on a sloping area	Juvenile tree in a group of similar trees
T54	Macaranga tanarius var. tomentosa	血桐	5	140 .	5.0	Poor	Poor	Good	Fair	Low	Located on a sloping area	Juvenile tree in a group of similar trees

#### Tree Assessment Schedule

Project Title:

Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85

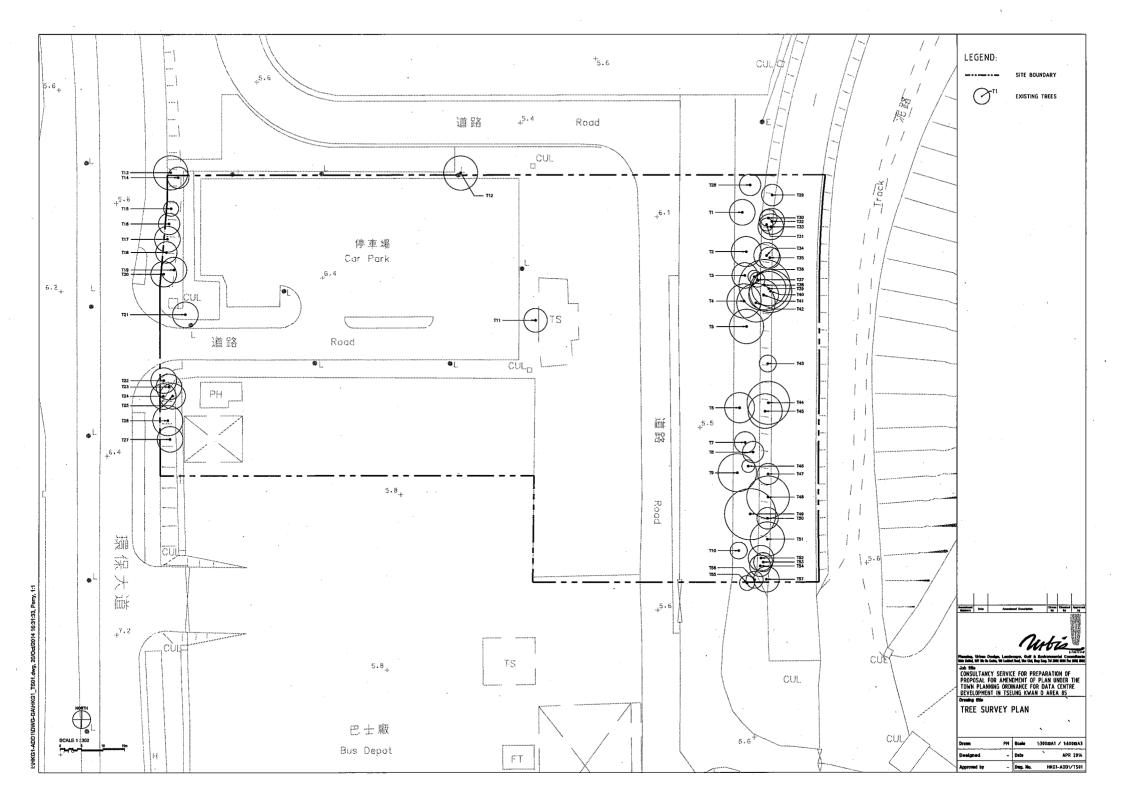
Date of Tree Survey:

15-16/10/2014

Surveyed by: Andre Le Claire & Felix Kwan

Tree No	Species		Measurements		Amenity value	Form	Health condition	Structural condition	Sultability for transplanting		Additional Remarks	
	Scientific name	Chinese name	height (m)	DBH (mm)	crown spread (m)		(good/fair/poor)			(high/ medium Remarks		
T55	Macaranga tanarius var. tomentosa	血桐	3	99	3.5	Poor	Fair	Good	Fair	Low	Not a valued specimen	Juvenile tree in a group of similar trees
T56	Macaranga tanarius var. tomentosa	血桐	3	102	4.0	Poor	Fair	Good	Fair	Low	Not a valued specimen	Juvenile tree in a group of similar trees
T57	Macaranga tanarius var. tomentosa	血桐	8	191	6.0	Poor	Poor	Poor	Poor	Low	Located on a sloping area	Severely asymmetrical specimen

Appendix B
Tree Survey Plan



Appendix C
Tree Survey Photographs



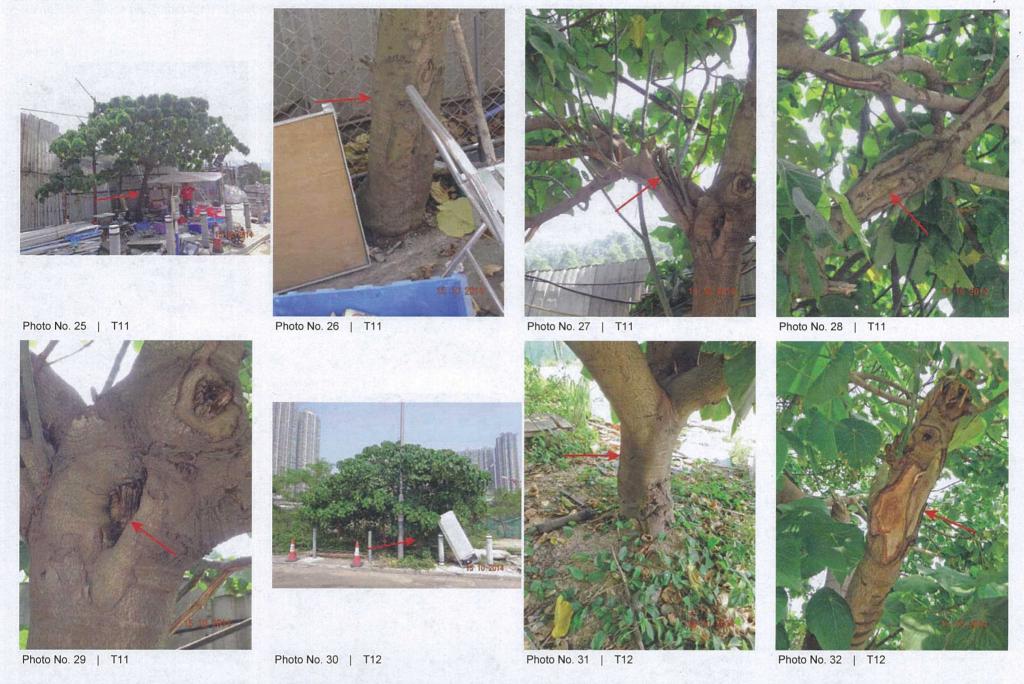
Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85 TREE SURVEY PHOTOGRAPHS



Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85 TREE SURVEY PHOTOGRAPHS



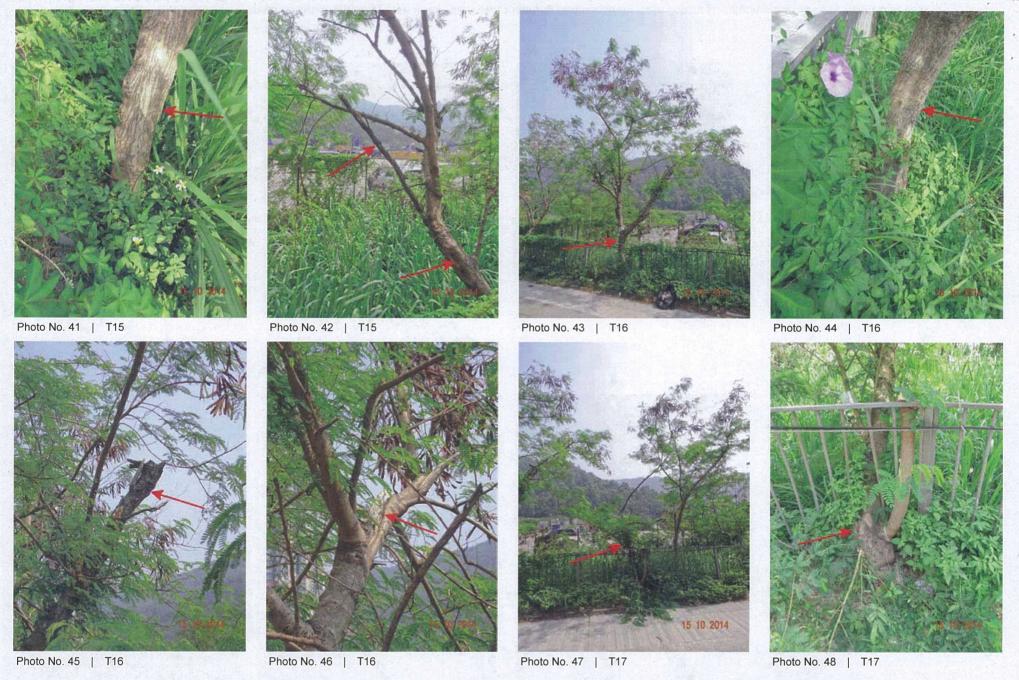
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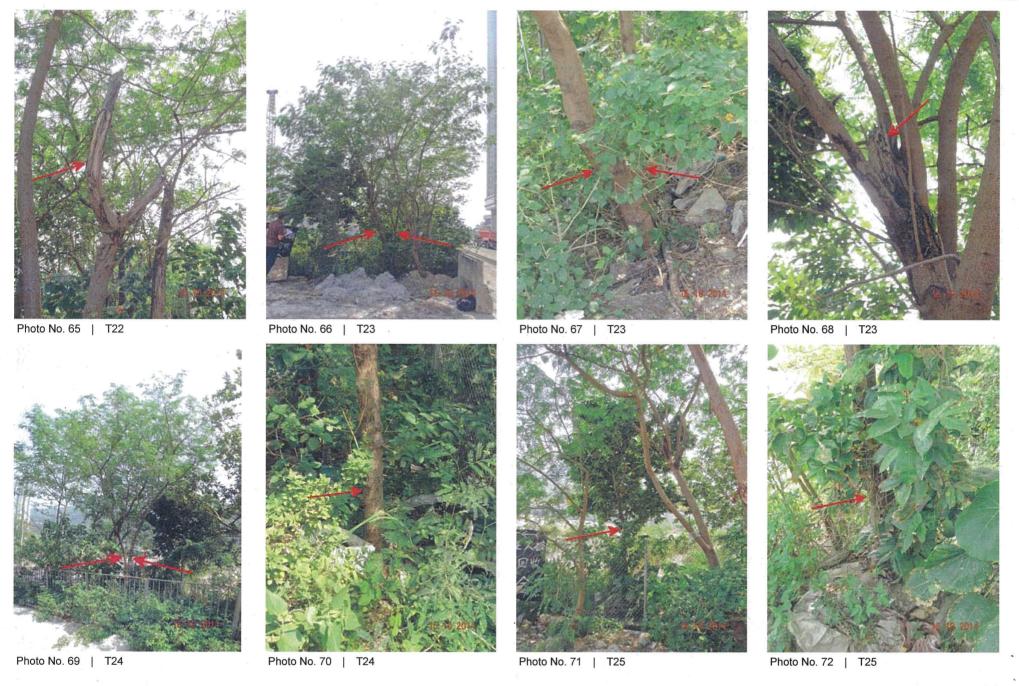
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Consultancy Service for Preparation of Proposal for Amendment of Plan under the Town Planning Ordinance for Data Centre Development in Tseung Kwan O Area 85 TREE SURVEY PHOTOGRAPHS



Photo No. 145 | T57°

#### Provision of Major Community Facilities in Tseung Kwan O

Type of	Hong Kong	HKPSG	Pro	vision	Surplus/Shortfall
Facilities	Planning Standards and Guidelines (HKPSG)	Requirement (Planned Population: About 445,000 <sup>(1)</sup> )	Existing	Planned (Existing + Proposed)	(against planned provision)
Secondary School	1 whole day classroom for 40 persons aged 12-17	471 classrooms	694	844	+373 classrooms
Primary School	1 whole day classroom for 25.5 persons aged 6-11	798 classrooms	697	787	-11 classrooms <sup>(2)</sup>
Kindergarten	26 classrooms for 1,000 children aged 3 to under 6	230 classroom	296	314	+84 classrooms
District Police Station	1 per 200,000 to 500,000 persons	1	1	1	.0
Divisional Police Station	1 per 100,000 to 200,000 persons	2	0	0	-2
Sub-divisional Police Station/Police Post	No set standard	NA	0	1	NA
Ambulance Depot/Divisional or Sub-divisional Fire Station	No set standard	NA	2	3	NA
Hospital	5.5 beds per 1,000 persons	2448 beds	1026	1026	-1422 beds <sup>(3)</sup>
Specialist Clinic/Polyclinic	1 Specialist clinc/polyclinic whenever a regional or district hospital is built	NA	2	2	NA
Clinic/ Health Centre	1 per 100,000 persons	4	2	3	-1
Post Office	1 per 30,000 persons	14	4	4	-10
Magistracy (with 8 courtrooms)	1 per 660,000 persons	1	0	0	-1
Market	No set standard	NA	11	11	NA

<sup>(1)</sup> Depends on the nature of the community facilities, "Planned Population" may include Usual Residents and/or Mobile Residents and/or Transients.

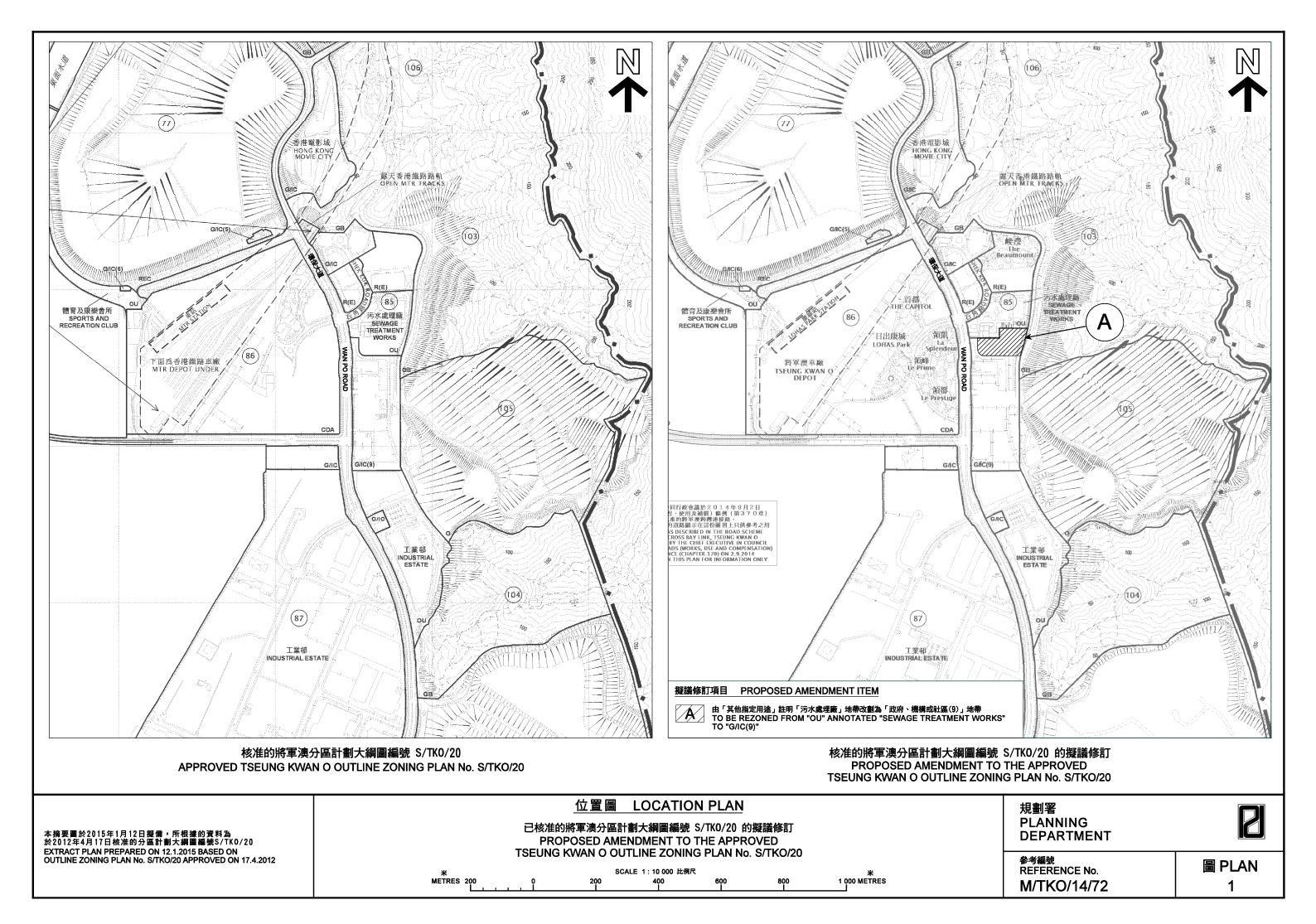
<sup>(2)</sup> As there is a surplus of secondary school classrooms, close liaison with the Education Bureau is being maintained to process proposals to convert school premises for post-secondary educational uses and address the deficit of primary school classrooms.

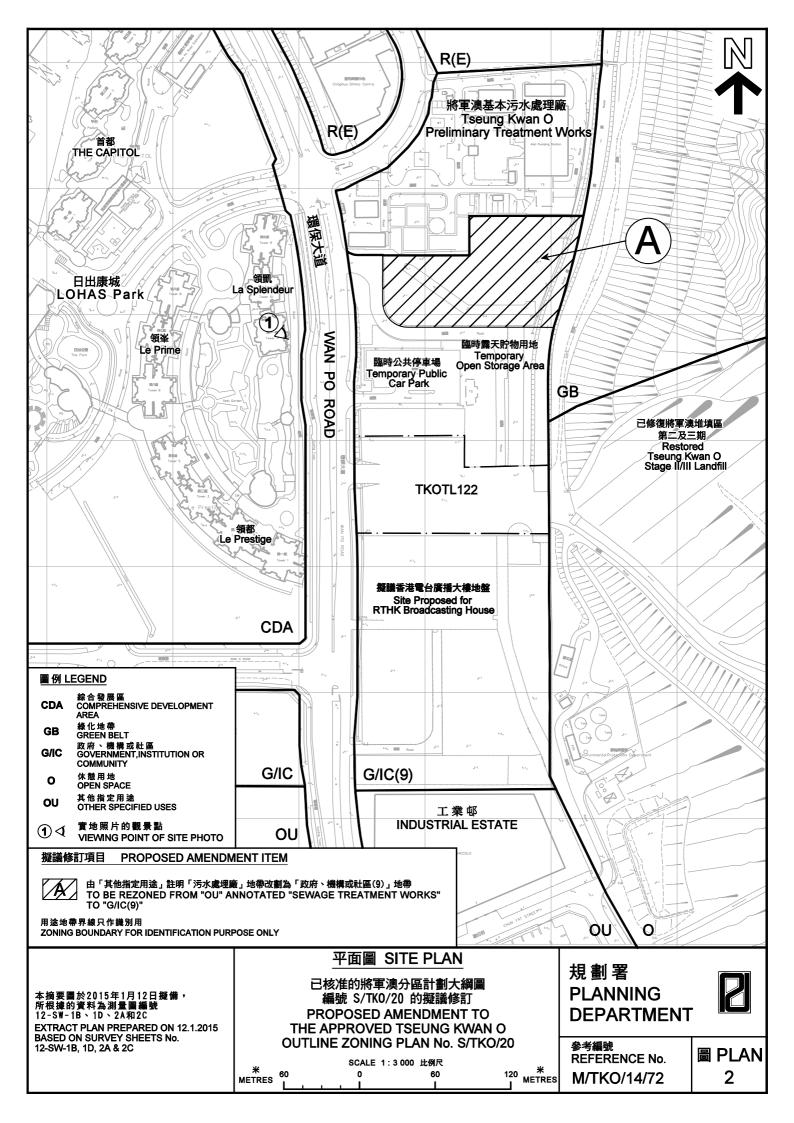
<sup>(3)</sup> In CE's 2014 Policy Address, a Chinese medicine hospital (中醫院) will be developed in TKO Area 78.

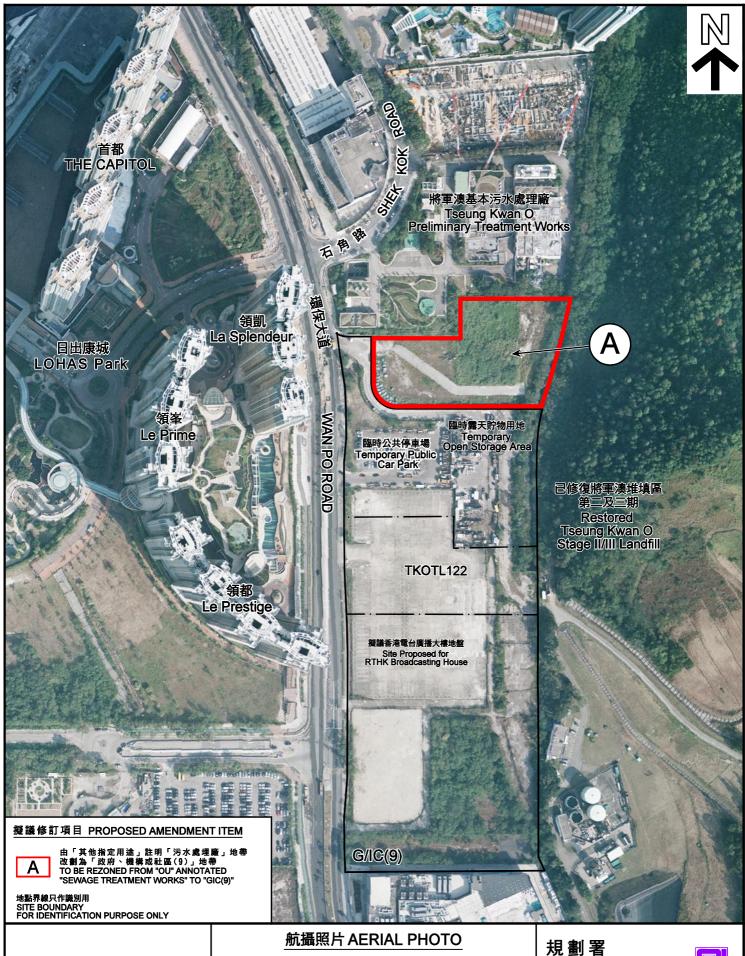
Type of	Hong Kong	HKPSG	Pro	vision	Surplus/Shortfall	
Facilities	Planning Standards and Guidelines (HKPSG)	Requirement (Planned Population: About 445,000 <sup>(1)</sup> )	Existing	Planned (Existing + Proposed)	(against planned provision)	
Child Care Centre	No set standard	NA	24	24	NA	
Integrated Children and Youth Services Centres	1 for 12,000 persons aged 6-24	5	10	10	+5	
District Elderly Community Centres	No set standard	NA	2	2	NA	
Neighourhood Elderly Centres	No set standard	NA	4	4	NA	
Day Care Centres for the Elderly	No set standard	NA	1	3	NA	
Day Care Unit for the Elderly in District Elderly Community Centres	No set standard	NA	1	1	NA	
Residential Care Homes for the Elderly	No set standard	NA	13	13	NA	
Integrated Family Services Centres	1 per 100,000 to 150,000 persons	3	4	4	+1	
Community Hall	No set standard (to be provided on a need basis)	NA	6	6	NA	
Art Venue	No set standard (to be provided on a need basis)	NA	0	1	NA	
Library	1 district library for every 200,000 persons	2	1	2	0	
Study Room	a) Usually 1 in each public major/district library b) 1 in each children/youth	NA	9	10	NA	
	centre c) Provision in community centre depends on the approved schedule of accommodation					

Type of	Hong Kong	HKPSG	Pro	vision	Surplus/Shortfall
Facilities	Planning Standards and Guidelines (HKPSG)	Requirement (Planned Population: About 445,000 <sup>(1)</sup> )	Existing	Planned (Existing + Proposed)	(against planned provision)
	d) Provision in public housing estates is on a need basis				
Sports Centre	1 per 50,000 to 65,000 persons	7	5	7	0
Sports Ground/ Sports Complex	1 per 200,000 to 250,000 persons	1.78	1	1 .	-0.78
Swimming Pool Complex - Standard	1 complex per 287,000 persons	2	1	1	-1 <sup>(4)</sup>
Local Open Space	10 ha per 100,000 persons	44.5ha	59.56 ha	71.25 ha	+26.75 ha
District Open Space	10 ha per 100,000 persons	44.5ha	28.51 ha	47.41 ha	+2.91 ha

<sup>&</sup>lt;sup>(4)</sup>According to DLCS memo of 22.9.2011 at SKT 1/0/10 Pt. 9, the leisure centre in Area 65B will provide swimming pool to meet the shortfall of facilities for swimming.







本摘要圖於2015年1月12日擬備, 所根據的資料為地政總署於2014年1月1日 拍得的航攝照片編號CS47083

EXTRACT PLAN PREPARED ON 12.1.2015 BASED ON AERIAL PHOTO No. CS47083 TAKEN ON 1.1.2014 BY LANDS DEPARTMENT 已核准的將軍澳分區計劃大網圖編號 S/TK0/20 的擬議修訂 PROPOSED AMENDMENT TO THE APPROVED TSEUNG KWAN O OUTLINE ZONING PLAN No. S/TKO/20

#### 規劃署 PLANNING DEPARTMENT



參考編號 REFERENCE No. M/TKO/14/72





地點界線只作識別用 SITE BOUNDARY FOR IDENTIFICATION PURPOSE ONLY

本圖於2015年1月12日擬備,所根據的 資料為攝於2014年2月26日的實地照片 PLAN PREPARED ON 12.1.2015 BASED ON SITE PHOTO TAKEN ON 26.2.2014

#### 實地照片 SITE PHOTO

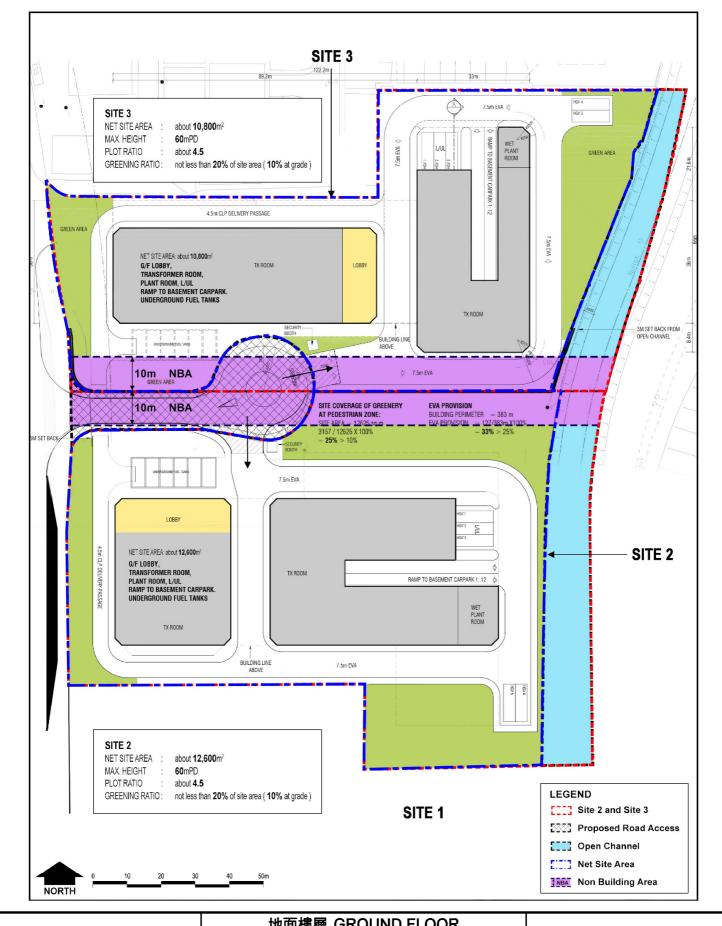
已核准的將軍澳分區計劃大綱圖編號 S/TK0/20 的擬議修訂PROPOSED AMENDMENT TO THE APPROVED TSEUNG KWAN OOUTLINE ZONING PLAN No. S/TKO/20

## 規劃署 PLANNING DEPARTMENT



参考編號 REFERENCE No. M/TKO/14/72

圖PLAN 4



本摘要圖於2015年1月12日擬備, 所根據的資料為政府資訊科技總監辦公室的 顧問公司提供的地面樓層圖

**EXTRACT PLAN PREPARED ON 12.1.2015** BASED ON GROUND PLAN PROVIDED BY THE CONSULTANTS OF OGCIO

#### 地面樓層 GROUND FLOOR

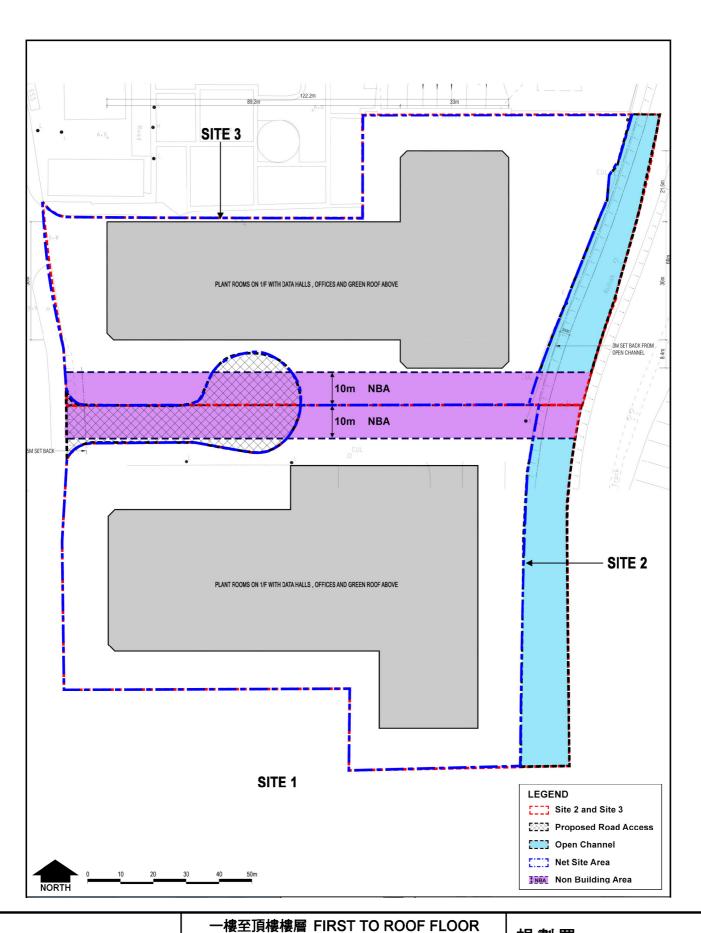
將軍澳第85區擬議數據中心發展 INDICATIVE LAYOUT PLAN FOR DATA CENTRE DEVELOPMENTS IN TSEUNG KWAN O AREA 85

## 規劃署 **PLANNING** DEPARTMENT



參考編號 REFERENCE No. M/TKO/14/72





本摘要圖於2015年1月12日擬備, 所根據的資料為政府資訊科技總監辦公室的 顧問公司提供的一樓樓層圖

EXTRACT PLAN PREPARED ON 12.1.2015 BASED ON FIRST FLOOR PLAN PROVIDED BY THE CONSULTANTS OF OGCIO

將軍澳第85區擬議數據中心發展 INDICATIVE LAYOUT PLAN FOR **DATA CENTRE DEVELOPMENTS IN TSEUNG KWAN O AREA 85** 

## 規劃署 **PLANNING DEPARTMENT**



參考編號 REFERENCE No. M/TKO/14/72





Before



After with mitigation measures

#### 合成照片 PHOTOMONTAGE

本摘要圖於2015年1月12日擬備, 所根據的資料為政府資訊科技總監辦公室的 顧問公司提供的合成照片 EXTRACT PLAN PREPARED ON 12.1.2015 BASED ON PHOTOMONTAGE PROVIDED BY THE CONSULTANTS OF OGCIO

將軍澳第85區擬議數據中心發展 PROPOSED DATA CENTRE DEVELOPMENTS IN TSEUNG KWAN O AREA 85

## 規劃署 PLANNING DEPARTMENT



參考編號 REFERENCE No. M/TKO/14/72

圖 PLAN 5c



Before



After with mitigation measures

#### 合成照片 PHOTOMONTAGE

本摘要圖於2015年1月12日擬備, 所根據的資料為政府資訊科技總監辦公室的 顧問公司提供的合成照片 EXTRACT PLAN PREPARED ON 12.1.2015 BASED ON PHOTOMONTAGE PROVIDED BY THE CONSULTANTS OF OGCIO

將軍澳第85區擬議數據中心發展 PROPOSED DATA CENTRE DEVELOPMENTS IN TSEUNG KWAN O AREA 85

# 規劃署 PLANNING DEPARTMENT



參考編號 REFERENCE No. M/TKO/14/72

圖 PLAN 5d



Before



After with mitigation measures

本摘要圖於2015年1月12日擬備, 所根據的資料為政府資訊科技總監辦公室的 顧問公司提供的合成照片 EXTRACT PLAN PREPARED ON 12.1.2015 BASED ON PHOTOMONTAGE PROVIDED BY THE CONSULTANTS OF OGCIO

#### 合成照片 PHOTOMONTAGE

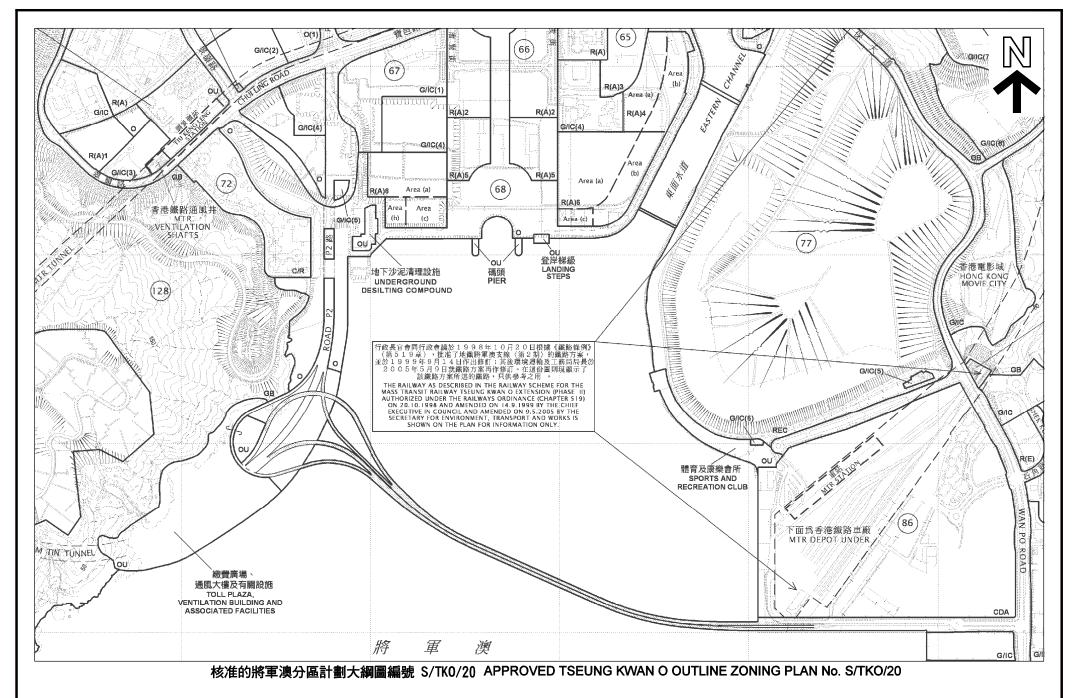
將軍澳第 8 5 區擬議數據中心發展 PROPOSED DATA CENTRE DEVELOPMENTS IN TSEUNG KWAN O AREA 85

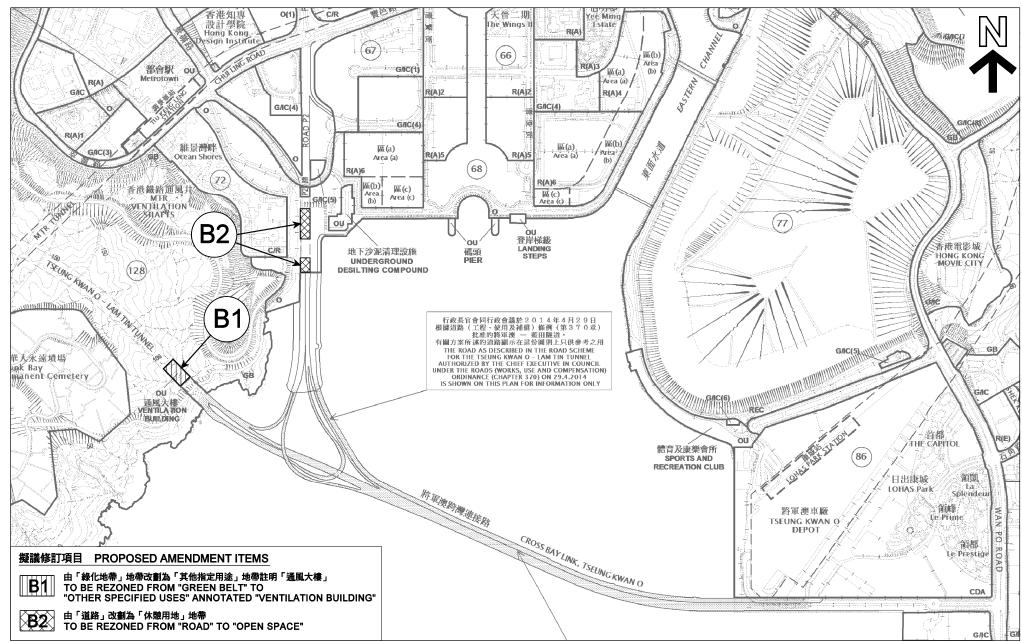
#### 規劃署 PLANNING DEPARTMENT



參考編號 REFERENCE No. M/TKO/14/72

圖 PLAN 5e





核准的將軍澳分區計劃大綱圖編號 S/TK0/20 的擬議修訂PROPOSED AMENDMENTS TO THE APPROVED TSEUNG KWAN O OUTLINE ZONING PLAN No. S/TKO/20

## 位置圖 LOCATION PLAN

本摘要圖於2015年1月12日擬備 所根據的資料為於2012年4月17日 核准的分區計劃大綱圖編號S/TK0/20 EXTRACT PLAN PREPARED ON 12.1.2015 BASED ON OUTLINE ZONING PLAN No. S/TKO/20 APPROVED ON 17.4.2012 已核准的將軍澳分區計劃大綱圖編號 S/TKO/20 的擬議修訂(B1及B2項)
PROPOSED AMENDMENTS TO THE APPROVED
TSEUNG KWAN O OUTLINE ZONING PLAN No. S/TKO/20 (ITEM B1 AND B2)

\* SCALE 1:10 000 比例尺 \*
METRES 200 0 200 400 600 800 1000 METRES

規劃署 PLANNING DEPARTMENT



参考編號 REFERENCE No. M/TKO/14/72

圖 PLAN 6a

