MASTERPLAN LIMITED
Planning and Development Advisors
領賢規劃顧問有限公司

Your Ref: Y/I-DB/3

8 February 2017

The Secretariat
Town Planning Board
15/F, North Point Government Offices
333 Java Road, North Point
Hong Kong

By Hand

Dear Sir,

Section 12A Application No.Y/I-DB/3
For Optimising Land Uses at Area 10b, Discovery Bay
Response to Comments

I refer to the abovementioned application which is currently being processed, and the departmental comments on the application made available by District Planning Office on 23 and 28 December 2016 and 5 and 17 January 2017.

In response to the departmental comments, please find the enclosure, for your consideration. We also supplement with the following information:

Concept Plan

The Bounty Pier is no longer required at the proposed location at Area 10b, and is deleted from the Concept Plan, as provided in **Annex G**. This does not affect the proposed "Other Specified Uses (Promenade)" zoning for the space.

The submitted Air Ventilation Assessment indicates building separations serving as air paths. The Applicant agrees in principle to designate the building separations/ air paths indicated in the AVA as Non Building Area, if required. This is subject to minor structures serving the amenity of the plazas such as eating place and pavilion and boat servicing facility at the pier, being permitted in the Non Building Area. This also relies on Clause 5 of the Cover Notes to the OZP that boundaries between zones may be subject to minor adjustments as detailed planning proceeds, and AVA Initial Study be supplemented, if necessary.

Water supplies and sewerage treatment facilities

1. As there are various on-going new developments at North Lantau and the Airport, WSD and EPD may consider for expansion of the Siu Ho Wan water supplies and sewerage treatment facilities, should the spare capacity for the current facility be not adequate. The Applicant believes that, should WSD and EPD plan for infrastructure expansion, all proposed future developments in the vicinity areas, including those in Discovery Bay, should be considered on an equal and fair basis. In addition, as the proposal for Area 10b is moderate in scale, the increase in demand on the overall Government infrastructure would be insignificant. Therefore, the Applicant requests WSD and EPD to take into account the proposed development, should they consider planning for future expansion of the Sui Ho Wan facilities.

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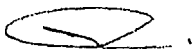
2. Nevertheless, the applicant is ready and willing to make their own provision to treat the fresh water supply and the sewage arising from the development where necessary. There is a decommissioned Water Treatment Plant near the Discovery Bay reservoir, and a decommissioned Sewerage Treatment Plant within Area 10b. Technical assessments reports have been submitted to demonstrate the adequacy of this approach in terms of the capacity and the capability to meet the relevant standards. The applicant is familiar and experienced in this approach, which has been the case prior to the commissioning and connection to Siu Ho Wan public facilities.

This information clarifies and supplements the application, and does not constitute a material change identified in Town Planning Board's Guideline No.32. It is consistent with the Guideline.

Several rounds of responses to departmental comments have been made during the processing of this application. The outstanding departmental comments do not object the proposed development at Area 10b. They are technical engineering details capable of being resolved at detail design stage or at Town Planning Board's hearing. It is considered that detail technicalities should not prevent an approval for the rezoning application.

Yours faithfully,



Cynthia Chan
For and on behalf of
Masterplan Limited

Enc

cc. DPO/SKI (Attn: Helena Pang) Email
Client & Consultants

Section 12A Application No.Y/I-DB/3 for Optimisation of Land Uses at Area 10b, Discovery Bay
Applicant's response to the departmental comments made available by District Planning Office on 23 and 28 December 2016, 5, 12 and 17 January 2017

H(GEO), CEDD's comment	**Applicant's response**
Based on the Geotechnical Planning Review Report (GPRR) attached in the application, it is noted that detailed stability assessments would be carried out on the registered features and natural terrain (unregistered feature nos. 1 and 2) which will affect or be affected by the proposed development. As the contents of the GPRR are considered as a preliminary review, please remind the applicant that all geotechnical submissions regarding the proposed development shall be submitted to the Buildings Department for approval according to the Buildings Ordinance.	Noted, geotechnical submissions regarding the proposed development will be submitted to the Buildings Department for approval according to the Buildings Ordinance, where required.
CTP/UD&L, PlanD's comment	**Applicant's response**
Landscape Aspect *i.* If the parameters of the proposed rezoning can only provide a 4m wide waterfront promenade, and it is cantilevered, separated into two levels, and backed by walls of private gardens, we maintain our previous comment that there is no room for a decent design to accommodate hard and soft landscape elements. Although the applicant compares the width with D Deck, it should be noted that D Deck's promenade is backed by alfresco dining areas without cover, and 2-storeys buildings are set back from the promenade. Instead of D Deck, comparison with waterfront promenade in North Plaza of Discovery Bay is more appropriate. Based on the above observation, we still have reservation on the proposed rezoning application.	The 4 meters wide waterfront promenade together with its back edge along the green garden of the low rise housing is considered appropriate for the following reasons: i. Improvement to the existing situation, in terms of its width and landscape design. ii. Commensurate with the intended residential settings. iii. Suitable level of service, as any broader width in the residential area may create a sense of void and lack of vibrancy. iv. The D deck and North Plaza are of commercial settings around the pier, serving much greater number and broader range of local residents and visitors, and hence requiring the different waterfront promenade width and landscape designs.
Urban Design Aspect i. According to the Responses to Comments and the Revised Concept Plan contained in Annex A of the FI, several amendments to the development scheme are proposed, including set-back from the northwestern part of the podium, building gaps and building height variation, to improve the visual appearance of the proposed development. We have the following comments on the Revised Concept Plan from urban design and visual points of view: (a) Visual impact of Tower M2 – The applicant has not addressed our comments on the building bulk of Tower M2. Our previous comment that efforts should be made to reduce the height of tower M2 to minimise the overbearing impact on the coast and to be in keeping with the urban design concept of low-density environment with a stepped height approach are still valid.	The proposed Tower M2 building height steps down from the hill and the existing buildings at Peninsula Village and to the rest of the proposed houses and buildings at the headland, creating different heights and levels along the length of Area 10b. Further, Tower M2, together with the rest of the proposed development at Area 10b will form and signify an icon, while being commensurate and in keeping with the proposed optimized development at the locality.
(b) Podium bulk – the proposed "recess" at the northwestern part of the podium is insignificant and does little if not nothing in reducing the podium bulk. More efforts, e.g. introduction of gaps between podium and terraced podium, should be made to reduce its bulk.	One of the fundamental design constraints of the podium is its intended function to enclose the existing bus depot with adequate parking spaces and maneuvering paths. UD&L's requests to break down the podium into several detached buildings would imply additional ingress/ egress points for the bus depot, which would create unnecessary visual and environmental nuisance for the residential neighborhood. The current proposal of an integrated podium with visual breaks and massing variations are considered an optimal approach. The Applicant cannot agree to UD&L's comments that the proposed architectural treatment to the podium being *'insignificant and does little if not nothing in reducing the podium bulk.'* The effect is significant if one compares the streetscape perspectives between the latest revision and the original submission, as illustrated in **Annex A**. The proposed articulations including i) the various layers and heights along the façade; ii) the slanting walls with vegetation; and iii) reduced height at the portion of podium abutting the driveway, will contribute to reducing the perceived bulk of the podium, and enhance the visual interest and walking environment of the future users.
(c) Building gaps – there should be room to widen the proposed building gap between L10 and L11 to provide a wider view from the coast towards the green slope to the northeast of the site.	The 15m wide separation between low-rise block L10 and L11 will provide suitable visual break. Attention will be given in detail design stage for room to widen the proposed building gap between L10 and L11 to provide a wider view from the coast towards the green slope to the northeast of the site.
ii. The building gaps introduced among low-rise residential blocks do not align with those among medium- and high-rise residential blocks behind. The building gaps/separations provided within the site should be aligned as far as possible to provide visual break along the long and extensive façade and to enhance air ventilation.	The building gaps/separations provided within the site will provide suitable visual break and air ventilation. Attention will be given in detail design stage for room to align building gaps/separations as far as possible to provide visual break along the long and extensive façade and to enhance air ventilation.

Air Ventilation perspective We refer to the draft AVA Initial Study Report dated 25.10.2016 received on 2.11.2016 in support of the captioned rezoning application. Our comments from air ventilation perspective are as follows .	A revised Air Ventilation Assessment is provided in **Annex B** (changes highlighted).
1. **OZP-Compliant Scheme** (section 2.3.1) ■ "...in the Explanatory Notes of the OZP ***No. ~~Y/I-DB/4~~ S/I-DB/4***, with ***some of the*** existing buildings reserved. Apart from those..., following OZP compliant buildings ~~permissible a of right~~ were added ..." ■ section 2.3.1 (i) – please add the planning intention of "G/IC" zone to tally with sections 2.3.1 (ii) to (iv). ■ section 2.3.1 (iii) – "OU(D.G. Store)" should be replaced by "OU(Dangerous Goods Store/Liquefied Petroleum Gas Store". ■ "The detailed 3D model ~~Baseline~~ ***OZP Compliant*** Scheme is shown in Section **3.2.2**." ■ Figures 8, 18 to 24 – There are no particular comment on the proposed OZP Compliant Buildings as the proposed building height do not exceed the building height restrictions under individual zones in the Notes of the OZP. However, it is noted that some of the existing buildings are either missed out in the figure or their demarcations are not reflected properly. Some of the zoning boundaries are also not tally with the OZP as well. The applicant should review and rectify accordingly. Moreover, we are not able to verify the existing building height (~10-25mPD) as shown on the legend.	1. **OZP-Compliant Scheme** Noted. Relevant text has been revised. Noted. Relevant text has been revised. The intention for the "G/IC" zone is for Sewage Treatment Works and upgrading Sewage Pumping Station. Noted. Relevant text has been revised. Noted. Relevant text has been revised. Noted. The boundary of the zoning is revised to tally with OZP. The existing building has been checked the building height has been listed in details. Please note that this OZP-Compliant Scheme was formulated by combining OZP-Compliant Buildings and existing buildings. Figure 8 and Appendix A has been updated. Some of the existing buildings are replaced with OZP-Compliant Buildings.
2. **Baseline Scheme** (section 2.3.2) ■ Most of the building height reported in text does not tally with that shown in Figure 9. The consultant should clarify and revise as appropriate. ■ Figure 7 – The consultant should provide a sectional drawing for illustrating the design details (e.g. building height) of the proposed terraced podium.	**2. Baseline Scheme** Noted. The building height in Figure 9 is correct. Text in Section 2.3.2 has been revised. Noted. A side view of the podium has been shown with building height marked in Figure 7.
3. **Proposed Scheme** (section 2.3.3) ■ 2nd bullet – It should read "*An additional building separation of 15m has been provided in the ~~south~~ eastern portion of the site.*". ■ 2nd and 3rd bullet – The consultant should clarify whether proposed 15m-wide building separations are located at grade. If affirmative, it is recommended to designate such building separations as NBA for better performance in improving pedestrian wind environment. ■ 4th bullet – The consultant should report the building height of M1 and M2 and coverage of the proposed elevations on plan.	**3. Proposed Scheme** Noted. Relevant text has been revised. It is confirmed that the proposed 15m-wide building separations are located at grade. Their designations as NBA area will be considered by the Town Planning Board. Noted. The building heights of M1 and M2 have been shown in Figures 11 and 12. G/F coverage of M1 and M2 have been added to Figure 10.
4. Figure 9 – The consultant should name two piers (i.e. Bounty Pier and Kaito Pier) on plan.	4. Noted. Indication of two piers has been added on plan in Figure 9.
5. **CFD simulation parameters** (section 3.4 and Table 3) – The consultant should make sure all the CFD simulation parameters, including number of prismatic layer and grid expansion ratio, reported in text should tally with that in table.	**5.** It is confirmed that the CFD simulation parameters tally with the table.
6. **Special test points** (section 3.8.3) – The consultant should place some special test points for demonstrating the effectiveness of the proposed mitigation measures such as building separations and voids under M1 and M2.	**6.** Noted. Test points have been rearranged to demonstrate the effectiveness of building separation. Test points SS26, SS27 have been positioned at the void under M2 SS_P14, SS_P15 have been positioned at the void under M1.
7. **Focus Areas** (section 3.9) – In relation to item 4 above, the consultant should provide the relevant focus areas for demonstrating the effectiveness of the proposed mitigation measures.	**7. Focus Areas** Noted. Focus Areas have been added at building separation above podium, along building separation between M2 and M3 and void around M2.
8. Table 5 – The test points described in the table do not tally with those shown on the figure. The consultant should confirm and revise the test points for the following focus areas and update the relevant SAVR and discussion where appropriate. ■ Discovery Bay Road – O14 – O17, O49 – O53, P6 – P17 ■ La Vista – O58 – O64 ■ Crestmont Villa 1 – O23 – O30 ■ Crestmont Villa 2 – O19, O20, O34, O35	8. Noted. Table 5 has been revised accordingly.
9. Section 4.1 (3rd paragraph) – The consultant should discuss the VR difference at the slope located between La Vista and Study Site.	9. Noted. Relevant text has been added.
10. Section 4.1 (4th paragraph) – The consultant should discuss the effectiveness of the proposed building separation under the Proposed Scheme in facilitating wind penetration through the Study Site.	10. Noted. Relevant text has been added.
11. **NNE/NE winds** (section 4.3.1) – The consultant should discuss why both Baseline and Proposed Schemes have better VR contour along north-western coast of Nim Shue Wan when compared to the OZP-Compliant Scheme.	11. **NNE/NE winds** Noted. High VR would be resulted by the openness in the western part and wind diverted towards this area along the podium. Relevant text has been added to the 1st and 2nd paragraph under Baseline Scheme. Figure 45 has also been revised to illustrate this.
12. **ENE wind** (section 4.3.2) ■ OZP-Compliant Scheme (2nd paragraph) – It is recommended to revise the sentence as "... *Compliant Scheme and ~~serve~~ **reattach to** the leeward side ...*". ■ OZP-Compliant Scheme (2nd paragraph) – Referring to the VR vector plot, it seems that Peninsula Village 2 would divert ENE wind and penetrate through the gap rather than creating significantly downwash effect. ■ Baseline Scheme (2nd paragraph) – No such purple arrow has been found in Figure 50. ■ Proposed Scheme (2nd paragraph, line 4) – The consultant should provide more results to demonstrate the mentioned phenomenon.	**12. ENE Wind** Noted. Relevant text has been revised. Noted. The incoming ENE wind would be channeled through the building separation and accelerated due to corner effect. Relevant text has been revised to elaborate. Noted. It should be the arrow shown in Figure 48. The color of the arrow is revised to blue for clarity. Noted. Relevant text has been revised and Figure 51 has been added for illustration.

■ Proposed Scheme (3rd paragraph, line 4) – Given Costa Court and Onida Court are existed in all three schemes, it is not understood how these buildings would affect the pedestrian wind environment significantly. The consultant should clarify and revise the relevant discussions as appropriate. ■ The consultant should discuss why the Proposed Scheme has a lower VR at the area between M1 and L4 when compared to the OZP-Compliant and Baseline Schemes. ■ Figure 50 – North arrow should be provided. 13. **E wind** (section 4.3.3) ■ Proposed Scheme (3rd paragraph, line 3) – It should be referred to blue arrow instead of purple arrow in Figure 53. 14. **ESE/SE winds** (section 4.3.4) ■ Given that the pedestrian wind environment for ESE and SE winds are not similar, the consultant should provide separation discussion to SE wind. ■ OZP-Compliant Scheme (1st paragraph) – The consultant should clarify whether the discussion in this paragraph is applied for ESE wind not E wind. ■ Baseline Scheme (2nd paragraph, line 1) – The consultant should clarify whether it should refer to Tower M1 not Tower T1. ■ Proposed Scheme (3rd paragraph) – It is not understood how the mentioned building would create downwash effect in its leeway side. The consultant should clarify and revise the argument as appropriate. 15. **SSE wind** (section 4.3.5) ■ Baseline Scheme (1st paragraph) – It seems all three schemes have similar VR contour along Capdridge Drive and Crestmont Villa 1. The consultant should clarify and revise the argument as appropriate. ■ Proposed Scheme (last paragraph) – No enhancement has been found at Caperidge Drive under the Proposed Scheme. 16. **S wind** (section 4.3.6) ■ The consultant should explain why the Proposed Scheme has a larger wake in the north side to Discovery Bay Marina Club. ■ The consultant should explain why the Proposed Scheme has much better VR to the area located at La Costa and Peninsular Village 1. 17. **SSW wind** (section 4.3.7) ■ Baseline Scheme (1st paragraph, line 5) – It should refer to blue arrow but not purple arrow. ■ Baseline Scheme (3rd paragraph, last sentence) – The simulation results shown that the Baseline Scheme has a larger wake at the leeward side of M1 when compared to the Proposed Scheme. The consultant should clarify and revise the argument as appropriate. 18. **SW wind** (section 4.3.8, penultimate paragraph, line 1) – It is recommended to revise the sentence as *"The 15m-wide building separation **between blocks L10 and L11** above podium in the central part would ...".* 19. **WSW wind** (section 4.3.9) – The consultant should discuss why the developments in OZP-Compliant Scheme would create lower VR at the north-western part of the Study Site. 20. **Mitigation Measures** – Given the Proposed Scheme has a lower LVR when compared to the OZP-Complaint Scheme, it reflects that the Proposed Scheme would have potential adverse air ventilation impact on the surrounding of the Subject Site. As such, the consultant should explore further mitigation measures to alleviate such impact. 21. Section 4.5 – The consultant should provide a comprehensive discussion for comparing the SAVR of each focus area. 22. Page number – The consultant should correct the page number of this report.	Noted. The discussion has been included in revised 3rd paragraph and added 4th paragraph. Noted. Relevant discussion has been added in the last paragraph under Baseline Scheme and 3rd paragraph of Proposed Scheme. Noted. North arrow has been added. **13. E Wind** Noted. Color of the arrow has been changed to blue for clarity. **14. ESE/SE winds** Noted. Additional Section 4.3.5 has been added for SE wind discussion. Noted. It should read as "ESE" wind not "E" wind. Relevant text has been revised. Noted. It should read as "Tower M1". Relevant text has been revised. Noted. It should refer to the downwash effect from the facade of Peninsula Village 2. Relevant text has been revised to elaborate. **15. SSE wind** Noted. The VR at Crestmont Villa 1 are similar among all three schemes. However, lower VR was observed at section of Capridge Drive near the site boundary and between Peninsular Village 1 and Crestmont Villa 2 under Baseline Scheme. Relevant text has been revised. Noted. Additional discussion has been added. **16. S wind** Noted. As a more negative pressure zone would be created at the back of M2 in Baseline Scheme, the wind is dragged towards the leeward side of Tower M2. On the other hand, the elevated design of M2 in Proposed Scheme would slightly average out the wind distribution around M2. The building gap between M2 and M3 would divert the wind towards the eastern part of the study site (i.e. the tennis court in Discovery Bay Marina Club). Hence larger wake in the north side of Discovery Bay Marina Club would observed. Relevant discussion has been added in 2nd paragraph. Noted. High VR in La Costa and Peninsular Village 1 would be due to the elevated design of Tower M1 and the building separation above podium. Relevant text has been added to 4th and last paragraph. **17. SSW wind** Noted. The color of the arrow has been changed to blue for clarity. Relevant text has been revised. Noted. The elevated design in Proposed Scheme would further minimize the wind shadow by M1. Relevant text under Baseline Scheme has been revised. **18. SW wind** Noted. Relevant text has been revised. **19. WSW wind** Noted. Lower VR is caused due to the OZP-compliant building in the northwestern part the Site. Higher VR in Baseline and Proposed Scheme would be due to the cornering effect from Tower M1. **20. Mitigation Measures** Noted. Mitigation Measures such as further elevate design of Tower L2, M3, M4 and additional air paths between Tower L7-L14 above podium could be considered. An AVA Initial Study can be carried out in Detailed Design Stage, where required. 21. Noted. Additional discussion has been added. 22. Noted. Page numbers have been revised.
Marine Department	**Applicant's response**
Based on the information provided in the RtoC and the Technical Note on Marine Moorings (Annex M), we could not agree with the view that the potential marine traffic impact, in particular the impact to the private moorings is insignificant. To ensure marine traffic safety, further study should be conducted, in particular on the following items: i. When the 49.8m LOA sand barge berthing perpendicular to the service pier, how could other vessels including the bounty enter into and leave from the inner water space through the remaining 15m (65m-50m) wide channel without affecting the private moorings?	There are two sets of landing steps at the new service pier. It is proposed to position the berth for the sand barge at the inner side of the new service pier and the Kaito vessel at the outer side of the pier. This would not require passing of Kaito vessel between the sand barge and the existing mooring buoys. In addition, the project proponent can arrange the berthing/ manoeurvring of the sand barge when there is no Kaito vessel berthing at the landing steps. Therefore, the berthing of the sand barge would not have impact to the Kaito service. The Applicant has decided that the Bounty berthing area is no longer required and will be deleted from the Concept Plan. Therefore, Bounty would no longer navigate into the inner water space in the future.

ii. As only a part of the channel will be dredged to -5mCD, when other ships are berthing alongside the piers/landing steps along the seawall, will the remaining deep waters wide enough for the large/deep vessels like the Bounty to approach to and leave from their berths without affecting the private moorings ?	The Bounty berthing area will not be re-provisioned in the development. Therefore, dredging of channel for the purpose of navigation is not required, and thus, there will be no impact to the private mooring.
iii. The impact that would be caused by the new submarine outfall. The logic of the second sentence of S4.1.1.3 is quite doubtful as the outfall is beyond the works area for the new platform.	It is preliminarily considered that part of the alignment of the submarine outfall be located within the footprint or immediately next to the proposed deck to reduce the impact on the private moorings due to the construction of the submarine outfall. The exact location of the outfall would be subject to further study.
iv. How to implement the "one-way navigation" for the Bounty as mentioned in S3.1.1.7?	The Bounty berthing area will not be re-provisioned in the development. No further consideration is required.
v. Traffic density of the Bounty vessels and berthing arrangement of them, including the number of tiers of vessels berthing alongside the pier/seawall.	The Bounty berthing area will not be re-provisioned in the development. Therefore, the Bounty will not navigate into the inner water space. No further consideration is required.
vi. Except the (inner) Bounty pier and the outer Kaito/service pier, will other sections of seawall between them be allowed to moor vessels? If yes, what will be the arrangement?	Except the outer Kaito/service pier, there is no other section of seawall for vessel mooring planned.
vii. As the existing berth for the Kaito service will be affected, will there be any alternative pier/landing steps for the Kaito vessels during the construction phase?	Temporary landing steps will be provided during the construction stage. The location of the alternative/ temporary landing steps will be further investigated in the detailed planning and design stage of this Project.
viii. The situation of the private moorings in Figure 12/14 is different from our record. Please request the applicant to clarify it. Copy of the laycut plan of the moorings is appended below for your reference.	The updated layout plans of the private mooring are shown in **Annex C**.
ix. Meanwhile, regarding the RtoC item d), it's undesirable that the consultation with the relevant private mooring owners and the local marine community will only be conducted in the detail design and construction phase.	Consultation with the relevant private mooring owners and the local marine community will be conducted at the next stage of the Project.
Controller of Government Flying Services' comment	**Applicant's response**
Previous comments remain valid. GFS is a provider of search and rescue and aviation services and we are committed to serving the community with a safe and efficient flying service. We support the view from FSD, being one of the client departments that GFS works closely with, that the LT17 helipad is part of an important element for casualties evacuation especially in case of mass casualties incidents or in any emergency situation. Any development and construction works in the vicinity of the helipad should take note of the approach and departure path and not to compromise the safe operation of helicopters. Moreover, if a reprovisioning of LT17 helipad is required, the location and surrounding of new helipad must provide the same operating environment for helicopters in terms of flight path and obstacle clearance.	Noted. A suitable helipad will be reprovided prior to removal of the existing one.
Water Supplies Department's comment	**Applicant's response**
If water is supplied for the additional residents by Discovery Bay's own water treatment works and discharged to the existing water supply networks (i.e. their treated water mixed with WSD's treated water), WSD has reservation to the proposal. As WSD has no authority and responsibility to monitor their water treatment works and the quality of the treated water, it would be quite difficult to identify and determine the responsibility of which party's fault if there is any contamination of water affecting the consumers. If the option is adopted, the new water supply network and the existing one must be segregated to avoid cross-contamination. Previous comments remain valid.	Noted. Should water supplies arrangement for Area 10 adopt the option of obtaining portable water from the proposed on-site water treatment plant, the treated water will be fed to the proposed development by new water mains separated from the existing mains to avoid potential cross contamination problem. Relevant page of the Studies on Water Supplies System in this regard is provided in **Annex D**. New distribution mains and a separate service reservoir storage (Service Reservoir No. 3) exclusively to cater the fresh water demand arising from the proposed development is shown also in **Annex D**. In response to WSD's previous comment concerning the assumption on the average persons per unit, 2.5 is derived from City Management's latest record (property management company of all Discovery Bay residential units) covering all the residential units, and the Working Group on Population Distribution Projections for 2013-2021. Planning Department has not raised objection to this assumption in our previous submission.
Architectural Services Department's comment	**Applicant's response**
Based on the further information provided, Annex II stated that numbers of building blocks are reduced from 74 to 67 and the total GFA is reduced from 89,500m^2 to 89,450m^2. The massing of the proposed development seems to be changed. In order to enable us to comment on the visual impact of the development, it would be useful to have some perspective images/photomontages of the revised development, master, layout plans and sections for further comment. Nevertheless, we would like to draw the applicant's attention that our previous comments regarding the provision of EVA, unclear description for petrol filling facilities operation, long podium design and width of promenade are still valid as those comments have not been satisfactorily address in this submission.	Perspective images/photomontages of the revised development, master, layout plans and sections have been included in previous response to comments submission dated October 2016 (revised Concept Plan in Annex A and the revised Landscape Design Proposal in Annex N). <u>Provision of EVA</u> The Applicant confirms that the medium-rise building blocks will be sufficiently provided with the EVA to comply with the relevant statutory requirements. The proposal for EVAs will be submitted to the Buildings Department for approval at a later stage. <u>Petrol filling facilities operation</u> The proposed petrol filling facilities operation is a replacement of the existing. There will be gasoline (DG category 5 class 1) and diesel (DG category 5 class 3) stored at the proposed petrol filling facilities.

	Podium design One of the fundamental design constraints of the podium is its intended function to enclose the existing bus depot with adequate parking spaces and maneuvering paths. The requests to break down the podium into several detached buildings would imply additional ingress/ egress points for the bus depot, which would create unnecessary visual and environmental nuisance for the residential neighborhood. The current proposal of an integrated podium with visual breaks and massing variations are considered an optimal approach. The proposed articulations including i) the various layers and heights along the façade; ii) the slanting walls with vegetation; and iii) reduced height at the portion of podium abutting the driveway, will contribute to reducing the perceived bulk of the podium, and enhance the visual interest and walking environment of the future users. Promenade width The 4 meters wide waterfront promenade together with its back edge along the green garden of the low rise housing is considered appropriate for the following reasons: i. Improvement to the existing situation, in terms of its width and landscape design. ii. Commensurate with the intended residential settings. iii. Suitable level of service, as any broader width in the residential area may create a sense of void and lack of vibrancy. The D deck and North Plaza are of commercial settings around the pier, serving much greater number and broader range of local residents and visitors, and hence requiring the different waterfront promenade width and landscape designs.
Environmental Protection Department's comments	**Applicant's Response**
Air Quality	
1. S4.2.2.1, please ensure the road type with TD.	All the roads within Discovery Bay are private road and have no specific road type assigned. There is no specific road buffer requirement in HKPSG for private road. In order to assess the potential air quality impact from vehicular emission, the road buffer requirements in HKPSG of road type in similar nature is referenced. As Marine Drive provides direct access to the buildings within the district, the nature of these roads would be the same as "Local Distributor". Therefore, the buffer requirement of "Local Distributor" (i.e. 5m) is referenced for the purpose of evaluating the potential air quality impact induced by the road traffic activities. Based on the latest layout, all the ASRs would comply with the 5m buffer requirement and therefore no adverse air quality impact is anticipated.
2. S4.2.3.1, the survey for chimney was conducted in 2014 which is 2 years ago. Please provide the review date in the report.	The chimney information was further reviewed in Nov 2016 and Jan 2017. All the information in the EA is still valid.
3. Rtc item 7 S4.2.4.6, please state in the report that MLD refilling facility, the oil tanker travelling route and the ferry travelling route to and from MLD refilling facility will be located outside the 500m assessment area.	Section 4.2.4.6 in the revised Environmental Assessment in **Annex E** now includes the statement, "...*The oil tanker travelling route, and the ferry travelling route to and from MLD refilling facility will be located outside the 500m assessment area...*".
4. Rtc item 8, it is noted that a STW is proposed and a SPS would be upgraded. Please update S4.2.6.2. Please provide information and address the potential odour nuisance for both the proposed STW and the proposed upgraded SPS. To support the conclusion in S4.2.6.2, further justification is required to demonstrate the odour impact is acceptable. It can be considered to make reference to other similar STW or to provide quantitative assessment/calculation findings.	Subject to detailed design, Membrane Bioreactor (MBR) will be implemented in proposed sewage treatment works in Area 10b to achieve secondary or better treatment level. The sewage treatment facilities will be fully enclosed or covered with the provision of deodourizing unit. The design capacity of the STW will be around 1,100m^3 per day. Deodourizing unit of 99% removal efficiency is recommended in the proposed sewage treatment works subject to further assessment during detailed design stage. In accordance with the approved EIA *Outlying Islands Sewerage Stage 2 – Upgrading of Cheung Chau Sewage Collection, Treatment and Disposal Facilities* (AEIAR-181/2013), the odour level at the 3 closest ASRs to the Cheung Chau Sewage Works (CCSTW) with the installation of deodourizing unit of 99% removal efficiency would be: • CCSH – Cheung Chau Slaughter House (3m from the CCSTW): 3.5 OU • GIC-1 – C/IC Area near Pak Kok Tsui Road (23m from the CCSTW): 2.7OU • CCSTW-DW – North of Cheung Chau Sewage Treatment Plant (18m from the CCSW): 3.6OU As the capacity of the proposed sewage treatment work is around 11% of that of CCSTW (i.e. MBR treatment with design capacity of 9,800m^3/day), the odour emission from the proposed sewage treatment work would be much lower than that of CCSTW. The closest ASR to the proposed STW in Area 10b is about 15m from the STW. Therefore, the odour impact of the proposed sewage treatment works could be mitigated to acceptable level by providing deodorizing unit and sufficient buffer distance between the exhaust of the deodourizing unit and ASRs. The exhaust location will also be located at the downwind location of the ASRs. The detail requirements of the deodourizing unit and buffer distance between exhaust and ASRs will be further determined during the EIA / detail design stage. Please note upgrading of the existing SPS would not be required according to the latest design. Hence, potential odour impact from upgraded SPS would not be relevant to this project.
5. The air modelling data should also be reviewed and rectified as appropriate when the discrepancies/deficiency are rectified.	The air modelling data has been reviewed and confirmed that the modelling data is still valid.
Water Quality	
ES Report	
6. S.2.1.1.1 - The Applicant stated that the proposed development will accommodate a total of about 2900 additional population but different number was observed in S.2.4.6.4 and Technical Note of Appendix 6.3. Please clarify such discrepancy.	Noted. The exact population is 2,813 and the report has been revised accordingly.

7. S.2.1.1.4 - In addition to the residents, other facilities such as commercial activities associated with the proposed development that would generate sewage should be included in the flow estimation.	Other than residential development at Area 10b, there are a range of supporting facilities, including bus depot, golf cart garages and petrol filling station, representing less than 25 employees in total. Their generated sewage flow will be insignificant (less than 1% of the total sewage flow) and be generally captured in the sewage flow generation in the flow estimation in the submitted SIA.
8. S.2.5 - Please review and supplement if there is cumulative impact on WSRs from the discharge of treated effluent for the development of Area 6f.	The discharge of treated effluent of Area 6f would be near Discovery Bay Plaza where the closest WSR would be WSR04 (Tai Pak Wan). Tai Pak Tsui Peninsula CPA has a width of 700m from east to west such that it would shield the plume from the proposed outfall of Area 10b from that of Area 6f. Besides, the shortest distance for effluent travelling from the tentative outfall location to WSR04 would be at least 2km. Given that the dilution factor of 306 at a distance of 320m according to the submitted Table 5.2 of *Technical Note on preliminary water quality assessment for the proposed STW*, it is concluded that the plume will be strongly diluted by the tidal current for a travelling distance more than 2km, thus causing no significant impact to that WSR. Thus, it is considered that the cumulative effect is negligible.
9. S.6.1.3.1 - For WSR07, please clarify if there was any survey conducted to verify this location as WSR. AFCD's comment should also be sought.	Site survey has been conducted to verify WSR07 as a coastal area with rocky shores and vegetation. The report has been circulated to AFCD for comments.
10. S.6.2.1.4 - Please provide construction details for the relocation of existing seawall and the corresponding mitigation measure(s). The mentioned Annex F in Rtc is missing.	As discussed in Section 6.2.1.4 and Section 6.2.1.5, in order to avoid/minimise water quality impacts due to the piling works, steel casings will firstly be installed at the proposed pile locations. The steel casings extend above the sea and will prevent soil or rock arisings from being disposed of into the sea. The arisings will be removed from within the piles to a barge anchored close to the piles. Once the materials inside the casings were removed, steel reinforcements/structural sections will be lowered inside the casing and then followed by concreting work. Silt curtain will be installed as secondary measures to prevent any accidental release of arisings into the sea. These were included in Annex F of the previous submitted response to comment dated October 2016, and are provided in **Annex F1** of this submission.
11. S.6.2.1.5 and S.6.3.1.2 - Please advise if dredging would be carried out by closed-grab dredger.	Any dredging would be carried out by closed-grab dredger.
12. S.6.4.1.5 - Please advise when the quantitative water quality model will be conducted.	Preliminary quantitative assessment has been conducted and presented in Appendix 6.3 of **Annex E**.
13. S.6.4.2.1 - The Applicant proposed emergency storage within pumping station was equivalent to 6 hours of ADWF while the RtC stated a storage tank will be installed to allow retention period of at least 2 hours. Please clarify the discrepancy.	According to latest design, emergency overflow to existing SPS would be proposed to avoid emergency discharge and the retention storage is no longer required.
14. S.6.4.2.2 - For the proposed contingency measures of the STW, the Applicant proposed to provide emergency overflow pipe from the STW to divert the raw sewage to the existing Sewage Pumping Station no. 1 then to SHWSTW for treatment. DSD's comments on its technical feasibility should be sought and consent should be obtained from the Authority for accepting the additional sewage from the proposed development during emergency. Please indicate the location of SPS no. 1 and identify the water sensitive receivers nearby.	The planning application with all the technical reports has already been circulated to DSD and no adverse comments were received. Please refer to **Annex F2** for the locations of SPS No. 1, 2 and 3. All three SPSs have the same design capacity that they all have 2 duty pumps and 1 standby pump with a duty capacity of 32,832 m^3/day and a standby capacity of 16,416 m^3/day respectively. Sewage received by SPS No.2 (most upstream) is conveyed to SPS No.1 and eventually enters SPS No.3 (most downstream), which then transfer flow to Siu Ho Wan STW. As the maximum existing flow for SPS No.3 is estimated to be around 27,750 m^3/day (i.e. 25,000 planned max. residential population + 15% for commercial activities), which is within the capacity of the duty pumps (i.e. 32,832 m^3/day). Hence, SPS No.1 and No.2 will have enough capacity for the emergency use as the existing flows are less than that in SPS No.3 because SPS No. 1 and No. 2 are upstream of SPS No. 3. The proposed emergency overflow sewers between the proposed STW at Area 10b and the SPS No. 2 will be gravity sewers mainly along the relatively steep Discovery Valley Road so there is no risk of pipe bursting as no pressurize sewage rising main is proposed for the emergency overflow sewer. In addition, in order to demonstrate the capacity of each SPS during emergency situation, the table below summarises the capacity of SPS No. 1, 2 and 3.

SPS	Duty Pump m^3 / day	Standby Pump m^3 / day	Total Capacity m^3 / day	Existing Flow m^3 / day	Sewage during Emergency Situation m^3 / day
SPS No.1	32,832	16,416	49,248	<27,750	440 from Area 6f 1,100 from Area 10b
SPS No. 2				<27,750	1,100 from Area 10b
SPS No. 3				27,750	440 from Area 6f 1,100 from Area 10b

From the above table, SPS No. 1, 2 and 3 can cater additional sewage during emergency situation from the discharge of Area 6f and Area 10b. It should also be noted that the 440m3 / day sewage from Area 6f would constitute only 1.6% of the existing daily flow of the SPS, while that of 1,100m3/day from 10b would constitute only 4%. Hence, even during the very remote case that all the 3 SPS encounter total power failure, the additional impacts caused by the new sewage from Area 6f and Area 10b would be marginal. In fact, during the operation of Discovery Bay in the last 2 decades, there have never been any cases for total power failure for the SPS.

To avoid overflow during normal condition, the following measures are proposed to be adopted subject to detail design:

1. The overflow pipe is designed at a higher level than the inflow pipe so the overflow will only happen during emergency case when the whole proposed STW at Area 10b is down.
2. The valve on the overflow pipe could only be opened under authorization by senior management.
3. There will be flow meter device on the normal effluent pipes and the emergency overflow pipes to monitor the flow condition on both pipes as part of the routine operation of the proposed STW at Area 10b. Those data could be submitted to relevant government department to supervise the operation of the proposed STW at Area 10b where required.

15. S.6.4.2.2 - Please further elaborate the measure of "suitable backup of treatment process in the Sewage Treatment Work".	Given the response to comment item 14 above, "suitable backup of treatment process in the Sewage Treatment Work" has been deleted accordingly.
Appendix 6.3 - Preliminary water quality assessment for the STW	
16. S.5 - Please supplement the effect of sedimentation on the water sensitive receivers as a result of STW operation in the report.	As regards the sedimentation, since the plume according to the model is above the seabed according to Section 5.1.1.2 of Appendix 6.3 in **Annex E,** there would be no direct deposit of suspended solid to the bottom. Even if it is assumed that the plume can hit the seabed and other conditions remain unchanged, the increase in the concentration of suspended solid would be <0.1 mg/L (=30/306, Table 5.2 of Appendix 6.3) which is within the natural fluctuation of the annual concentration of suspended solid. It is thus anticipated that the sedimentation due to the treated effluent would be insignificant.
17. S.5.1.1.2 - The assessment results indicated that the increase in TIN level at certain depth (i.e. inside the sewage plume) could be up to 18% as compared with baseline condition. The Applicant should exhaustively explore and provide all practicable mitigation measures to minimize the residual impact as far as practicable (e.g. adoption of more advanced treatment technology, review the discharge location, etc.). It is noted that the foregoing conclusion was also mentioned in S.7 of the ecological section, AFCD's comment should also be sought.	Please refer to **Annex F3** for the justification of the sewage treatment level. Key highlights of the justification are as follows. • Compared with the planned STW in South Lantau and the existing STW in South Lantau and the surrounding outlying islands, the adopted treatment technology is at the same level or even better, particularly at *E. coli* and TIN. • The increases of depth-averaged TIN and TIN within plume at the nearest WSR (Hai Tei Wan Marina) from the discharge are 2% and 18.3% respectively. The increases are smaller than the 33% increase of depth-averaged TIN caused by the planned STW in South Lantau to Tong Fuk Beach, indicating that the proposed STW has already ensured the elevation at WSRs to be very low as compared to other approved EIA reports.
18. In Section 1, the Applicant stated "... the treated effluent from proposed STW would be conveyed to a sewerage system, and finally discharged via a submarine outfall.". Please clarify the details of sewerage system.	The statement should read as "... the treated effluent from proposed STW would be conveyed to a *booster pump system...*"
Sewerage Infrastructure	
19. Rtc - The Siu Ho Wan STW has no spare capacity to cater for sewage arising from the proposed developments in Discovery Bay. The applicant should clearly indicate that the developer shall make own provision to treat the sewage to arise from the development.	The additional 1,100m^3/day sewage generated by the proposed residential developed is proposed be catered by an onsite sewage treatment facility which would be implemented by the Project Proponent. Yet in view of the fact that there are various on-going new developments at North Lantau and Airport, expansion of the Siu Ho Wan sewerage treatment facilities in order to provide extra sewage treatment capacity is likely to take place. The Applicant believes that, should EPD plan for infrastructure expansion, all proposed future developments in the vicinity areas, including those in the Discovery Bay, should be considered on equal and fair basis. In addition, the proposal for Area 10b is moderate in scale, the demand on the overall Government infrastructure would be insignificant. Therefore, the Applicant requests EPD to take into account the proposed development should they consider for future expansion of the Sui Ho Wan facilities.
Waste Management	
20. For the proposed STW, the applicant is reminded to ensure that consent from Waste Disposal Authority shall be obtained for disposal of the potential sewage screenings and sludge to be produced from the facility.	Noted. Relevant text has been added in S.7.1.1.3 in **Annex E**, "*Consent from Waste Disposal Authority would be obtained prior to the disposal of potential sewage screenings and sludge which to be produced from the proposed STW.*"
21. For the existing facilities having potential for land contamination and to be removed from the site (e.g. depot for vehicles and petrol filling station), the Applicant clarified in the ES that they would complete the land contamination assessment and any remediation works, including relevant submissions, before any construction works of the proposed development. The Applicant shall confirm on the control mechanism that they will undertake to carry out the above (e.g. the land approval process for amendment of the Master Plan for implementation of the development).	During the land approval process for amendment of the Master Plan, the Applicant will undertake the required CAP, CAR, RAP and RR and submit them to EPD for approval prior to commencement of any construction works.
Air Quality	
22. Please clarify if there is any updates on the model runs compare with those submitted in July 2016.	There are no updates on the model runs compared with those submitted in July 2016.
23. The ASRs @ 80 mAG are included in the model, while the excel file for Appendix 4.3 covered up to 70mAG only which is not tally with the PDF.	The excel file for Appendix 4.3 covered up to 80mAG will be supplemented. It will be submitted to EPD separately and directly.
24. A STW is proposed and a SPS would be upgraded, the modelling file would subject to further review if air quality modelling is considered necessary.	Refer to RtoC Item 4, a qualitative assessment on the odour impact from the proposed STW was conducted. No adverse odour impact is anticipated. Hence, there is no model file for odour impact assessment. Please note upgrading of the existing SPS would not be required according to the latest design. Hence, potential odour impact from upgraded SPS would not be relevant to this project.
25. Table A4.2e for Area 10b adopted the same data as Table A4.2d for Area 6f. As such, please refer to our comment #3 in Area 6f.	The cumulative heavy metal concentration has been updated by adopting the latest 5 year (i.e. 2011 – 2015) background. The updated background and assessment results are presented in Appendix 4.2 and Appendix 4.3 of **Annex E** respectively.
AFCD's Comment	
Impact on Fisheries	
a. The proposed project may involve construction of a new sewage treatment plant, dredging works and associated minor marine works. However, the impact on fisheries was not covered as one of the environmental issues in the Environmental Study. Any potential direct or indirect impacts on fisheries should be identified and evaluated. It is understood that an EIA study which will cover ecological surveys and impact assessment would be subsequently prepared. The statutory EIA report shall also cover fisheries assessment. Fishermen undertakings should be consulted to gauge their views on the proposed project.	The discussion on mariculture fisheries impact is now included in S7.4 of the revised Environmental Assessment in **Annex E**, whereas the impact on capture fisheries production and fish spawning grounds is also supplemented in the same section. It is noted the statutory EIA report shall also cover fisheries assessment. Fishermen undertakings would also be consulted in the future EIA stage.
b. The applicant should provide a stand-alone section for review on fisheries issues. He noted that the proposed project may involve construction of a new sewerage treatment plant, dredging works and associated minor works. Apart from impact on mariculture fisheries, any direct or indirect impacts on fishing grounds, fisheries resources, capture fisheries production, etc. should be fully identified and evaluated.	The review on fisheries impact has been separated and put under S7.4 of the revised Environmental Assessment in **Annex E.** Impacts on capture fisheries and spawning grounds are also supplemented. **Nursery and spawning grounds for fisheries resources** The distance with the nearest nursery and spawning ground for fisheries resources in the southern waters is at least 6.5km away from the proposed discharge location. Given the effluent discharged from the proposed STW meets the statutory standard together with the large separation distance, direct or indirect adverse impacts on the nursery and spawning ground for fisheries resources are not anticipated.

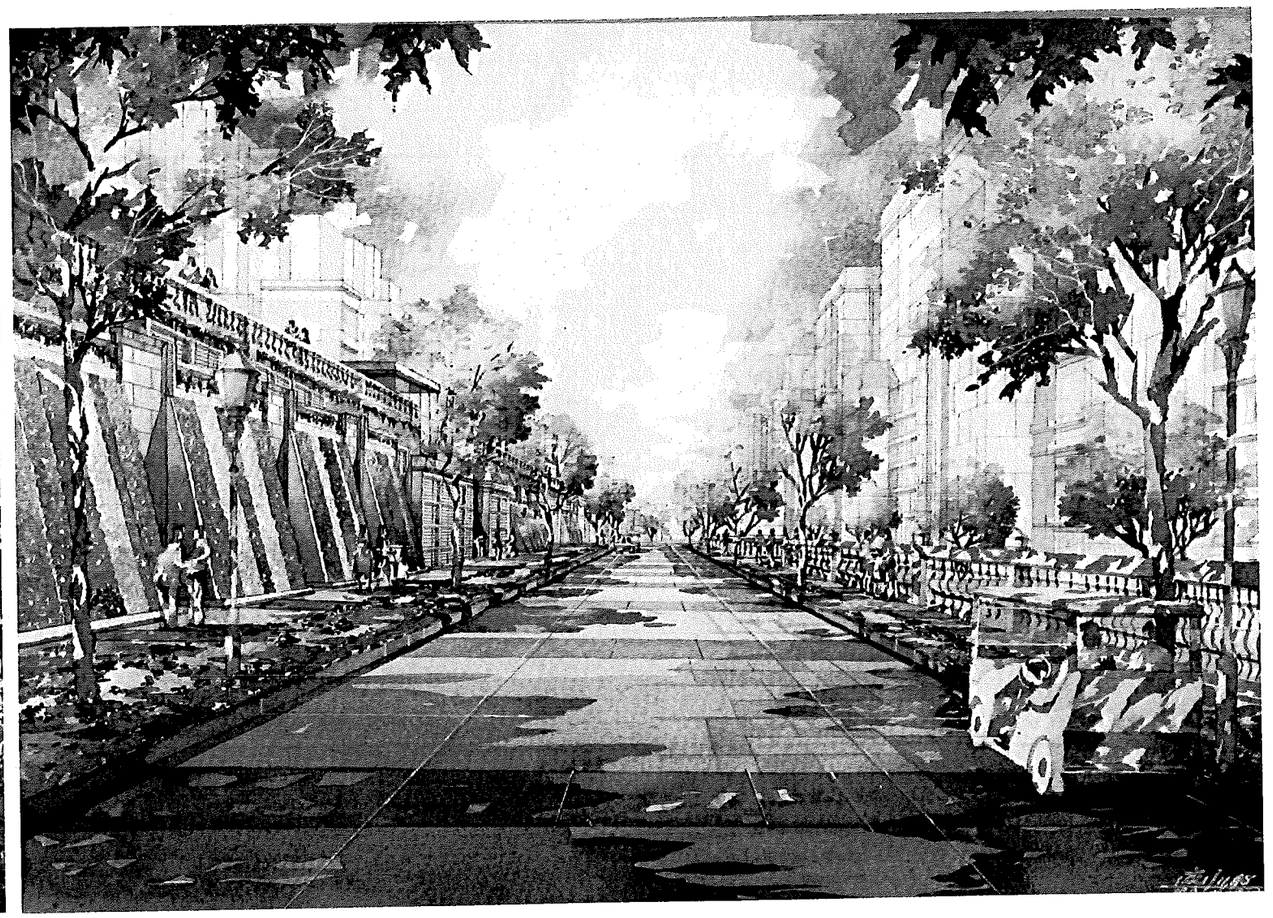
	Capture fisheries production According to the Port Survey published by AFCD in 2006, the number of fishing fleets using the waters immediately outside Area 10b was around 100-400 per grid cell, of which majority of them were small vessels/ sampan under 15m in length. The fisheries production within the area was around 100-200 kg/ha in Year 2006. Direct impact on fishing grounds is not anticipated as there would be no reclamation works at the location of the submarine outfall. For indirect impacts, water quality change due to effluent discharge from the submarine outfall could potentially affect capture fisheries production. However, given the proposed STW would only have a daily flow rate of 1,100m^3 and the effluent concentration would be monitored and controlled properly meeting statutory standards. The water quality impact to the nearby marine waters should be minimal. Although dredging works, if necessary, may be required to implement the future submarine outfall, mitigation measures such as silt curtain would be provided to reduce any potential impacts. The potential impact would be temporary and properly controlled. Therefore, the impacts on capture fisheries production during both construction and operation should be minimal.
Marine/Ecological Impact	
c. The applicant should provide more details on the reclamation scale and its related marine works (e.g. dredging of seabed). A map showing the proposed reclamation area should be provided.	Please refer to Figure 2-2 in **Annex E** for the information of the reclamation scale. Dredging works would no longer be required for providing navigation channel as the Bounty would not be re-provisioned and is deleted from the Concept Plan as agreed with the Applicant. However, dredging works may be required for the implementation of the submarine outfall, subject to the ultimate location of the submarine outfall which would be determined in the detailed design stage.
d. While the reclamation and associated works (dredging and sewage treatment activities) would inevitably cause marine ecological impacts, it is noted that a statutory EIA study would be conducted subsequently. He reserves his comments on the proposal until detailed findings of the Environmental Impact Assessment (EIA) are available.	Noted.
e. Sightings of seahorse have been reported inside the loading bay at Nim Shue Wan and Discovery Bay Marina. The applicant should advise any ecological sensitive receivers, such as seashore and corals, would be affected within the proposed reclamation/dredging footprint and its vicinity. The applicant should conduct an ecological assessment in relation to seashore and coral in the nearby coastal areas.	The proposed reclamation would be in a form of deck supported by piles rather than fully eliminating the seabed habitat within the footprint. Hence the direct loss of benthic habitat and species would be minimized. Besides, the reclamation would be along the existing artificial shoreline. Compare with the surrounding habitats in Nim Shue Wan, the proposed reclamation footprint may be less preferable for seahorses and coral colonization due to its proximity to the anthropogenic activities on shore. Therefore it is likely that the occurrence or abundance of seahorse and corals within the footprint, if any, would be lower than that in the surrounding habitats. A detailed marine ecological assessment with marine survey would be conducted in the EIA stage to investigate the occurrence and distribution of any species of conservation importance in the area, and formulate mitigation measures such as translocation where necessary.
f. The mitigation measures (i.e. installation of silt curtain and grab speed) recommended in the Environmental Study should evaluate whether translocation of the above species is feasible.	As Nim Shue Wan is an existing habitat with reported sighting of corals and seahorse, it is possibly a suitable location for translocation. Detail marine survey in the Nim Shue Wan area should be conducted in the EIA stage to identify the species within the proposed reclamation footprint, and the suitability of translocation from the proposed footprint to the immediately surrounding habitat. It is considered that the benthic area surrounding the proposed reclamation footprint in Nim Shue Wan share similar conditions, such as water temperature and salinity, as the proposed reclamation area. Besides, the surrounding area is further away from the existing development and anthropogenic activities, it is probably less disturbed and more suitable for the habitation of seahorse and coral.
Terrestrial Impact	
g. The applicant should incorporate the submitted response related to terrestrial impacts (e.g. habitat types/species affected and impact due to habitat loss, etc.) with map and photos showing the habitat types/species affected into the revised Environmental Study. Tree felling impact and the associated transplantation/compensation should be considered from the landscape assessment perspective.	Out of the 6.25 ha of Area 10b, disturbed area occupies 5.12 ha which is approximately 82% of the site area. Only 1.13 ha (or 18%) of the area accommodates trees and plantation. The current development plan has exercised due consideration in avoiding and minimising terrestrial ecological impact by utilising all the 5.12 ha of disturbed area. For the 1.13 ha of existing area with trees and plantation, only 0.74 ha of that would be directly impacted. Given the developed nature of Area 10b, it is considered that the terrestrial ecological impacts associated with the captioned development, if any, would be minor. The affected vegetated area is a patch of standalone plantation within the developed area in the centre of the site that, which has limited connectivity with other natural habitats in the vicinity. Furthermore, the area is mostly urbanised and subject to moderate to high anthropogenic disturbance, hence the ecological value of the area should be relatively low. The section related tree felling has been deleted as appropriate. Assessment on tree felling impact and the associated transplantation/compensation from the landscape assessment perspective is available in the separate appendix of the planning application submission.
EMSD's comments	**Applicant's Response**
LPG Storage Installations Safety (a) There is a LPG store within the Site, which supplies the piped LPG system in Discovery Bay. The developer should clarify whether there would be any re-provision of LPG store to maintain the LPG supply to the existing LPG users.	There will be re-provision of LPG store elsewhere in Discovery Bay to maintain the LPG supply to the existing LPG users.
(b If a new LPG store is to be constructed, the developer should conduct a Quantitative Risk Assessment to ascertain that the new LPG store will not pose unacceptable risk to the members of the public and submit application in accordance with the Gas Safety Ordinance (Cap. 151).	Noted.
Buildings Department's comments	**Applicant's Response**
The excessive headroom at the entrance lobby of the proposed 18-storey height building buildings with 5.5m as shown in Section A-A and F-F o the revised Concept Plan in Annex A of the applicant's response to comments (October 2016) should either be justified and accepted by the Buildings Department or accountable for gross floor area calculation.	Noted.

Annex A

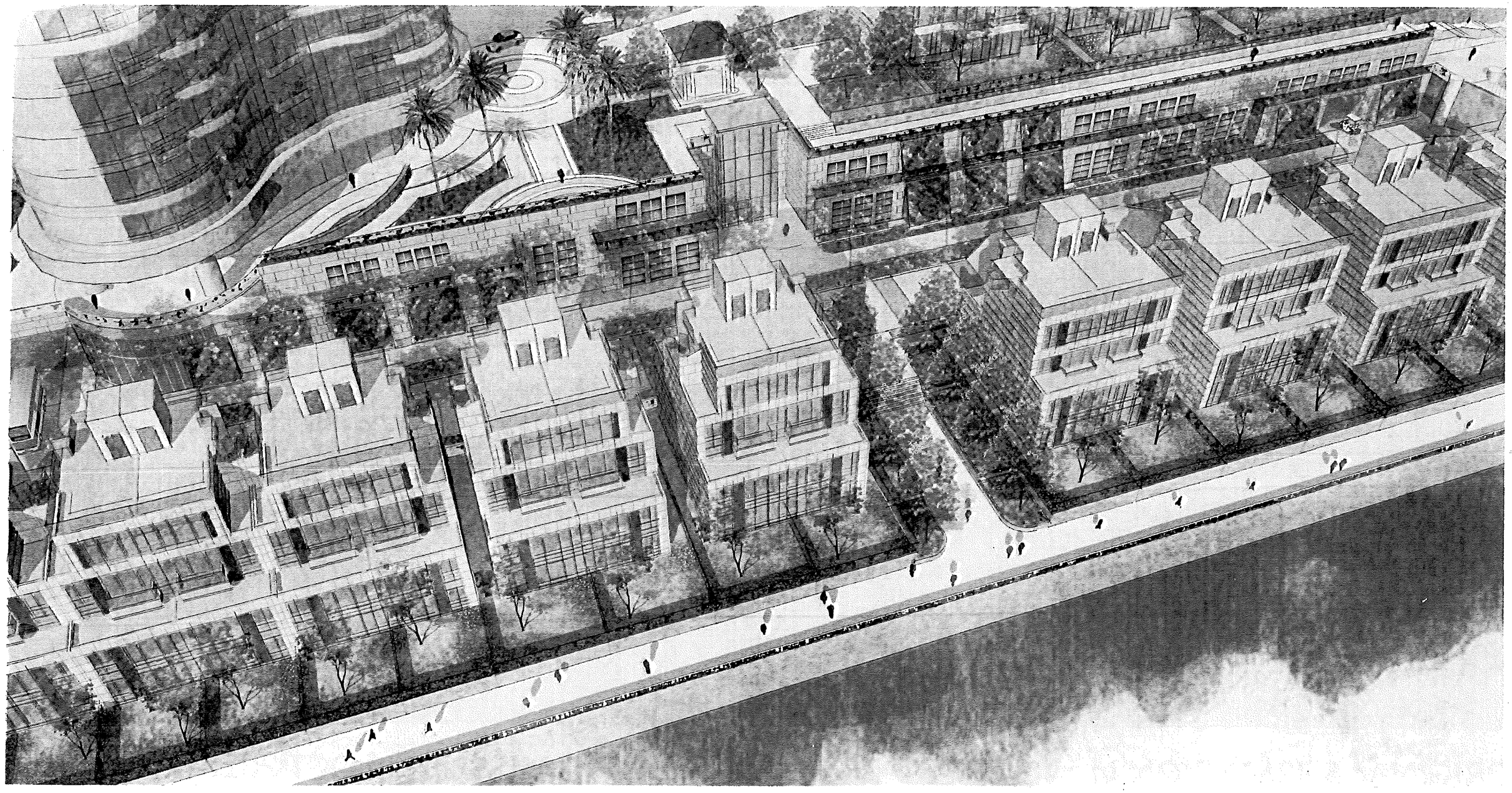
Perspectives

DISCOVERY BAY
Area 10b - REZONING APPLICATION

ORIGINAL SUBMISSION in JAN 2016



LATEST SUBMISSION in OCT 2016



TITLE :

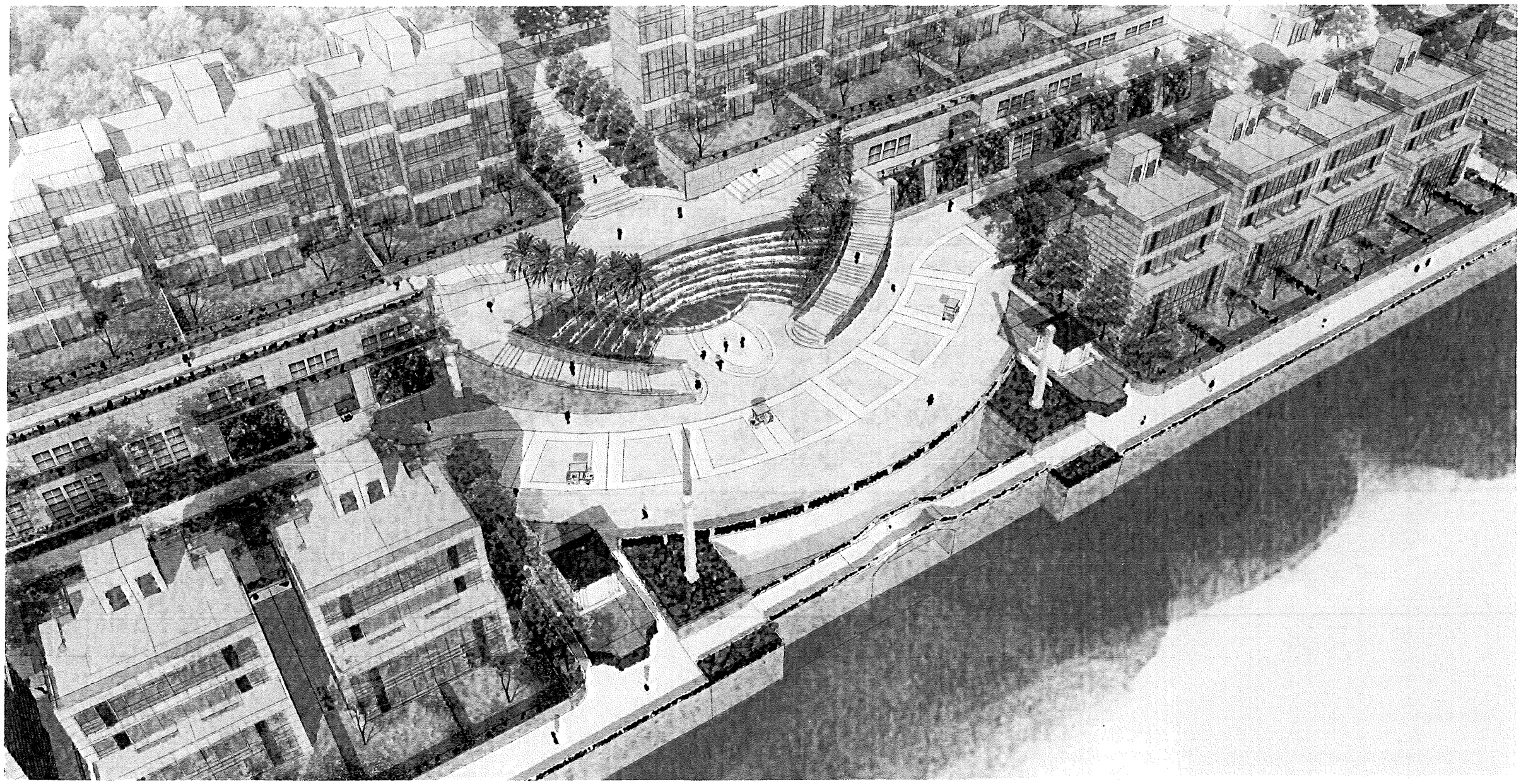
ARRIVAL AREA PODIUM

REV. 0
OCTOBER 2016

ANNEX:
B.11

PROJECT :

DISCOVERY BAY OPTIMIZATION OF LAND USE - AREA 10B



TITLE :

PIAZZA WITH CASCADE WATER FEATURE

REV. 0
OCTOBER 2016

ANNEX:
B.12

PROJECT :
DISCOVERY BAY OPTIMIZATION OF LAND USE - AREA 10B

Annex B

Revised Air Ventilation Assessment

HKR International Ltd.

Optimization of Land Use in Discovery Bay (Area 10b)

Air Ventilation Assessment - Initial Study

Issue | 20 January 2017

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

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

Job number

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ARUP

Document Verification

ARUP

Job title		Optimization of Land Use in Discovery Bay (Area 10b)		Job number
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Document ref				
Revision	Date	Filename	20161024_HKRI_DiscoveryBay_IS_Draft.docx	
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			Prepared by	Checked by	Approved by
		Name	Jenny Zhao	Camby Se	Tony Lam-Ngan Tung
		Signature			
Issue	20 Jan 2017	Filename	20170120_HKRI_DiscoveryBay.docx	
		Description	Revised to incorporate PlanD's Comment	
			Prepared by	Checked by	Approved by
		Name	Jenny Zhao	Camby Se	
		Signature			
		Filename			
		Description			
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
				Issue Document Verification with Document	✓

Contents

1 Introduction

1.1 Study Background

Ove Arup & Partners Hong Kong Limited (ARUP) has been appointed to conduct the Air Ventilation Assessment (AVA) Initial Study for the planning application for the potential development area, Area 10b in Discovery Bay ("Study Site").

This AVA Initial Study will be conducted in accordance with the specifications set by the *Technical Guide for AVA for the Developments in Hong Kong (Annex A of HPLB and ETWB Technical Circular No. 1/06 for Air Ventilation Assessments)* (termed *"AVA Technical Circular"* hereafter).

1.2 Study Site

The Study Site falls within an area zoned "Other Specific Use (OU)" and "Government, Institution or Community (G/IC)" on the approved Discovery Bay Outline Zoning Plan (OZP) Y/I-DB/4. The Study Site, with site area of 6.29ha, is located on a flat land at the southern side of the headland in the eastern part of Discovery Bay. Part of the Study Site will be provided by decking with piles. The boundary of the Study Site and current coastline are shown as red and blue line respectively in **Figure 1** below.

The Study Site is facing open sea to the southeast and southwest in which Discovery Bay Marina Club (about +15mPD) is located to the immediate east of the Study Site. To the northeast quadrant of the Study Site, located a gentle hill with low to mid-rise residential buildings, namely Crestmont Villa, Peninsula Village and Coastline Villa, with building height ranging from +30mPD to +75mPD. To the southwest, located the Nim Shue Wan and a scatter of low-rise village cluster across the Nim Shue Wan. More residential clusters, namely La Costa, Costa Court and Onda Court with maximum height of +87mPD are located to the northwest of Study Site. To the further southwest, some village type residential clusters with about +15mPD are located. **Figure 1** shows the Study Site and its surrounding areas.

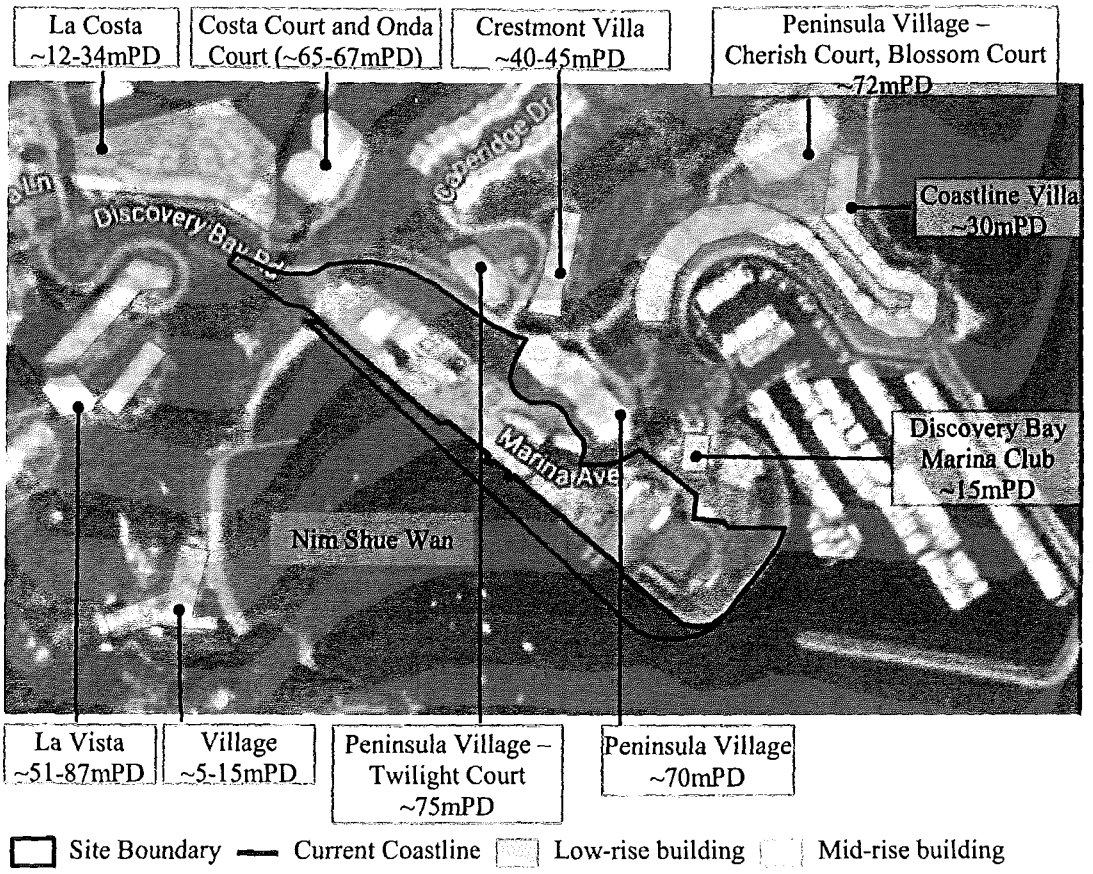


Figure 1 Study Site and Surrounding Area (Source: Google Map)

1.3 Objectives of the Study

An AVA Initial Study will be conducted by using Computational Fluid Dynamics (CFD) techniques. It aims to achieve the following tasks:

- Initially assess the characteristics of the wind availability of the site;
- Gives a general pattern and a rough quantitative estimate of the wind performance at the pedestrian level reported using Wind Velocity Ratio (VR);
- Identify good design features and problem areas if any and recommend mitigation measures.

2 Wind Availability Data

As per the *AVA Technical Circular*, at least 75% of the time in a typical reference year (frequency of occurrence) would be studied under both annual and summer wind conditions in the AVA Initial Study by using a Computational Fluid Dynamics (CFD) modelling technique. Since the CFD approach is adopted for the present project's AVA, this criterion together with the following points of consideration needs to be applied to the methodology.

The site wind availability data of the Study Site and its surrounding is an essential parameter for AVA. There is simulated meso-scale data of Regional Atmospheric Modelling System (RAMS) from PlanD * available. In the RAMS data, the grid (x:049, y:037) is referred. The annual and summer wind roses at 500m are shown in **Figure 2** and **Figure 3** respectively.

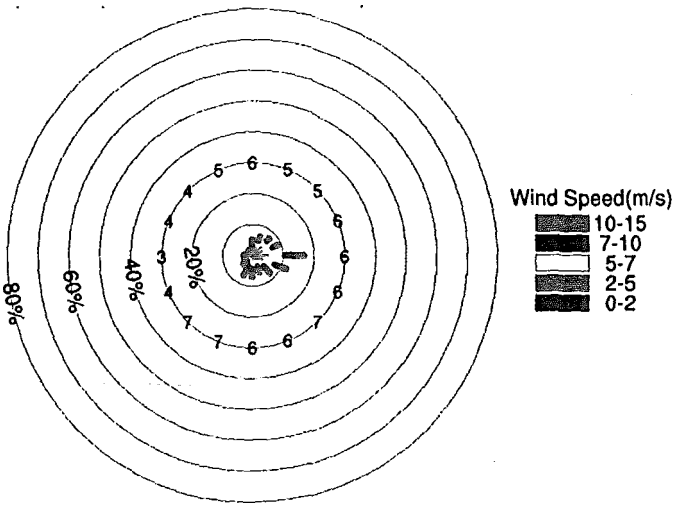


Figure 2 Annual Wind Rose at 500m extracted from the grid (x:049, y:037) of RAMS

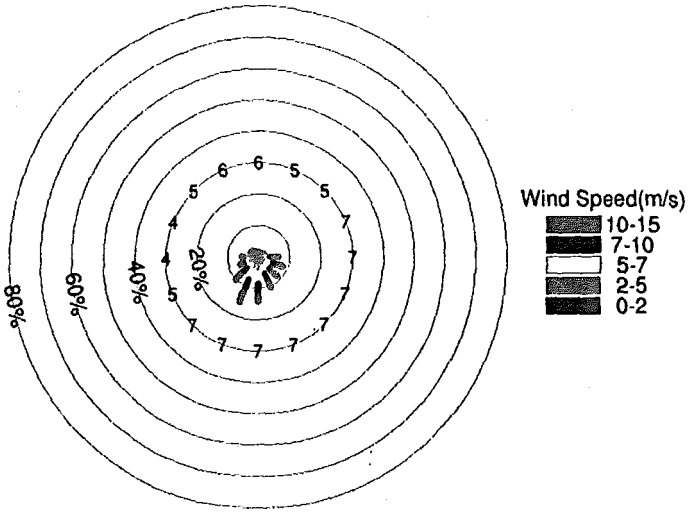


Figure 3 Summer Wind Rose at 500m extracted from the grid (x:049, y:037) of RAMS

* http://www.pland.gov.hk/pland_en/info_serv/site_wind/site_wind/049037.html

2.1 Prevailing Wind Directions

2.1.1 Annual Prevailing Wind

According the selected set of wind data from the RAMS, eight prevailing wind directions (highlighted in Red colour in **Table 1**) will be considered in this AVA Study which altogether cover 80.0% of the total annual wind frequency which exceeds 75% of annual wind frequency as required by the Technical Circular of AVA. They are north-northeasterly (6.4%), northeasterly (7.7%), east-northeasterly (9.0%), easterly (17.0%), east-southeasterly (11.9%), southeasterly (8.2%), south-southeasterly (6.0%), southerly (6.8%) and south-southwesterly (7.0%) wind directions.

Table 1 Annual Wind Frequency

Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	
Wind Frequency	5.2%	**6.4%**	**7.7%**	**9.0%**	**17.0%**	**11.9%**	**8.2%**	**6.0%**	
Wind Direction	S	SSW	SW	WSW	W	WNW	NW	NNW	SUM
Wind Frequency	**6.8%**	**7.0%**	4.2%	2.7%	2.6%	1.4%	1.6%	2.1%	80.0%

2.1.2 Summer Prevailing Wind

Eight prevailing wind directions (highlighted in Red colour in **Table 2**) will be considered in this AVA Study which cover 80.6% of the total summer wind frequency. They are easterly (6.4%), east-southeasterly (8.4%), southeasterly (8.8%), south-southeasterly (10.3%), southerly (14.3%), south-southwesterly (15.6%), southwesterly (10.4%) and west-southwesterly (6.5%) wind directions.

Table 2 Summer Wind Frequency

Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	
Wind Frequency	1.6%	1.4%	1.4%	2.1%	**6.4%**	**8.4%**	**8.8%**	**10.3%**	
Wind Direction	S	SSW	SW	WSW	W	WNW	NW	NNW	SUM
Wind Frequency	**14.3%**	**15.6%**	**10.4%**	**6.4%**	5.3%	2.7%	2.7%	1.8%	80.6%

** The wind frequency showing in red colour represents the selected winds for the CFD simulation.*

2.2 Wind Profiles

In the RAMS data the vertical profiles of the normalised mean wind speed were provided and the exact profile will be modelled in the CFD model for each corresponding wind directions to be studied. The vertical wind profile for all wind directions to be studied are shown in **Figure 4** through **Figure 6**.

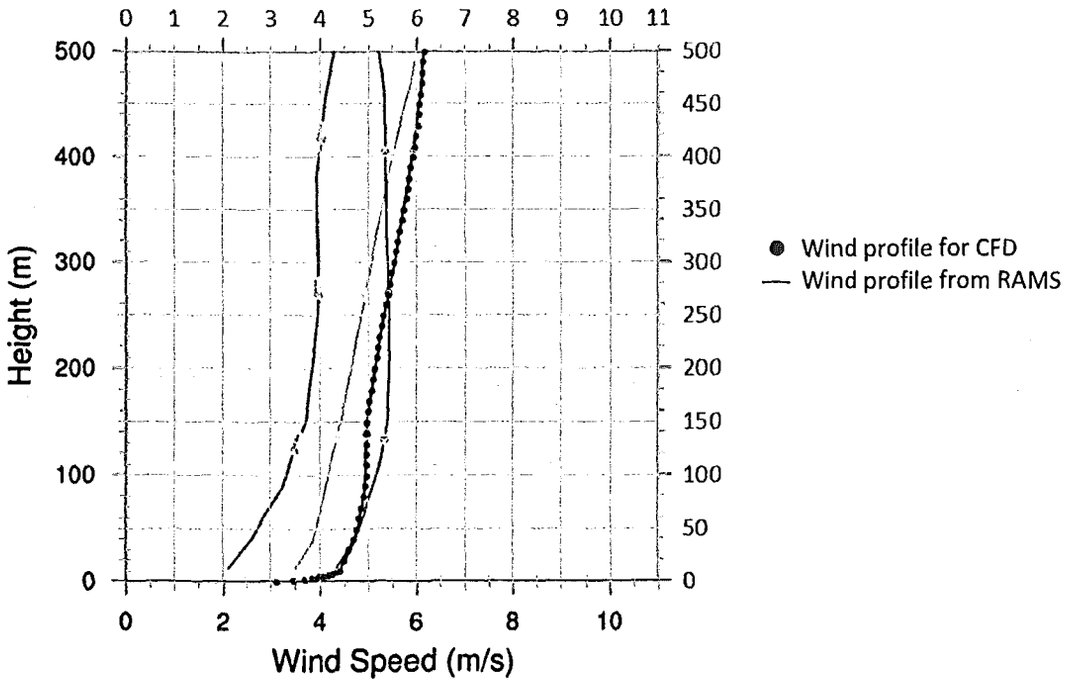


Figure 4 Vertical Wind Speed Profile of 22.5° - 112.4° winds

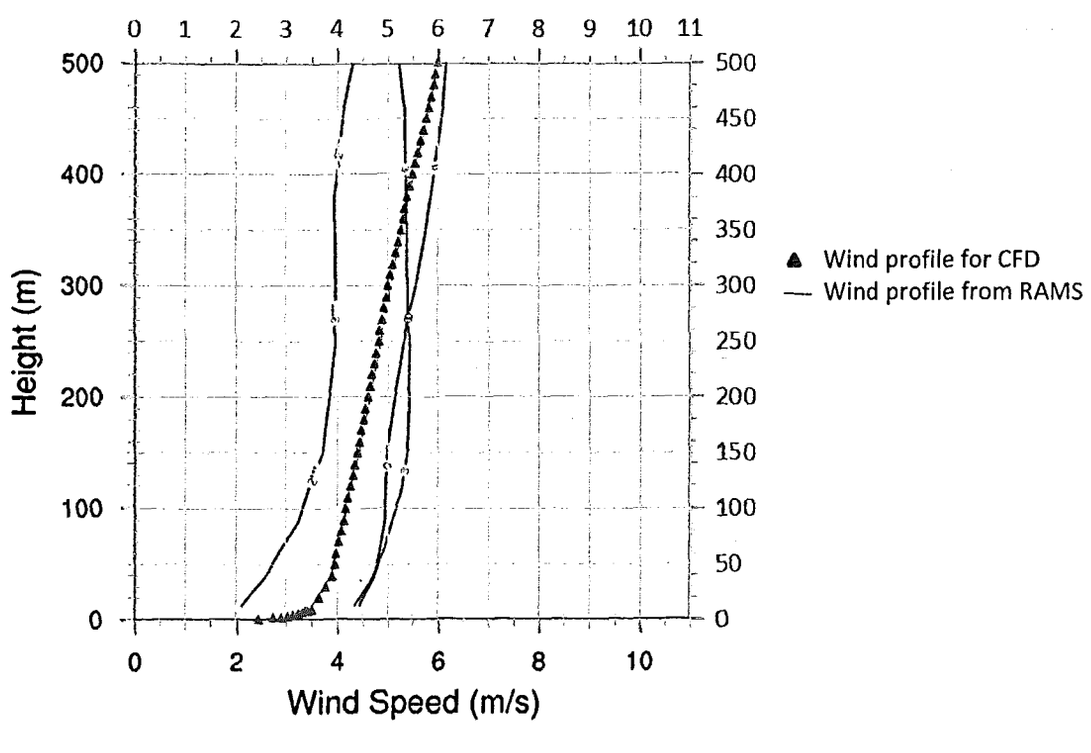


Figure 5 Vertical Wind Speed Profile of 112.5° - 202.4° winds

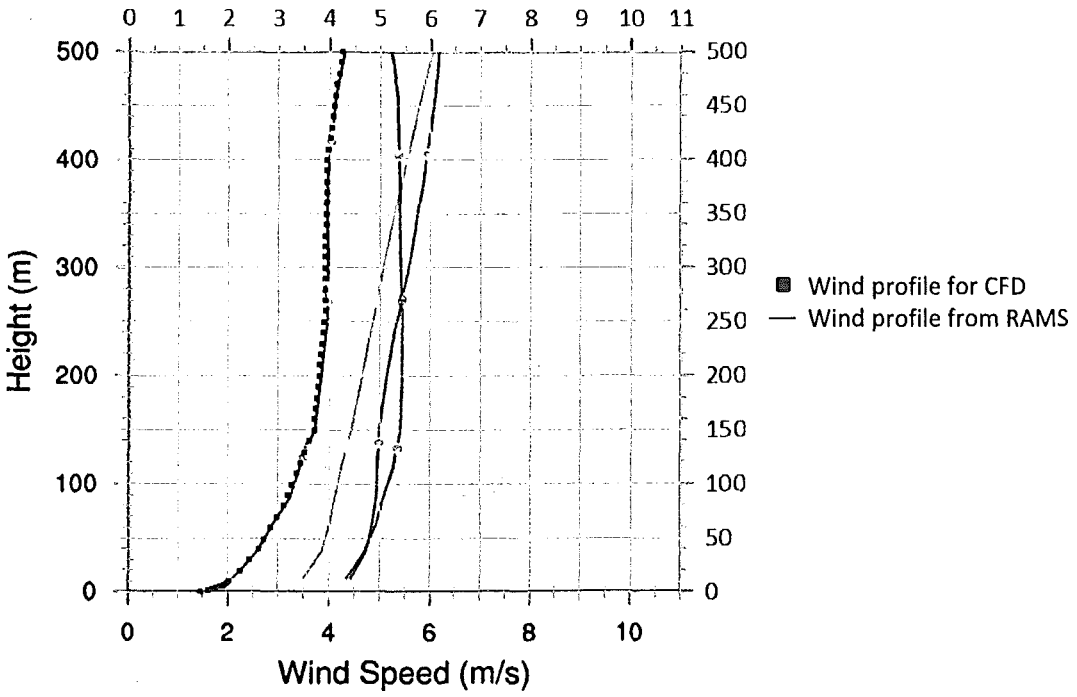


Figure 6 Vertical Wind Speed Profile of 202.5° - 292.4° winds

2.3 Studied Schemes

To further investigate the ventilation impacts from the proposed Developments and the effectiveness of wind enhancement features, an AVA – Initial Study has been carried out to compare the ventilation performance among OZP-Compliant Scheme, Baseline Scheme and Proposed Scheme. Each scheme will be briefly described in following sub-sections. The architectural drawings can be found in **Appendix A** of this report.

2.3.1 OZP Compliant Scheme

The OZP Compliant Scheme is developed according to the GFA and maximum height requirements stated in the Explanatory Notes of the OZP No. S/I-DB/4, with some of the existing buildings reserved. Apart from those existing buildings, following OZP compliant buildings were added to form this scheme. The master plan layout with building height for OZP Compliant Scheme is illustrated in **Figure 8**.

(i) "G/IC (Sewage Treatment Works and Upgrading Sewage Pumping Station)" site is planned with maximum building height of 18m above ground.

(ii) The "OU (Service Area)" site is intended for services in support of the Discovery Bay development with maximum GFA of 5310m^2 and maximum building height of one storey not exceeding 9m.

(iii) The "OU (Dangerous Goods Store/Liquefied Petroleum Gas Store)" site is intended for dangerous goods store/liquefied petroleum gas store to serve the Discovery Bay development, which is subject to a maximum

GFA of 500m^2 with maximum building height restricted to one storey not exceeding 9m.

(iv) The "OU (Pier(3))" site is intended with maximum GFA of 100m^2 and maximum building height of one storey not exceeding 9m.

The detailed 3D model for OZP-Compliant Scheme is shown in **Section 3.2.2**.

2.3.2 Baseline Scheme

The Baseline Scheme is developed to accommodate several residential blocks within the Study Site. Land reclamation in the form of decking over will be carried out, hence a Study Area different from the OZP compliant scheme, but similar to the Proposed Scheme has been adopted for the Baseline Scheme.

The master plan layout with building height for Baseline Scheme is illustrated in **Figure 9**.

(i) A podium of +15mPD housing bus depot in the north western portion with 6 nos. of +29mPD blocks, 2 nos. +31mPD blocks and 1 nos. of +78mPD blocks above the podium structure.

(ii) 6 blocks of 27mPD buildings, 3 blocks ranging from +42mPD to +70mPD with height decreasing towards waterfront in the south-eastern portion.

(iii) 56 houses with building height of +18mPD along the coast line.

(iv) 2 piers with width of around 65m and 55m facing Nim Shue Wan act as major wind entrance for summer prevailing wind. The outer pier would be dedicated for Kaito/services meanwhile the inner pier (bounty pier) was planned for bounty services, and yet, it should be noted that the bounty services would not be re-provisioned in the future.

(v) A terraced entrance with staircases has been provided to promote wind penetration from the wind entrance, as shown in **Figure 7**.

The detailed 3D model for Baseline Scheme is shown in **Section 3.2.3**.

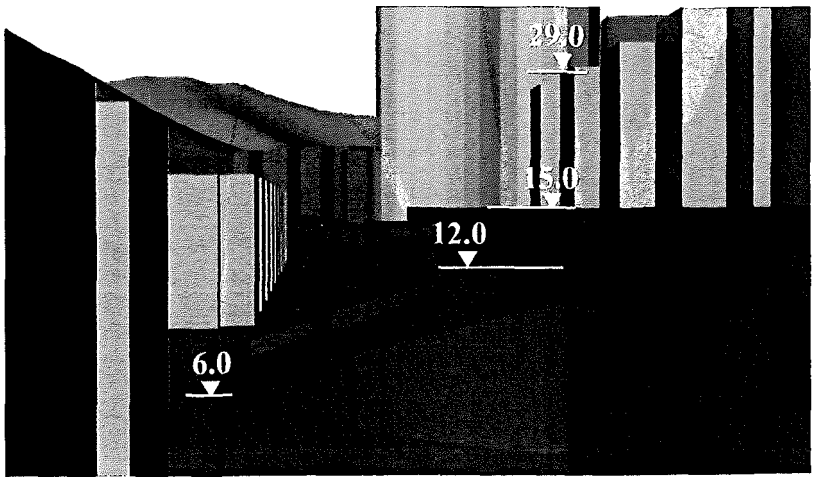


Figure 7 Details of Ramped Entrance in Baseline Scheme

2.3.3 Proposed Scheme

Similar to Baseline Scheme, same area of land will be reclaimed in the form of decking over. The Study Area from Baseline Scheme is adopted for Proposed Scheme. Proposed Scheme is developed based on the same development parameters as Baseline Scheme with various wind enhancement features.

Based on the Government department's comments received dated July 25, 2016, the Proposed Scheme has been revised with following wind enhancement features. The master plan layout with building height for Proposed Scheme is illustrated in **Figure 10**. In general, the building heights were kept similar to those in Baseline Scheme. Following changes were made to Baseline Scheme to address air ventilation impact within and around the Study Site:

- Building separation between the two clusters of buildings above podium structure has been increased to 15m to enhance wind permeability in the north-western portion of the site.
- An additional building separation of 15m has been provided in the eastern portion of the site.
- The building blocks along the water front has been rearranged and several building separations of 15m along the coast line has been provided to act as wind entrances.
- Building towers were elevated for 5.5m above podium structure and ground for M1 and M2 buildings respectively, as shown in **Figure 11** and **Figure 12** to enhance wind permeability near pedestrian level.

The detailed 3D model for Proposed Scheme is shown in **Section 3.2.4**.

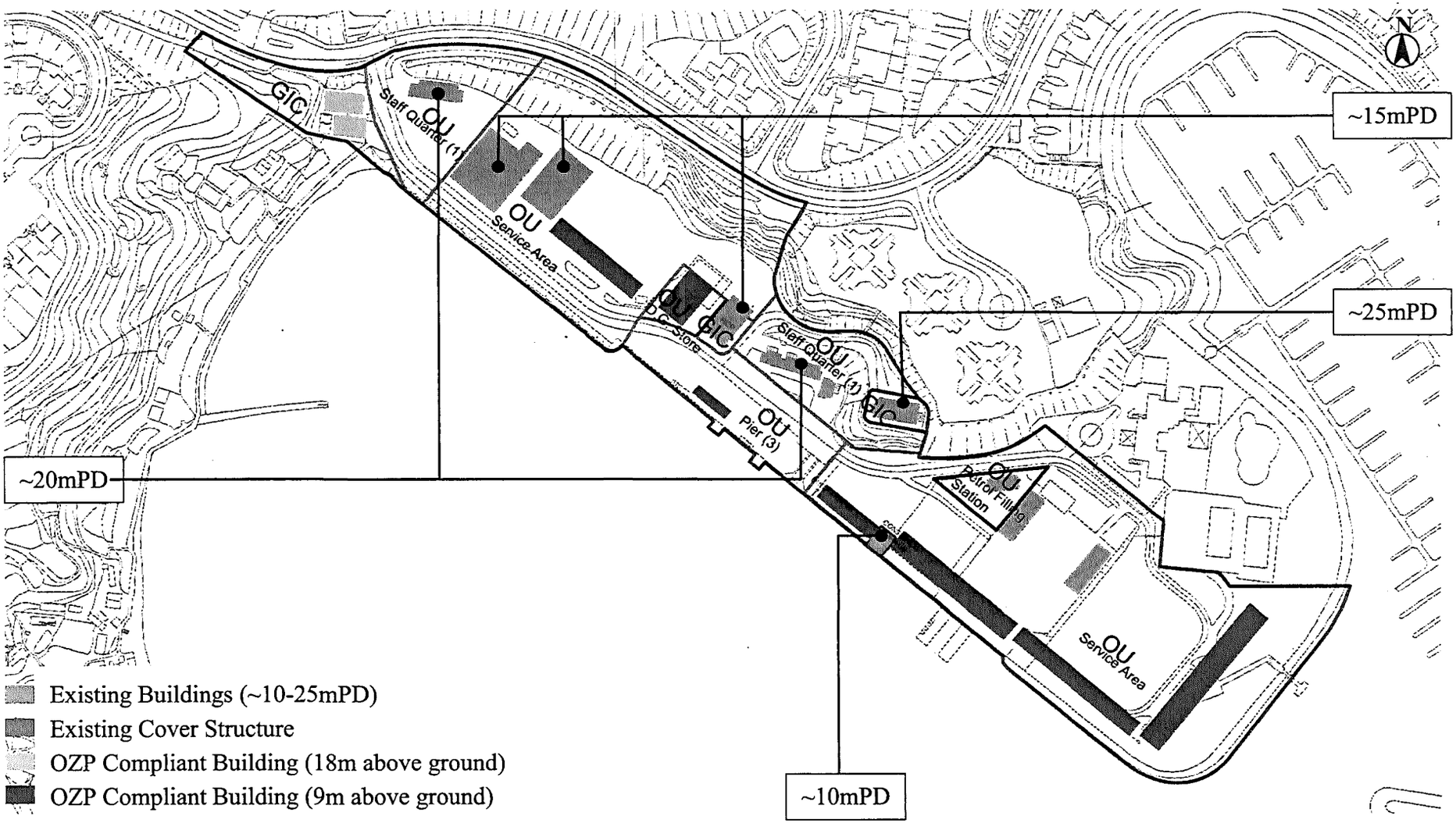


Figure 8 Layout of OZP Compliant Scheme

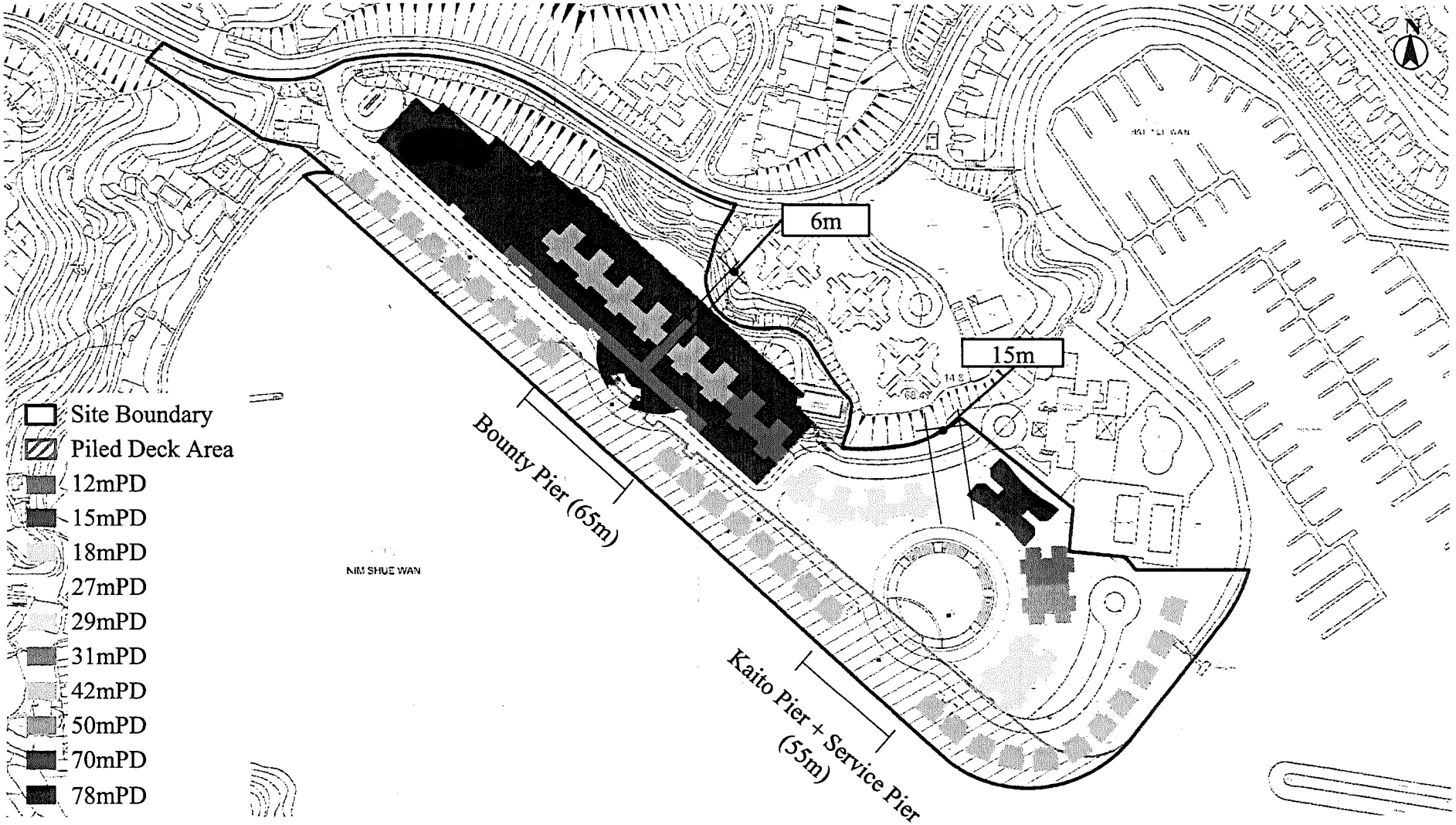


Figure 9 Layout of Baseline Scheme

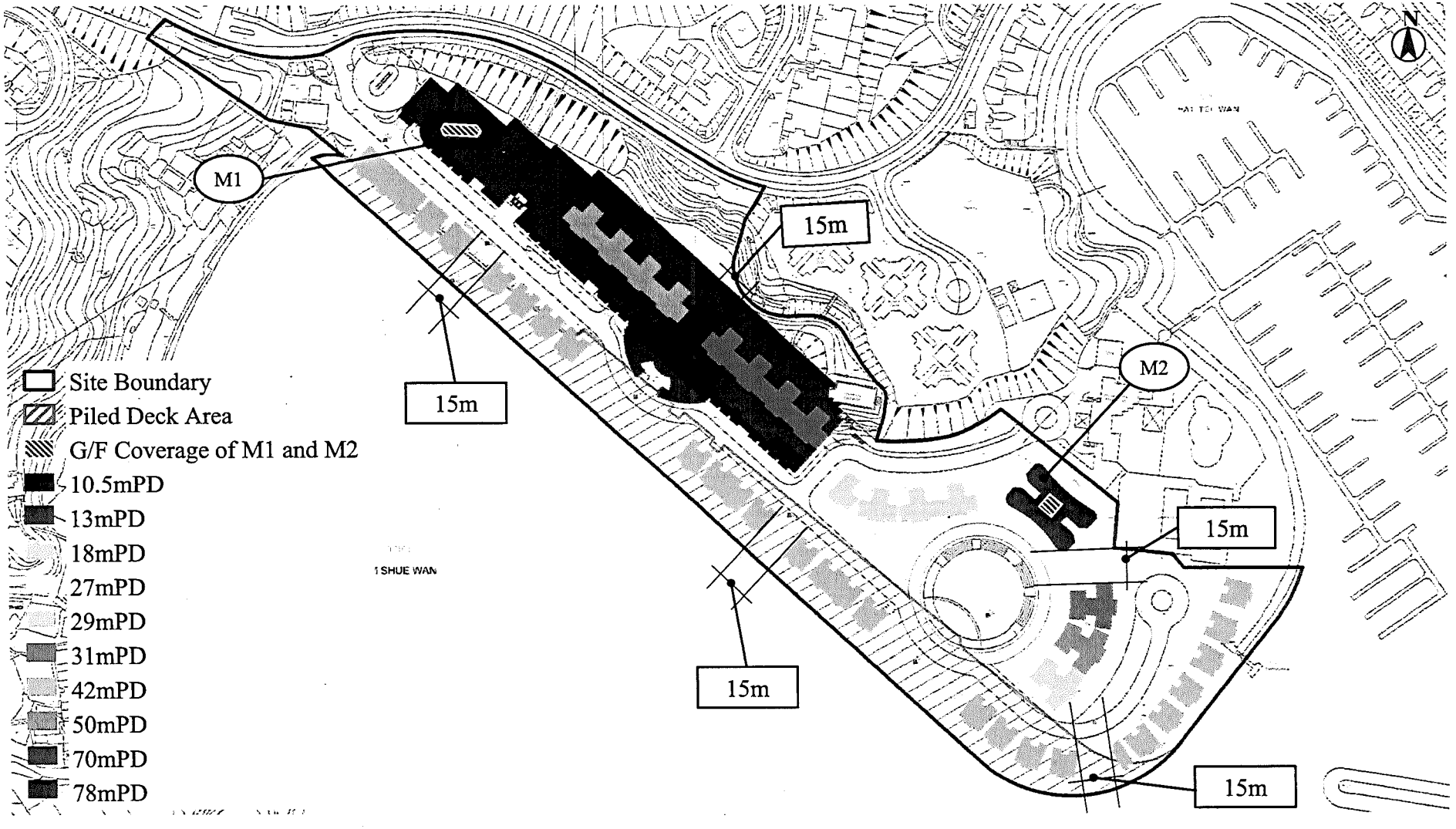


Figure 10 Layout of Proposed Scheme

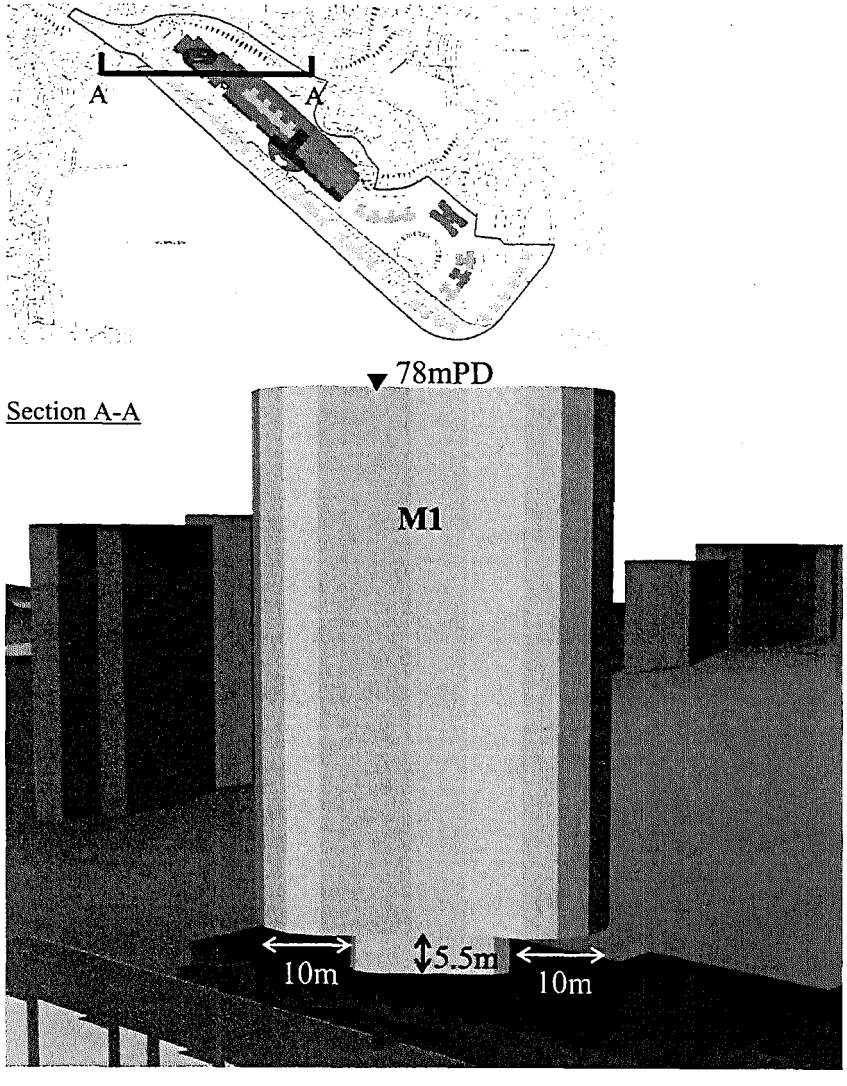
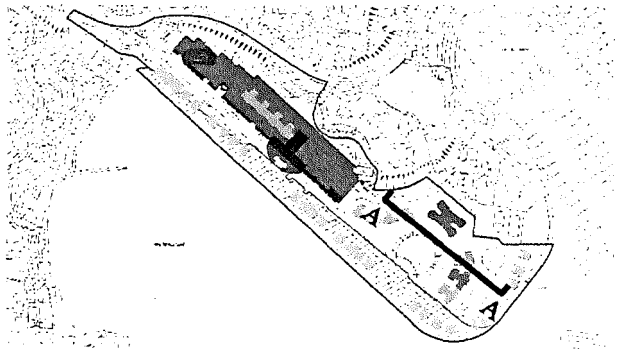
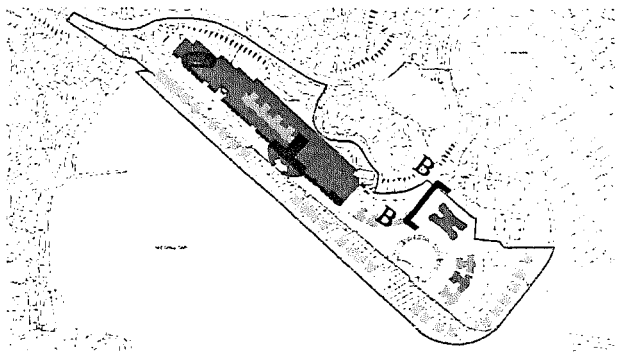
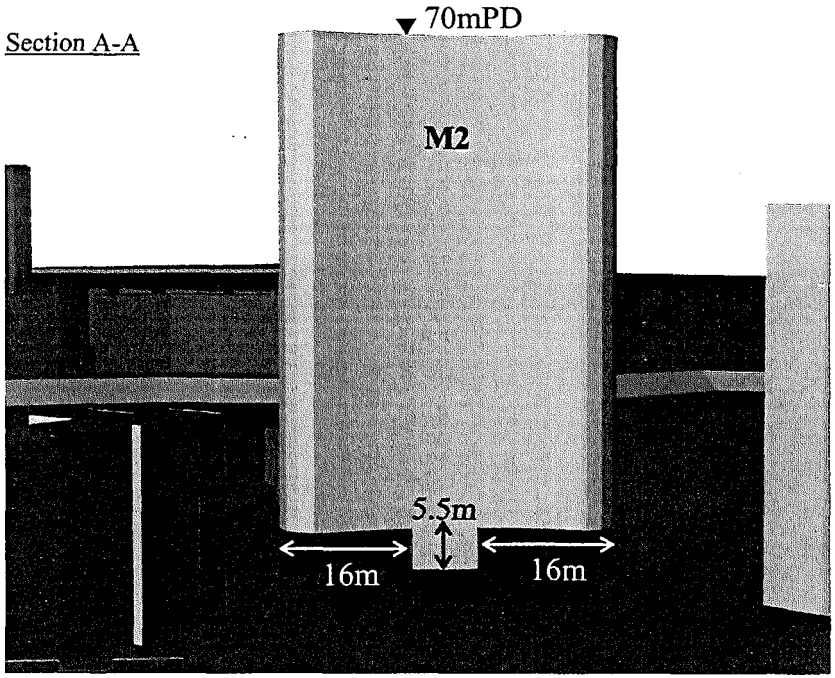


Figure 11 Elevated Tower, M1, in Proposed Scheme





Section A-A



Section B-B

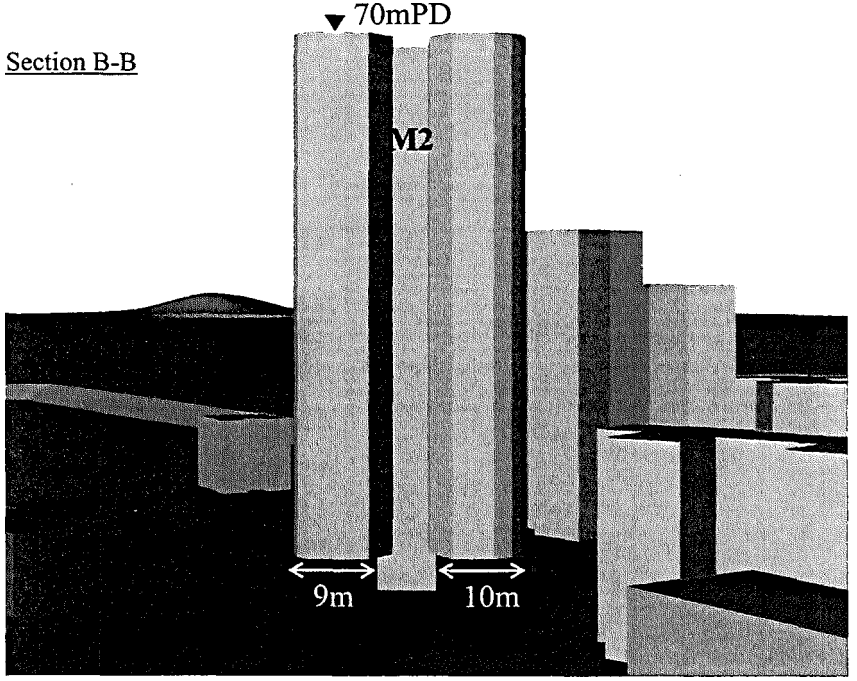


Figure 12 Elevated Tower, M2, in Proposed Scheme

3 Methodology

3.1 Surrounding Area

As the maximum building height of the Study Area is +79mPD, the focus areas to be assessed is limited. Therefore, the Assessment and Surrounding Areas will be extended to 150m and 300m away from the site boundary of the Study Area respectively as indicated in **Figure 13**. The computational domain will be about 3600m (length) x 3600m (width) x 1500m (height).

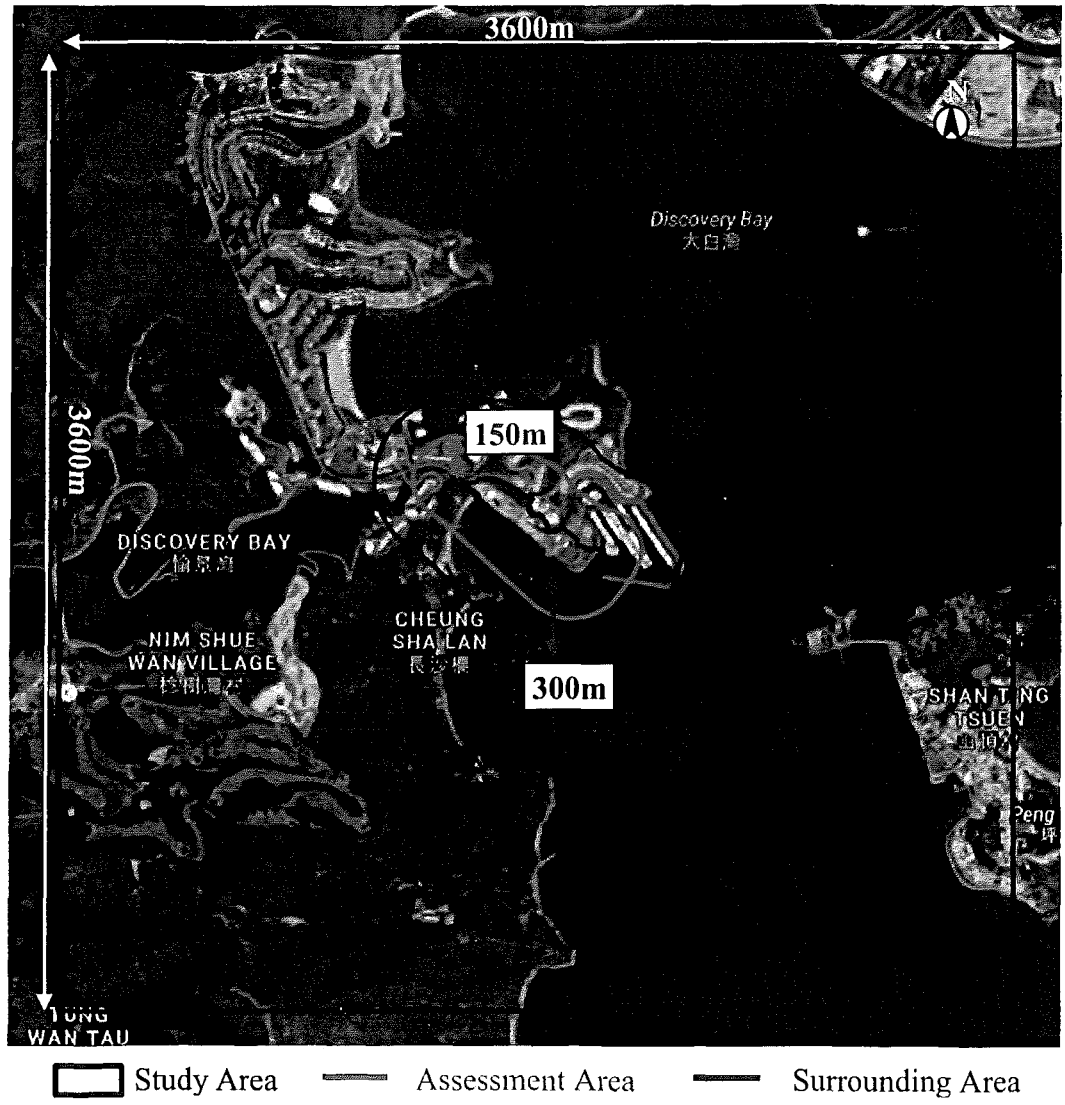


Figure 13 Dimension of the computational domain with Study Area (red), 1*H* Assessment Area (green) and 2*H* Surrounding Area (blue) highlighted

3.2 Directional Views of the 3D models

Four different views of the 3D models for this AVA Initial Study are shown in coming subsections.

3.2.1 Views on the 3D Models

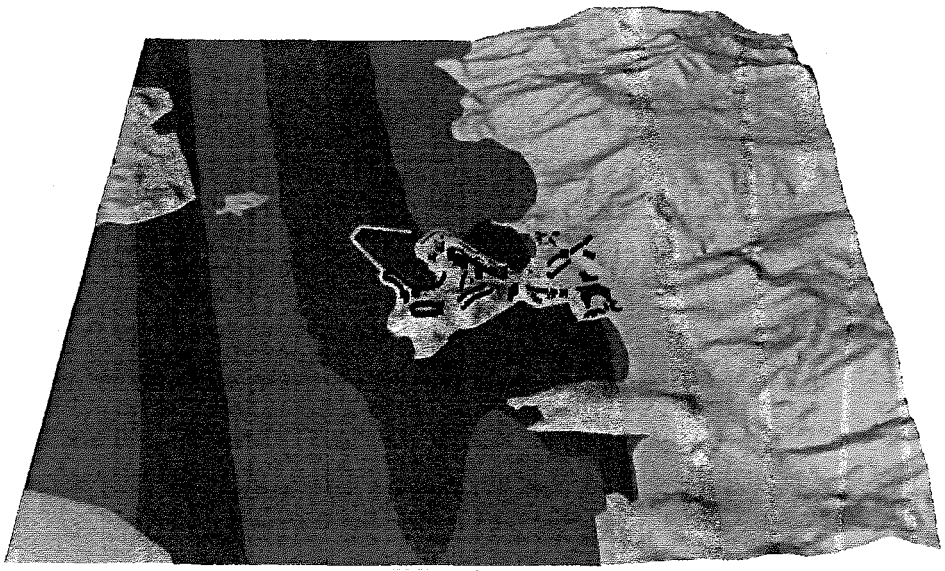


Figure 14 Northerly View of the CFD model

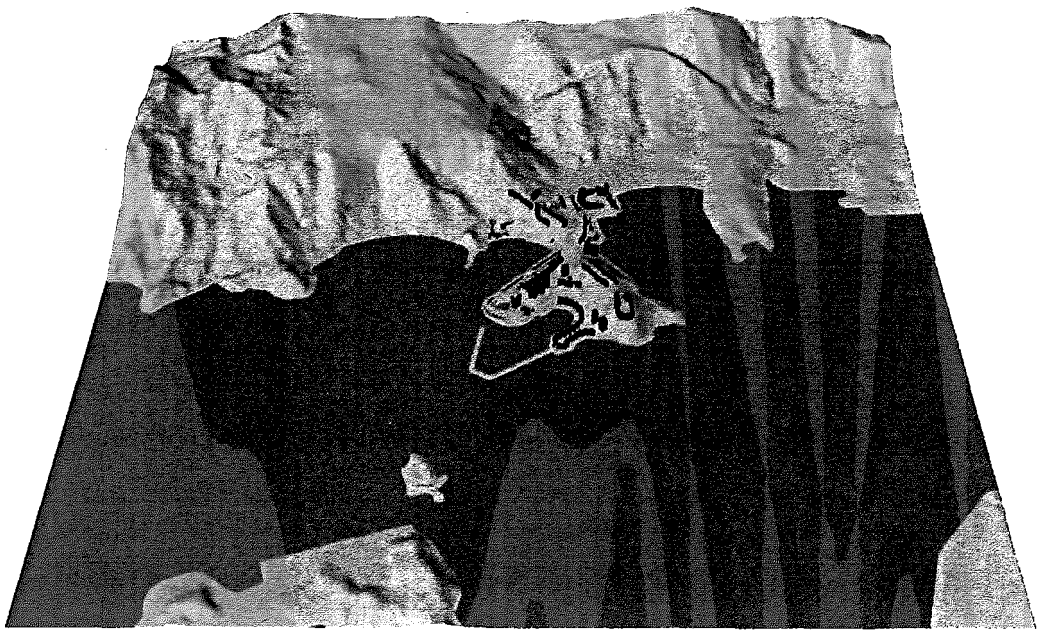


Figure 15 Easterly View of the CFD model

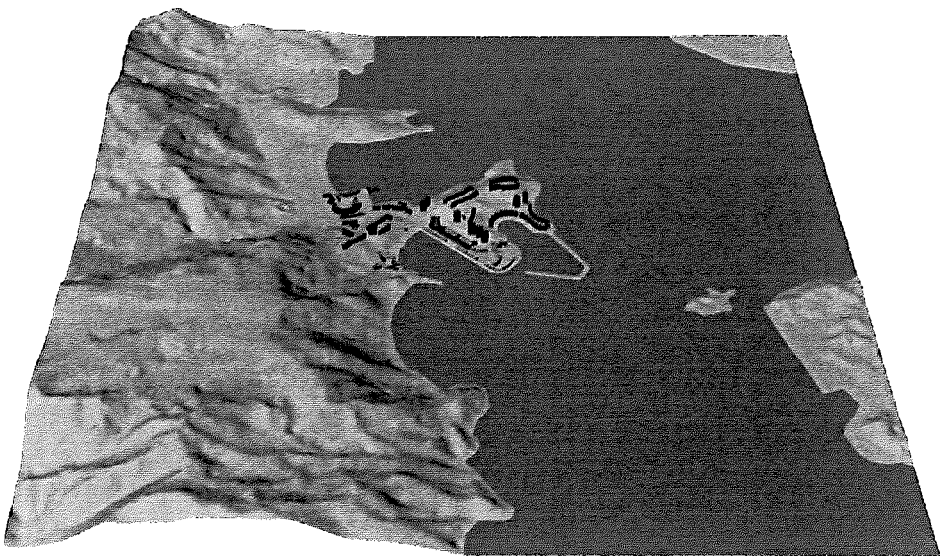


Figure 16 Southerly View of the CFD model

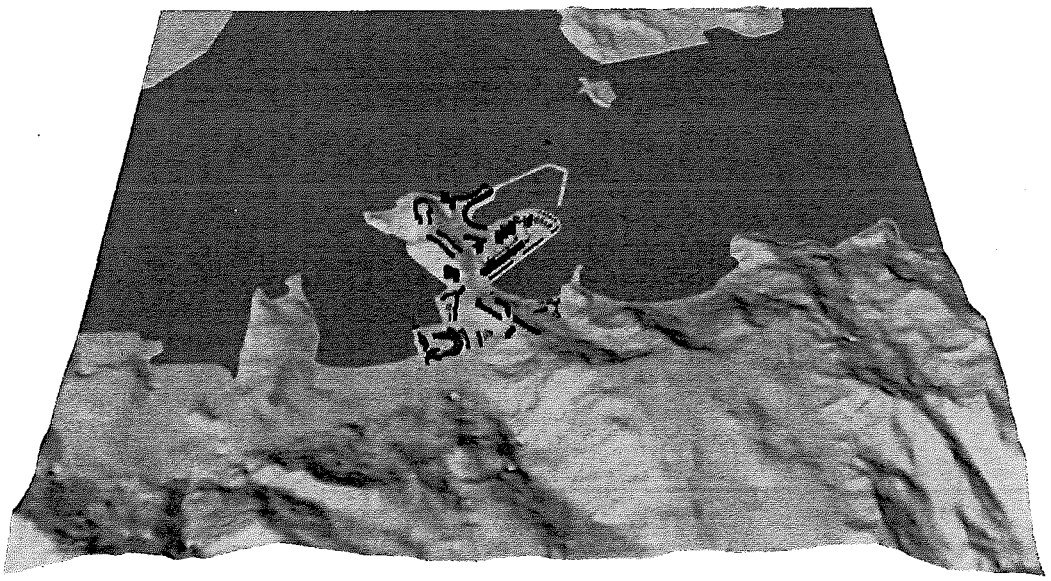


Figure 17 Westerly View of the CFD model

3.2.2 3D model of OZP Compliant Scheme

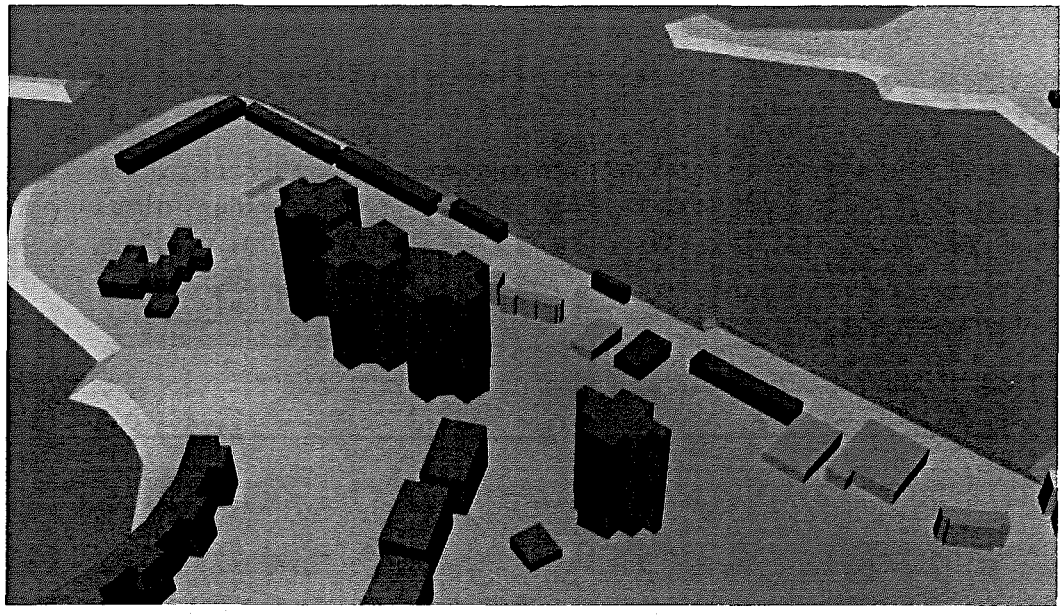


Figure 18 Northerly View on OZP Compliant Scheme

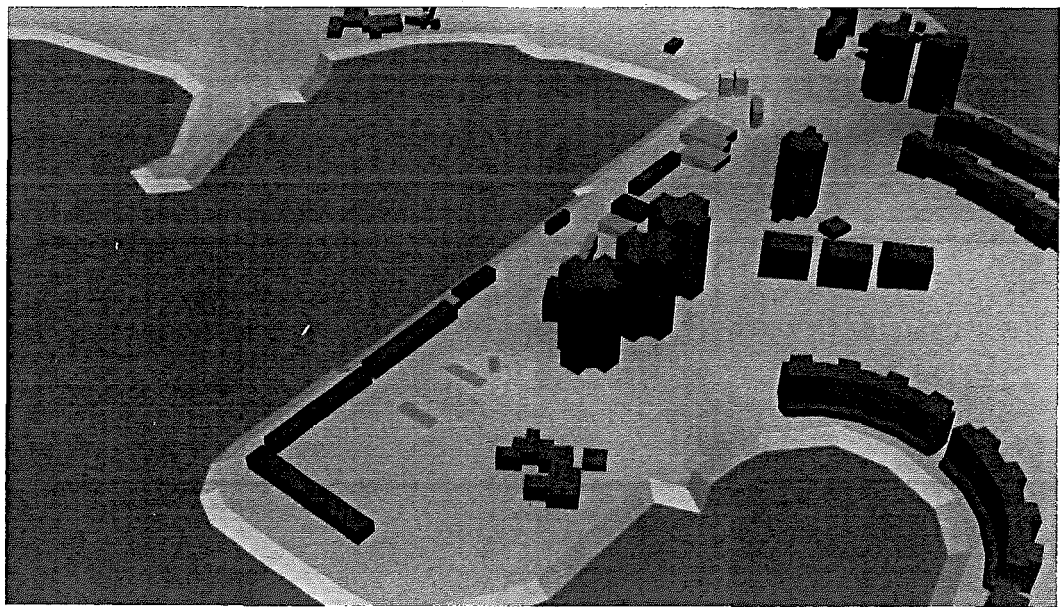


Figure 19 Easterly View on OZP Compliant Scheme

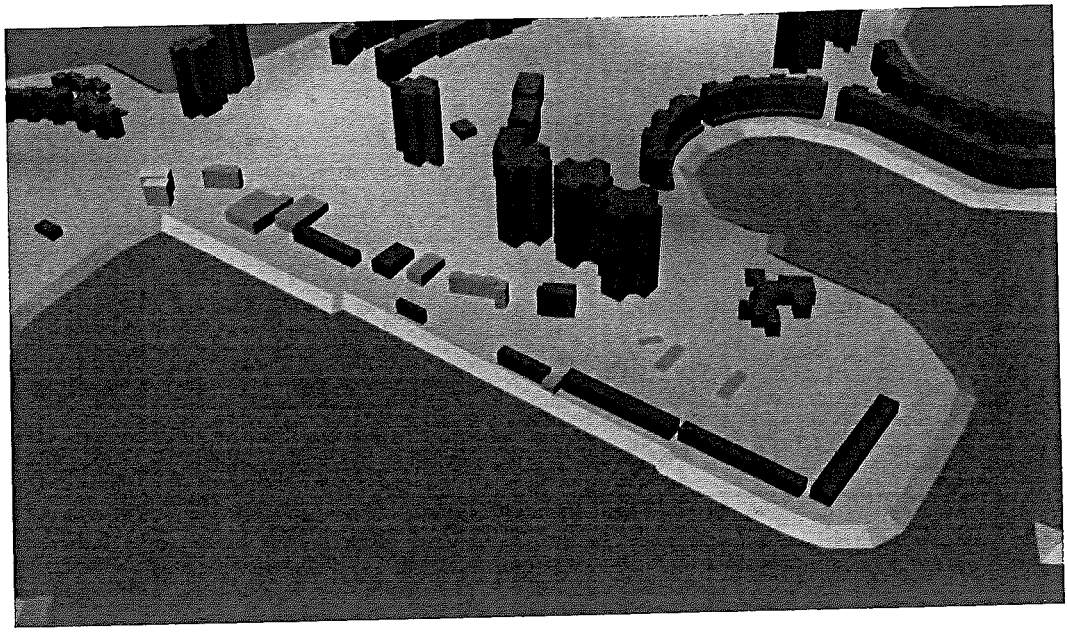


Figure 20 Southerly View on OZP Compliant Scheme

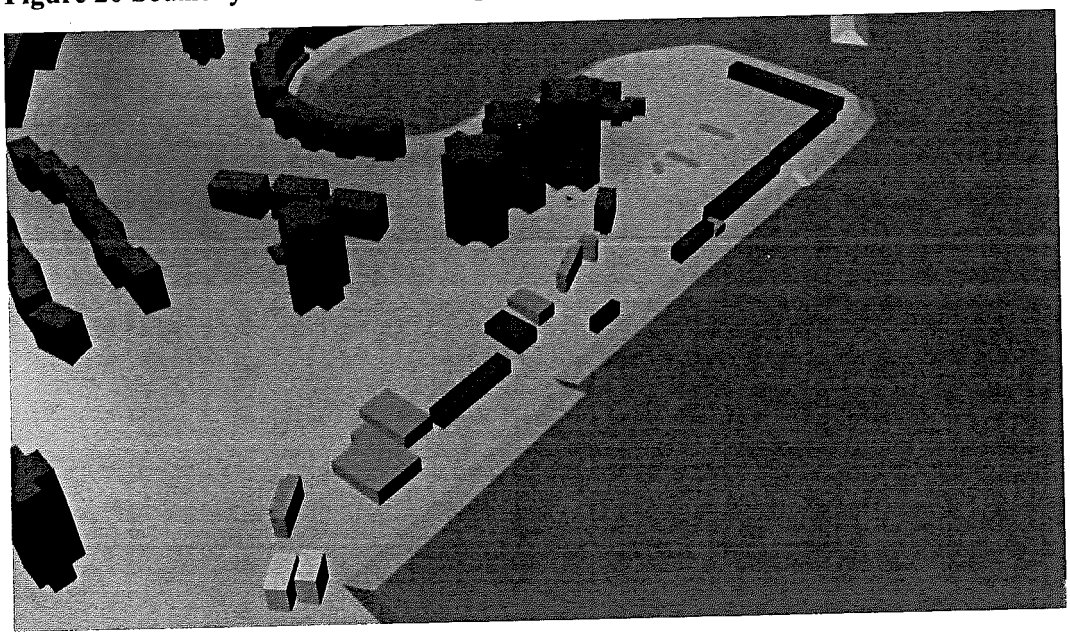


Figure 21 Westerly View on OZP Compliant Scheme

3.2.3 3D model of Baseline Scheme

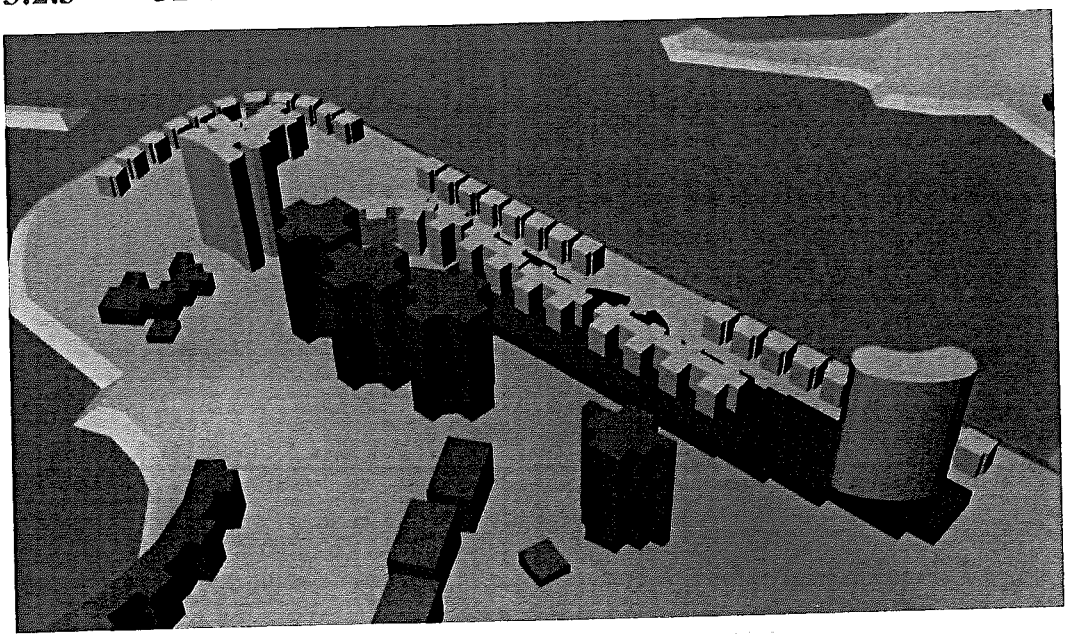


Figure 22 Northerly View on Baseline Scheme

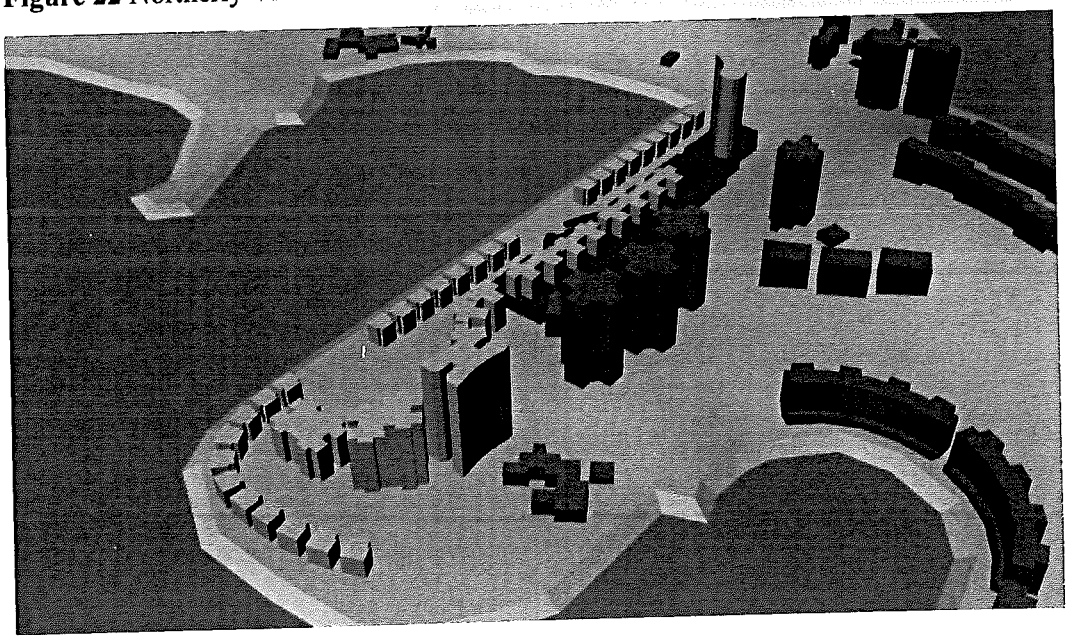


Figure 23 Easterly View on Baseline Scheme

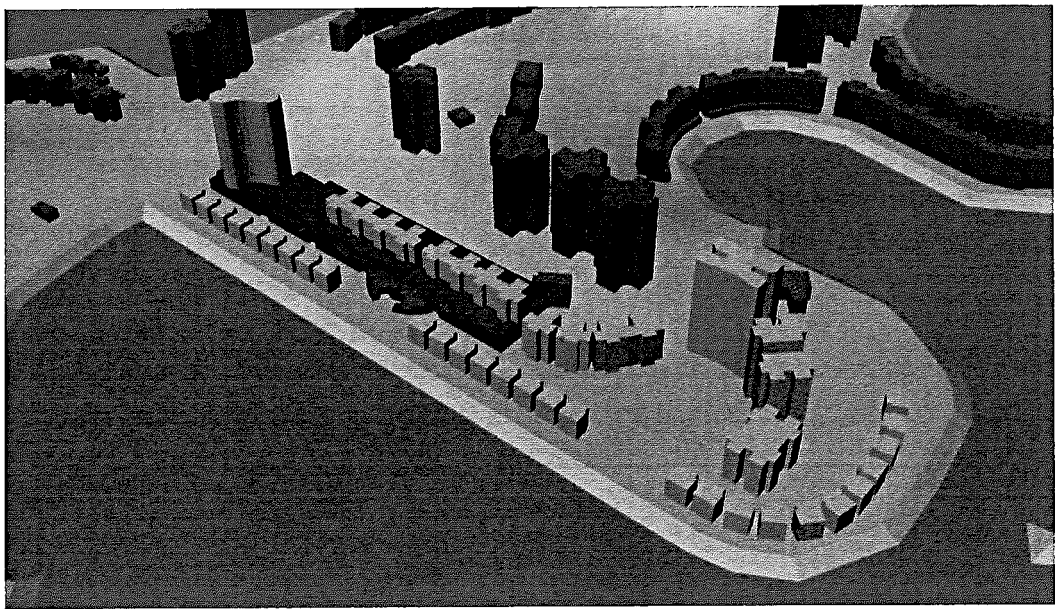


Figure 24 Southerly View on Baseline Scheme

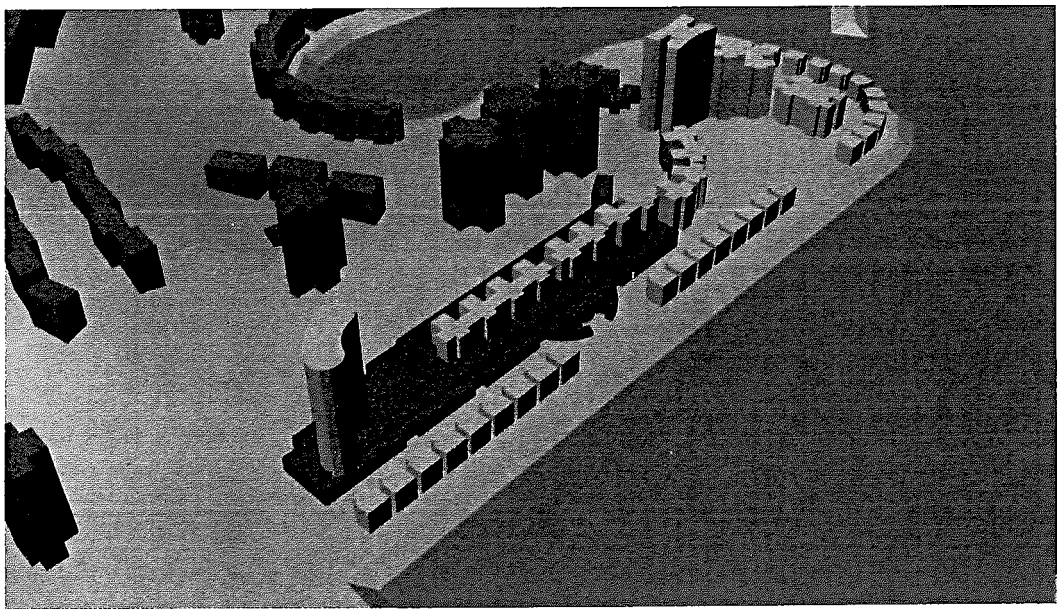


Figure 25 Westerly View on Baseline Scheme

3.2.4 3D model of Proposed Scheme

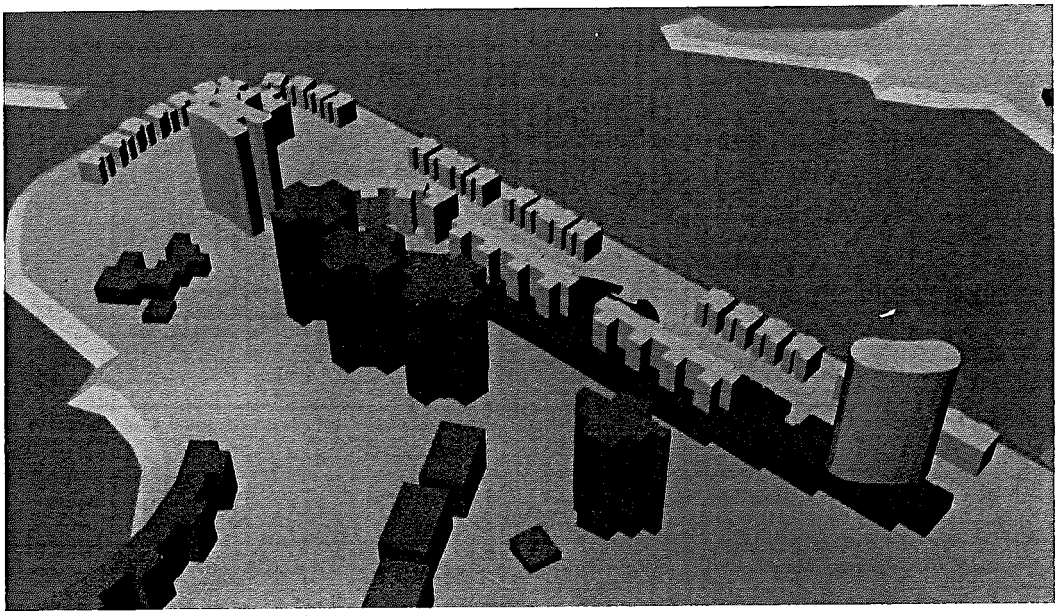


Figure 26 Northerly View on Proposed Scheme

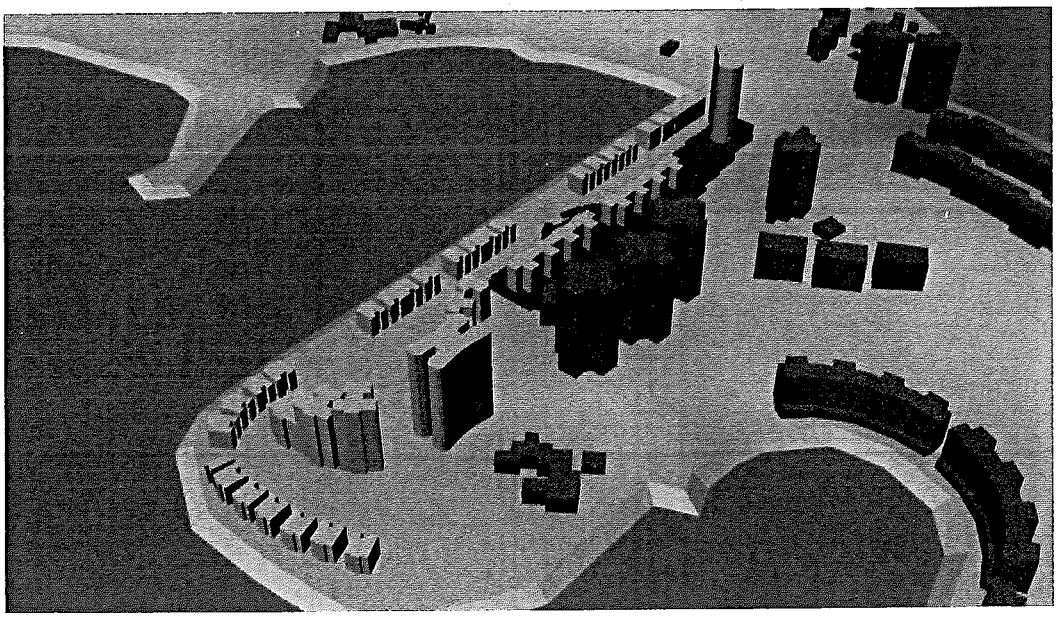


Figure 27 Easterly View on Proposed Scheme

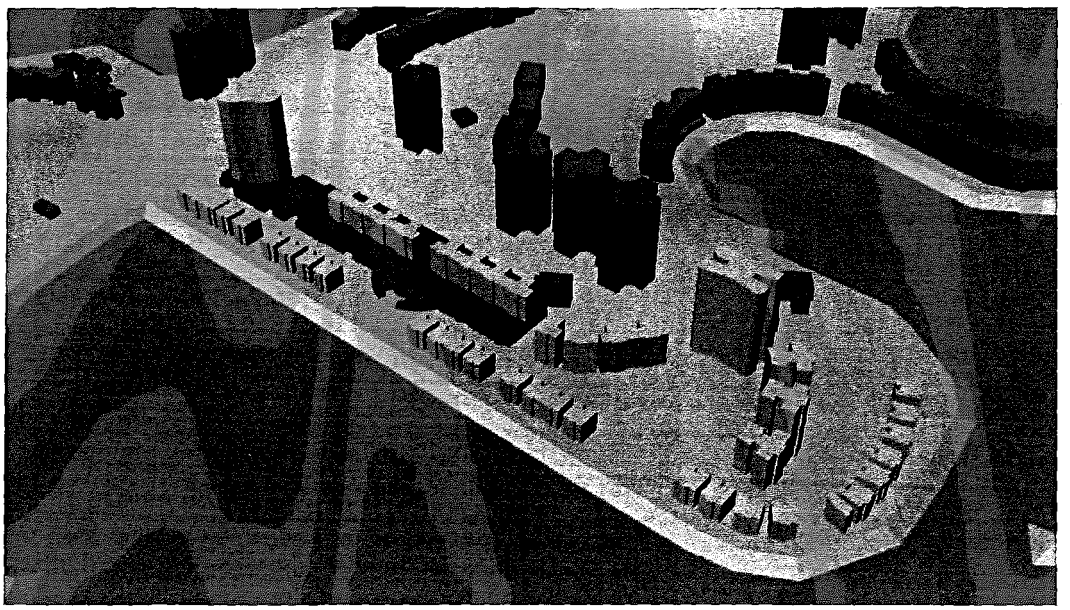


Figure 28 Southerly View on Proposed Scheme

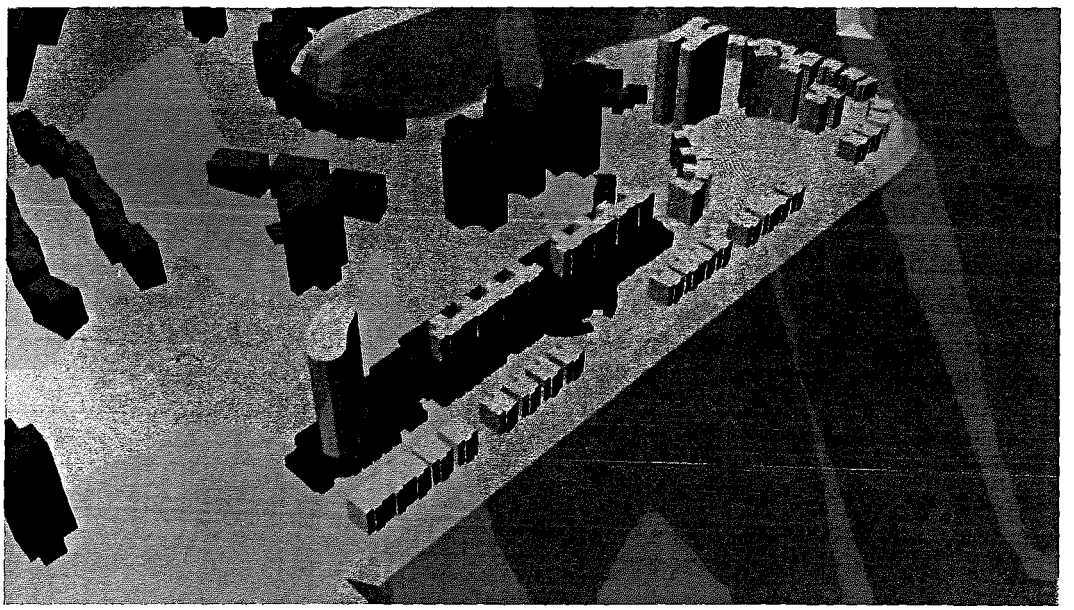


Figure 29 Westerly View on Proposed Scheme

3.3 Assessment Tools

Computational Fluid Dynamics (CFD) technique is utilized for this AVA study. With the use of three-dimensional CFD method, the local airflow distribution can be visualized in details. The velocity distribution within the flow domain, being affected by the site-specific design and the nearby topography, will be simulated under selected wind directions as stated in **Section 2** for annual and summer wind conditions.

3.4 CFD Model

Following the *AVA Technical Circular*, buildings within Surrounding Area shall be built in the CFD model. In order to simulate the approaching wind turbulence effect in a more accurate manner, the CFD model is built to include the highways or bridges as they may affect the approaching wind, even it is falling outside the Surrounding Area. In addition, the model domain is built far beyond the Surrounding Area as required in the Technical Circular in order to eliminate the boundary effects. Therefore, the studied size of CFD model of the development is approximately 3600m (Length) x 3600m (Width) x 1500m (Height) which contains more than 4,500,000 cells (**Figure 30**).

The computational domain covers the site of the Development and provides sufficient consideration on surrounding topography. The model also contains information of the surrounding buildings and site topography via Geographical Information System (GIS) platform. The site topography would be modelled within the whole computational domain. Body-fitted unstructured grid technique is used to fit the geometry and reflect the complexity of the development geometry. A prism layer of 3m above ground (totally 6 layers and each layer of 0.5m thick, shown in **Figure 31** is incorporated in the meshing so as to better capture the approaching wind and wind condition at pedestrian level. A mesh expansion ratio of 1.3 is adopted and the blockage ratio was less than 3%.

3.5 Turbulence Model

As highlighted in recent academic and industrial research literatures by CFD practitioners, the widely used standard k-ε turbulence model technique may not adequately model the effects of large scale turbulence around buildings and ignores the wind gusts leading to the relatively poor prediction in the recirculation regions around building. Therefore in this CFD simulation, realizable k-ε turbulence modelling method is applied. This technique provides more accurate representation of the levels of turbulence that can be expected in an urban environment.

3.6 Calculation Method

The Segregated Flow model solves the flow equations in a segregated manner. The linkage between the momentum and continuity equations adopted the predictor-corrector approach. A collocated variable arrangement and a Rhie-and-Chow-type pressure-velocity coupling combined with a SIMPLE-type algorithm. A higher order differencing scheme is applied to discretize the governing equations. The convergence criterion is set to 0.0005 on mass conservation. The calculation will repeat until the solution satisfies this convergence criterion.

The prevailing wind direction as mentioned in **Section 2.1** and **2.1.2** is set to inlet boundary of the model with wind profile as detailed in **Section 2.2.** The downwind boundary is set to pressure with value of atmospheric pressure. The top and side boundaries are set to symmetry. In addition, to eliminate the boundary effects, the model domain is built beyond the Surrounding Area as required in the *AVA Technical Circular*.

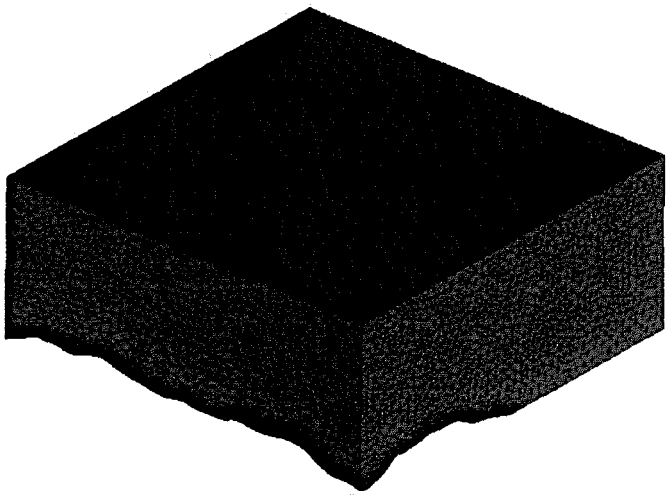


Figure 30 Mesh of Computational Domain

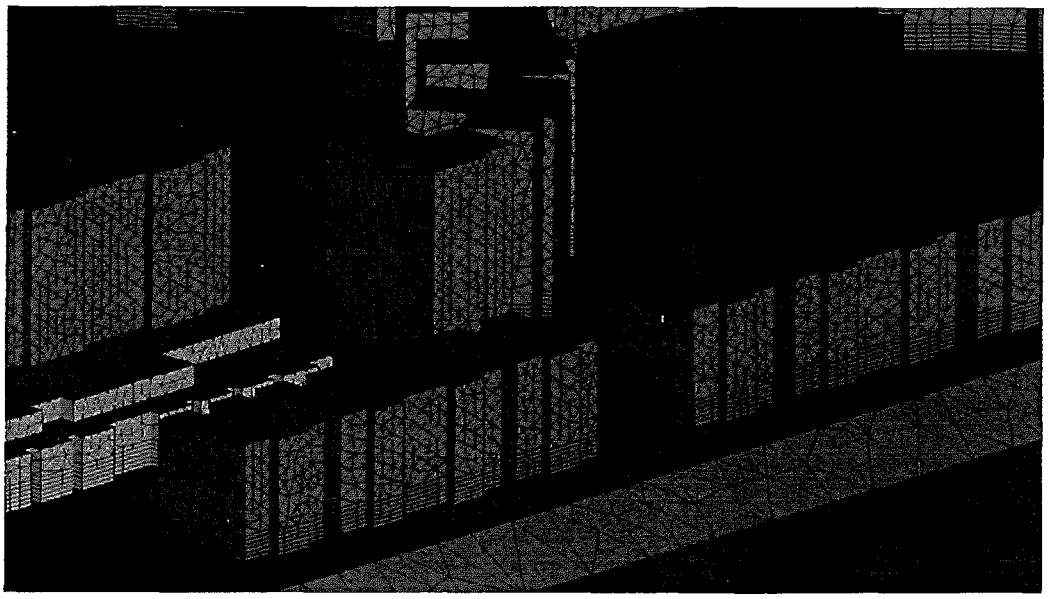


Figure 31 Prism Layers

The detail parameters are summarized in **Table 3**.

Table 3 Detail parameters to be adopted in the CFD model

	CFD Model
Physical Model Scale	1:1 to real environment
Model details	Only include Topography, Buildings blocks, Streets with major elevated structures (footbridges and flyovers). No landscape is included
Domain	3600m (Length) x 3600m (Width) x 1500m (Height)
Assessment Area	≥ 1H area
Surrounding Area	≥ 2H area
Grid Expansion Ratio	The grid should satisfy the grid resolution requirement with maximum expansion ratio = 1.3
Prismatic layer	Prism layers must cover the pedestrian level at least 2m from ground, each layer with 0.5m spacing.
Inflow boundary Condition	Incoming wind profiles adopted from the RAMS
Outflow boundary	Pressure boundary condition with dynamic pressure equal to zero
Wall boundary condition	Logarithmic law boundary
Solving algorithms	*Rhie* and *Chow* SIMPLE for momentum equation Realisable k-ε turbulence model Hybrid model for all other equations
Expansion Ratio	1.2
Blockage ratio	< 3%
Convergence criteria	Below $0.5x10^{-3}$

3.7 AVA Indicator

The Wind Velocity Ratio (VR) as proposed by the Technical Circular was employed to assess the ventilation performances of the Proposed Development and surrounding environment. Higher VR implies better ventilation. The calculation of VR is given by the following formula:

$$VR = \frac{V_p}{V_\infty}$$

V_∞= the wind velocity at the top of the wind boundary layer (assumed to be around 500m above the centre of the site of concern, or at a height where wind is unaffected by the urban roughness below).

V_P= the wind velocity at the pedestrian level (2m above ground) after taking into account the effects of buildings.

The higher the value of VR, the less is the impact due to buildings on wind availability.

The Average VR is defined as the weighted average VR with respect to the percentage of occurrence of all considered wind directions. This gives a general idea of the ventilation performance at the considered location at both annual and summer wind condition.

3.7.1 Assessment Parameters

CFD simulations will be conducted to study the wind environment. As specified in the Technical Circular, indicator of ventilation performance should be the Wind Velocity Ratio (VR), defined as the ratio of the wind velocity at the pedestrian level (2m above ground) to the wind velocity at the top of the wind boundary layer. Site spatial average velocity ratio (SVR) and a Local spatial average velocity ratio (LVR) should be determined.

Table 4 Terminology of the AVA Initial Study

Terminology	Description
Velocity Ratio (VR)	The velocity ratio (VR) represents the ratio of the air velocity at the measurement position to the value at the reference points.
Site spatial average velocity ratio (SVR)	The SVR represent the average VR of all perimeter test points at the site boundary which identified in the report.
Local spatial average velocity ratio (LVR)	The LVR represent the average VR of all points, i.e. perimeter and overall test points at the site boundary which identified in the report.

3.8 Locations of Test Points

As per the *AVA Technical Circular* two types of test point – Perimeter test point and Overall test point will be adopted to understand the wind performance. For those areas within the proposed Assessment Area, Special test point will be used. The allocation of these test points will be distributed evenly as per the requirement stated in the *AVA Technical Circular*

3.8.1 Perimeter Test Points

A total number of 30 perimeter test points are allocated as indicated by the blue dots in **Figure 32.**

3.8.2 Overall Test Points

A total number of 64 overall test points are evenly distributed and positioned within the Assessment Area and their locations are shown by red dots in **Figure 32**.

3.8.3 Special Test Points

Due to different Study Area and building layout between OZP Compliant Scheme and Baseline/Proposed Scheme, three sets of special test points were proposed for OZP-Compliant Scheme, Baseline Scheme and Proposed Schemes. The location of special test points OZP Compliant Scheme (57 nos. Special Test Points), Baseline Scheme (66 nos. Special Test Points) and Proposed Scheme (70 nos. Special Test Points) are shown in **Figure 33, Figure 34** and **Figure 35** respectively.

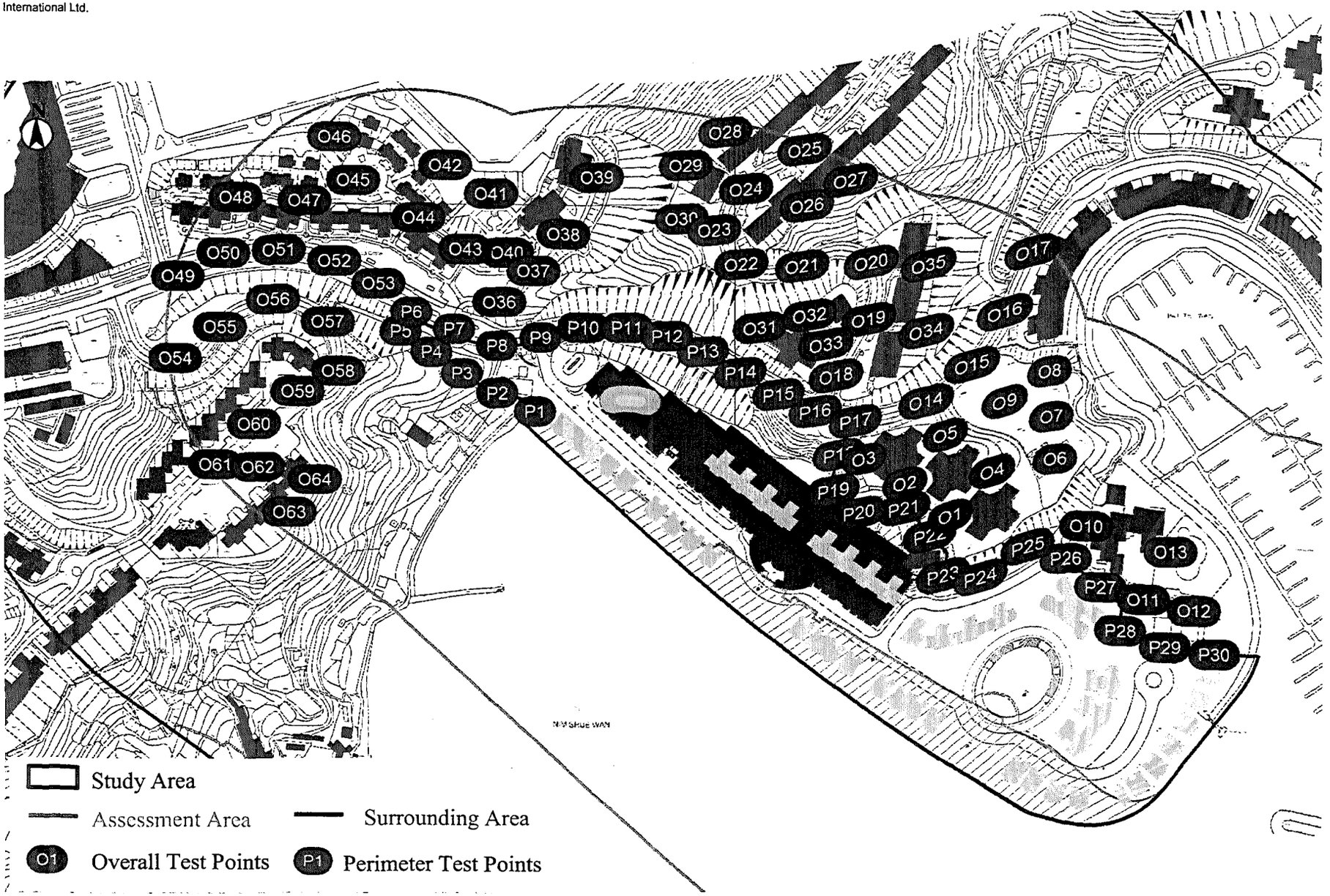


Figure 32 Locations of Perimeter Test Points and Overall Test Points

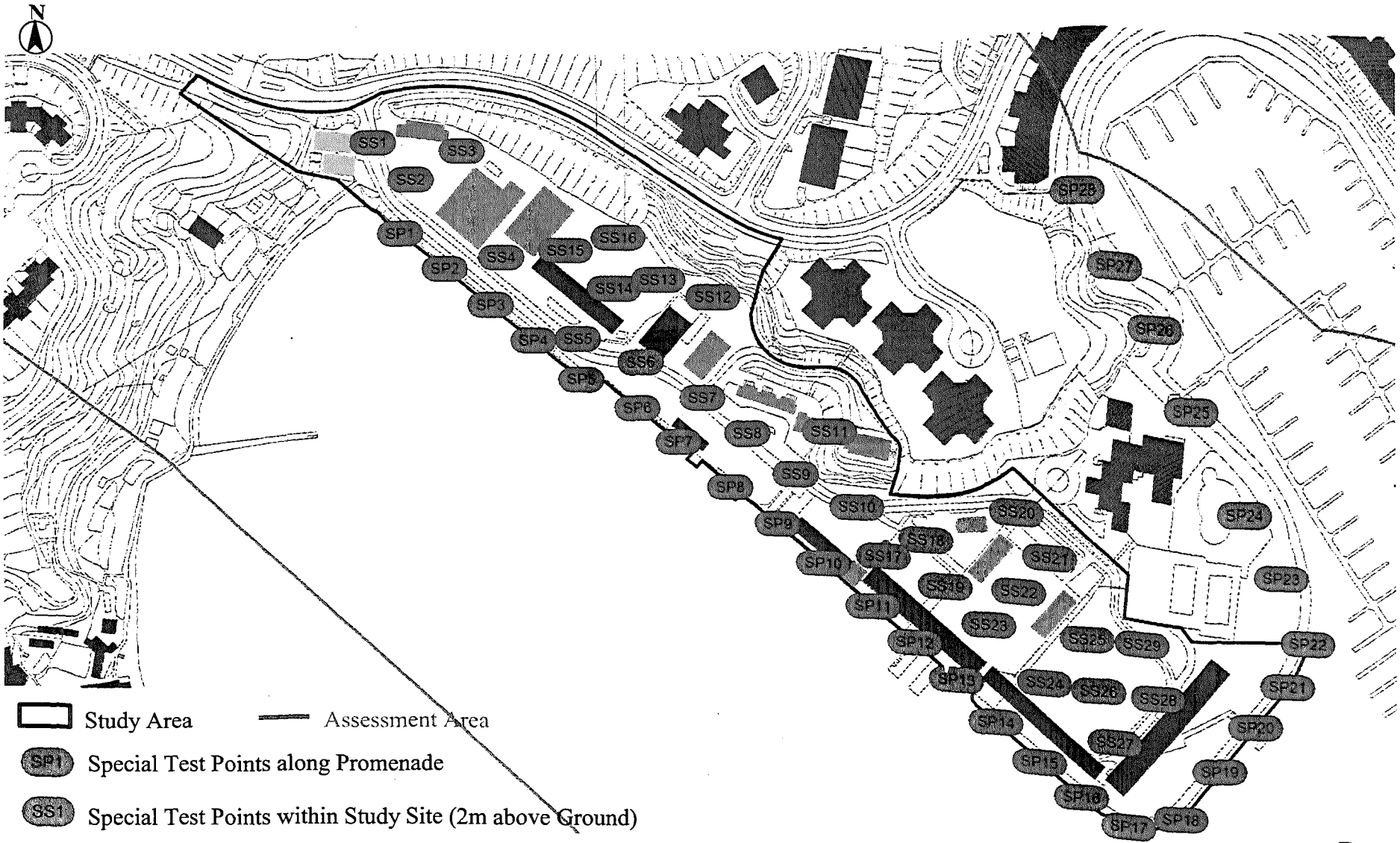


Figure 33 Locations of Special Test Points for OZP Compliant Scheme

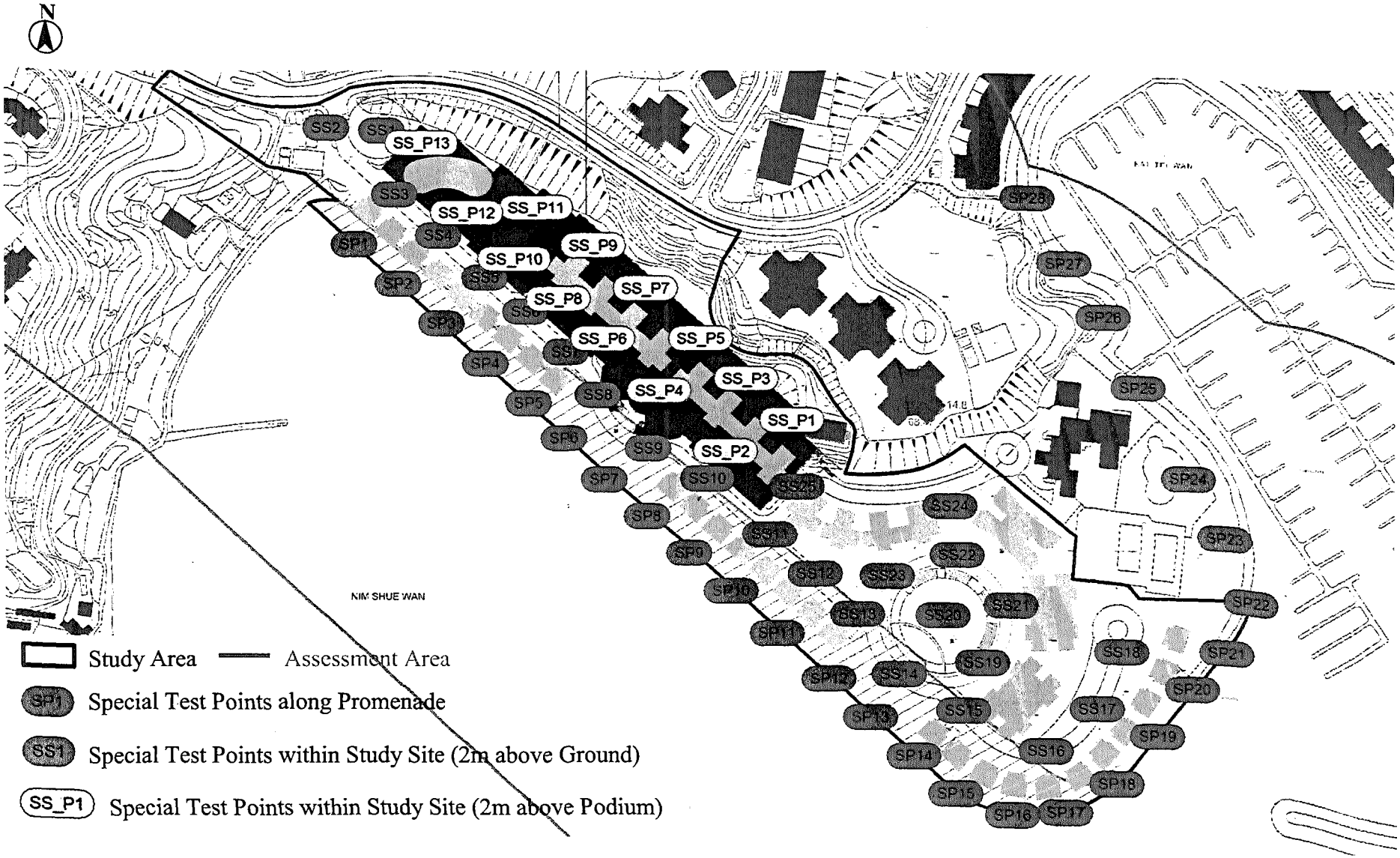


Figure 34 Locations of Special Test Points for Baseline Scheme

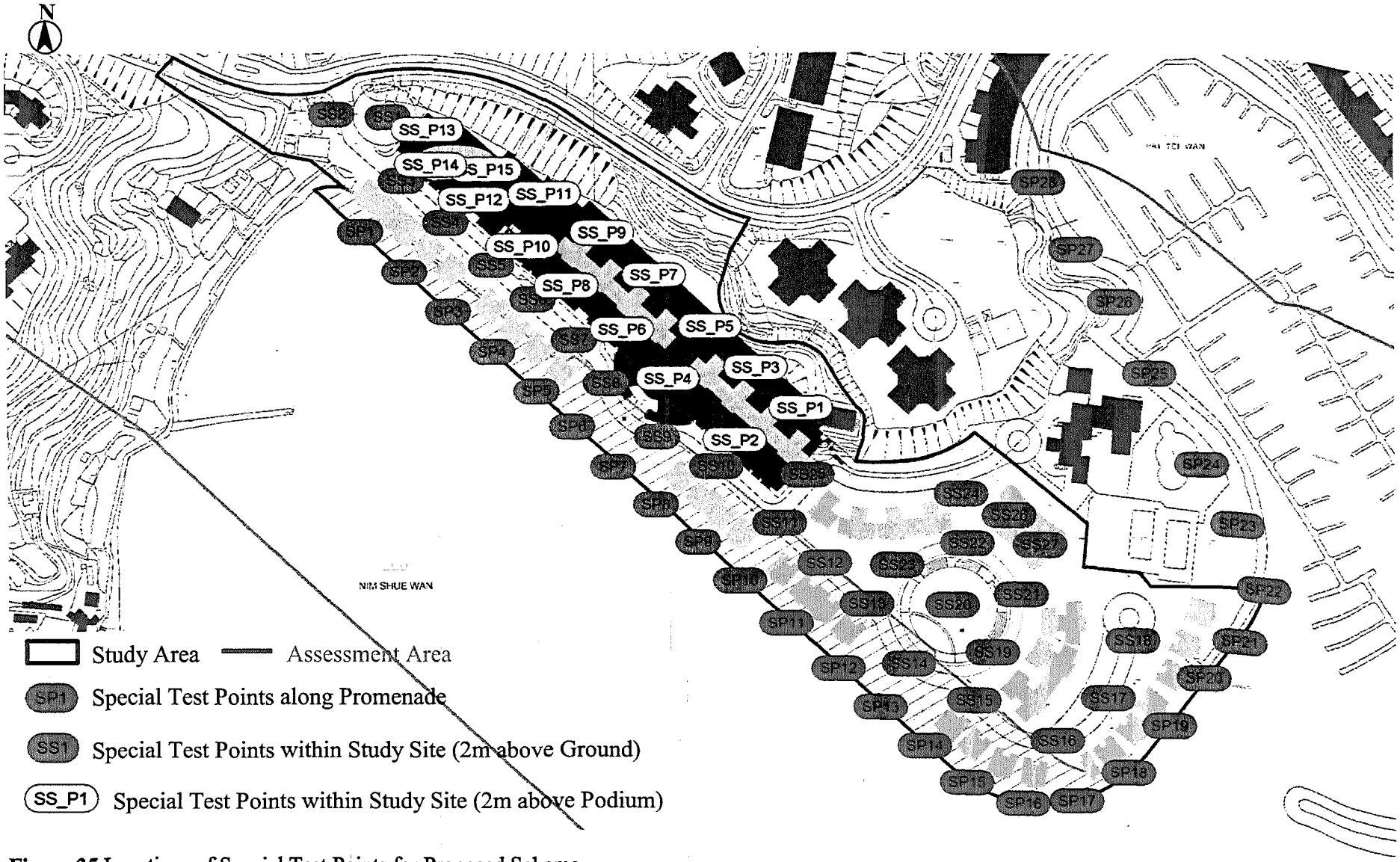


Figure 35 Locations of Special Test Points for Proposed Scheme

3.9 Focus Areas

Within the Assessment Area given in **Figure 13**, a total of 13 focus areas are marked in **Figure 36** and **Figure 37** are tabulated in Table 5. Three focus areas are within the Study Area to investigate the wind performance of proposed wind enhancement features listed in Section 2.3.3.

Table 5 List of Focus Areas

	Focus Areas	**Group of Test points**		
1	La Costa	O36-O48		
2	Discovery Bay Road	O14-O17, O49-O53, P6-P17		
3	Vista Avenue	O54-O61		
4	La Vista	O58-O64		
5	Crestmont Villa 1	O23-O30		
6	Capridge Drive	P16, O18-25		
7	Crestmont Villa 2	O19-O20, O34-O35		
8	Peninsula Village 1	O31-O33		
9	Peninsula Village 2	O1-O9		
10	Discovery Bay Marina Club	P26-P30, O10-O13		
		OZP-Compliant Scheme	**Baseline Scheme**	**Proposed Scheme**
11	Podium	N/A	SS_P1-SS_P13	
12	Central Landscape Plaza		SS12-SS15, SS19-SS23	
13	Access Road		SS2-SS18	
14	Elevated M1		N/A	SS_P14, SS_P15
15	Building Separation L10_L11		SS_P4 - SS_P5	
16	Building Separation Water Front 1		SP3, SS5	
17	Building Separation Water Front 2		SP10, SS11, SS25	
18	Building Separation Water Front 3		SP17, SS16	
19	Building Separation M2_M3		SS21, P28	
29	Elevated M2		N/A	SS26, SS27

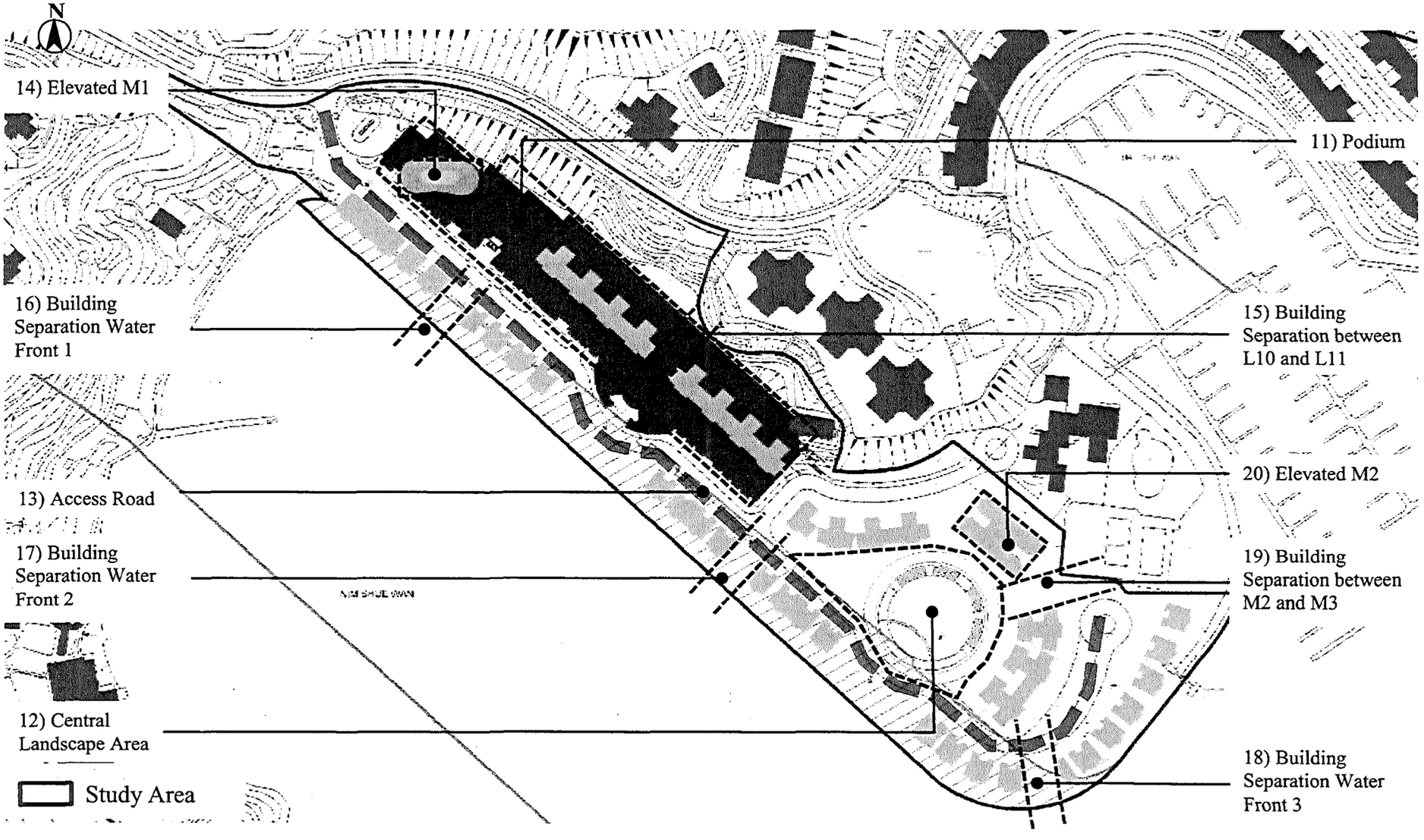


Figure 36 Focus Areas identified within the Study Site

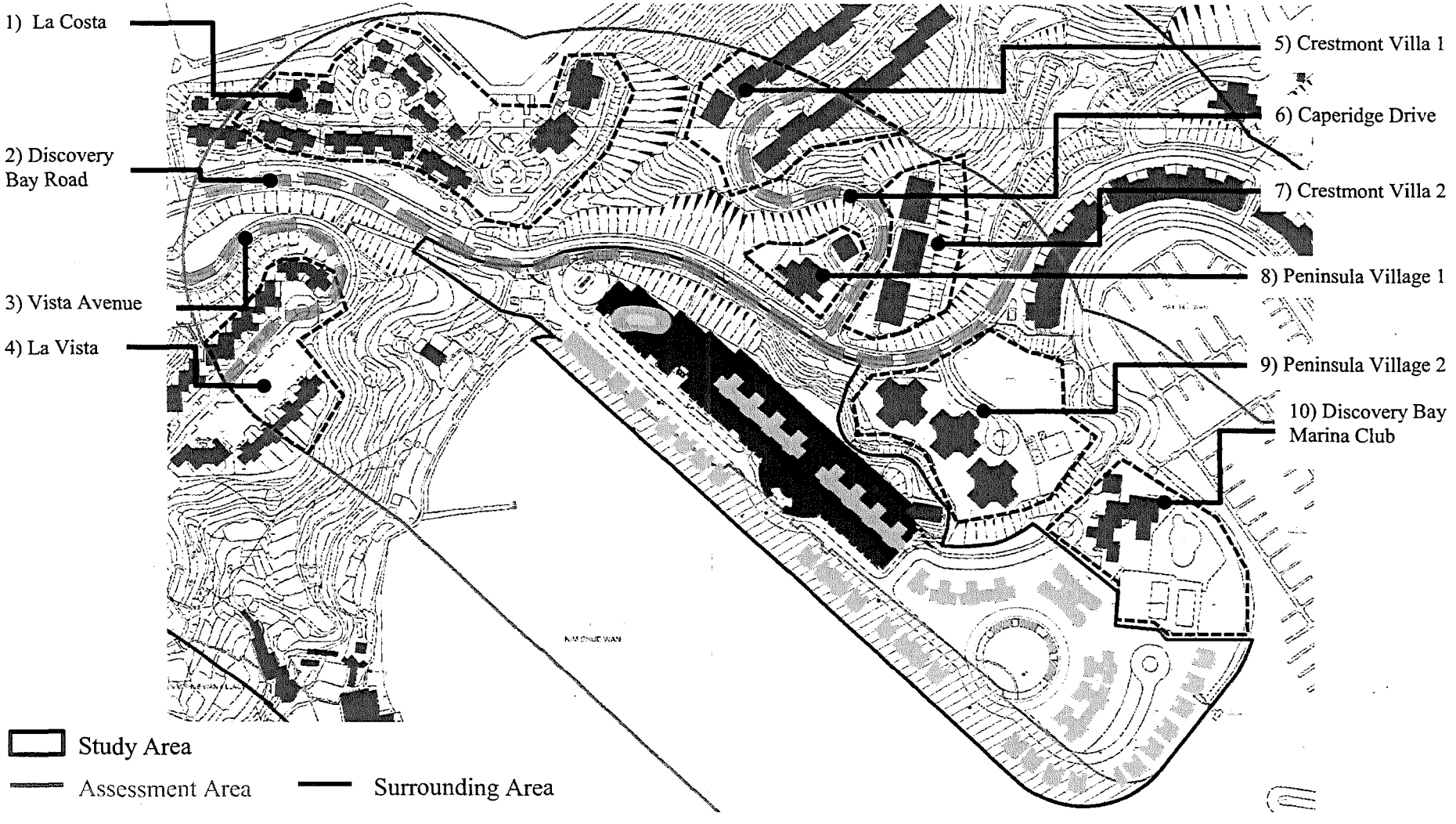


Figure 37 Focus Areas identified within Assessment Area

4 Results and Discussion

The contour and vector plots for each studied wind directions may refer to **Appendix B** and **Appendix C** of this report.

4.1 Annual Weighted Average

The contour plots of annual weighted VR for OZP-Compliant Scheme, Baseline Scheme and Proposed Scheme, as shown in **Figure 38, Figure 39** and **Figure 40**.

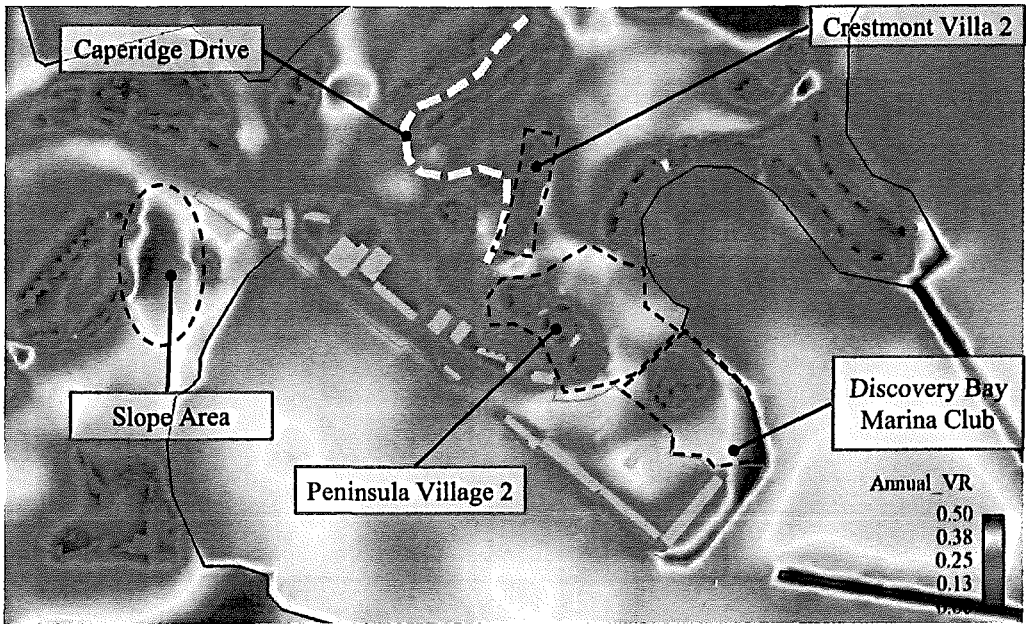


Figure 38 Contour Plot for Annual Weighted Average VR for OZP-Compliant Scheme

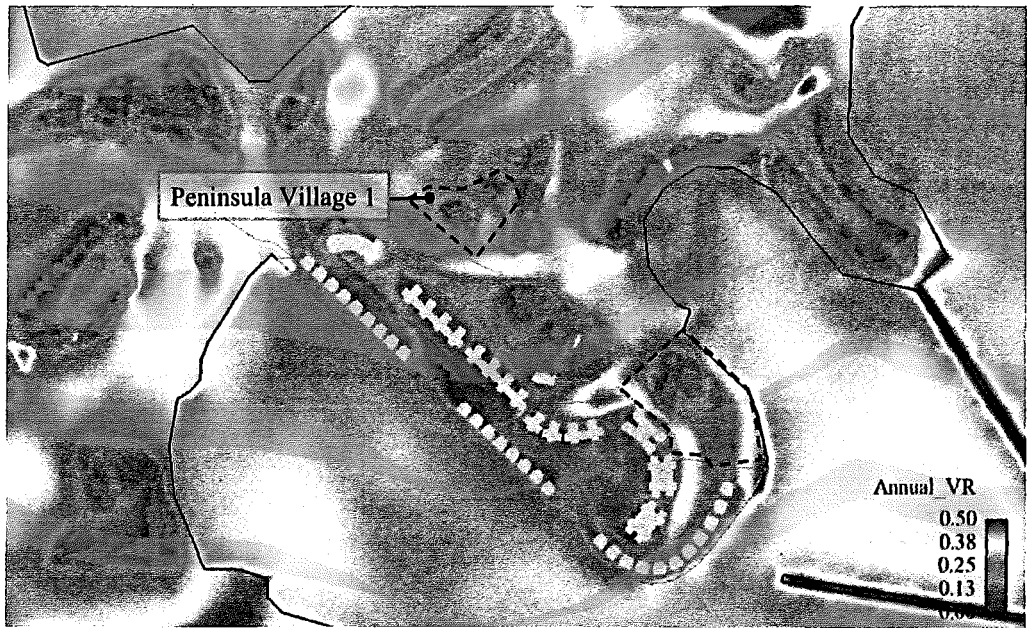


Figure 39 Contour Plot for Annual Weighted Average VR for Baseline Scheme

Figure 40 Contour Plot for Annual Weighted Average VR for Proposed Scheme

Due to the low-rise nature of the buildings within the Study Site, the wind performance of OZP-Compliant scheme is generally better than that for the other two schemes.

Most observable difference is found at the area at close distance to the Study Site, such as Caperidge Drive, Crestmont Villa 2, Peninsula Village 2 and Discovery Bay Marina Club.

The slope between La Vista and Study Site achieved a slightly higher VR under OZP-Compliant Scheme due to the openness in its upwind location. The proposed building and the piled deck area in Baseline and Proposed Scheme would shield some of the annual prevailing wind such as ESE, E winds to the slope area.

Between the two schemes with proposed developments with new uses, Proposed Scheme is found to achieve better wind environment at some focus areas. The widened building separation above podium help to enhance the VR at Peninsula Village 1 and the additional building separation in the southern part with elevated design of tower M2 help to facilitate wind penetration towards Discovery Bay Marina Club. In addition, with the wind enhancement features incorporated, higher VR is found for the focus areas within the Study Site under Proposed Scheme.

4.2 Summer Weighted Average

The contour plots of summer weighted VR for OZP-Compliant Scheme, Baseline Scheme and Proposed Scheme, as shown in **Figure 41**, **Figure 42** and **Figure 43**.

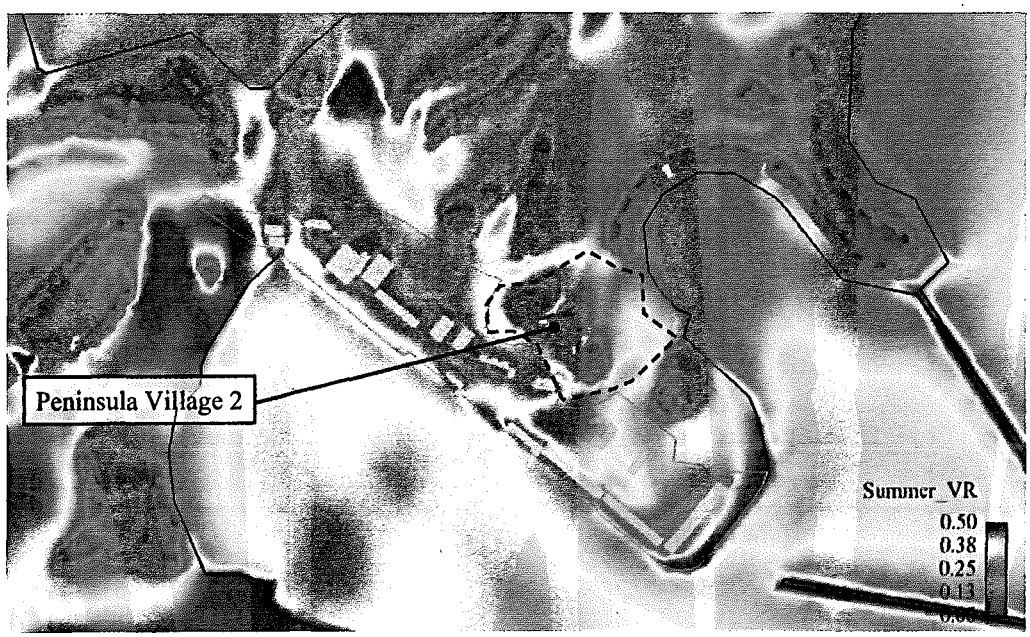


Figure 41 Contour Plot for Summer Weighted Average VR for OZP-Compliant Scheme

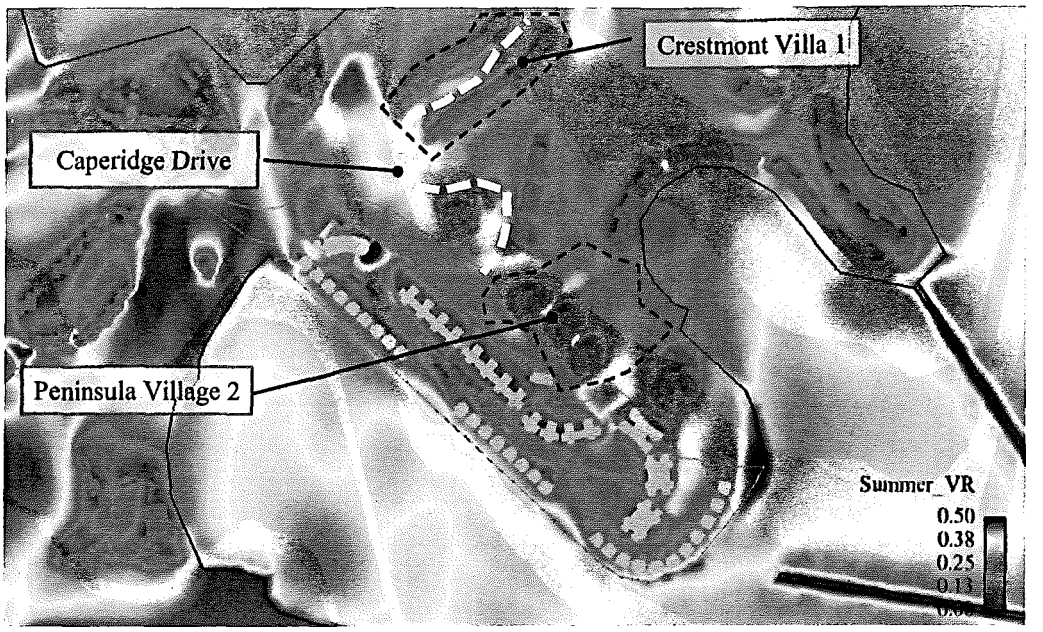


Figure 42 Contour Plot for Summer Weighted Average VR for Baseline Scheme

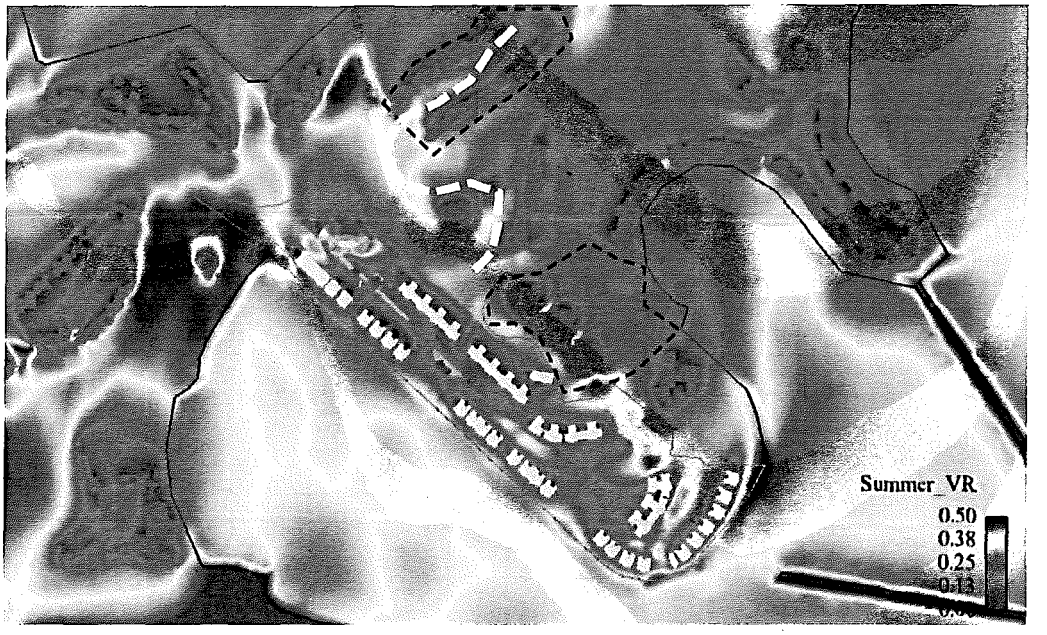


Figure 43 Contour Plot for Summer Weighted Average VR for Proposed Scheme

Similar to annual condition, most of the focus areas are located at the downwind area to the Study Site. Due to the low-rise nature of the buildings under OZP-Compliant Scheme, the ventilation impacts from the OZP-Compliant Scheme would be the least compare to other two schemes.

Comparing to Baseline Scheme, various air paths provided under Proposed Scheme would help to promote wind penetration towards downwind area such as Crestmont Villa 1, Peninsula Village 2 and Caperidge Drive.

4.3 Directional Analysis

4.3.1 NNE/NE Wind Direction

Under NNE and NE Wind, majority of the incoming wind would reach the site travelling around the building cluster of Peninsula Village 1 and Crestmont Villa 2 to reach the western part of the Study Site, and through the open space to the northeast of Peninsula Village 2 and building separation with Discovery Bay Marina Club to reach the eastern part of the Study Site, shown as black arrow in **Figure 44**. The mid-rise Peninsula Village 2 and low-rise Discovery Bay Marina Club to the northeast of the Study Site would shield some of the incoming wind.

OZP-Compliant Scheme

The incoming wind would skim over the low-rise existing/OZP-compliant building (~15mPD) and reach Nim Shue Wan. Due to the low-rise nature of the buildings, the wind would recover over short distance. The wake zone would be created by the existing mid-rise residential clusters (such as Crestmont Villa 2 and Peninsula Village 2) which are located to the immediate northeast of the Study Site.

Baseline Scheme

The proposed podium and low to mid-rise buildings blocks are situated in the middle and eastern part of the site, leaving a relative open space in the western corner of the Study Site. The incoming wind would travel along the waterfront to reach the village buildings at downwind area, shown as blue arrow in **Figure 45**. Hence, higher VR would be observed along the north-western coast of Nim Shue Wan.

In addition, the continuous podium with tower sitting above would channel the incoming wind travel along the podium towards Peninsula Village 2 and the western part of the Study Site (shown by pink arrow in **Figure 45**) such that the wind environment at Peninsular Village 2 and the site boundary between the Study Site and Peninsular Village 2 would be slightly enhanced (shown as black circle in **Figure 45**) and more wind would travel along the north-western coast of Nim Shue Wan. On the other hand, with the proposed L7 to L14 would shield the incoming wind and lead to relatively calm wind condition on the proposed podium and access road.

The presence of proposed L3 to L6 of Baseline Scheme would split the incoming wind travelling along the building separation between Peninsula Village 2 and Discovery Bay Marina Club (black arrow in **Figure 45**). It eventually would lead to relatively calm wind condition near central landscape area to the southeast part of the Study Site, indicated as white circle.

The alignment of 3-storey houses along the southeast site boundary would divert the incoming wind to serve southeastern part of the Study Site, shown as purple arrow in **Figure 45**. Therefore, the wind environment would be enhanced in compared to the OZP-Compliant Scheme.

Proposed Scheme

Although various wind enhancement features have been adopted in the Proposed Scheme in compared to the Baseline Scheme, the wind environment of the surrounding area would not significantly enhanced, as the Study Site is located at the downwind area of the surrounding buildings.

The widened building separation of 15m in the central part, elevated tower design for M1 and M2 buildings in the western and eastern part would help to increase permeability at podium and pedestrian levels, more wind could penetrate through these building separation and ventilate the open spaces within the Study Site, i.e. access road and central landscape area. The wind environment at the northwestern and southeastern parts of the Study Site would be enhanced as circled in Figure 46. The wake zone on the leeward area in Nim Shue Wan would be relatively smaller under Proposed Scheme.

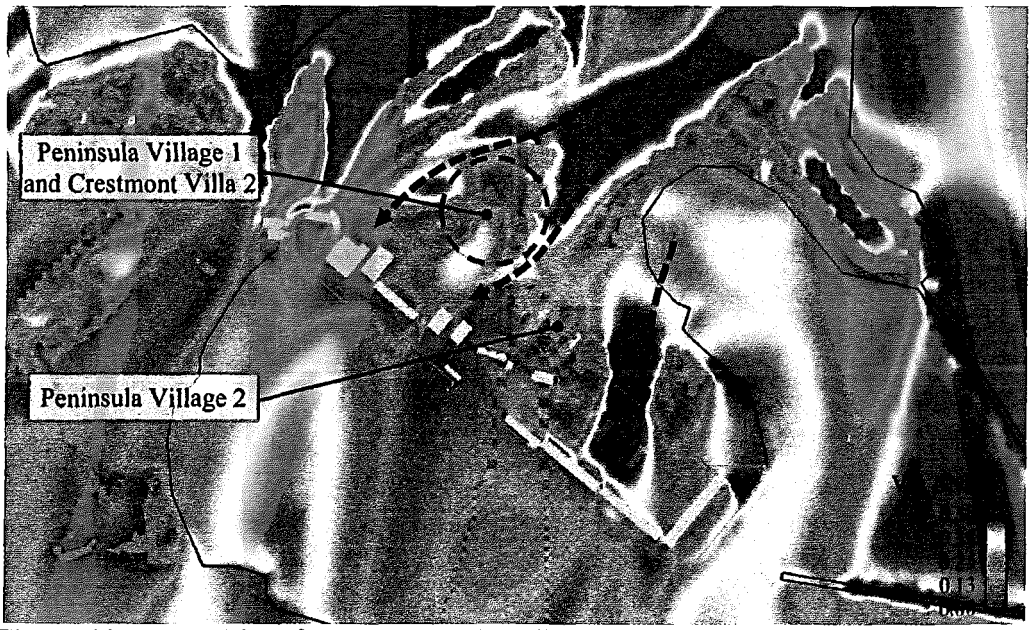


Figure 44 Contour Plot of VR for OZP-Compliant Scheme under NNE Wind

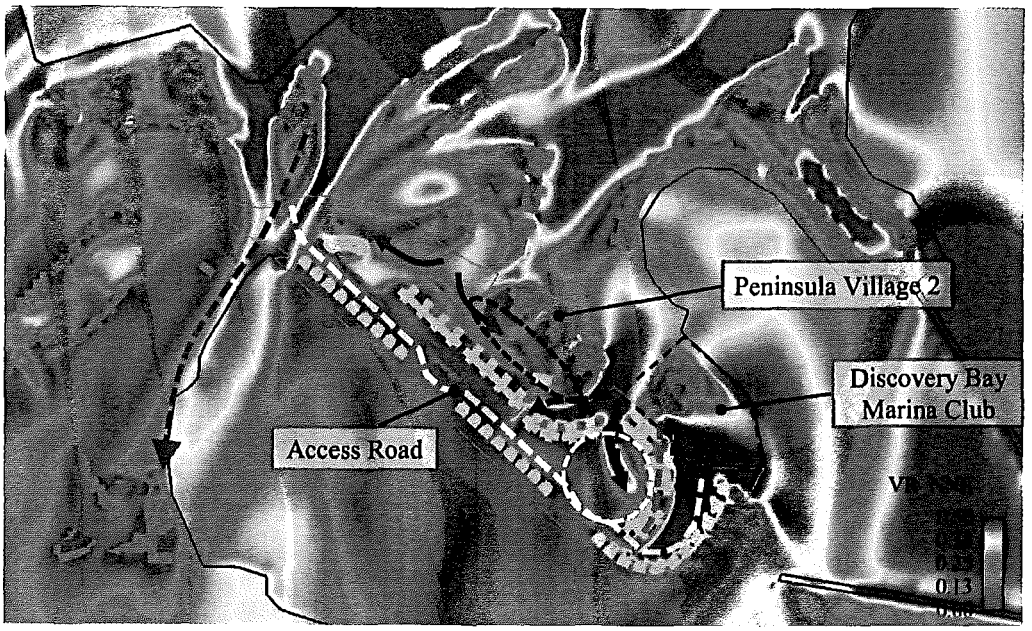


Figure 45 Contour Plot of VR for Baseline Scheme under NNE Wind

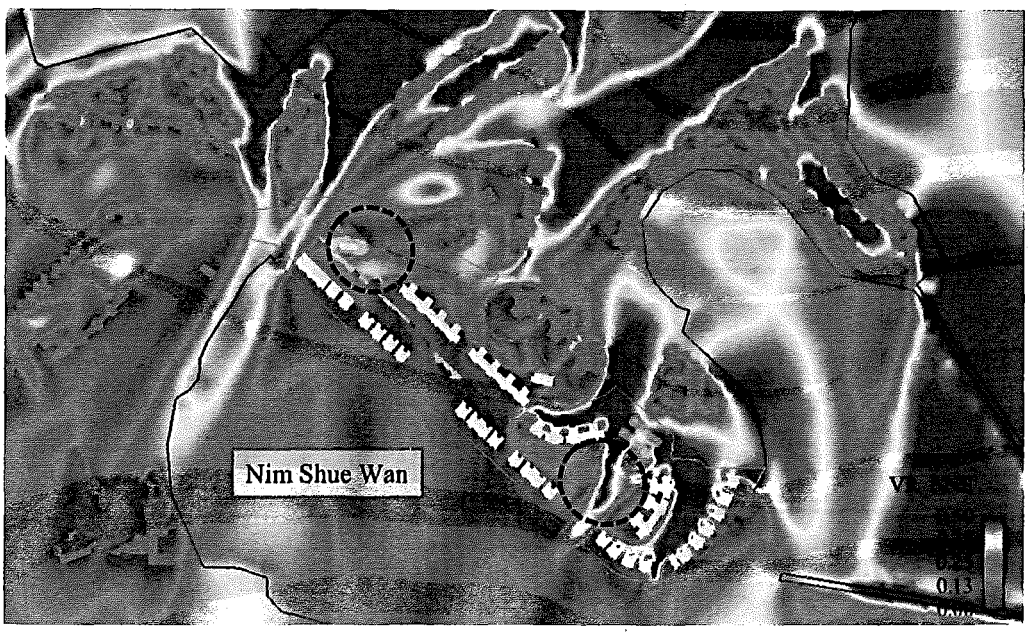


Figure 46 Contour Plot of VR for Proposed Scheme under NNE Wind

4.3.2 Under ENE Wind

As the lengthy building frontage of Coastline Villa would shield some of the incoming wind to the Study Site, the incoming wind would be diverted to travel along Discovery Bay Road to the northwest of the Study Site, along the slope between Crestmont Villa 2 and Coastline Villa or skimming over the low-rise building in Discovery Bay Marina Club, shown as black arrow in **Figure 47.** Surrounding buildings at upwind location, such as Peninsula Village 1, 2 and Crestmont Villa 2 would shield some of the ENE wind hence lower VR would be found in the central and western part of the Study Site.

OZP-Compliant Scheme

The low-rise nature would alleviate and minimize the wind shadow on its leeward area.

The incoming wind would generally skim over those low-rise buildings under OZP-Compliant Scheme and reattach to the leeward area. However, the mid-rise blocks of Peninsula Village 2 would cast wind shadow over the north-western part of the Nim Shue Wan. The wind shadow would also reach Nim Shue Wan Village. Incoming wind would be channelled through the building separation between Peninsula Village 2 and Discovery Bay Marina Club and accelerated due to corner effect when travelling around Peninsula Village 2. Therefore, relatively higher VR was observed at in the south-eastern part of the Study Site, circled in **Figure 47.**

Baseline Scheme

The close deposition of Tower M2, M3, M4, L1 and L2 in the eastern part of the site would block some of the incoming wind directly from the Floating Jetties. The incoming ENE wind would be diverted by the facade of Peninsula Village 2 and divert the ENE wind towards the Discovery Bay Road and up to the slope between Crestmont Villa 2 and Coastline Villa, shown as black arrows in **Figure 48** Contour Plot of VR for Baseline Scheme under ENE Wind. Hence, the wind environment at Crestmont Villa 2 would be enhanced.

In addition, some of the incoming ENE wind would be downwashed by M2 and M3 tower and would then be diverted sideways by the adjacent building and travel through the building gaps to reach podium area in the central part and access road in the eastern part (shown as blue arrows in **Figure 48** and **Figure 50**).

The building separation within Peninsula Village 2 would allow wind penetration towards the Study Site. The incoming wind would then skim over the proposed blocks atop the podium and further ventilate and enhance the wind environment at the bounty pier at the central part of Study Area.

In the western part of the podium, the round shape of tower M1 would accelerate the incoming ENE wind. Hence, higher VR above podium area between M1 and L14 would be resulted, highlighted in dotted black circle in **Figure 48**.

Proposed Scheme

The building separation provided by elevated M2 tower would facilitate the penetration of both incoming wind and downwashed wind through and reach the central landscape area. Therefore, less wind would be diverted towards the Discovery Bay Road and lower VR along the Discovery Bay Road and western part of the Study Site. On the other hand, higher VR would be found in Discovery Bay Marina Club due to the improved permeability in the eastern part of the Study Site.

Given the building height of proposed block atop the podium (L9-L10) under Proposed Scheme would be slightly higher by 2m than that under Baseline Scheme, the incoming wind via the building separation of Peninsula Village 2 would not be able to skim over the proposed building blocks. In addition, due to the wider building separation between Tower L6 and L7, which would attract the incoming ENE wind to travel along the building separation instead, as shown in **Figure 51.**

Therefore, the north-western part and the bounty pier would encounter relatively calmer wind environment, circled in **Figure 49**.

Together with the additional building separation between L3, M2 and M3 and elevated design of M2, the permeability of the eastern part of the site would be improved. Thus more ENE wind would be diverted to travel through the eastern part of the site while relatively calm wind environment would be observed in the central and western part. Although the elevated M1 design would not enhance the VR at podium level significantly, more wind would reach the access road in the leeward side hence the VR would be improved herein.

Wind shadow would be casted on Nim Shue Wan Village by the central and western part of the study site while the wind shadow casted by the eastern part of the study site would be alleviated, comparing to Baseline Scheme.

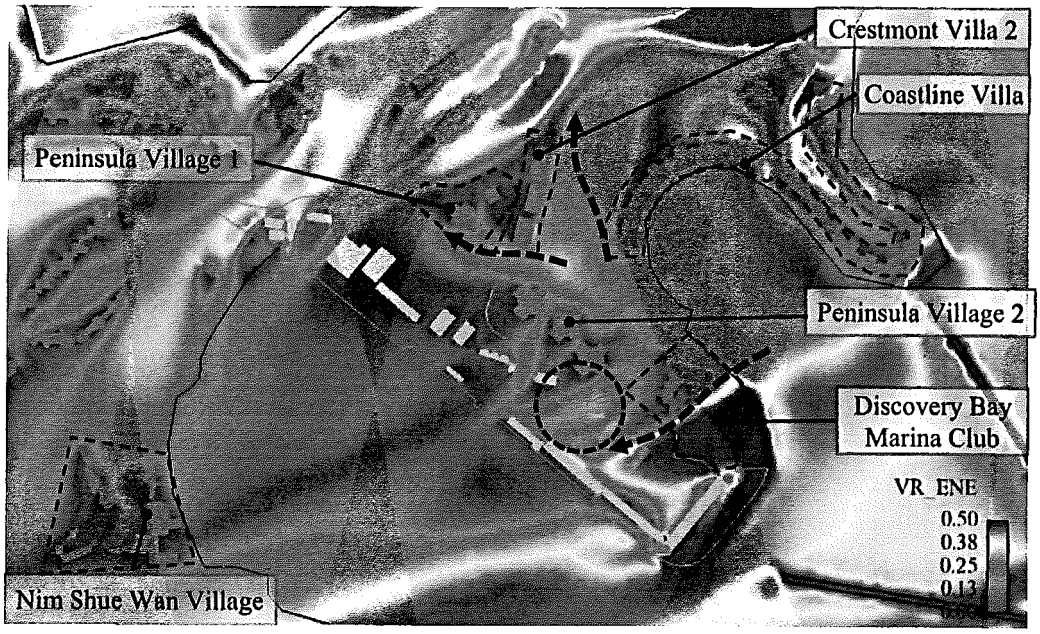


Figure 47 Contour Plot of VR for OZP-Compliant Scheme under ENE Wind

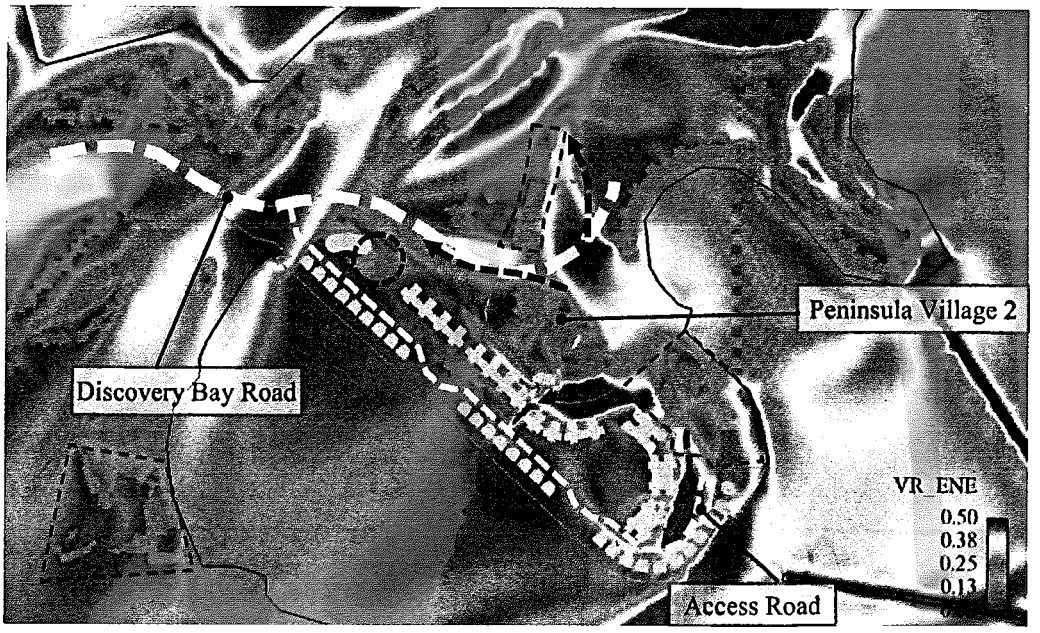


Figure 48 Contour Plot of VR for Baseline Scheme under ENE Wind

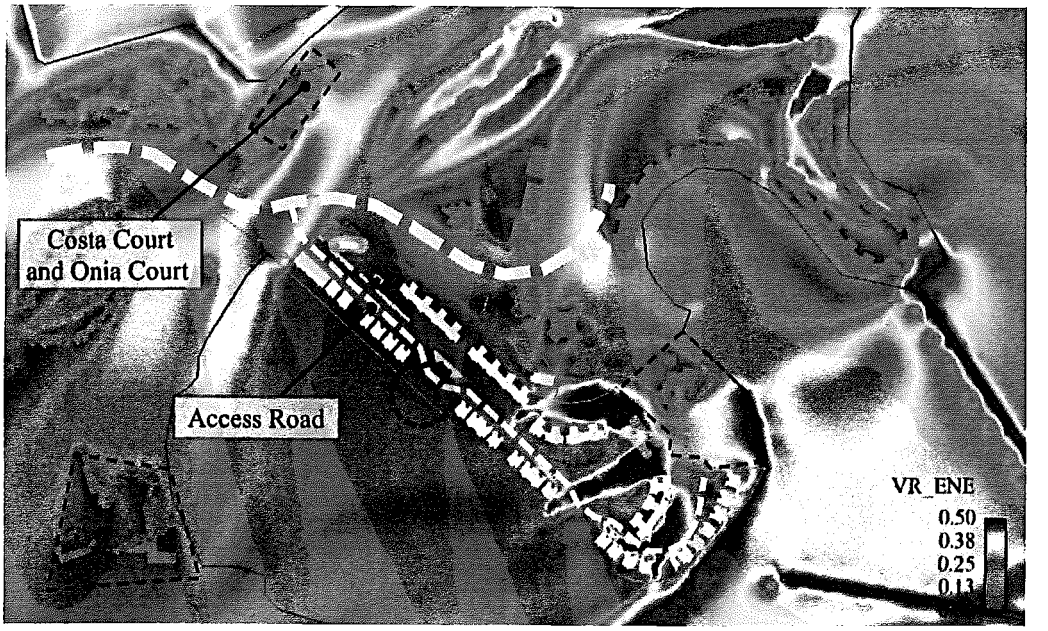


Figure 49 Contour Plot of VR for Proposed Scheme under ENE Wind

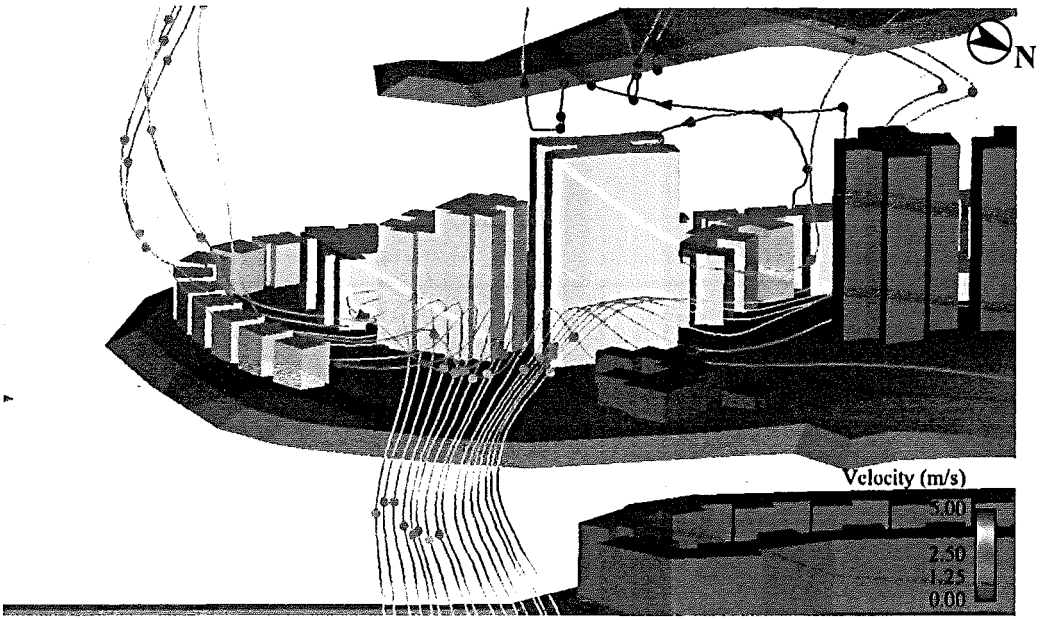


Figure 50 Illustration of Downwash Effect under Baseline and Proposed Scheme under ENE Wind

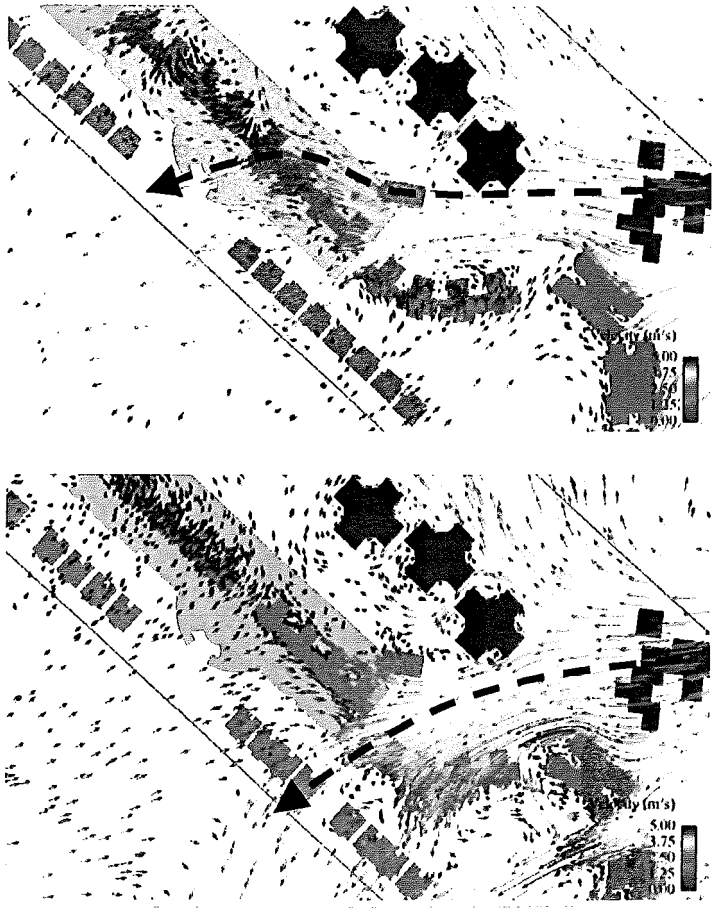


Figure 51 Vector Plots at 30mPD under Baseline (above) and Proposed Scheme (bottom) under ENE Wind

4.3.3 Under E Wind

There is no obstruction to the east of the Study Site, the incoming wind would reach the Study Site freely along the Discovery Bay Road or skimming over the Discovery Bay Marina Club.

OZP-Compliant Scheme

The elongated low-rise buildings would minimize the blockage to incoming E wind from waterfront. The southeastern part would freely enjoy the incoming wind so that Discovery Bay Marina Club at upwind location and La Vista at downwind location would have higher VR than the other two schemes.

Baseline Scheme

Similar to the wind environment under ENE wind direction, the incoming wind would be diverted towards Discovery Bay Road and higher VR is found at some sections of the Discovery Bay Road, shown white circle in **Figure 53**. Together with the separation between Tower M1 and L14, the incoming wind could subsequently ventilate the north-western part of podium area, shown as black circle in **Figure 53**.

In addition, the incoming wind would also be downwashed by Tower M2 and M3 to the southeastern part of Study Site and then being channelled through the building separation towards the access road near podium area, shown as blue arrows in **Figure 53**. The wake zone at the leeward side of M2 and M3 would lead to an air stream to ventilate the eastern part of the Study Site shown as white arrow in **Figure 53**.

On the other hand, due to increased building height and building footprint in compared to the OZP-Compliant Scheme, some of the E wind would be shielded and wind shadow would be casted over the area to the west of the Study Site. Instead of traveling along the site boundary adjacent to Nim Shue Wan and reach La Vista and Vista Avenue from SE direction, the extended decking with piles and array of 3 storey houses along the waterfront in the southeastern part would direct the incoming wind to reach Nim Shue Wan Village, hence lower VR at La Vista and Vista Avenue would be resulted.

Proposed Scheme

Due to higher permeability at pedestrian level in the south-eastern part of the Study Site, less wind would be driven through the Discovery Bay Road, comparing to Baseline Scheme. The wind environment at Discovery Bay Marina Club and Central Landscape Area would be enhance, circled in **Figure 54**.

The presence of M2 would divert the incoming wind to sideways. Together with relatively higher building height of those proposed blocks atop podium than those under Baseline Scheme, the diverted wind would then travel along those proposed L7-L14 which would subsequently enhance the wind environment at Peninsula Village 2 in compared to the Baseline Scheme, shown as black arrow in **Figure 54**.

In addition, due to larger building separations around Tower M2 and between L6 & L7, more wind would be diverted towards podium area and access road, shown as blue arrow in **Figure 54**. Besides, the widened building separation of 15m above podium between L10 and L11 would facilitate wind penetration from windward side of Tower L7 – L14 towards the access road at the back of the Study Site, shown as white arrow in **Figure 54**. Therefore, higher VR would be resulted herein.

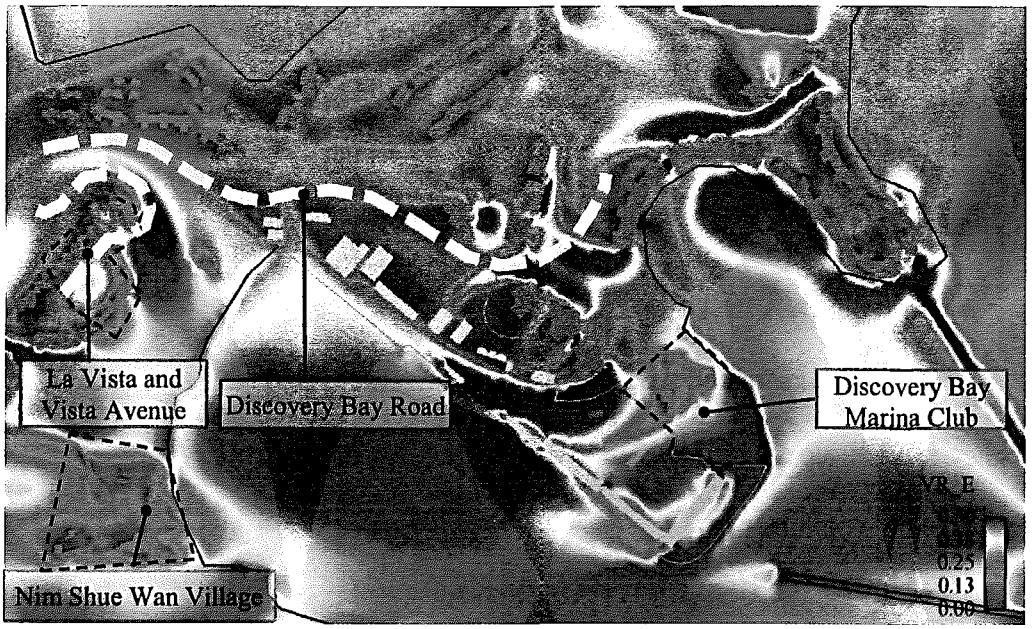


Figure 52 Contour Plot of VR for OZP-Compliant Scheme under E Wind

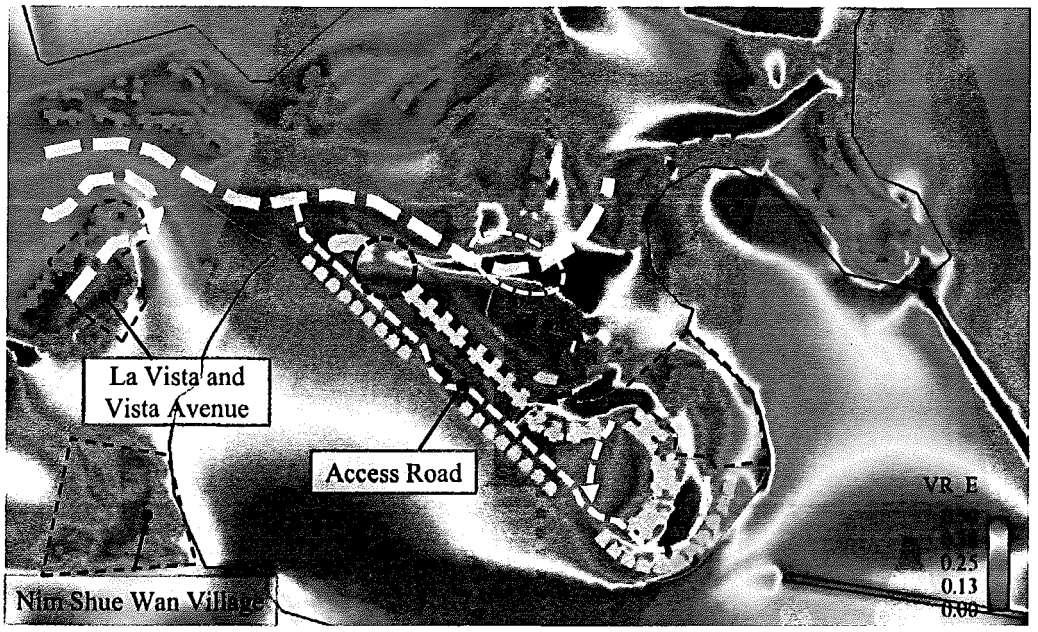


Figure 53 Contour Plot of VR for Baseline Scheme under E Wind

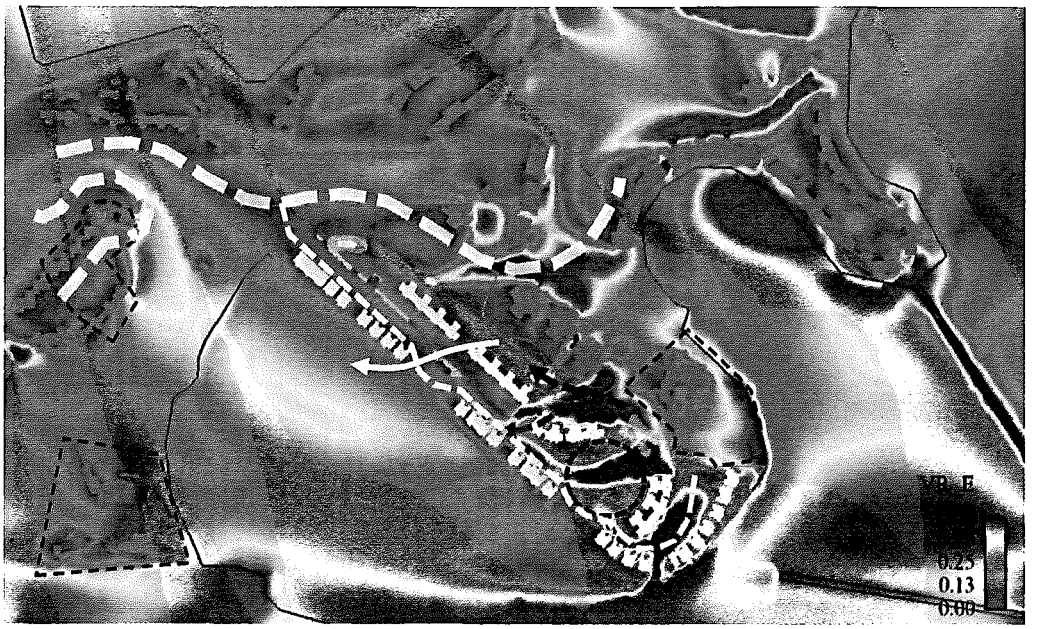


Figure 54 Contour Plot of VR for Proposed Scheme under E Wind

4.3.4 Under ESE Wind

The Study Site is located at upwind location to surrounding buildings such as La Costa, Crestmont Villa 2, Peninsula Village 2 and Discovery Bay Marina Club. Some wind shadow would be casted in these areas.

OZP-Compliant Scheme

The building to the southeast of the Study Site would shield the incoming ESE wind to serve the Study Area. However, the wind speed would recover after a short distance at the downwind area of the OZP-Compliant Scheme due to the low building height. The swimming pool and tennis court of Discovery Bay Marina Club would then become the wind entrance for the incoming wind. Besides, the discrete building within the Study Site promote wind penetration. Higher VR at the southeastern part of the Study Site were found comparing to other two schemes.

In addition, some of the incoming wind would be downwashed by Peninsula Village 2 and higher VR around Peninsula Village 2 were identified, circled in **Figure 55**.

Baseline Scheme

The incoming wind would travel around the coastline of the headland of Discovery Bay. Some of the incoming wind would be diverted into Discovery Bay Road. The 3 storey houses (+18mPD) along the coastline and the mid-rise building in the eastern part of the Study Site would cast some wind shadow on Discovery Bay Marina Club and Peninsula Village 2, where the VR were found to be lower than the OZP-Compliant Scheme. Nevertheless, Towers M2, M3 and M4 (42-70mPD) would allow the incoming wind to be downwashed and reach pedestrian level. The wind would then reach the central landscape area through the building separation between Tower L3 and M2.

Due to the bulkiness of the 78mPD Tower M1 in the north-western part of the site, wind shadow would be casted over La Costa such that its wind environment would be affected and lower VR was found in compared to the OZP-Compliant Scheme, circled in **Figure 56**.

The 65m-wide bounty pier in the central part of the Study Site would also act as a wind entrance of the Study Site. The wind would travel along the access road and skim over the podium. The wind would then reach Discovery Bay Road at downwind Area, shown as white arrow in **Figure 56** and relatively higher VR was found therein.

Proposed Scheme

Similar to Baseline Scheme, the incoming wind travel around the coastline of the headland. The wind environment would be calmer than the OZP-Compliant Scheme.

However, as a larger building separation is provided by elevated Tower M2 at pedestrian level, more wind would be able to travel through and reach the access road in the central part and Central Landscape Area in the eastern part of the Study Site. The permeable pedestrian level design would also help to enhance the wind environment Discovery Bay Marina Club at upwind area in compared to the Baseline Scheme.

In addition, some of the incoming wind would be diverted by Tower M2 and reach the facade of Peninsula Village 2. Downwash effect would be induced by Peninsula Village 2 (shown as pink circle in **Figure 57**) and the wind would be channelled along the podium structure to reach the Discovery Bay Road and La Costa to further northwest direction.

In the central part of the Study Site, a 15m-wide building separation between L10 and L11 would help to minimize the wind shadow area casted by adjacent Peninsula Village 2, shown as black arrow in **Figure 57**. As a result, the proposed podium would have higher VR comparing to Baseline Scheme.

Elevated Tower M1 in the north-western part would also enhance the permeability above podium. Therefore, the wind shadow at pedestrian level of leeward area would be reduced shown as black circle in Figure 57 and the adverse impact on the wind environment at La Costa would be minimized.

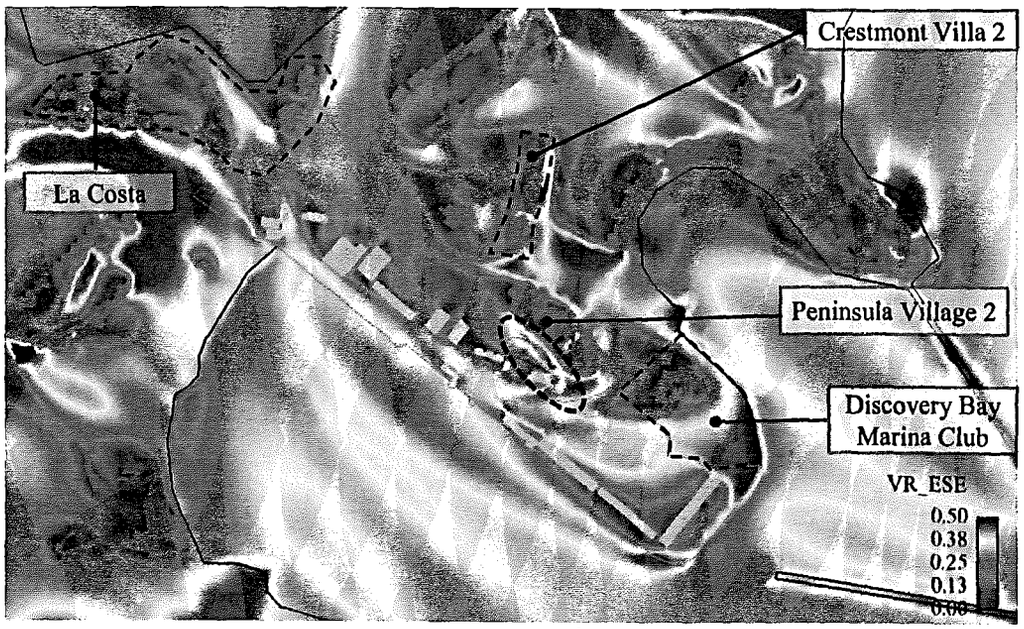


Figure 55 Contour Plot of VR for OZP-Compliant Scheme under ESE Wind

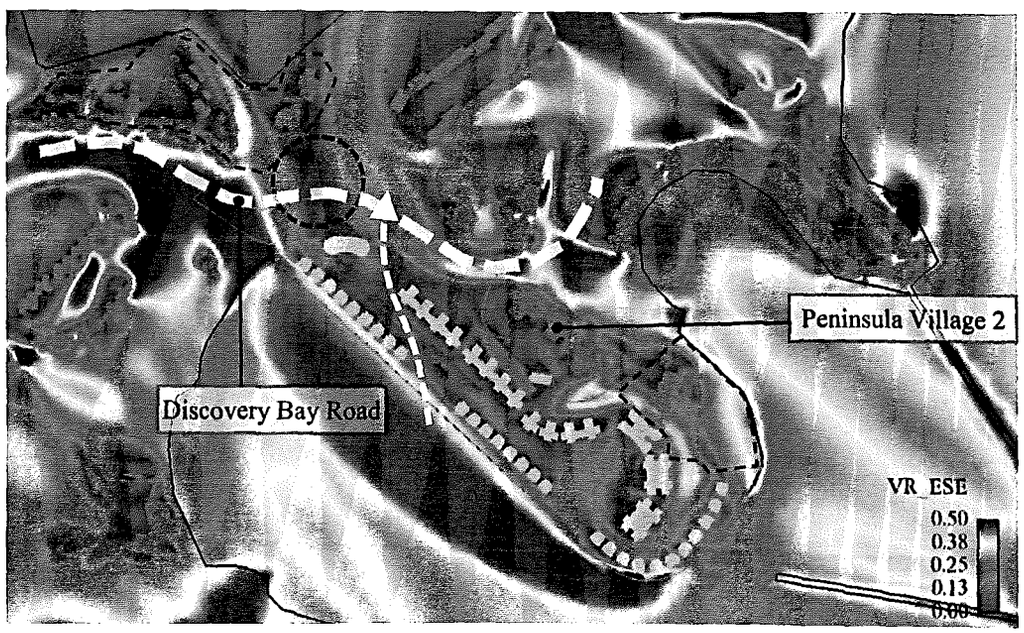


Figure 56 Contour Plot of VR for Baseline Scheme under ESE Wind

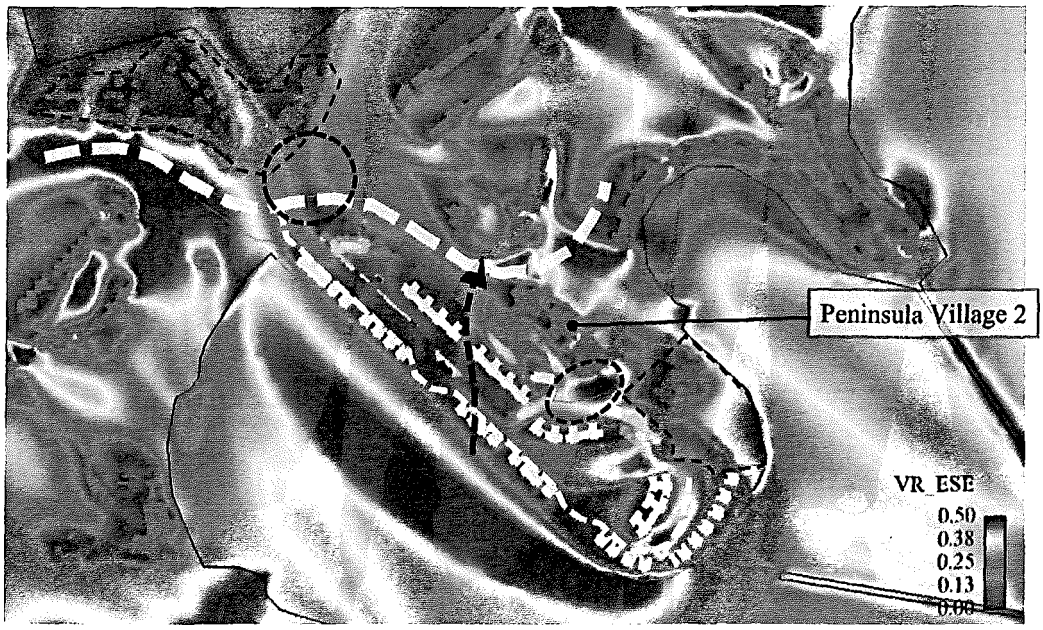


Figure 57 Contour Plot of VR for Proposed Scheme under ESE Wind

4.3.5 Under SE Wind

There would be no obstruction at the upwind area to the Study Site. Hence the wind would reach the site freely.

OZP-Compliant Scheme

The wind would skim over the low-rise building within the Study Site. In the eastern part, the OZP-Compliant buildings would cast a wind shadow within the Site. The southeast facing facade of Peninsula Village 2 would induce downwash effect, which would then be diverted sideways and enhance the VR in the central part of the Study Site, as shown in black arrows in **Figure 58**. Although some wind shadow would be created by the OZP-Compliant Scheme to the northwest of the Study Site due to the low-rise nature of the buildings, the wind would quickly reattach to the ground. Higher VR at La Costa, Crestmont Villa 1&2, Peninsula Village 1&2 were observed.

Baseline Scheme

The incoming wind would travel around the headline of Discovery Bay. The SE wind would travel along the coast line in the north-eastern part of Nim Shue Wan or Along the Discovery Bay Road to reach the leeward side of the Study Site.

In the eastern part of the site, the array +18mPD houses would cast some wind shadow on the access road within the site. The facade of Tower L1, L2, M3, M4 and M2 would induce some downwash effect in the windward side, which would slightly enhance the wind performance along the access road and the open space in Discovery Bay Marina Club. The continuous building deposition in the eastern part of the site would shield the incoming wind towards Peninsula Village 2, which would result in relatively calm wind environment.

The continuous facade of the array of +18mPD houses between two piers would induce channelling effect, which slightly enhance the VR at the central part of the site, highlighted with blue circle in **Figure 59**. The study site located at the upwind location and tower L7-L14 would shield the incoming wind for Crestmont Villa 1&2, Peninsula Village 1 and Capridge Drive, comparing to OZP-Compliant Scheme. The 65m wide bounty pier act as wind entrance and a stream of air would enter the site and skim over the terraced podium to reach the downwind area, shown as white arrow in **Figure 59**. Thus, the VR at part of Discovery Bay have been enhanced.

Tower M1 with 78mPD located in the western part of the site would induced some down wash effect on the podium but also wind shadow at the leeward site, highlighted with black circle in **Figure 59,** such that lower VR would be found in the La Costa.

Proposed Scheme

Similar to Baseline Scheme, the SE wind would travel along the north-eastern coast line of Nim Shue Wan and along Discovery Bay Road.

The additional building separation among the +18mPD houses would act as wind entrance to facilitate wind penetration through the access road towards Discovery Bay Marina Club, shown as black arrow in **Figure 60**.

The building separation between Tower M2, M3 and L3 would improve the permeability in the eastern part of the study site. The incoming wind would ventilate the central landscape area such that higher VR would be observed comparing to Baseline Scheme. In addition, the building separation around Tower M2 would allow incoming wind to travel around Tower M2 and reach the south-eastern facade of Peninsula Village 2, where the downwash effect would be induced, as highlighted in red circle in **Figure 60**. The downwashed wind would be subsequently separated and diverted to travel through the building separation between Tower L6 and L7, Peninsula Village 2 and the study site, shown as red arrow in **Figure 60**, resulting in a slightly calmer wind environment to the immediate southwest of tower L7-L10.

Similar to Baseline Scheme, the wind would reach the podium level through the 65m wide bounty pier. Due to the elevated design of Tower M1, the wind shadow casted by the +78mPD building would be alleviated. Hence the VR at La Costa at leeward side would be enhanced, highlighted in black circle in **Figure 60.**

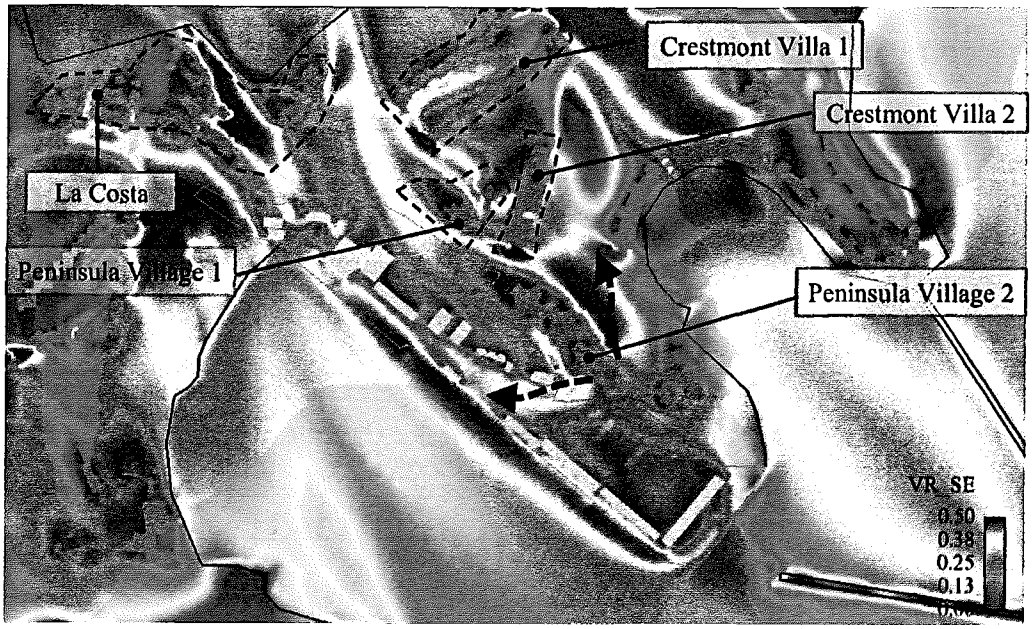


Figure 58 Contour Plot of VR for OZP-Compliant Scheme under SE Wind

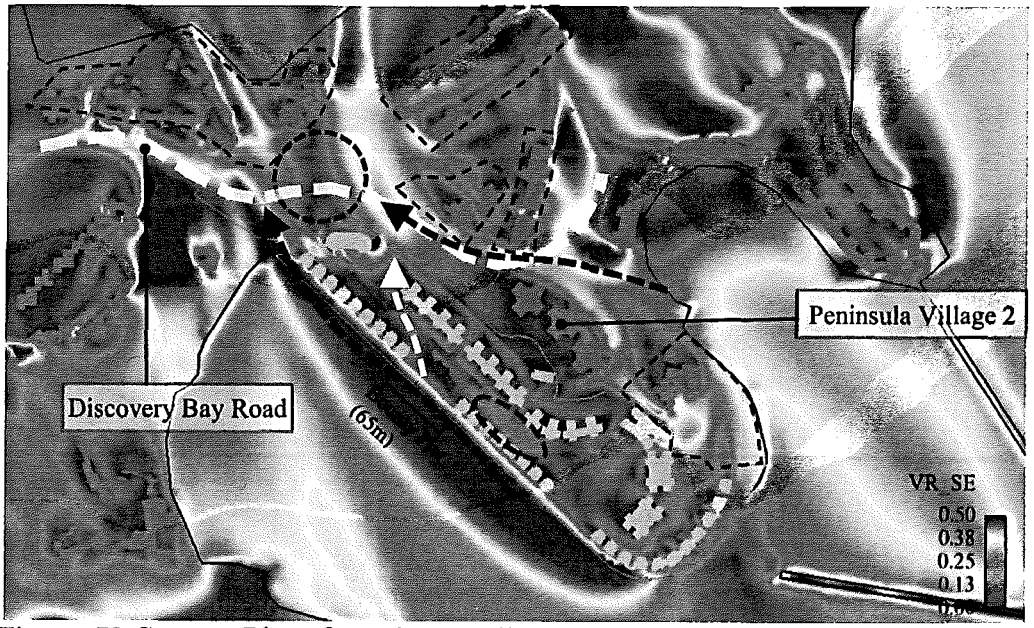


Figure 59 Contour Plot of VR for Baseline Scheme under SE Wind

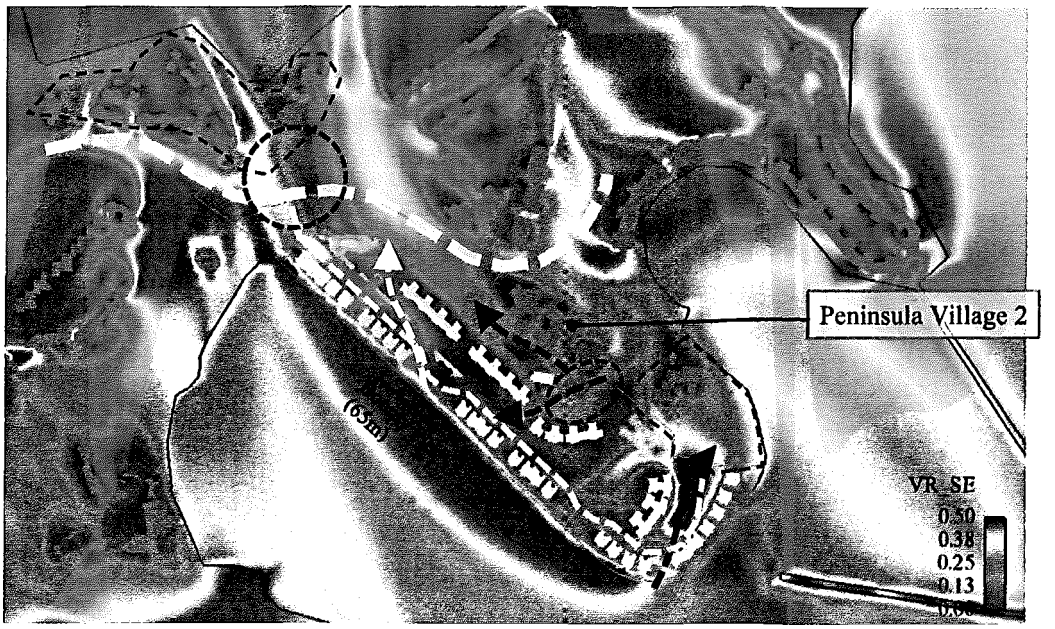


Figure 60 Contour Plot of VR for Proposed Scheme under SE Wind

4.3.6 Under SSE Wind

The incoming wind would freely reach the Study Site from the seashore. The existing tower of Peninsula Village 2 would downwash the incoming wind to the pedestrian level such that the

OZP-Compliant Scheme

In the presence of larger open space and low-rise building in the southeastern part of the Study Site comparing to other schemes, the incoming wind would skim over those low-rise building of OZP-Compliant Scheme and travel up the slope between Crestmont Villa 2 and Coastline Villa in the downwind area. The height profile between those blocks within Study Site under OZP-Compliant Scheme and Peninsula Village 2 would facilitate downwash effect and ventilate the pedestrian level around the Peninsula Village 2, circled in **Figure 61**. Therefore, the VR around Peninsula Village 2 would be higher than other schemes.

Baseline Scheme

Similar to ESE and SE wind condition, the incoming wind would be diverted around the coastline towards Nim Shue Wan and floating jetties area for Discovery Bay Marina Club. The proposed residential blocks would shield the incoming wind towards the downwind areas, such as, Peninsula Village 1&2 and La Costa. Therefore, the wind environment of these areas would be relatively calmer under Baseline Scheme than that under OZP-Compliant Scheme.

The two piers (Kaito pier and bounty pier) would allow incoming wind to travel along the access road, shown as black arrow in **Figure 62**. The available building separations among towers would allow the incoming wind to further distribute to the leeward area, such as Discovery Bay Road and Crestmont Villa 1. In addition, the proposed building clusters together with the Peninsula Village 2 would divert the wind to travel up the hill to the east of Peninsula Village 2 and skim over

Crestmont Villa 2 to reach Crestmont Villa 1 thus higher VR would be resulted at Crestmont Villa 1, shown as blue arrow in **Figure 62**.

Proposed Scheme

Similar to the Baseline Scheme, the piers would also allow incoming wind to reach and ventilate the Study Site under Proposed Scheme. Three additional 15m-wide building separations among 3-storey houses along the coastline would further enhance the permeability such that the wind environment of Study Site would be enhanced under Proposed Scheme than that under Baseline Scheme.

The wind entrance at southeast corner would facilitate wind penetration along the access road towards Discovery Bay Marina Club, reducing the wind shadow area casted by the Proposed Scheme. Together with the channelling effect by L2, M3 and M4, the wind environment at the swimming pool and tennis court of Discovery Bay Marina Club would be enhanced than that of Baseline Scheme, shown as black arrow in **Figure 63**.

The 65m-wide bounty pier and 15m building separation above podium form an air path aligning with SSE wind direction would facilitate wind penetration towards downwind area and slightly enhanced the wind environment Peninsula Village 1 in compared to the Baseline Scheme, shown as pink arrow in **Figure 63**.

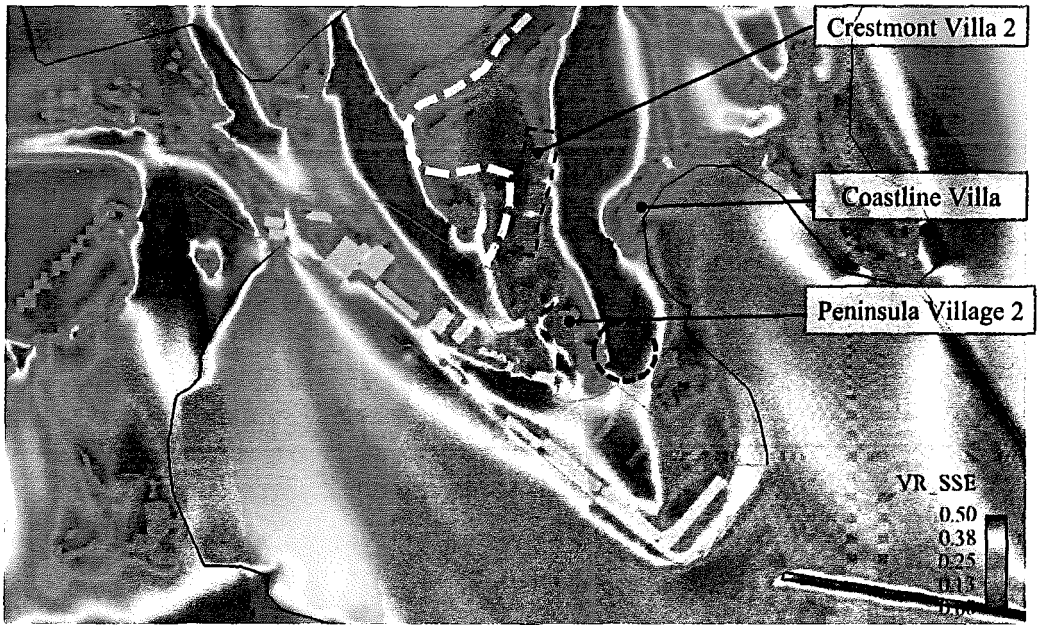


Figure 61 Contour Plot of VR for OZP-Compliant Scheme under SSE Wind

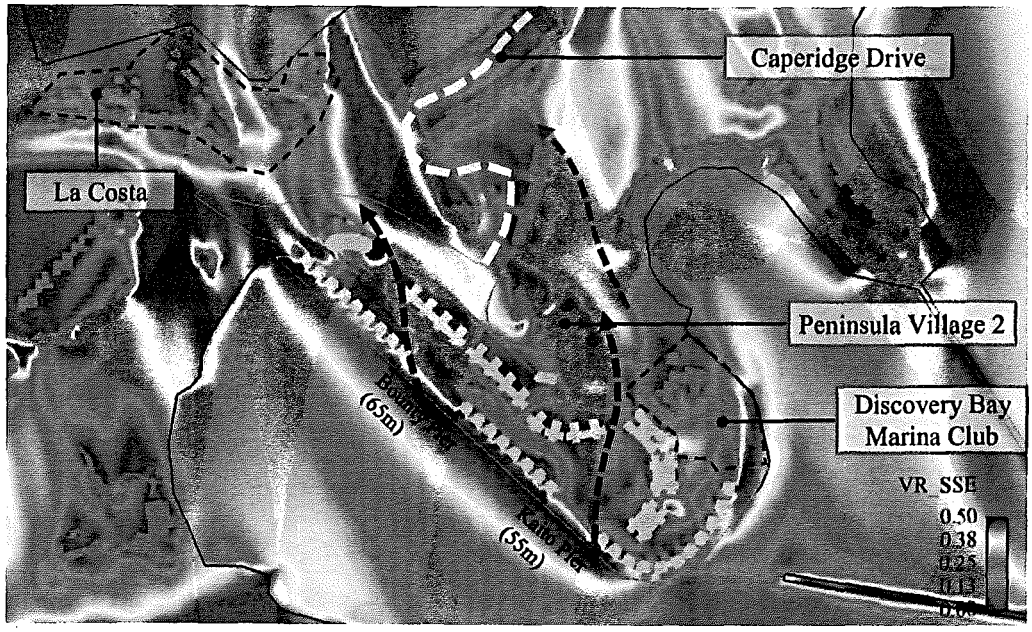


Figure 62 Contour Plot of VR for Baseline Scheme under SSE Wind

Figure 63 Contour Plot of VR for Proposed Scheme under SSE Wind

4.3.7 Under S Wind

The incoming wind would freely reach and ventilate the Study Site.

OZP-Compliant Scheme

With the incoming wind from the seashore, the Study Site could enjoy the S wind freely. The Study Site is located at the upwind location, which would shield some of the incoming wind at the surrounding buildings. The incoming wind would recover after a short distance and thus enhance the wind environment at Discovery Bay Marina Club. In addition, after skimming over the low-rise building within the Study Site, the incoming wind would be downwashed by Peninsula Village 2

(circled in **Figure 64**) which would then further ventilate Caperidge Drive and Crestmont Villa 2.

To the south-eastern part of the Study Site, the elongated block along coastline would divert a portion of incoming wind towards floating jetties of Discovery Bay Marina Club where relatively higher VR was found.

Baseline Scheme

In the south-eastern part of the site, the array of 3-storey houses, together with M2, M3 and M4 towers would shield and divert the incoming wind for downwind area, such as Discovery Bay Marina Club and Coastline Villa. Therefore, larger area with higher VR was found over the floating jetties comparing to the OZP-Compliant Scheme.

Besides, the mid-rise nature of M2 Tower (+70mPD) would capture the incoming wind towards the pedestrian level. Together with the building separation between M2 and L3, the downwashed wind would reach the southeast side of Peninsula Village 2 at the immediate leeward side, shown as black arrow in Figure 65.

On the other hand, the Tower L3-L6 (+27mPD) at the leeward side of the Kaito pier would shield some incoming wind for Peninsula Village 2 such that the wind environment of the latter would be relatively calm in compared to the OZP-Compliant Scheme. The building height profile among two arrays of proposed house in height of 18mPD (3 storey houses) and 27mPD (L3-L6), as well as Peninsula Village 2 (~72mPD) would result in downwash which would slightly alleviate the calm wind condition of Caperidge Drive due to tower L7-L14, shown as pink circle in **Figure 65**.

In the north-western part of the Study Site, Tower M1 (+78mPD) would induce the downwash effect at upwind area such that higher VR would be observed above podium deck. However, it would also induce wind shadow over La Costa at downwind area where lower VR was found therein, shown as black circle in **Figure 65**.

Proposed Scheme

The wind entrance provided at the south-eastern corner of the Study Site would promote wind penetration through the Study Site towards northern end of access road which would enhance the wind environment at Discovery Bay Marina Club in compared to the Baseline Scheme, shown as black arrow in **Figure 66**.

Under Baseline Scheme, a wake zone (with relatively lower pressure, as shown in **Figure 68**.) would be created at the leeward side of Tower M2 due to the bulkiness of the building, such that the incoming wind would be drawn towards the wake zone, such that the VR of its leeward area (to the north of Discovery Bay Marina Club) would be relatively higher. On the other hand, under Proposed Scheme, with the elevated design of Tower M2 and additional building separation, more incoming wind would penetrate underneath the Tower M2 near pedestrian level, such that the pressure would be relatively higher than the Baseline Scheme as shown in **Figure 68**. In addition, since the existing Discovery Bay Marina Club is situated at the immediate northwest of the void under Tower M2 which would limit the incoming wind to ventilate further to the leeward side. In contrary, another stream of air would

be penetrate across the wider building separation created by void under Tower M2 and building separation between M2 and M3, which would therefore enhance the wind performance of the open space in Discovery Bay Marina Club, shown as blue arrow in **Figure 66**. In the absence of wind recovery towards the immediate leeward side of Tower M2, relatively larger area with lower VR would be found to the north of the building in Discovery Bay Marina Club.

The building separation provided between 3 storey houses aligned with the building separation between L6 and L7. Hence, incoming wind could penetrate through the Study Site, shown as grey arrow in Figure 66. In addition, the smaller building footprint of L3-L6 with the building separation between L3 and M2 would alleviate the wake zone due to L3-L6. The incoming wind would skim over and down-washed by the facade of Peninsula Village 2, circled in **Figure 66**. Such air stream would then ventilate the podium and the Discovery Bay Road, as illustrated in **Figure 67**.

Similar to SSE wind, various wind entrances provided along the waterfront facing Nim Shue Wan under Proposed Scheme would enhance the permeability of the Study Site under S wind condition. More wind could be directed towards the leeward side, such as the Peninsular Village 1, shown as pink arrows in **Figure 66**. Therefore, the wind performance within the Study Site would be enhanced than that under Baseline Scheme.

In the western part of the Study Site, the elevated Tower M1 above podium would facilitate wind penetration, and alleviate the wind shadow casted by M1 and enhance the ventilation performance at La Costa.

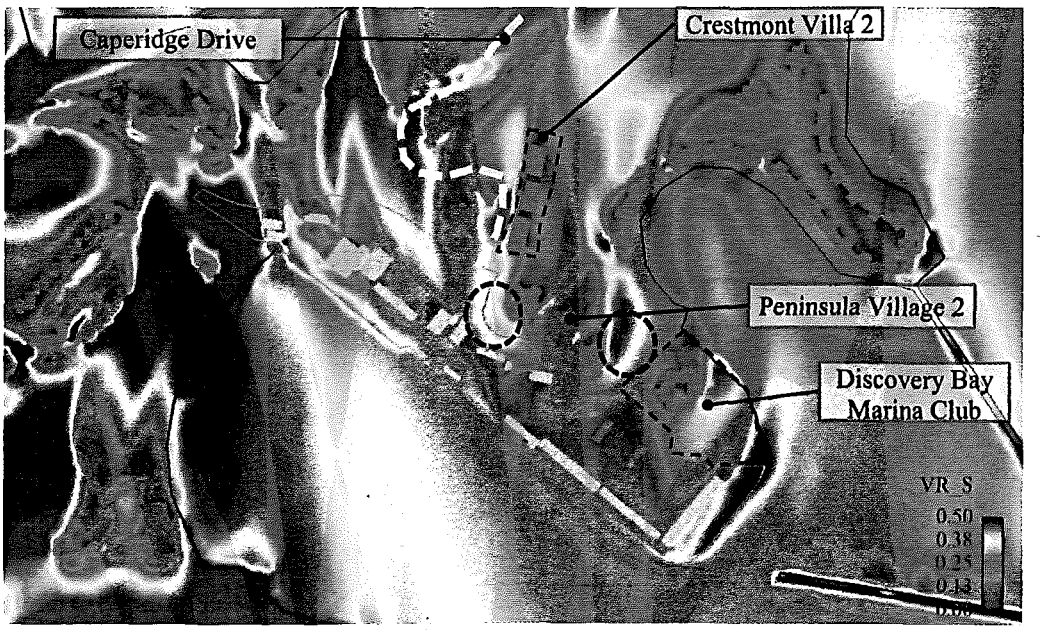


Figure 64 Contour Plot of VR for OZP-Compliant Scheme under S Wind

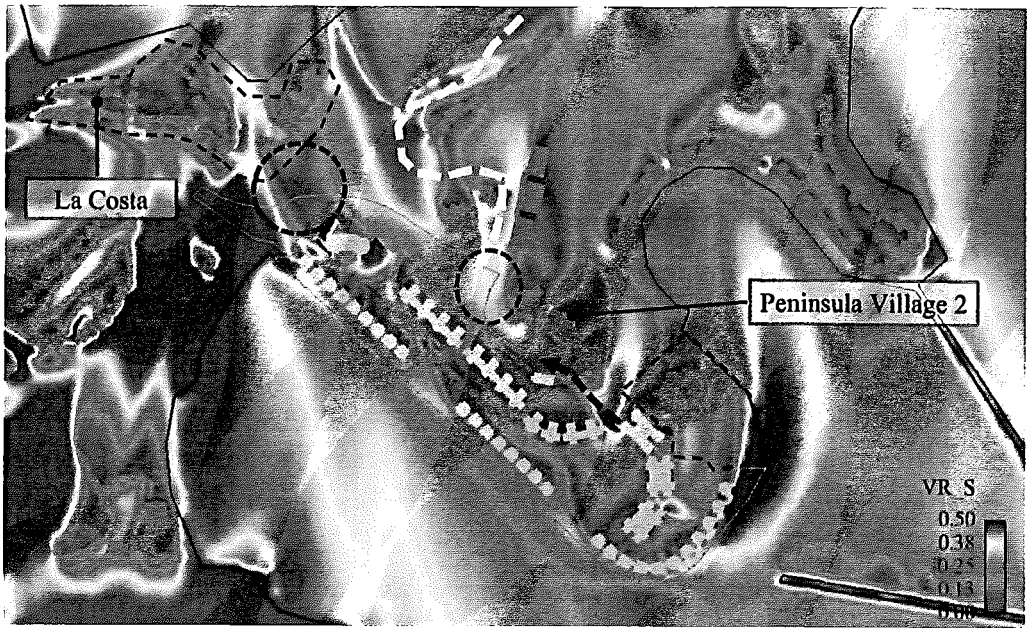


Figure 65 Contour Plot of VR for Baseline Scheme under S Wind

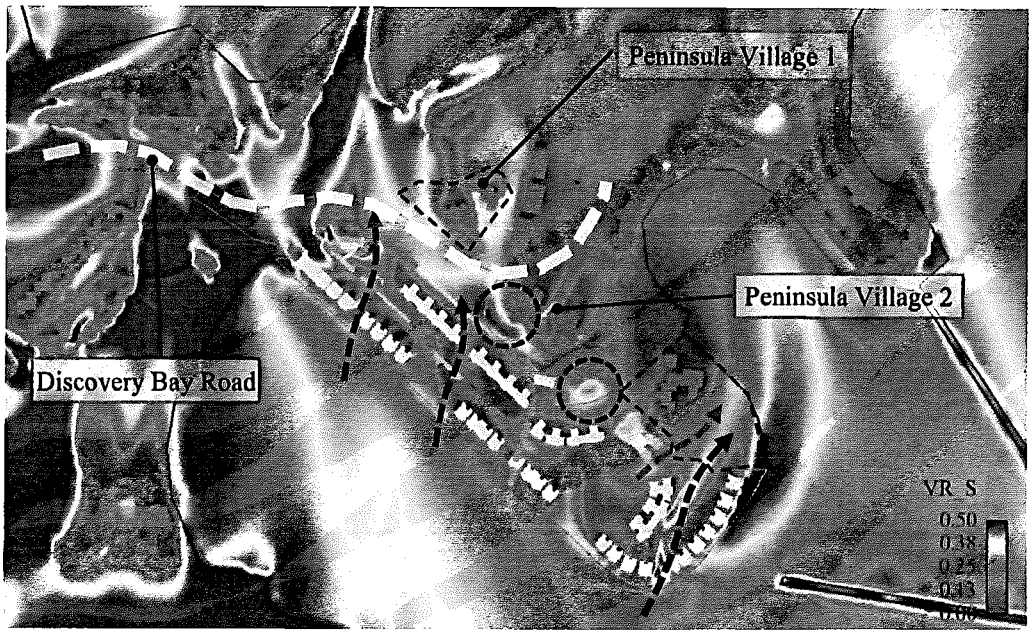


Figure 66 Contour Plot of VR for Proposed Scheme under S Wind

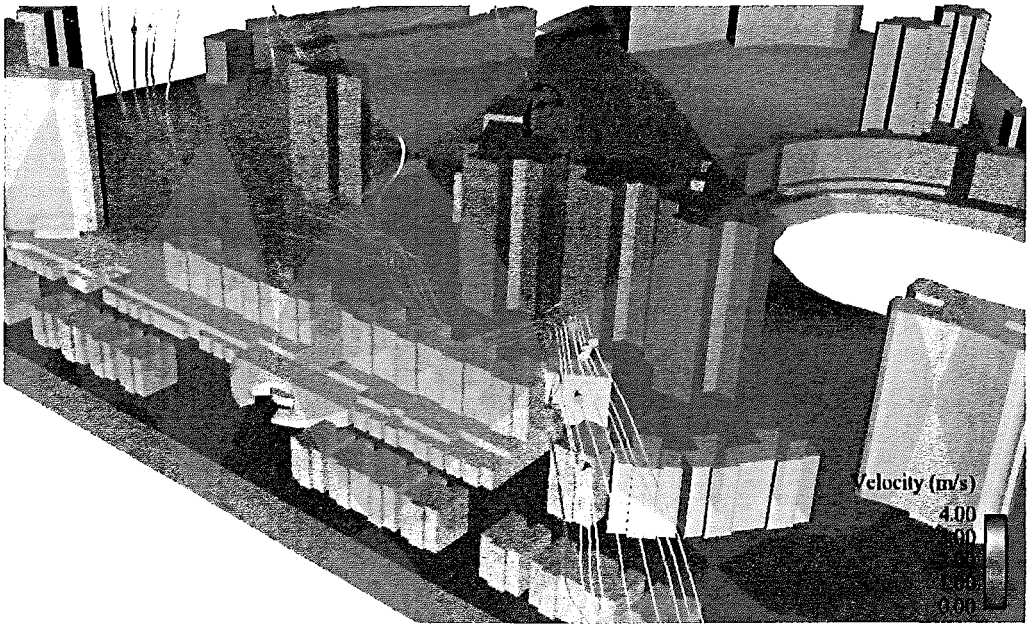


Figure 67 Downwahsed by Peninsula Village 2 under Propsoed Scheme

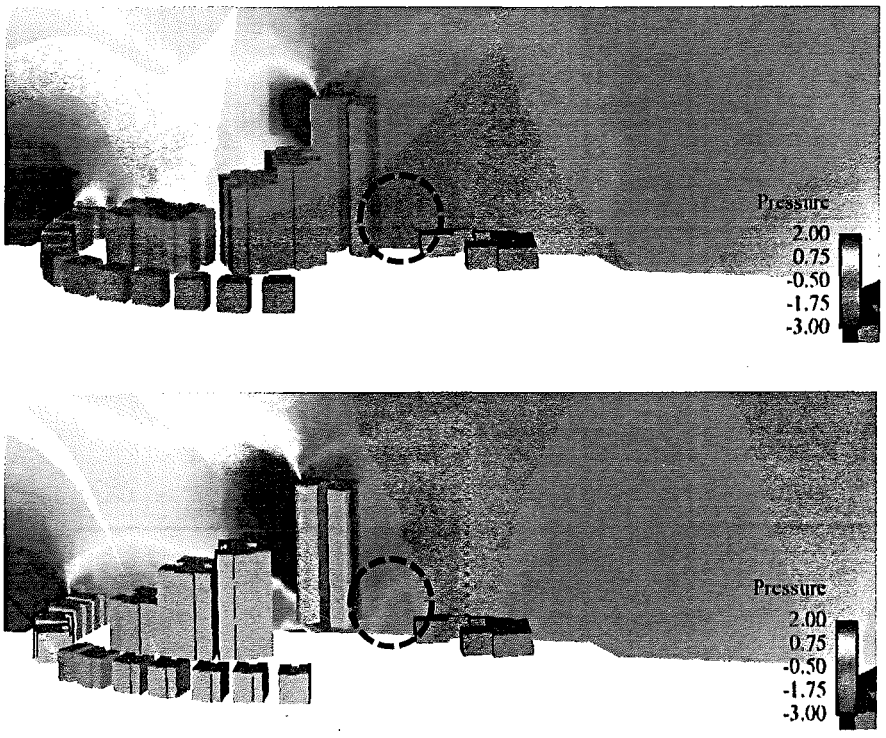


Figure 68 Pressure Distribution Near M2 under Baseline and Proposed Scheme

4.3.8 Under SSW Wind

The incoming wind would freely reach and ventilate the Study Site.

OZP-Compliant Scheme

The available building separations would allow incoming wind to penetrate across the Study Site and serve the leeward areas.

In the southeastern part of the Study Site, the incoming wind would skim over the low-rise buildings along the waterfront and diverted through the open space to the northeast of the Peninsula Village 2 while elongated shape of the buildings would shield some of the incoming wind for Discovery Bay Marina Club.

As the buildings of OZP-Compliant Scheme are generally low-rise, the SSW wind would easily reach the Peninsula Village 2 which would then be downwashed by its building façade, circled in Figure 69. Eventually, the downwashed wind would ventilate existing Peninsula Village 1, Crestmont Villa 2 and Capedridge Drive in the downwind area.

Baseline Scheme

Similar to S wind condition, the incoming wind would be shielded by the array of 3-storey houses along the southeast coastline and Towers M2, M3, M4 and L1, L2. However, Tower M2 (70mPD) and M3 (42mPD) would capture and divert the high-level wind towards pedestrian level of the Discovery Bay Marina Club, shown as blue arrow in **Figure 70**. Therefore, higher VR at Discovery Bay Marina Club would be resulted, comparing OZP-Compliant Scheme.

Six 4-storeys and two 5-storey house atop the podium under Baseline Scheme would shield the low-level incoming wind towards Crestmont Villa 1&2 such that the VR at Crestmont Villa 1&2, Peninsula Village 2, Caperidge Drive would generally lower than the OZP-Compliant Scheme.

In addition, the increasing height profile from waterfront towards Peninsula Village 1 & 2 would help wind deflection. The downwashed wind would then be channelled along the space between the podium and Peninsula Village 2, shown as black arrow in **Figure 70**, and further distribute towards Discovery Bay Road and Peninsula Village 1. However, the Tower M1 (+78mPD) above podium would cast wind shadow at its downwind area, as circled in **Figure 70**, relatively lower VR at Peninsular Village 1 and Capridge Drive.

Proposed Scheme

The 55m-wide Kaito pier/ service pier and 15m-wide building separation provided at southeastern corner of Study Site would allow the incoming wind to enter the Study Site. Together with the building separation around the elevated Tower M2, the incoming wind would then travel towards and ventilate Discovery Bay Marina Club in the leeward side, shown as black arrow in **Figure 71**.

However, given the downwash effect by those towers to the east of Central Landscape Area under Proposed Scheme would be less significant than that under Baseline Scheme, the wind shadow casted by elevated M2 would not be significantly reduced under Proposed Scheme. Therefore, the area with lower VR at the leeward side of elevated M2 of Proposed Scheme would be larger than that of Baseline Scheme, shown as white circle in **Figure 71**.

Widened building separation of 15m between proposed L10 and L11 in the central part would slightly promote the wind penetration towards the leeward areas which is not in favourable alignment to the incoming wind, as shown in **Figure 71**. The VR at Peninsula Village 1 at close proximity would be slightly enhanced comparing to Baseline Scheme.

Elevated Tower M1 in the western part would enhance the permeability at low level. The wind shadow caused by Proposed Scheme would therefore be minimized comparing to Baseline Scheme, shown as black circle in **Figure 71**. Together with the additional wind entrances provided in form of 15m-wide building separations, more wind would be promoted to penetrate through the Study Site, shown as grey arrow in **Figure 71**. The VR at Crestmont Villa 1 and Caperidge Drive were then enhanced, comparing to Baseline Scheme.

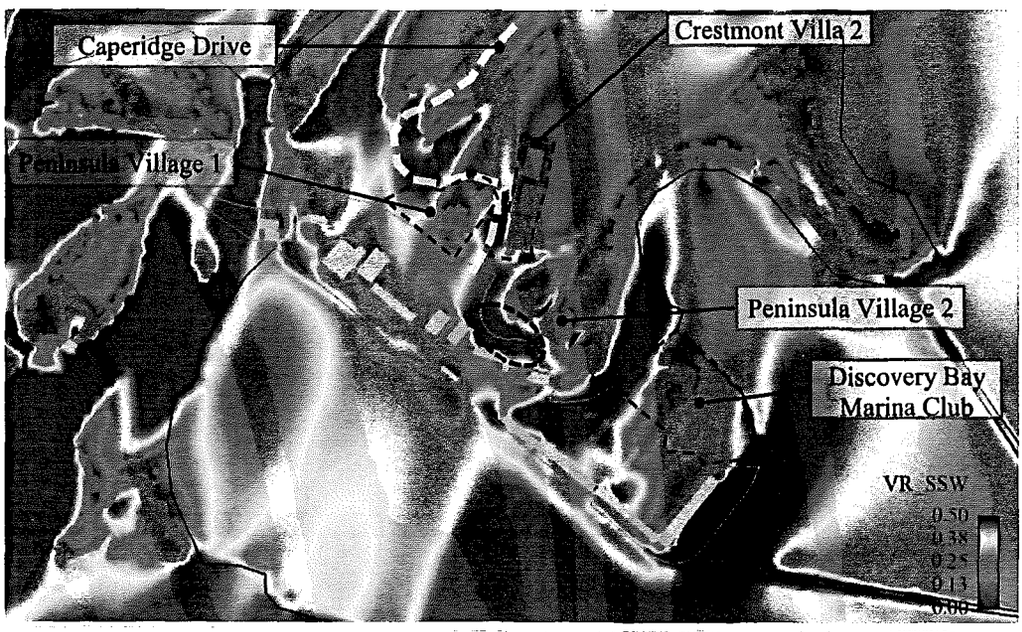


Figure 69 Contour Plot of VR for OZP-Compliant Scheme under SSW Wind

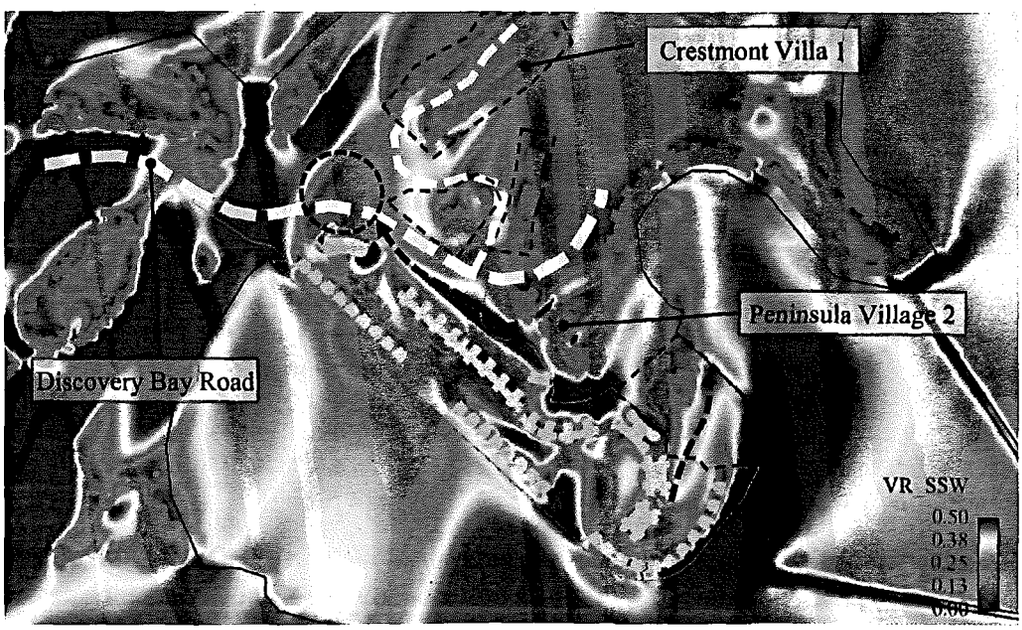


Figure 70 Contour Plot of VR for Baseline Scheme under SSW Wind

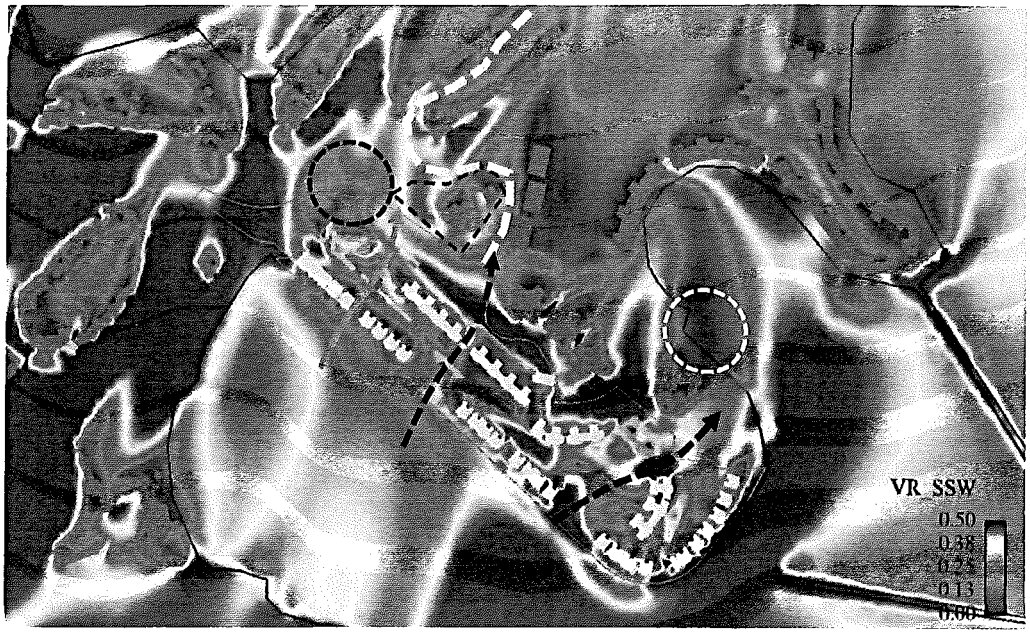


Figure 71 Contour Plot of VR for Proposed Scheme under SSW Wind

4.3.9 Under SW Wind

The incoming wind would freely reach and ventilate the Study Site. Nim Shue Wan Village would not be affected by any buildings within the Study Site.

OZP-Compliant Scheme

As the major surrounding buildings, such as Coastline Villa, Crestmont Villa 2, Peninsula Village 1, are located at a ground level higher than that of the Study Site, together with the low-rise building in nature, the wind environment at the surrounding area is not significantly affected under OZP-Compliant Scheme. Therefore, Crestmont Villa 1&2, Peninsula Villa 2, Discovery Bay Marina Club could achieve higher VR than other two schemes.

Baseline Scheme

The wind environment within the southeastern part of the Study Site is similar as under SSW wind condition. However, as the frontage area of Tower M2 facing SW direction is larger, more wind could be downwashed towards the pedestrian level of Central Landscape Area, circled in **Figure 73**.

Tower M2 would cast wind shadow over Discovery Bay Marina Club where lower VR would be resulted compared to the OZP-Compliant Scheme.

With the 65m-wide bounty pier, the incoming wind would travel along the access road to southeastern and northwestern part of the Study Area, shown as black arrow in **Figure 73**. The houses atop the podium and the podium itself would shield some of the incoming wind. Therefore, the VR at Peninsula Village 2, Crestmont Villa 2 would be lower, comparing to OZP-Compliant Scheme.

Proposed Scheme

In the southeastern part of the Study Site, several air paths formed by Kaito pier and building separation would align with SW direction. With the elevated M2, the incoming wind could penetrate towards Discovery Bay Marina Club, shown as black arrow in **Figure 74**. The wind shadow by M2 would be reduced than that under Proposed Scheme

The 15m-wide building separation between blocks L10 and L11 above podium in the central part would promote more wind to be diverted towards Caperidge Drive, Crestmont Villa 1&2, where higher VR was observed than that under Baseline Scheme, shown as white arrow in **Figure 74**; while the VR at Peninsula Village 1 was found to be lower.

Similar VR is found in other surrounding areas.

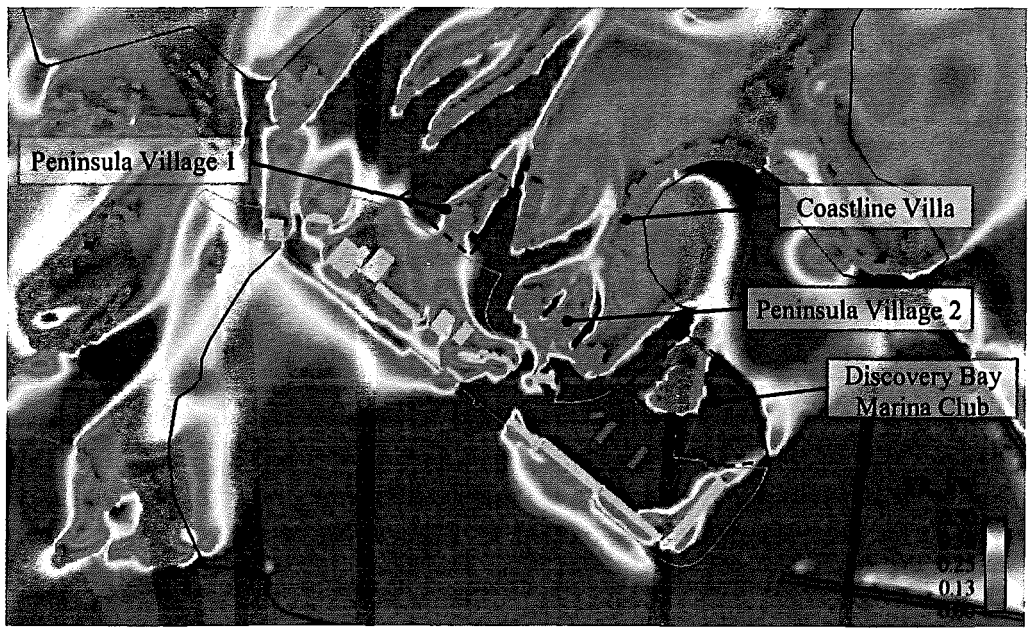


Figure 72 Contour Plot of VR for OZP-Compliant Scheme under SW Wind

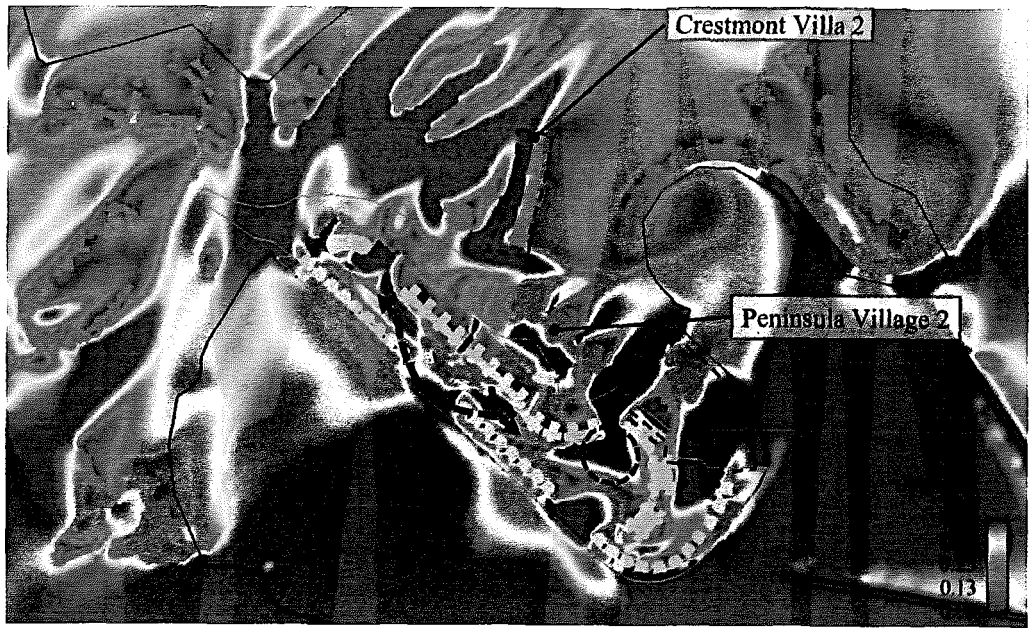


Figure 73 Contour Plot of VR for Baseline Scheme under SW Wind

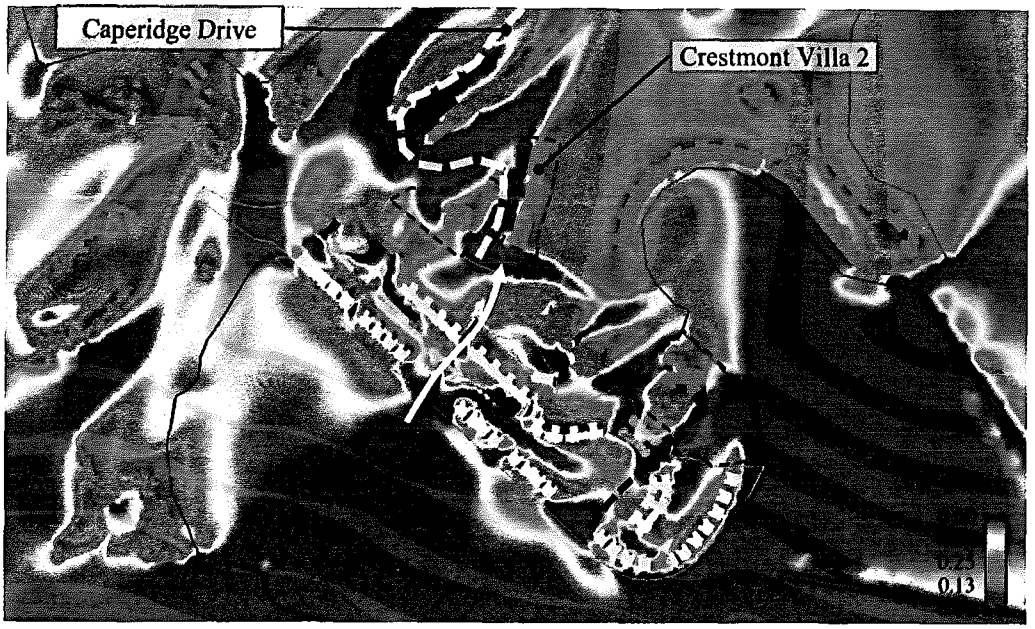


Figure 74 Contour Plot of VR for Proposed Scheme under SW Wind

4.3.10 Under WSW Wind

OZP-Compliant Scheme

The incoming wind would skim over the low-rise building in the southeastern part of the Study Site and quickly recovered after short distance. The VR at Discovery Bay Marina Club would be higher than other schemes.

The incoming wind for western part of the site would be slightly shielded by the topology to the southwest of the Study Site across the Nim Shue Wan. The VR would be generally lower in the western part of the Study Site.

The buildings located in the western part of the Study Site would create some wind shadow at the north-western part of the Study Site.

Baseline Scheme

In the presence of development in the Study Site, the permeability at higher level would be reduced by the proposed mid-rise developments, which would be not favourable for wind penetration. The wind availability at pedestrian level would be slightly lower than OZP-Compliant Scheme. Hence, the VR over Nim Shue Wan would be generally lower.

The incoming wind would enter the Study Site through the pier areas and would be channelled along the access road. The height difference between the Baseline scheme and Peninsula Village 2 would help to promote the incoming wind to be downwashed and enhance the VR at the area between northern boundary of the Study Site and Peninsula Village 2, highlighted with black circle in **Figure 76**.

The Baseline Scheme would shield some of the incoming wind such that Crestmont Villa 2 would have relatively calmer wind condition than that under OZP-Compliant Scheme. The round shaped Tower M1 would induce some corner effect, which would slightly accelerate the incoming wind and enhance the VR at its leeward side, highlighted with blue circle in **Figure 76**.

To the eastern part, the taller tower would cast wind shadow over the leeward side such that Discovery Bay Marina Club and the floating jetties area would have calmer wind environment than that under OZP-Compliant Scheme.

Proposed Scheme

The building separation near elevated M2 tower would help to divert the incoming wind around the tower and reach the Discovery Bay Marina Club and Peninsula Village 2, which would enhance the wind performance at Discovery Bay Marina Club.

The 65m-wide bounty pier and the 15m-wide building separation between L10 and L11 would form an air path for the incoming WSW wind to reach Peninsula Village 2, shown as black arrow in **Figure 77**. The building façade would then downwash and divert the incoming wind towards Crestmont Villa 2, circled in **Figure 77**. Therefore, relatively higher VR was found therein.

Similarly, another straight-through building separation across few arrays of proposed houses would also facilitate wind penetration which would result in relatively higher VR at the building gap of Peninsula Village 2, shown as pink arrow in **Figure 77**.

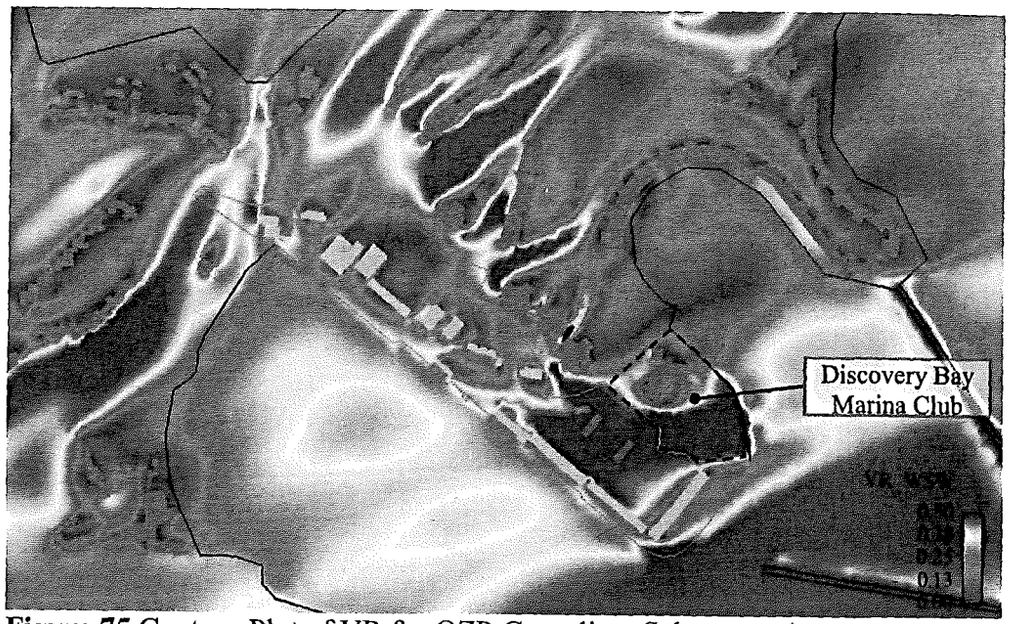


Figure 75 Contour Plot of VR for OZP-Compliant Scheme under WSW Wind

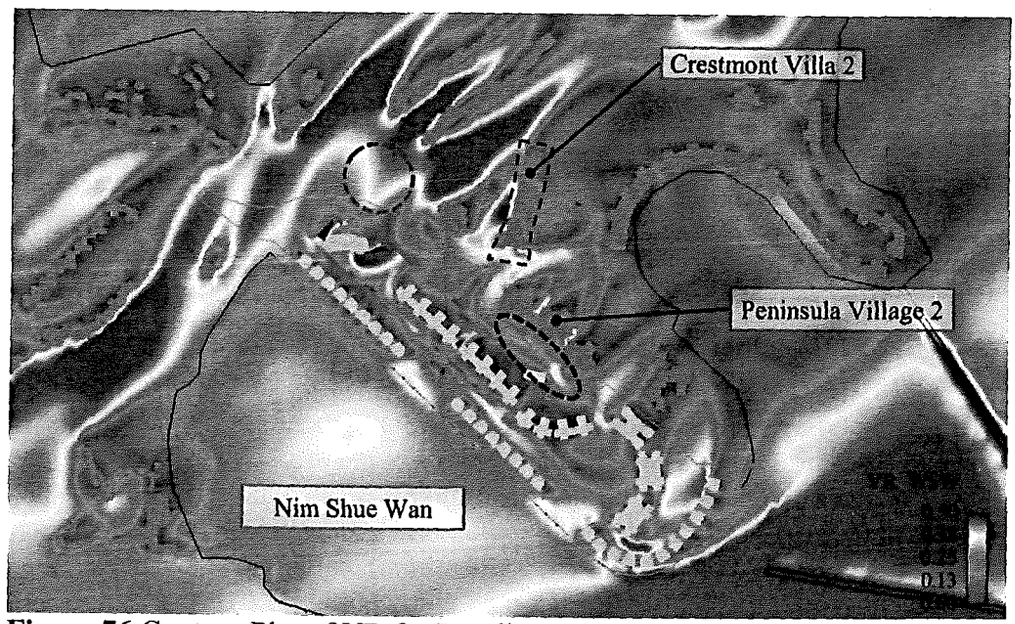


Figure 76 Contour Plot of VR for Baseline Scheme under WSW Wind

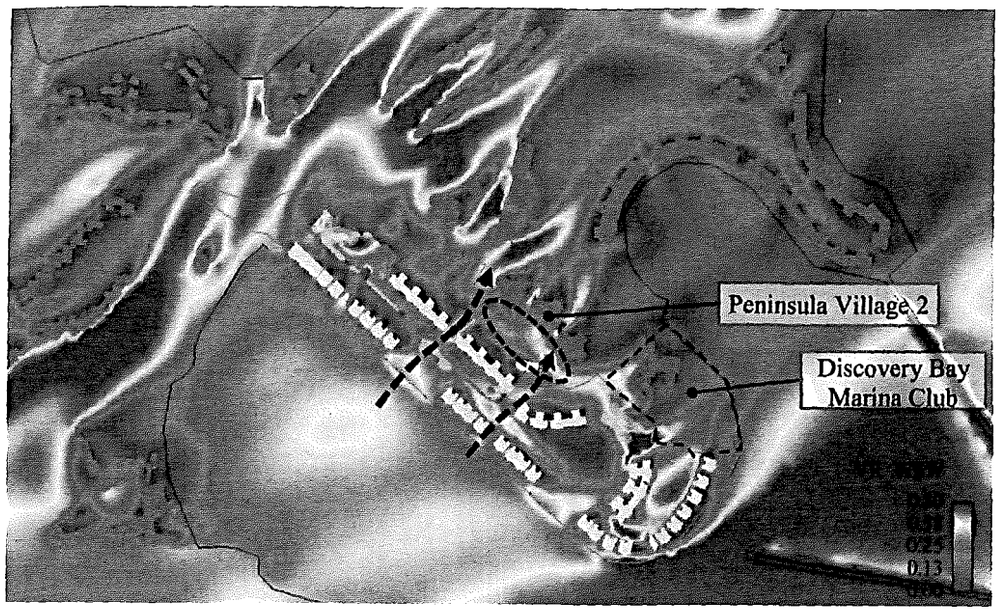


Figure 77 Contour Plot of VR for Proposed Scheme under WSW Wind

4.4. VR of Test Points

Table 6 summarizes the values of SVR and LVR among OZP-Compliant Scheme, Baseline Scheme and Proposed Scheme. The VR of individual test points may refer to Appendix D of this Report.

Table 6 Comparison of the SVR and LVR among OZP-Compliant Scheme, Baseline Scheme and Proposed Scheme

	Annual Weighted VR			Summer Weighted VR		
	OZP-Compliant Scheme	**Baseline Scheme**	**Proposed Scheme**	**OZP-Compliant Scheme**	**Baseline Scheme**	**Proposed Scheme**
SVR	0.30	0.29	0.30	0.35	0.33	0.34
LVR	0.29	0.27	0.28	0.33	0.30	0.31

Under annual condition, OZP-Compliant Scheme obtained the same SVR as Proposed Scheme, which is slightly higher than the SVR for Baseline Scheme. In terms of LVR, OZP-Compliant Scheme achieved slighted higher VR than the other two schemes. Between the two schemes with developments, Proposed Scheme would achieve slightly higher LVR comparing to baseline Scheme.

Under summer condition, OZP-Compliant Scheme obtained higher SVR than Baseline Scheme and Proposed Scheme by 0.02 and 0.01 respectively. As for LVR, the difference in VR was increased by 0.03 and 0.02 while the same trend remained.

Through the detailed directional analysis in Section 4.3, the dominant reason of having slightly higher SVR and LVR for OZP-Compliant Scheme is due to the low-rise nature of the existing and OZP-Compliant buildings.

With the wind enhancement features, such as wider building separation and elevated tower, higher SVR and LVR would be achieved comparing to Baseline Scheme.

4.5 Focus Areas

There are a total of 13 focus areas identified for this study, which includes 3 focus areas within the Study Site.

Table 7 summarized the Spatial Average VR (SAVR) for each focus areas under annual and summer conditions. In general, OZP-Compliant Scheme would achieve the highest SAVR for Vista Avenue, Caperidge Drive, Crestmont Villa 2, Peninsula Village 2 and Discovery Bay Marina Club among three schemes. Baseline and Proposed Schemes would achieve similar ventilation performance apart from some localized areas as discussed in sections below.

Table 7 Spatial Averaged VR (SAVR) for Each Focus Area

	Focus Areas	Annual Condition			Summer Condition		
		OZP-Compliant Scheme	Baseline Scheme	Proposed Scheme	OZP-Compliant Scheme	Baseline Scheme	Proposed Scheme
1	La Costa	0.27	0.26	0.26	0.29	0.29	0.30
2	Discovery Bay Road	0.28	0.28	0.28	0.32	0.32	0.31
3	Vista Avenue	0.32	0.30	0.30	0.33	0.32	0.32
4	La Vista	0.33	0.31	0.32	0.34	0.33	0.33
5	Crestmont Villa 1	0.25	0.24	0.24	0.33	0.29	0.31
6	Caperidge Drive	0.28	0.27	0.26	0.36	0.34	0.35
7	Crestmont Villa 2	0.26	0.25	0.23	0.27	0.23	0.23
8	Peninsula Village 1	0.26	0.25	0.26	0.26	0.28	0.28
9	Peninsula Village 2	0.29	0.27	0.26	0.32	0.25	0.26
10	Discovery Bay Marina Club	0.33	0.27	0.29	0.34	0.29	0.29
11	Podium	-	0.16	0.15	-	0.21	0.19
12	Central Landscape Plaza	-	0.16	0.26	-	0.21	0.25
13	Access Road	-	0.18	0.22	-	0.23	0.25
14	Elevated M1	-	-	0.30	-	-	0.52
15	Building Separation L10_L11	-	0.12	0.13	-	0.14	0.17
16	Building Separation Water Front 1	-	0.18	0.19	-	0.23	0.26
17	Building Separation Water Front 2	-	0.24	0.26	-	0.31	0.32
18	Building Separation Water Front 3	-	0.33	0.41	-	0.38	0.43
19	Building Separation M2_M3	-	0.19	0.37	-	0.19	0.37
20	Elevated M2	-	-	0.33	-	-	0.38

Focus Areas outside Study Site

Under annual wind condition, due to the openness of OZP-Compliant Scheme, highest SAVR were achieved for most of the focus areas, such as Crestmont Villa 2, Peninsula Village 2, Capridge Drive and Discovery Bay Marina Club in particular. Although the proposed building clusters are located to the downwind area of the existing buildings under annual condition, the proposed building clusters in Baseline and Proposed Schemes (maximum building height of 78mP) would reduce the permeability within the site, such that the incoming wind would be diverted elsewhere. Hence, lower SAVR at these areas would be found under Baseline and Proposed Schemes.

With the mitigation measures provided in Proposed Scheme, such as the building separation around Tower M2 and elevated design of M2, which would improve the permeability of the eastern part of the site such that more wind would penetrate through the eastern part of the site, resulting in a higher SAVR at Discovery Bay Marina Club by 0.02, comparing to Baseline Scheme. On the other hand, the wind travelling towards the central and western part through Peninsula Village 2, Crestmont Villa 2 and part of Capridge Drive would be reduced. Thus, the VR at Crestmont Villa 2 would be lowered by 0.02 when comparing to Baseline Scheme.

At the focus areas, such as La Costa, Peninsula Village 1, Crestmont Villa 1 and Discovery Bay Road located to the north and north-west of the study site, which are parallel to the proposed study under major annual prevailing winds, the effect from proposed developments are minimum. Hence, similar VR were found under all three schemes.

At the focus areas, such as the Vista Avenue and La Vista, located at downwind area of the study site under major annual prevailing winds. Given the distance between study site and these focus areas are more than 150m, the impacts from the wind shadow casted on these areas due to the proposed buildings in Baseline and Proposed Scheme would be diluted. Thus, a slightly lower VR would be observed under Baseline and Proposed Scheme, comparing to OZP-Compliant Scheme.

Under summer condition, most of the focus areas are located at the leeward area of the study site. Proposed building developments with building height ranging from +18mPD to 78mPD would shield the incoming wind to these focus areas under major summer prevailing wind directions while the incoming wind would skim over the low-rise buildings in OZP-Compliant Scheme. Hence, OZP-Compliant Scheme would achieve highest VR at Discovery Bay Marina Club, Penisula Village 2, Crestmont Villa 2, Caperidge Drive and Crestmont Villa 1. As the Crestmont Villa 1 and Caperidge Drive are located at a further distance to the downwind side of the study site, the difference in VR at these area are less significant. Similar VR were observed at Crestmont Villa 1 and Caperidge Drive among all three schemes with OZP-Compliant Scheme outrunning the other two by 0.01.

Various air paths with widen wind entrances, in forms of building separations, open spaces and elevated Tower M2, has been incorporated into Proposed Scheme. These air paths in general align with ESE, SSW, SW and WSW wind, which would promote wind penetration towards downwind area, including Crestmont Villa 1, Caperidge Drive and Peninsula Village 2, under 40.8% of the summer prevailing

winds. Hence, when comparing to Baseline Scheme, the VR at these focus area would be enhanced under Proposed Scheme.

For Peninsula Village 1 at close proximity to the study site, due to the low-rise nature building in OZP-Compliant Scheme, the incoming summer prevailing wind would be diverted to travel around Peninsula Village 1, leaving a wake zone at the leeward side. On the other hand, due to the building height created by houses at waterfront (+18mPD), Tower L7-L10 above podium (+31mPD) and Peninsula Village 2 (+70mPD) in Baseline Scheme and Proposed Scheme, incoming summer wind would be downwashed by Peninsula Village 2, which would then be diverted to travel up to hill towards Peninsular Village 1 and would alleviate the wind shadow therein. Hence, slightly higher VR by 0.02 would be observed at Peninsula Village 1 under Baseline and Proposed Scheme.

Other focus areas located at some distance to the south-west and north-west of the site, such as La Costa, Vista Avenue and La Vista, are parallel to the study site under major summer prevailing winds. The impact from the study site on these focus areas would be insignificant. Hence, the VR would be very similar among the three schemes.

Focus Areas within Study Site

Due to the openness and low-rise nature of the proposed building within the study site under OZP-Compliant Scheme, the OZP-Compliant Scheme achieved the highest SAVR of within the study site while Baseline Scheme achieved the lowest.

The focus areas within the study site would only be discussed for Baseline and Proposed Scheme as the focus areas are not applicable to OZP-Compliant Scheme.

Several wind enhancement features were incorporated under Proposed Scheme. Test points were added at these position to prove their efficiency. The void under elevated M1 and M2 would improve the permeability at podium and pedestrian level, achieving VR greater than the SAVR of the Proposed Scheme.

The air paths and wind entrance provided by building separation are generally align with the annual and summer major prevailing wind directions. The VR at building separation between L10 and L11, between the houses along waterfront and between M2 and M3 were higher comparing to Baseline Scheme under both annual and summer conditions.

Considering focus area 14-20 achieved higher VR under Proposed Scheme, the wind enhancement features proposed would be considered efficient. These wind enhancement features would help to achieve higher VR at Central Landscape Plaza and Access Road within the site of Proposed Scheme.

Under Proposed Scheme, building separation between Tower M2 and M3 together the elevated design at Tower M2 and wind entrance provided by building separation at the south-eastern corner of the site would improve the permeability of the study site, especially in the eastern part. Hence, hence ventilation performance at Central Landscape Plaza would be enhanced with higher VR by 0.10 and 0.04 under annual and summer condition respectively, comparing to Baseline Scheme.

With additional wind entrances provided by separation of houses along water front and wider building separation between L10 and L11, the overall wind performance along Access Road would be enhanced.

However, the rounded solid shape of Tower M1 would induce downwash effect, which increased the VR at the podium area between L14 and M1. Slightly higher VR at podium would be observed under Baseline Scheme. On the other hand, instead of being downwahsed towards the podium level, the voids under Tower M1 of Proposed Scheme would promotes wind penetration at low level. The wake zone created by Tower M1 would be alleviated under both annual and summer conditions.

5 Results and Recommendation

5.1 Overview

An Air Ventilation Assessment (AVA) – Initial Study was conducted to assess the ventilation performance of OZP-Compliant Scheme, Baseline Scheme and Proposed Scheme in accordance with the AVA Technical Circular No. 1/06.

Three schemes were assessed using Computational Fluid Dynamics (CFD) techniques. A series CFD simulation using Realizable k-ε turbulence model were performed under annual and summer wind conditions with reference to the AVA Technical Circular No. 1/06. For annual wind condition, NNE, NE, ENE, E, ESE, SE, SSE, S and SSW were selected which gives total wind frequency of 80% over a year while E, ESE, SE, SSE, S, SSW, SW and WSW were selected for summer condition, which gives total wind frequency of 80.6%.

The Velocity Ratio (VR) as proposed by the AVA Technical Circular No.1/06 was employed to assess the ventilation performance under difference schemes and its impact to the surroundings.

With reference to the AVA Technical Circular No. 1/06, 30 perimeter test points and 64 overall test points were allocated to assess the overall ventilation performance in the Assessment Area. Another 29, 38 and 42 special test points were allocated for OZP-Compliant, Baseline and Proposed Schemes, respectively, to assess the ventilation performance within the Study Site.

5.2 Results

The results showed that

- Under annual condition, OZP-Compliant Scheme obtained the same SVR as Proposed Scheme, which is slightly higher than the SVR for Baseline Scheme. In terms of LVR, OZP-Compliant Scheme achieved slighted higher VR than the other two schemes. Between the two schemes with developments, Proposed Scheme would achieve slightly higher LVR comparing to baseline Scheme.
- Under summer condition, OZP-Compliant Scheme obtained higher SVR than Baseline Scheme and Proposed Scheme by 0.02 and 0.01 respectively. As for LVR, the difference in VR was increased by 0.03 and 0.02 respectively.

The low-rise nature of the buildings under OZP-Compliant Scheme would impose negligible impact to the surrounding buildings.

Following wind enhancement features has been incorporated under Proposed Scheme.

- Building separation between the two clusters of buildings above podium structure has been increased to 15m to enhance wind permeability in the north-western portion of the site.

- An additional building separation of 15m has been provided in the south-eastern portion of the site.
- The building blocks along the water front has been rearranged and several building separations of 15m along the coast line has been provided to act as wind entrances.
- Building towers were elevated for 5.5m above podium structure and ground for M1 and M2 buildings respectively,

With the wind enhancement features incorporated in Proposed Scheme, the permeability of the Study Site has been improved and the adverse impacts on the wind environment of surrounding area has been mitigated. The wind environment at Discovery Bay Marina Club and Crestmont Villa 1 as well as within the Study Site were enhanced.

5.3 Further Mitigation Measures

Although the overall ventilation performance would be similar comparing to OZP-Compliant Scheme, relatively lower VR were found at certain areas, such as Crestmont Villa 2, Peninsula Village 2 and Discovery Bay Marina Club. In order to further mitigate the impacts on these areas, following mitigation measures could be considered during the detailed design stage. An AVA – Initial Study should be carried out to verify the wind performance of the detailed design.

- Additional building separation(s) between L8 and L9 to ventilate Peninsula Village 2.
- Shift or widen existing building separation between L10 and L11 to ventilate Crestmont Villa 2.
- Elevated design for Tower L2, M3 and M4 to improve the permeability at pedestrian level to ventilate Discovery Bay Marina Club.
- Rotate or revise the building shape of Tower M2 to ventilate Discovery Bay Marina Club.

Appendix A

Architectural Drawing

A1 OZP-Compliant Scheme

Area 4

Area 22

DB Nursery

CAPEVALE DRIVE

DISCOVERY BAY ROAD

NOTIONAL SITE BOUNDARY

Non Piling Zone

BOAT SERVICING FACILITY

Open ground with metal sheds
GBA = 500 sq.m (about)

1 storey shelter
GBA = 100sq.m (about)

3 storey building
700 sq.m (about)

5 storey building
GBA = 1,300sq.m (about)

One storey structure
GBA = 400sq.m (about)
Building Ht. = 9m

One storey structure
GBA = 80sq.m (about)

One storey structure
GBA = 280sq.m (about)

EXISTING WORKSHOP
One storey structure
GBA = 585sq.m (about)

One storey structure
GBA = 450sq.m
Building Ht. = 9m

WAREHOUSE AND BUS DEPOT
One storey structure
GBA = 890sq.m (about)

BUS OVERNIGHT PARKING

4 storey Buildings
Total GBA = 1450sq.m
Building Ht. = 18m

Staff Quarter (1)

Staff Quarter

Staff Qtrs.

Public Toilet

LPG Store

RCP

G/C

D.G Store

Service Area

Pier (3)

Petrol Filling Station
underground tanks

Petrol Station

Boatyard

Service Area

BUS PARKING

CONTAINER STORAGE

Petrol Filling Station
1 storey structure
GBA = 20sq.m (about)

One storey structure
GBA = 100sq.m (about)
Building Ht. = 9m

One storey structure
GBA = 250sq.m (about)
Building Ht. = 9m

One storey structure
GBA = 720sq.m (about)
Building Ht. = 9m

One storey structure
GBA = 600sq.m (about)
Building Ht. = 9m

One storey structure
GBA = 950sq.m (about)
Building Ht. = 9m

Seabed Lease Boundary

GFA	--
Storey	--
Height	18m

GFA	1300m2
Storey	5
Height	15m

GFA	5310m2
Storey	1
Height	9m

GFA	500m2
Storey	1
Height	9m

GFA	100m2
Storey	1
Height	9m

GFA	--
Storey	--
Height	18m

GFA	1300m2
Storey	5
Height	15m

GFA	--
Storey	--
Height	18m

GFA	240m2
Storey	1
Height	9m

GFA	240m2
Storey	1
Height	9m

GFA	5310m2
Storey	1
Height	9m

LEGEND:

Current OZP boundary

GFA	1300m2
Storey	5
Height	15m

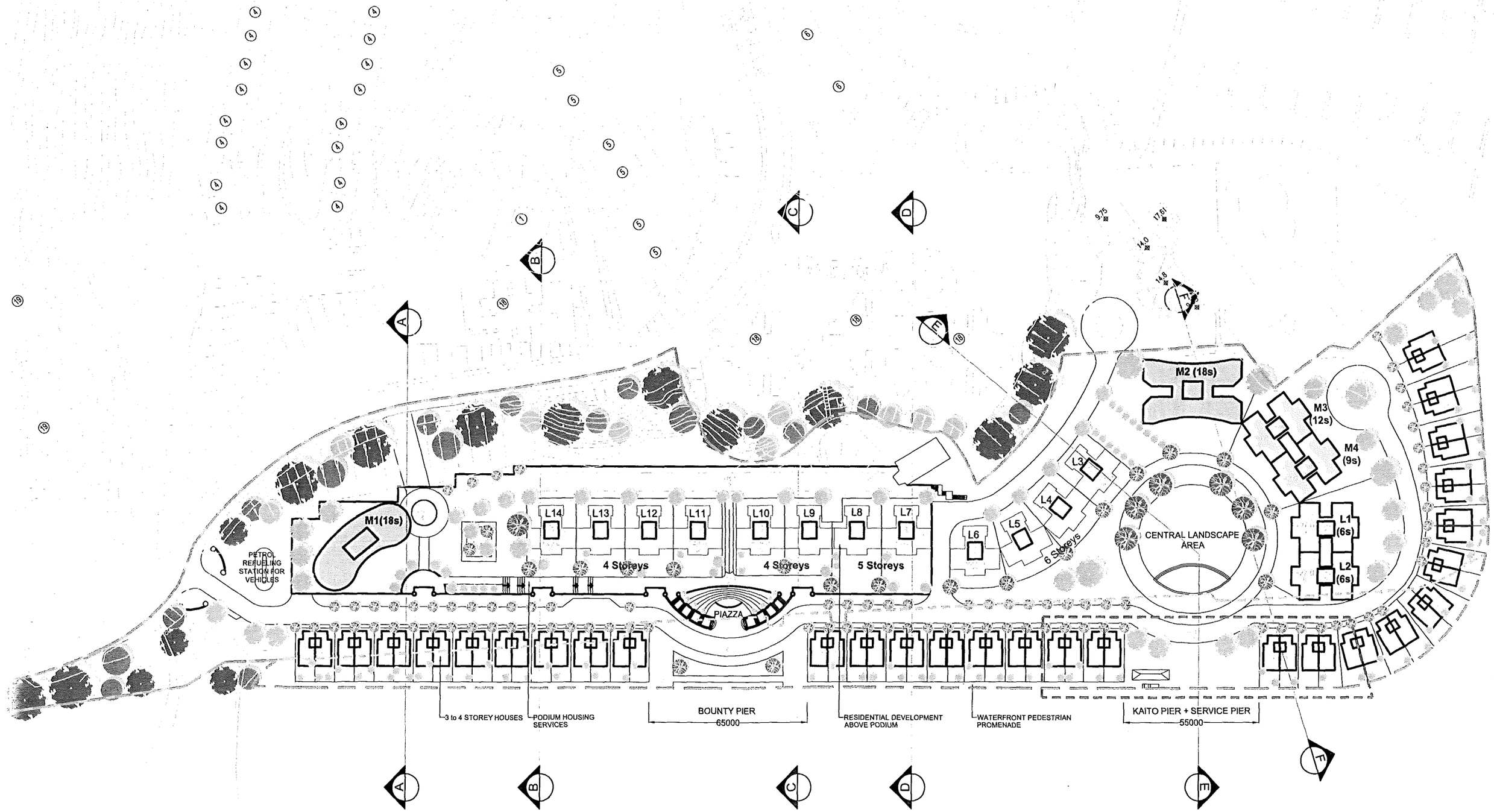
Current OZP restrictions

Proposed New Building

Discovery Bay - Area 10b

Sept 2016 (Rev.0)
1:1500 in A3

A2 Baseline Scheme



EXISTING OZP BOUNDARY FOR AREA 10b

PROPOSED OZP BOUNDARY FOR AREA 10b

MAXIMUM 3 STOREYS IN THIS AREA

PODIUM EXTENT

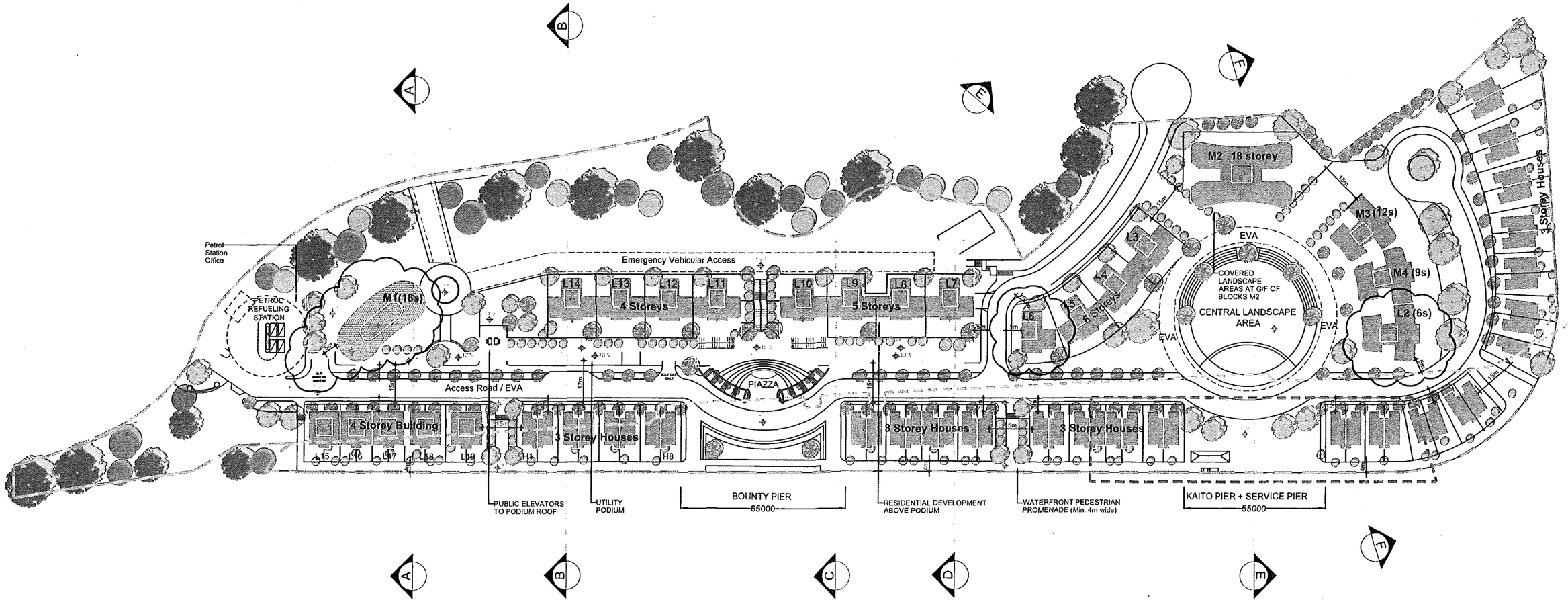
0 20 40 50m

AREA 10b

PROPOSED RESIDENTIAL DEVELOPMENT

MASTER PLAN

A3 Proposed Scheme



EXISTING OZP BOUNDARY FOR AREA 10b

PROPOSED OZP BOUNDARY FOR AREA 10b

PODIUM EXTENT

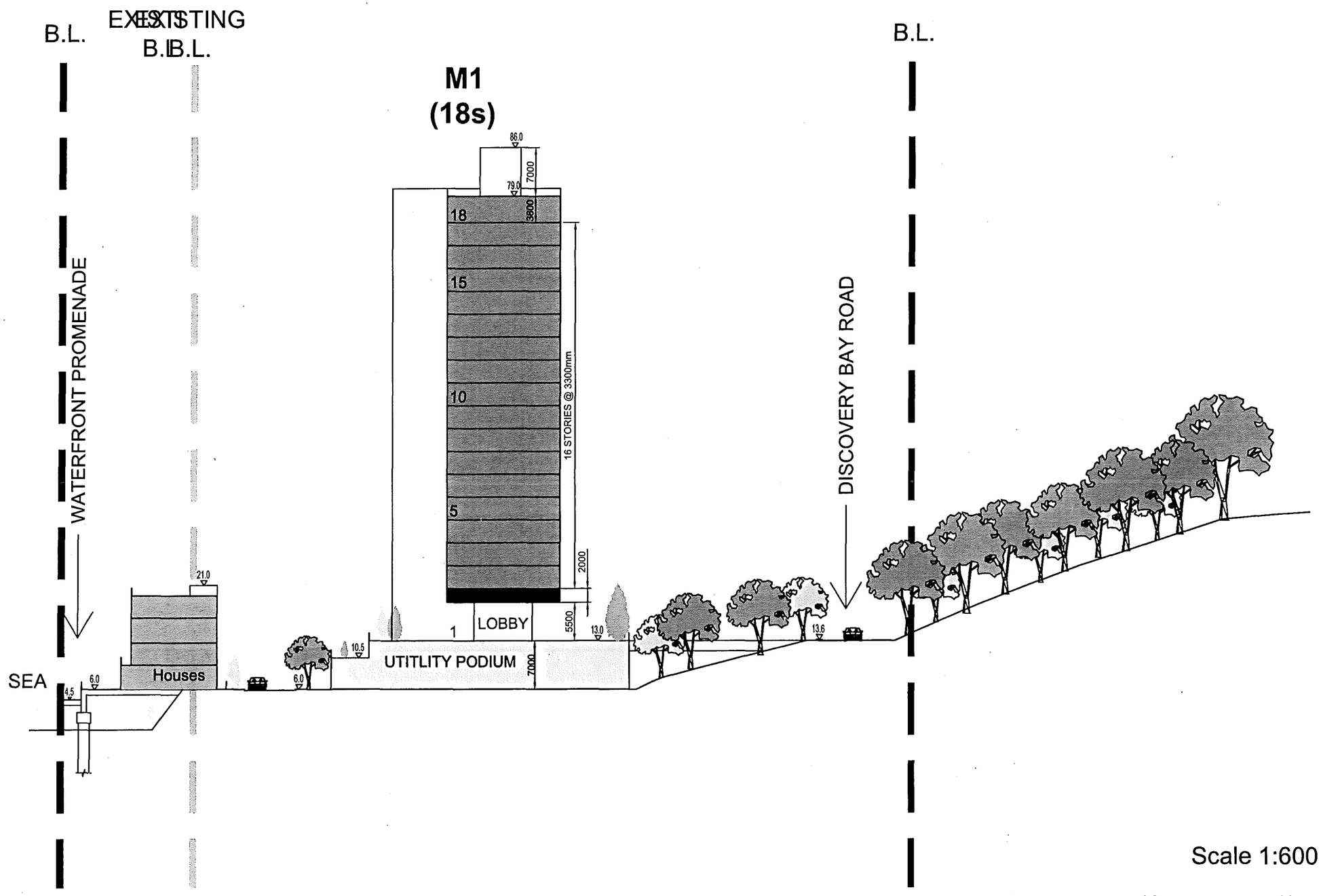
0 20 40 50m

AREA 10b
PROPOSED RESIDENTIAL DEVELOPMENT

Rev.2, Aug 2016

CONCEPT PLAN
Master Layout

Rev.2, Aug 2016



Scale 1:600 @ A3

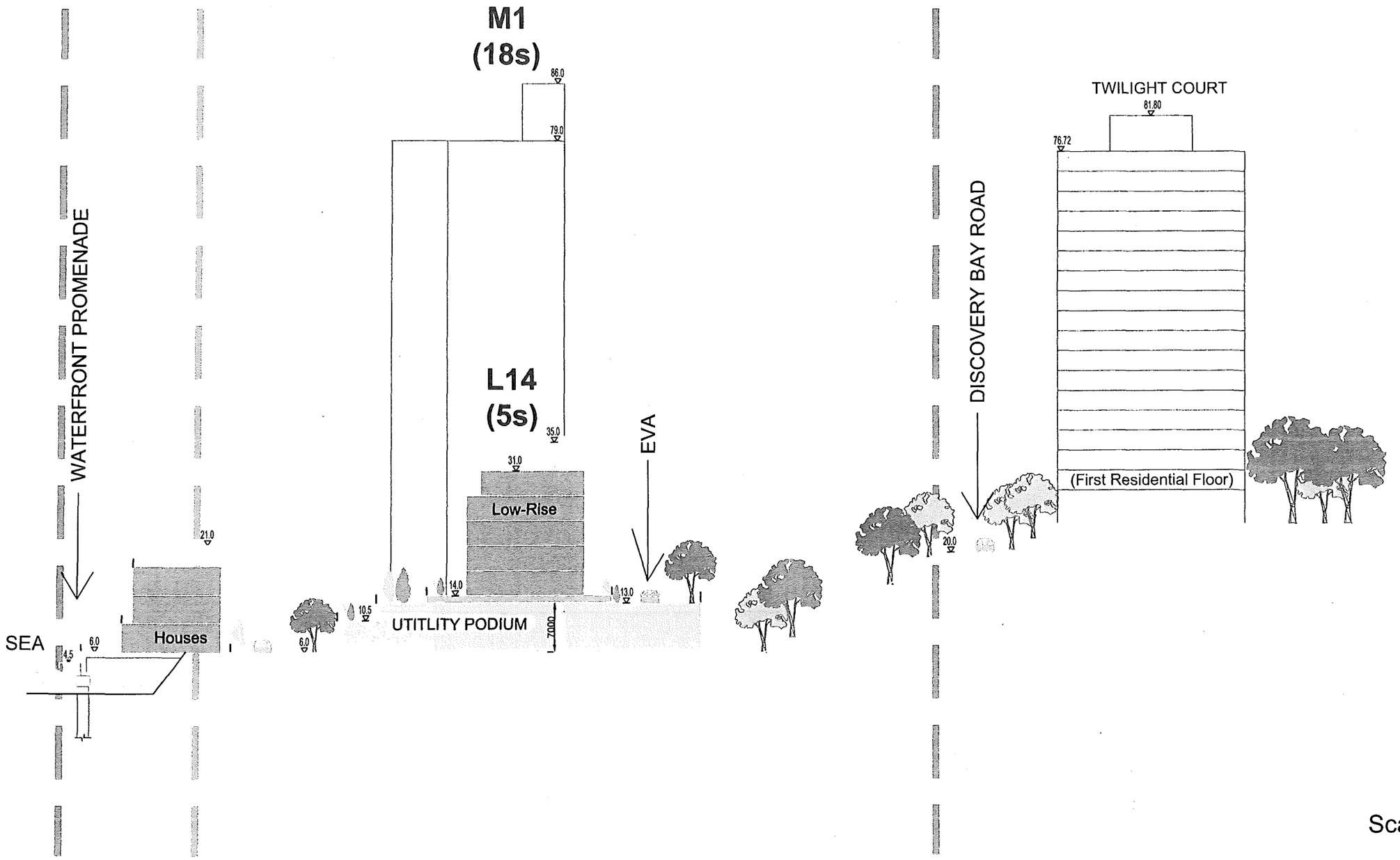
0 20 40 50m

AREA 10b

PROPOSED RESIDENTIAL DEVELOPMENT

SECTION A-A

Rev.2, Aug 2016



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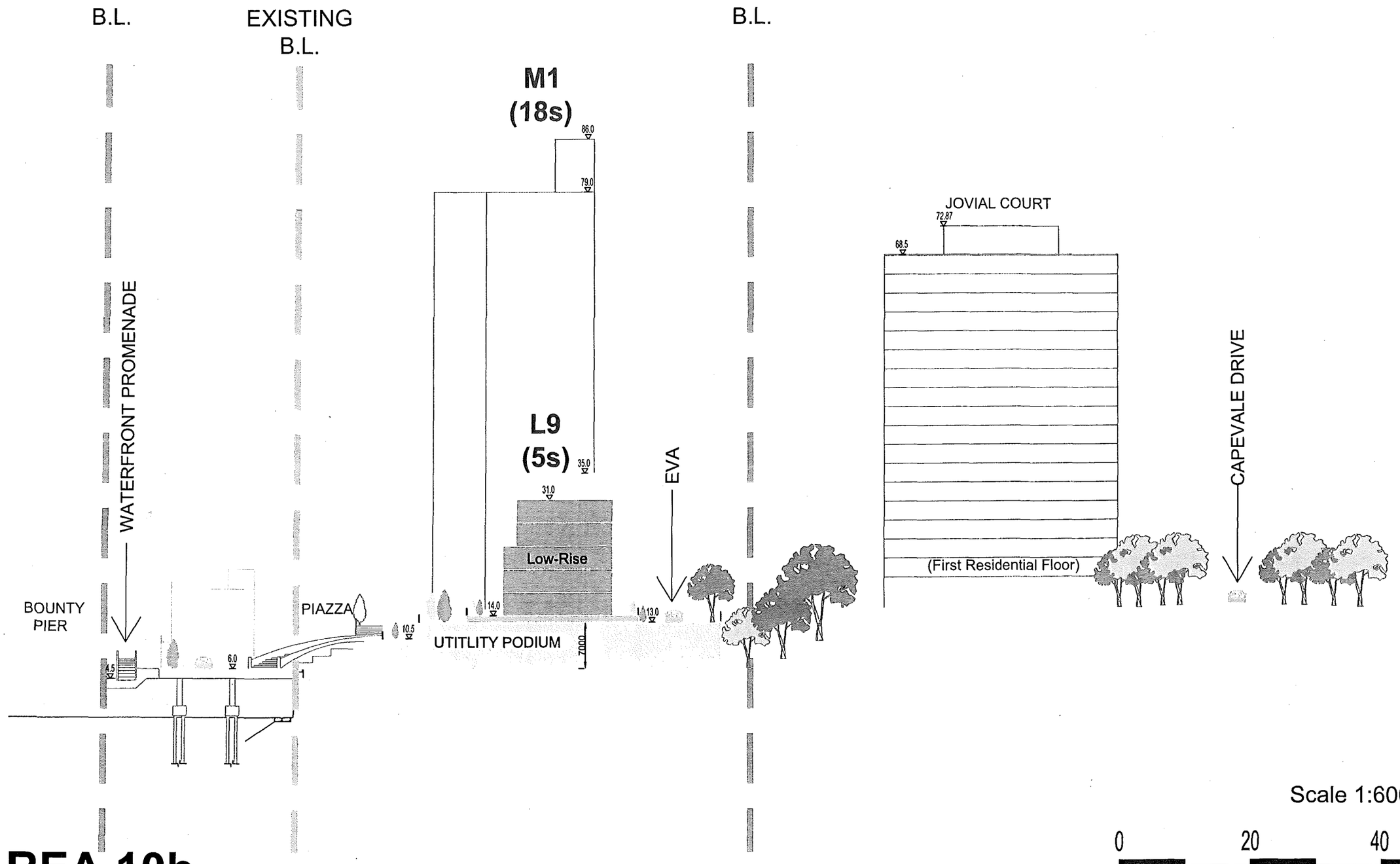
AREA 10b

PROPOSED RESIDENTIAL DEVELOPMENT

SECTION B-B

Rev.2, Aug 2016



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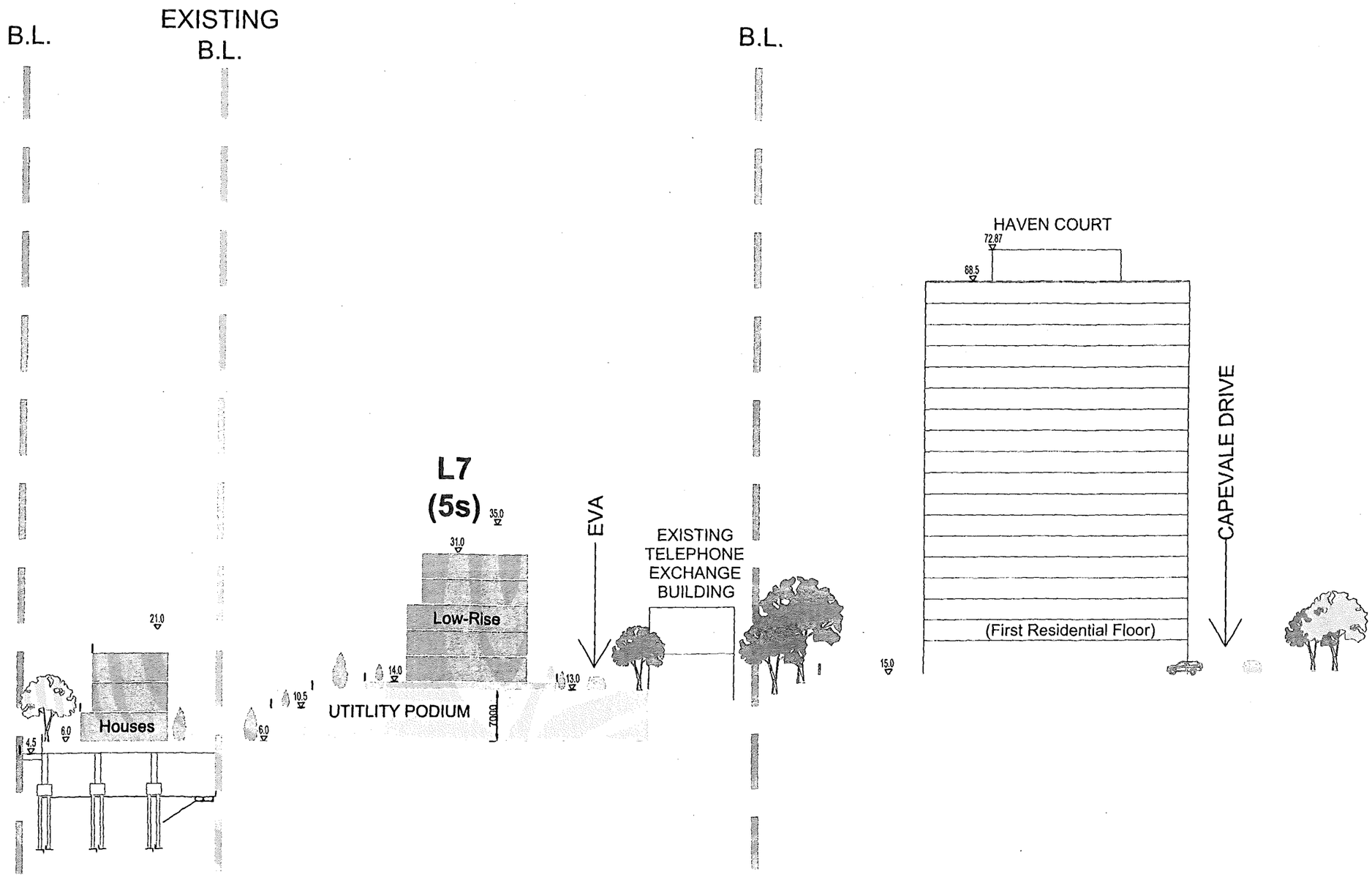
AREA 10b

PROPOSED RESIDENTIAL DEVELOPMENT

SECTION C-C

Rev.2, Aug 2016



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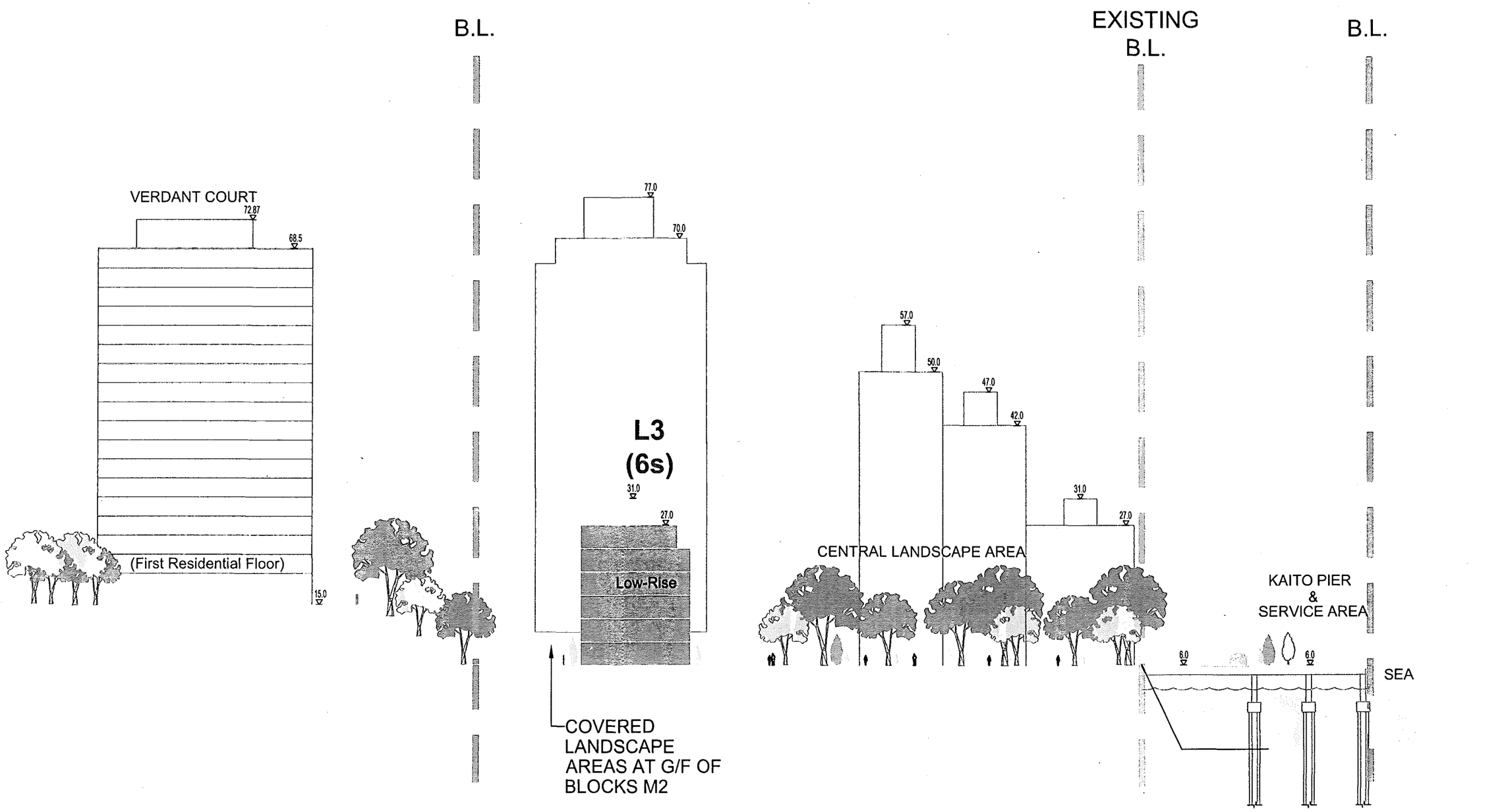
AREA 10b

PROPOSED RESIDENTIAL DEVELOPMENT

SECTION D-D

Rev.2, Aug 2016



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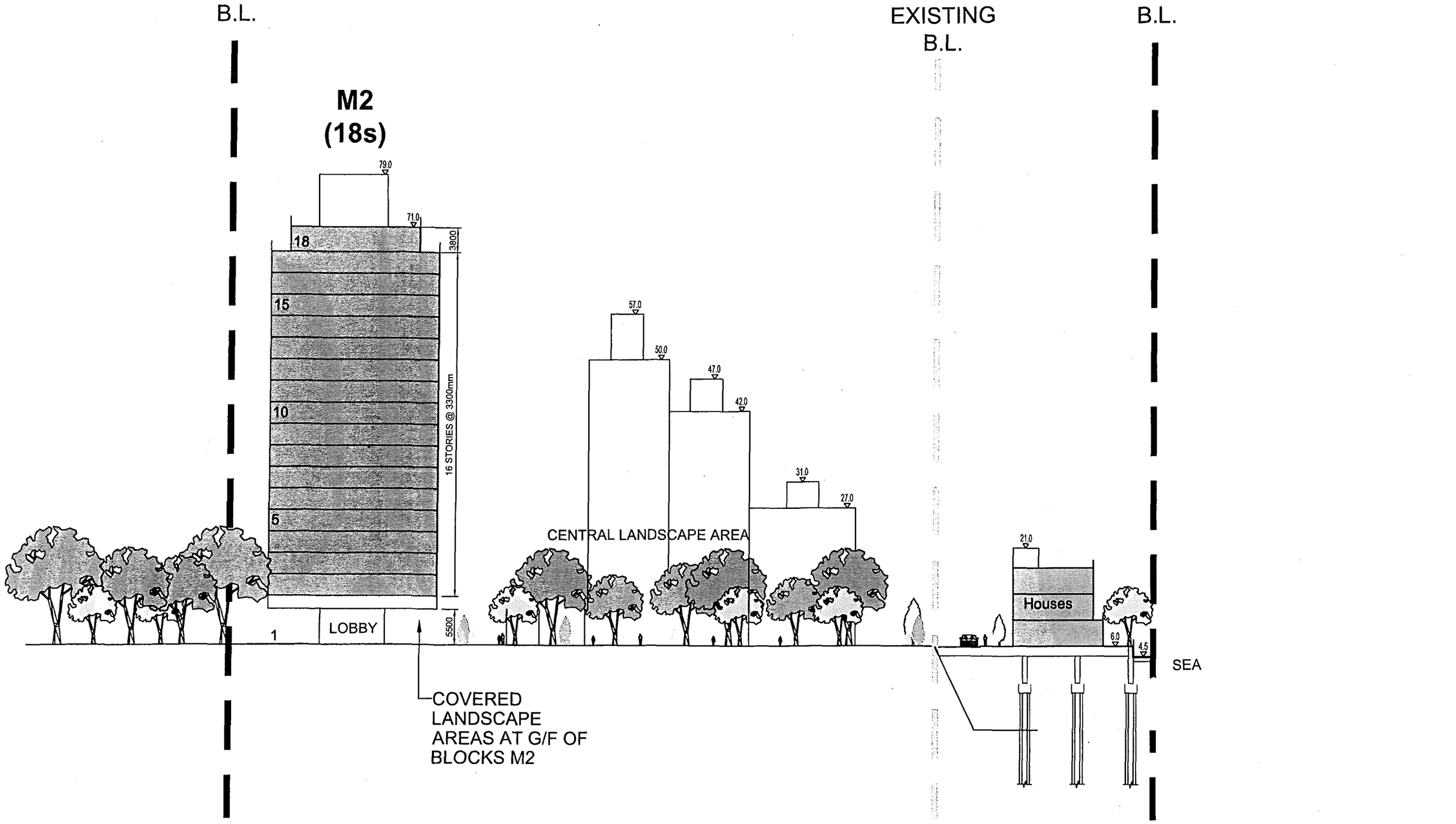
AREA 10b

PROPOSED RESIDENTIAL DEVELOPMENT

SECTION E-E

Rev.2, Aug 2016



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0 20 40 50m

AREA 10b

PROPOSED RESIDENTIAL DEVELOPMENT

SECTION F-F

Rev.2, Aug 2016

Appendix B

Contour Plots of Velocity Ratio

Contents

B1 OZP-Compliant Scheme

Figure B1 Contour Plot of VR under NNE Wind

Figure B2 Contour Plot of VR under NE Wind

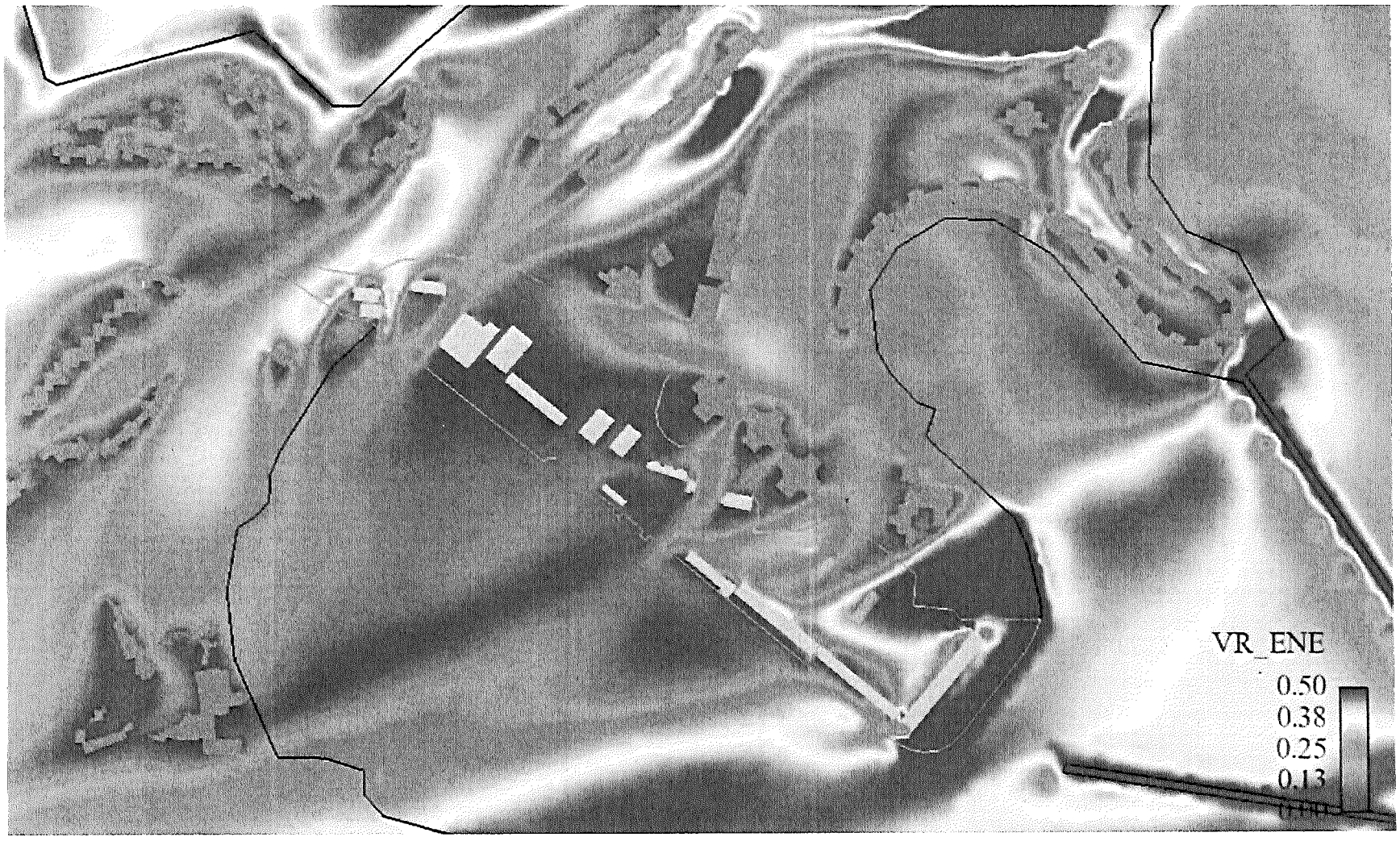

Figure B3 Contour Plot of VR under ENE Wind

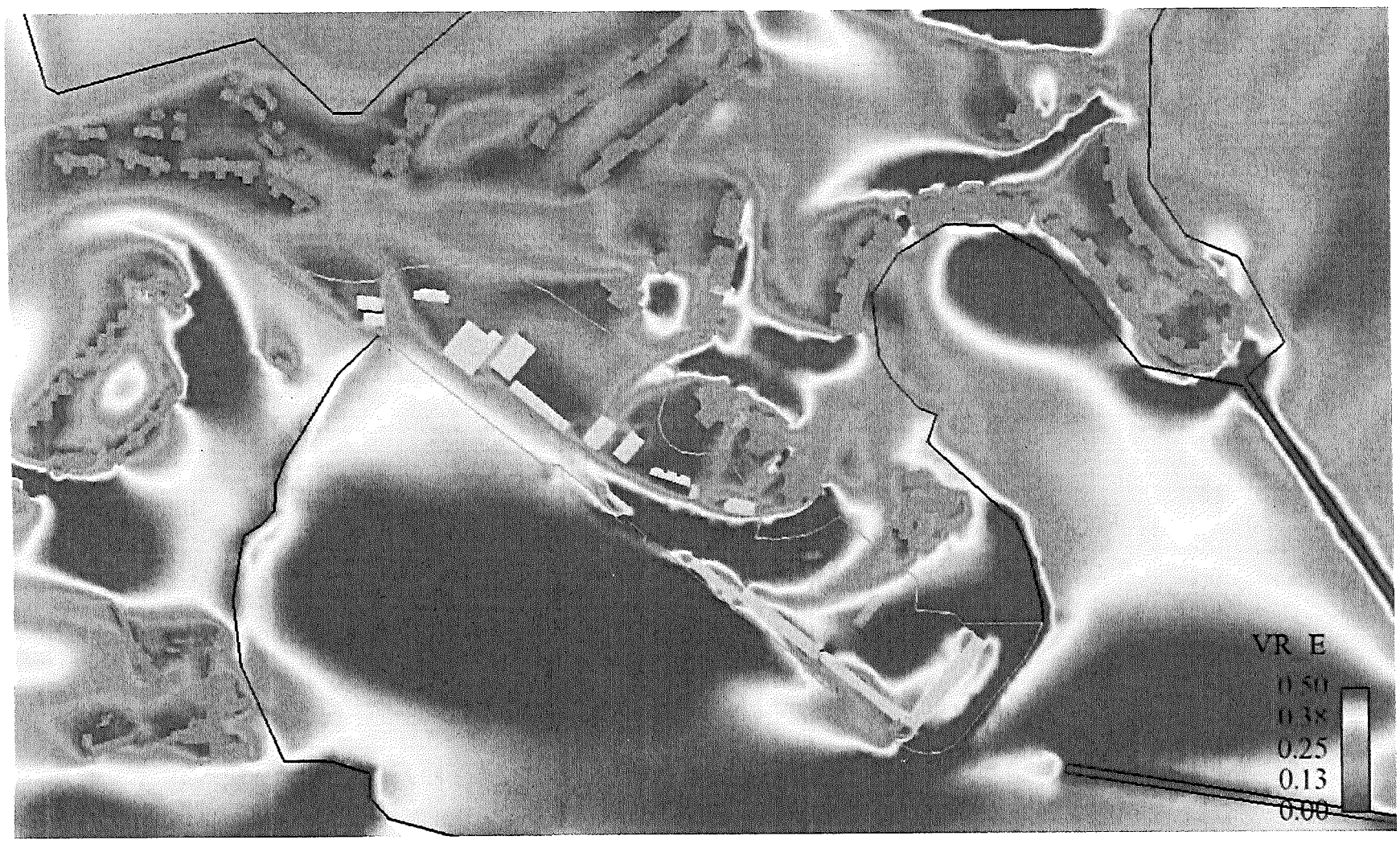

Figure B4 Contour Plot of VR under E Wind

Figure B5 Contour Plot of VR under ESE Wind

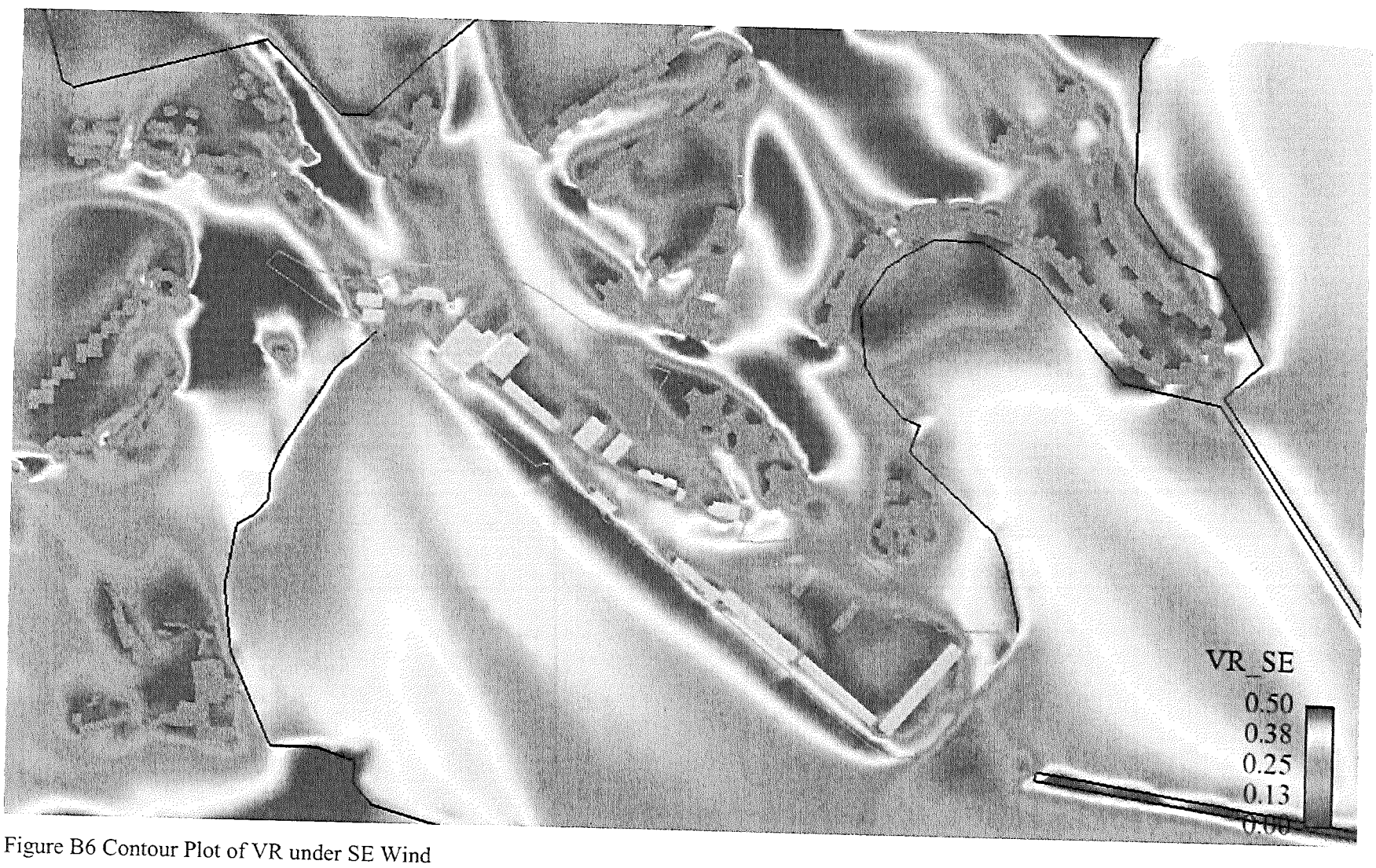

Figure B6 Contour Plot of VR under SE Wind

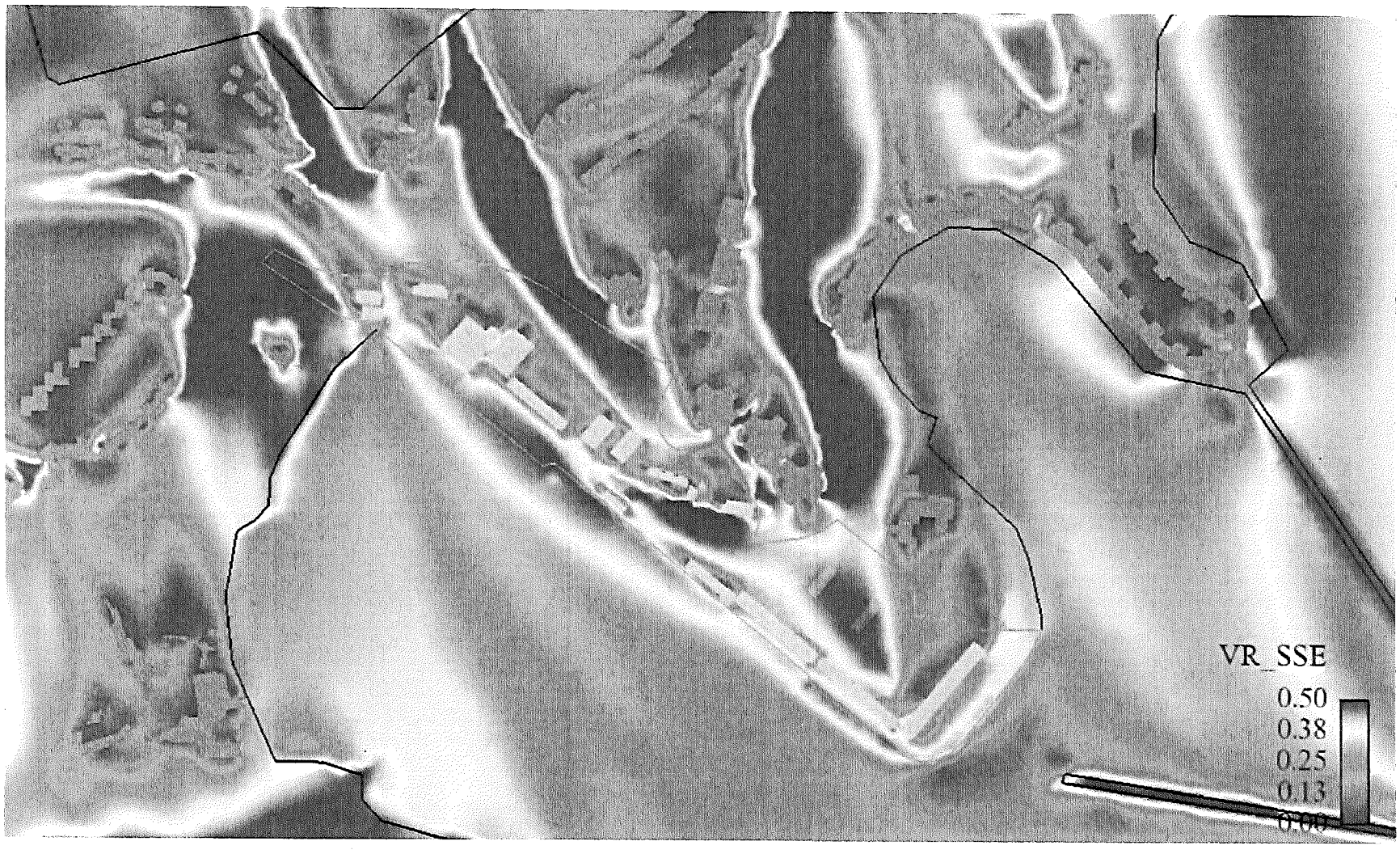

Figure B7 Contour Plot of VR under SSE Wind

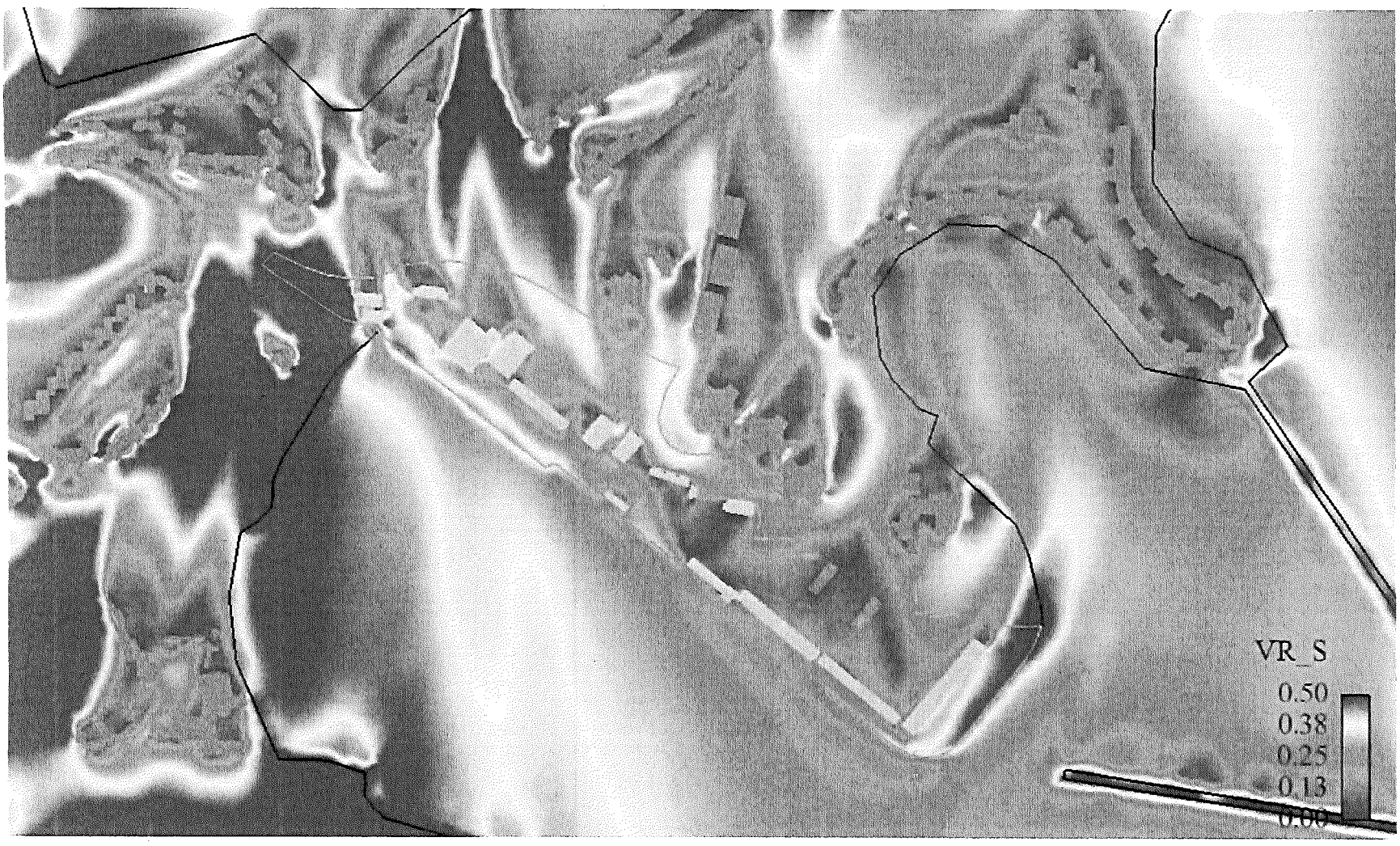

Figure B8 Contour Plot of VR under S Wind

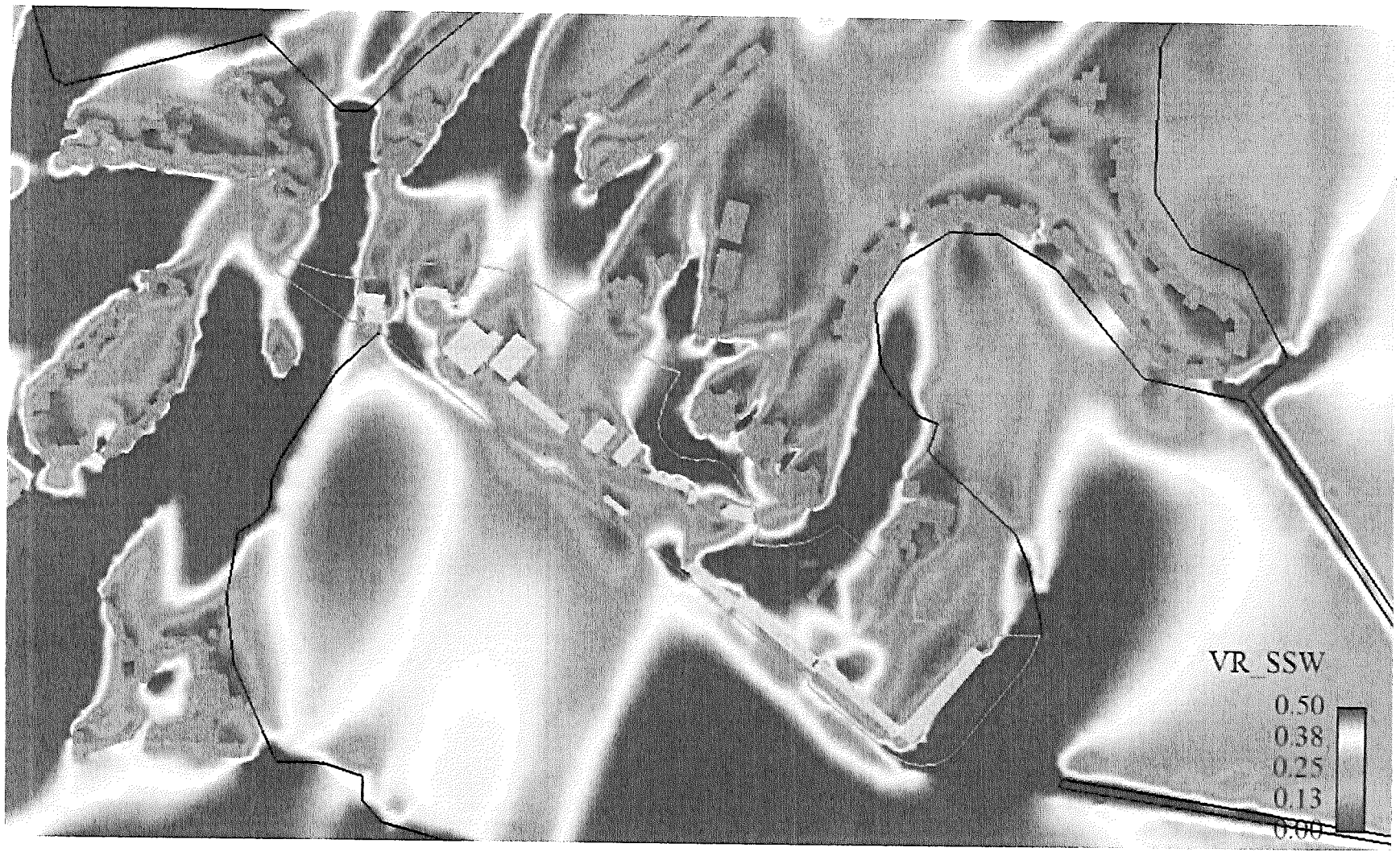

Figure B9 Contour Plot of VR under SSW Wind

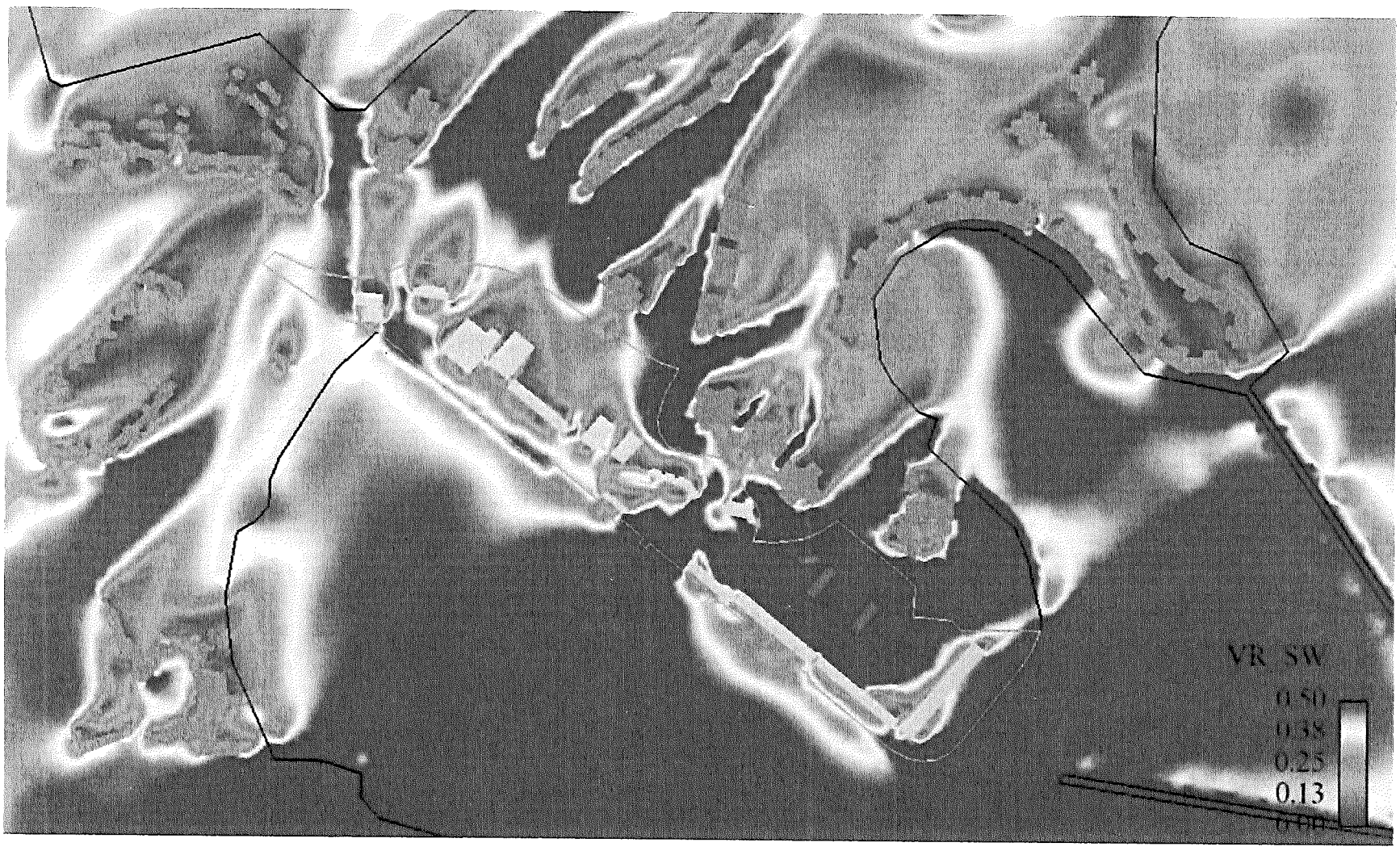

Figure B10 Contour Plot of VR under SW Wind

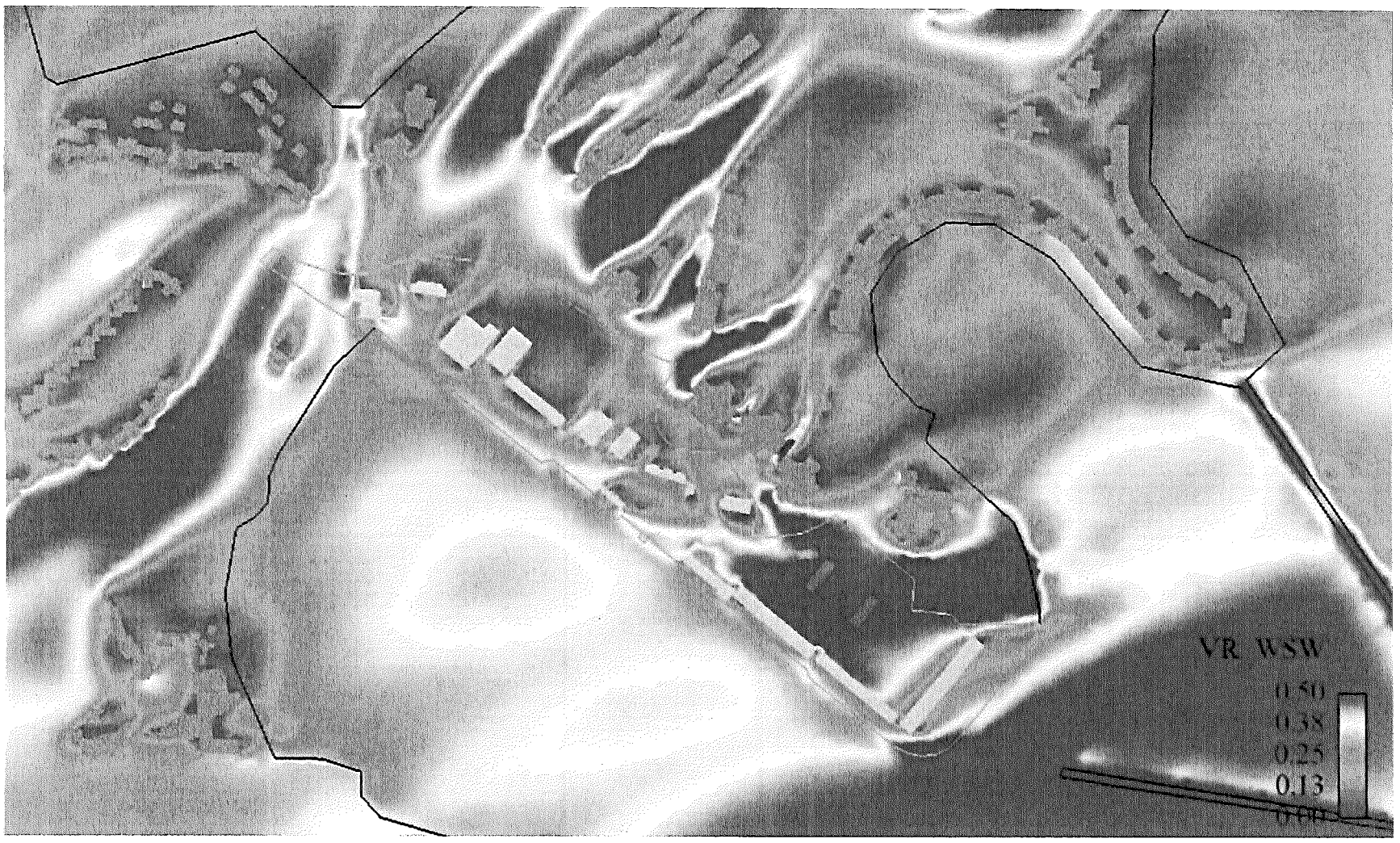

Figure B11 Contour Plot of VR under WSW Wind

Figure B12 Annual Weighted Average Contour Plot of VR

Figure B13 Summer Weighted Average Contour Plot of VR

B2 Baseline Scheme

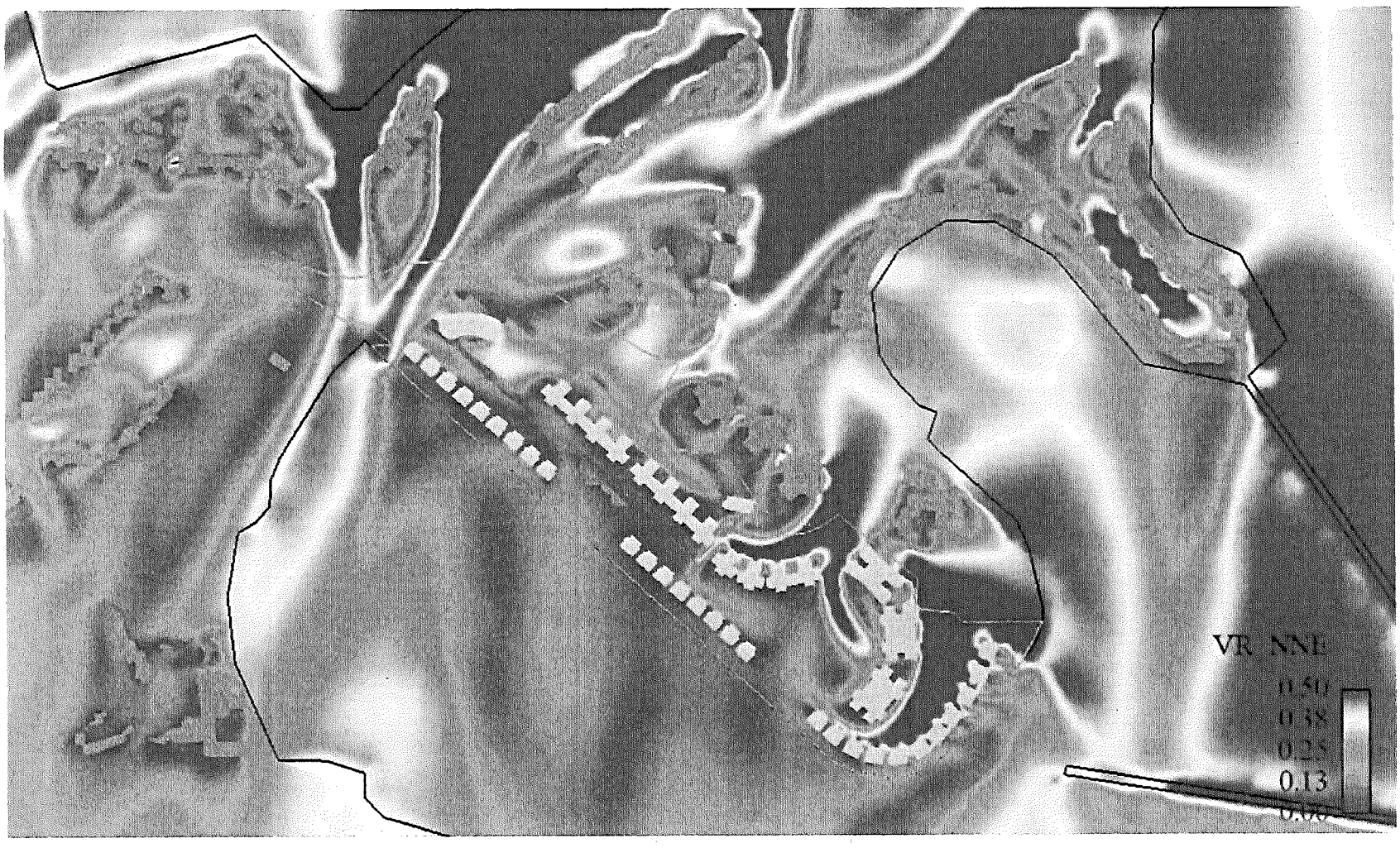

Figure B14 Contour Plot of VR under NNE Wind

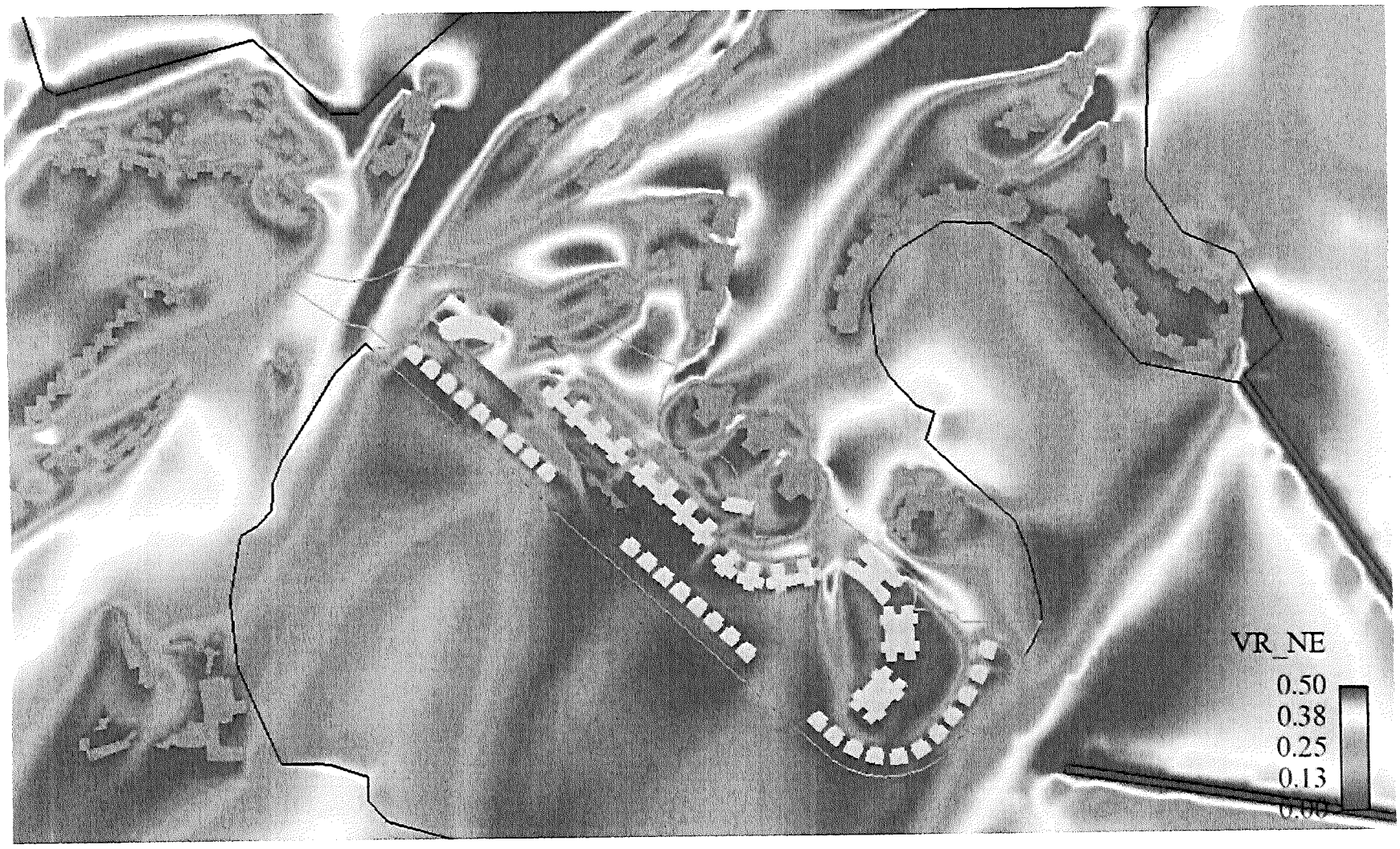

Figure B15 Contour Plot of VR under NE Wind

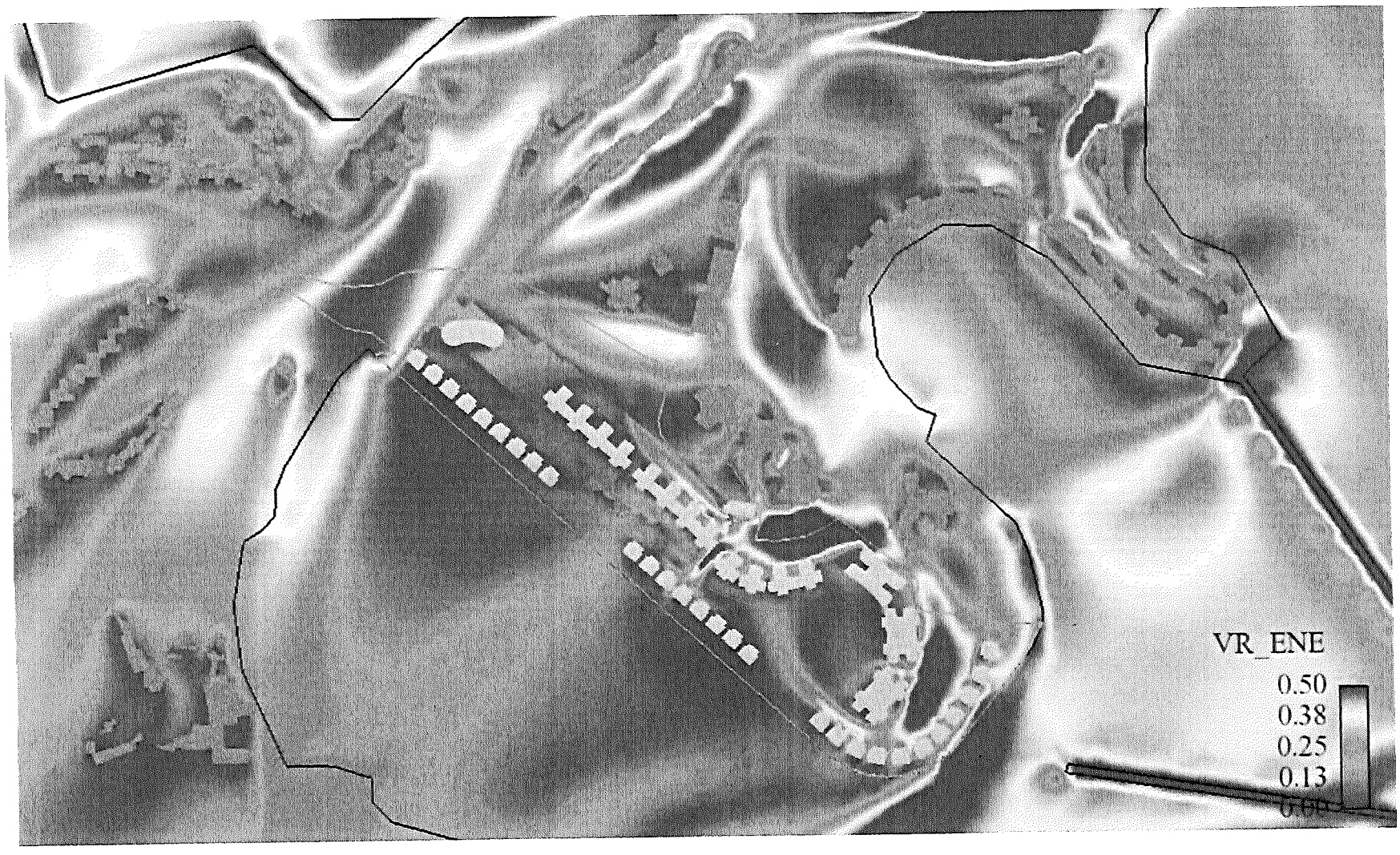

Figure B16 Contour Plot of VR under ENE Wind

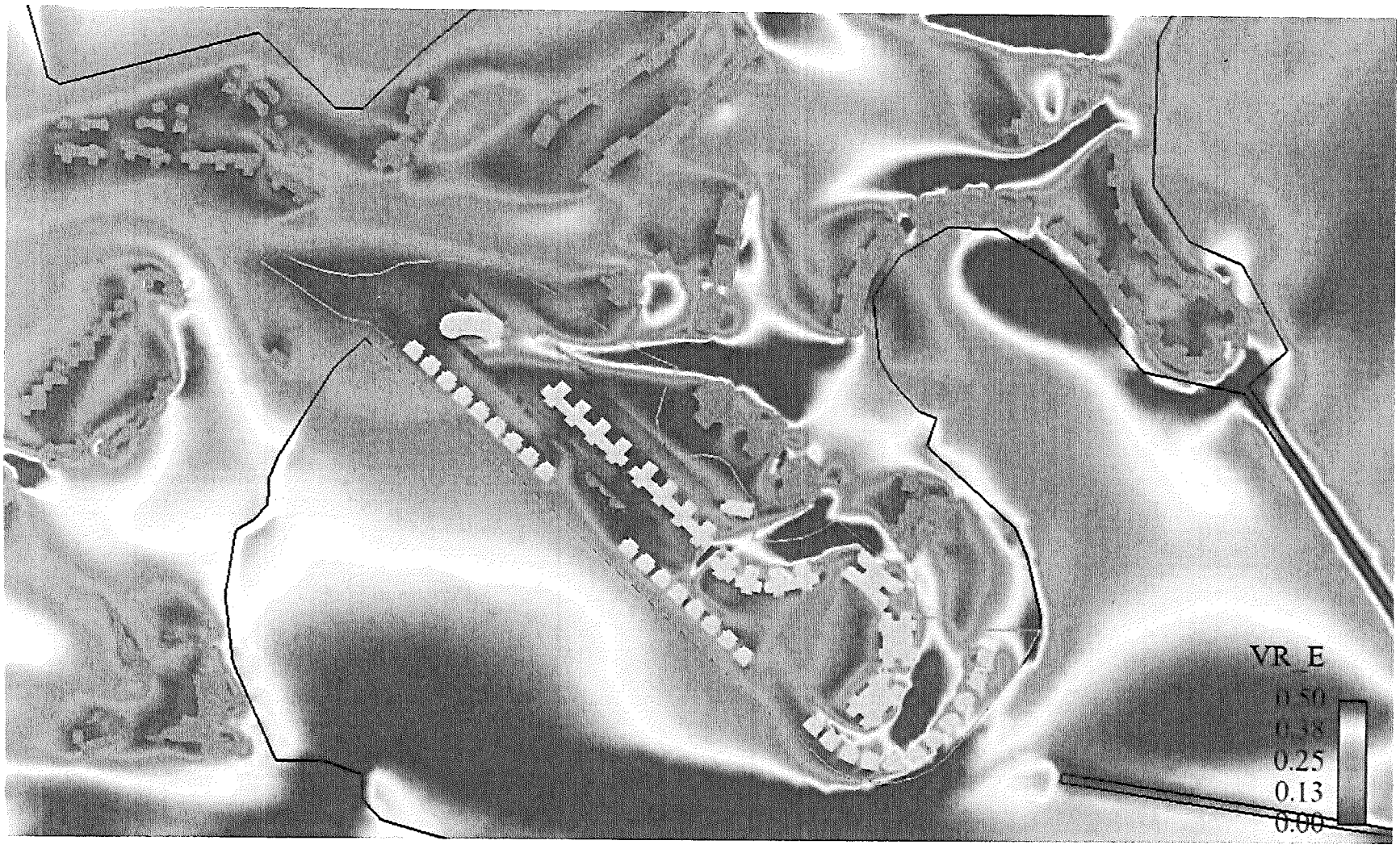

Figure B17 Contour Plot of VR under E Wind

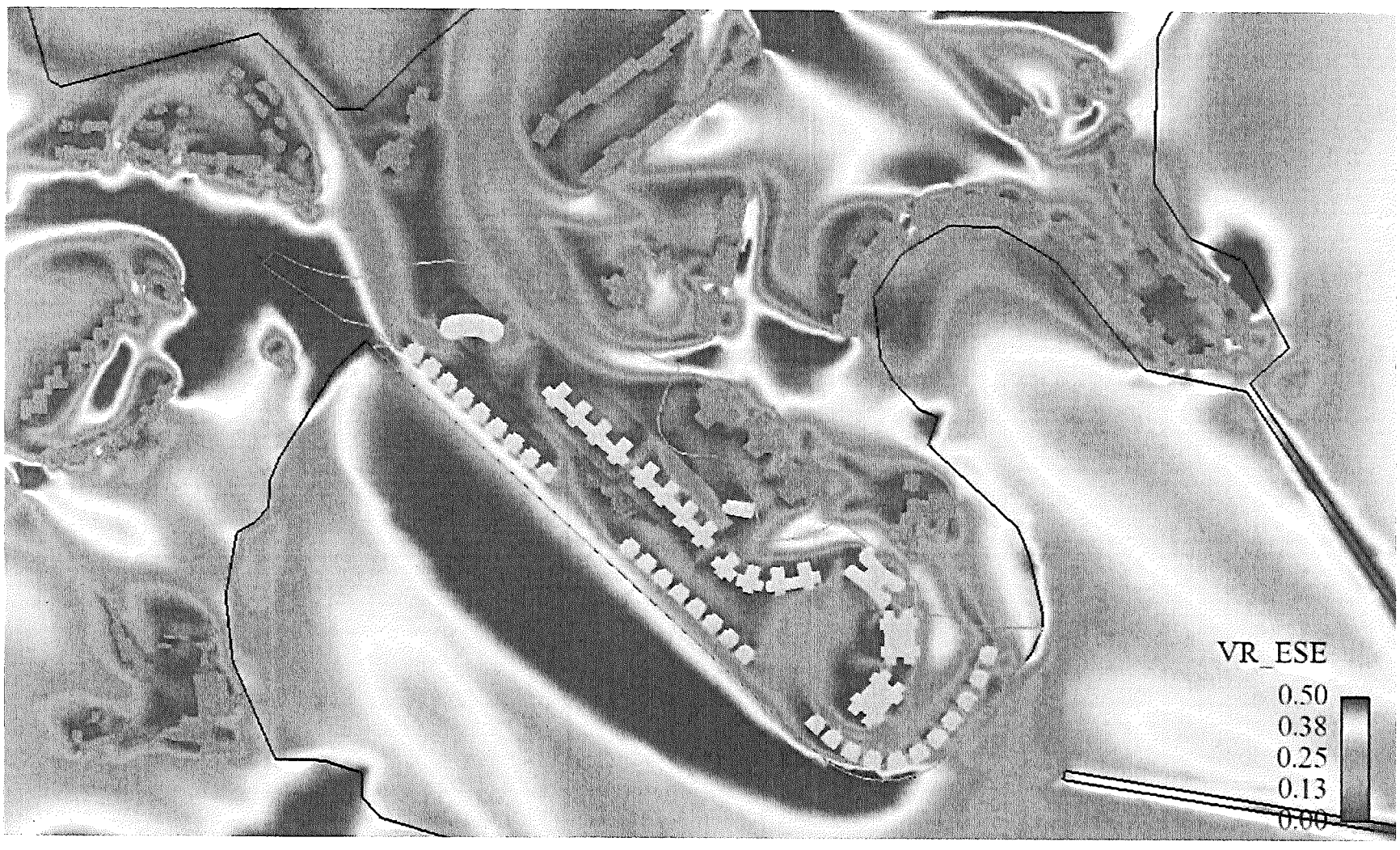

Figure B18 Contour Plot of VR under ESE Wind

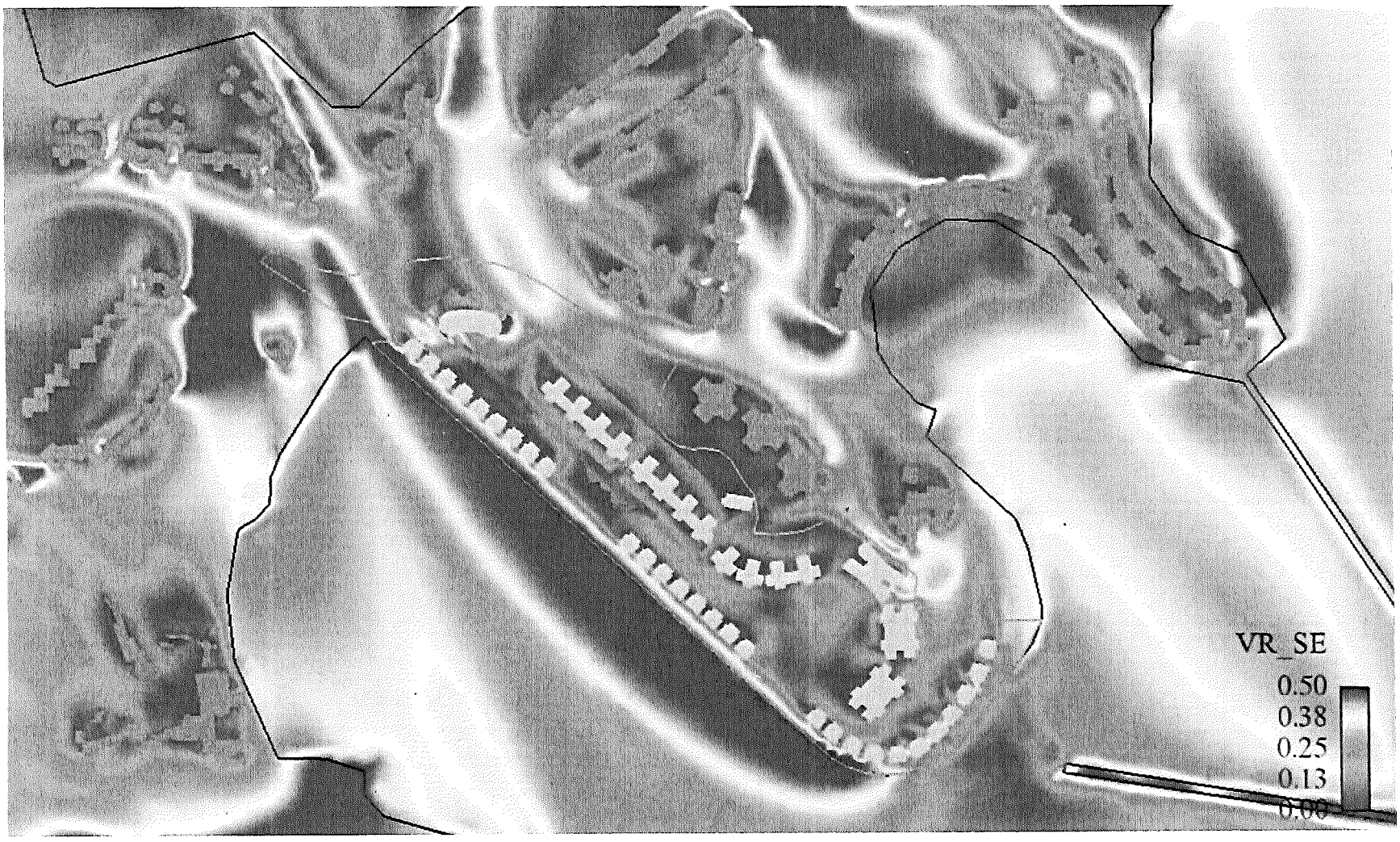

Figure B19 Contour Plot of VR under SE Wind

Figure B20 Contour Plot of VR under SSE Wind

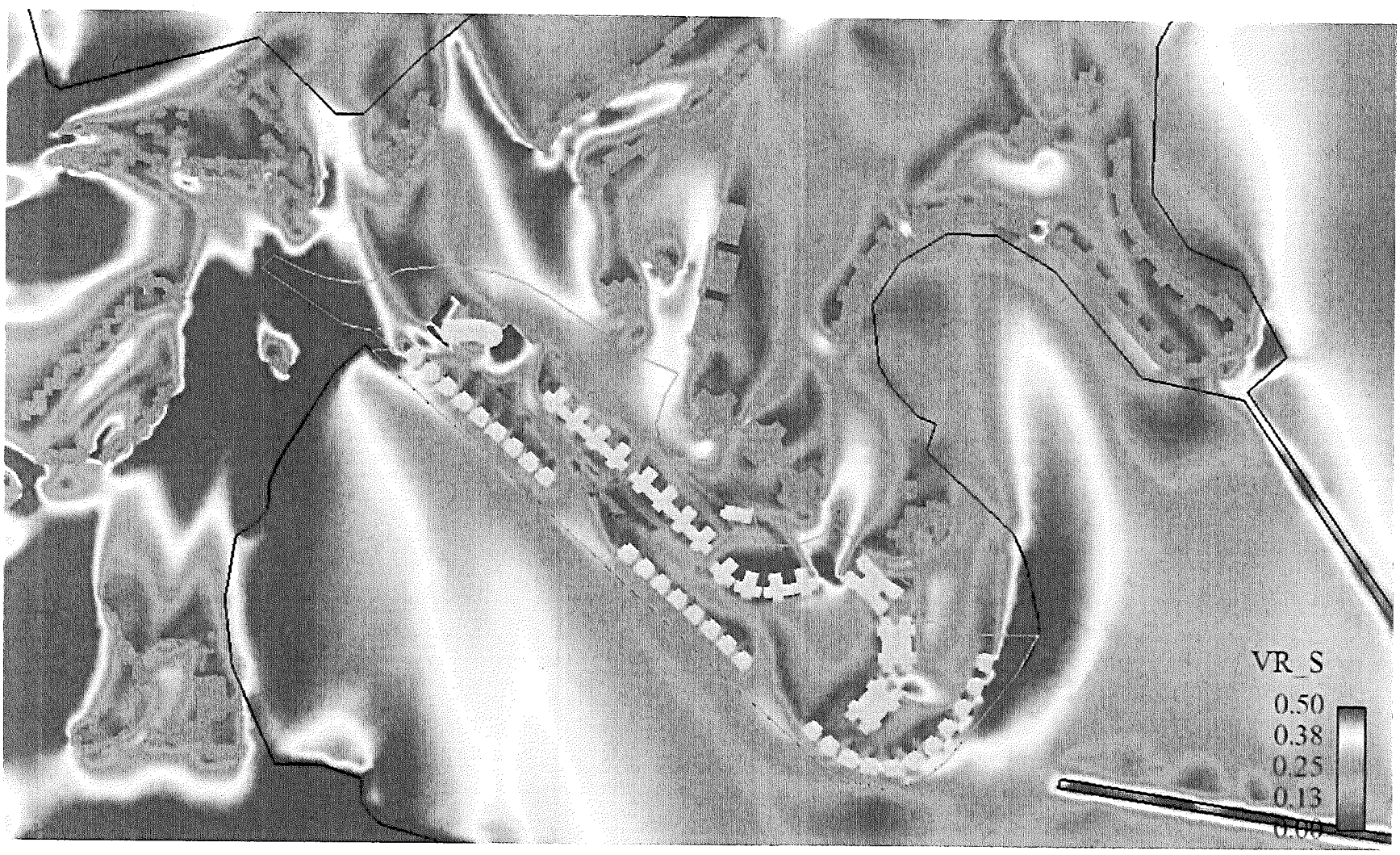

Figure B21 Contour Plot of VR under S Wind

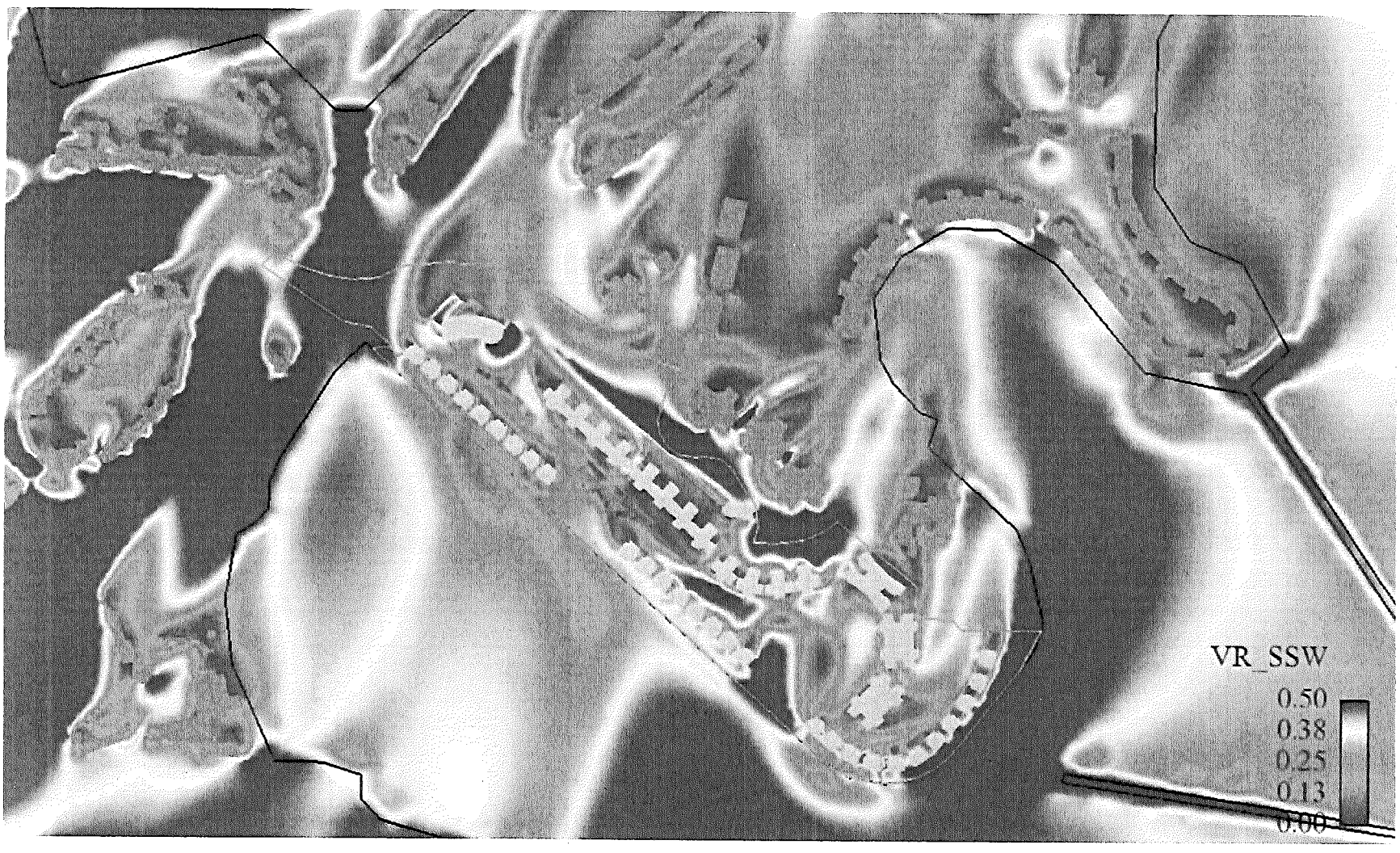

Figure B22 Contour Plot of VR under SSW Wind

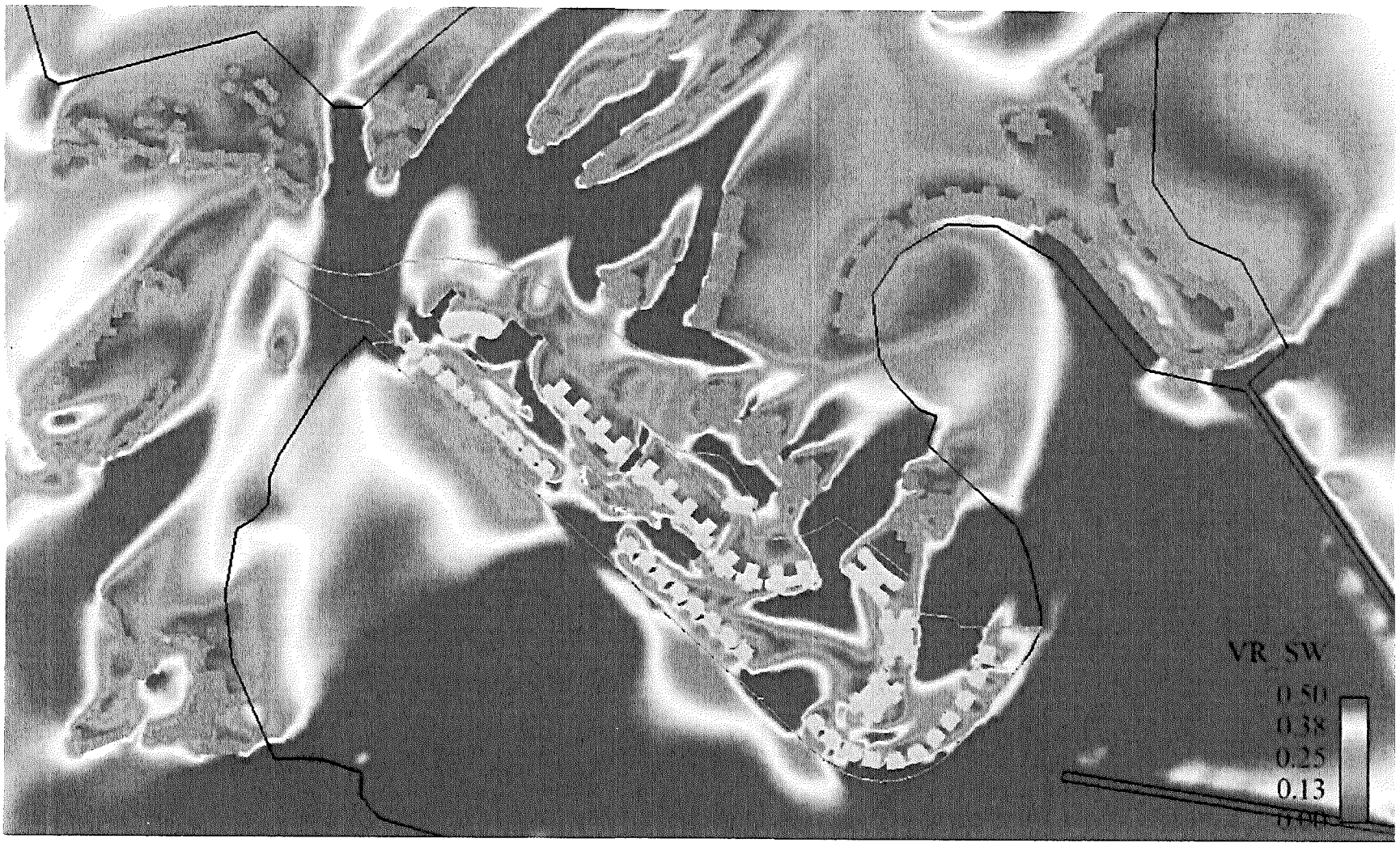

Figure B23 Contour Plot of VR under SW Wind

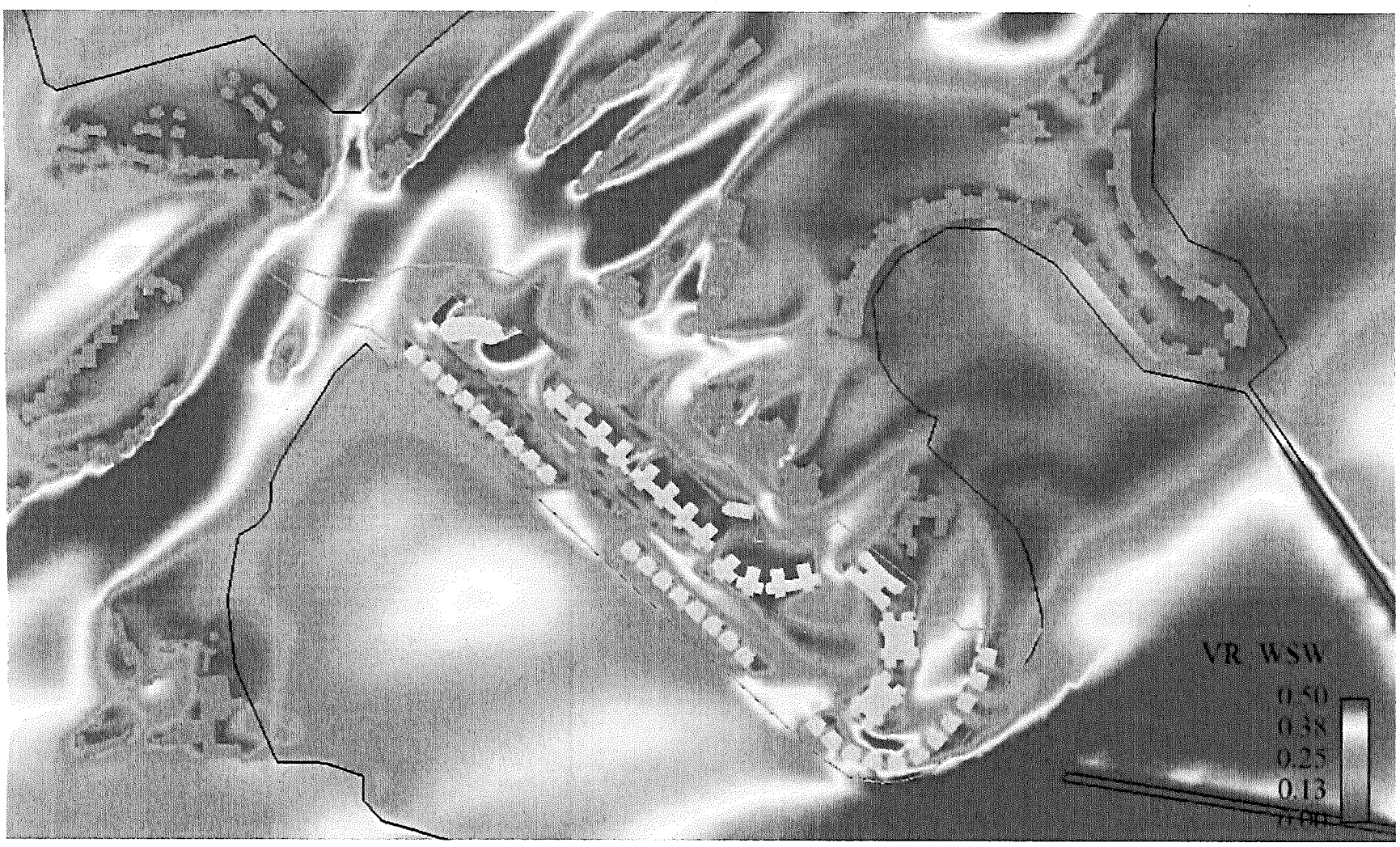

Figure B24 Contour Plot of VR under WSW Wind

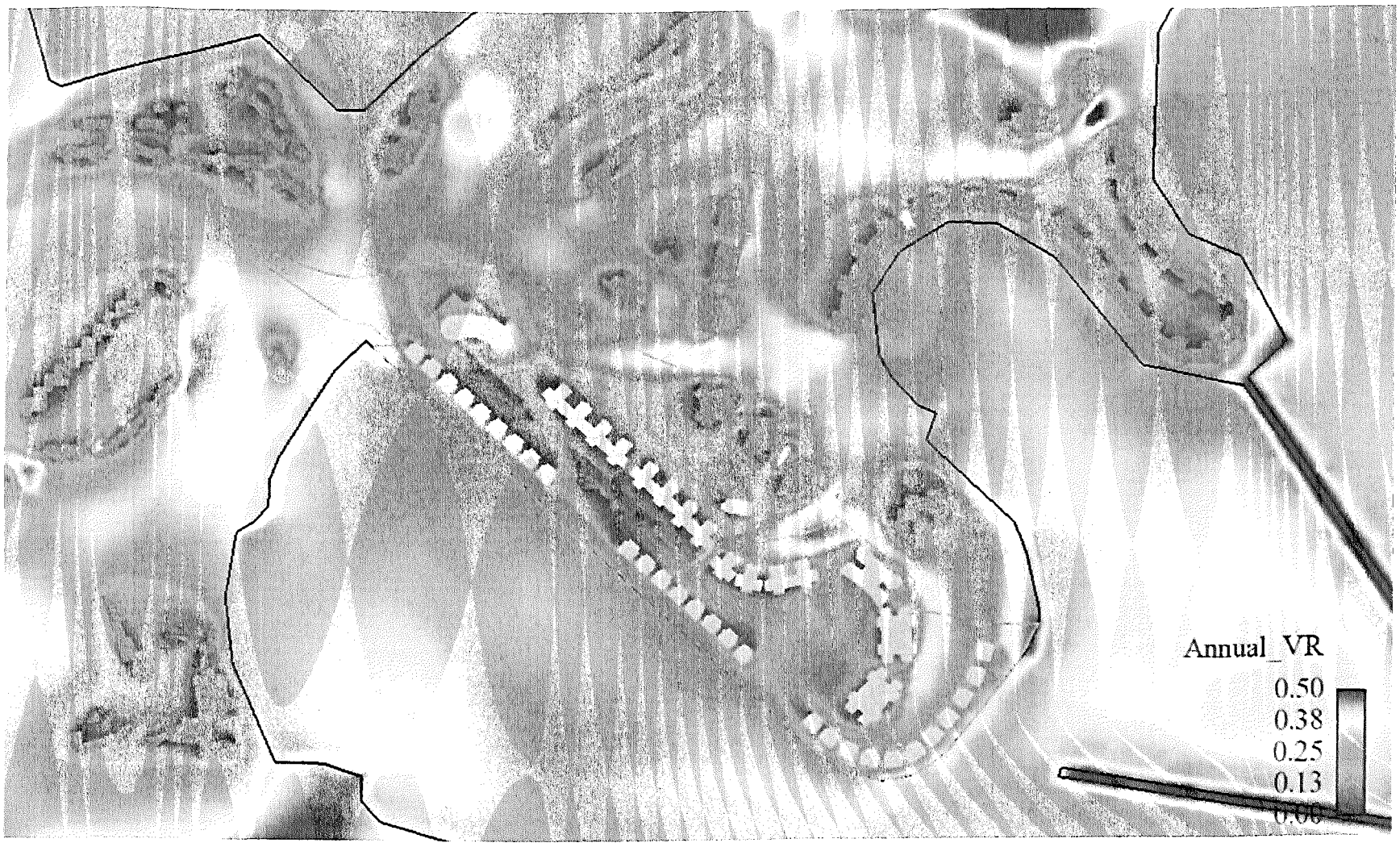

Figure B25 Annual Weighted Average Contour Plot of VR

Figure B26 Summer Weighted Average Contour Plot of VR

B3 Proposed Scheme

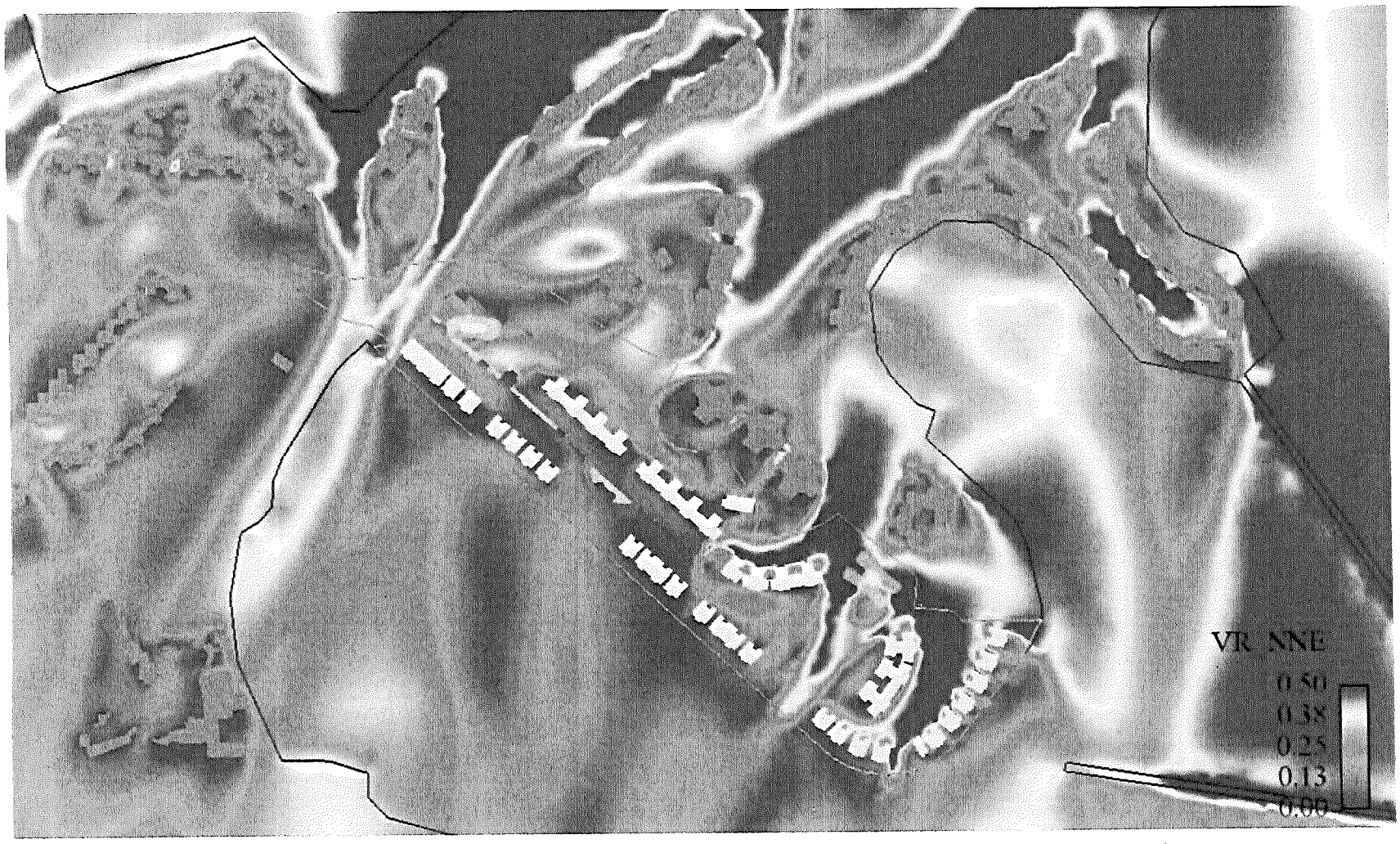

Figure B27 Contour Plot of VR under NNE Wind

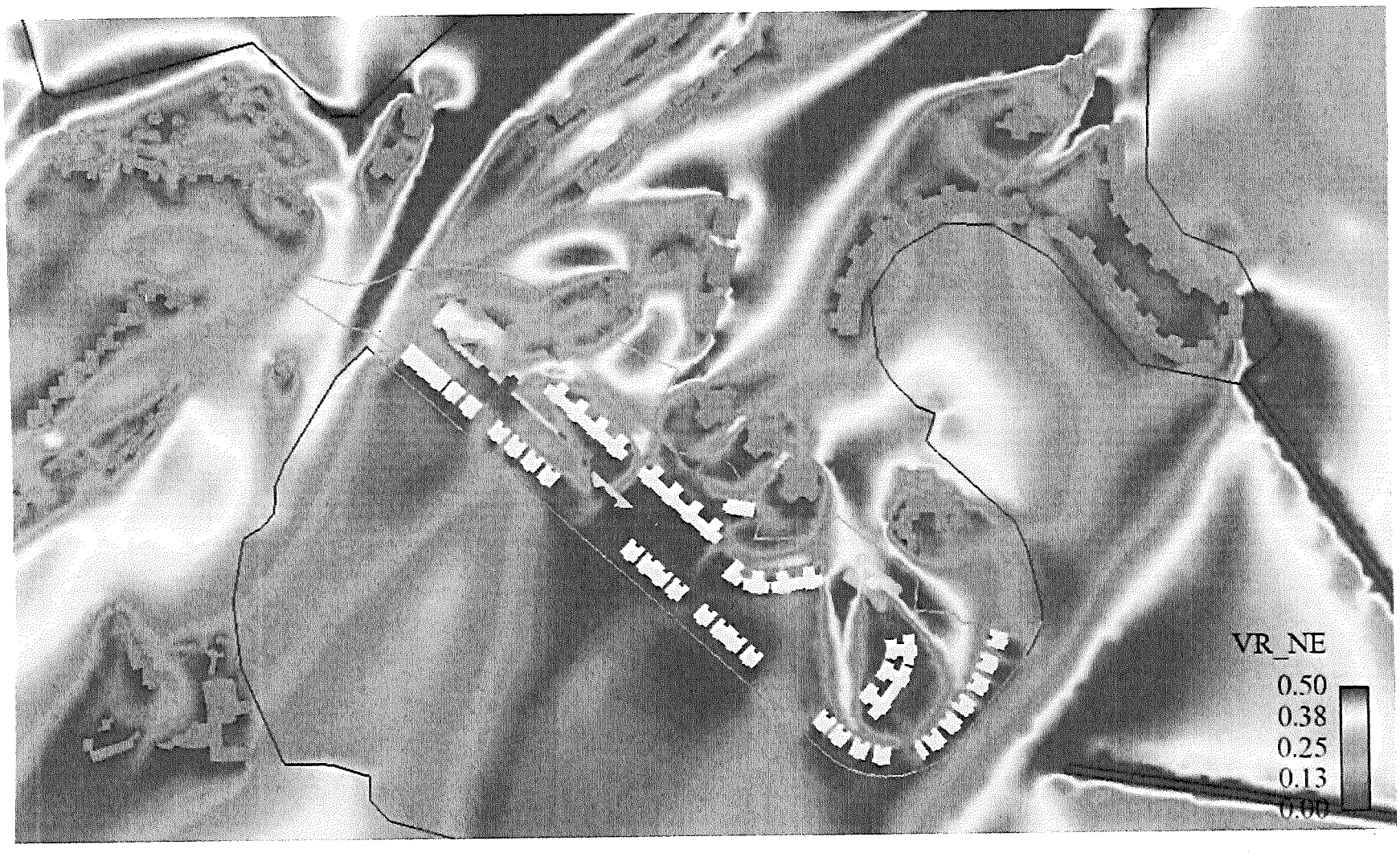

Figure B28 Contour Plot of VR under NE Wind

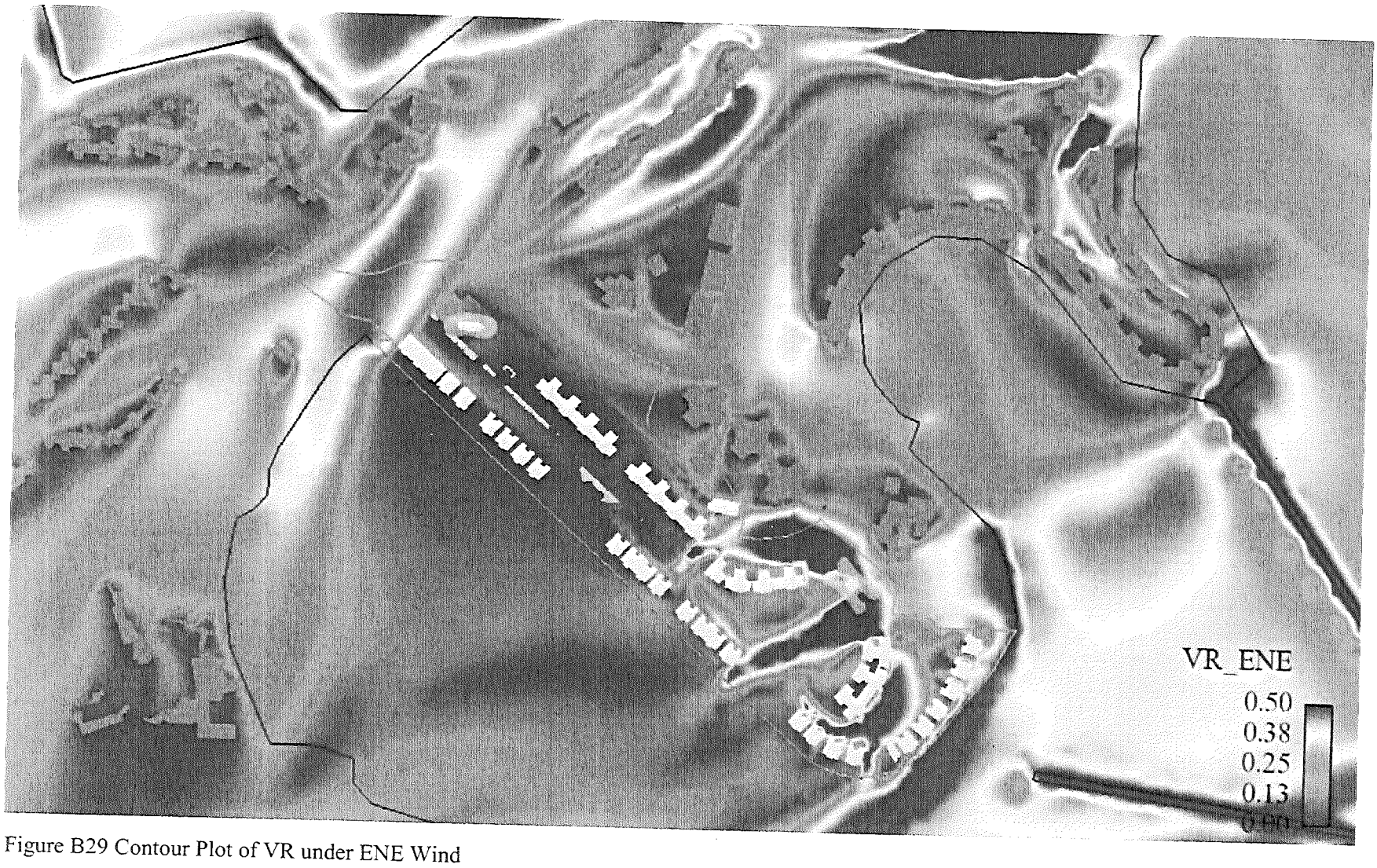

Figure B29 Contour Plot of VR under ENE Wind

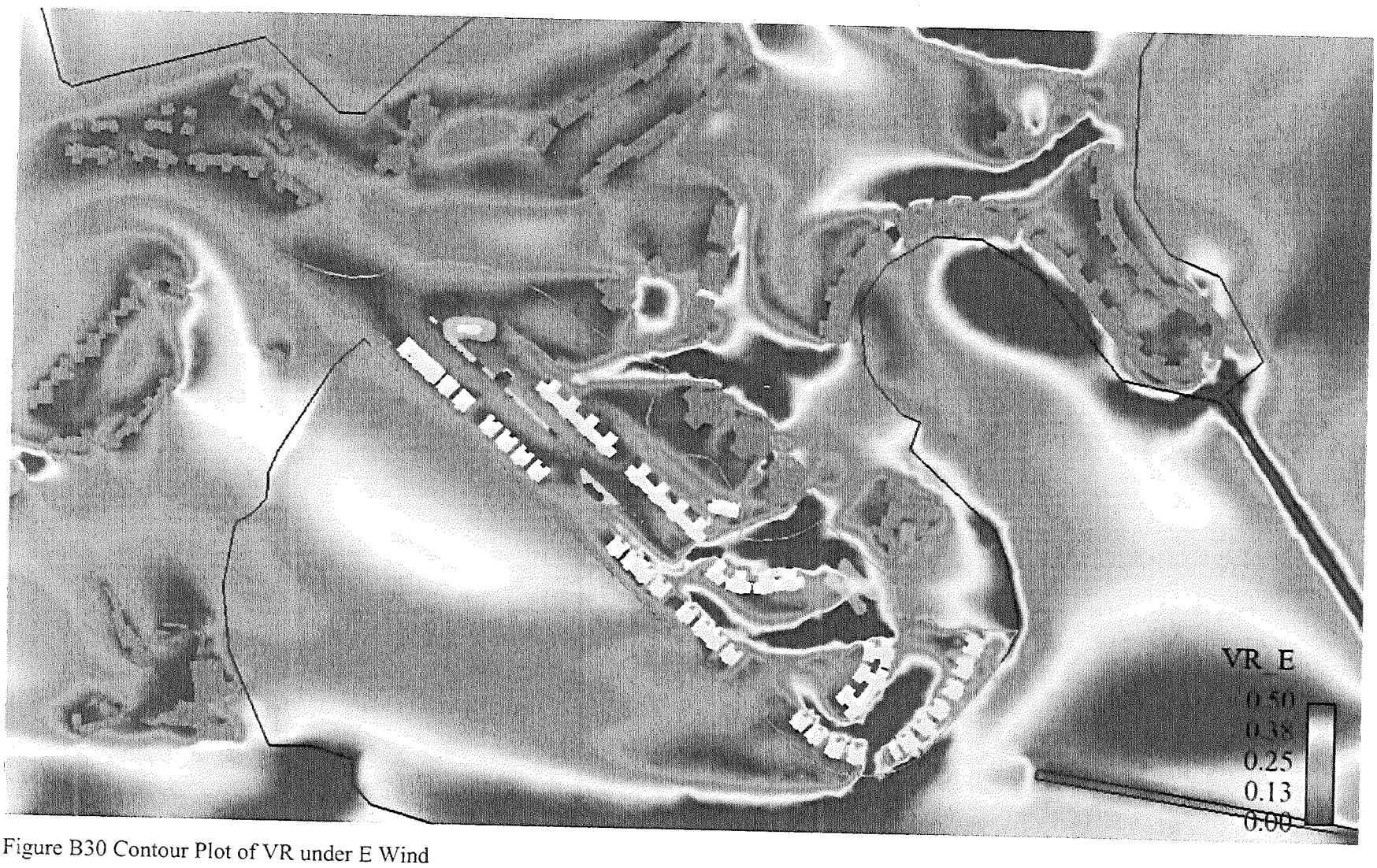

Figure B30 Contour Plot of VR under E Wind

Figure B31 Contour Plot of VR under ESE Wind

Figure B32 Contour Plot of VR under SE Wind

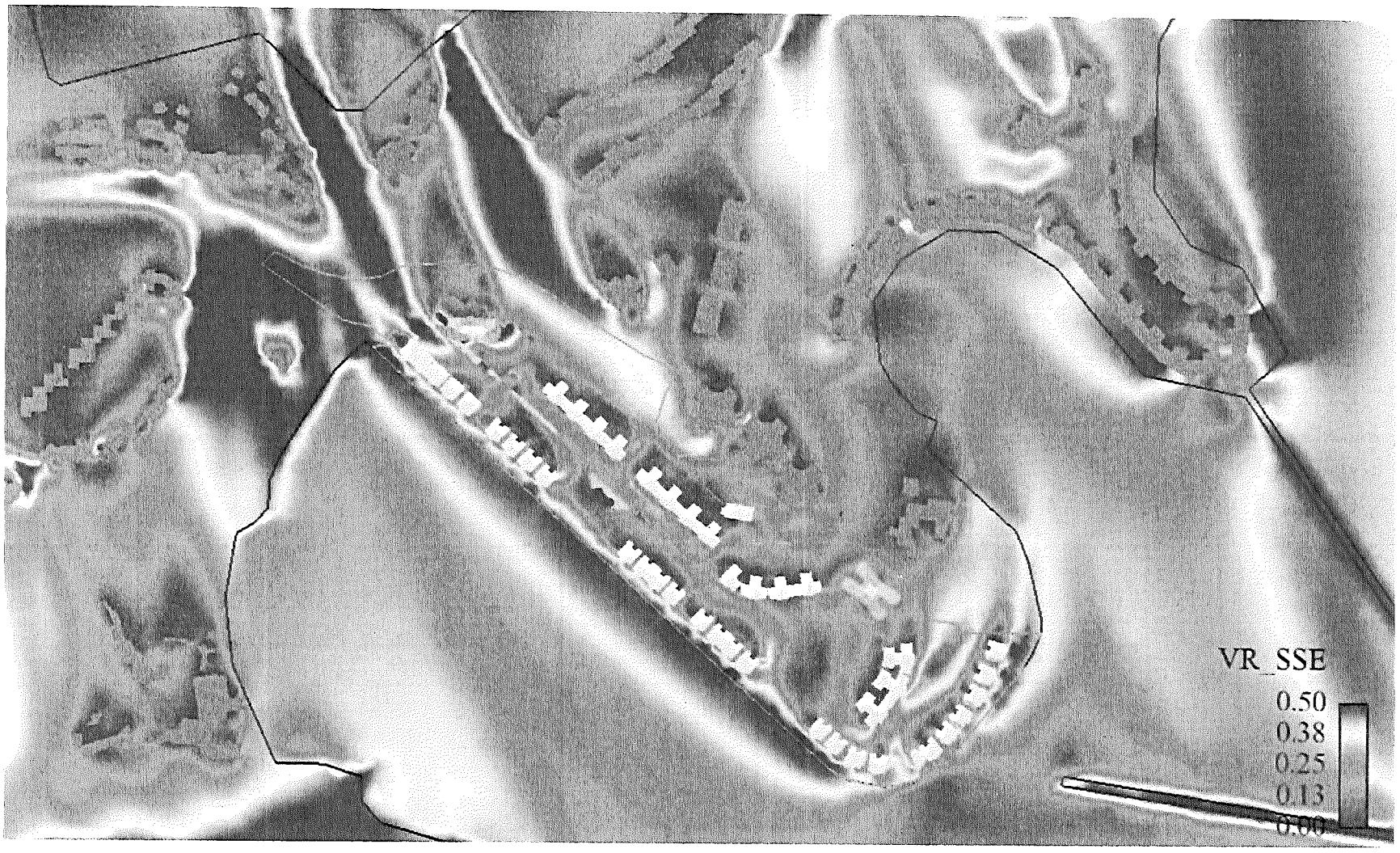

Figure B33 Contour Plot of VR under SSE Wind

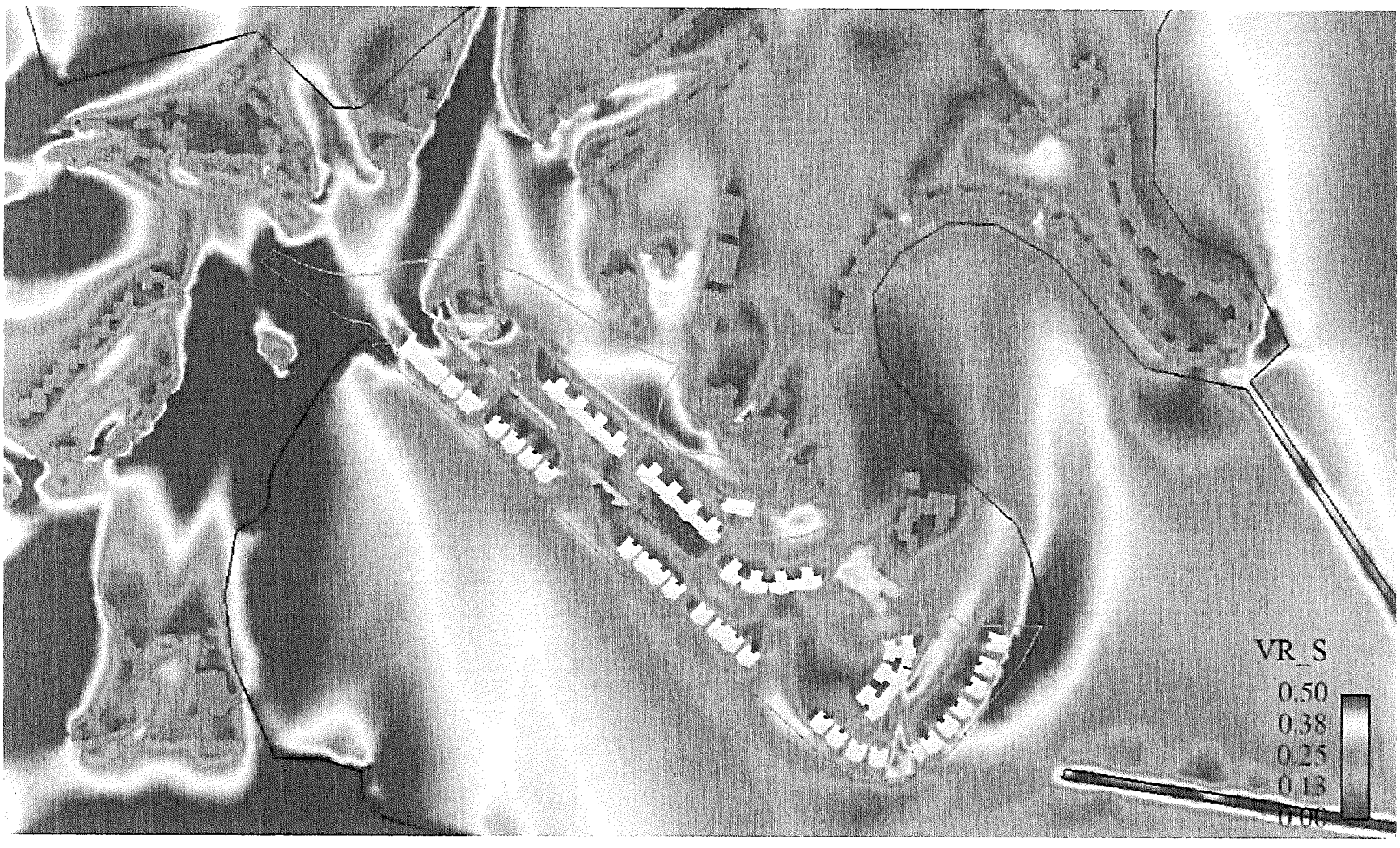

Figure B34 Contour Plot of VR under S Wind

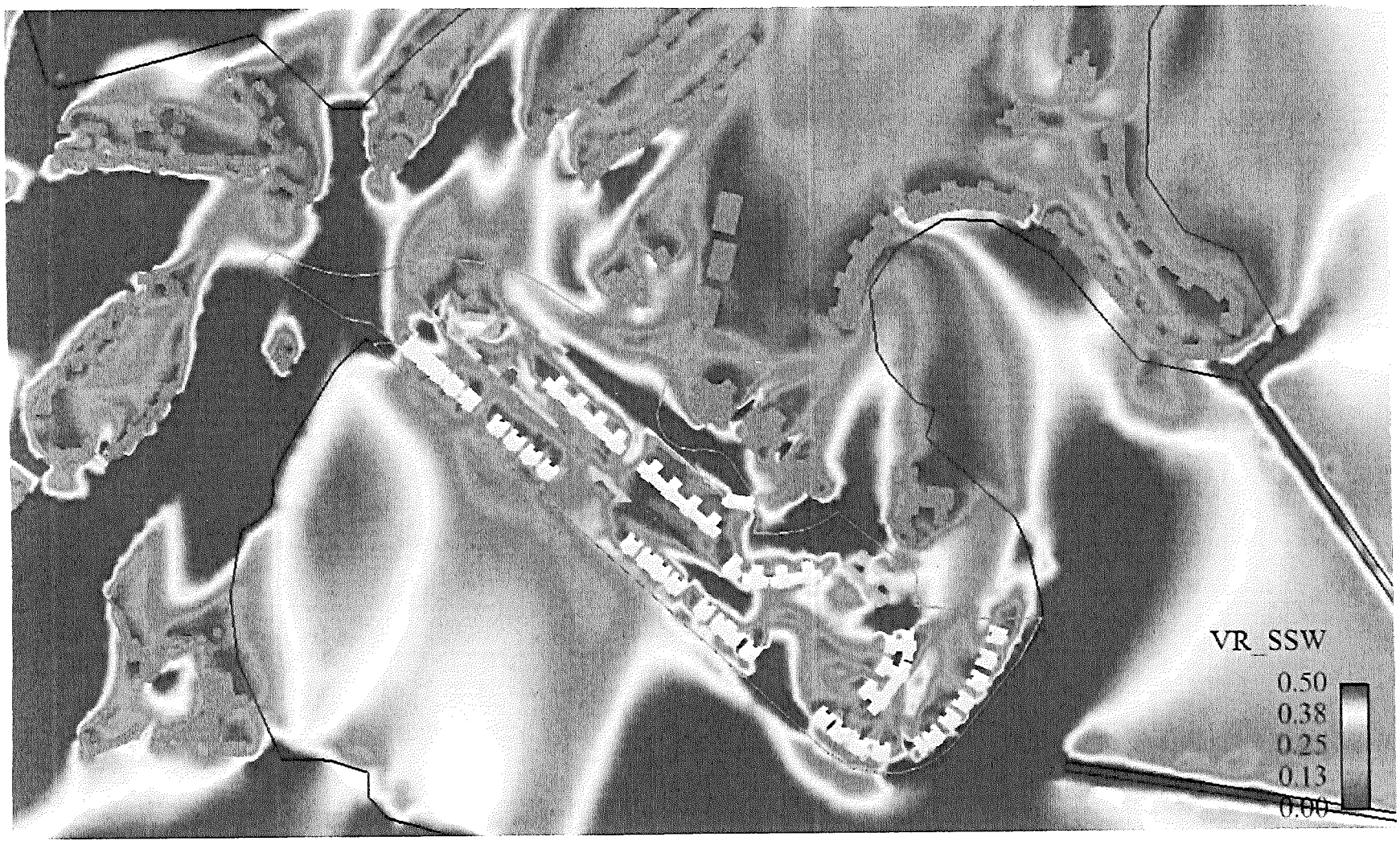

Figure B35 Contour Plot of VR under SSW Wind

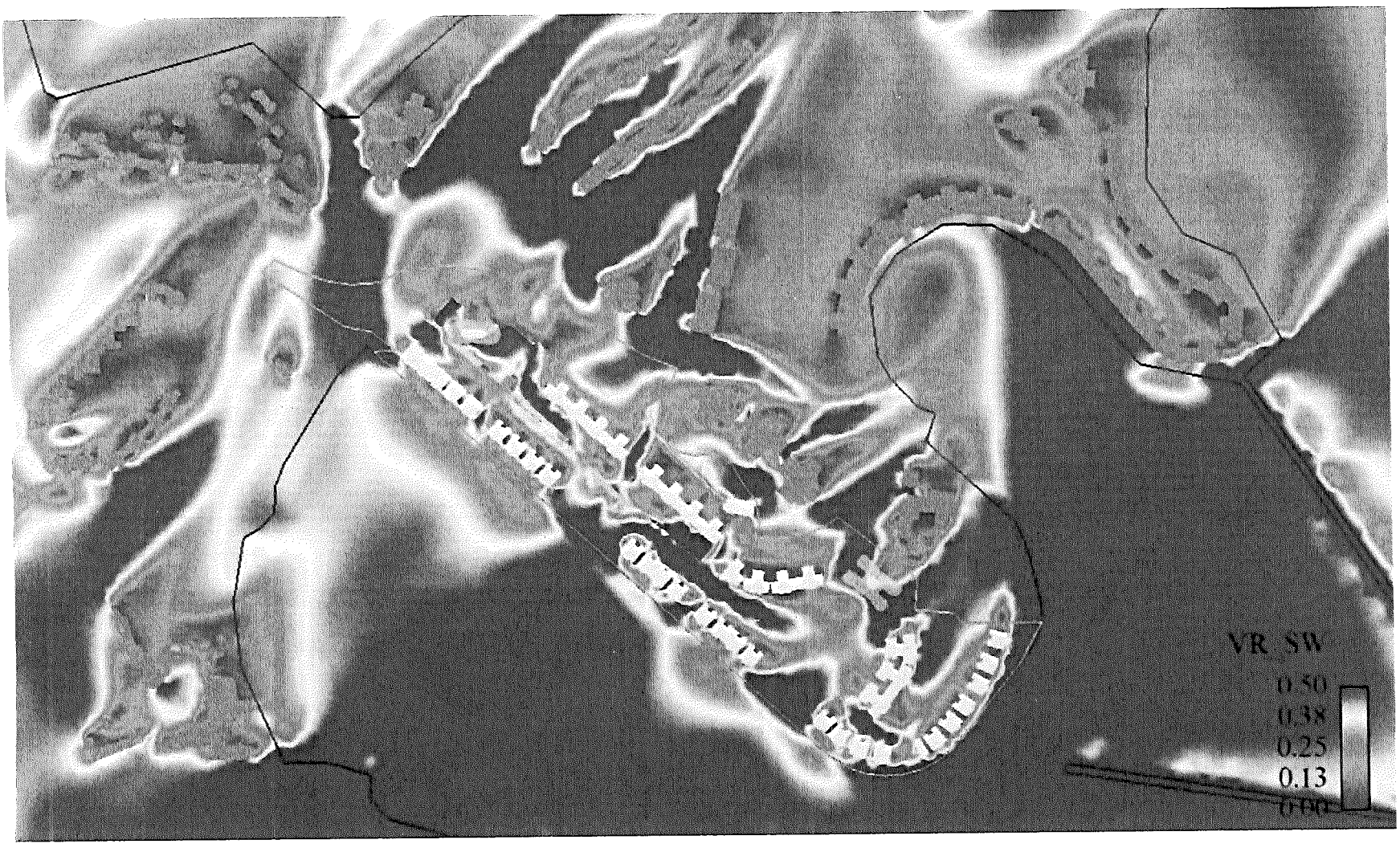

Figure B36 Contour Plot of VR under SW Wind

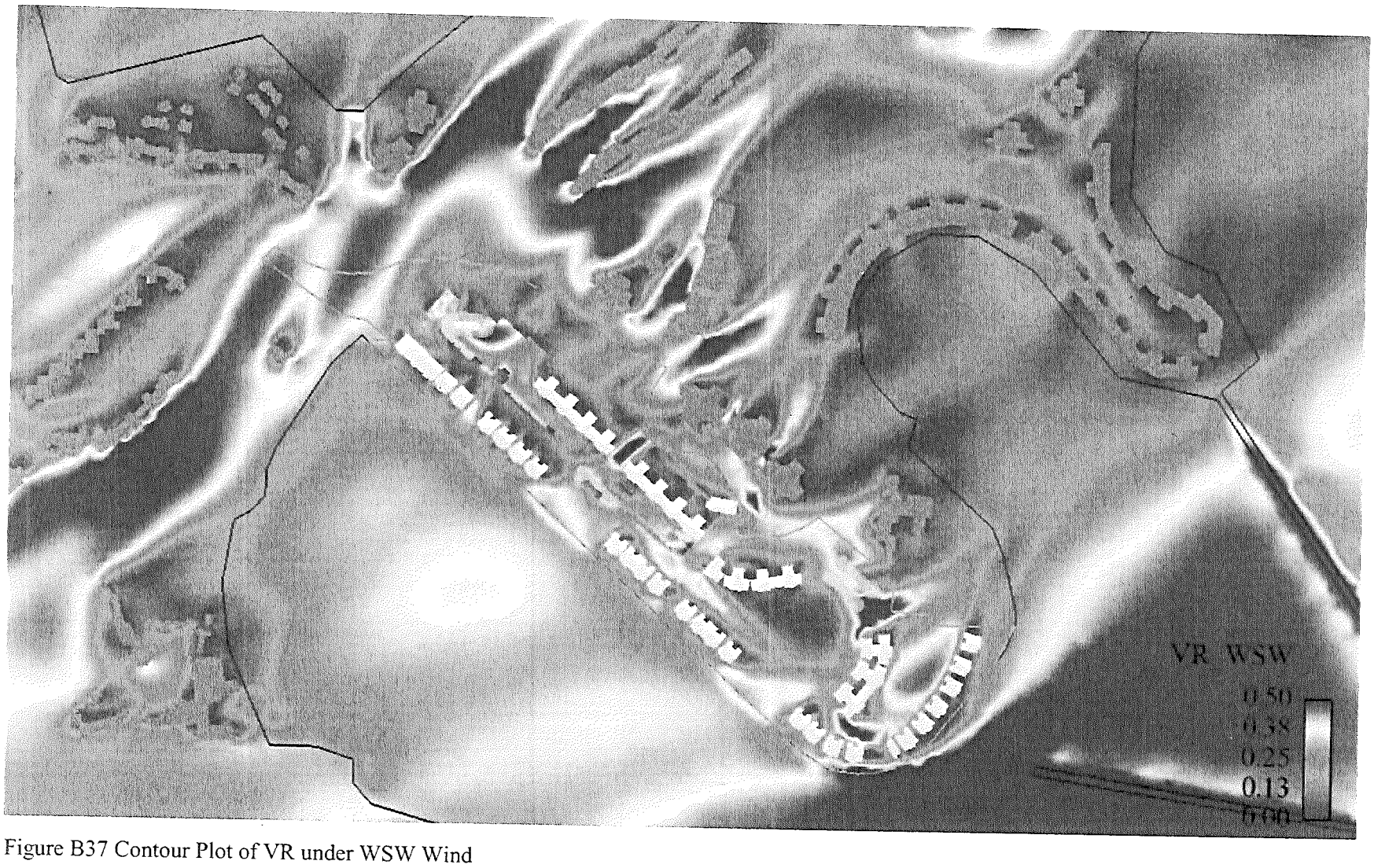

Figure B37 Contour Plot of VR under WSW Wind

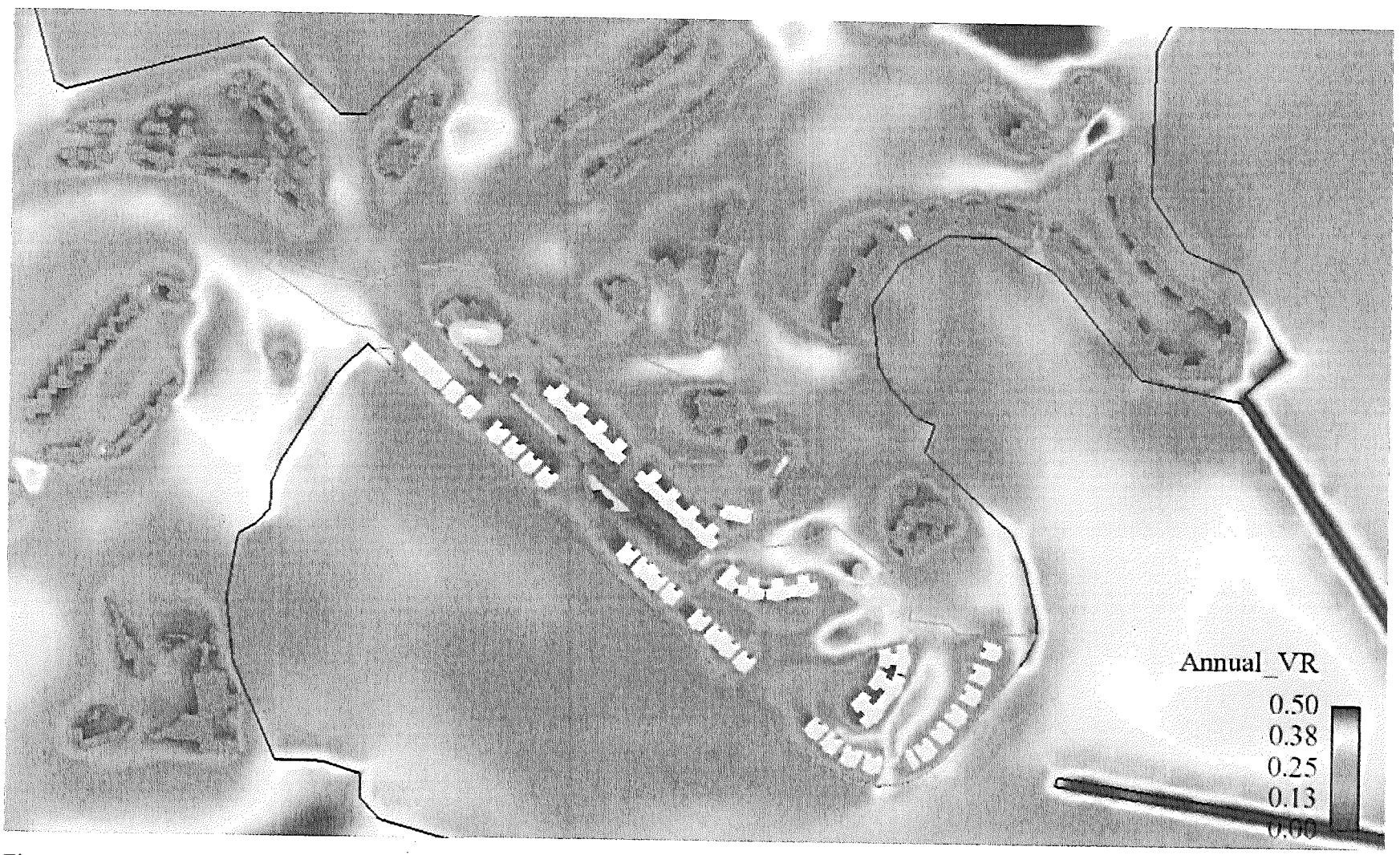

Figure B38 Annual Weighted Average Contour Plot of VR

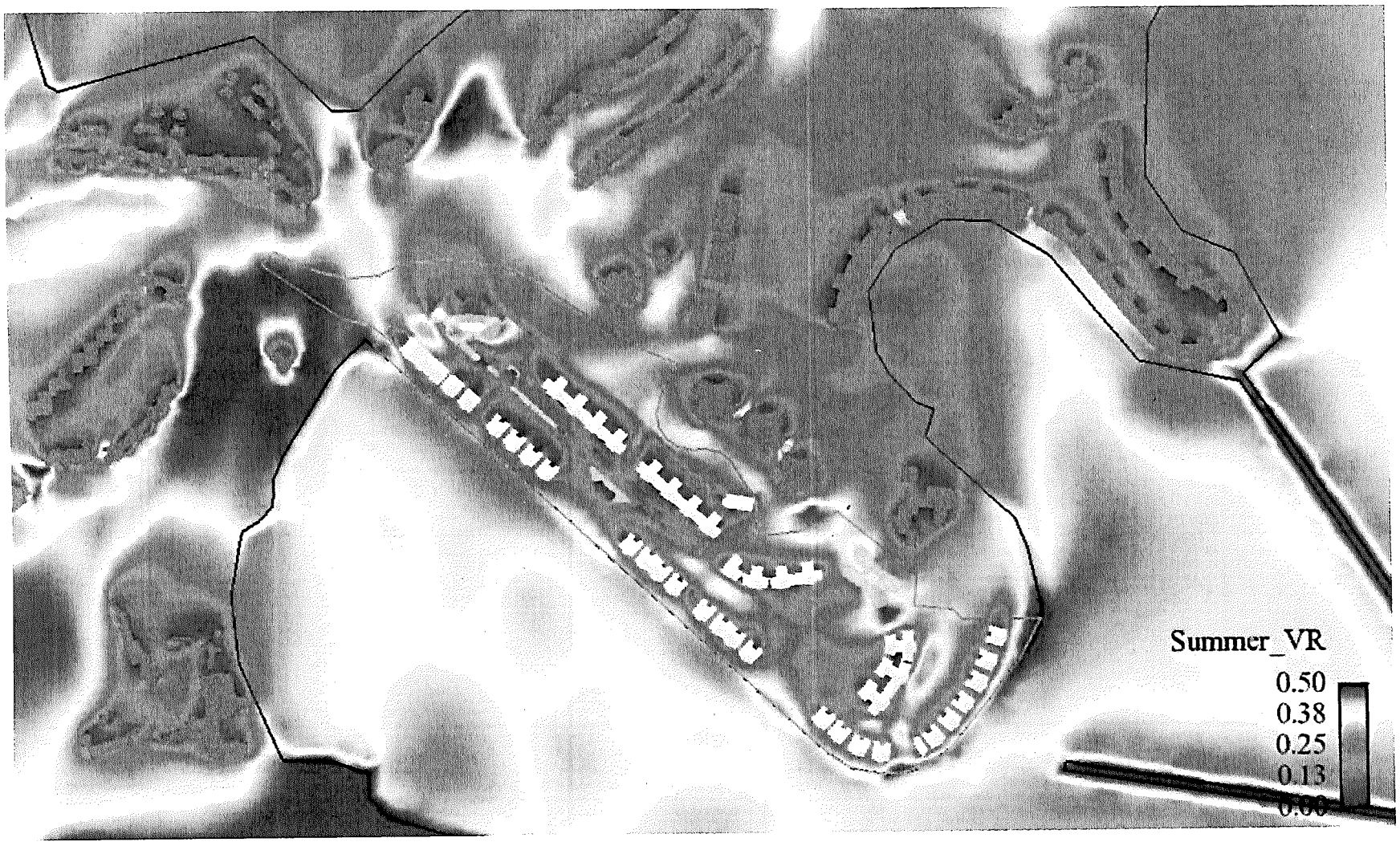

Figure B39 Summer Weighted Average Contour Plot of VR