

DESIGN AND CONSTRUCTION OF CAUSEWAY BAY FLYOVER**PROJECT PROFILE****CONTENTS**

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1. BASIC INFORMATION

1.1 Project Title

1.1.1 Design and Construction of Causeway Bay Flyover.

1.2 Purpose and Nature of the Project

1.2.1 The purpose of the Project is to increase the capacity of the Causeway Bay Flyover. The general nature of the proposed works include:

- (i) Construction of a two-lane flyover (Primary Distributor) connecting Gloucester Road and Victoria Park Road in 220m (approx.) length to replace the existing single-lane Causeway Bay Flyover;
- (ii) Permanent closure and demolition of the existing single-lane Causeway Bay Flyover and the adjoining footbridge;
- (iii) Reprovisioning of a temporary footbridge with lifts on both sides to replace the footbridge adjoining to the existing single-lane Causeway Bay Flyover;

1.3 Name of Project Proponent

1.3.1 Highways Department (HyD).

1.4 Location and Scale of Project

1.4.1 The proposed Project site is located at the waterfront of Causeway Bay, which is near to a densely developed residential/commercial area. The location of the site and the details of the construction works are shown in Figure 1.1. During construction, the existing Causeway Bay Promenade shall be temporarily occupied and converted into temporary carriageway for the required temporary traffic diversion as shown in Appendix 1.1.

1.5 Number and Types of Designated Projects to be Covered by the Project Profile

1.5.1 In this Project, the construction of Causeway Bay Flyover is classified as a designated project under Item A.1, Part I, Schedule 2 of the Environmental Impact Assessment (EIA) Ordinance.

1.6 District Council Consultation

1.6.1 In order to minimize the encroachment and impact on Victoria Park, five alternative alignment schemes as shown in Appendix 1.2 have been reviewed/considered in respect of the current design standards and site constraints. After reviewing the alternative flyover alignments, it has been concluded that the proposed flyover alignment is in fact the only alignment that could fulfill both the current design standards and the minimum land take from Victoria Park. The last consultation with both Eastern and Wan Chai District Councils (DC) were conducted on 20 September 2001 and 20 December 2001 respectively. Generally DC members were told the alternative alignments considered and they understood that the proposed alignment is the only one that can fulfil the current design standard. The conclusion of the consultation was that members of DCs supported the proposed alignment of Causeway Bay Flyover. DC members realized that trees affected are the minimum and tree transplanting from Victoria Park is unavoidable. Members of Wan Chai DC expressed their concerns on the survival rates of the trees to be transplanted. Representative of Leisure and Cultural Services Department (LCSD) gave detailed explanation at the Wan Chai DC consultation that they have confident on increasing the survival rate of the trees to be transplanted, should the proposed transplanting procedures presented at the meeting be followed strictly. In addition to follow

stringent transplanting procedures agreed by LCSD, the tree transplanting works shall be closely monitored by HyD and LCSD. Members of Food, Environmental and Hygiene Committee (FEHC) of Wan Chai DC will be informed of the progress of the tree transplanting.

1.7 Name and Telephone Number of Contact Person(s)

1.7.1 All queries regarding the project can be addressed to:

Ir. C W Lam Senior Engineer
Hong Kong Region, Highways Department
Tel No.: 2231 5724; Fax No.: 2576 7540

Ir. Vincent Chan Engineer
Hong Kong Region, Highways Department
Tel No.: 2231 5726; Fax No. 2576 7540

2. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Responsibilities of Parties

2.1.1 This Project is proposed by Transport Department (TD) and taken up by Highways Department (HyD) as a works agent. In this Project, HyD is the overall Project Proponent, who oversees and manages the Project. The Consultants, Babbie-Ove Arup JV, will be responsible for the design and supervision of the construction. The Project will be implemented by Contractor(s) to be appointed by the Project Proponent at the subsequent stages. One year maintenance period after the completion of the Project will be allowed for in the Contract for the Contractor. After that, HyD will be responsible for the long term maintenance of the Project.

2.2 Project Time Table

2.2.1 The Project has undergone the Review Phase. The detailed design commenced in December 2002 and will be completed by mid 2003. Trees transplanting works within Victoria Park area is expected to commence in late 2003 and the main construction works of the flyover is expected to commence in early 2004. The construction programme for construction of Causeway Bay Flyover will divide into 8 stages and the construction period is about 32 months. The Project Proponent confirmed that the Project would be completed within the scheduled programme. The construction programme is shown in Figure 2.1 and the construction works sequence are as shown in Appendix 1.1 and are described as follows:

Mobilization and preparation (2 months)

Stage 1 : Construction of temporary footbridge and foundation works of the proposed flyover (2 months);

Stage 2 : Construction of abutment within Victoria Park (4 months);

Stage 3 : Construction of temporary ramp within Victoria Park (6 months);

Stage 4 : Demolition of existing abutment within Victoria Park (2 months);

Stage 5 : Construction of proposed flyover from Gloucester Road to Victoria Park (11 months);

Stage 6 : Demolition of existing abutment along Gloucester Road (1 months);

Stage 7 : Demolition of existing flyover and temporary ramp (3 months);

Stage 8 : Reinstatement works for all landscape area (1 month).

2.3 Interactions with Other Projects

2.3.1 Other concurrent projects, Wan Chai Development Phase II (WDII) and Central Wan Chai Bypass (CWB) Tunnel Construction (Entrusted Works under WDII Project), will commence in 2004 and 2005 respectively. Some construction activities under Central Reclamation Phase III (CRIII) Project would also overlap with this Project. Cumulative construction impacts on the sensitive receiver in the vicinity of the Project were therefore considered in the assessment. The information and data regarding the WDII and CRIII project were in reference to the WDII EIA and CRIII EIA Reports, which were approved in August 2001.

2.3.2 Since the Island Eastern Corridor Links (IECL) construction under CWB & IECL Project, which will be commenced at the end of 2007 in accordance with EIA Report for CWB & IECL Project Review Study, and the Victoria Park Road widening (commenced after the completion of Causeway Bay Flyover construction) would not overlap with the Causeway Bay Flyover construction, their activities have not been considered in the assessment.

3. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

3.1.1 The Project site is located in an urban, busy traffic area. Vehicles emission from Gloucester Road and Victoria Park Road are dominant air pollutant in the study area. The major noise impact on the study area is traffic noise due to high traffic flow on Gloucester Road and Victoria Park Road. Also, the proposed flyover, which would encroach onto the Victoria Park, would give rise to visual and landscape impacts.

3.1.2 The temporary shifting of Victoria Park Road eastbound onto Causeway Bay Promenade is for traffic diversion purpose. The effects of the road to the environment are better than existing conditions since the traffic noise along the shifted Victoria Park Road is further away from the Noise Sensitive Receivers (NSR). Causeway Bay Promenade will be reinstated to a state similar to the existing settings after the completion of the temporary traffic diversion.

4. POSSIBLE IMPACT ON THE ENVIRONMENT

4.1 Air Quality

Construction Phase

4.1.1 During the construction phase, dust may be generated from the demolition of existing structures and general concrete works.

4.1.2 According to Table 3.5 of the approved WDII EIA Report, some construction activities of the WD II project (Scenario 1-5) such as dredging, seawall construction and drainage culvert would be undertaken concurrently during the period from mid 2004 to mid 2006. The following table summarised the concurrent construction activities during the construction of the Causeway Bay Flyover.

Table 4.1 Different Major Dust Generating Activities of Other Project in the Worst Case Scenarios during Construction of the Project ⁽¹⁾

Period	2004	2005			2006
Worst month	Oct. 2004	Feb. 2005	May. 2005	Aug. 2005	Jul. 2006
Activities	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
1	CRIII ⁽²⁾ – Stage 5	CRIII ⁽²⁾ – Stage 5	CRIII ⁽²⁾ – Stage 6	CRIII ⁽²⁾ – Stage 6	CRIII ⁽²⁾ – Stage 7
2	WDII – Filling	WDII – Filling	WDII – Filling	WDII – Filling	CWB&IECL (Central Interchange Tunnel Section)
3	WDII – Cooling Water System	WDII – Cooling Water System	WDII – Drainage Work	WDII – Drainage Work	CWB&IECL (Central Interchange Bridge Section)
4		WDII – Basic Reclamation	WDII – Cooling Water System	WDII – Cooling Water System	WDII – Drainage Work
5			WDII – CWB Tunnel	WCR1 – CWB Tunnel	WDII – Filling
6				WDII – CWB Tunnel	WDII - Pier Construction
7				WDII – MTR Tunnel	

Note:

(1) The Table is extracted from WDII EIA Report.

CWB Tunnel works indicated above include possible entrusted NIL tunnel works through the WCR2E&W, HKCEC1 and HKCEC2E&W areas, which would take place during the same periods of time.

(2) Based on CR III EIA Report:

CRIII Stage 5 includes Central Wan Chai Bypass Construction (entrusted work under CRIII contract), dredging, seawall construction, sand filling and drainage works.

CRIII Stage 6 includes Central Wan Chai Bypass Construction (entrusted work under CRIII contract), filling, drainage works and road works.

CRIII Stage 7 includes Central Wan Chai Bypass Construction (entrusted work under CRIII contract), drainage and utility work, road works and landscaping.

4.1.3 The above concurrent activities by other projects were also taken into account in assessing the cumulative air quality impact. As informed by the Project Proponent, the Victoria Park Road Widening Work would be commenced after the construction of Causeway Bay Flyover.

4.1.4 In order to evaluate construction dust impact from the Project on the air sensitive receivers (ASRs) in the study area, representative ASRs in the vicinity of the work site were selected for assessment. A summary for the representative ASRs is listed in Table 4.2. Figure 4.1 shows the locations of the identified ASRs.

Table 4.2 Summary of Representative Air Sensitive Receivers

ASR ¹	Section	Location	Land Use	No. of floors
A44	Causeway Bay	Sino Plaza	Commercial	33
A45	Causeway Bay	World Trade Centre	Commercial	34
A46	Causeway Bay	Excelsior Hotel	Commercial	28
A47	Causeway Bay	Riviera Mansion	Residential	15
A48	Causeway Bay	Marco Polo Mansion (northern facade)	Residential	15

ASR ¹	Section	Location	Land Use	No. of floors
A49	Causeway Bay	Marco Polo Mansion (eastern facade)	Residential	15
A50	Causeway Bay	Royal Hong Kong Yacht Club	Recreation	3
A51	Causeway Bay	Police Officers Club (Tennis Courts)	Recreation	0
A52	Causeway Bay	Police Officers Club (Bowling Green)	Recreation	0
A53	Causeway Bay	Police Officers Club	Recreation	3

Note: For easy reference, the same ASR identifications and locations used in the WDII EIA Report have been adopted in this study. (Refer to Section 3.4 of WDII Final EIA Report)

- 4.1.5 Fugitive Dust Model (FDM) was used to assess potential dust impacts from construction activities. Prediction of dust emissions was based on the emission factors from USEPA Compilation of Air Pollution Emission Factors (AP-42), 5th Edition. For conservative simulation, general construction activities and wind erosion of open sites were considered to be the major dust emission sources from the construction work in the study.
- 4.1.6 The 1997 meteorological data from the Hong Kong Observatory (Central Station) was used in the FDM to predict the TSP concentrations. The data includes hourly-averaged wind speed, wind direction, stability class, ambient temperature and mixing height.
- 4.1.7 The length of proposed Causeway Bay Flyover is approximately 220m. The construction works would be not carried out at the full length of the site. It is assumed that the construction area would be divided into two sections, namely Section 1 and Section 2 as shown in Figure 4.1. The maximum predicted concentrations between Section 1 and 2 would be used as the worst –case scenario to calculate the cumulative air quality impact from the Project.
- 4.1.8 The criteria for evaluating air quality impacts and the guidelines for air quality assessment are laid out in Annex 4 and Annex 12 for the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM), respectively.
- 4.1.9 The Air Pollution Control Ordinance (APCO) provides the statutory authority for controlling air pollutants from a variety of sources. The ordinance encompasses a number of Air Quality Objectives (AQOs) which stipulate maximum concentrations for a range of pollutants, of which Carbon Monoxide (CO), Nitrogen Dioxide (NO₂), Respirable Suspended Particulate (RSP) and Total Suspended Particulate (TSP) are relevant to this study. The relevant AQOs are listed in Table 4.3.

Table 4.3 Air Quality Objectives

Parameter	Maximum Average Concentration (μgm^{-3})	
	1 Hour ⁽²⁾	24 Hours ⁽³⁾
NO ₂	300	150
RSP	--	180
CO	30,000	--
TSP	500 ⁽⁵⁾	260

Note:

- (1) Measured at 298 K and 101.325 kPa
(2) Not to be exceeded more than three times per year.
(3) Not to be exceeded more than once per year.
(4) Arithmetic mean

- (5) Not an AQO. However, in addition to the established legislative controls, it is accepted that an hourly average TSP concentration of 500 $\mu\text{g m}^{-3}$ should not be exceeded.

4.1.10 Without any mitigation measures, the predicted cumulative 1-hour and 24-hour TSP concentrations are shown in Table 4.4 and 4.5.

Table 4.4 Predicted Cumulative 1-hour Average TSP Concentration at Representative ASRs (Unmitigated)

ASRs	Predicted TSP Concentration ($\mu\text{g m}^{-3}$)							
	Predicted Concentration *							
	WDII ⁽¹⁾						Causeway Bay Flyover ⁽³⁾	Cumulative 1-hr ⁽⁴⁾
	Scen.1	Scen.2	Scen.3	Scen.4	Scen.5	Max ⁽²⁾		
A44	108	161	139	142	144	161	105	266
A45	112	149	150	150	171	171	350	521
A46	115	144	166	166	176	176	493	669
A47	119	143	181	181	155	181	452	633
A48	123	138	185	185	172	185	358	543
A49	130	139	184	184	185	185	824	1009
A50	103	391	149	149	166	391	86	477
A51	127	224	141	140	159	224	106	330
A52	115	177	154	154	164	177	144	321
A53	111	193	147	146	186	193	167	360

Note: * Background concentration is included

- (1) Predicted Concentrations are extracted from EIA Report for “Central-Wan Chai Bypass and Island Eastern Corridor Link” and “Wan Chai Development Phase II”. The construction activities of the WDII, CRIII and CWB & IECL were taken into account.
- (2) Referring to the construction programme, the construction of Causeway Bay Flyover would only overlap the Scenarios 1- 5 of WDII Project, therefore, the maximum value was selected based on the Scenarios 1 – 5. (Refer to Table 4.1)
- (3) Construction of Causeway Bay Flyover
- (4) Cumulative TSP Concentration (4)=(2)+(3)
- (5) The 1-hour TSP criteria is 500 $\mu\text{g m}^{-3}$

Table 4.5 Predicted Cumulative 24-hour Average TSP Concentration at Representative ASRs (Unmitigated)

ASRs	Predicted TSP Concentration ($\mu\text{g m}^{-3}$)							
	Predicted Concentration *							
	WDII ⁽¹⁾						Causeway Bay Flyover ⁽³⁾	Cumulative 24-hr ⁽⁴⁾
	Scen.1	Scen.2	Scen.3	Scen.4	Scen.5	Max ⁽²⁾		
A44	96	124	114	114	115	124	53	177
A45	97	118	119	119	130	130	177	307
A46	99	115	128	127	132	132	250	382
A47	101	115	136	135	122	136	229	365
A48	103	113	138	137	130	138	181	319
A49	107	114	137	137	137	137	417	554
A50	94	250	119	119	127	250	44	294
A51	105	159	115	114	123	159	54	213
A52	99	133	122	121	126	133	73	206
A53	97	143	118	117	138	143	84	227

Note: * Background concentration is included

- (1) Predicted Concentrations are extracted from EIA Report for “Central-Wan Chai Bypass and Island Eastern Corridor Link” and “Wan Chai Development Phase II”. The construction activities of the WDII, CRIII and CWB & IECL were taken into account.
- (2) Referring to the construction programme, the construction of Causeway Bay Flyover would only overlap the Scenarios 1- 5 of WDII Project, therefore, the maximum value was selected based on the Scenarios 1 – 5. (Refer to Table 4.1)
- (3) Construction of Causeway Bay Flyover
- (4) Cumulative TSP Concentration (4)=(2)+(3)
- (5) The 24-hour TSP criteria is 260 $\mu\text{g m}^{-3}$

4.1.11 Based on the above tables, exceedances of both 1-hour and 24-hours TSP criteria are predicted at some ASRs. The maximum predicted 1-hour and 24-hour TSP at A49, Marco Polo Mansion (eastern facade) would be 1009 $\mu\text{g m}^{-3}$ and 555 $\mu\text{g m}^{-3}$ respectively. Detailed calculations of the emission factors and breakdown of the dust impact are provided in Appendix 4.1. A sample output file of FDM model run, which includes all the input information and model parameters for the assessment, is provided in Appendix 4.2.

4.1.12 To further ensure compliance with the AQOs at all ASRs at all time, the mitigation measures were recommended to minimise cumulative dust impact. The recommended mitigation measures are stipulated in Section 5.1.1.

Operational Phase

4.1.13 During the operation phase, vehicle emission generated from the road network may pose a potential air quality impact. In order to evaluate air quality impact from the Project, representative ASRs stated in Table 4.1 and two planned receivers, namely A87 and A88, in the vicinity of the work site were selected for operational air quality assessment.

4.1.14 In accordance with the Section 3.5.12 of the approved WDII EIA Report, the air quality of the study area of this Project has been assessed in view of the presence of Central-Wan Chai Bypass and ICEL Link and the roads proposed under WDII and CWB & IECL Projects. Having reviewed the Causeway Bay Flyover layout in WDII EIA report and the present layout in this Project, the alignment of the proposed Causeway Bay Flyover in this Project is only shifted to the south west direction by about 5m. The Causeway Bay Flyover considered in WDII EIA Report has been assumed as two-lanes flyover and its scale is similar to the present layout.

4.1.15 Besides, referring to the WDII Traffic Impact Assessment Report, there is a steady increase growth of traffic per year. The adoption of traffic flow Year 2027 would be the worst-case scenario in the assessment.

4.1.16 Based on the above reasons, the assessment results in the WDII EIA Report are still considered valid to be adopted in this project profile.

4.1.17 In accordance with the Section 3.7.7-3.7.12 of the WDII EIA Report, the cumulative 1-hr NO₂, 24-hr NO₂, 24-hr RSP and 1-hr CO concentration at ASRs are summarised in Table 4.6.

Table 4.6 Predicted Cumulative 1-hour Average NO₂, 24-hour Average NO₂, 24-hour Average RSP and 1-hour Average CO Concentrations at the Representative ASRs at 1.5 m above ground

ASRs	Predicted Concentration ($\mu\text{g m}^{-3}$)* ⁽¹⁾			
	1-Hour NO ₂	24-Hour NO ₂	24-Hour RSP	1-Hour CO
A44	265	140	111	3934

ASRs	Predicted Concentration ($\mu\text{g m}^{-3}$)* ⁽¹⁾			
	1-Hour NO ₂	24-Hour NO ₂	24-Hour RSP	1-Hour CO
A45	263	139	111	3969
A46	253	135	108	3817
A47	228	125	98	3364
A48	205	115	88	2964
A49	202	114	86	2890
A50	193	111	94	3089
A51	244	131	109	3762
A52	174	103	88	2811
A53	231	126	108	3709
A87 ⁽²⁾	291	150	130	4732
A88 ⁽²⁾	156	96	83	2579
Criteria⁽³⁾	300	150	180	30000

Note:

* Background concentrations are included.

(1) Predicted Concentration is reference to Table 3.11 of the WDII EIA Report.

(2) A87 and A88 are planned receivers.

(3) Hong Kong Air Quality Objectives

4.1.18 From the above table, no exceedance of 1-hr NO₂, 24-hr NO₂, 24-hr RSP and 1-hr CO objective would be predicted at any ASR. Mitigation measures were therefore not required.

4.2 Noise

Construction Phase

4.2.1 Construction noise would be mainly generated by activities related to the demolishing of the existing Causeway Bay Flyover and reconstruction of new flyover throughout the project period. The power mechanical equipment (PME) required for each construction stage and its sound power level (SWL) are listed in Appendix 4.3. The Project Proponent confirmed that the inventory list was practicable for completing the Project in schedule. These SWL were obtained from the Technical Memorandum on Noise from Construction Work Other than Percussive Piling.

4.2.2 In order to evaluate construction noise impact from the Project on the noise sensitive receivers (NSRs) in the study area, two representative NSRs in the vicinity of the work site were selected for assessment. The selected NSRs N1 and N2a are in accordance with WDII EIA Report and are located closest to the up ramp and down ramp of the flyover, respectively. The representative NSRs are listed in Table 4.7 and its locations are shown in Figure 4.2.

Table 4.7 Summary of Representative Noise Sensitive Receivers for Construction Noise Impact Assessment

Area	Location	Use	Closest Distance from the Flyover Alignment (m)
N1	Riviera Mansion	Residential	76
N2a	Marco Polo Mansion (eastern facade)	Residential	24

Note:

(1) The locations of N1 and N2a are the NSRs 9 and 11 in WDII EIA Report, respectively.

4.2.3 The construction noise impact at the representative NSRs was assessed in accordance with the methodology of the Technical Memorandum on Noise from

Construction Work Other than Percussive Piling. Cumulative noise impacts from the other concurrent construction activities from WDII Project including entrusted CWB Tunnel within 300m from this Project boundary were also included in the assessment. The construction activities of CRIII Project are out of 300m from the Project boundary and therefore they have not been considered in the assessment. The construction works for Victoria Park Road Widening and CWB & IECL Project (IECL section) would be commenced after the construction of Causeway Bay Flyover. Assessment results indicated that most of the predicted unmitigated noise levels at representative NSRs during daytime would exceed the construction noise criterion of 75 dB(A), mitigation measures were therefore required. A summary for the predicted maximum unmitigated construction noise levels at representative NSRs on each construction stage is provided in Table 4.8. Details of the predicted unmitigated noise levels at representative NSRs during each construction stage are presented in Appendix 4.4.

Table 4.8 Predicted Maximum Unmitigated Noise Levels at Representative Noise Sensitive Receivers

Construction Stage	Predicted Maximum Unmitigated Noise Levels, dB(A)	
	N1	N2a
Stage 1	72	84
Stage 2	76	88
Stage 3	79	82
Stage 4	79	86
Stage 5	77	81
Stage 6	79	81
Stage 7	77	82
Stage 8	76	78

Note: Bold value – exceedance of noise criterion, 75 dB(A)
Construction Noise Impact from WDII has been included

- 4.2.4 As informed by the Project Proponent, no construction work for the Causeway Bay Flyover would be carried out during restricted hours unless otherwise approved by the EPD.

Operational Phase

- 4.2.5 Traffic noise impact would be arising from the re-provisioned flyover during operational phase. NSRs N1, N2a and N2b, in accordance with WDII EIA Report, were selected for traffic noise impact assessment. The descriptions for representative NSRs are listed in Table 4.9. Being confirmed with the Project Proponent, the traffic speed for the re-provisioned flyover is 50 km/hr and its road surface is impervious, which are the same assumptions for the traffic noise prediction in WDII EIA Report. The proposed flyover layout with two lanes has been considered in the WDII EIA and therefore the traffic forecast year 2027 used in the WDII EIA Report are still valid for assessment. The endorsed letter for traffic flow Year 2027 from Transport Department as provided in the WDII EIA Report is attached in Appendix 4.5.

Table 4.9 Summary of Representative Noise Sensitive Receivers for Traffic Noise Impact Assessment

Area	Location	Use	Closest Distance from the Flyover Alignment (m)

Area	Location	Use	Closest Distance from the Flyover Alignment (m)
N1	Riviera Mansion	Residential	76
N2a	Marco Polo Mansion (eastern facade)	Residential	24
N2b	Marco Polo Mansion (northern facade)	Residential	68

Note:

(1) The locations of N2a and N2b are the NSRs 11 and 10 in WDII EIA Report, respectively. The location of N1 is the NSR 9 in WDII EIA Report.

4.2.6 Traffic noise impact assessment was carried based on the assumption of WDII EIA Report but without 0.8m high concrete parapets provided on the roadside of the flyover due to sight-line requirement of the latest design standard. Table 4.10 shows the predicted noise levels at the representative NSRs and detail assessment result is provided in Appendix 4.5.

4.2.7 Referring to the traffic noise assessment results, the overall noise levels at the NSRs would exceed the criterion of 70 dB(A). However, the noise exceedances would be dominantly due to existing roads. The noise levels contributed from the Causeway Bay Flyover in Year 2027 would be less than 1.0 dB(A) in total noise levels. Therefore, mitigation measures on the flyover would not be recommended.

Table 4.10 Predicted Noise Levels at Representative Noise Sensitive Receivers

NSR ⁽¹⁾	Description	Use	Floor	Noise Level from Proposed Causeway Bay Flyover	Noise Levels from other roads ⁽²⁾	Total Noise Levels in 2027, dB(A)
N1	Riviera Mansion	Residential	1	61.8	82.9	82.9
			8	62.6	80.3	80.4
			15	62.5	78.9	79.0
N2a	Marco Polo Mansion (eastern facade)	Residential	1	62.6	78.7	78.8
			8	64.4	77.3	77.5
			15	63.9	75.7	76.0
N2b	Marco Polo Mansion (northern facade)	Residential	1	67.6	80.4	80.6
			8	66.4	78.3	78.6
			15	65.6	77.4	77.7

Note:

(1) The locations of N2a and N2b are the NSRs 11 and 10 in WDII EIA Report, respectively. The location of N1 is the NSR 9 in WDII EIA Report.

(2) Existing roads other than Causeway Bay Flyover and new roads proposed in WDII and CWB&IECL Projects.

(3) The traffic noise criterion of residential development is 70 dB(A).

4.3 Water Quality

Construction Phase

4.3.1 During the construction phase, possible impacts may arise from the discharge of construction wastewater into storm drains, site run-off and the operation of on-site sanitary accommodations. Due to limited scale of the Project, no significant water impact would be anticipated.

Operational Phase

4.3.2 No operational water quality impact from the project would be anticipated.

4.4 Construction Waste

Construction Phase

4.4.1 General construction and demolition materials (about 2500 m³) including wood, scrap metal and concrete generated during construction phase is expected as well as refuse and sewage wastes generated by site workers. Due to close proximity of residences to the construction site, improper waste management on site would cause visual and dust impacts on nearby sensitive receivers. Therefore, good practices for waste management practices are required.

Operational Phase

4.4.2 No waste impacts would be anticipated during operation of the project.

4.5 Landscape and Visual Impact

Construction Phase

4.5.1 There will be some construction plants and equipment on site during construction stage. The demolition materials would be transported off site as soon as they are generated. It is not anticipated to generate significant visual impact. During construction portion of Victoria Park and Causeway Bay Promenade will be occupied as temporary works area, the total area of temporary loss of open space shall be 3,826m² as shown in Figure 1.1 and the remedial measures for landscaping are described in Section 4.5.6.

Operational Phase

4.5.2 The alignment of the proposed flyover aligns adjacent to the existing one. This section addresses the landscape and visual impact for those areas immediately around the new flyover within Victoria Park.

4.5.3 The proposed flyover shall require an encroachment of 1,162m² of the Victoria Park. By surrendering the area created by demolition of the existing flyover, a total of 1,159m² of open space shall be compensated back to Victoria Park. Hence, the net loss of open space in Victoria Park is only 3m². (See Figure 1.1)

4.5.4 As shown in Figure 1.1, the construction of the new flyover will somehow disturb the landscaping areas of Victoria Park, Causeway Bay Promenade and transplanting of affected tree is necessary. Once construction is completed, these areas will be reinstated as soft landscape areas using vegetation to archive a character similar to that which the park currently possesses and partially to screen the flyover and help to integrate it into the park environment. The area freed up by the removal of the existing flyover will be similarly reinstated and the Causeway Bay Promenade shall be reinstated to as existing unless the area is allocated to other projects as works area, then alternative arrangement shall be arranged.

4.5.5 A total of 30 no. of trees within Victoria Park (including 1 Champion Tree – Tree No. 158 (*Ailanthus Fordii*) of the Tree Transplanting Schedule as in Appendix 4.6) and 23 no. of trees within Causeway Bay Promenade which are of common species and not within the list of protected tree species will be affected and they are all proposed for direct transplanting. Tree Transplanting Schedule, Location Plans and Tree

transplanting locations for the affected transplanting within Victoria Park are as shown in Appendix 4.6 and the Project Proponent will strictly follow the procedures and guidelines for tree transplanting given by LCSD as shown in Appendix 4.7. The survival rate for the transplanting trees is expected to be medium to high since the Project Proponent will fully comply with the "Procedures & Guidelines for Trees Transplanting" given by LCSD. Moreover, compensatory trees of same species and same sizes (or those species and sizes agreed by LCSD) will be planted if any transplanted trees are unable to thrive during the maintenance period. For the trees remaining within the site boundary (11 nos. of tree as shown in Appendix 4.6, Figure 1), tree protection measures will be carried out in accordance with the latest standard and techniques laid down by the LCSD as shown in Appendix 4.8. Both land alienation application for the new flyover and tree transplanting proposal were discussed and agreed with LCSD.

- 4.5.6 The area affected by the construction of the new flyover overlaps part of Portion IVB of Victoria Park Proper Improvement Project. To tally with the environment and landscape of Victoria Park, this project shall undertake the reinstatement works including new fence, architectural features, paving and new planting, etc in accordance with the landscaping proposal designed by Architectural Services Department (ASD) for Portion IVB of Victoria Park Proper Improvement Project. The conventional landscaping proposal designed by ASD for LCSD which has incorporated the area affected by the construction of the new flyover within Portion IVB of Victoria Park are as shown in Figures 4.3 and 4.4. Figure 4.3 is abstracted from the Victoria Park Improvement Proper Portion IVB to indicate the new landscaping works nearby the new flyover. Figure 4.4 is to indicate the extent of the area which will be reinstated under this project in accordance with ASD's design. The Project Proponent will forward a detailed landscape proposal of the reinstated area to LCSD for agreement prior to implementation
- 4.5.7 This project can simply be regarded as realignment of the existing flyover inside Victoria Park. The visual impact of the new flyover will not be worse than the existing as the view from Victoria Park to the flyover shall remain similar to the existing. In addition, this project shall take the opportunity to provide architectural finish to the new flyover and new plantings and architectural features around the new flyover. These proposed features which are shown in Figures 4.6 to 4.8 were presented to the ACABAS and no objection from ACABAS was received.
- 4.5.8 As shown in Figure 1.1, due to the realignment of the existing flyover, the footbridge attached to the existing flyover shall be demolished and a temporary footbridge will be provided by this project at a location about 40m east of the existing pedestrian footbridge with south landing resting within Victoria Park. Based on the latest information, a wide landscaped pedestrian crossing deck connecting Victoria Park and the future seafront promenade will be constructed by WDII Project of Territories Development Department (TDD). Upon the completion of such pedestrian crossing by TDD, the proposed temporary footbridge shall be demolished and therefore there should be no long term visual impact from the temporary footbridge.
- 4.5.9 All landscaping works shall be carried out and funded by this project with one year maintenance period. Then the park area shall be handed back to LCSD for long term management and maintenance. A Landscape Architect shall be employed during the construction and maintenance period by this project to be responsible for all landscaping matters for this project. .

5. ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED

5.1 Air Quality

Construction Phase

5.1.1 In order to minimize the air quality impact during the construction, the following mitigation measures recommended for WDII, CRIII and CWB & IECL projects would be adopted in accordance with WDII EIA. The construction site for Causeway Bay Flyover was also proposed to adopt these dust suppression measures.

- ? Twice daily water of work site with active operation when the weather and the work site are dry. Through the implementation of this mitigation measures, dust emissions from materials handling can be reduced by 50%, according to USEPA AP-42;
- ? Water spraying during excavation and material handling; this can reduce the emission by 85%
- ? Provision of vehicles wheel and body washing facilities at the exit points of the site, combined with cleaning of public road where necessary; and
- ? Tarpaulin covering of all dusty vehicles loads transported to, from and between site locations

5.1.2 With the above mitigation measures, the predicted cumulative 1-hour and 24-hour TSP concentrations are shown in Tables 5.1 and 5.2.

5.1.3 Detailed calculations of the emission factors and breakdown of the dust impact are provided in Appendix 5.1. A sample output file of FDM model run, which includes all the input information and model parameters for the assessment, is provided in Appendix 5.2.

Table 5.1 Predicted Cumulative 1-hour Average TSP Concentration at Representative ASRs (Mitigated)

ASRs	Predicted TSP Concentration ($\mu\text{g m}^{-3}$)							
	Predicted Concentration *							
	WDII ⁽¹⁾						Causeway Bay Flyover ⁽³⁾	Cumulative 1-hr ⁽⁴⁾
	Scen.1	Scen.2	Scen.3	Scen.4	Scen.5	Max ⁽²⁾		
A44	108	161	139	142	144	161	16	177
A45	112	149	150	150	171	171	54	225
A46	115	144	166	166	176	176	76	252
A47	119	143	181	181	155	181	70	251
A48	123	138	185	185	172	185	55	240
A49	130	139	184	184	185	185	127	312
A50	103	391	149	149	166	391	13	404
A51	127	224	141	140	159	224	16	240
A52	115	177	154	154	164	177	22	199
A53	111	193	147	146	186	193	26	219

Note: * Background concentration is included

(1) Predicted Concentrations are extracted from the Central-Wan Chai Bypass and Island Eastern Corridor Link and EIA Report, Wan Chai Development Phase II. The construction activities of the WDII, CRIII and CWB & IECL were taken into account.

(2) Referring to the construction programme, the construction of Causeway Bay Flyover would only overlap the Scenarios 1- 5 of WDII Project, therefore, the maximum value was selected based on the Scenarios 1 – 5. (Refer to Table 3.5 of WDII EIA Report)

(3) Construction of Causeway Bay Flyover

(4) Cumulative: Cumulative TSP Concentration (4)=(2)+(3)

Table 5.2 Predicted Cumulative 24-hour Average TSP Concentration at Representative ASRs (Mitigated)

ASRs	Predicted TSP Concentration ($\mu\text{g m}^{-3}$)							
	Predicted Concentration *							
	WDII ⁽¹⁾						Causeway Bay Flyover ⁽³⁾	Cumulative 1-hr ⁽⁴⁾
	Scen.1	Scen.2	Scen.3	Scen.4	Scen.5	Max ⁽²⁾		
A44	96	124	114	114	115	124	8	132
A45	97	118	119	119	130	130	28	158
A46	99	115	128	127	132	132	40	172
A47	101	115	136	135	122	136	36	172
A48	103	113	138	137	130	138	29	167
A49	107	114	137	137	137	137	66	204
A50	94	250	119	119	127	250	7	257
A51	105	159	115	114	123	159	9	168
A52	99	133	122	121	126	133	12	145
A53	97	143	118	117	138	143	13	156

Note: * Background concentration is included

(1) Predicted Concentrations are extracted from the Central-Wan Chai Bypass and Island Eastern Corridor Link and EIA Report, Wan Chai Development Phase II. The construction activities of the WDII, CRIII and CWB & IECL were taken into account.

(2) Referring to the construction programme, the construction of Causeway Bay Flyover would only overlap the Scenarios 1- 5 of WDII Project, therefore, the maximum value was selected based on the Scenarios 1 – 5. (Refer to Table 3.5 of WDII EIA Report)

(3) Construction of Causeway Bay Flyover

(4) Cumulative: Cumulative TSP Concentration (4)=(2)+(3)

5.1.4 From the above results, the predicted dust levels at all ASRs would comply with the 1-hour and 24-hour TSP criteria.

Operational Phase

5.1.5 The predicted air quality impacts on the ASRs are within the Air Quality Objective. No mitigation measure would be required during the operational phase.

5.2 Noise

Construction Phase

5.2.1 With the adoption of following quiet plant with reference to BS 5228: Part 1: 1997, which are known to be in Hong Kong, attenuation of about 3 – 4 dB(A) was obtained. However, 1 – 6 dB(A) noise exceedances were still predicted at the NSRs during some construction stages. Adoption of quiet power mechanical equipment (PME) in different construction stages are summarised as following. The Project Proponent confirmed that the proposed quiet plant were suitable for the intended construction works and are likely to be available locally.

Main Works

Stage 1: Lorry, mobile crane, poker vibrator;

Stage 2: Excavator mounted breaker, asphalt paver, roller, lorry, mobile crane, poker vibrator;

Stage 3: Excavator mounted breaker, lorry, mobile crane;

Stage 4: Excavator mounted breaker, lorry, mobile crane;

Stage 5: Mobile crane, poker vibrator, lorry;

Stage 6: Excavator mounted breaker, lorry, mobile crane;

Stage 7: Excavator mounted breaker, lorry, mobile crane;

Stage 8: Excavator mounted breaker, lorry, poker vibrator.

5.2.2 To further alleviate the construction noise impacts, reduction of on-time operation of

some PMEs, installation of temporary noise barriers for certain noisy equipment and reduction of plant number, will be adopted. With the implementation of above proposed mitigation measures, the predicted maximum noise levels at all representative NSRs would comply with the construction noise criterion. Adoption of the above mentioned mitigation measures for different construction stages are summarised as follows:

Reduction in number of PME & PME % On-time

Main Works

Stage 1: Lorry, bored pile machine
 Stage 2: Excavator mounted breaker, roller, lorry & bored pile machine
 Stage 3: Bored pile machine
 Stage 4: Excavator mounted breaker, lorry & bored pile machine

Installation of temporary movable noise barrier

Main Works

Stage 1: Bored pile machine
 Stage 2: Excavator mounted breaker, air compressor & bored pile machine
 Stage 3: Excavator mounted breaker
 Stage 4: Excavator mounted breaker, bored pile machine
 Stage 5: Bored pile machine
 Stage 6: Excavator mounted breaker
 Stage 7: Excavator mounted breaker, bored pile machine
 Stage 8: Excavator mounted breaker

5.2.3 A summary for the predicted maximum mitigated noise levels at the representative NSRs during each construction stage is provided in Table 5.3. Detail sound power levels of PMEs under mitigation scenario and mitigated results are presented in Appendices 5.3 and 5.4 respectively.

Table 5.3 Predicted Maximum Mitigated Noise Levels at Representative Noise Sensitive Receivers

Construction Stage	Predicted Noise level, dB(A)	
	N1	N2a
Stage 1	67	75
Stage 2	67	75
Stage 3	73	75
Stage 4	69	75
Stage 5	73	75
Stage 6	73	73
Stage 7	72	74
Stage 8	71	72

Note:

- (1) Adoption of quiet plant, reduction of on-time operation of PMEs and installation of temporary noise barriers Construction Noise Impact from WDII has been included.
- (2) Construction Criterion for NSR is 75 dB(A)

Operational Phase

5.2.4 In accordance with the assessment results in Section 4, the traffic noise contribution from Causeway Bay Flyover in the total noise levels would be less than 1.0 dB(A), the provision of noise barrier on the flyover would not be effective to attenuate the total noise levels. Therefore, it is not recommended to provide the noise barriers on Causeway Bay Flyover.

5.3 Water Quality

5.3.1 By implementing good practices outlined in ProPECC PN 1/94 "Construction Site Drainage", the surface runoff could be controlled satisfactorily without adverse impact during demolition and construction. Relevant clauses will also be incorporated into the construction contract documents requiring the Contractor to comply with the Water Pollution Control Ordinance and its subsidiary regulation.

5.4 Waste Management

5.4.1 Waste management in the way of avoiding, minimising, reusing and recycling should be adopted to reduce waste generation. In addition, on site sorting of demolition debris would be carried out. Scrap metals or abandoned equipment would be recycled if possible. Relevant pollution control clauses will be included in the construction contract in order to minimize the environmental nuisance to the nearby sensitive receivers.

5.4.2 As part of the project area is in close proximity of some existing petrol filling stations, it is recommended that the Contractor shall submit a contingency plan if any of the project area is suspected to be contaminated by TPH during construction.

6. USE OF PREVIOUSLY APPROVED EIA REPORTS

6.1.1 Wan Chai Development Phase II Environmental Impact Assessment Report.

6.1.2 Central-Wan Chai Bypass and Island Eastern Corridor Link Environmental Impact Assessment Report.

6.1.3 Central Reclamation Phase III- Studies, Site Investigation, Design and Construction, Environmental Impact Assessment Report.

7. CONCLUSIONS

7.1.1 Potential air quality and noise impacts arising from construction of the project would likely affect the sensitive receivers in the vicinity. However, with the implementation of mitigation measures, no adverse impacts would be anticipated and the sensitive receivers would comply with the legislative criteria. Negligible water and waste impact would be expected with adoption of good site practice during construction.

7.1.2 The proposed flyover is only a replacement of the existing one and has no noise barrier to be installed. Therefore, visually the proposed flyover shall have minimal impact to the surrounding. In addition, the landscaping measures and features proposed for the new flyover and designed by ASD for the Portion IVB of Victoria Park Improvement Proper project will be undertaken in this project. It can be concluded that the landscape and visual characteristic of the area nearby the new flyover will be enhanced.

7.1.3 Based on the above assessments, the environmental impacts on the sensitive receivers during construction and operation stages would meet the legislation criteria.

