TABLE OF CONTENTS

Page

List of Tables

List of Figures

Appendices

1.0 INTRODUCTION

Background

1.1 In order to facilitate the construction works for the Cyberport Development, the Project Proponent intends to erect a concrete batching plant for the day-to-day consumption at the site. However, the proposed facility has the potential to cause adverse cumulative impacts on the air quality and to a lesser extent the noise level, water quality, waste management and visual quality at the nearby sensitive receivers. As the issue was not addressed in the Environmental Impact Assessment Report, entitled “Infrastructural Works for the Proposed Development at Telegraph Bay” (hereinafter called “approved EIA Report”) for the proposed development, the establishment of the proposed facility is considered to constitute a Material Change to the approved EIA Report. This report has been prepared to address this Material Change in fulfilment of the requirement of the Environmental Impact Assessment Ordinance (EIAO).

1.2 Maunsell Consultant Asia Limited (MCAL) in association with Maunsell Environmental Management Consultants Limited (MEMCL) were commissioned by Cyber-Port Limited to assess the potential environmental impact of constructing and operating the proposed concrete batching plant on the nearby sensitive receivers. This report presents the assessment criteria, methodology, and results for the potential noise, dust and visual impacts, as appropriate, during construction and operation phases, with and without mitigation measures. It addresses also the cumulative effect with the concurrent construction activities including advance works, main construction works and road works (include Southern Access Road, Northern Access Road, D1 and D2 roads). An EM&A Manual has also been prepared as a stand-alone document.

Objectives of the Environmental Impact Studies

1.3 The main objective of this EIA were as follows :

1.4 To identify and describe the elements of the community and environment likely to be affected by the Projects;

1.5 To identify and quantify emission sources and determine the significant of impacts on sensitive receivers and potential affected uses;

1.6 To propose the provision of mitigation measures so as to minimise pollution, environmental disturbance and nuisance arising from the project;

1.7 To identify, predict and evaluate the residual environmental impacts (i.e. after practicable mitigation) and the cumulative effects expected to arise from the project in relation to the sensitive receivers and potential affected uses;

1.8 To identify, assess and specify methods, measures and standards, to be included in the Project which are necessary to mitigate these environmental impacts and to reduce them to acceptable levels.

Scope of the Environmental Impact Assessment Study

1.9 This EIA study addressed the likely potential air quality, noise, visual, waste management and water quality impacts of the project, together with any other key issues identified during the course of the EIA study.

1.10 The concrete batching plant will be constructed in two stages. Stage 1 is a mobile unit, with a total cement silo capacity of 45 tonnes, and Stage 2 is a more permanent unit with total cement silo capacity of 800 tonnes. Once the Stage 2 plant is operational, the Stage 1 mobile unit will be used as back up and will not operate concurrently with the Stage 2 plant. As a worst case scenario, the assessment has therefore focused only on the impacts arising from the Stage 2 batching plant.

2.0 DESCRIPTION OF THE PROJECT

Background

2.1 The approved EIA has assumed that ready-mixed concrete in concrete mixer trucks would be delivered by barges to Telegraph Bay for the construction of Cyberport. The delivery of concrete by sea or by road would cause environmental and traffic problems in the peak production period. The production of concrete at an off-site concrete batching plant would also create environmental problem for local sensitive receivers. It proposes, as an alternative, that an on-site concrete batching plant be constructed to meet the concrete demand on site.

2.2 Estimated quarterly consumption of concrete quantity required for the current programme of construction at Cyberport is tabulated in Table 2.1.

Table 2.1 Estimated Quarterly Consumption of Concrete Quantity

Quarter	Quantity$_1$, m^3	Average Truck Load per Day$_2$
2Q2000	11,000	29
3Q2000	24,630	64
4Q2000	39,850	104
1Q2001	54,460	141
2Q2001	54,460	141
3Q2001	71,360	185
4Q2001	58,970	151
1Q2002	48,285	125
2Q2002	48,285	125
3Q2002	44,420	115
4Q2002	44,420	115

Quantity is estimated based on 25 production days per month.
Concrete capacity of each mixer truck is assumed to be 5 m^3/Load.

Environmental and Programming Benefits

2.3 According to the concrete consumption in Table 2.1, it is estimated that more than 10 barges would be required for daily delivery of concrete mixer trucks after the fourth quarter in year 2000. The maximum barge traffic would be 26 barges per day in the third quarter of 2001. It is anticipated this additional barge traffic may have implications on the busy marine traffic around the Hong Kong waters.

2.4 The short-term tenancy for the concrete batching plant operated by Ready Mixed Concrete (H.K.) Limited (RMC), the concrete provider of the site, at Aberdeen may be terminated very soon. The employment of other batching plant at Ap Lei Chau may also affect the marine traffic. It is very likely that the supply of concrete would rely on batching plant not in the practical vicinity of Telegraph Bay. This would definitely lengthen the travelling time for barges, with consequential problem on concrete quality.

2.5 The barge traffic would also create air quality, noise and water quality pollution along the marine route. Dark smoke from barges is both unsightly and air polluting and this has been a cause for complaint by residents at Baguio Villas. Barge horn noise would be unavoidable under misty weather and therefore can be another cause for complaint. In addition, minor quantities of wastewater may be discharged from these barges into the water, causing local water pollution.

2.6 The existing vertical seawall is not designed for berthing of a large number of barges. However, construction of a new jetty would cause marine water quality impact and programming constraints on the construction works.

2.7 Other demerits include the delivery time of concrete by barges. It is very likely that because of busy marine traffic, concrete may not always be delivered to the site by barges earlier than, say, 6: 00 p.m., for the concrete to be placed before 7:00pm on each working day. Any delay in the delivery would require concreting to proceed into the restricted hours and therefore risk the violation of the Environmental Permit conditions.

2.8 On the other hand, land transportation of concrete would require a large number of trucks on road after the 4th quarter of 2000, which would, in turn, cause serious traffic problem for Victoria Road and generate air quality and noise impacts on the nearby sensitive receivers

2.9 An on-site concrete batching plant is therefore desirable from environmental and operational points of view. Table 2.2 summarizies the benefits between an on site concrete batching plant and the concrete delivery by barges.

Table 2.2 Comparison between on site concrete batching plant and concrete delivery by barges

	Concrete Batching off-site	**Concrete Batching Plant on Site**
Barge Traffic	4 to 5 barges per day for Stage 1 Up to 26 barges per day for Stage 2	2- 3 barges per day for two days a week
Air Quality impact	High, due to the exhaust emissions from the barges	Low, due to the low number of barges operating and the batching plant is totally enclosed
Noise Impact	Medium, but high during misty weather. In case that land transportation is used, the delivery of concrete will increase the traffic noise impact on the nearby sensitive receivers.	Low, due to the low number of barges operating and the batching plant is totally enclosed.
Water Quality Impact	High risk of polluting the harbour due to barges	Low risk
Marine Traffic Impact	High	Low
Visual Impact	High, particularly when dark smokes are emitted from a large number of barges	Low, as the earth mound and future buildings will reduce the visual impact
Delivery Timing Control	Little control on the timing due to the busy marine traffic	Good control on concrete delivery
Potential for Mitigation	Mitigation measures are difficult to implement on barges.	Easy to implement. As the concrete batching plant is stationary, the mitigation measures (such as totally enclose the plant) can easily be applied.

2.10 It is clear from Table 2.2 that an on-site concrete batching plant has far better environmental benefits than an off-site concrete batching plant. In addition, the on-site concrete batching plant will only supply concrete for the day to day use at Cyberport only. No concrete will be delivered off site.

In addition, as the concrete batching plant is constructed on top of a concrete base slab which separates the plant from existing ground, it is anticipated that no land contamination will be resulted during decommissioning of concrete batching plant.

Location of the proposed Batching Plant

2.11 RMC has proposed to install a concrete batching plant with a maximum hourly production of 300 m^3 concrete. Location of the proposed batching plant is shown in Figure 2.1.

2.12 The siting of the concrete batching plant has been carefully examined. The proposed location is considered the best in terms of environmental and visual impacts while maintaining the stability of the seawall. In addition, the proposed location is quite far away from Baguio Villa. It is anticipated that the existing earth mound and the future commercial buildings would screen the plant at this location from the sensitive receivers, and hence the potential visual impact can be much reduced. Further details are given in Chapter 8. For other locations further south along the seawall, the earth mound and the future commercial buildings can only screen a small portion of the proposed concrete batching plant, the advantage of using earth mound and buildings to reduce the visual impact may not be guaranteed.

2.13 Furthermore, the proposed location of the concrete batching plant to the nearest sensitive receiver is about 280m away, which comply with the Hong Kong Planning and Standard Guideline (HKPSG).

2.14 In addition, the proposed plant is very close to the vertical seawall. If alternative locations are selected, longer conveyance system and more traffic will be required to transfer the cement and aggregates from the vertical seawall to the concrete batching plant. These may introduce additional and unnecessary noise and dust nuisance to local sensitive receivers.

Description of the Proposed Batching Plant

2.15 The actual operation of the plant will be subject to the issuance date of the Environmental Permit and the S.P. License. The concrete batching plant would operate until November 2001 when the land lease for the plant expires; thereafter the need for such a concrete batching plant will be re-visited.

2.16 As the operation of a concrete batching plant with a total silo capacity exceeding 50 tonnes is a specified process (S.P.) under the Air Pollution Control Ordinance (APCO), application for a S.P. license is required in order to conduct the works. As it takes time for the authority to issue a S.P. license, the intention is to divide the works into two stages for the operation of the concrete batching plant. A mobile batching plant of a total cement silo capacity of 45 tonnes would be employed for temporary production in Stage 1 while a complete batching plant of a total capacity of 800 tonnes would be operated in Stage 2 (Fig.2.2).

2.17 For the Stage 1 plant, a mobile batching plant Mob 60 with a total silo capacity of 45 tonnes – one 30 tonnes and one 15 tonnes, would be employed. The mixer capacity is 1.25 m^3/batch. The dimension of Stage 1 plant is 23m x 20m x15m. Cement and aggregates are delivered to the site by barges. Fig.2.3 shows the schematic diagram for stage 1. Predetermined mixing ratios of cement and aggregates are set to produce different grades of concrete for application. Appropriate amount of water is also injected to form the mix.

2.18 Cement is pumped from the barge to a cement tanker. The cement tanker transfers the cement to the fully enclosed cement silos. Cement is stored in the silos and properly weighed for mixing. Dust collectors would be installed at the cement silos and the concrete mixer. Totally three dust collectors would be employed.

2.19 Aggregates would be transferred from a barge to a tripper truck through the sea front receiving hopper. In order to reduce dust emission, water will be sprayed on the barge (Fig.2.4). The tripper truck then transports the aggregates to the aggregate storage yard (Fig.2.5). A wheel loader would transfer the aggregates to an aggregate-receiving hopper (Fig.2.6). Finally, the aggregates are conveyed to a fully enclosed aggregate storage bin with a total capacity of 30 tonnes by a belt conveyor. Aggregates are stored in the overhead storage bins and ready for mixing in the mixer

2.20 For the Stage 2 plant, a fixed batching plant with a total cement silo capacity of 800 tonnes – two 200 tonnes and four 100 tonnes, would be employed (Fig.2.7). The mobile batching plant Mob 60 would be used as a standby and will not be operated concurrently with the Stage 2 plant. The total dimensions of the Stage 2 and Stage 1 plants is 95m x 45m x 24m. The Stage 2 plant is composed of two identical mixers. Both will be operated at batch mode and the capacity is 3.5 m^3/batch each. Cement and aggregates are also delivered to the site by barges. Similar operations to the Stage 1 are involved.

2.21 In Stage 2, cement is directly pumped from the barge to the cement silos. The schematic diagram is shown in Fig. 2.8. There are totally six cement silos – two are 200 tonnes and four are 100 tonnes. The two 200 tonnes silos are interconnected while the other four silos are also connected. Two dust collectors would serve each group of silos and one dust collector would serve the two mixers. Therefore, totally five dust collectors would be employed in the Stage 2 plant.

2.22 The operating hours will be 0700 to 1900 hours on a normal working day. There will be no operation on Sundays and Public Holidays.

2.23 Aggregates would be transferred from a barge to the sea front receiving hopper. Afterwards, the aggregates would be transported to a group of five 200 tonnes aggregate storage bins by enclosed belt conveyors (Fig.2.9). Moreover, each mixer is equipped with an overhead storage bin composing of four compartments (Fig. 2.10). Each compartment can hold 40 tonnes of aggregates.

2.24 Three sets of generators would be used in the plant - two sets for the batching plant and the other for maintenance workshop.

2.25 A concrete recycling machine of capacity $20m^3$/hr will be installed on-site to recycle concrete waste (Fig.2.11). In the worst case situation, the recycled concrete will not exceed $5m^3$/day.

2.26 Before decommissioning of the proposed concrete batching plant, remained materials shall be removed from the facilities before decommissioning of concrete batching plant. The storage, handling and disposal of unused materials, chemical waste, construction waste, general refuse shall be conducted with current waste management practices. In addition, during decommissioning, the noise and air quality impacts will be much lower than those in the operation and construction phases.

Construction Program

2.27 Table 2.3 shows the schedules of the concrete batching plant

Table 2.3 Schedules of Concrete Batching Plant

Description	Period	Time
Construction of Stage 1	~ 1 month	Dec 2001
Operation of Stage 1 and Construction of Stage 2	~ 3 month	March 2001
Operation of Stage 2	~3 month after and onwards	April 2001

2.28 The construction works during the commencement of Concrete Production and the completion of Concrete Production (i.e. Dec, 2000 to Dec, 2001) will comprise the following works:

- Main Construction Works for the Telegraph Bay Development
- Construction and operation of the Concrete Batching Plant

2.29 The main construction work includes construction of the Cyberport Phase C1, C2, C3 and R1, sewage treatment plant, Southern Access Road, Northern Access Road, Road D1, D2 and L1.

2.30 The working Programmes for various works are shown in Fig.2.12 and Fig.2.13.

3.0 RELEVANT ENVIRONMENTAL LEGISLATION

Introduction

3.1 This section presents a summary of current and relevant environmental legislation which relates to the assessment of potential environmental impacts from the proposed development.

Environmental Impact Assessment Ordinance

3.2 Preparation of the EIA itself has been undertaken in accordance with the Environmental Impact Assessment Ordinance (EIAO) and associated Technical Memorandum on Environmental Impact Assessment (EIA-TM) (Environmental Impact Assessment Ordinance, Cap.499, S.16).

Air

3.3 The Air Pollution Control Ordinance (APCO) provides the statutory authority for controlling air pollutants from a variety of stationary and mobile sources, including fugitive dust emissions from construction sites. It encompasses a number of Air Quality Objectives (AQOs) which stipulate concentrations for a range of pollutants including Sulphur Dioxide (SO2), Nitrogen Dioxide (NO2), Respirable Suspended Particulars (RSP) and Total Suspended Particulates (TSP).

3.4 In addition, the AQOs, Annex 4 of EIA-TM also outlines criteria for evaluating the construction dust and odour impacts.

3.5 The Air Pollution Control (Restriction on Open Burning) Regulations may also be relevant during the construction phase of the development.

Noise

3.6 Reference to table 1B of the Technical Memorandum on Environmental Impact Assessment Process (EIA-TM) regarding noise standards for daytime construction activities, a limit of $L_{eq(30\ min)}$ 75 dB(A) has been proposed for all domestic premises including temporary housing accommodation, hotels and hostels. For schools, a daytime noise level of $L_{eq(30\ min)}$ 70 dB(A), lowered to 65 dB(A) during examination periods is recommended.

3.7 Subsidiary regulations of the NCO include the Noise Control (Hand Held Percussive Breakers) and Noise Control (Air Compressors) Regulations, which required compliance with relevant noise emission standards and the fixing of noise emission labels to hand-held percussive breaker and air compressor respectively. While these requirement

3.8 The control of construction noise during restricted periods (anytime for percussive piling) is carried out under the Noise Control Ordinance (NCO) and three subsidiary Technical Memoranda (TMs) covering Noise from Percussive Piling (PP-TM), Noise from Construction Work Other Than Percussive Piling (GW-TM) and Noise from Construction Work in

Designated Areas (DA-TM). The TMs establish the permitted noise levels for construction work depending upon working hours and the existing noise climate. Nothing in this report will bind the noise Control Authority in the assessment of an application for a Construction Noise Permit pursuant to the NCO, instead, the Authority will consider each application based on the contemporary conditions/situations.

3.9 A Construction Noise Permit (CNP) is required by the regulations of the NCO for the use of all PME during restricted hours. The procedures set out in GW-TM, PP-TM, DA-TM are used by EPD to determine whether or not a CNP should be issued. CNPs will not automatically be granted and will be assessed on a case by case basis by the Authority.

Water

3.10 The principal legislation governing marine water quality in Hong Kong is the Water Pollution Control Ordinance (Cap 358), 1980 (WPCO). Under an amendment to the original Ordinance of 1980, the Territorial Waters of Waters of Hong Kong waters have been subdivided into ten Water Control Zones (WCZs) with each WCZ being assigned a designated set of statutory Water Quality Objectives (WQOs). These WQOs relate to the Beneficial Uses (BU) and assimilative capacity of the particular water body or part thereof. The WCZ relevant to this study is the Western Buffer Water Control Zone.

3.11 Effluents generated during the construction and operational phases requiring disposal must comply with the discharge standards stipulated within the Technical Memorandum on Standards for Effluents (TMSE) into Drainage and Sewerage Systems, Inland and Coastal Waters prior to entering the receiving water.

Waste

3.12 The Waste Disposal Ordinance (WDO) (Cap 354) was enacted in 1980 and the formulation of a strategic Waste Disposal Plan for Hong Kong was founded upon this legislation. The relevant waste management legislation which will require compliance during the construction phase include:

- The Waste Disposal Ordinance(Cap. 354);
- The Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354); and
- The Dumping at Sea Ordinance.

3.13 Under the WDO construction waste is classified as a trade waste and the site contractor is responsible for its disposal. Under the Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354) chemical waste includes scrap material and unwanted substances specified under Schedule 1 of the Waste Disposal Regulation. Such materials are considered to have the potential to cause serious environmental, health and safety hazards if they are not stored and disposed of in an appropriate manner. If chemical wastes are to be generated, requiring handling, storage and subsequent disposal, the contractor must register with EPD as a chemical waste generator.

3.14 Guideline values issued within the EPD Technical Circular No 1-1-92 are used to determine suitability of dredges materials for marine disposal (classification based upon metals only).

Landscape and Visual Impact Assessment

3.15 The methodology will be in general accordance with the project brief and Annex 18 of the EIA-TM. The evaluation of landscape and visual impact will be classified into five levels of significance, beneficial, acceptable, acceptable with mitigation measures, unacceptable and determined in accordance with Annex 10 of the EIA-TM.

4.0 AIR QUALITY IMPACT ASSESSMENT

Introduction

4.1 This section evaluates the likely air quality impacts associated with the construction/operation of the proposed concrete batching plant and the concurrent construction works at Telegraph Bay. The key issues will be dust impacts arising from the works and the plant.

Assessment Criteria

4.2 The criteria and guideline for air quality assessment are laid out in Annex 4 and Annex 12 of the *Technical Memorandum on Environmental Impact Assessment Process* (EIA-TM), respectively.

4.3 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 Total Suspended Particulates (TSP) are relevant to this study. The relevant AQOs are listed in Table 4.1.

Table 4.1 Hong Kong Air Quality Objectives

Parameter	Maximum Average Concentration$_1$, µg/m^3		
	1-Hour$_2$	24-Hour$_3$	Annual$_4$
TSP	---	260	80

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 means.

4.4 In addition to the AQOs, a non-statutory 1-hour average criterion for Total Suspended Particulates (TSP) of 500 µg/m^3 (at 298 K and 101.325 kPA) is adopted for assessing construction dust impacts (as specified in the EIA-TM).

Description of Surrounding Environment

4.5 Telegraph Bay is located on the western side of Hong Kong Island and is to be developed with residential towers and G/IC facilities which are compatible with existing developments in the area.

4.6 Telegraph Bay occupies a reclaimed bay with high landscape quality comprising wooded valleys slopes, streams and armoured sea frontage. The site consists of two areas. The larger northern section (proposals for 3 housing sites and 1 G/IC sit) is located at the foot of the western slopes of Hong Kong Island, on the reclaimed site of Telegraph Bay. The southern section (1 housing site) occupies the prominent spur of headland between Waterfall Bay and Telegraph Bay.

Identification of Air sensitive receivers

4.7 Nearby sensitive receivers for air quality in the vicinity of the Study Area are identified. The selected sensitive receivers are made with reference to the approved EIA Report . Description of the sensitive receivers is provided in Table 4.2. Figure 4.1 shows the location of the selected sensitive receiver for the air quality assessment.

Table 4.2 Locations of the Air Sensitive Receivers

ASR	SR No.	Description	Land Use[1]	App. distance between the plant and the ASRs (m)
1	SR1	Stanley Ho Sports Centre	Rec	1033
2	SR2	Tam Villa	R	890
3	SR3	HKU Staff Quarters	R	771
4	SR4	42 Sasson Road	R	619
5	SR5	45 Sasson Road	R	530
6	SR6	47 Sasson Road	R	530
7	SR7	50 Sasson Road	R	518
8	SR8	60 Sasson Road	R	458
9	SR9	Magnolia Villas	R	577
10	SR10	Point Breeze	R	518
11	SR11	Carriana Sasson	R	601
12	SR12	Stone Manor	R	676
13	SR13	Provident Villas	R	768
14	SR14	HKU Medical Faculty	S	878
15	SR18	Ebenezer Home for the Blind	S	845
16	SR19	16-18, Baguio Villas	R	310
17	SR21	Pok Fu Lam Training Centre	S	571
18	SR22	Pok Fu Lam Garden	R	658
19	SR23	Wah Fu Estate	R	780
20	SR24	Lui Ming Choi Secondary School	S	726
21	SR25	Precious Blood Primary School	S	798
22	SR26	Tsui Ching Tong School for the Handicap	S	810
23	SR27	Kong Sin Wan Tsuen	R	589
24	SR40	Pui Ying Secondary School	S	774

1. Residential uses (R); School (S); Recreational uses (Rec)

Meteorology

4.8 The potential for the dispersion of air pollution is very much dependent on local factors such as wind speed, wind direction, and atmospheric stability.

4.9 Site specific meteorological data for the Telegraph Bay Area are limited. The study has therefore reviewed the nearest Hong Kong Observatory meteorological station data to gain an overall appreciation of likely meteorological conditions that would prevail at the study area.

4.10 The fugitive emissions will be determined by local prevailing meteorological conditions. An understanding of prevailing wind speed and direction at the study area will help to determine potential air quality concerns.

4.11 Hong Kong's climate is dominated by two monsoons:

- The warm rain bearing south easterly summer monsoon; and
- The cool dry north-easterly winter monsoon

4.12 The frequency of stable atmospheric conditions over Hong Kong is about 10-20% whilst unstable conditions occur about 30-40% of the time.

4.13 The proposed development site at Telegraph Bay lies between the HK Observatory meteorological sites at Green Island and Wong Chuk Hang.

Identification of Air Pollution Sources

Concurrent Construction Activities

4.14 Dust impact will arise from the following concurrent construction activities:

- Advance Works for Telegraph Bay Development, including earthworks and surcharging on the reclamation area;
- Main Construction Works for Telegraph Bay Development, including access roadworks, civil works and superstructure construction; and
- Construction and operation of the Concrete Batching Plant.

4.15 During the construction phase, dust generating construction activities include vehicle movements, site clearance, drilling, ground excavation and material handling. Wheel wash units will be provided at the entrances and exits of the worksite and, with the proper use of these facilities, there will be minimal dust nuisance outside the worksite. However, fugitive dust will arise from the vehicle movements within the worksite.

4.16 The main dust impacts will arise from truck movements along the unpaved haul roads. Secondary impacts will arise through the stockpiling and removal of spoil during the advance works and main construction works period. The amounts of material expected to be handled during the period December 2000 to December 2001 are summarized in Table 4.3

Table 4.3 Spoil Handling During Construction Phases

Construction Activities	Spoil Quantity (m^3)	Estimated Number of Dump Trucks on Haul road
Advance Works Disposal*	 330,000	 83 veh/hr
Main Construction Works** Road D1 Road D2 Southern Access Road Northern Access Road	 22,280 8,700 124,165 9,900	20 veh/hr
Concrete batching Plant		185 trips/day

* As the import from the sand fill and public has been performed before December 2000, the handling due to the import is not taken into account.

** Since the concrete batching plant is situated on the proposed Route 7, the construction of Route 7 will not take place during the operation of the concrete batching plant.

Construction of Batching Plant

4.17 Major construction works are formation of foundation, erection of carbon steel supports, metal works including welding and assembly of fabricated metal sheets. Since the excavation material is small (~1200m^3), the amounts of dust that will be generated from such works are relatively minor compared with other concurrent construction works at the Telegraph Bay Reclamation. However, during construction, the requirements of the Air Pollution Control (Construction Dust) Regulation in dust control will be strictly followed.

Operation of the Batching Plant

4.18 During the operation of the proposed batching plant, dust emission sources can be identified in the plant. They involve:

- Emissions from the dust collectors;
- Emissions for unloading of materials to receiving hopper;
- Emissions from aggregate stockpile; and
- Emissions from paved access road.

Assessment Methodology

Dispersion Modelling

4.19 Dispersion modelling has been undertaken using USEPA approved Fugitive Dust Model (FDM) to assess potential dust impacts arising from construction activities and fugitive dust sources. Surface roughness was taken to be 0.6 metre in the FDM model to represent the terrain in the vicinity of the study area.

4.20 For the purpose of this assessment, it is considered that dust emissions from vehicles moving on unpaved road surfaces would constitute the major dust source for most of the construction sites. There is no site-specific information relating to particle size distribution, and as a result, assumptions were made using the unpaved road emission equation from AP-42 (5th Edition) to provide input for the FDM modelling. Particle size distribution was estimated based on the most appropriate particle size multipliers. For the modelling exercise 9 particle size classes were used in the FDM model. Their averaged diameters are 0-1 µm, 1-2 µm, 2-2.5 µm, 2.5-3 µm, 3-4 µm, 4-5 µm, 5-6 µm, 6-10 µm and 10-30 µm. The percentage in each class was estimated to be 4%, 7%, 4%, 3%, 7%, 5%, 4%, 17% and 49% respectively.

Meteorological Conditions

4.21 According to the Guideline on Choice of Models and Model Parameters, the worst case meteorological data was used for the FDM modelling:

Mixing height : 500m
Stability Class : D
Wind Direction : worst-case wind angle
Surface Roughness : 0.6 m
Height of Emissions : Ground Level
Wind speed at 1, 2 and 4m/s was tested and the worst case is selected.

Background Pollutant Concentrations

4.22 Background pollutant concentrations have been derived from the baseline monitoring result performed in December 1999 in Cyberport. Therefore, the baseline 1-hour TSP and 24-hour TSP are 265 $\mu g/m^3$ and 59 $\mu g/m^3$ respectively.

4.23 In the absence of in-situ monitoring data, the annual average TSP concentration has been used as the background concentration for the impact assessment.

Emission Factors

4.24 The particulate emission rates are estimated using the Compilation of Air Pollutant Emission Factors (AP-42), USEPA, 5th edition, 1995. The emission factors used in the modelling are tabulated in Table 4.4.

Table 4.4 Emission Factors of Dust Generating Activities

Activities	Emission Factor
Truck movements unpaved roads	Appendix 4.1
Handling of spoil (loading/unloading)	Appendix 4.1
Wind erosion	Appendix 4.1
Emissions for unloading of materials to receiving hopper	AP 42 Section 11.19.2, Table11.19.2-1
Emissions from aggregate stockpile	AP 42 Section 13.2.4
Paved roads	AP 42 Section 13.2.1

Impact Assessment

4.25 During the construction of the Concrete Batching Plant, the requirement of the Air Pollution Control (Construction Dust) will be followed. As the construction period of the plant is short (< 120days) and the amount of excavated material is small (~1200m^3), the impact due to the construction phase of the concrete batching plant is smaller than that during the operation stage. Therefore, the operation phase of the concrete batching plant is presented in this report.

4.26 In the schematic process, there will be totally eleven emission points. Detail calculations of the source strengths of the identified emission points in plant are given in Appendix 4.2.

4.27 The concrete recycling machine is used to recycle wet concrete waste, which will not generate dust problem.

4.28 Mitigation measures which have been assumed in the concrete batching plant assessment are summarized in Table 4.5.

Table 4.5 Mitigation Measures incorporated on the Proposed Concrete Batching Plant

Item/ Process	Description	Mitigation Measures
Unloading of Sand And Aggregates	a. Unloading of Sand and Aggregates from Barge to aggregate Receiving Hopper at Seafront	• Water spray installed on barge for wetting the sand and aggregates[1] • Conveyor barge designed for unloading aggregate[3] • Fully enclosed conveyor used to unload the material to the aggregate receiving hopper[1] • Aggregate receiving hopper installed with 3 sides and water spray[1]
	b. Unloading of wetted Sand and Aggregates from Aggregate Receiving Hopper to Tipper truck	• The wetted sand and aggregates are loaded into the tipper truck in enclosed loadout section[1]
Storage of Sand and Aggregates	Storage of Sand and Aggregates in Ground Storage Yards and Aggregate Storage Bins. Storage of Sand and Aggregates in Fully Enclosed Aggregate Overhead Storage Bins	• The storage yards are installed with 3 sides enclosure and roof, curtain at entrance[1] • Water spray is installed in storage yard for wetting the sand and aggregates[1] • Aggregate Storage Bins and Aggregate Overhead Storage Bins are fully enclosed[1]
Transfer of Sand And Aggregates	a. Transfer of sand and Aggregates from Loadout Section to Storage Yards by tipper truck	• The tipper trucks with wetted sand and aggregates are covered with plastic canvas[2] • The aggregate materials are unloaded into storage yards, which have 3 sides and roof enclosed and curtain at entrance and water spray[1]
	b. Transfer of Sand and Aggregates from Storage Yards to Aggregate Receiving Hoppers by loader	• The sand and aggregates are wetted before transferring to aggregate receiving hopper[1] • Aggregate receiving hopper installed with 3 sides and roof and water spray[1]
	c. Transfer of Sand and Aggregates from Seafront Aggregate Receiving Hopper to Aggregate Storage Bins OR from Ground Aggregate Receiving Hopper or from Aggregate Storage Bins to Overhead Aggregates Storage Bins	• The sand and aggregates are transferred by fully enclosed conveyors[1] • Aggregate conveyor and Transfer Points are fully enclosed[1] • The sand and aggregates are unloaded into fully enclosed overhead storage bins[1]
Batching of Sand And Aggregates	a. Weighing and Batching of Sand and Aggregate by Aggregate Weigh Hopper	• The sand and aggregates are transferred and weighed within an enclosed structure[1]
Unloading of Cementitious Material	a. Transfer of Cementitous Material from Cement Barge to Cement Tankers or directly to Plant Silos	• All cementitious materials are transferred within a fully enclosed piping system[1,2] • The cement blower of barge is enclosed[1,2] • The cement tanker and silos are fully enclosed systems[1,2] • Dust-laden air is filtered through bag filter and vented to the dust collectors[1,2]
Transferring of Cementitious Material	a. Transferring of Cementitious Material from cement tanker to Silos	• The silos are fully enclosed[1,2] • Dust-laden air is filtered through bag filter and vented tot he dust collectors[1,2] • The level alarms are installed for all silos to prevent overfilling[1,2]

Item/ Process	Description	Mitigation Measures
		• Cement Tanker will transfer the materials within an enclosure[1,2]
Batching of Cementitious Material	a. Weighing and batching of Cementitious Material by Cement Weigh Hoppers	• The weigh hopper is fully enclosed[1,2] • Dust-laden air from the cementitious weigh hoppers is filtered through bag filter and vented to the dust collector[1,2] • Cementitious transfer using fully enclosed pipes and screw conveyors[1,2]
Mixing of Sand, Aggregates and Cementitious Material	a. Mixing of Batched Sand, Aggregates and Cementitious Material in the Concrete Mixer	• The mixer is fully enclosed[1,2] • Dust-laden air in the mixer is filtered though bag filter and vented to the dust collector[1,2]
Truck Loading	a. Loading of mixed concrete into the trucks	• All mixing & loading conduct in fully enclosed area[1] • Truck loaded with concrete in "Wet" form[1,2]
Plant Yard	a. The Concrete Batching Plant Area	• Floor to be concrete paved[1,2] • Pavement to be kept moist with water[1,2]
Concrete trucks	a. Concrete Delivery Mixer Trucks within Cyber Port Site	• Well maintained trucks[3] • Clean trucks regularly[1] • Trucks comply with APCO regulations[2]
Plant Equipment	a. Facilities and equipment operates within the batching plant for handling materials and producing concrete	• Perform regular maintenance works for plant equipment[1,3] • Maintain all environmental control facilities in operating condition[3]

1. Recommended by the Best Practicable Means Requirement for Cement Works (Concrete Batching Plant)
2. Recommended by the Air Pollution Contral (Construction Dust) Regulation in Dust Control
3. Good Site Management Practices

4.29 Sample of computer output is shown in Appendix 4.3.

4.30 Results in Tables 4.6 and 4.7 demonstrate that the TSP concentrations arising from the batching plant at the representative ASRs are well below the AQOs. Therefore, there is no air quality impact arising from the plant on the nearby ASRs.

Table 4.6 Predicted TSP Concentration Levels at Representative Air Sensitive Receivers without mitigation at 1.5m height

		TSP Concentration (μgm^{-3})							
		Concrete[1]		Others[2]		Background		Overall	
		1-hr	24-hr	1-hr	24-hr	1-hr	24-hr	1-hr	24-hr
1	SR1	8	4	432	216	265	59	705	279
2	SR2	11	5	550	275	265	59	826	339
3	SR3	13	7	685	342	265	59	963	408
4	SR4	19	9	957	479	265	59	1241	547
5	SR5	24	12	1108	554	265	59	1397	625
6	SR6	24	12	1162	581	265	59	1451	652
7	SR7	26	13	1296	648	265	59	1587	720
8	SR8	30	15	1453	726	265	59	1748	800
9	SR9	22	11	1091	545	265	59	1378	615
10	SR10	26	13	1341	670	265	59	1632	742

		TSP Concentration (μgm^{-3})							
		Concrete[1]		Others[2]		Background		Overall	
		1-hr	24-hr	1-hr	24-hr	1-hr	24-hr	1-hr	24-hr
11	SR11	20	10	961	481	265	59	1246	550
12	SR12	16	8	772	386	265	59	1053	453
13	SR13	13	7	671	336	265	59	949	402
14	SR14	11	5	540	270	265	59	816	334
15	SR18	11	6	476	238	265	59	752	303
16	SR19	57	29	1078	539	265	59	1400	627
17	SR21	23	12	543	271	265	59	831	342
18	SR22	18	9	529	265	265	59	812	333
19	SR23	13	7	739	369	265	59	1017	435
20	SR24	15	8	1010	505	265	59	1290	572
21	SR25	13	7	788	394	265	59	1066	460
22	SR26	13	6	763	382	265	59	1041	447
23	SR27	20	10	1011	505	265	59	1296	574
24	SR40	14	7	791	395	265	59	1070	461

[1]Concrete batching plant, with dust suppression measures
[2]Concurrent construction works at the site
Bolded figure indicate the exceedance of the 1-hr or 24-hr TSP criteria

Table 4.7 Predicted TSP Concentration Levels at Representative Air Sensitive Receivers without mitigation at 10m height

		TSP Concentration (μgm^{-3})							
		Concrete[1]		Others[2]		Back-ground		Overall	
		1-hr	24-hr	1-hr	24-hr			1-hr	24-hr
1	SR1	9	4	446	223	265	59	720	286
2	SR2	11	5	560	280	265	59	836	344
3	SR3	13	7	689	344	265	59	967	410
4	SR4	19	9	936	468	265	59	1220	536
5	SR5	24	12	1051	526	265	59	1340	597
6	SR6	24	12	1103	552	265	59	1392	623
7	SR7	25	13	1217	609	265	59	1507	681
8	SR8	29	15	1323	662	265	59	1617	736
9	SR9	21	11	1053	526	265	59	1339	596
10	SR10	25	13	1260	630	265	59	1550	702
11	SR11	20	10	933	467	265	59	1218	536
12	SR12	16	8	764	382	265	59	1045	449
13	SR13	13	7	672	336	265	59	950	402
14	SR14	11	5	549	274	265	59	825	338
15	SR18	11	6	479	240	265	59	755	305
16	SR19	53	26	952	476	265	59	1270	561
17	SR21	23	12	521	260	265	59	809	331
18	SR22	18	9	523	262	265	59	806	330
19	SR23	14	7	735	368	265	59	1014	434
20	SR24	15	8	896	448	265	59	1176	515
21	SR25	13	7	765	383	265	59	1043	449
22	SR26	13	6	734	367	265	59	1012	432
23	SR27	20	10	948	474	265	59	1233	543

		TSP Concentration (μgm^{-3})							
		Concrete[1]		Others[2]		Back-ground		Overall	
		1-hr	24-hr	1-hr	24-hr			1-hr	24-hr
24	SR40	14	7	785	392	265	59	1064	458

[1]Concrete batching plant, with dust suppression measures
[2]Concurrent construction works at the site
Bolded figure indicate the exceedance of the 1-hr or 24-hr TSP criteria

4.31 Contours of the cumulative 1-hour and 24-hour average TSP concentrations at the levels of 1.5m and 10m above ground are presented in Figures 4.2 and 4.3, showing exceedance of the TSP criteria at sensitive receiver locations.

4.32 As shown in Tables 4.6 and 4.7, the cumulative TSP concentrations are expected to exceed the TSP criteria at all Air sensitive Receivers. In order to comply with the TSP criteria, the following mitigation measures have incorporated for the concurrent construction works at Telegraph Bay:

- Twice daily watering (with complete coverage) of the whole area. Through the implementation of this mitigation measure, dust emissions from materials handling can be reduced by 50%, according to AP-42.
- Speed control of dump truck in site area can reduce dust generation by 50%, according to AP-42.
- A watering program of once every 2 hours in normal weather conditions, and hourly in dry/windy condition on all haul roads can reduce dust emission by 97%, according to the Scheme 1 of the EIA report for the Infrastructural Works for the Proposed Development at Telegraph Bay.

4.33 The mitigated cumulative 1-hour and 24-hour average TSP concentrations are shown in Tables 4.8 and 4.9. The contours of the TSP concentration are shown in Figures 4.4 and 4.5.

Table 4.8 Predicted TSP Concentration Levels at Representsative Air Sensitive Receivers with mitigation at 1.5m height

		TSP Concentration (μgm^{-3})							
		Concrete[1]		Others[2]		Background		Overall	
		1-hr	24-hr	1-hr	24-hr	1-hr	24-hr	1-hr	24-hr
1	SR1	8	4	16	8	265	59	289	71
2	SR2	11	5	20	10	265	59	296	74
3	SR3	13	7	25	12	265	59	303	78
4	SR4	19	9	34	17	265	59	318	85
5	SR5	24	12	41	21	265	59	330	92
6	SR6	24	12	42	21	265	59	331	92
7	SR7	26	13	45	23	265	59	336	95
8	SR8	30	15	51	25	265	59	346	99
9	SR9	22	11	39	19	265	59	326	89
10	SR10	26	13	47	24	265	59	338	96
11	SR11	20	10	35	18	265	59	320	87
12	SR12	16	8	28	14	265	59	309	81
13	SR13	13	7	24	12	265	59	302	78
14	SR14	11	5	20	10	265	59	296	74
15	SR18	11	6	18	9	265	59	294	74
16	SR19	57	29	40	20	265	59	362	108
17	SR21	23	12	20	10	265	59	308	81

		TSP Concentration (μgm^{-3})							
		Concrete[1]		Others[2]		Background		Overall	
		1-hr	24-hr	1-hr	24-hr	1-hr	24-hr	1-hr	24-hr
18	SR22	18	9	20	10	265	59	303	78
19	SR23	13	7	26	13	265	59	304	79
20	SR24	15	8	37	18	265	59	317	85
21	SR25	13	7	29	14	265	59	307	80
22	SR26	13	6	28	14	265	59	306	79
23	SR27	20	10	38	19	265	59	323	88
24	SR40	14	7	28	14	265	59	307	80

[1]Concrete batching plant, with dust suppression measures
[2]Concurrent construction works at the site, with dust suppression measures

Table 4.9 Predicted TSP Concentration Levels at the Selected Air Sensitive Receivers with mitigation at 10m height

		TSP Concentration (μgm^{-3})							
		Concrete[1]		Others[2]		Background		Overall	
		1-hr	24-hr	1-hr	24-hr	1-hr	24-hr	1-hr	24-hr
1	SR1	8	4	16	8	265	59	289	71
2	SR2	11	5	20	10	265	59	296	74
3	SR3	13	7	25	12	265	59	303	78
4	SR4	19	9	34	17	265	59	318	85
5	SR5	24	12	39	20	265	59	328	91
6	SR6	24	12	40	20	265	59	329	91
7	SR7	26	13	43	21	265	59	334	93
8	SR8	30	15	46	23	265	59	341	97
9	SR9	22	11	37	19	265	59	324	89
10	SR10	26	13	44	22	265	59	335	94
11	SR11	20	10	34	17	265	59	319	86
12	SR12	16	8	28	14	265	59	309	81
13	SR13	13	7	24	12	265	59	302	78
14	SR14	11	5	20	10	265	59	296	74
15	SR18	11	6	18	9	265	59	294	74
16	SR19	57	29	36	18	265	59	358	106
17	SR21	23	12	19	10	265	59	307	81
18	SR22	18	9	19	10	265	59	302	78
19	SR23	13	7	26	13	265	59	304	79
20	SR24	15	8	32	16	265	59	312	83
21	SR25	13	7	28	14	265	59	306	80
22	SR26	13	6	27	13	265	59	305	78
23	SR27	20	10	35	18	265	59	320	87
24	SR40	14	7	28	14	265	59	307	80

[1]Concrete batching plant, with dust suppression measures
[2]Concurrent construction works at the site, with dust suppression measures

4.34 From the results, it was noted that with the implementation of the dust suppression measures on the concurrent construction works at Telegraph Bay, no adverse cumulative dust impact is expected at all ASRs.

Conclusions

4.35 The construction works of the concrete batching plant are much smaller than the concurrent construction works of the Telegraph Bay Reclamation. Therefore, the dust impact during construction phase of the concrete batching plant is insignificant. However, during the construction of concrete batching plant, the Air Pollution Control (Construction Dust) Regulation would be strictly followed.

4.36 During operation phase, the concrete batching plant should strictly follow the requirements stipulated in the Best Practicable Means Requirement for Cement Works (Concrete Batching Plant) and the Air Pollution Control (Construction Dust) for dust control. Besides, the following practices will also be incorporated:

- Dust collectors will be sized to exceed the requirement of the Specified Processes Regulation.
- For Stage 1, the cement tankers will be working inside enclosure with cladding to reduce air quality impact.
- For stage 2, cement will be transferred directly from barges to the plant. There is no need for cement tankers for intermediate transfer.

4.37 With the implementation of the mitigation measures at the concrete batching plant and the concurrent construction site at the Telegraph Bay, the predicted cumulative 1-hour and 24 hour TSP concentration are expected to comply with the Air Quality Objectives.

5.0 NOISE IMPACT

Introduction

5.1 During the construction and operation of the proposed on-site concrete batching plant, other construction works such as road works (construction of Northern Access Road, Southern Access Road, D1 and D2 roads) and main construction works will be carried out concurrently. Noise arising from these construction and operation activities are likely to create noise impacts on the surrounding NSRs. The extent of the impacts affecting the identified NSRs will vary from phase to phase depending upon the types of powered mechanical equipment (PME) used and locations of works to be carried out.

5.2 This section presents an assessment for the possible cumulative noise impacts arising from the road works, main construction work, together with the construction/operation of the proposed concrete batching plant at Telegraph Bay between December 2000 and December 2001.

Government Legislation and Standards

5.3 The *Technical Memorandum on Environmental Impact Assessment Process* (EIAO-TM) provides guidance on construction noise levels at the openable windows of various types of noise sensitive buildings. The recommended noise standards are presented in Table 5.1.

Table 5.1 EIAO-TM Daytime Construction Noise Guidelines (Leq, 30min dB(A))

Land Use	Noise Standards dB(A)
Domestic Premises	75
Educational Institutions (normal periods)	70
Educational Institutions (during examination periods)	65

5.4 The target construction noise impact upon school adopted in this assessment is 65 dB(A). However, it is recongized that this target is only applicable during examinations periods, and EIAO-TM provides guidance on construction noise levels at the openable windows of various types of noise sensitive buildings.

5.5 The Noise Control Ordinance (NCO) provides statutory controls on general construction works during the restricted hours (i.e. 1900 to 0700 hours Monday to Saturday and at any time on Sundays and public holidays). The use of powered mechanical equipment (PME) for the carrying out of construction works during the restricted hours would require a Construction Noise Permit (CNP). Despite any description or assessment made in this EIA Report on construction noise aspects, there is no guarantee that a CNP will be issued for the project construction. The Noise Control Authority will consider a well-justified CNP application, once filed, for construction works within restricted hours as guided by the relevant Technical Memoranda issued under the NCO. The Noise Control Authority (NCA)will take into account of contemporary conditions / situations of adjoining land uses and any previous complaints against construction activities at the site before making his decision in granting a CNP. Nothing in this EIA Report shall bind the NCA in making his decision. If a CNP is to be issued, the NCA shall included in it any condition he thinks fit. Failure to comply with any such conditions will lead to cancellation of the CNP and prosecution action under the NCO.

Assessment Methodology

5.6 Noise predictions were undertaken for the Cyberport Development and its Associated Engineering Infrastructure works in accordance with the methodology outlined in the GW-TM. Additional information was obtained from "A Practical Guide to the Reduction of Noise from Construction Works', EPD 1989 and British Standard 5228 Part 1: 1997, 'Noise Control on Construction and Open Sites'.

5.7 A positive correction of 3 dB(A) was made to the calculated result to allow for façade effect. Also, the distance between the batching plant and noise sensitive receivers (NSRs) would be determined [D]. For distance attenuation equals to or below 300m, reference to Table 5 of the GW-TM has been made. For distance attenuation above 300m, it has been estimated using the following formula:

Distance Attenuation in dB(A) = 20 log D +8 [where D is the distance in metre]

5.8 The distance attenuation calculated from the above formula would be subtracted from the total sound power level to give the Predicted Noise Level (PNL) at the existing NSR.

5.9 This assessment presents only the impacts during normal daytime hours (07:00 – 19:00) excluding Sundays and Public Holidays work. The relevant noise criteria as stipulated in the EIAO-TM are 75 dB(A) for residential dwellings, and 70dB(A) for education institutions during normal periods and 65dB(A) during examination periods.

5.10 The construction and operation of the concrete batching plant, and the construction of the road works and main works for cyberport will be carried out concurrently and therefore assessment for the possible cumulative noise impacts from these activities are required. Since the assessment of the Northern Access Road and other main works are performed by two separate consultants. For the purpose of the cumulative assessment, the noise impacts arising from the construction of Northern Access Road and other main works have been made reference to the following two documents:

- R1: Main Work for Cyber Port Development Environmental Permit Variation Application – Construction Noise Impact Assessment (February 2000); and

- R2: Northern Access Road for Cyberport Development Environmental Permit Application – Supplementary Environmental Assessment Report (July 2000);

5.11 The mitigated noise levels at the existing NSRs during the construction of both Northern Access Road and other roads have been calculated in the above documents. The highest mitigated noise level at each of the NSR as given in Appendix 5.1 has been used for the cumulative noise predictions.

Identification of Sensitive Receivers

5.12 Twenty-two representative NSRs similar to those identified in the two documents have been selected for the cumulative noise assessment and are listed in Table 5.2.

Table 5.2 Proposed Noise Sensitive Receivers (NSRs) during Construction of Telegraph Bay Development

NSR No.	Description	Land Use*	No. of Storeys
SR2	Tam Villa	R	22
SR3	HKU Staff Quarters	R	12
SR4-8	42,45,47,50 & 60 Sasson Road	R	3
SR9	Magnolia Villas	R	3
SR10	Point Breeze	R	3
SR11	Carriana Sasson	R	3
SR12	Stone Manor	R	3
SR13	Provident Villas	R	3
SR19	16-18 Baguio Villas	R	10
SR19 a, b	45-48 Baguio Villas	R	29
SR21	Pok Fu Lam Training Centre	S	7
SR22	Pok Fu Lam Garden	R	28
SR23	Wah Fu Estate	R	21
SR24	Lui Ming Choi Secondary School	S	7
SR25	Precious Blood Primary School	S	5
SR26	Tsui Ching Tong School For the Handicap	S	6
SR27	Kong Sin Wan Tsuen	R	2-3
SR40	Pui Ying Secondary School	S	7

* Residential Uses – R, School Uses - S

Noise Impact Assessment

Potential Construction Noise Impacts

5.13 The construction and operation of the proposed concrete batching plant is scheduled to be carried out from December 2000 to December 2001, including three phases as shown in the following table.

12/2000	01/2001 – 03/2001	04/2001 – 12/2001
Phase 1	**Phase 2**	**Phase 3**
Construction of Stage 1 batching plant	Construction of Stage 2 batching plant and operation of Stage 1 batching plant	Operation of Stage 2 batching plant

5.14 A list of powered mechanical equipment (PME) items to be used during the construction and operation of the concrete batching plant, as well as the associated sound power levels (SWLs) are given in the Appendix 5.2. As the conveyor belt will be fully enclosed on all four sides and therefore its contribution to the total sound power level of the concrete batching plant is excluded.

5.15 The unmitigated noise levels for the construction and operation of the concrete batching plant in the three phases at the representative NSRs have been predicted and are presented in Table 5.3. The notional noise source due to the construction of the concrete batching plant and the location of the concrete batching plant are approximately the same. Therefore, same distances are assumed in the assessment of the construction and operation phases noise impact.

Table 5.3 Predicted Noise level due to the operation and construction of Concrete Batching Plant only (Unmitigated)

NSR No.	Approximately Distance to the notional Noise Source of the concrete batching plant(m)	Predicted Noise Level, dB(A)			EIAO-TM Noise Criteria, dB(A)
		Phase 1	Phase 2	Phase 3	
SR2	930	60	61	59	75
SR3	813	61	62	60	75
SR4	663	62	64	62	75
SR5	585	64	65	63	75
SR6	565	64	66	63	75
SR7	562	64	66	63	75
SR8	500	65	67	64	75
SR9	613	63	65	62	75
SR10	570	64	66	63	75
SR11	650	63	64	62	75
SR12	763	61	63	61	75
SR13	813	61	62	60	75
SR19	325	69	70	68	75
SR19 a	380	67	69	67	75
SR19 b	398	67	69	66	75
SR21*	600	63	65	63	70 (65)
SR22	695	62	64	61	75
SR23	825	61	62	60	75
SR24*	763	61	63	61	70 (65)
SR25*	850	60	62	60	70 (65)
SR26*	863	60	62	59	70 (65)
SR27	633	63	65	62	75
SR40*	830	60	62	60	70 (65)

Note: * denotes education institution

Sound Pressure Level inside ( ) indicates the noise limit for education institutions during the examination period.

5.16 As indicated in Table 5.3, the noise levels at the NSRs are predicted to be in the range of 59-70dB(A). The predicted noise levels at all the residential and educational NSRs would be below the noise criterion of 75dB(A) for residential dwellings and 70dB(A) for schools during normal periods and 65dB(A) during examination periods.

5.17 In order to assess the possible cumulative effect of the noise from the construction of Northern Access Road and other roads, and the construction/operation of the concrete batching plant, the cumulative noise levels at the representative NSRs have been calculated and are presented in Table 5.4. The cumulative noise levels at the NSRs are predicted to vary between 59 and 76dB(A). The result indicates that though the cumulative noise levels at all the educational NSRs would comply with the noise criterion of 70dB(A), the cumulative noise levels at some of schools still exceed the noise criterion of 65 dB(A) during examination. On the other hand, due to the cumulative effect, the noise levels at a residential NSR (SR19) are predicted to exceed 75dB(A) criterion by 1dB(A) during the duration between January and March of 2001. Hence, appropriate mitigation measures for the construction and operation of batching plant are required to alleviate the noise impacts. The appropriate mitigation measures are recommended in the following sections.

Table 5.4 Cumulative Construction Noise Levels (Unmitigated)

NSR	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
SR2	65	63	63	62	61	65	61	59	61	61	61	61	61
SR3	75	74	74	75	72	74	75	68	75	75	74	73	73
SR4	74	73	74	69	72	74	69	66	69	69	69	72	72
SR5	66	68	68	68	66	66	66	66	65	65	65	65	65
SR6	64	66	67	66	66	66	66	66	66	66	66	63	63
SR7	69	71	72	72	72	72	72	72	70	70	70	65	67
SR8	72	74	74	74	74	74	74	75	72	71	71	66	70
SR9	75	75	75	74	74	75	73	70	72	72	72	75	75
SR10	69	71	70	71	70	70	69	69	66	65	66	65	67
SR11	65	66	66	66	65	65	65	65	64	64	64	64	64
SR12	64	65	65	65	64	64	64	64	63	63	63	63	63
SR13	63	64	64	64	63	63	63	63	62	62	62	62	62
SR19	75	**76**	**76**	**76**	75	75	75	75	74	74	74	74	74
SR19A	74	75	75	75	74	74	74	74	73	73	73	73	73
SR19B	74	75	75	75	74	74	74	74	73	73	73	73	73
SR21*	**66**	**67**	**67**	**67**	**66**	**66**	**66**	**66**	65	65	65	65	65
SR22	66	67	67	67	65	65	65	65	64	64	64	64	64
SR23	66	66	66	66	65	65	62	62	62	62	62	62	62
SR24*	67	**66**	**66**	**66**	65	65	64	64	64	64	64	64	64
SR25*	62	63	63	63	61	61	63	63	63	63	63	63	63
SR26*	64	64	64	64	63	63	62	62	62	62	62	62	62
SR27	64	66	66	66	64	64	64	64	63	63	63	63	63
SR40*	64	64	64	64	63	63	62	62	61	61	61	61	61

Noted: * denotes educated institutes
Bold means exceedance of the EIAO-TM criteria (75 dB(A) for residential dwellings, 70dB(A) for education institutions during normal periods and 65dB(A) for education institutions during examination period)

Mitigation Measures

5.18 In order to alleviate the noise impacts from the construction and operation of the concrete batching plant, appropriate and practicable mitigation measures have been recommended and are presented in the following sections.

Selecting Quiet Plant and Working Methods

5.19 The most effective way to mitigate noise impact is to reduce noise at source. This involves using quieter equipment plants. With reference to the two documents (R1 and R2), GW-TM and the BS5228: Part 1: 1997 “Noise Control on Construction and open Sites”, some quieter equipment has been selected, including generator, excavator, mobile crane, truck and vibration poker.

5.20 In addition to the above recommended mitigation measures, percentage ‘on-time’ of each PME (the time when the PME is in operation within a 30 minutes time slot) has been taken into account to give a more realistic calculation.

5.21 With the adoption of the recommended mitigation measures and the percentages ‘on –time, the total SWLs for the construction and operation activities of the batching plant are presented in Appendix 5.3. The mitigated noise levels for the Concrete Batching Plant and the cumulative noise levels at the representative NSRs have been calculated and are given in Table 5.5 and 5.6, respectively.

5.22 As indicated in Table 5.6, with the implementation of the recommended mitigation measures, the cumulative construction noise levels at almost all the NSRs (except 24) could be mitigated to be within the EIAO-TM criteria of 75dB(A) for residential dwellings, and 70dB(A) for education institutions during normal periods and 65dB(A) for examination. Therefore, no further mitigation measures are required.

5.23 However, it is noted that 1dB(A) exceedances of the 65dB(A) (noise criterion for schools during examination periods) at SR24 (Lui Ming Choi Secondary School) are predicted in December 2000. On checking with the examination schedule in Lui Ming Choi Secondary School, there is no examination in December. Therefore, the cumulative predicted noise level at SR24 still complies with the 70dB(A) for education institutions during normal periods.

Table 5.5 Predicted Noise level due to the operation and construction of Concrete Batching Plant only (Mitigated)

NSR	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
SR2	52	57	57	57	56	56	56	56	56	56	56	56	56
SR3	53	58	58	58	58	58	58	58	58	58	58	58	58
SR4	55	60	60	60	59	59	59	59	59	59	59	59	59
SR5	56	61	61	61	60	60	60	60	60	60	60	60	60
SR6	56	61	61	61	61	61	61	61	61	61	61	61	61
SR7	57	61	61	61	61	61	61	61	61	61	61	61	61
SR8	58	62	62	62	62	62	62	62	62	62	62	62	62
SR9	56	61	61	61	60	60	60	60	60	60	60	60	60
SR10	56	61	61	61	61	61	61	61	61	61	61	61	61
SR11	55	60	60	60	60	60	60	60	60	60	60	60	60
SR12	54	59	59	59	58	58	58	58	58	58	58	58	58
SR13	53	58	58	58	58	58	58	58	58	58	58	58	58
SR19	61	66	66	66	66	66	66	66	66	66	66	66	66
SR19A	60	65	65	65	64	64	64	64	64	64	64	64	64
SR19B	60	64	64	64	64	64	64	64	64	64	64	64	64
SR21*	56	61	61	61	60	60	60	60	60	60	60	60	60
SR22	55	60	60	60	59	59	59	59	59	59	59	59	59
SR23	53	58	58	58	57	57	57	57	57	57	57	57	57
SR24*	54	59	59	59	58	58	58	58	58	58	58	58	58
SR25*	53	58	58	58	57	57	57	57	57	57	57	57	57
SR26*	53	58	58	58	57	57	57	57	57	57	57	57	57
SR27	55	60	60	60	60	60	60	60	60	60	60	60	60
SR40*	53	58	58	58	57	57	57	57	57	57	57	57	57

Noted: * denotes educated institutes

Table 5.6 Cumulative Noise Levels (Mitigated)

NSR	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
SR2	64	61	60	59	60	64	59	56	60	60	60	60	60
SR3	74	74	73	75	72	74	75	67	75	75	74	73	73
SR4	73	72	73	68	72	74	68	65	68	68	68	72	72
SR5	64	65	65	65	65	65	65	65	64	64	64	64	64
SR6	57	61	65	62	65	65	65	65	65	65	65	61	61
SR7	68	70	71	71	72	72	72	72	70	70	70	63	66
SR8	72	73	73	74	74	74	74	74	71	71	71	65	69
SR9	74	74	75	74	74	75	72	70	72	72	72	75	75
SR10	67	70	69	70	70	70	69	69	64	63	64	63	66
SR11	62	64	64	64	64	64	64	64	62	62	62	62	62
SR12	61	63	63	63	63	63	63	63	61	61	61	61	61
SR13	60	62	62	62	62	62	62	62	61	61	61	61	61
SR19	74	75	75	75	75	75	75	75	73	73	73	73	73
SR19A	73	74	74	74	74	74	74	74	73	73	72	73	73
SR19B	73	74	74	74	74	74	74	74	73	73	73	73	73
SR21*	64	65	65	65	65	65	65	65	64	64	64	64	64
SR22	64	65	65	65	65	65	64	64	63	63	63	63	63
SR23	65	65	65	65	65	65	61	61	61	61	61	61	61
SR24*	66	65	65	65	65	65	63	63	63	63	63	63	63
SR25*	59	60	60	60	59	59	62	62	62	62	62	62	62
SR26*	63	62	62	62	62	62	61	61	61	61	61	61	61

SR27	60	62	62	62	62	62	62	62	61	61	61	61	61
SR40*	62	62	62	62	62	62	60	60	60	60	60	60	60

Noted: * denotes educated institutes

Monitoring Audit

5.24 The Independent Environmental Consultant should conduct regular monitoring and audit during the construction works.

Conclusions

5.25 The construction of Roads and other Main works, and the construction /operation of the concrete batching plant will be carried out concurrently. An assessment for cumulative construction noise impacts arising from these activities has been conducted. The assessment result shows that the cumulative noise levels at some NSRs (SR19, 21 and 24) would likely exceed the EIAO-TM noise criteria without mitigation measures for the construction/operation of the concrete batching plant.

5.26 In order to alleviate the cumulative noise impacts, appropriate mitigation measures including the use of quiet equipment in both construction and operation stages of the concrete batching plant. With the adoption of the recommended mitigation measures, the predicted noise levels at all the representative NSRs would comply with the EIAO-TM criteria for residential dwellings and for schools during normal and examination periods.

6.0 WASTE MANAGEMENT IMPLICATIONS

Introduction

6.1 In this section, the types of wastes that are likely to be generated during the construction and operation of the concrete batching plant have been identified. Potential environmental impacts associated with the handling and disposal of these waste arisings are then assessed. Mitigation measures and good site practices, including waste handling, storage and disposal, are recommended with reference to the applicable legislation and guidelines.

Waste Management and Environmental Regulations

6.2 The relevant legislative requirements and guidelines with respect to waste management and disposal are listed below.

- Waste Disposal Ordinance (Cap. 354);
- Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354);
- Dumping at Sea Ordinance (Cap. 466).

6.3 Under the Waste Disposal Ordinance (WDO), construction waste is classified as a trade waste and the site contractor is responsible for its disposal. Under the Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354) chemical waste includes scrap material and unwanted substances specified under Schedule 1 of the Waste Disposal Regulation. Such materials are considered to have the potential to cause serious environmental, health and safety hazards if they are not stored and disposed of in an appropriate manner. If chemical wastes are to be generated, requiring handling, storage and subsequent disposal, the contractor must register with EPD as a chemical waste generator.

Assessment Criteria and Methodology

6.4 The criteria for evaluating the potential waste management implications are set out in *Annex 7* of the EIAO-TM. The method for assessing potential waste management impacts during construction and operation phases follows that presented in *Annex 15* of EIAO-TM and includes the following:

- estimation of the types and quantities of wastes generated;
- assessment of potential secondary environmental impacts from the management of solid waste with respect to potential hazards, air and odour emissions, noise, wastewater discharges and traffic; and
- impacts on the capacity of waste collection, transfer and disposal facilities.

6.5 If not properly managed, the handling and disposal of waste materials may cause environmental nuisance and impacts. The nature of each type of waste arising is discussed below, together with an evaluation of the potential environmental impacts associated with the management of these waste arisings.

Prediction and Evaluation of Environmental Impacts

Construction Phase

6.6 The proposed site is on reclaimed land and therefore no site clearance or demolition works are required. Small quantities of excavated material will be generated from the minor earthworks required for the foundation of the concrete batching plant and this will consist of reclamation fill material. The volume of excavated material is estimated to be approximately 1,200 m^3. Considering the inert nature of the excavated material, the material can be re-used at the site.

6.7 Throughout construction, the workforce will generate general refuse comprising food scraps, waste paper, empty containers etc. The storage, handling and disposal of general refuse have the potential to give rise to some environmental impacts if not properly managed. These include odour if waste is not collected frequently, windblown litter, water quality impacts if waste enters water bodies, and visual impact. Rapid and effective collection of site wastes will therefore be required. With the implementation of good site practices and the recommended mitigation measures on disposal arrangements, adverse environmental impacts are not expected to arise during the construction works.

Operation Phase

6.8 A concrete recycling machine with a capacity of 20m^3/hr will be installed on-site to recycle concrete waste in order to reduce material consumption and waste generation. Concrete waste material will be broken down into slurry water and aggregates. Sludge will be generated during the recycling process and will require off-site disposal.

6.9 The other waste arising during the operational phase would be chemical wastes, such as lubrication oil used by the loader, mixer truck and generator. The quantity of used lubrication oil is estimated to be approximately 330 to 350 litres per month. The contractor is registered with the EPD as a Chemical Waste Producer.

6.10 Diesel fuel will be stored in drums and in a completely bunded area as per government safety regulations. Used oils will be stored in containers and disposed off-site by licensed contractors. Other mitigation and control requirements for chemical wastes are detailed in Sections 6.14 to 6.16. Provided that the storage and disposal of chemical wastes are in accordance with these requirements, adverse environmental impacts are not expected.

Mitigation Measures

6.11 The following recommended storage, transportation and disposal measures to avoid or minimise potential adverse impacts associated with the identified waste arisings should be incorporated by the Contractor into an on-site waste management plan for the construction phase.

Storage, Collection and Transport of Waste

6.12 Permitted waste hauliers should be used to collect and transport waste to the appropriate disposal points. The following measures to minimise adverse impacts should be instigated:

- Handle and store waste in a manner which ensures that it is held securely without loss or leakage, thereby minimising the potential for pollution;
- Use waste hauliers authorised or licensed to collect specific categories of waste;
- Remove waste in a timely manner;
- Maintain and clean waste storage areas regularly;
- Minimise windblown litter and dust during transportation by either covering trucks or transporting waste in enclosed containers;
- Obtain the necessary waste disposal permits from the appropriate authorities, if they are required, in accordance with the Waste Disposal Ordinance (Cap 354), Waste Disposal

(Chemical Waste) (General) Regulation (Cap 354), the Land (Miscellaneous Provision) Ordinance (Cap 28);

- Dispose of waste at licensed waste disposal facilities;
- Develop procedures such as a ticketing system to facilitate tracking of loads, particularly for chemical waste, and to ensure that illegal disposal of waste does not occur; and
- Maintain records of the quantities of waste generated, recycled and disposed.

Chemical Waste

6.13 Chemical waste that is produced should be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes as follows:

6.14 Containers used for the storage of chemical waste should:

- Be suitable for the substance they are holding, resistant to corrosion, maintained in good condition, and securely closed;
- Have a capacity of less than 450 litres unless the specifications have been approved by the EPD; and
- Display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations.

6.15 The storage area for chemical waste should:

- Be clearly labelled and used solely for the storage of chemical waste;
- Be enclosed on at least 3 sides;
- Have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in that area, whichever is the greatest;
- Have adequate ventilation;
- Be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste if necessary); and
- Be arranged so that incompatible materials are adequately separated.

6.16 Disposal of chemical waste should:

- Be via a licensed waste collector; and
- Be a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Facility which also offers a chemical waste collection service and can supply the necessary storage containers; or
- Be to a re-user of the waste, under approval from the EPD.

General Refuse

6.17 General refuse should be stored in enclosed bins or compaction units separate from chemical wastes. A reputable waste collector should be employed by the contractor to remove general refuse from the site, on a daily or every second day basis to minimise odour, pest and litter impacts. The burning of refuse on construction sites is prohibited by law.

Conclusions

6.18 With the implementation of the recommended mitigation measures on waste management practices and pollution control measures for the construction and operation phases of the concrete batching plant, adverse environmental impacts are not expected. No unacceptable residual impacts are expected provided that the recommended waste management mitigation measures for the Project are implemented.

7.0 WATER QUALITY

Introduction

7.1 The potential water quality impacts associated with the construction and operation of the proposed concrete batching facility are assessed in this section. Where necessary, mitigation measures have been proposed to ensure that all residual impacts are in compliance with the relevant environmental legislation, standards and guidelines.

Assessment Criteria

7.2 The Water Pollution Control Ordinance (Cap.358) provides the major statutory framework for the protection and control of water quality in Hong Kong. According to the Ordinance and its subsidiary legislation, all Hong Kong waters are divided into Water Control Zones (WCZ). The proposed site is located at the western end of Hong Kong Island and is adjacent to the East Lamma Channel. The East Lamma Channel falls within the Western Buffer WCZ, which was declared in 1993. The relevant Water Quality Objectives (WQOs) for this WCZ are given in Table 7.1 below.

Table 7.1 Water Quality Objectives – Western Buffer Water Control Zone

Parameters	Criterion	Beneficial Use
Suspended Solids	Waste discharges shall neither cause the natural ambient level to be raised by more than 30% nor give rise to accumulation of suspended solids which may adversely affect aquatic communities	Marine waters
Dissolved Oxygen	Waste discharges shall not cause the level of dissolved oxygen to fall below 4 mg/L (depth averaged) for 90% of the sampling occasions during the whole year The dissolved oxygen concentration should not be less than 2mg/L within bottom 2m of seabed for 90% of the sampling occasions during the whole year	Marine subzone except FCZ Marine waters
PH	The pH of water should be within the range of 6.5-8.5 units. Changes due to waste discharges should not exceed 0.2 pH units	Marine waters except bathing beaches subzone
BOD	BOD should not exceed 3 mg/L	Water Gathering Ground
Nutrients	Annual depth averaged total inorganic nitrogen not to exceed 0.4mg/L	Marine waters
Ammonical Nitrogen	Annual mean not to exceed 0.021mg/L	Whole zone

Water Sensitive Receivers

7.3 The water quality sensitive receivers identified in Section 7.3 of the Scheme 1 EIA Report which are applicable to the Project are listed below (Figure 7.1).

- Queen Mary Hospital seawater intake at Sha Wan Drive (WSR1);
- The as-built salt water intake (as part of the CED reclamation work) for the proposed WSD pumping station at the southern end of the reclamation (WSR2);

- WSD seawater intake at Wah Fu Estate (WSR3).

Description of Environmental Baseline Conditions

7.4 The water quality baseline conditions described in Section 7.4 of the Scheme 1 of the approved EIA Report are applicable to the Project and are summarized below. Existing ambient marine water quality in the area was established based on the EPD routine monitoring data obtained for the years 1996 to 1998 for stations WM1 and WM2. Table 7.2 summarises the key monitoring data. A review of the data indicated that:

- Dissolved oxygen (DO). The DO level at the surface and the bottom was between 4.7 mg/L to 8.7 mg/L and 2.9 mg/L to 8.1 mg/L, respectively. The WQO for depth-averaged DO was only satisfied in 1996 and 1997. More than 10% of the samples collected from both stations in 1998 had DO content less than 4 mg/L. Non-compliance with the WQO for depth-averaged DO was recorded in the October and November 1998 monitoring data;
- pH. This was within the WQO range of 6.5 to 8.5 throughout the monitoring period;
- Suspended solids (SS). The recorded SS levels fluctuated throughout the monitoring period. The annual mean depth-averaged levels were below 10mg/L. A decreasing trend was observed over the three year period;
- Total Inorganic Nitrogen (TIN). Full compliance with the WQO for TIN was recorded at both monitoring stations;
- E-Coli. There is no secondary contact subzone in the vicinity of the site and therefore the WQO is not applicable;
- BOD_5. The annual mean BOD_5 was consistently between 0.5 mg/L to 0.8 mg/L with the depth-averaged maximum levels being well below the WQO (3 mg/L);
- NH4-N. Annual NH4-N levels at both stations ranged from 0.09 mg/L to 0.13 mg/L. The results indicated that the WQO for marine waters could not be met.

7.5 In summary, the monitoring results indicated that marine water quality in the East Lamma Channel in general complied with the WQOs except NH4-N and depth-averaged DO.

Table 7.2 Summary of EPD Marine Water Quality Monitoring Data

Parameter		**WM1**			**WM2**		
		1996	**1997**	**1998***	**1996**	**1997**	**1998***
DO [mg/L]	Surface	6.4 (4.7-8.1)	6.6 (4.7-11.1)	6.5 (3.5-8.2)	6.1 (4.4-8.5)	6.4 (5.0-9.2)	6.0 (3.5-7.6)
	Bottom	5.5 (2.9-7.2)	5.8 (2.7-8.0)	5.4 (2.2-8.7)	5.7 (3.3-8.5)	5.5 (3.6-7.0)	5.3 (2.5-8.0)
	Depth-averaged	10% - 3.7 mg/L 90% - 7.24 mg/L			10% - 3.4 mg/L 90% - 7 mg/L		

pH		8.1 (7.8-8.3)	7.8 (6.8-8.2)	7.7 (7.0-8.2)	8.1 (7.8-8.3)	7.8 (7.2-8.2)	7.9 (7.5-8.2)
SS	[mg/L]	4.8 (3.0-8.1)	4.3 (2.2-7.2)	3.9 (2.7-4.8)	7.5 (2.6-14.6)	5.9 (2.5-12.3)	5.4 (1.9-11.2)
TIN	[mg/L]	0.19 (0.04-0.38)	0.2 (0.11-0.43)	0.24 (0.12-0.44)	0.25 (0.14-0.40)	0.30 (0.18-0.42)	0.25 (0.14-0.39)
BOD5	[mg/L]	0.6 (0.36-1.07)	0.66 (0.21-1.6)	0.71 (0.34-1.1)	0.56 (0.27-1.39)	0.6 (0.08-1.9)	0.79 (0.23-1.36)
E-Coli	[cfu/100ml]	188 (56-1333)	201 (35-634)	65 (14-170)	111 (13-1167)	251 (21-1327)	345 (40-1869)
NH4-N	[mg/L]	0.09 (0.01-0.26)	0.08 (0.03-0.13)	0.09 (0.04-0.17)	0.09 (0.02-0.16)	0.13 (0.03-0.28)	0.12 (0.04-0.18)

Source: EPD Routine Monitoring Data
Note: * Data for 1998 were calculated based on the EPD monitoring results obtained up to November 1998.

Assessment Methodology

7.6 The water sensitive receivers that may be affected by the construction works and operational activities for the on-site concrete batching plant were described. Potential sources of water quality impact that may arise during the construction and operation phases of the Project were identified. This task included identifying pollutants from point discharges and non-point sources to surface run-off, and wastewater arisings during the operational phase. All the identified sources of potential water quality impact were then evaluated and their impact significance determined. The need for mitigation measures to reduce any identified adverse impacts on water quality to acceptable levels was determined. Residual impacts were also evaluated and requirements for environmental monitoring and audit identified.

Construction Phase Impact Assessment

Potential Sources of Impact

7.7 Potential sources of water quality impact associated with the construction of the proposed concrete batching facility have been identified and include:

- construction run-off and drainage;
- general construction activities; and
- sewage effluent produced by the on-site workforce.

The construction of additional piers or berthing facilities will not be required. There will not be any marine-based construction activities associated with the proposed concrete batching plant.

Construction Runoff and Drainage

7.8 During site formation works, soil surfaces would be exposed and an elevated level of suspended particles would be present in the surface run-off. As the proposed site for the concrete batching plant is located near the seawall, the coastal waters could potentially be impacted by sediment laden and polluted runoff if construction runoff from the site is uncontrolled. Sources of water pollution include release of cement materials with rain wash, wash water from dust suppression sprays, and fuel, oil and other lubricants from maintenance of construction vehicles and mechanical equipment.

7.9 Mitigation measures should be implemented to control construction site runoff, and to minimise the chances of introducing sediment and pollutants into the nearby coastal waters. With the implementation of adequate construction site drainage and the provision of sediment removal facilities, it is expected that unacceptable water quality impacts on the coastal waters would not arise.

7.10 The nearest saltwater intake for the proposed WSD saltwater pumping station at the southern end of the reclamation is located at a distance of approximately 200 m from the boundary of the proposed works site for the concrete batching plant. Any stormwater discharge locations from the works site should be located at a distance of over 100 m from the seawater intake point. With the implementation of the recommended mitigation measures and good site practices, it is anticipated that adverse water quality impacts would not arise at the intake point of the saltwater pumping station during the works period.

General Construction Activities

7.11 On-site construction activities may cause water pollution from the following:

- Uncontrolled discharge of debris and rubbish, such as packaging and used construction materials, could result in floating refuse with associated impacts on the aesthetic quality of the coastal waters; and
- Spillages of liquids stored on-site, such as oil, diesel and solvents etc, are likely to result in water quality impacts if they enter the water column.

7.12 Good construction practices and site management measures should be observed to ensure that rubbish, fuels and solvents do not enter the nearby coastal waters.

Sewage Effluent

7.13 Domestic sewage would be generated from the workforce during the construction phase. It is unlikely that sewage generated from the site would have a significant water quality impact, provided that sewage is not discharged directly into storm water drains adjacent to the construction site. Temporary sanitary facilities such as portable chemical toilets should be used on-site and properly maintained.

Operation Phase Impact Assessment

7.14 All water used within the concrete batching plant will be collected, stored and recycled to reduce resource consumption. This includes water used in the concrete batching process, truck cleaning, yard washing and dust suppression spraying. All spent dust suppression effluent will be collected and recycled. Stormwater run-off at the plant will drain under gravity towards a sedimentation basin located at the lowest site formation level. The overlying water from the sedimentation basin will be recycled for reuse within the plant. The deposited sediment will be dewatered and the dry matter will require disposal off-site. As no water will be discharged outside the boundary of the plant, there will not be any potential water quality impacts associated with the operation of the facility.

7.15 The use of conveyor barge is proposed instead of derrick barge for aggregate storage and transfer. The transfer of material from barge to hopper is via conveyor system (no lifting of material) and the conveyors are enclosed. The loss of material and floating refuse is therefore not an issue of concern.

Mitigation Measures

7.16 Proposed mitigation measures for containing and minimising construction phase water quality impacts are summarised below.

Construction Runoff and Drainage

7.17 The site practices outlined in *ProPECC PN 1/94 Construction Site Drainage* should be followed as far as practicable in order to minimise surface runoff and the chance of erosion, and also to retain and reduce any suspended solids prior to discharge. These practices include, *inter alia*, the following items :

- Provision of perimeter channels to intercept storm-runoff from outside the site.
- Programming of the works to minimise earthworks during the rainy season whenever possible.
- Sand/silt removal facilities such as sand traps, silt traps and sediment basins should be provided to remove sand/silt particles from runoff to meet the requirements of the Technical Memorandum on Effluent Standards under the Water Pollution Control Ordinance. The silt traps should be designed as per the guidelines given in Appendix A1 of ProPECC PN 1/94. Sedimentation basins should be configured so as to provide sufficient time for the suspended solids to settle out. These facilities should be regularly desilted to maintain their effectiveness.
- Channels or earth bunds should be constructed to direct the surface runoff to sand/silt removal facilities.
- Exposed soil surfaces should be protected by paving as soon as possible to reduce the potential for soil erosion.
- Open stockpiles of construction materials on site should be covered with tarpaulin or similar fabric to prevent surface erosion during rainstorms.

General Construction Activities

7.18 Debris and rubbish generated on-site should be collected, handled and disposed of properly to avoid entering the nearby coastal waters. All fuel tanks and storage areas should be provided with locks and be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank.

Sewage Effluent

7.19 Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site. A licensed contractor must be responsible for appropriate disposal and maintenance of these facilities.

Operational Phase

7.20 Environmental protection measures proposed for the operation phase of the concrete batching plant are described below :

- All water used within the concrete batching plant will be collected, stored and recycled. This includes water used in the concrete batching process, truck cleaning, yard washing and dust suppression spraying. No water will be discharged outside the plant boundary.
- Barge effluent should be properly contained and diverted to adequately designed treatment facilities, and treated to Technical Memorandum standard prior to discharge.

7.21 Regular environmental inspections should be conducted to check the environmental performance of daily operation. These inspections will ensure proper installation and maintenance of pollution control measures, such as checking of sedimentation basin, wastewater recycling facility and enclosure of stockpiles, and the implementation of other mitigation measures.

Conclusions

7.22 The potential water quality impacts arising from the construction and operation of the proposed concrete batching plant have been assessed. Key concerns of water quality issues are related to the construction phase, as no wastewater will be discharged from the plant during the operation of the plant. It is considered that construction run-off and drainage generated during the construction works for the Project will have minimal impacts on the receiving waters provided that mitigation measures are implemented. With the adoption and incorporation of the recommended mitigation measures for the construction phase, unacceptable residual impacts on water quality are not expected.

8.0 VISUAL IMPACT

Introduction

8.1 This section assesses the likely visual impacts of the concrete batching plant and proposes mitigation measures to alleviate the impacts caused. However, by the nature and scale of the project, it is very unlikely that the plant would create a significant visual impact as viewed from Baguio Villas, and other sensitive receivers in the close vicinity.

8.2 The Cyberport development lies on the west coast of Hong Kong Island to the south of Pok Fu Lam and comprises an area of existing flat reclamation bordered to the north, east and south by densely wooded slopes, and some residential development, and to the west by the open waters of the East Lamma Channel between Lamma Island and Hong Kong Island. It is overlooked by a number of residential developments, notably Baguio Villa, Kong Sin Wan Tsuen village, Wah Fu Estate, Pok Fu Lam Gardens and houses along Sassoon Road. These currently have open views over the channel. The proposed concrete batching plant is located to the south of the vertical seawall within the Route 7 reserve (Figure 8.1).

8.3 The operation of the concrete batching plant is divided into two stages. The stage 1 proposed concrete batching plant is mobile and of dimension 23m x 20m x15m. After stage 2 proposed plant is operated, stage 1 will act as a stand by plant on site. The overall configuration is a temporary structure of 95m x 45m x 24m (max height) near the shore on a large construction site with other plant and equipment and is therefore unlikely to be an eyesore during the construction phase of Cyberport. The 24m high of the proposed Stage 2 concrete batching plant is the minimum requirement for the normal operation and maintenance. By the time the office towers in Phases C1, C2 and C3 are erected, the concrete batching plant will have been totally screened from the line of sight of the lower floor receivers in the nearby residential community. The plant will be demolished and removed after the project is finished.

Methodology

8.4 The methodology for undertaking the visual impact assessment is in general accordance with Annex 18 of the Technical Memorandum to the Environmental Impact Assessment Ordinance (EIAO). The assessment of impacts is based on the criteria in Annex 10 of the EIAO. The main elements are given below.

8.5 The source and magnitude of effects caused by the proposed development on the existing views, visual amenity, character and quality of the visually sensitive receivers within the context of the site and its environs were assessed.

8.6 The assessment of the potential visual impact of the scheme comprised two distinct parts:

- Baseline survey; and,
- Visual impact assessment.

8.7 The baseline survey of all views towards the proposal facility was undertaken by identifying:

- The visual envelope or visual zone within which the proposed development may be contained either wholly or partially within views. This also includes indirect effects such as offsite construction activities;

- The visually sensitive receivers within the visual envelope whose views will be effected by the proposed construction. The potential receivers include the following three groups:

Views from residences – the most sensitive of receivers due to the potential of intrusion on the visual amenity and quality of life;

View from workplaces – less sensitive than above due to visual amenity being less important within the work environment, and;

Views from public areas – including all areas apart from the above, e.g., public parks, recreation grounds, footpaths, roads, etc. Sensitivity of this group depends on the transitory nature of the receiver, e.g. sitting in a park or travelling on a highway. Also considered is the degree of view or glimpsed views.

8.8 Its location and direction of view relative to the batching plant also influence the sensitivity of each group. Typical viewpoints from within each of the visually sensitive groups are identified and their views described. Both present and future visually sensitive receivers have been considered.

8.9 The baseline survey has formed the basis of the visual character and quality of the site. The assessment of the potential visual impacts was based on:

- Identification of the sources of visual impact, and their magnitude, that would be generated during construction and operation of the plant; and,
- Identification of the principal visual impacts primarily in consideration of the degree of change to the baseline conditions.

8.10 The impact assessment relates to the typical viewpoints within the visual receiver group, as identified previously, and their existing and potential views subsequent to the construction of the plant. The visual impact assessment takes into account the following:

- Character of existing views;
- Quality of existing view;
- Context and location of the visually sensitive receiver;
- Visual receiver group sensitivity;
- Degree of change of existing views;
- Other views available to visual receiver group; and,
- The cumulative effects on views of this and to other neighbouring developments.

8.11 The degree of visual impact is rated in a similar fashion to the landscape impact, i.e. substantial, moderate, slight and no change. The impacts may be beneficial or adverse.

Visual Impact Assessment

8.12 The sensitive receivers to the concrete batching plant will be the Baguio Villa, Aegean Terrace and Pok Fu Lam Garden and Chi Fu Fa Yuen.

8.13 As Pok Fu Lam Garden and Aegean Terrace are at a higher level, it will not block the view towards the existing landscape features.

8.14 The stage 1 proposed concrete batching plant is of dimension 23m x 20m x15m. In the present situation, the view of stage 1 concrete batching plant will be greatly shielded off by the existing earth mound (Fig.8.2). After the completion of stage 2 concrete batching plant, the stage 1 plant will be put inside the enclosure of stage 2 plant. Therefore the impact from stage 1 plant is minor.

8.15 The total dimensions of the proposed stage 2 and Stage 1 concrete batching plant is 95m × 45m × ~24m (max height) and the elevation view of the concrete batching plant layout is shown in Fig.2.7. The height of the lower floor in the Baguio Villa is around 30-40 mPD. The proposed plant will only obstruct a very small part of the view of the sensitive receiver in the lower floor of Baguio Villa during the operation stage.

8.16 Fig. 8.3a and 8.3b show the photomontages of the concrete batching plant, as viewed from Baguio Villas and Wah Fu. At present, the existing earth mound will partially shield the view of the concrete batching plant from the Baguio Villa.

8.17 After the main construction contracts starts, office buildings will be constructed between the sensitive receivers and the concrete batching plant. By the end of 2001, the buildings marked as "1" – "7" on Figure 8.1 will be partially or fully constructed. This will further reduce the visual impact from the concrete batching plant on Baguio Villa. A photomontage of the plant as viewed from Baguio Villas after the erection of the office towers in Phase C1, C2 and C3 is shown in Figure 8.4.

8.18 The external façade of the concrete batching plant will be fabricated by steel. In order to increase the visual compatibility of the concrete batching plant, it is suggested to paint the reflective material and the external façade of the concrete batching plant into dull green.

8.19 The construction of the plant is temporary and will be decommissioned after the project is finished. It will have no permanent effect to the sensitive receivers.

Conclusions

8.20 The proposed concrete batching plant is only a small, temporary, low-rise structure near the seawall of a large construction site at Telegraph Bay. At present, it is partially screened by an existing earth mound. By the time the office blocks in Phases C1, C2 and C3 are erected, the plant will be further screened from the views of the nearby sensitive receivers. As such, it is not expected to have a significant visual impact on sensitive receivers in the neighbourhood.

9.0 IMPLEMENTATION SCHEDULES

Introduction

9.1 In order to reduce the potential impact due to the construction and operation of the concrete batching plant, the following tables summarize the implementation schedules in during the design, construction, operation and decommissioning of the concrete batching plant.

Implementation Schedule of Mitigation Measures for Air Quality Control on the Concrete Batching Plant

Environmental Protection Measures	Timing	Implementation Agent	Implementation Stages *			
			Des	C	O	Dec
Water spray installed on barge for wetting the sand and aggregates[1]. Conveyor barge used for unloading aggregate[3]. Fully enclosed conveyor used to unload the material to the aggregate-receiving hopper[1]. Aggregate receiving hopper installed with 3 sides and water spray[1]. The wetted sand and aggregates are loaded into the tipper truck in enclosed loadout section[1].	Throughout the operation of the concrete batching plant	Plant Operator	√		√	
The storage yards are installed with 3 sides enclosure and roof, curtain at entrance[1]. Water spray is installed in storage yard for wetting the sand and aggregates[1]. Aggregate Storage Bins and Aggregate Overhead Storage Bins are fully enclosed[1].	Throughout the operation of the concrete batching plant	Plant Operator	√		√	
The tipper trucks with wetted sand and aggregates are covered with plastic canvas[2]. The aggregate materials are unloaded into storage yards which has 3 sides enclosure and roof, curtain at entrance and water spray[1]. The sand and aggregates are wetted before transferring to aggregate receiving hopper[1]. Aggregate receiving hopper installed with 3 sides and roof and water spray[1]. The sand and aggregates are transferred by fully enclosed conveyors[1]. Aggregate conveyor and Transfer Points are fully enclosed[1]. The sand and aggregates are unloaded into fully enclosed overhead storage bins[1].	Throughout the operation of the concrete batching plant	Plant Operator	√		√	
The sand and aggregates are transferred and weighed within an enclosed structure[1].	Throughout the operation of the concrete batching plant	Plant Operator			√	
All cementitious materials are transferred within a fully enclosed piping system[1,2]. The cement blower of barge is enclosed[1,2]. The cement tanker and silos are fully enclosed systems[1,2]. Dust-laden air is filtered through bag filter and vented to the dust collectors[1,2].	Throughout the operation of the concrete batching plant	Plant Operator	√		√	
The silos are fully enclosed[1,2]. Dust-laden air is filtered through bag filter and vented to the dust collectors[1,2]. The level alarms are installed for all silos to prevent overfilling[1,2]. Cement Tanker will transfer the materials within an enclosure[1,2].	Throughout the operation of the concrete batching plant	Plant Operator	√		√	

1. Recommended by the Best Practicable Means Requirement for Cement Works (Concrete Batching Plant)
2. Recommended by the Air Pollution Contral (Construction Dust) Regulation in Dust Control
3. Good Site Management Practices

* Des = design, C = construction, O = operation, Dec = decommissioning

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Implementation Schedule of Mitigation Measures for Air Quality Control on the Concrete Batching Plant (Cont'd)

Environmental Protection Measures	Timing	Implementation Agent	Implementation Stages *			
			Des	C	O	Dec
The weigh hopper is fully enclosed[1,2]. Dust-laden air from the cementitious weigh hoppers is filtered through bag filter and vented to the dust collector[1,2]. Cementitious transfer using fully enclosed pipes and screw conveyors[1,2].	Throughout the operation of the concrete batching plant	Plant Operator	√		√	
The mixer is fully enclosed[1]. Dust-laden air in the mixer is filtered though bag filter and vented to the dust collector[1,2].	Throughout the operation of the concrete batching plant	Plant Operator	√		√	
All mixing & loading conduct in fully enclosed area[1,2]. Truck loaded with concrete in "Wet" form[1,2].	Throughout the operation of the concrete batching plant	Plant Operator			√	
Well maintained trucks[3]. Clean trucks regularly[1]. Trucks comply with HKSAR regulations[2].	Throughout the operation of the concrete batching plant	Plant Operator			√	
Floor to be concrete paved[1,2]. Pavement to be kept moist with water[1,2].	Throughout the operation of the concrete batching plant	Plant Operator			√	
Perform regular maintenance works for plant equipment[1,3]. Maintain all environmental control facilities in operating condition[3].	Throughout the operation of the concrete batching plant	Plant Operator			√	

1. Recommended by the Best Practicable Means Requirement for Cement Works (Concrete Batching Plant)
2. Recommended by the Air Pollution Contral (Construction Dust) Regulation in Dust Control
3. Good Site Management Practices

* Des = design, C = construction, O = operation, Dec = decommissioning

Implementation Schedule of Mitigation Measures for Air Quality Control on the Concurrent Works at Telegraph Bay which was already in place

Environmental Protection Measures	Timing	Implementation Agent	Implementation Stages *			
			Des	C	O	Dec
Regular watering of all haul roads with complete coverage once every 2 hours in normal conditions and hourly in dry / windy conditions	Cyberport Construction	Contractors		√		
Speed control for all on-site vehicle movement to 10km/h	Cyberport Construction	Contractors		√		
Watering of the whole area with complete coverage twice daily	Cyberport Construction	Contractors		√		

* Des = design, C = construction, O = operation, Dec = decommissioning

Implementation Schedule of Mitigation Measures for Noise Control

Environmental Protection Measures	Timing	Implementation Agent	Implementation Stages *			
			Des	C	O	Dec
Use of quieter equipment	During the construction of the Concrete batching Plant	Contractors		√		
Fully enclose the conveyor to unload the material to the aggregrate receiving hopper	Throughout the operation of the concrete batching plant	Plant Operator	√		√	
Fully enclose the concrete mixer	Throughout the operation of the concrete batching plant	Plant Operator	√		√	
Mixer driven by electric motor	Throughout the operation of the concrete batching plant	Plant Operator	√		√	
Conduct all mixing and loading in fully enclosed area	Throughout the operation of the concrete batching plant	Plant Operator			√	
Well maintain all concrete trucks	Throughout the operation of the concrete batching plant	Plant Operator			√	
Perform regular maintenance works for plant equipment	Throughout the operation of the concrete batching plant	Plant Operator			√	

* Des = design, C = construction, O = operation, Dec = decommissioning

Implementation Schedule of Mitigation Measures for Water Pollution Control

Environmental Protection Measures	Timing	Implementation Agent	Implementation Stages *			
			Des	C	O	Dec
Works should be programmed to avoid the rainy season whenever possible to minimise storm runoff. If work during rainy season cannot be avoided, precautions should be taken to prevent soil erosion.	Throughout the construction of concrete batching plant	Plant Operator		√		
Channel or earth bunds should be constructed to direct the runoff to sand/silt removal facilities.	Throughout the construction of concrete batching plant	Plant Operator		√		
Perimeter channels should be constructed to stop the storm runoff from washing across the site	Throughout the construction of concrete batching plant	Plant Operator		√		
Sand/silt removal facilities should be checked and cleaned regularly to ensure these facilities are working in good condition.	Throughout the construction of concrete batching plant	Plant Operator		√		
Exposed soil surface should be paved to reduce the potential soil erosion.	Throughout the construction of concrete batching plant	Plant Operator		√		
Stockpiles of construction materials on site should be covered with tarpaulins or similar fabric to prevent surface erosion. Minimisation of stockpiling in the wet season will reduce the chance of silt laden surface runoff from entering the ocean	Throughout the construction of concrete batching plant	Plant Operator		√		
All washing water will be collected, stored and recycled. No water will be discharged outside the plant boundary	Throughout the operation of the concrete batching plant	Plant Operator	√		√	

* Des = design, C = construction, O = operation, Dec = decommissioning

Implementation Schedule of Mitigation Measures for Waste Management

Environmental Protection Measures	Timing	Implementation Agent	Implementation Stages *			
			Des	C	O	Dec
Install a concrete recycling machine to reduce material consumption and waste generation.	Throughout the operation of concrete batching plant	Plant Operator	√		√	
Maintenance of records of quantities of wastes generated, recycled and disposed, including disposal location	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Where practicable, different types of wastes should be segregated, stockpiled and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Good site management, planning and design considerations to reduce over-ordering and waste generation	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Educate workers on the concepts of site cleanliness and appropriate waste management procedures	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Minimise land-take by reducing the size of the stockpiles and associated working areas	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Provide fencing to separate sensitive habits and landscape areas to prevent accidental stockpiling in these areas	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Designate appropriate haulage routes	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Keep material covered in heavy rainfall	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Keep movement of stockpiled material to a minimum	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Optimise reuse of suitable material on site to reduce the volume of materials to be disposed to public filling areas	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Use appropriate dust suppression by use of appropriate bunding, interceptors and direction of run-off into settlement ponds	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
For wastes with <20% of non-inert materials, should be segregated and disposed of to public filling area	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Waste collection by an approved licensed waste collectors	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
All necessary waste disposal permits should be obtained	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Store appropriately and isolate from current working areas	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Secure storage area should be set up for chemical waste storage (refer to ‘Practice on the Package, Labelling and Storage of Chemical Wastes’)	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	

* Des = design, C = construction, O = operation, Dec = decommissioning

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Implementation Schedule of Mitigation Measures for Waste Management

Environmental Protection Measures	Timing	Implementation Agent	Implementation Stages *			
			Des	C	O	Dec
Erect appropriate fence and signs beside the chemical waste storage area	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Minimise waste production and careful handling of waste fuel and oil residues	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Supply spill absorbent material and emulsifiers in case of spillages	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Store wastes remote from sensitive receivers	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Wastes should be stored in black refuse bags prior to collection and disposal	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Frequent collection of general refuse	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Regular maintenance and cleaning of the waste storage areas	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Sewage generated on the site should be controlled through the use of chemical toilets or sewage holding tanks. Either would require regular cleaning with the resulting sewage disposed of appropriately	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	
Storage of a material in suitable containers	Throughout the construction and operation of concrete batching plant	Plant Operator		√	√	

* Des = design, C = construction, O = operation, Dec = decommissioning

Implementation Schedule of Mitigation Measures for Visual Impacts

Environmental Protection Measures	Timing	Implementation Agent	Implementation Stages *			
			Des	C	O	Dec
The external façade and reflective surface of the concrete batching plant shall be painted to dull green to reduce reflection and increase the visual compatibility.	Throughout the operation of the concrete batching plant	Plant Operator	√		√	

* Des = design, C = construction, O = operation, Dec = decommissioning

10.0 ENVIRONMENTAL MONITORING AND AUDIT

10.1 The following summarizes the environmental monitoring and audit programmes for the construction and operation of the concrete batching plant.

Air

10.2 Baseline Monitoring: The 1-hour and 24-hou TSP samples from the baseline report of "Infrastructural Works" for the Proposed Development at Telegraph Bay" are applicable

10.3 Impact Monitoring (Construction and Operation Phases): During the construction of the stage 1 concrete batching plant and the first month of the full operation of stage 2 concrete batching plant, the monitoring frequency for 24-hour TSP obtained at No.60 Sasson Road and Upper Kong Sin Wan Tsuen stations should be increased. It is suggested to perform monitoring twice in every six days. For 1-hour TSP monitoring, the monitoring frequency shall be increased to at least 4 times in every 6 days. The impact monitoring data will then be compared with the air quality criteria and the action as set out in the Event/Action Plan. Any appropriate mitigation measures should then be implemented if exceedance of the air quality criteria is recorded.

10.4 In case that there is no exceedance due to the full operation of stage 2 concrete batching plant, the monitoring frequency shall be returned to normal. Therefore, the routine one 24-hour and three 1-hour TSP samples should be obtained from all stations once six days, with 1-hour samples being collected when the worst dust impacts occurs.

10.5 Apart from the above two stations, continuous real time reporting of the air quality data on two agreed existing monitoring locations (Baguio Villa and Pui Ying Secondary School) are proposed so that a close look on the environment can be done.

Noise

10.6 Baseline Monitoring:. The data from the baseline report of "Infrastructural Works for the Proposed Development at Telegraph Bay" are applicable

Impact Monitoring (Construction and Operation Phases): Continuous real time reporting of the noise data on three current and one agreed existing monitoring locations are proposed so that a close look on the environment can be done.

Water

10.7 During the construction phase, if uncontrolled, contaminated surface runoff from the construction site can flow into the harbour.

10.8 Baseline monitoring: The data from the baseline report of "Infrastructural Works.for the Proposed Development at Telegraph Bay" are applicable.

10.9 Impact Monitoring (Construction): Since no marine construction, auditing works (such as checking of perimeter channel, stream course, surface run-off and pre-treatment facilities, etc) should be carried out.

10.10 During the operation phase, no wastewater will be discharge outside the boundary of the plant, there will not be any potential water quality impact. As that of construction phase, auditing works should be carried out.

Waste

10.11 The contractor will be responsible for waste control within the site as well as minimizing the volume of waste generated. The contractor should comply with all the mitigation measures as suggested in the EIA. Regular inspections carried out by the environmental team will be required in order to check the contractor's compliance with the relevant specifications.

11.0 SUMMARY OF ENVIRONMENTAL OUTCOMES

11.1 With the construction and operation of the proposed concrete batching plant, air quality, noise nuisance, water quality and visual impact induced by the barges transportation can be minimized. All sensitive receivers around the Cyberport and along the marine transport route would benefit from the reduction.

11.2 In order to further reduce the environmental impact, apart from the requirements stipulated in Best Practicable Means Requirement for Cement Works (Concrete Batching Plant) and Air Pollution Control (Construction Dust) Regulation, the concrete batching plant will incorporate the following design and practices:

- Dust collectors will be sized to exceed the requirement of the Specified Processes Regulation.
- For Stage 1, the cement tankers will be working inside enclosure with cladding to reduce noise.
- For stage 2, Cement will be transferred directly from barges to the plant. There is no need for cement tankers for intermediate transfer.
- All mixing will be in the enclosed electric motor driven plant mixer, NOT in trucks.
- Truck loaded with concrete will be in wet form.
- All washing water used by the plant and stormwater will be collected and stored within the plant and recycled for re-use in the plant.
- No water will be discharged outside the plant boundary.
- Concrete recycling machine used to recycle waste material to slurry water and aggregates for reuse.

11.3 While the Cyberport can continue to be constructed using concrete delivered by barges to the site from an off-site concrete batching plant, there are obviously overall environmental benefits of setting up an on-site concrete batching plant. The additional environmental benefits with the concrete batching plant on site and the key environmental problems avoided will include:

- The number of barges for delivery can be much reduced. These will reduce the noise, air quality and water quality and marine traffic impact.
- Any mitigation measures can be easily incorporated into the stationary concrete batching plant on site. However, it is difficult to apply on the moving barges.
- It is much easier to control the delivery time. This will avoid concreting in the restricted hours caused, otherwise, by the delay of barges.
- With an existing earth mound and future commercial buildings in between the sensitive receivers and the proposed plant location, the visual impact of the concrete batching plant can be much reduced. However, this cannot be done on the large number of barges.

11.4 A summary of the key findings is given in Table 11.1. Based on this, it can be concluded that the construction of the proposed on-site concrete batching plant is unlikely to cause adverse impacts on air quality, noise, water quality and visual at Telegraph Bay. Besides, the on-site concrete batching plant can further reduce the environmental and traffic nuisances caused by the barges. From the environmental point of view, the on-site concrete batching plant will have significant benefits to the local sensitive receivers.

Table 11.1 Summary of Environmental Impact Assessment Findings

Environmental Aspect	Key Impacts (without mitigation measures)	Proposed Mitigation Measures	Residual Impacts (after mitigation)
Construction Phase			
Air Quality	Short term elevated dust levels	Watering of road surfaces at every 2 hours, on-site vehicle speed control, covering/dampening of stockpiles in dry/windy conditions	Acceptable
Noise	Short-term elevated construction noise levels	Adoption of quiet powered mechanical equipment; use of acoustic barrier, use of semi-enclosure	Acceptable
Water Quality	Limited discharge of sediment-laden wastewater	Site management. Treatment of effluent prior to discharge.	Acceptable
Wastes	Limited spoil and construction wastes	Site management, segregation of waste, and waste minimisation	Acceptable
Landscape & Visual	Change in visual character	Use of earth mound to screen the powered mechanical equipment	Acceptable
Operation Phase			
Air Quality	Limited dust emissions	Implementation of Best Practical Means for concrete batching plant	Acceptable
Noise	Limited noise emissions	Use of quieter powered mechanical plant and full enclosure for the noisy component of the plant; all concrete mixing done inside plant	Acceptable
Water Quality	Discharge of wash water	Use of treatment plant to treat and recycle all wash water; no water will be discharged from the plant	Acceptable
Waste	Limited concrete and aggregate wastes	Use of concrete recycling machine to recycle waste material for reuse	Acceptable
Visual Impact	Change in visual Character	Use of earth mound in the short-term and the use of newly completed buildings afterwards to screen the plant	Acceptable

11.5 It has been estimated that about eleven tower blocks with an estimated population of 1,300 at Lower Baguio Villas and six buildings with an estimated population of 300 along Sassoon Road would be protected by the above mitigation measures.

12.0 CONCLUSION

12.1 While the Cyberport can continue to be constructed using concrete delivered by barges or by land to the site from an off-site concrete batching plant, there are obviously overall environmental benefits of setting up an on-site concrete batching plant. The approved EIA report has assessed the potential impact without this proposed plant. However, it has been shown above that with appropriate mitigation measures, adverse impacts due to the additional plant are unlikely to occur.

In addition, as the concrete batching plant is constructed on top of a concrete slab, land contamination will not be expected during decommissioning. Besides, during decommissioning of the proposed concrete batching plant, the noise and air quality impacts will be much lower than those in the construction and operation phases.

Air Quality Impacts

In terms of the air quality impacts, it is anticipated the dust impacts arising from the construction phase of the plant is insignificant, given the short construction period of the plant (< 120 days).

The net dust impact during the operation of the plant are well below the EIAO-TM Criterion for 1-hour TSP and Air Quality Objective (AQO) respectively with the built-in dust suppression measures for the batching plant. However, additional dust suppression measures such as speed control of dump trucks and increased watering of the site and haul roads will be required to meet the criteria arising from the cumulative effects of then plant with the concurrent construction works at the site.

Noise Impacts

In terms of noise impact, the construction of the concrete batching plant is considered to produce short-term and minor impact.

The operational noise impact from the plant is also minor. However, the concurrent construction activities and the batching plant could have some cumulative noise impacts at certain noise sensitive receivers, including domestic premises and educational institutions, and would exceed the respective construction noise limits. Mitigation measures are required to comply with the noise criteria at the nearby domestic premises, as well as the schools.

Waste Impacts

Construction of the batching plant will result in the generation of very limited quantities of wastes and materials and these are unlikely to be a cause for concern.

A concrete recycling machine will be installed on-site to recycle concrete waste in order to reduce material consumption and waste generation. Concrete waste material will be broken down into slurry water and aggregates. Sludge will be generated during the recycling process and will require off-site disposal.

Limited amounts of chemical wastes, such as fuel and lubrication oils, will be generated from the operation of the plant. These will be stored and disposed in accordance with the chemical waste regulations. As such, no adverse environmental impacts are expected.

Water Quality Impacts

Limited surface run-off with grouting, cement materials and lubrication oils, etc, from the site during construction of the plant may affect the coastal water off the site. Good site management practices and the implementation of a construction site drainage system that includes sediment removal facilities will be required to meet the water quality objectives.

Temporary sanitary facilities such as portable chemical toilets will be required to treat the domestic sewage from the workforce. No water quality impact is anticipated.

All water used within the concrete batching plant will be collected, stored and recycled to reduce resource consumption. This includes water used in the concrete batching process, truck cleaning, yard cleaning and spraying. As no wastewater will be discharged outside the boundary of the plant, there will not be any potential water quality impacts associated with the operation of the facility.

Visual Impacts

The proposed plant will be partially screened by an existing earth mound. As the main building works progress, high-rise buildings will be erected on the site to further reduce the view of the plant from the sensitive receivers at Baguio Villa and the visual impact of the concrete batching plant will be much reduced. Therefore, the visual impact of the concrete batching plant on the sensitive receivers can be considered as minor.

Environmental Monitoring and Audit (EM&A)

An Environmental Monitoring and Audit (EM&A) Manual has been prepared to provide the necessary mechanism to ensure the compliance with all environmental regulations currently in force in the HKSAR. This includes a real-time monitoring network to provide 24-hr noise and TSP data for subsequent posting to the web for public viewing.

Appendix 4.1 Calculation of Dust Emission Factors

	Sites	D1	D2	SAR	NAR
Spoil Quantity (m3)	330000	22280	8700	124165	9900
no of days	300	600	300	600	1050
Truck size	6	8	8	8	8
No of areas	7	3	1	3	2
Density (kg/m3)	1990	1990	1990	1990	1990
Handing (kg/hr)	199000.00	6717.76	5246.36	37437.63	1705.71
per site (kg/hr)	28428.57	2239.25	5246.36	12479.21	852.86
Trucks per hour	16.67	0.42	0.33	2.35	0.11
Round tip / hr	33.33	0.84	0.66	4.70	0.21
mixers (185trip/day)					
Round tip/hr	33.64				
total	66.97				

Loading/Unloading (AP42, 5th ed., S13.2.4)

E = k*0.0016*(U/2.2)^1.3 / (M/2)^1.4

k	0.74		E=	0.000124711	kg/Mg
U	1				
M	4.8				

Emission rate (g/s)	9.85E-04	7.76E-05	1.82E-04	4.32E-04	2.95E-05
mitigate 50%	4.92E-04	3.88E-05	9.09E-05	2.16E-04	1.48E-05

Haul Road (AP42, 5ht ed., Section 13.2.2)

E = k ((s/12)^a) ((W/3)^b) / ((M/0.2)^c)			E =	4.041587667	lb/VMT
k	10			1.14E+03	g/VKT
a	0.8				
b	0.5				
c	0.4				
s	10				
W	15				
M	10				
1 lb/VMT = 281.9 g/VKT					

Emission rate (g/m/s)	2.12E-02	2.67E-04	2.09E-04	1.49E-03	6.78E-05
mitigate 97%	6.36E-04	8.01E-06	6.26E-06	4.47E-05	2.03E-06

Wind erosion (AP-42, 5th ed., Table 11.9.4)

0.85 Mg/heatre/year

	Area	Line (12m width)	Line (16m width)
E=	2.69533E-06 g/m2/s	3.2344E-05 g/m/s	4.31253E-05 g/m/s
mitigate	50%		
	Area	Line (12m width)	Line (16m width)
E=	1.34767E-06 g/m2/s	1.6172E-05 g/m/s	2.15627E-05 g/m/s

APPENDIX 4.2

Emission Calculation of Concrete Batching Plant for Cyber-Port Development

Stage 2

1. Daily Plant Operation time (07:00 – 19:00) = 12 hours
2. Density of Concrete = 2380 kg/m^3
3. Maximum Hourly Production rate of Concrete = 300 m^3 (714 Ton)
4. Average Ingredient of Concrete Production:

Crushed Rock	= 750 kg/m^3	= 315 kg/Ton
10/20mm Aggregate	= 1050 kg/m^3	= 441 kg/Ton
Cementitious Material	= 440 kg/m^3	= 185 kg/Ton
Water	= 180 kg/m^3	= 76 kg/Ton

5. Maximum Hourly Throughput Rate:

Rock + Aggregate	= 540 Ton/hour
Cement/PFA	= 132 Ton/hour

6. Exhaust air flowrate of dust collectors:

At maximum = 5800 m^3/hour (for DC5 and DC7)
At maximum = 12000 m^3/hour (for DC4)
At maximum = 1700 m^3/hour (for DC6 and DC8)

Emission for Unloading of Sand/Aggregate to Ground Receiving Hopper

Referring to (AP-42, Section 11.19.2, Table 11.19.2-1, 1/95 Edition) the emission factor for truck unloading was recorded:

Truck Unloading	Emission Factor (kg/Mg)
TSP – Calculated[a]	16.8×10^{-6}
RSP - Given	8.0×10^{-6}
[a] Relative ratios in AP-42 Section 13.2.2 and 13.2.4 indicate that TSP emission factors may be estimated by multiplying PM-10 by 2.1.	

Emission for Particles from Aggregate Stock Pile

Referring to (AP-42, Section13.2.4, 1/95 Edition) the aggregate storage piles can be calculated.

$$E = k(0.0016)\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \text{ (kg/Mg)}$$

Where E = emission factor
k = particle size multiplier (dimensionless)
U = mean wind speed, meters per second (m/s)
M = material moisture content (%)

Given, Moisture Content = 4.8%
k value for TSP (particle size <30μm) = 0.74

Thus, emission factors for aggregate storage plies are:

TSP $= 0.74 \times (0.0016) \times [(U/2.2)^{1.3} / (4.8/2)^{1.4}]$ kg/Mg
$= 1.25\times10^{-4}\ U^{1.3}$ kg/Mg

Emission for Particles from Paved Access Road

Referring to (AP-42, Section 13.2.1, 10/97 Edition), Predictive Emission Factor Equation --- the quantity of dust emissions from vehicle on a paved road be estimated using the following empirical expression:

$$E = k\,(sL/2)^{0.65} \times (W/3)^{1.5} \qquad \text{.....(1)}$$

Where

E = particulate emission factor (having units matching the units of k)
k = base emission factor for particle size range and units of interest (see below)
sL = road surface silt loading (grams per square meter) (g/m^2)
W = average weight (tons) of the vehicle traveling the road

Referring to (AP-42, Table 13.2-1.1.), constant for equation 1.

Particulate Size	Multiplier k (g/VMT)[a]
PM-30 (TSP)[b]	24
[a] Unit shown is grams per vehicle kilometer traveled (g/VKT).	

Referring to (AP-42, Table 13.2.1-3), typical silt content and loading values for paved roads at industrial Facility.

Industry	Silt Loading (g/m^2)
Concrete batching	12[a]
[a] The value shown is the mean value.	

Mean vehicle weight is 18 Ton.

Thus, TSP emission factor $= k\,(sL/2)^{0.65} \times (W/3)^{1.5}$ g/VKT
$= 24\,(12/2)^{0.65} \times (18/3)^{1.5}$ g/VKT
$= 1.130$ kg/VKT

Emission Point EP1 and EP2 (Emission from Ground Receiving Hopper)

Emission factor for TSP = 16.8×10^{-6} kg/Mg

Maximum throughput rate of sand/aggregate = 540 Ton/h

Thus, the maximum TSP emission rate = $540 \times 16.8\times10^{-6}$ kg/h
= 9.07×10^{-3} kg/h
= 2.52×10^{-3} g/s

With water spraying system and 3-sides and top enclosed the emission rate is reduced by 90%.
Therefore, the maximum TSP emission rate = $2.52\times10^{-4} \times 10\%$ g/s
= 0.000252 g/s

Emission Point EP-7 (Emission from 225 Ton Aggregate Stock Pile)

Emission factor for TSP = 1.25×10^{-4} $U^{1.3}$ kg/Mg
Assume the mean wind speed = 2.3 m/s

Maximum throughput rate of sand/aggregate = 540 Ton/h

Thus, the maximum TSP emission rate = $540 \times 1.25\times10^{-4}$ $U^{1.3}$ kg/h
= 0.0675 $U^{1.3}$ kg/h

With water spraying system, 3-side and top enclosure and plastic curtain, the emission rate is reduced by 95%.
Therefore, the maximum TSP emission rate = 0.0675 $U^{1.3} \times 5\%$ kg/h
= 3.375×10^{-3} $U^{1.3}$ kg/h
= 0.00094 $U^{1.3}$ g/s

Emission Point EP8 (Exhaust from Dust Collectors, DC4)

Assume the maximum emission concentration for TSP = 50 mg/m^3
The maximum exhaust gas flowrate = 5000 m^3/h

Thus, the maximum TSP emission rate = 5000×50 mg/h
= 250 g/h
= 0.0694 g/s

Emission Point EP9 and 11 (Exhaust from Dust Collectors, DC5 and DC7)

Assume the maximum emission concentration for TSP = 50 mg/m^3
The maximum exhaust gas flowrate = 5800 m^3/h

Thus, the maximum TSP emission rate = 5800 × 50 mg/h
= 290 g/h
= 0.0806 g/s

Emission Point EP10 and EP12 (Exhaust from Dust Collectors, DC6 and DC8)

Assume the maximum emission concentration for TSP = 50 mg/m^3
The maximum exhaust gas flowrate = 1700 m^3/h

Thus, the maximum TSP emission rate = 1700 × 50 mg/h
= 85 g/h
= 0.0236 g/s

Emission Point EP19 (Emission from Conveying of Aggregate)

Maximum trucks flowrate = 90 per hour
Mean vehicle weight = 18 Ton
(Vehicle weight is 24 Ton for full loading of 12 Ton concrete)

TSP emission factor = 1.130 kg/VKT

TSP emission rate = 1.130 × 1000 × 90 / (1000 × 3600) g/ms
= 0.028 g/ms

With water spraying system and speed limit control, the emission rate is reduced by 90%.

Therefore, the maximum TSP emission rate = 0.028 × 10% g/ms
= 0.002825 g/ms

<u>Emission Point EP20</u> (Emission from Conveying of Cement)

Maximum trucks flowrate = 22 per hour
Mean vehicle weight = 18 Ton
(Vehicle weight is 24 Ton for full loading of 12 Ton concrete)

TSP emission factor = 1.130 kg/VKT

TSP emission rate = $1.130 \times 1000 \times 22/ (1000 \times 3600)$ g/ms
= 0.0069 g/ms

With water spraying system and speed limit control, the emission rate is reduced by 90%.

Therefore, the maximum TSP emission rate = $0.0069 \times 10\%$ g/ms
= 0.00069 g/ms

<u>Emission Point EP21</u> (Emission from Conveying of Concrete Product)

Maximum trucks flowrate = 60 per hour
Mean vehicle weight = 18 Ton
(Vehicle weight is 24 Ton for full loading of 12 Ton concrete)

TSP emission factor = 1.130 kg/VKT

TSP emission rate = $1.130 \times 1000 \times 60/ (1000 \times 3600)$ g/ms
= 0.0188 g/ms

With water spraying system and speed limit control, the emission rate is reduced by 90%.

Therefore, the maximum TSP emission rate = $0.0188 \times 10\%$ g/ms
= 0.00188 g/ms

Modelling Parameters

EP No.	Description	Emission Char.	Height (m)	Stage 2 Emission Rate, (g/s) TSP	Emission Coordinate (x , y)
EP1	Sea Front Aggregate Receiving Hopper	Point	6.5	0.000252	831398.5 , 813290.1
EP2	Aggregate Receiving Hopper	Point	3	0.000252	831416.9 , 813367.4 (831440.4 , 813332.6)
EP3	Dust Collector, DC1	Point	17	n/a	831443.4 , 813360.1
EP4	Dust Collector, DC2	Point	7	n/a	831431.8 , 813352.3
EP5	Dust Collector, DC3	Point	8	n/a	831435.1 , 813354.6
EP6	---	---	---	---	---
EP7	Aggregate Stockpile	Point	0.5	$0.00094U^{1.3}$	831407.9 , 813385.1
EP8	Dust Collector, DC4	Point	24	0.0694	831460.1 , 813353.1
EP9	Dust Collector, DC5	Point	24	0.0806	831465.6 , 813345.6
EP10	Dust Collector, DC6	Point	24	0.0236	831461.1 , 813342.8
EP11	Dust Collector, DC7	Point	24	0.0806	831455.6 , 813350.6
EP12	Dust Collector, DC8	Point	24	0.0236	831463.2 , 813345.6
EP13	---	---	---	---	---
EP14	---	---	---	---	---
EP15	---	---	---	---	---
EP16	Conveying of Aggregate	Line	0.5	n/a	831398.5 , 813290.1 831451.3 , 813310.0 831404.1 , 813377.6 831409.4 , 813382.6 831416.9 , 813367.4
EP17	Conveying of Cement	Line	0.5	n/a	831398.5 , 813290.1 831451.3 , 813310.0 831443.4 , 813360.1
EP18	Conveying of Concrete Product	Line	0.5	n/a	831451.3 , 813310.0 831443.4 , 813360.1 831404.8 , 813370.8
EP19	Conveying of Aggregate	Line	0.5	0.002825 g/ms	831409.4 , 813382.6 831440.4 , 813332.6
EP20	Conveying of Cement	Line	0.5	0.00069 g/ms	831451.3 , 813310.0 831471.6 , 813323.8 831474.6 , 813330.1 831467.6 , 813344.1
EP21	Conveying of Concrete Product	Line	0.5	0.00188 g/ms	831451.3 , 813310.0 831471.6 , 813323.8 831474.6 , 813330.1 831467.6 , 813344.1 831446.1 , 813375.3 831438.6 , 813385.1 831428.6 , 813386.5 831404.8 , 813370.8

Appendix 4.3 Sample Computer Outputs of FDM Calculations

Concrete Batching Plant

```
1                     FDM - (DATED 91109)

                      IBM-PC VERSION (1.01)
                      (C) COPYRIGHT 1991, TRINITY CONSULTANTS, INC.
                      SERIAL NUMBER 8354  SOLD TO ENPAC LIMITED
                      RUN BEGAN ON  7/27/00 AT 19:15:29



     RUN TITLE:
          Cyber-Port Development - Piling Contract for Phase CI - Daytime 1.5m Discrete(Op

          INPUT FILE NAME: D15M_2.DAT
          OUTPUT FILE NAME: D15M_2.LST


          CONVERGENCE OPTION 1=OFF, 2=ON                    1
          MET OPTION SWITCH, 1=CARDS, 2=PREPROCESSED        1
          PLOT FILE OUTPUT, 1=NO, 2=YES                     1
          MET DATA PRINT SWITCH, 1=NO, 2=YES                1
          POST-PROCESSOR OUTPUT, 1=NO, 2=YES                1
          DEP. VEL./GRAV. SETL. VEL., 1=DEFAULT, 2=USER     1
          PRINT 1-HOUR AVERAGE CONCEN, 1=NO, 2=YES          3
          PRINT 3-HOUR AVERAGE CONCEN, 1=NO, 2=YES          1
          PRINT 8-HOUR AVERAGE CONCEN, 1=NO, 2=YES          1
          PRINT 24-HOUR AVERAGE CONCEN, 1=NO, 2=YES         1
          PRINT LONG-TERM AVERAGE CONCEN, 1=NO, 2=YES       1
          BYPASS RAMMET CALMS RECOGNITION, 1=NO, 2=YES      1
          NUMBER OF SOURCES PROCESSED                      18
          NUMBER OF RECEPTORS PROCESSED                    24
          NUMBER OF PARTICLE SIZE CLASSES                   9
          NUMBER OF HOURS OF MET DATA PROCESSED           216
          LENGTH IN MINUTES OF 1-HOUR OF MET DATA         60.
          ROUGHNESS LENGTH IN CM                        60.00
          SCALING FACTOR FOR SOURCE AND RECPTORS       1.0000
          PARTICLE DENSITY IN G/CM**3                    2.50
          ANEMOMETER HEIGHT IN M                        10.00


          GENERAL PARTICLE SIZE CLASS INFORMATION

                                   GRAV.                FRACTION
            PARTICLE      CHAR.  SETTLING  DEPOSITION   IN EACH
                SIZE       DIA.  VELOCITY    VELOCITY      SIZE
               CLASS       (UM)   (M/SEC)     (M/SEC)     CLASS
               -----  ---------  --------  ----------  --------
                   1   .5000000        **          **     .0400
                   2  1.5000000        **          **     .0700
                   3  2.2500000        **          **     .0400
                   4  2.7500000        **          **     .0300
                   5  3.5000000        **          **     .0700
                   6  4.5000000        **          **     .0500
                   7  5.5000000        **          **     .0400
                   8  8.0000000        **          **     .1700
                   9 20.0000000        **          **     .4900
          ----------
          ** COMPUTED BY FDM
1

          RECEPTOR COORDINATES (X,Y,Z)

(830885., 814278.,  2.)  (831103., 814235.,  2.)  (831121., 814116.,  2.)
(831180., 813975.,  2.)  (831303., 813925.,  2.)  (831257., 813907.,  2.)
(831199., 813871.,  2.)  (831262., 813839.,  2.)  (831124., 813898.,  2.)
(831158., 813847.,  2.)  (831281., 813993.,  2.)  (831302., 814100.,  2.)
(831283., 814165.,  2.)  (831331., 814284.,  2.)  (831640., 814238.,  2.)
(831643., 813642.,  2.)  (832041., 813458.,  2.)  (832140., 813266.,  2.)
(832050., 812793.,  2.)  (831857., 812701.,  2.)  (831891., 812637.,  2.)
(831859., 812604.,  2.)  (831460., 814000.,  2.)  (831991., 812753.,  2.)
1

          SOURCE INFORMATION

                 ENTERED EMIS.     TOTAL
                  RATE (G/SEC,  EMISSION    WIND
                   G/SEC/M OR       RATE   SPEED      X1        Y1       X2        Y2  HEIGHT   WIDTH
          TYPE     G/SEC/M**2)   (G/SEC)    FAC.     (M)       (M)      (M)       (M)     (M)     (M)
          ---- --------------- ---------- ------ ------- -------- ------- -------- ------- -------
             1      .000025200     .00003   .000 831299.  813290.       0.       0.    6.50     .00
             1      .000025200     .00003   .000 831440.  813333.       0.       0.    3.00     .00
             1      .069400000     .06940   .000 831460.  813353.       0.       0.    4.00     .00
             1      .080600000     .08060   .000 831466.  813346.       0.       0.    4.00     .00
             1      .023600000     .02360   .000 831461.  813343.       0.       0.    4.00     .00
             1      .080600000     .08060   .000 831456.  813351.       0.       0.    4.00     .00
             1      .023600000     .02360   .000 831463.  813346.       0.       0.    4.00     .00
             1      .000940000     .00094  1.300 831408.  813385.       0.       0.     .50     .00
             2      .002825000     .16620   .000 831409.  813383. 831440.  813333.     .50    3.50
             2      .000690000     .01695   .000 831451.  813310. 831472.  813324.     .50    3.50
             2      .000690000     .00482   .000 831472.  813324. 831475.  813330.     .50    3.50
```

2	.000690000	.01080	.000	831475.	813330.	831468.	813344.	.50	3.50
2	.001880000	.04618	.000	831451.	813310.	831472.	813324.	.50	3.50
2	.001880000	.01314	.000	831472.	813324.	831475.	813330.	.50	3.50
2	.001880000	.02943	.000	831475.	813330.	831468.	813344.	.50	3.50
2	.001880000	.02351	.000	831446.	813375.	831439.	813385.	.50	3.50
2	.001880000	.01898	.000	831439.	813385.	831429.	813387.	.50	3.50
2	.001880000	.05361	.000	831429.	813387.	831405.	813371.	.50	3.50
		===========							
TOTAL EMISSIONS		.66240							

NOTE: SOME SOURCE EMISSION RATES ARE A FUNCTION OF WIND SPEED AND TOTAL IS NOT CORRECT

1

TOP 50 TABLE FOR 1 HOUR AVERAGES

RANK	RECEPTOR	X-COORDINATE	Y-COORDINATE	ENDING HOUR	CONCENTRATION	DEPOSITION
1	16	831643.1	813641.8	115	57.3509	.9873
2	16	831643.1	813641.8	114	54.6878	.9419
3	16	831643.1	813641.8	116	50.7376	.8732
4	16	831643.1	813641.8	113	43.8125	.7552
5	16	831643.1	813641.8	117	37.7201	.6491
6	16	831643.1	813641.8	187	30.5346	.8680
7	8	831262.1	813838.7	104	30.2894	.5086
8	16	831643.1	813641.8	112	29.1791	.5035
9	16	831643.1	813641.8	186	29.0464	.8254
10	8	831262.1	813838.7	103	28.2055	.4737
11	16	831643.1	813641.8	188	27.0895	.7705
12	10	831157.7	813846.9	102	25.7545	.4298
13	7	831198.6	813871.4	103	25.5021	.4255
14	8	831262.1	813838.7	105	25.3273	.4255
15	6	831256.9	813907.2	104	24.4976	.4082
16	5	831303.0	813924.6	105	24.3339	.4053
17	7	831198.6	813871.4	102	23.4821	.3918
18	10	831157.7	813846.9	101	23.4809	.3919
19	17	832040.7	813457.5	124	23.3709	.3889
20	16	831643.1	813641.8	118	23.3644	.4021
21	16	831643.1	813641.8	185	23.2206	.6598
22	10	831157.7	813846.9	103	23.0093	.3841
23	5	831303.0	813924.6	106	22.7477	.3790
24	7	831198.6	813871.4	104	22.5640	.3766
25	6	831256.9	813907.2	105	22.3923	.3732
26	9	831123.9	813898.0	102	21.5536	.3573
27	8	831262.1	813838.7	102	21.4261	.3601
28	17	832040.7	813457.5	123	21.3141	.3548
29	6	831256.9	813907.2	103	21.0678	.3512
30	5	831303.0	813924.6	104	21.0450	.3507
31	17	832040.7	813457.5	125	20.9049	.3479
32	23	831460.0	814000.0	108	20.4656	.3388
33	16	831643.1	813641.8	189	20.2066	.5753
34	11	831280.5	813993.0	105	19.9094	.3291
35	9	831123.9	813898.0	101	19.8713	.3295
36	23	831460.0	814000.0	109	19.3791	.3209
37	8	831262.1	813838.7	106	19.0402	.3200
38	9	831123.9	813898.0	103	18.9606	.3144
39	4	831180.3	813974.6	103	18.9311	.3125
40	4	831180.3	813974.6	104	18.4287	.3042
41	11	831280.5	813993.0	106	18.3056	.3027
42	18	832140.2	813266.0	127	17.9300	.2955
43	6	831256.9	813907.2	106	17.8490	.2977
44	23	831460.0	814000.0	107	17.5638	.2909
45	11	831280.5	813993.0	104	17.5590	.2903
46	7	831198.6	813871.4	101	17.5454	.2930
47	18	832140.2	813266.0	128	17.5227	.2888
48	10	831157.7	813846.9	100	17.3594	.2900
49	5	831303.0	813924.6	107	17.3488	.2892
50	10	831157.7	813846.9	104	16.6564	.2783

1

HIGHEST AND SECOND HIGHEST VALUES FOR 1 HOUR AVERAGES

RECEPTOR	X-COORDINATE	Y-COORDINATE	HIGHEST VALUE	ENDING HOUR	DEPOSITION	SECOND HIGH	ENDING HOUR	DEPOSTION
1	830885.2	814278.4	8.4821	102.	.1353	7.9870	101.	.1274
2	831103.4	814235.1	10.6098	104.	.1711	10.0087	103.	.1614
3	831120.8	814115.6	13.2415	103.	.2156	12.8972	104.	.2100
4	831180.3	813974.6	18.9311	103.	.3125	18.4287	104.	.3042
5	831303.0	813924.6	24.3339	105.	.4053	22.7477	106.	.3790
6	831256.9	813907.2	24.4976	104.	.4082	22.3923	105.	.3732
7	831198.6	813871.4	25.5021	103.	.4255	23.4821	102.	.3918
8	831262.1	813838.7	30.2894	104.	.5086	28.2055	103.	.4737
9	831123.9	813898.0	21.5536	102.	.3573	19.8713	101.	.3295
10	831157.7	813846.9	25.7545	102.	.4298	23.4809	101.	.3919
11	831280.5	813993.0	19.9094	105.	.3291	18.3056	106.	.3027
12	831302.0	814099.6	15.5567	106.	.2548	14.9905	105.	.2455
13	831282.6	814165.1	13.3385	106.	.2172	13.0538	105.	.2125
14	831330.6	814284.4	10.6006	107.	.1711	10.4034	106.	.1679
15	831640.1	814237.9	11.1986	110.	.1812	11.1029	111.	.1797
16	831643.1	813641.8	57.3509	115.	.9873	54.6878	114.	.9419
17	832040.7	813457.5	23.3709	124.	.3889	21.3141	123.	.3548
18	832140.2	813266.0	17.9300	127.	.2955	17.5227	128.	.2888
19	832050.1	812793.4	13.4775	135.	.2196	13.3030	134.	.2168
20	831856.7	812701.4	15.1636	138.	.2483	14.9469	137.	.2447
21	831890.5	812636.8	13.0207	138.	.2118	12.6133	137.	.2052
22	831858.8	812604.1	12.8287	138.	.2085	12.0713	139.	.1962

23	831460.0	814000.0	20.4656	108.	.3388	19.3791	109.	.3209
24	831991.4	812753.4	13.8381	136.	.2258	13.7054	135.	.2236

RUN ENDED ON 7/27/00 AT 19:15:37

Main Construction - Unmitigated

```
1                    FDM - (DATED 91109)

                     IBM-PC VERSION (1.01)
                     (C) COPYRIGHT 1991, TRINITY CONSULTANTS, INC.
                     SERIAL NUMBER 8354  SOLD TO ENPAC LIMITED
                     RUN BEGAN ON  8/24/00 AT 12:29:05



     RUN TITLE:
          Cyber-Port Development only

          INPUT FILE NAME: OT15_U.DAT
          OUTPUT FILE NAME: OT15_U.LST


          CONVERGENCE OPTION 1=OFF, 2=ON                     1
          MET OPTION SWITCH, 1=CARDS, 2=PREPROCESSED         1
          PLOT FILE OUTPUT, 1=NO, 2=YES                      1
          MET DATA PRINT SWITCH, 1=NO, 2=YES                 1
          POST-PROCESSOR OUTPUT, 1=NO, 2=YES                 1
          DEP. VEL./GRAV. SETL. VEL., 1=DEFAULT, 2=USER      1
          PRINT 1-HOUR AVERAGE CONCEN, 1=NO, 2=YES           3
          PRINT 3-HOUR AVERAGE CONCEN, 1=NO, 2=YES           1
          PRINT 8-HOUR AVERAGE CONCEN, 1=NO, 2=YES           1
          PRINT 24-HOUR AVERAGE CONCEN, 1=NO, 2=YES          1
          PRINT LONG-TERM AVERAGE CONCEN, 1=NO, 2=YES        1
          BYPASS RAMMET CALMS RECOGNITION, 1=NO, 2=YES       1
          NUMBER OF SOURCES PROCESSED                       89
          NUMBER OF RECEPTORS PROCESSED                     24
          NUMBER OF PARTICLE SIZE CLASSES                    9
          NUMBER OF HOURS OF MET DATA PROCESSED            216
          LENGTH IN MINUTES OF 1-HOUR OF MET DATA          60.
          ROUGHNESS LENGTH IN CM                         60.00
          SCALING FACTOR FOR SOURCE AND RECPTORS        1.0000
          PARTICLE DENSITY IN G/CM**3                     2.50
          ANEMOMETER HEIGHT IN M                         10.00


          GENERAL PARTICLE SIZE CLASS INFORMATION

                               GRAV.                FRACTION
            PARTICLE     CHAR. SETTLING  DEPOSITION  IN EACH
                SIZE      DIA. VELOCITY    VELOCITY     SIZE
               CLASS      (UM)  (M/SEC)     (M/SEC)    CLASS
               -----  --------- --------  ----------  --------
                   1   .5000000       **          **     .0400
                   2  1.5000000       **          **     .0700
                   3  2.2500000       **          **     .0400
                   4  2.7500000       **          **     .0300
                   5  3.5000000       **          **     .0700
                   6  4.5000000       **          **     .0500
                   7  5.5000000       **          **     .0400
                   8  8.0000000       **          **     .1700
                   9 20.0000000       **          **     .4900
          ----------
          ** COMPUTED BY FDM
1

          RECEPTOR COORDINATES (X,Y,Z)

(830885., 814278.,  2.)  (831103., 814235.,  2.)  (831121., 814116.,  2.)
(831180., 813975.,  2.)  (831303., 813925.,  2.)  (831257., 813907.,  2.)
(831199., 813871.,  2.)  (831262., 813839.,  2.)  (831124., 813898.,  2.)
(831158., 813847.,  2.)  (831281., 813993.,  2.)  (831302., 814100.,  2.)
(831283., 814165.,  2.)  (831331., 814284.,  2.)  (831640., 814238.,  2.)
(831643., 813642.,  2.)  (832041., 813458.,  2.)  (832140., 813266.,  2.)
(832050., 812793.,  2.)  (831857., 812701.,  2.)  (831891., 812637.,  2.)
(831859., 812604.,  2.)  (831460., 814000.,  2.)  (831991., 812753.,  2.)
1

          SOURCE INFORMATION

                ENTERED EMIS.     TOTAL
                RATE (G/SEC,  EMISSION    WIND
                  G/SEC/M OR      RATE   SPEED      X1       Y1      X2       Y2  HEIGHT   WIDTH
          TYPE    G/SEC/M**2)   (G/SEC)    FAC.     (M)      (M)     (M)      (M)     (M)     (M)
          ---- --------------- ---------- ------ ------- -------- ------- -------- ------- -------
             2      .021200000    5.86417   .000 831247.  813636. 831503.  813531.     .50   10.00
             2      .021200000    6.66787   .000 831503.  813531. 831676.  813268.     .50   10.00
             2      .021200000    4.86317   .000 831676.  813268. 831664.  813039.     .50   10.00
             2      .021200000    2.75947   .000 831483.  813774. 831457.  813646.     .50   10.00
             2      .021200000    4.95602   .000 831333.  813626. 831423.  813410.     .50   10.00
             2      .021200000    5.71189   .000 831706.  813131. 831502.  813307.     .50   10.00
             2      .000067800     .00403   .000 831080.  813945. 831060.  813889.     .50   12.00
             2      .000067800     .00481   .000 831060.  813889. 831073.  813819.     .50   12.00
             2      .000067800     .01082   .000 831073.  813819. 831192.  813713.     .50   12.00
```

2	.000067800	.00632	.000	831192.	813713.	831271.	813663.	.50	12.00
2	.000067800	.00506	.000	831271.	813663.	831342.	813642.	.50	12.00
2	.000267000	.04152	.000	831342.	813642.	831495.	813612.	.50	12.00
2	.000267000	.01579	.000	831495.	813612.	831549.	813588.	.50	12.00
2	.000267000	.04011	.000	831549.	813588.	831663.	813490.	.50	12.00
2	.000267000	.04454	.000	831663.	813490.	831735.	813339.	.50	12.00
2	.000267000	.03604	.000	831735.	813339.	831747.	813205.	.50	12.00
2	.000267000	.05879	.000	831747.	813205.	831683.	812994.	.50	12.00
2	.001490000	.35961	.000	831684.	812994.	831636.	812757.	.50	12.00
2	.001490000	.09488	.000	831636.	812757.	831662.	812699.	.50	12.00
2	.001490000	.09881	.000	831662.	812699.	831721.	812668.	.50	12.00
2	.001490000	.08489	.000	831721.	812668.	831777.	812676.	.50	12.00
2	.001490000	.10106	.000	831777.	812676.	831820.	812729.	.50	12.00
2	.001490000	.47308	.000	831820.	812729.	831818.	813046.	.50	12.00
2	.001490000	.11248	.000	831818.	813046.	831859.	813110.	.50	12.00
2	.000209000	.01404	.000	831541.	813576.	831502.	813521.	.50	16.00
2	.000209000	.02307	.000	831502.	813521.	831408.	813463.	.50	16.00
1	.000985000	.00099	1.300	831289.	813623.	0.	0.	.50	.00
1	.000985000	.00099	1.300	831432.	813561.	0.	0.	.50	.00
1	.000985000	.00099	1.300	831469.	813705.	0.	0.	.50	.00
1	.000985000	.00099	1.300	831537.	813418.	0.	0.	.50	.00
1	.000985000	.00099	1.300	831644.	813409.	0.	0.	.50	.00
1	.000985000	.00099	1.300	831650.	813269.	0.	0.	.50	.00
1	.000985000	.00099	1.300	831673.	813104.	0.	0.	.50	.00
1	.000029500	.00003	1.300	831072.	813818.	0.	0.	.50	.00
1	.000029500	.00003	1.300	831270.	813663.	0.	0.	.50	.00
1	.000077600	.00008	1.300	831448.	813621.	0.	0.	.50	.00
1	.000077600	.00008	1.300	831664.	813490.	0.	0.	.50	.00
1	.000077600	.00008	1.300	831747.	813205.	0.	0.	.50	.00
1	.000182000	.00018	1.300	831502.	813521.	0.	0.	.50	.00
1	.000432000	.00043	1.300	831818.	812881.	0.	0.	.50	.00
1	.000432000	.00043	1.300	831721.	812668.	0.	0.	.50	.00
1	.000432000	.00043	1.300	831653.	812839.	0.	0.	.50	.00
3	.000002695	.00927	.000	831452.	813770.	57.	61.	.50	78.89
3	.000002695	.00887	.000	831510.	813758.	56.	59.	.50	79.85
3	.000002695	.01553	.000	831420.	813718.	56.	103.	.50	78.23
3	.000002695	.01455	.000	831516.	813699.	58.	93.	.50	77.90
3	.000002695	.01362	.000	831409.	813668.	49.	104.	.50	78.40
3	.000002695	.01272	.000	831504.	813645.	51.	93.	.50	77.71
3	.000002695	.01706	.000	831437.	813588.	39.	163.	.50	78.05
3	.000002695	.01319	.000	831419.	813555.	34.	143.	.50	76.78
3	.000002695	.01163	.000	831396.	813523.	39.	110.	.50	77.88
3	.000002695	.00992	.000	831320.	813612.	53.	70.	.50	73.15
3	.000002695	.01304	.000	831566.	813509.	60.	81.	.50	36.86
3	.000002695	.01360	.000	831517.	813473.	63.	80.	.50	36.65
3	.000002695	.01389	.000	831466.	813434.	64.	80.	.50	36.64
3	.000002695	.01545	.000	831617.	813438.	61.	94.	.50	37.11
3	.000002695	.01601	.000	831568.	813401.	63.	95.	.50	37.61
3	.000002695	.01692	.000	831516.	813362.	66.	95.	.50	37.25
3	.000002695	.01350	.000	831668.	813368.	63.	80.	.50	37.64
3	.000002695	.01360	.000	831618.	813329.	63.	81.	.50	37.64
3	.000002695	.01470	.000	831567.	813289.	67.	81.	.50	37.96
3	.000002695	.02114	.000	831646.	813273.	180.	44.	.50	39.19
3	.000002695	.01713	.000	831661.	813232.	165.	39.	.50	39.02
3	.000002695	.01436	.000	831669.	813191.	150.	36.	.50	39.36
3	.000002695	.01186	.000	831672.	813150.	137.	32.	.50	39.92
3	.000002695	.01587	.000	831682.	813077.	147.	40.	.50	73.12
3	.000002695	.00607	.000	831643.	813074.	72.	31.	.50	71.55
3	.000002695	.00567	.000	831649.	813467.	24.	86.	.50	36.81
3	.000002695	.00836	.000	831257.	813633.	50.	62.	.50	73.38
2	.000032344	.00192	.000	831080.	813945.	831060.	813889.	.50	12.00
2	.000032344	.00229	.000	831060.	813889.	831073.	813819.	.50	12.00
2	.000032344	.00516	.000	831073.	813819.	831192.	813713.	.50	12.00
2	.000032344	.00302	.000	831192.	813713.	831271.	813663.	.50	12.00
2	.000032344	.00241	.000	831271.	813663.	831342.	813642.	.50	12.00
2	.000032344	.00503	.000	831342.	813642.	831495.	813612.	.50	12.00
2	.000032344	.00191	.000	831495.	813612.	831549.	813588.	.50	12.00
2	.000032344	.00486	.000	831549.	813588.	831663.	813490.	.50	12.00
2	.000032344	.00540	.000	831663.	813490.	831735.	813339.	.50	12.00
2	.000032344	.00437	.000	831735.	813339.	831747.	813205.	.50	12.00
2	.000032344	.00712	.000	831747.	813205.	831683.	812994.	.50	12.00
2	.000032344	.00781	.000	831684.	812994.	831636.	812757.	.50	12.00
2	.000032344	.00206	.000	831636.	812757.	831662.	812699.	.50	12.00
2	.000032344	.00214	.000	831662.	812699.	831721.	812668.	.50	12.00
2	.000032344	.00184	.000	831721.	812668.	831777.	812676.	.50	12.00
2	.000032344	.00219	.000	831777.	812676.	831820.	812729.	.50	12.00
2	.000032344	.01027	.000	831820.	812729.	831818.	813046.	.50	12.00
2	.000032344	.00244	.000	831818.	813046.	831859.	813110.	.50	12.00
2	.000043125	.00290	.000	831541.	813576.	831502.	813521.	.50	16.00
2	.000043125	.00476	.000	831502.	813521.	831408.	813463.	.50	16.00

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TOTAL EMISSIONS 32.89844
NOTE: SOME SOURCE EMISSION RATES ARE A FUNCTION OF WIND SPEED AND TOTAL IS NOT CORRECT

1

TOP 50 TABLE FOR 1 HOUR AVERAGES

RANK	RECEPTOR	X-COORDINATE	Y-COORDINATE	ENDING HOUR	CONCENTRATION	DEPOSITION
1	8	831262.1	813838.7	103	1452.7850	27.4747
2	8	831262.1	813838.7	102	1407.0460	26.5145
3	8	831262.1	813838.7	104	1375.9520	26.1433
4	10	831157.7	813846.9	100	1340.5780	25.1316
5	10	831157.7	813846.9	101	1337.3610	25.0978
6	7	831198.6	813871.4	102	1296.1730	24.3084
7	7	831198.6	813871.4	101	1264.9700	23.6730
8	8	831262.1	813838.7	101	1246.6130	23.4482

9	7	831198.6	813871.4	103	1167.7970	21.9698
10	6	831256.9	813907.2	103	1161.5500	21.7036
11	10	831157.7	813846.9	99	1160.5960	21.7452
12	10	831157.7	813846.9	102	1152.8600	21.6771
13	8	831262.1	813838.7	105	1138.0720	21.7480
14	6	831256.9	813907.2	104	1115.5300	20.9141
15	5	831303.0	813924.6	104	1107.8440	20.7025
16	6	831256.9	813907.2	102	1105.5450	20.6243
17	5	831303.0	813924.6	103	1100.1460	20.5403
18	7	831198.6	813871.4	100	1096.3600	20.5029
19	9	831123.9	813898.0	100	1090.7360	20.2602
20	9	831123.9	813898.0	101	1084.8920	20.1618
21	16	831643.1	813641.8	121	1078.3470	20.8701
22	16	831643.1	813641.8	122	1078.2250	20.8280
23	16	831643.1	813641.8	109	1057.6230	20.0915
24	16	831643.1	813641.8	123	1051.8350	20.2845
25	16	831643.1	813641.8	120	1040.6340	20.1681
26	8	831262.1	813838.7	100	1030.2260	19.3965
27	5	831303.0	813924.6	105	1024.0400	19.2061
28	16	831643.1	813641.8	110	1020.7080	19.4744
29	23	831460.0	814000.0	108	1010.6180	18.9639
30	20	831856.7	812701.4	139	1009.5280	18.8260
31	5	831303.0	813924.6	102	1008.0170	18.8514
32	16	831643.1	813641.8	119	1007.9510	19.5677
33	16	831643.1	813641.8	108	1007.2470	19.0685
34	23	831460.0	814000.0	107	1005.9560	18.8167
35	16	831643.1	813641.8	124	996.0840	19.1922
36	6	831256.9	813907.2	101	964.3687	18.0049
37	11	831280.5	813993.0	104	961.3375	17.8136
38	4	831180.3	813974.6	102	957.2378	17.6800
39	20	831856.7	812701.4	140	954.4672	17.8014
40	8	831262.1	813838.7	106	951.6124	18.2545
41	16	831643.1	813641.8	118	949.5010	18.4589
42	16	831643.1	813641.8	111	944.5136	18.1098
43	9	831123.9	813898.0	99	941.6645	17.4908
44	11	831280.5	813993.0	103	938.5048	17.3770
45	6	831256.9	813907.2	105	935.3621	17.6220
46	23	831460.0	814000.0	109	932.3434	17.5269
47	5	831303.0	813924.6	106	927.1146	17.4425
48	7	831198.6	813871.4	104	926.0471	17.4910
49	9	831123.9	813898.0	102	923.8848	17.1929
50	20	831856.7	812701.4	138	917.9058	17.1607

1

HIGHEST AND SECOND HIGHEST VALUES FOR 1 HOUR AVERAGES

RECEPTOR	X-COORDINATE	Y-COORDINATE	HIGHEST VALUE	ENDING HOUR	DEPOSITION	SECOND HIGH	ENDING HOUR	DEPOSTION
1	830885.2	814278.4	431.9157	101.	7.6757	408.7195	100.	7.2684
2	831103.4	814235.1	549.6605	103.	9.8892	524.7223	102.	9.4372
3	831120.8	814115.6	684.8812	102.	12.4481	656.7786	103.	11.9462
4	831180.3	813974.6	957.2378	102.	17.6800	914.6420	103.	16.9232
5	831303.0	813924.6	1107.8440	104.	20.7025	1100.1460	103.	20.5403
6	831256.9	813907.2	1161.5500	103.	21.7036	1115.5300	104.	20.9141
7	831198.6	813871.4	1296.1730	102.	24.3084	1264.9700	101.	23.6730
8	831262.1	813838.7	1452.7850	103.	27.4747	1407.0460	102.	26.5145
9	831123.9	813898.0	1090.7360	100.	20.2602	1084.8920	101.	20.1618
10	831157.7	813846.9	1340.5780	100.	25.1316	1337.3610	101.	25.0978
11	831280.5	813993.0	961.3375	104.	17.8136	938.5048	103.	17.3770
12	831302.0	814099.6	771.8635	105.	14.1732	758.9182	104.	13.9104
13	831282.6	814165.1	671.1988	105.	12.2376	656.3674	104.	11.9439
14	831330.6	814284.4	540.1637	106.	9.7476	529.5900	105.	9.5427
15	831640.1	814237.9	475.9070	111.	8.6529	469.7398	110.	8.5099
16	831643.1	813641.8	1078.3470	121.	20.8701	1078.2250	122.	20.8280
17	832040.7	813457.5	542.5516	120.	10.1373	532.8053	121.	9.9568
18	832140.2	813266.0	529.2670	128.	9.7404	525.9459	126.	9.7469
19	832050.1	812793.4	738.8818	135.	13.5145	725.3604	136.	13.2351
20	831856.7	812701.4	1009.5280	139.	18.8260	954.4672	140.	17.8014
21	831890.5	812636.8	788.3367	139.	14.4642	725.5047	140.	13.3181
22	831858.8	812604.1	763.4655	140.	14.0231	731.7023	139.	13.4297
23	831460.0	814000.0	1010.6180	108.	18.9639	1005.9560	107.	18.8167
24	831991.4	812753.4	790.5957	137.	14.4655	779.5481	136.	14.2888

RUN ENDED ON 8/24/00 AT 12:30:21

Main Construction - Mitigated

```
1                 FDM - (DATED 91109)

                  IBM-PC VERSION (1.01)
                  (C) COPYRIGHT 1991, TRINITY CONSULTANTS, INC.
                  SERIAL NUMBER 8354  SOLD TO ENPAC LIMITED
                  RUN BEGAN ON  8/24/00 AT 12:27:49



    RUN TITLE:
         Cyber-Port Development only

         INPUT FILE NAME: OT15_M.DAT
         OUTPUT FILE NAME: OT15_M.LST
```

CONVERGENCE OPTION 1=OFF, 2=ON	1
MET OPTION SWITCH, 1=CARDS, 2=PREPROCESSED	1
PLOT FILE OUTPUT, 1=NO, 2=YES	1
MET DATA PRINT SWITCH, 1=NO, 2=YES	1
POST-PROCESSOR OUTPUT, 1=NO, 2=YES	1
DEP. VEL./GRAV. SETL. VEL., 1=DEFAULT, 2=USER	1
PRINT 1-HOUR AVERAGE CONCEN, 1=NO, 2=YES	3
PRINT 3-HOUR AVERAGE CONCEN, 1=NO, 2=YES	1
PRINT 8-HOUR AVERAGE CONCEN, 1=NO, 2=YES	1
PRINT 24-HOUR AVERAGE CONCEN, 1=NO, 2=YES	1
PRINT LONG-TERM AVERAGE CONCEN, 1=NO, 2=YES	1
BYPASS RAMMET CALMS RECOGNITION, 1=NO, 2=YES	1
NUMBER OF SOURCES PROCESSED	89
NUMBER OF RECEPTORS PROCESSED	24
NUMBER OF PARTICLE SIZE CLASSES	9
NUMBER OF HOURS OF MET DATA PROCESSED	216
LENGTH IN MINUTES OF 1-HOUR OF MET DATA	60.
ROUGHNESS LENGTH IN CM	60.00
SCALING FACTOR FOR SOURCE AND RECPTORS	1.0000
PARTICLE DENSITY IN G/CM**3	2.50
ANEMOMETER HEIGHT IN M	10.00

GENERAL PARTICLE SIZE CLASS INFORMATION

PARTICLE SIZE CLASS	CHAR. DIA. (UM)	GRAV. SETTLING VELOCITY (M/SEC)	DEPOSITION VELOCITY (M/SEC)	FRACTION IN EACH SIZE CLASS
1	.5000000	**	**	.0400
2	1.5000000	**	**	.0700
3	2.2500000	**	**	.0400
4	2.7500000	**	**	.0300
5	3.5000000	**	**	.0700
6	4.5000000	**	**	.0500
7	5.5000000	**	**	.0400
8	8.0000000	**	**	.1700
9	20.0000000	**	**	.4900

** COMPUTED BY FDM

1

RECEPTOR COORDINATES (X,Y,Z)

(830885., 814278., 2.)	(831103., 814235., 2.)	(831121., 814116., 2.)
(831180., 813975., 2.)	(831303., 813925., 2.)	(831257., 813907., 2.)
(831199., 813871., 2.)	(831262., 813839., 2.)	(831124., 813898., 2.)
(831158., 813847., 2.)	(831281., 813993., 2.)	(831302., 814100., 2.)
(831283., 814165., 2.)	(831331., 814284., 2.)	(831640., 814238., 2.)
(831643., 813642., 2.)	(832041., 813458., 2.)	(832140., 813266., 2.)
(832050., 812793., 2.)	(831857., 812701., 2.)	(831891., 812637., 2.)
(831859., 812604., 2.)	(831460., 814000., 2.)	(831991., 812753., 2.)

1

SOURCE INFORMATION

TYPE	ENTERED EMIS. RATE (G/SEC, G/SEC/M OR G/SEC/M**2)	TOTAL EMISSION RATE (G/SEC)	WIND SPEED FAC.	X1 (M)	Y1 (M)	X2 (M)	Y2 (M)	HEIGHT (M)	WIDTH (M)
2	.000636000	.17593	.000	831247.	813636.	831503.	813531.	.50	10.00
2	.000636000	.20004	.000	831503.	813531.	831676.	813268.	.50	10.00
2	.000636000	.14590	.000	831676.	813268.	831664.	813039.	.50	10.00
2	.000636000	.08278	.000	831483.	813774.	831457.	813646.	.50	10.00
2	.000636000	.14868	.000	831333.	813626.	831423.	813410.	.50	10.00
2	.000636000	.17136	.000	831706.	813131.	831502.	813307.	.50	10.00
2	.000002030	.00012	.000	831080.	813945.	831060.	813889.	.50	12.00
2	.000002030	.00014	.000	831060.	813889.	831073.	813819.	.50	12.00
2	.000002030	.00032	.000	831073.	813819.	831192.	813713.	.50	12.00
2	.000002030	.00019	.000	831192.	813713.	831271.	813663.	.50	12.00
2	.000002030	.00015	.000	831271.	813663.	831342.	813642.	.50	12.00
2	.000008010	.00125	.000	831342.	813642.	831495.	813612.	.50	12.00
2	.000008010	.00047	.000	831495.	813612.	831549.	813588.	.50	12.00
2	.000008010	.00120	.000	831549.	813588.	831663.	813490.	.50	12.00
2	.000008010	.00134	.000	831663.	813490.	831735.	813339.	.50	12.00
2	.000008010	.00108	.000	831735.	813339.	831747.	813205.	.50	12.00
2	.000008010	.00176	.000	831747.	813205.	831683.	812994.	.50	12.00
2	.000044700	.01079	.000	831684.	812994.	831636.	812757.	.50	12.00
2	.000044700	.00285	.000	831636.	812757.	831662.	812699.	.50	12.00
2	.000044700	.00296	.000	831662.	812699.	831721.	812668.	.50	12.00
2	.000044700	.00255	.000	831721.	812668.	831777.	812676.	.50	12.00
2	.000044700	.00303	.000	831777.	812676.	831820.	812729.	.50	12.00
2	.000044700	.01419	.000	831820.	812729.	831818.	813046.	.50	12.00
2	.000044700	.00337	.000	831818.	813046.	831859.	813110.	.50	12.00
2	.000006260	.00042	.000	831541.	813576.	831502.	813521.	.50	16.00
2	.000006260	.00069	.000	831502.	813521.	831408.	813463.	.50	16.00
1	.000492000	.00049	1.300	831289.	813623.	0.	0.	.50	.00
1	.000492000	.00049	1.300	831432.	813561.	0.	0.	.50	.00
1	.000492000	.00049	1.300	831469.	813705.	0.	0.	.50	.00
1	.000492000	.00049	1.300	831537.	813418.	0.	0.	.50	.00
1	.000492000	.00049	1.300	831644.	813409.	0.	0.	.50	.00
1	.000492000	.00049	1.300	831650.	813269.	0.	0.	.50	.00
1	.000492000	.00049	1.300	831673.	813104.	0.	0.	.50	.00
1	.000014800	.00001	1.300	831072.	813818.	0.	0.	.50	.00
1	.000014800	.00001	1.300	831270.	813663.	0.	0.	.50	.00
1	.000038800	.00004	1.300	831448.	813621.	0.	0.	.50	.00

1	.000038800	.00004	1.300	831664.	813490.	0.	0.	.50	.00
1	.000038800	.00004	1.300	831747.	813205.	0.	0.	.50	.00
1	.000909000	.00091	1.300	831502.	813521.	0.	0.	.50	.00
1	.000216000	.00022	1.300	831818.	812881.	0.	0.	.50	.00
1	.000216000	.00022	1.300	831721.	812668.	0.	0.	.50	.00
1	.000216000	.00022	1.300	831653.	812839.	0.	0.	.50	.00
3	.000001348	.00464	.000	831452.	813770.	57.	61.	.50	78.89
3	.000001348	.00444	.000	831510.	813758.	56.	59.	.50	79.85
3	.000001348	.00776	.000	831420.	813718.	56.	103.	.50	78.23
3	.000001348	.00728	.000	831516.	813699.	58.	93.	.50	77.90
3	.000001348	.00681	.000	831409.	813668.	49.	104.	.50	78.40
3	.000001348	.00636	.000	831504.	813645.	51.	93.	.50	77.71
3	.000001348	.00853	.000	831437.	813588.	39.	163.	.50	78.05
3	.000001348	.00660	.000	831419.	813555.	34.	143.	.50	76.78
3	.000001348	.00581	.000	831396.	813523.	39.	110.	.50	77.88
3	.000001348	.00496	.000	831320.	813612.	53.	70.	.50	73.15
3	.000001348	.00652	.000	831566.	813509.	60.	81.	.50	36.86
3	.000001348	.00680	.000	831517.	813473.	63.	80.	.50	36.65
3	.000001348	.00694	.000	831466.	813434.	64.	80.	.50	36.64
3	.000001348	.00773	.000	831617.	813438.	61.	94.	.50	37.11
3	.000001348	.00800	.000	831568.	813401.	63.	95.	.50	37.61
3	.000001348	.00846	.000	831516.	813362.	66.	95.	.50	37.25
3	.000001348	.00675	.000	831668.	813368.	63.	80.	.50	37.64
3	.000001348	.00680	.000	831618.	813329.	63.	81.	.50	37.64
3	.000001348	.00735	.000	831567.	813289.	67.	81.	.50	37.96
3	.000001348	.01057	.000	831646.	813273.	180.	44.	.50	39.19
3	.000001348	.00857	.000	831661.	813232.	165.	39.	.50	39.02
3	.000001348	.00718	.000	831669.	813191.	150.	36.	.50	39.36
3	.000001348	.00593	.000	831672.	813150.	137.	32.	.50	39.92
3	.000001348	.00794	.000	831682.	813077.	147.	40.	.50	73.12
3	.000001348	.00304	.000	831643.	813074.	72.	31.	.50	71.55
3	.000001348	.00283	.000	831649.	813467.	24.	86.	.50	36.81
3	.000001348	.00418	.000	831257.	813633.	50.	62.	.50	73.38
2	.000016172	.00096	.000	831080.	813945.	831060.	813889.	.50	12.00
2	.000016172	.00115	.000	831060.	813889.	831073.	813819.	.50	12.00
2	.000016172	.00258	.000	831073.	813819.	831192.	813713.	.50	12.00
2	.000016172	.00151	.000	831192.	813713.	831271.	813663.	.50	12.00
2	.000016172	.00121	.000	831271.	813663.	831342.	813642.	.50	12.00
2	.000016172	.00252	.000	831342.	813642.	831495.	813612.	.50	12.00
2	.000016172	.00096	.000	831495.	813612.	831549.	813588.	.50	12.00
2	.000016172	.00243	.000	831549.	813588.	831663.	813490.	.50	12.00
2	.000016172	.00270	.000	831663.	813490.	831735.	813339.	.50	12.00
2	.000016172	.00218	.000	831735.	813339.	831747.	813205.	.50	12.00
2	.000016172	.00356	.000	831747.	813205.	831683.	812994.	.50	12.00
2	.000016172	.00390	.000	831684.	812994.	831636.	812757.	.50	12.00
2	.000016172	.00103	.000	831636.	812757.	831662.	812699.	.50	12.00
2	.000016172	.00107	.000	831662.	812699.	831721.	812668.	.50	12.00
2	.000016172	.00092	.000	831721.	812668.	831777.	812676.	.50	12.00
2	.000016172	.00110	.000	831777.	812676.	831820.	812729.	.50	12.00
2	.000016172	.00513	.000	831820.	812729.	831818.	813046.	.50	12.00
2	.000016172	.00122	.000	831818.	813046.	831859.	813110.	.50	12.00
2	.000021563	.00145	.000	831541.	813576.	831502.	813521.	.50	16.00
2	.000021563	.00238	.000	831502.	813521.	831408.	813463.	.50	16.00

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TOTAL EMISSIONS 1.19744

NOTE: SOME SOURCE EMISSION RATES ARE A FUNCTION OF WIND SPEED AND TOTAL IS NOT CORRECT

1

TOP 50 TABLE FOR 1 HOUR AVERAGES

RANK	RECEPTOR	X-COORDINATE	Y-COORDINATE	ENDING HOUR	CONCENTRATION	DEPOSITION
1	8	831262.1	813838.7	103	50.7284	.9588
2	8	831262.1	813838.7	102	50.5255	.9518
3	10	831157.7	813846.9	100	47.2620	.8852
4	8	831262.1	813838.7	104	47.0307	.8930
5	10	831157.7	813846.9	101	46.5563	.8731
6	8	831262.1	813838.7	101	46.3203	.8715
7	7	831198.6	813871.4	102	45.1665	.8463
8	7	831198.6	813871.4	101	45.0048	.8416
9	10	831157.7	813846.9	99	41.8576	.7835
10	6	831256.9	813907.2	103	41.7697	.7803
11	5	831303.0	813924.6	103	41.3377	.7722
12	6	831256.9	813907.2	102	40.8966	.7630
13	5	831303.0	813924.6	104	40.7141	.7611
14	16	831643.1	813641.8	109	40.4701	.7706
15	7	831198.6	813871.4	100	40.1558	.7505
16	7	831198.6	813871.4	103	40.1491	.7547
17	10	831157.7	813846.9	102	39.9227	.7503
18	8	831262.1	813838.7	100	39.7724	.7494
19	16	831643.1	813641.8	110	39.1710	.7491
20	6	831256.9	813907.2	104	39.1267	.7332
21	9	831123.9	813898.0	100	38.8197	.7205
22	16	831643.1	813641.8	108	38.6836	.7341
23	16	831643.1	813641.8	122	38.6758	.7483
24	5	831303.0	813924.6	102	38.6271	.7228
25	16	831643.1	813641.8	121	38.5004	.7460
26	8	831262.1	813838.7	105	38.3800	.7331
27	16	831643.1	813641.8	123	38.1179	.7366
28	9	831123.9	813898.0	101	38.0858	.7073
29	23	831460.0	814000.0	107	37.6591	.7044
30	23	831460.0	814000.0	108	37.3741	.7014
31	16	831643.1	813641.8	120	37.1649	.7208
32	20	831856.7	812701.4	139	36.9185	.6891
33	16	831643.1	813641.8	124	36.8389	.7116
34	6	831256.9	813907.2	101	36.7392	.6862
35	5	831303.0	813924.6	105	36.5241	.6851

36	16	831643.1	813641.8	111	36.5089	.7015
37	16	831643.1	813641.8	119	36.2211	.7035
38	20	831856.7	812701.4	140	35.1661	.6562
39	11	831280.5	813993.0	104	35.1106	.6506
40	11	831280.5	813993.0	103	35.0330	.6487
41	16	831643.1	813641.8	125	34.8020	.6728
42	16	831643.1	813641.8	118	34.6155	.6732
43	4	831180.3	813974.6	102	34.3683	.6344
44	9	831123.9	813898.0	99	34.3168	.6369
45	23	831460.0	814000.0	106	34.2371	.6375
46	23	831460.0	814000.0	109	34.1256	.6418
47	16	831643.1	813641.8	107	33.5099	.6344
48	20	831856.7	812701.4	138	33.4813	.6268
49	16	831643.1	813641.8	112	33.3515	.6437
50	10	831157.7	813846.9	98	33.3371	.6245

1

HIGHEST AND SECOND HIGHEST VALUES FOR 1 HOUR AVERAGES

RECEPTOR	X-COORDINATE	Y-COORDINATE	HIGHEST VALUE	ENDING HOUR	DEPOSITION	SECOND HIGH	ENDING HOUR	DEPOSTION
1	830885.2	814278.4	15.6944	101.	.2788	15.0297	100.	.2671
2	831103.4	814235.1	19.8878	103.	.3576	19.3070	102.	.3470
3	831120.8	814115.6	24.8657	102.	.4517	23.4492	103.	.4262
4	831180.3	813974.6	34.3683	102.	.6344	32.3851	101.	.5977
5	831303.0	813924.6	41.3377	103.	.7722	40.7141	104.	.7611
6	831256.9	813907.2	41.7697	103.	.7803	40.8966	102.	.7630
7	831198.6	813871.4	45.1665	102.	.8463	45.0048	101.	.8416
8	831262.1	813838.7	50.7284	103.	.9588	50.5255	102.	.9518
9	831123.9	813898.0	38.8197	100.	.7205	38.0858	101.	.7073
10	831157.7	813846.9	47.2620	100.	.8852	46.5563	101.	.8731
11	831280.5	813993.0	35.1106	104.	.6506	35.0330	103.	.6487
12	831302.0	814099.6	28.2906	104.	.5185	28.1416	105.	.5166
13	831282.6	814165.1	24.4266	105.	.4452	24.3947	104.	.4438
14	831330.6	814284.4	19.8239	106.	.3576	19.6291	105.	.3536
15	831640.1	814237.9	17.5335	111.	.3187	17.4610	110.	.3163
16	831643.1	813641.8	40.4701	109.	.7706	39.1710	110.	.7491
17	832040.7	813457.5	19.5439	127.	.3605	19.2567	126.	.3563
18	832140.2	813266.0	19.5356	128.	.3595	19.3433	129.	.3544
19	832050.1	812793.4	26.2548	135.	.4799	26.0858	136.	.4756
20	831856.7	812701.4	36.9185	139.	.6891	35.1661	140.	.6562
21	831890.5	812636.8	28.7083	139.	.5267	26.6611	140.	.4893
22	831858.8	812604.1	27.9666	140.	.5138	26.6156	139.	.4887
23	831460.0	814000.0	37.6591	107.	.7044	37.3741	108.	.7014
24	831991.4	812753.4	28.4358	137.	.5199	27.8116	136.	.5096

RUN ENDED ON 8/24/00 AT 12:29:05

Appendix 5.1 Mitigated Construction Noise Levels

Northern Access Road

NSR	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
SR2	63.3	59.2	57.4	54.3	56.7	63.6	56	35.4	57.2	56.8	56.7	56.9	56.7
SR3	74.4	73.4	73.2	75	71.4	73.8	74.5	66.8	74.7	74.5	74.2	72.6	72.6
SR4	73.2	72.2	73.3	67.5	71.5	73.7	67.5	64.1	67.8	67.7	67.5	72.1	71.6
SR5													
SR6	43.2	41.9	62.4	54.5	62.8	63.3	63.1	63.7	63.7	63.2	63	40.7	40.1
SR7	67.2	68.5	69.8	69.6	70.7	71.1	71	71.5	69.3	68.6	68.7	56.5	64
SR8	71.2	72.5	72.4	73.4	73.4	73.8	73.6	74.1	70.7	69.8	70.2	60.2	67.9
SR9	74.2	74.1	74.4	73.9	74.2	74.9	72.2	69.1	71.8	71.6	71.6	74.4	74.4
SR10	67	69.6	68.1	69.2	69.4	69.3	67.8	68	62.1	59.8	61.9	59.9	64
SR11	39	39.5	42.1	37.4	41.6	42.5	39.5	39	39.7	39.3	39.1	38.8	38.2
SR12													
SR13													
SR19	61.3	62.6	62.1	63.4	63.2	63.6	63.5	64	60.2	59.2	59.8	50.9	58.6
SR19A	60.2	61.5	61.1	62.3	62.2	62.6	62.5	63	59.3	58.8	49.8	57.5	62
SR19B													
SR21*													
SR22													
SR23													
SR24*													
SR25*													
SR26*													
SR27	44.6	45.9	43.9	46.5	45.2	45.3	44.7	45	36.6	35.2	36.3	34.3	38.4
SR40*													

Appendix 5.1 Mitigated Construction Noise Levels

Main Work

NSR	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
SR2	29.4	29.4	29.4	29.4	20.3	20.3	20.3	20.3	15.3	15.3	15.3	15.3	15.3
SR3	49.6	49.6	49.6	49.6	40.1	40.1	40.1	40.1	30.3	30.3	30.3	30.3	30.3
SR4													
SR5	62.7	63.5	63.5	63.5	63.5	63.5	63.5	63.5	61.1	61.1	61.1	61.1	61.1
SR6	45.9	45.9	45.9	45.9	35.4	35.4	35.4	35.4	0	0	0	0	0
SR7	60.8	61.9	61.9	61.9	61.5	61.5	61.5	61.5	56.8	56.8	56.8	56.8	56.8
SR8	58.3	58.3	58.3	58.3	56.8	56.8	56.8	56.8	56.6	56.6	56.6	56.6	56.6
SR9													
SR10	50	50	50	50	43.2	43.2	43.2	43.2	41.2	41.2	41.2	41.2	41.2
SR11	60.9	61.7	61.7	61.7	61.7	61.7	61.7	61.7	59.3	59.3	59.3	59.3	59.3
SR12	60.1	60.9	60.9	60.9	60.9	60.9	60.9	60.9	58.5	58.5	58.5	58.5	58.5
SR13	59.2	60	60	60	60	60	60	60	57.6	57.6	57.6	57.6	57.6
SR19	73.4	74.2	74.2	74.2	74.2	74.2	74.2	74.2	72.3	72.3	72.3	72.3	72.3
SR19A	72.6	73.2	73.2	73.2	73.2	73.2	73.2	73.2	71.7	71.7	71.7	71.7	71.7
SR19B	72.9	73.3	73.3	73.3	73.3	73.3	73.3	73.3	72.2	72.2	72.2	72.2	72.2
SR21*	63.1	63.6	63.5	63.5	63.5	63.5	63	63	60.9	60.9	60.9	60.9	60.9
SR22	63.7	63.4	63.4	63.4	63.4	63.4	62.1	62.1	60.9	60.9	60.9	60.9	60.9
SR23	64.6	63.7	63.7	63.6	63.6	63.6	59.1	59.1	57.7	57.7	57.7	57.7	57.7
SR24*	65.4	63.6	63.6	63.5	63.5	63.5	61.1	61.1	61.1	61.1	61.1	61.1	61.1
SR25*	57.8	55.6	55.6	54.9	54.9	54.9	60	60	60	60	60	60	60
SR26*	62.3	60.6	60.6	60.4	60.4	60.4	58.8	58.8	58.8	58.8	58.8	58.8	58.8
SR27	57.5	58	58	58	57.9	57.9	57.8	57.8	56.4	56.4	56.4	56.4	56.4
SR40*	61.4	60.1	60.1	60.1	60.1	60.1	56.7	56.7	55.5	55.5	55.5	55.5	55.5

Appendix 5.2 Proposed Powered Mechanical Equipment for Construction and Operation of Concrete Batching Plant

Construction Stage				
Equipment	**Quantity**	**TM reference**	**SWL per Piece dB(A)**	**Sub-Total SWL dB(A)**
Generator Set	2	CNP 101	108	111
Excavator	1	CNP 081	112	112
150T Mobile Crane	2	CNP 048	112	115
Service Truck	2	CNP 067	117	120
Vibration Poker	2	CNP 170	113	116
Pneumatic Breaker	1	CNP 026	114	114
Compressor	1	CNP 003	104	104
Concrete Mixer Truck	2	CNP 044	109	112
Total SWL in dB(A)				**124**
Operation Stage 1				
Equipment	**Quantity**	**TM reference**	**SWL per Piece dB(A)**	**Sub-Total SWL dB(A)**
Wheel Loader	1	CNP 081	112	112
Concrete Recycle Machine	1	CNP 045	96	96
Generator	1	CNP 101	108	108
Cement Blower	1	CNP 047	109	109
Concrete Wet Mixer	1	CNP 045	96	96
Tipper Truck	1	CNP 067	117	117

Cement Tanker	1	CNP 141	112	112
Concrete Mixer Truck	3	CNP 044	109	114
Batching Plant	1	CNP 022	108	108
Compressor	2	CNP 003	104	107
Total SWL in dB(A)				**121**
Operation Stage 2				
Equipment	**Quantity**	**TM reference**	**SWL per Piece dB(A)**	**Sub-Total SWL dB(A)**
Wheel Loader	1	CNP 081	112	112
Concrete Recycle Machine	1	CNP 045	96	96
Generator	4	CNP 101	108	114
Cement Blower	3	CNP 047	109	114
Concrete Wet Mixer	3	CNP 045	96	101
Tipper Truck	1	CNP 067	117	117
barge	3	CNP 061	104	109
Concrete Mixer Truck	8	CNP 044	109	118
Batching Plant	1	CNP 022	108	108
Compressor	5	CNP 003	104	111
Total SWL in dB(A)				**123**

Appendix 5.3 Proposed Powered Mechanical Equipment with Mitigation Measures						
Construction Stage						
Equipment	**Quantity**	**TM reference**	**% on-time**	**Barrier Correction**	**SWL per Piece dB(A)**	**Sub-Total SWL dB(A)**
Generator Set	2	R1	100	0	95	98
Excavator	1	R2	80	0	105	104
150T Mobile Crane	2	R2	70	0	106	107
Service Truck	2	R2	60	0	109	110
Vibration Poker	2	R2	70	0	100	101
Pneumatic Breaker	1	CNP 025	80	0	111	110
Compressor	1	CNP001	80	0	100	99
Concrete Mixer Truck	2	CNP 044	90	0	109	112
Total SWL in dB(A)						**116.5**
Operation Stage 1						
Equipment	**Quantity**	**TM reference**	**% on-time**	**Barrier Correction**	**SWL per Piece dB(A)**	**Sub-Total SWL dB(A)**
Wheel Loader	1	CNP 081	80	0	112	111
Concrete Recycle Machine	1	CNP 045	100	0	96	96
Generator	1	CNP 101	100	0	108	108

Concrete Wet Mixer	1	CNP 045	90	0	96	96
Tipper Truck	1	CNP 067	60	0	117	115
Cement Tanker	1	CNP 141	60	0	112	110
barge	1	CNP 061	80	0	104	103
Concrete Mixer Truck	3	CNP 044	90	0	109	113
Batching Plant	1	CNP 022	100	0	108	108
Compressor	3	CNP001	80	0	100	104
Total SWL in dB(A)						**120**
Operation Stage 2						
Equipment	**Quantity**	**TM reference**	**% on-time**	**Barrier Correction**	**SWL per Piece dB(A)**	**Sub-Total SWL dB(A)**
Wheel Loader	1	CNP 081	80	0	112	111
Concrete Recycle Machine	1	CNP 045	100	0	96	96
Generator	4	R1	100	0	95	101
Concrete Wet Mixer	3	CNP 047	80	0	109	113
Cement Blower	3	CNP 045	80	0	96	100
Tipper Truck	1	R2	60	0	109	107
barge	3	CNP 061	80	0	104	108
Concrete Mixer Truck	8	CNP 044	90	0	109	118
Batching Plant	1	CNP 022	100	0	108	108
Compressor	6	CNP 003	80	0	104	111
Total SWL in						**121**

dB(A)						
Note:						
R1: Environmental Permit Variation for Road Work for Cyber Port Development - Construction Noise Impact Assessment Report (February 2000)						
R2: Northern Access Road for Cyberport Development Environmental Permit Application - Supplementary Environmental Assessment Report (July 2000)						
Phase 1 Construction of Stage 1						
Phase 2 Consrruction of Stage 2 and operation of Stage 1						
Phase 3 Operation of Stage 2						