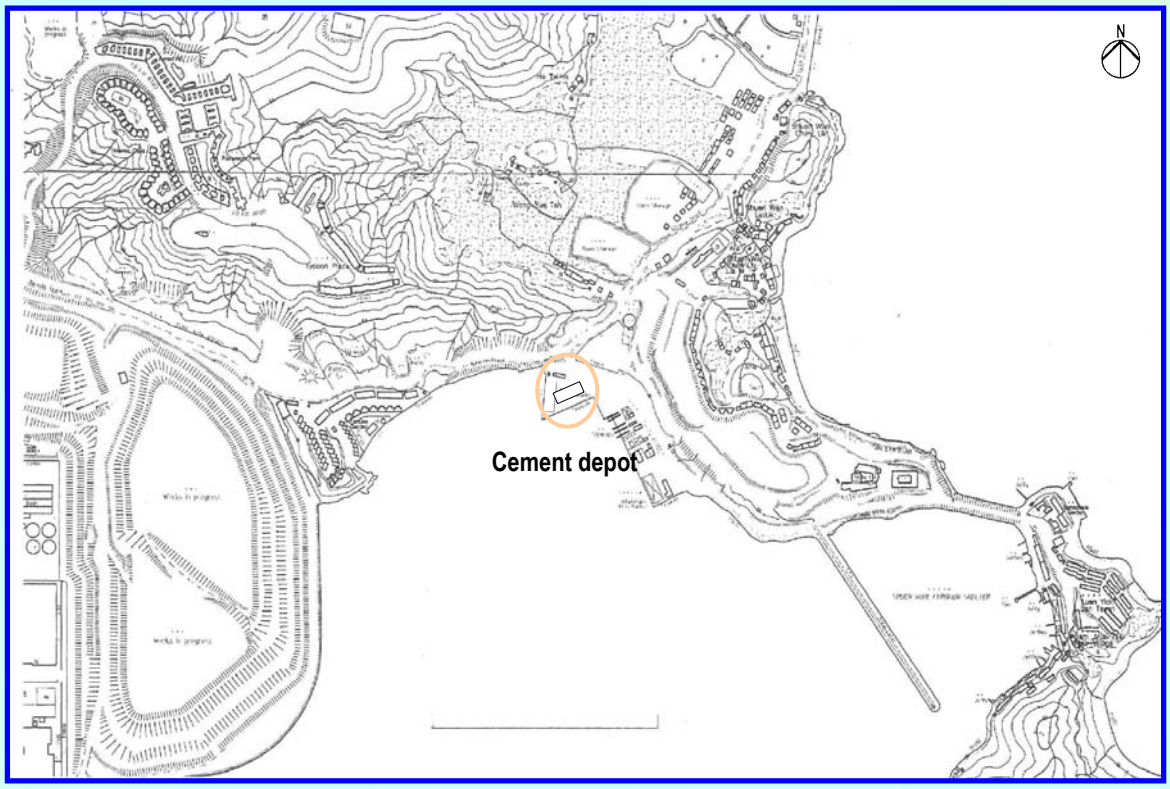
K. Wah Materials Limited



Environmental Impact Assessment Study for Cement Silos Addition Work in Tai Po Cement Depot

Environmental Impact Assessment Study

ARUP
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ABBREVIATIONS

ANLs	Acceptable Noise Levels
APCO	Air Pollution Control Ordinance
APCP	Air Pollution Control Plan
Arup	Ove Arup and Partners
ASR	Air Sensitive Receptors
AQO	Air Quality Objectives
CED	Civil Engineering Department
CNP	Construction Noise Permit
DEP	Director of Environmental Protection
DO	Dissolved Oxygen
EIA	Environmental Impact Assessment
EIAO	Environmental Impact Assessment Ordinance
EM&A	Environmental Monitoring and Audit
EP	Environmental Permit
EPD	Environmental Protection Department
HKPSG	Hong Kong Planning Standards and Guidelines
NCO	Noise Control Ordinance
NSRs	Noise Sensitive Receivers
PME	Powered Mechanical Equipment
SPME	Specified Powered Mechanical Equipment
SWL	Sound Power Level
TMs	Technical Memoranda
TM-GW	Technical Memorandum on Noise from Construction Work other than Percussive Piling
TM-DA	Technical Memorandum on Noise from Construction Work in Designated Areas
TM-PP	Technical Memorandum on Noise from Percussive Piling
TM-EIA	Technical Memorandum on Environmental Impact Assessment Process
TM-IND	Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites
TM-Water	Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters
VSR	Visual Sensitive Receiver
WCZ	Water Control Zone
WDO	Waste Disposal Ordinance
WQO	Water Quality Objectives

1 INTRODUCTION

1.1 Background

The existing Tai Po cement depot has been operated by K. Wah Materials Ltd. (hereafter refer to as the Project Proponent). It covers approximately 5,900 m^2 and consists of 6 cement silos of total capacity at 8,500 MT. Currently, cement is delivered to the depot through cement barges. Existing cement silo capacity is not capable of storing all the cement from a single shipment load. Current practice is to unload the cement from the silos by cement tankers for immediate delivery to the client, thus free up the silos for further storage. As a result, the barge is required to berth alongside the shore for a period of time and uploading of cement can only be operated in batch mode.

In order to reduce potential nuisance of the barge operation, the only way is to increase the depot storage capacity. K. Wah plans to construct three additional cement silos of total capacity at 7,500 MT. With the three additional silos, the total capacity of the depot will be increased to 16,000MT.

As the depot capacity involves cement works greater than 10,000MT, it is classified as a designated project under item K.5 of Part I of Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) (Cap. 499). An Environment Permit is therefore required for the construction and operation of the cement depot. K. Wah has commissioned Ove Arup & Partners Hong Kong Ltd (Arup) to provide environmental consultancy services for this application. A study brief (ESB-084/2001) was issued on 30 October 2001 outlining the requirements of the EIA Study.

The objective of this report is to provide an Environmental Impact Assessment (EIA) for the proposed project. This report presents the assessment criteria, methodologies, and results for the potential noise, dust, water quality and visual impacts, during construction and operational phases, with and without mitigation measures.

1.2 Objectives of the Environmental Impact Studies

The main objectives of this EIA report are summarized as follows:

- To give an account of the considerations given to different alternative sites
- To identify and describe the elements of the community and environment likely to be affected by the Project
- To identify and quantify emission sources and determine the significant of impacts on sensitive receivers and potential affected uses
- To propose mitigation measures so as to minimize pollution, environmental disturbance and nuisance arising from the Project

- To identify, predict and evaluate the residual environmental impacts and the cumulative effects expected to arise from the construction and the operation of the Project in relation to the sensitive receivers and potential affected uses

- To identify, assess and specify methods, measures and standards, to be included in the detailed design, construction and operation of the Project, which are necessary to mitigate these environmental impacts and reducing them to acceptable levels

- To investigate the extent of side-effects of proposed mitigation measures that may lead to other forms of impacts and to identify the constraints associated with the mitigation measures

- To identify, design and specify the environmental monitoring and audit requirements, to ensure the implementation and the effectiveness of the environmental protection control measures adopted

2 PROJECT DESCRIPTION

2.1 Background

The proposed project site is within the existing site of cement depot, which is located at 18 Yu On Street, Sam Mun Tsai, Tai Po. The present site is owned and has been operated by Project Proponent since 1992. A location plan of the site is shown in Fig 2.1. The existing cement depot consists of 6 cement silos of total capacity at 8,500 MT- four at 1,500 MT and two at 1,250 MT (Fig. 2.2). The silos are located at about 13 - 24 m from the existing seawall. Average daily cement dispatching rate is 1,400 – 1,500 MT.

In the existing depot, amongst the six silos, two of the 1,500MT cement silos and two of the 1,250MT cement silos are interconnected. This allows the existing six silos to be connected to four dust collectors. In addition, another three dust collectors are installed at the three loading points for the cement tankers. A total of seven dust collectors are employed in the existing plant to mitigate any fugitive emissions (Fig.2.3). In normal situation, only two loading points are operated. The remaining loading point is for backup purpose.

Cement is delivered to the depot by cement barges (loading capacity of 400 MT) from the ocean going vessel (not owned by project proponent but of loading capacity 10,000 MT, Fig. 2.2), which is located in Tolo Harbour Channel. Cement unloading from the ocean going vessel to the barge is through enclosed pipelines. The barge then travels to the depot and the cement is uploaded to the cement silos via enclosed pipelines and Bucket Elevator. The entire uploading process is performed within a totally enclosed system in order to suppress dust emissions (Fig. 2.3). Cement is stored inside the silos until unloading to cement tankers for delivery. This process is also conducted in totally enclosed connections.

The operation of depot will be powered by mains. There are no additional gaseous emissions from the mechanical plant (e.g. generators).

2.2 Design of the Project

Due to the limited capacity of existing silos, 3 additional silos of total capacity at 7,500MT are proposed to be constructed. The new silos are located adjacent to the existing silos and occupy a floor area of approximately 400m^2 (Fig 2.4). Each planned silo will be fitted with a dust collector. Besides, the planned silos are also interconnected to the existing unloading points. Fig.2.5 shows the schematic diagram of the planned process. There will not be any increased throughput or operational capacity to the existing operations as a result of the increased silo capacity.

A Concrete Batching Plant and a Stone Plant, operated by other companies are identified within 500m of the proposed development (Fig. 2.1). The Concrete Batching Plant consists of 2 legs, hereafter referred to as East Wing Concrete Batching Plant and West Wing Concrete Batching Plant respectively. These plants will contribute to cumulative impacts of noise and fugitive dust emissions on the nearby sensitive receivers. As the proposed project site is within the existing industrial premises, there will not be any impacts on local ecology, landscaping, site of cultural importance or listed buildings.

2.3 Scenarios with or without the Project

The existing operation requires uploading from the ocean going vessel to be stopped when the silos are full. Until space inside the silos is freed from cement dispatched by the cement tankers,

the barge will have to remain at berth. This causes long lag time and frequent startup of the pumping barge, which results in intermittent transient noise nuisance to the nearby sensitive receivers.

By increasing the silo capacity, cement uploading from the barge can be completed in one batch. The proposed additional silos will therefore eliminate the intermittent transient noise due to the frequent startup of the pumping barge. Also, the berthing time of the ocean vessel will be shortened, thus reducing the marine traffic impact in Tolo Harbour.

2.4 Demerit of other Alternatives

In arriving at the selected option, different alternative locations including outside the existing depot area (off-site) have been evaluated from the environmental point of view. The demerits of the alternative options are summarized as follows.

(i) The construction of a new cement depot off site would require a new jetty and a large site formation area. This will introduce impact on marine water quality, marine ecology and air quality.
(ii) More cement barges will need to be deployed for serving the two depots at different locations, thus leading to an increase in air quality (such as dark smoke emission from generator), noise and marine traffic impacts.
(iii) Additional cement unloading bays will be required, which will give rise to dust emission, visual and noise impact and safety concerns.
(iv) There is also a need to introduce a new conveyor system for cement unloading which will increase the risk of accidental leakage.
(v) Locating the additional silos at further distance from the existing silos will also give rise to demerits of an offsite location as described in (iii) and (iv).

2.5 Construction Methodology and Programme

The construction of the new cement silos will consist of three stages: ground excavation, setting of foundation and the silo erection works. Ground excavation work will employ excavator mounted breaker and drilling rig. Foundation works will employ concrete lorry mixer, concrete pump and vibratory poker. Silos erection works will employ sky-crane and arc welders. The proposed new silos will be fabricated off-site and transport to the existing depot by barge such that the transportation and construction noise nuisance can be reduced. The tentative construction programme is shown in Table 2.1

Table 2.1: Tentative construction schedule

Description	Commencement Date	Completion Date
Construction of addition 3 silos	Feb 2003	Nov 2003

During the construction period, the existing cement depot will continue operation. Therefore, the cumulative impact due to the operation of the existing cement depot is taken into account in this study. The addition three silos will start immediately operation upon completion of works in November 2003.

2.6 Interactions with Other Projects

There are no other projects likely to interface with this proposed project. As the construction of the Casa Marina III is nearly finished, it will not cause cumulative impact on the environment.

3 RELEVANT ENVIRONMENTAL LIGISTATION

3.1 Introduction

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

3.2 Environmental Impact Assessment (EIA)

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 Process (TM-EIA) (EIAO, Cap.499, S.16).

3.3 Air

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 (SO_2), Nitrogen Dioxide (NO_2), Respirable Suspended Particulars (RSP) and Total Suspended Particulates (TSP).

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

The Air Pollution Control (Construction Dust) Regulations will also be relevant during the construction phase of the development.

3.4 Noise

With reference to Table 1B of the TM-EIA regarding noise standards for daytime construction activities, a limit of 75 dB(A) in Leq(30 min) has been proposed for all domestic premises including temporary housing accommodation, hotels and hostels. For schools, a daytime noise level of 70 dB(A) in Leq(30 min), lowered to 65 dB(A) during examination periods is recommended.

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

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 (TM-PP), Noise from Construction Work Other Than Percussive Piling (TM-GW) and Noise from Construction Work in Designated Areas (TM-DA). The TMs establish the permitted noise levels for construction work depending upon working hours and the existing noise climate.

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 TM-GW, TM-PP, TM-DA 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. 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.

Noises from fixed sources, including that from industrial-type establishments, is governed by the TM-EIAO and Technical Memorandum for the Assessment of Noise from Places Other Than Domestic Premises, Public Places or Construction Site (TM-IND).

For the operational traffic noise, annex 5 of "Criteria for Evaluating Noise Impact" of the TM-EIA defines the $L_{10\ (1\ hr)}$ at various NSRs.

3.5 Water

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 Hong Kong Waters have been subdivided into 10 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 Tolo Harbour and Channel Water Control Zone.

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 (TM-Water) into Drainage and Sewerage Systems, Inland and Coastal Waters prior to entering the receiving water.

3.6 Visual Impact Assessment

The assessment will be conducted in accordance with the study brief and Annex 18 of the TM-EIA. 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 TM-EIA.

3.7 Waste Management

The assessment will be conducted in accordance with the Annex 7 & 15 of the TM-EIA. Under the Waste Disposal Ordinance (Cap. 354), construction waste is classified as a trade waste. The Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354) stipulates the special handling, storage and subsequent disposal requirements for chemical waste. The Dumping at Sea Ordinance (Cap. 466) stipulates the requirements for permits for dumping at sea as well as designating areas within Hong Kong waters as a marine dumping area. The Land (Miscellaneous Provisions) Ordinance (Cap. 28) requires that dumping licenses are obtained by individuals or companies who deliver C&D waste to public filling areas. The Public Cleansing and Prevention of Nuisances Regulations under the Public Health and Municipal Services Ordinance (Cap 132) provides a further control on the illegal tipping of wastes on unauthorized sites.

Other guideline documents, which detail how the waste-related regulations shall be complied with during the construction of the works are as follows:

- Waste Disposal Plan for Hong Kong Planning, Environment and Lands Branch, December 1989;
- Hong Kong Planning Standard and Guideline (HKPSG) – Chapter 9 Environment, Hong Kong Government 1996;

- New Disposal Arrangement for Construction Waste, Environmental Protection Department & Civil Engineering Department 1992;
- Works Branch Technical Circular No. 2/93, Public Dumps;
- Works Branch Technical Circular No. 16/96, Wet Soil in Public Dumps;
- Works Branch Technical Circular No. 4/98, Use of Public Fill in Reclamation and Earth Filling Projects;
- Works Branch Technical Circular No. 5/99, Trip-ticket System for Disposal of Construction and Demolition Materials;
- Works Branch Technical Circular No.19/99, Metallic Site Hoardings and Signboards;
- Works Branch Technical Circular No. 25/99 Incorporation of Information on Construction and Demolition Material Management;
- Works Branch Technical Circular No. 12/2000, Fill Management; and
- ETWB's Technical Circular (Works) No. 33/2002 Management of Construction and Demolition Material Including Rock

4 AIR QUALITY ASSESSMENT

4.1 Introduction

This section evaluates the likely air quality impact associated with the construction and operation of additional cement silos in the existing Tai Po cement depot. During the construction phase, the potential emission sources are identified as:

- Construction works : material handling, excavation of material and wind erosion
- Emission from dust collectors of existing cement silos and barge
- On-site vehicle movement
- Emission from the adjacent concrete batching plants, Stone Plant and associated facilities

During normal operation of the additional silos, the potential emission in the vicinity include:

- Emission from dust collectors of existing cement silos and barge
- Emission from dust collectors of planned cement silos
- Emission from adjacent concrete batching plants, Stone Plant and associated facilities
- On site movement of the heavy vehicles
- Off site road traffic emission in 2018 (Fig.4.1 shows the predicted traffic flow in 2018)

Cement from the ocean going vessel is unloaded onto the cement barges in Tolo Harbour. The process is either through enclosed air slide or enclosed pneumatic system. Three dust collectors are equipped on the barge to reduce the dust emission. In normal case, activation of one dust collector will be adequate. The emission limit of the dust collectors are all in compliance with the 'Guidance note on the Best Practicable Means BPM 3/1' and the specification of the dust collectors is given in Appendix 4n. Given the long distance (greater than 500m) from the anchorage position to the planned and existing air sensitive receivers (ASRs), no adverse air quality impact is anticipated (Fig 5.6).

The barge will carry the cement to the cement depot. Cement in the barge is discharged by screw conveyor to the enclosed Bucket Elevator through an enclosed Barge Air Slide. The Bucket Elevator then uploads the cement to the top of the silo for storage. The entire uploading process is totally enclosed. Fig. 2.5 shows the schematic diagram of the planned process. The emission points will be from the dust collectors on top of the silos and the unloading points , which will be designed for compliance with the 'Guidance note on the Best Practicable Means BPM 3/1'.

4.2 Assessment Criteria

According to the APCO, the relevant AQOs for this study are listed in Table 4.1.

Table 4.1: Air quality objectives

Pollutant	Concentration in micrograms per cubic metre [(i)]		
	1 Hour [(ii)]	24 Hours [(iii)]	1 Year [(iv)]
Total Suspended Particulates	500[(v)]	260	80
Respirable Suspended Particulates	-----	180	55

Notes:
(i) Measured at 298K(25 ^{o}C) and 101.325 kPa (one atmosphere).
(ii) Not to be exceeded more than three times per year.
(iii) Not to be exceeded more than once per year.
(iv) Arithmetic means.

(v) Not stipulated in AQO but provide from the EPD guidelines for construction dust assessment.

The corresponding guidelines for air quality assessment is laid down in Annex 12 of the TM-EIA, respectively.

For the operation of the cement depot, a specified process licence under the Air Pollution Control Ordinance is required. The "Guidance Note on the Best Practicable Means for Cement Works (Cement Depot) BPM 3/1" issued by the EPD will provide general guidelines for the depot operation.

4.3 Air Sensitive Receivers

The existing and planned air sensitive receivers (ASR) in the vicinity of the project site have been identified (Fig.4.2). The details of the ASR are tabulated in Table 4.2.

Table 4.2: Air sensitive receivers

ASR	Air Sensitive Receivers	Description	Distance[2] (m)
1	Fortune Garden	Residential	274
2	Tycoon Place	Residential	372
3	Village House	Residential	184
4	Sha Lan Villa	Residential	184
5	Wu York Yu Care and Attention Home	Home for the aged	504
6	TWGHs Pao Siu Loong Care & Attention Home	Home for the aged	592
7	Casa Marina III[1]	Residential	50
8	Shipyard	Industrial	40
9	Tai Po Marine Office	Commercial	64
10	Wholesale Fish Market	Commercial	172

Note 1: Planned Receiver
Note 2: Distance are measured to the site boundary

4.4 Methodology

Dispersion modeling has been taken using USEPA approved Fugitive Dust Model (FDM) to assess potential dust impacts arising from construction activities and fugitive dust sources. In order to assess the traffic emissions impact, the USEPA approved CALINE4 dispersion method was used.

In the TSP and RSP modelling, particle size distribution was estimated based on the most appropriate particle size multipliers as stated in the Appendix B of AP42. In the modelling exercise, 9 particle size classes were used in the FDM model. Table 4.3 shows the average diameters and percentage of each class for TSP and RSP.

Table 4.3: Average diameter and percentage of each particle class in TSP and RSP modelling

Particle range (μm)	Average Particle Size (μm)	TSP (%)	RSP (%)
0 – 1	0.5	4	7.84
1 – 2	1.5	7	13.73
2 – 2.5	2.25	4	7.84
2.5 – 3	2.75	3	5.89
3 – 4	3.5	7	13.73
4 – 5	4.5	5	9.80
5 – 6	5.5	4	7.84
6 – 10	8	17	33.33
10 – 30	20	49	---

According to the Guideline on Choice of Models and Model Parameters, the meteorological parameter used in FDM and CALINE4 modelling are:

FDM Modelling

Surface Roughness : 100cm
Terrain : Rural
Meteorological Data : Meteorological data in Tai Mei Tuk Automatic Weather Station in 2001

CALINE 4 modelling

Mixing height : 500m
Stability Class : D (day time); F (night time)
Surface Roughness : 100cm
Terrain : Rural
Wind Direction : Worst case wind angle (in 1° interval)
Wind Speed : 1m/s (10m height)

Background concentrations of TSP and RSP in Tai Po were taken to be 63 $\mu g/m^3$ and 45 $\mu g/m^3$ according to Air Quality in Hong Kong 2000.

4.5 Emission Factors

During construction, major sources of dust on site are expected to be from excavation, materials handling and wind erosion. The dust emission during construction was modelled as heavy construction according to USEPA, AP42 S13.2.3.

The emission factors for the operation of existing cement depot, construction and operation of the planned silos are tabulated in Appendix 4a. The detailed calculations of the air emission factors are shown in Appendix 4b. In existing cement works operation, the cement depot is in compliance with the requirement listed in the Specific Process Licence (Licence No. L – 3-070(2)).

On gaining the additional silo capacity, all cement in each barge shipment can be transferred into the additional silos for storage within one batch. The corresponding number of vehicles and emission duration from the emission points are estimated and summarized in Table 4.4 below.

Table 4.4: Estimated vehicle number and emission duration of the planned process

Description	Quantity
No. of Cement Tanker Use	
The planned normal worst unloading rate to cement tanker in daytime (DR1)	3300 MT
The planned normal worst unloading rate to cement tanker in evening time (DR2)	700 MT
The planned normal worst unloading rate to cement tanker per day (DR = DR1 + DR2)	4000 MT
The capacity of one cement tanker for offsite delivery (CT)	26 MT
Day operation hour (OT1)	12 hr (0700 –1900)
Evening operation hour (OT2)	4 hr (1900 – 2300)
The number of cement tanker per hour in daytime N1 = DR1 / CT /OT1	**11 veh /hr[1]**
The number of cement tanker per hour in evening time N2 = DR2 / CT /OT2	**7 veh /hr[2]**
Emission Duration	
The unloading rate for each vehicle (ULR)	6 min / veh
No. of unloading points operating per time (S)	2
The cement unloading point emission duration per day OD = (OT1 × N1+OT2 × N2) × ULR/ S /60]	**8 hr**
The planned uploading cement into silos per day (PR = DR)	4000 MT
The hourly uploading rate from Pumping Barge(UPR)	400 MT / hr

The uploading duration from Pumping Barge per day (LR = PR /UPR)	**10 hr**

Note [1]: In daytime, among the 11 vehicles, 4 vehicles will serve for West Wing and East Wing Concrete Batching Plants
[2]: In evening time, among the 7 vehicles, 2 vehicles will serve for West Wing and East Wing Concrete Batching Plants

Apart from the dust sources from the cement depot, other dust sources from the east wing and west wing of the 2-leg concrete batching plants and stone plant (operated by other companies) also contribute to the cumulative impact. The emission factors of the adjacent concrete batching plant and stone plant were obtained from the Air Pollution Control Plan submitted for the specific process licence application. Appendix 4c and 4d summarize the details.

In determining the traffic emission, the vehicles were divided into different categories, namely Car/PV, LGV, HGV and Bus/Coach. Vehicle emission factors were taken from the Fleet Average Emission Factors – EURO3 Model provided by EPD. The fleet average emission factors of year 2011 (the last future year forecast) were adopted in this assessment as conservative estimates for the emissions 15 years after the operation estimated at year 2018. The highest emission factors among the vehicle types included in each vehicle category were taken for conservative assessment. In this study, the fleet average emission factors for RSP for different vehicle categories are summarized in Appendix 4e.

4.6 Air Quality Impact

4.6.1 Construction Phase

The normal daily operation of the cement depot during construction phase is listed in Table 4.5. The operation of the cement depot is controlled by BPM 3/1. The specification of the dust collector is shown in Appendix 4n for reference. K. Wah Concrete Ltd. agreed that their West Wing Concrete Batching Plant will not be operated during the construction phase.

The present site is equipped with an automated water spraying system. Water will be sprayed to wet the ground in every 30 mins. Hence, the dust removal efficiency will exceed 85% ("Control Techniques for Particulate Emissions from Stationary Sources: Volume 1", September, 1992, 450381005A, USEPA).

Table 4.5: Daily operation schedule of the cement plant during construction period

Activities	0700 – 1900 (Daytime, 12 hrs)	1900 – 2300 (Evening Time, 4 hrs)	2300 –0700 (Night Time, 8 hrs)
Emission Duration of Existing Cement Work (include on-site traffic)	√	√	
Emission Duration of East Wing Concrete Batching Work (include on-site traffic)	√	√	
Operation of West Wing Concrete Batching Plant	No operation during construction period		
Construction work (Foundation)	√		
Wind Erosion	√	√	√

As there is no construction in evening time, only the 1-hr TSP cumulative impact in daytime is present. The daytime meteorological data (i.e. 0700 – 1900) in Tai Mei Tuk in 2001 is extracted for the 1-hr TSP modelling. The predicted cumulative 1-hr TSP concentrations in daytime (0700-1900) due to construction at the ASRs are summarized in Appendix 4f. Maximum 1-hr TSP is predicted at 5m above ground at ASR8 and the pollution contour is shown in Fig. 4.3.

Based on the meteorological data in Tai Mei Tuk in 2001, the predicted cumulative 24-hr TSP concentrations due to construction at the ASRs are summarized in Appendix 4f. Maximum 24-hr

TSP is predicted at 5m above the ground. Hence, the pollution contour of cumulative 24-hr TSP at 5m is plotted and shown in Fig.4.4. The FDM output files are listed in Appendix 4i.

As shown in Appendix 4f and the pollution contours, the predicted cumulative 1-hr and 24-hr TSP concentrations at all the air sensitive receivers will comply with the 1 hr and 24 hr TSP limits. No adverse air quality impact during construction phase is anticipated.

Apart from regular watering the site by an automated watering system at an interval of every 30 minutes, the contractor is still required to implement the mitigation measures stipulated in the Air Pollution Control Regulation (Construction Dust) as far as practical. The mitigation measures shall be incorporated in the Contract Specification in order to minimize any potential dust nuisance arising from the construction activities of the project that are in excess of the acceptable levels.

4.6.2 Operational Phase

On site operation

During the operational phase of the cement silos, additional dust emission sources are identified as follows:

- Emissions from vents (EP8, EP9, EP10) of the proposed silos. The vents will be housed with dust collector to achieve the particulate emission limit of 50mg/m^3 as specified in the BPM 3/1. The specification for these dust collectors are shown in Appendix 4n.

- Off site road traffic emission at 2018

The normal daily operation of the cement depot during operational phase is listed in Table 4.6. The operation of the cement depot is controlled by BPM 3/1. The present site is equipped with an automated water spraying system. Water will be sprayed in every 30 mins. Hence, the dust removal efficient will exceed 85% ("Control Techniques for Particulate Emissions from Stationary Sources: Volume 1", September, 1992, 450381005A, USEPA).

Table 4.6: Daily operation schedule of the cement plant during operational period

Activities	0700 – 1900 (Daytime, 12 hrs)	1900 – 2300 (Evening Time, 4 hrs)
Emission Duration of Proposed Cement Work (include on-site traffic)	√	√
Emission Duration of East Wing Concrete Batching Work (include on-site traffic)	√	√
Emission Duration of West Wing Concrete Batching Plant (include on-site traffic)	√	√

The 24-hour TSP due to the on-site activities is predicted based on meteorological data in Tai Mei Tuk in 2001 and shown in Appendix 4g.The FDM output file is listed in Appendix 4j.

Maximum 24-hr TSP is predicted at 1.5m above the ground and the pollution contour is shown in Fig 4.5. Results indicate that the predicted 24-hr TSP at all ASRs will comply with the 24-hr TSP limit of 260 μg/m^3 as stipulated in AQO.

Procedures to prevent silo explosion accident

The cement uploading process will be operated by mechanically means, which is different from the pneumatic mode system used in the concrete batching plant explosion accident in Yuen Long area several years ago. Additional safety mechanisms and procedures have also been introduced to offer further protection as follows.

a. Installation of a dual sensors alarm system: The dual sensors act as a back up for each other. They will be activated when the cement reaches the safety level during uploading and triggered the termination of screw conveyor pump operation immediately to prevent overflow. Should the two sensors be not functioning, the system will also stop when the cement are jammed inside the screw convey system due to blockage of the screw conveyor outlet by the cement.

b. Audio alarm and automatic stop interlocking system: The audio alarm will be activated when the cement reaches the safety level and this will trigger the automatic stop interlocking system to stop the screw conveyor from further uploading of cement.

c. Water pipe and water spraying system: The system will be operated manually when bursting of dust collectors occurs.

d. Routine system checking, maintenance and drills: Routine check, maintenance and drills will be performed regularly to ensure the system function properly.

An event contingency plan for silo explosion accident has also been established for enhancing safety and it is given in Appendix 4m.

Off Site Traffic on Pubic Road

CALINE4 dispersion modelling was used to predict the air quality impact due to traffic emission in 2018. As the major impact in this study will be from the cumulative impact of RSP from the on-site activities and off-site traffic, only RSP concentration is modelled. The RSP output from the CALINE4 file is in 1-hr average. A multiple factor of 0.4 is used to convert to 24hr RSP.

The predicted 24-hr RSP due to traffic flow in 2018 and the cumulative impact with the on-site operation are shown in Appendix 4h.

The cumulative 24-hour RSP is calculated as follows:

RSP (24-hour) = [RSP (24-hour, on site activities)] + RSP(24-hour, traffic) + Background RSP

The output file of the FDM and CALINE 4 are shown in Appendix 4k and 4l. Maximum RSP level is predicted at 1.5m above ground at ASR8 and the pollution contour is shown in Fig.4.6.

The predicted cumulative 24-hr RSP at ASR will comply with the AQO limits of 180μg/m^3. Other than watering by an automated watering system at an interval of every 30 minutes, those measures specified under the Guidance Note on the Best Available Means for Cement Works (Cement Depot) BPM 3/1 have to be strictly followed.

However, the operator is required to apply for a revised licence for the Specified Process (cement works) operation. The licensing conditions should be strictly followed to ensure that there is no environmental impact on the nearby sensitive receivers.

4.7 Conclusion

During the construction and operational phases, adverse air quality impact is not anticipated provided that the following mitigation measures are incorporated:

Construction Phase

- No operation of the West Wing Concrete Batching Plant
- Regular watering of the site by an automated watering system at an interval of every 30 minutes

Operational Phase

- Regular watering of the site by an automated watering system at an interval of every 30 minutes

In addition, the requirements stipulated in the Best Practical Means Requirement for Cement Works (Cement Depot) BPM 3/1 and the Air Pollution Control (Construction Dust) Regulation for dust control should be strictly followed.

5 NOISE ASSESSMENT

5.1 Introduction

This section presents an assessment for the noise impacts arising from construction and operation of the additional cement silos in Tai Po Cement Depot (Tai Po Town Lot No. 102). During the construction phase, noise is generated from the Powered Mechanical Equipment (PME), together with the operational noises from existing cement works and the adjacent concrete batching plants, owned by another company.

During the operational phase, both on-site and off-site operational noises are identified. On-site operational noises are generated from the operation of cement works and the adjacent concrete batching plants, running by another company. The off-site operational noise is originated from the unloading activities from the ocean going vessels and the vehicles travelling on the public road.

5.2 Assessment Criteria

5.2.1 Construction Noise

Reference to Table 1B of the TM-EIA regarding noise standards for daytime construction activities, the noise limits are tabulated in Table 5.1.

Table 5.1: Construction noise guidelines ($L_{eq(30min)}$ dB(A)) within non-restricted hours

Land Uses	**Noise Standards $L_{eq(30min)}$ dB(A)**
Domestic premises	75
Educational institutions (normal period)	70
Educational institutions (during examination)	65

The control of construction noise during restricted periods is enforced under the Noise Control Ordinance (NCO) and three subsidiary Technical Memoranda (TMs) covering Noise from Percussive Piling (TM-PP), Noise from Construction Work Other Than Percussive Piling (TM-GW) and Noise from Construction Work in Designated Areas (TM-DA). The TMs establish the permissible noise levels for construction works in regard to working time period and the area sensitivity use.

5.2.2 Operational Noise

For fixed noise sources, the operational noise limit stipulated in TM-EIA is :

- 5 dB(A) below the appropriate Acceptable Noise Levels (ANL) shown in Table 3 of the Technical Memorandum for the Assessment of Noise from Places Other than Domestic Premises, Public Places or Construction Sites, (TM-IND). Table 5.2 shows the area sensitivity rating and the corresponding recommended noise standard

Table 5.2: TM-EIA industrial noise guidelines for different Area Sensitivity Ratings (ASR)

Time Period	SPL dB(A)		
	ASR C	ASR B	ASR A
Day and Evening (0700 – 2300)	65	60	55
Night (2300 - 0700)	55	50	45

or

- the prevailing background noise level (for quiet area with level 5dB below ANL)

In any event, the Area Sensitivity Rating (ASR) assumed in this EIA Report is for indicative assessment only. It should be noted that fixed noise sources are controlled under section 13 of the NCO. At the time of investigation, the Noise Control Authority shall determine noise impact from concerned fixed noise sources on the basis of prevailing legislation and practices being in force, and taking account of contemporary conditions/ situations of adjoining land uses. Nothing in this EIA Report shall bind the Nose Control Authority in the context of law enforcement against all the fixed noise sources being assessed.

For the traffic noise, according to the TM-EIAO, the $L_{10,\ 1\ hr}$ limits for road traffic noise at various NSRs are summarized in Table 5.3

Table 5.3 TM-EIA traffic noise guideline

Noise sensitive Use	Peak Hour Traffic $L_{10\ (1\text{-}hr)}$ dB(A)
All domestic premises including temporary housing accommodation	70
Educational institutions including kindergartens, nurseries and all others where unaided voice communication is required	65
Hospitals, clinics, convalescences and homes for aged, diagnostic rooms, ward	55

The noise generated from ocean going vessel in public place is governed under Section 4 and 5 of the Noise Control Ordinance. There is no acceptable noise limit under NCO. However the operation of the ocean going vessel involves the pumping of cement into small barges. Due to the industrial nature of the operation, it is proposed to adopt the fixed noise limit as stipulated in TM-EIA.

5.3 Noise Sensitive Receivers

The existing and planned noise sensitive receivers (NSRs) in the vicinity of the project site have been identified and are tabulated in Table 5.4. The locations of the NSRs are shown in Fig 5.1.

Table 5.4: Noise sensitive receivers in the vicinity of the project site

NSR	Noise Sensitive Receivers	Description	Distance[1] (m)	ASR	Prevailing Noise Level[3] $L_{eq(30min)}$
1	Fortune Garden	Residential	274	A	60 – 68
2	Tycoon Place	Residential	372	A	61 – 69
3	Village House	Residential	184	A	58 – 67
4	Sha Lan Villa	Residential	184	A	55 – 59
5	Wu York Yu Care and Attention Home	Home for the aged	504	A	55 – 60
6	TWGHs Pao Siu Loong Care & Attention Home	Home for the aged	592	A	55 – 60

NSR	Noise Sensitive Receivers	Description	Distance[1] (m)	ASR	Prevailing Noise Level[3] $L_{eq(30min)}$
7	Casa Marina III[2]	Residential	50	B	65 – 73
7a	Casa Marina III[2]	Residential	44	B	60 – 70

Note [1]: Distance is measured from the sensitive receivers to the site boundary of the depot

[2]: Planned Receivers. Due to the contribution of the traffic noise in Ting Kok Road and Sam Mun Tsai Road, the existing cement depot and concrete batching plant (IF) are not the dominant feature of the noise climate of the NSR. According to TM-IND, Casa Marina III will be "indirectly affected" by the IF and hence, ASR "B" is adopted.

[3]: Measurement details of Prevailing Level is shown in Appendix 5i

The potential NSRs along the coastal area of Ma On Shan, planned Whitehead development and planned Pak Shek Kok Development which are likely affected by the operation of the ocean going vessel are tabulated in Table 5.5 and shown in Fig.5.2.

Table 5.5: Off-site noise sensitive receivers

NSR	Noise Sensitive Receivers	Description	Distance[1] (m)	ASR	Prevailing Noise Level[3] $L_{eq(30min)}$ dB(A)
13	Villa Oceania	Residential	1500	B	59 – 65
14	Bayshore Tower	Residential	1500	B	59 – 66
15	Fok On Garden	Residential	1500	B	58 – 65
16	Chung On Estate	Residential	1500	B	60 – 66
17	Planned whitehead development	Residential	1340	A	59 – 67
18	Planned Pak Shek Kok development	Residential	2100	B[2]	59 – 67

Note [1]: Distance is measured from the sensitive receivers to the anchorage of the vessel. The anchorage of the vessel was assigned by Marine Department.

[2]: The planned Pak Shek Kok Reclamation will be affected by Tolo Highway, which is an influence Factor as considered in the TM

[3]: Measurement detail of the prevailing noise level is shown in Appendix 5j.

5.4 Methodology

The noise prediction methodology was undertaken according to the TM-GW and TM-IND. Additional information was obtained from "A Practical Guide to Reduction of Noise from Construction Work" and BS5228 Part I: 1997 "Noise and Vibration Control on Construction and Open Sites"

5.5 Construction Noise Impact

5.5.1 Unmitigated Case

In order to minimize the construction noise impact, the additional cement silos will be fabricated off-site and transported to the depot by barge for installation. Therefore, major on-site noisy construction activities will be from the ground excavation, setting of foundation and silos erection. The construction time will be from 0700 – 1900. No evening and night time work are expected. Table 5.6 summarizes the powered mechanical equipment to be used for each stage of work. The location of the construction site is shown in Fig.5.3a and Fig5.3b.

Table 5.6: Sound power level of the powered mechanical equipment in construction phase

Equipment	CNP Code	Number	Sound Power Level dB(A)	Total Sound Power Level dB(A)
Ground Excavation				
Excavator (Breaker mounted)	CNP 028	1	122	122
Dumper	CNP 066	1	106	106
Drilling Rig	CNP 167	1	114	114
			Total	122.7
Setting of Foundation				
Concrete Lorry Mixer	CNP 044	2	109	112
Concrete Pump	CNP 047	1	109	109
Electric Vibratory Poker	CNP 173	3	102	107
			Total	115
Silos Erection				
Sky Crane	CNP 048	1	112	112
Electric Saw	CNP 205	1	101	101
Arc Welders	----	1	---	---
			Total	112

The predicted maximum façade noise levels at the sensitive receivers without mitigation are shown in Table 5.7.

Table 5.7: Predicted façade noise levels without mitigation measures at NSRs

NSR	Noise Sensitive Receiver	Construction Noise $L_{eq\ (30min)}$ dB(A)
1	Fortune Garden	68.1
2	Tycoon Place	65.5
3	Village House	61.4
4	Sha Lan Villa	58.7
5	Wu York Yu Care and Attention Home	51.9
6	TWGHs Pao Siu Loong Care & Attention Home	50.5
7	Casa Marina III	**75.6**
7a	Casa Marina III	**74.1**

Note : Detail calculation of the construction noise are shown in Appendix 5f
Bold values indicate the exceedance in noise criterion

Almost all NSRs, except NSR7, will comply with the construction noise limit. In case that there is no resident in Casa Marina III during construction period, no mitigation measures are required. Should there be residents in Casa Marina III during the construction period, construction noise impact shall be alleviated by the use of quieter construction Power Mechanical Equipment and the use of portable barrier.

5.5.2 Mitigation Measures

Table 5.8 summarizes the proposed mitigation measures and the sound power level of the PME after attenuation.

Table 5.8: Proposed mitigation measures for construction phase

Equipment	CNP Code	Number	Barrier	Total Sound Power Level dB(A)
Ground Excavation				
Excavator (Breaker mounted)	BS 5228: C8.13	1	---	110
Dumper	CNP066	1	---	106
Drilling Rig	CNP 167	1	5	109
		Total		113
Setting of Foundation				
Concrete Lorry Mixer	CNP 044	2	---	112
Concrete Pump	CNP 047	1	---	109
Electric Vibratory Poker	CNP 173	3	---	107
		Total		115
Silos Erection				
Sky Crane	CNP 048	1	---	112
Electric Saw	CNP 205	1	---	101
Arc Welders	----	1	---	---
		Total		112

With the use of quieter excavator and the use of portable barrier for Drilling Rig, the maximum sound power level will drop to 115 dB(A). The predicted maximum façade noise levels at the sensitive receivers are shown in Table 5.9.

Table 5.9: Predicted façade noise levels at NSRs with quieter powered mechanical equipment and other mitigation measures

NSR	Noise Sensitive Receiver	Construction Noise $L_{eq\ (30min)}$ dB(A)
1	Fortune Garden	59.9
2	Tycoon Place	57.4
3	Village House	53.2
4	Sha Lan Villa	50.5
5	Wu York Yu Care and Attention Home	43.7
6	TWGHs Pao Siu Loong Care & Attention Home	42.3
7	Casa Marina III	67.4
7a	Casa Marina III	65.9

Note: Detail calculation of the construction noise are shown in Appendix 5f
Bold values indicate the exceedance in noise criterion

Predicted results indicate that the façade noise levels at NSR7 will comply with the day-time construction noise limit.

Apart from the above proposed mitigation measures, the contractors shall adopt good site practices and noise management to reduce the impact of the construction site activities on nearby NSRs. The following measures are recommended to incorporate into the contract specifications.

- Only well maintained plants shall be operated on-site and plant should be serviced regularly during the construction period.
- Machines and plants used intermittently shall be shut down between work periods or should be throttled down to a minimum.
- Silencers or mufflers on construction equipment shall be utilized and should be properly maintained during the construction period.
- Existing structures shall be effectively utilized to screen the noise.

- Portable noise barriers shall be positioned within a few metres of noisy plant items.

5.6 Operational Noise Impacts

5.6.1 Ocean Going Vessel

An ocean going vessel (not owned by the project proponent) will be used by the cement supplier in Japan / Philippines to deliver cement to the project proponent once or twice a week. As the vessel movement is transient, it will not have significant impact on the nearby NSRs.

Due to the limited capacity of the existing jetty, the ocean going vessel cannot be berthed to the existing cement depot to upload the cement into the silos. The ocean going vessel is thus anchored at a location inside Tolo Harbour assigned by Marine Department. Small barge (owned by project proponent) is then used to deliver the cement from the ocean going vessel to the depot. The operation time of the cement depot is from 0700 to 2300. There is no nighttime work (2300 to 0700) for the cement depot. It is proposed that all barges will be berthed on shore at 2300hr and the barge operator will report to the plant manager afterwards. This can ensure that the ocean going vessel will not be operated during nighttime.

The most significant noise source identified will be from the unloading of cement from the vessel to the barge. On board measurement (Appendix 5e) on the ocean-going vessel during its unloading to the barge indicated that the dominant noise source is from the pumping facilities and engine room of cement unloading side (measurement position G in Appendix 5e) with maximum sound pressure level of 97.6 dB (A) at the most outer edge of the ocean going vessel. On the other hand, the maximum sound pressure level of the opposite side (measurement position C in Appendix 5e) of the ocean going vessel is 91 dB(A). As there is no NSR along the shore of Ma Shi Chau facing the Tolo Harbour (Fig.5.2b), in order to minimize the noise nuisance towards the existing and planned noise sensitive receivers, it is proposed that the cement unloading side of the cement vessel (measurement position G) should be faced away from the sensitive receivers in Ma On Shan and the planned Whitehead development such that the unloading part of the ocean vessel do not have a direct line of sight from the sensitive receivers.

The predicted minimum distances required by the vessel to comply with the noise limits at the nearby noise sensitive receivers are shown in Table 5.10.

Table 5.10: Predicted façade noise levels at NSRs due to the operation of the ocean going vessel

NSR	Noise Sensitive Receiver	Noise Limit $L_{eq\ (30min)}$ dB(A)	Air Absorption[3] dB(A)	Façade Correction dB(A)	Predicted distance required m
13	Villa Oceania[1]	59	-2.8	3	> 920 m
14	Bayshore Tower[1]	59	-2.8	3	> 920 m
15	Fok On Garden[1]	58	-3	3	> 1000 m
16	Chung On Estate[1]	60	-2.5	3	> 845 m
17	Planned Whitehead development[2]	55	-2.1	3	> 710 m
18	Planned Pak Shek Kok Reclamation[1]	59	-2.8	3	> 920 m

Note [1]: As these locations are not directly facing away from the unloading side of the vessel, the maximum SPL of 97.6 dB(A) is adopted for calculation.
[2]: As this location is directly facing away from the unloading side of the vessel, the maximum SPL of 91dB(A) is adopted for calculation.
[3]: The dominant frequency during operation is at 500Hz. Assuming typical Relative humidity is at 70% and Temperature is at 25°C, based on ANSI S1.26 –1995 "Method for calculation of the Absorption of Sound By the Atmosphere", the air absorption is ~3dB / km

Figure 5.6 shows the proposed anchorage region for the ocean going vessel. With the maximum sound pressure level at the outermost boundary of the vessel facing towards the Planned Whitehead Development less than 91 dB(A), the proposed anchorage region will fulfill the distance requirement as listed in Table 5.10. Double anchoring will be applied on the vessel in order to prevent its swing.

Alternative anchorage positions were also explored. However, different constraints were identified and those positions are not suitable for ocean vessel anchorage (Fig.5.7). To the west of the proposed anchorage position (Region 1 in Fig.5.7), according to the BA chart 1915 published by Marine Department, the water depth (7 – 9m) is not deep enough for the anchorage of ocean vessel (which will require water depth of 9 – 10m). To the north of the proposed anchorage position (Region 2 in Fig.5.7), an oil pipeline was identified under the seabed. Anchorage near the oil pipeline may have potential to cause damage on the pipeline and increase the risk of oil spill. To the east of the proposed anchorage position (Region 3 in Fig.5.7), coral were identified on the seabed (Fig.6.1b and reported by "Apple Daily" on 4, Nov, 2002). Vessel anchorage may, thus, cause damage to the coral. In addition, due to the 500m near-shore constraints, Regions 4 and 5 (Fig.5.7) are also not suitable for anchorage. Therefore, the present proposed anchorage region is the most suitable position in term of environmental and operational constraints.

Noise from a trade/activities in public places, e.g. cement loading in Tolo Harbour, causing annoyance to any person is an offence under Section 4 and 5 of NCO which is enforced by HK Police Force and Marine Department despite the assessment in this EIA.

5.6.2 On site Activities

During normal operation, the major on-site noise sources in the vicinity of the proposed project site will be from the operation of the proposed cement works, the traffic noise due to the on-site cement tankers movement, the adjacent concrete batching plants (run by another company) and the adjacent shipyards.

The noise sources generated from the operation of the planned cement works and the concrete batching plant (as advised by project proponent) are summarized in Table 5.11. The locations of the noise sources are shown in Fig.5.3a and Fig.5.3b.

Table 5.11 Noise inventory for the concrete batching plant activities and the proposed cement works

Equipment	CNP Code	Number	Source Height [2] (m)	Sound Power Level dB(A)	Total Sound Power Level dB(A)
Adjacent Concrete Batching Plant Activities (operated by another company)					
Concrete Batching Plant	CNP022	2	0.5	108	111
Concrete Lorry Mixing Bay	CNP044	1 Lorry each time	0.5	109	109
Derrick Barge	CNP061	1	3	104	104
Concrete Lorry Mixer Travelling	On-site Measurement[1]	31 vehicles	0.5	101.5	----

Equipment	CNP Code	Number	Source Height [2] (m)	Sound Power Level dB(A)	Total Sound Power Level dB(A)
		/ hour			
Concrete Lorry Washing Bay	CNP044	2	0.5	109	112
Proposed Cement Works					
Pumping Barge	On-site Measurement[1]	1	0[3]	116.0	116
Cement Unloading Facilities (Blowers)	On-site Measurement[1]	2	8	108.0	111
Cement Tanker Travelling	On-site Measurement[1]	11 [4] vehicles / hour	0.5	98.5	----

Note: 1. The measurement details are shown in Appendix 5a –5d
2. The source height is relative to the local ground level
3. The engine room in the barge is at the similar level of the ground
4. Please refer to Table 4.4 for detailed calculation

For the adjacent shipyards, the measured noise levels were 57 – 65 dB(A) at a distance of ~10m from the site boundary. The predicted noise level at Casa Marina III from the shipyards is 51 – 59 dB(A), which were far below the prevailing noise level (65 – 73 dB(A)) at Casa Marina III, which is 40m from the site boundary of shipyards. Therefore, the cumulative effect of the shipyards is considered as insignificant.

The predicted sound pressure levels at the NSRs are summarized in Table 5.12. Detailed calculations for the un-mitigated case and the location of the noise sources are shown in Appendix 5h and Fig. 5.3 respectively.

Table 5.12: Predicted façade noise levels without mitigation measures at NSRs

NSR	Noise Sensitive Receivers	Operational Noise $L_{eq(30min)}$ dB(A)			
		Proposed Cement Work	Concrete Batching Plants	Cumulative	Criterion
1	Fortune Garden	**60.5**	**60.0**	**63.2**	55
2	Tycoon Place	**58.4**	**58.2**	**61.3**	55
3	Village House	55.0	54.3	**57.7**	55
4	Sha Lan Villa	53.9	54.6	**57.3**	55
5	Wu York Yu Care and Attention Home	46.5	47.4	50.0	55
6	TWGHs Pao Siu Loong Care & Attention Home	45.4	46.3	48.9	55
7	Casa Marina III	**71.7**	**73.6**	**75.8**	60
7a	Casa Marina III	**69.9**	**74.1**	**75.5**	60

Note: Detail calculation are shown in Appendix 5g
Bold values indicate the exceedance of noise criterion

From Table 5.12, only the predicted cumulative noise levels at NSR5 & NSR6 will comply with the operational noise limit. However, the predicted cumulative noise levels at other NSRs are ~2 - 16 dB(A) higher than the operational noise criterion.

As shown in Table 5.12, the contribution due to the operation of the adjacent concrete batching plants (owned by another company) is quite significant. At some NSRs, the predicted noise levels due to the concrete batching plants will exceed the operational noise limit. As the concrete batching plants belong to another company, several negotiations on imposing noise mitigation

measure on their site were unsuccessful. The target is to reduce the noise level of the proposed work to an acceptable level, i.e,

- The operation noise level due to the proposed activities is below the noise limit listed in TM-EIAO, and
- The contribution due to the operation of the proposed activities on the cumulative noise level is limited to within 1dB.

Table 5.13 summarizes the proposed noise mitigation measures and their predicted noise reduction.

Table 5.13 Characteristics of the Proposed Noise Mitigation Measures

Noise Source	Mitigation Measures	Attenuation Level dB(A)	Dimension	Remark
Proposed Cement Depot				
Pumping Barge	Replaced by electric driven Screw conveyor Barge,	14[1]	---	Please refer to Appendix 5c for the measurement data
Unloading Facilities	Vertical Barrier below the silos	10	16m high	Please refer to Fig.5.4 - 5.5 for the design

Note [1]: Onsite measurement. For a typical pumping barge, the SWL is 116 dB (Appendix 5b). However for the proposed Screw Conveyor Barge, in which the screw conveyor will be operated by electricity from the shore, the measured noise level is 102 dB(A) (Appendix 5c). Hence, the attenuation is 14 dB(A).

With the incorporation of the noise mitigation measures, the predicted façade noise levels at all NSRs are shown in Table 5.14. Appendix 5i shows the detailed calculations.

Table 5.14: Predicted Façade Noise Levels with Mitigation Measure at NSRs

NSR	Noise Sensitive Receiver	Operational Noise Leq(30min) dB(A)				
		Proposed Cement Work (P)	Concrete Batching Plants (E)	Cumulative (C)	Criterion	(C) – (E)
1	Fortune Garden	50.2	**60.2**	**60.6**	55	0.4
2	Tycoon Place	48.5	**58.4**	**58.8**	55	0.4
3	Village House	43.8	54.6	54.9	55	---
4	Sha Lan Villa	42.6	55.0	**55.2**	55	0.2
5	Wu York Yu Care and Attention Home	36.7	47.6	48.0	55	---
6	TWGHs Pao Siu Loong Care & Attention Home	35.9	46.5	46.9	55	---
7	Casa Marina III	59.6	**74.2**	**74.3**	60	0.1
7a	Casa Marina III	57.8	**74.5**	**74.5**	60	~ 0

Note: Please refer to Appendix 5h for detailed calculation
Bold values indicate the exceedance of noise criterion

With the proposed mitigation measure incorporated, the predicted noise levels due to the proposed cement works are within an acceptable noise limit. In addition, its contribution on predictive cumulative noise impact due to the proposed cement work is within 1 dB(A).

The project proponent has committed that the operational hour of the cement depot is restricted from 7am to 11pm. EPD and HK Police are able to check the status of the cement silo site easily

by visiting the site outside the restricted hour. Should the project proponent violates the condition of NCO, EPD or HK Police could take necessary action against the project proponent according to the ordinance after investigation.

5.6.3 Off-site Activities

The off-site activity will consist of the noise generated by the on road traffic vehicles. The traffic flow in 2018 is shown in Fig.4.1. The number of cement tankers for off-site delivery will be 7 veh /hour. Table 5.15 shows the traffic noise due to the cement tankers from the cement depot and the road traffic noise (excluding those from cement tankers) from existing road. Only the NSRs that are likely affected are considered. The roadplot and output file are shown in Appendix 5j.

Table 5.15 Predicted Traffic Noise due to off-site transportation

NSR	Noise Sensitive Receiver	Operational Noise $L_{10\ (1\text{-}hr)}$ dB(A)			
		Traffic from cement tankers (A)	Road traffic noise (exclude tankers) from existing roads (B)	Cumulative (C=A+B)	Difference For C > 70 (D=C-B)
1	Fortune Garden				
	1/F	34.3	41.7	42.4	---
	2/F	34.3	41.7	42.4	---
	3/F	34.3	41.7	42.4	---
2	Tycoon Place				
	1/F	49.6	62.9	63.1	---
	2/F	50.6	63.9	64.1	---
	3/F	50.6	63.9	64.1	---
7	Casa Marina III				
	1/F	60.5	70.2	**70.6**	0.4
	2/F	61.3	**70.7**	**71.2**	0.5
	3/F	61.2	70.2	**70.7**	0.5
7a	Casa Marina III				
	1/F	60.5	68.9	69.5	---
	2/F	61.6	70	**70.6**	0.6
	3/F	61.5	69.6	70.2	---

As shown in Table 5.15, the predicted cumulative traffic noise at Fortune Garden and Tycoon Place are within the traffic noise criteria of 70 dB(A). The predicted cumulative noise levels at the Casa Marina III will exceed the operational traffic noise limit. However, the breakdown analysis indicates that the cumulative noise level is dominated by the traffic from existing roads. The noise due to the cement tankers is well below the noise limit. It only contributes less than 1 dB(A) on the overall noise level, which is considered as insignificant to the overall noise level. Any mitigation measures on the vehicles will not be effective on the cumulative road noise level. Therefore, no mitigation measures on the cement tankers are recommended.

5.7 Conclusion

During the construction phase, assessment results indicate that the un-mitigated noise level at Casa Marina III due to the construction activity will exceed the noise limit. In case that there is resident in the Casa Marina III, mitigation measures inside the cement depot such as the use of quieter equipment in ground excavation and portable barriers for Drilling Rig will be adopted.

For the operational phase, assessment results indicate that the predicted noise levels without mitigation measures at Casa Marina III due to the on-site activity will exceed the noise limit. Different noise mitigation measures inside the cement depot are proposed, which include:

- Adoption of quieter electric- driven screw conveyor barge for the cement depot
- Barriers for the cement unloading bay

With the recommended mitigation measures implemented, the predicted construction and operational noise impacts on all the neighbouring NSRs will comply with the relevant standards and requirements.

In order to reduce the noise impact from the ocean going vessel, the anchorage position of the ocean vessel shall refer to Fig.5.6. In addition, the unloading part of the ocean vessel shall be positioned to face away from the existing and planned noise sensitive receivers in Ma On Shan and the planned Whitehead development.

6 WATER QUALITY ASSESSMENT

6.1 Introduction

The potential water quality impact associated with the construction and operation of the proposed cement works are investigated in this section. If necessary, mitigation measures are proposed to ensure that all residual impacts are in compliance with the relevant environmental legislation, standard and guideline.

6.2 Assessment Criteria

The Water Control Zone (WCZ) relevant to this study is the Tolo Harbour and Channel Water Control Zone. All Water Quality Objectives parameters, unless specified, refer to subzones including Harbour, Buffer and Channel subzones. The corresponding Water Quality Objectives are shown in Table 6.1.

Table 6.1: Water Quality Objectives – Tolo Harbour and Channel Water Control Zone

Parameters	Criterion
Aesthetic Appearance	a. Odours, taints and colors Waste discharges shall cause no noxious or offensive odour or offensive taint or colour in either waters or edible aquatic organisms in the subzone to be present in concentrations detectable by bioassay or organoleptic tests b. Visible matter Waste discharges shall cause no visible foam, oil, grease, scum, litter or other objectable matter in waters of the subzone.
Bacteria	Secondary contact recreation sub zone and Fish culture subzone The level of E coli shall not exceed 610 / ml, calculated as the geometric mean of all samples collected in one calendar year
Chlorophyll – a	Harbour Subzone Waste discharges shall not cause the level of Chlorophyll-a in waters of the subzone to exceed 20mg/m^3, calculated as a running arithmetic mean of 5 daily measurements for any single location and depth Buffer Subzone Waste discharges shall not cause the level of Chlorophyll-a in waters of the subzone to exceed 10mg/m^3, calculated as a running arithmetic mean of 5 daily measurements for any single location and depth Channel Subzone Waste discharges shall not cause the level of Chlorophyll-a in waters of the subzone to exceed 6mg/m^3, calculated as a running arithmetic mean of 5 daily measurements for any single location and depth
Dissolved Oxygen	Harbour Subzone Waste discharges shall not cause the level of dissolved oxygen in waters of the subzone to be less than 2 mg/L within 2m of the bottom, or to be less than 4mg/L in the reminder of the water column Buffer Subzone Waste discharges shall not cause the level of dissolved oxygen in waters of the subzone to be less than 3 mg/L within 2m of the bottom, or to be less than 4mg/L in the reminder of the water column Channel Subzone Waste discharges shall not cause the level of dissolved oxygen in waters of the subzone to be less than 4 mg/L at any point in the water column
Light Penetration	Harbour Subzone No changes in turbidity, suspended material, colour or other parameters arising from waste discharges shall reduce light transmission by more than 20% of the normal level in the subzone at any location or any time

	Buffer Subzone No changes in turbidity, suspended material, colour or other parameters arising from waste discharges shall reduce light transmission by more than 15% of the normal level in the subzone at any location or any time Channel Subzone No changes in turbidity, suspended material, colour or other parameters arising from waste discharges shall reduce light transmission by more than 10% of the normal level in the subzone at any location or any time
pH	Harbour Subzone Waste discharges shall not cause the normal pH range of any waters of the subzone to be extended by greater than ± 0.5 pH units at any time Buffer Subzone Waste discharges shall not cause the normal pH range of any waters of the subzone to be extended by greater than ± 0.3 pH units at any time Channel Subzone Waste discharges shall not cause the normal pH range of any waters of the subzone to be extended by greater than ± 0.1 pH units at any time
Salinity	Waste discharges shall not cause the normal salinity range of any waters of the subzone to be extended by greater than ± 3 parts per thousand at any time
Settleable material	Waste discharges shall give rise to no bottom deposits or submerged objects which adversely influence bottom-living communities, alter the basic Harbour geometry or shipping channels, prevent any harzard to shipping or diving activities, or affect any other beneficial use of the waters of the subzone
Temperature	Waste discharges shall not cause the natural daily temperature change shall not exceed 0.5° per hour at any location, unless due to natural phenomena.
Toxicants	Waste discharges shall not cause the toxicants in waters of the subzone to attain such a level as to produce significant toxic effects in humans, fish or any aquatic organism, which due regard to biologically cumulative effects in food chains and to toxicant inter-actions with each other.

6.3 Water Sensitive Receivers

Fig. 6.1a and 6.1b show the locations of the water and ecological sensitive receivers. The potential water and ecological sensitive receivers in the vicinity of the project site include:

- Fish Culture Zone in Sam Mun Tsai (including those in Yim Tin Tsai & Yim Tin Tsai (East))
- Sea water abstraction point for flushing in Tai Po Industrial Estate and other uses
- Secondary contact recreation zone
- Typhoon shelter in Shuen Wan
- Non Gazetted Beaches along Plover Cove (near Sha Lan and Lung Mei)

6.4 Description of Environmental Baseline Conditions

The existing ambient marine water quality in the area was established based on the EPD routine monitoring data for year 1999 at marine water quality monitoring stations TM2-TM8 and Typhoon shelter water sampling station. Table 6.2 summarizes the key monitoring data in different sub-zones within Tolo Harbour. Locations of the monitoring locations are shown in Fig. 6.1. The marine water quality data in 1998, which can be found in 'Marine Water Quality in Hong Kong in 98', is not present here.

Table 6.2 Summary statistics of 1999 water quality of Tolo Harbour and Channel WCZ

	Harbour Subzone			Buffer Subzone		Channel Subzone		Typhoon Shelter
	TM2	TM3	TM4	TM5	TM6	TM7	TM8	PT3
DO (mg/L)	5.8 (2.7 – 7.7)	6.5 (3.4 –8.3)	6.0 (2.4 –9.0)	6.1 (3.6 – 9.7)	5.8 (2.6 – 7.8)	5.8 (3.0-7.2)	5.7 (3.0 – 7.8)	6.7 (5.8 – 8.3)
DO (mg/L) Bottom	5.6 (1.9 – 7.7)	5.9 (2.2 – 8.3)	5.2 (1.0- 7.8)	5.9 (2.9-8.5)	4.9 (1.1 – 6.9)	5.1 (1.2-7.2)	5.0 (1.5 – 7.2)	6.8 (6.3 – 7.3)
SS (mg/L)	7.5 (2.7 – 24.0)	3.6 (2.1 – 8.0)	3.1 (1.7 – 5.8)	16.9 (1.6 – 120)	2.7 (1.0 – 5.6)	2.9 (1.1 – 6.1)	3.4 (0.7 – 11.1)	4.2 (0.5 – 9.7)
BOD (mg/L)	2.1 (1.5 – 2.9)	2.0 (1.2 – 3.3)	1.7 (1.1 – 2.5)	1.9 (0.7 – 3.2)	1.5 (0.9 –2.2)	1.0 (0.7 –1.4)	1.1 (0.3 – 5.4)	0.7 (0.1 – 1.4)
TIN (mg/L)	0.21 (0.08 – 0.55)	0.13 (0.06–0.34)	0.11 (0.04-0.30)	0.07 (0.03-0.15)	0.09 (0.03-0.18)	0.08 (0.03-0.15)	0.07 (0.02-0.11)	0.03 (0.01 –0.09)
Unionized Ammonia (µg/L)	4 (1-10)	5 (2-12)	3 (1-6)	3 (1-10)	30 (1-80)	2 (<1 – 7)	2 (<1 – 5)	2 (< 1 – 6)
E. *Coli* (cfu/100mL)	220 (27-2200)	17 (3-140)	6 (1-80)	4 (1-740)	3 (1-20)	1 (1-3)	1 (1-1)	1 (1-1)

Note: All water Quality Objectives parameters, unless specified, refer to subzones including Harbour, Buffer and Channel subzones.

It is observed that:

- Full compliance with E. coli WQO was achieved at all sampling stations. The E *Coli* concentrations at all stations in 1999 are found lower than those in 1998.
- The compliance with the DO WQO ranged from 83% - 95%. There is a slightly lower DO at all stations in 1999 as compared with 1998.
- The annual mean ammonia nitrogen in the Harbour showed a decrease of 34 – 59% and total nitrogen a decrease of 59 – 66% as compared with 1998
- However, the annual mean SS showed a significant increase in stations TM3
- The Yim Tin Tsai Typhoon Shelter was characterized by high DO and low faecal bacteria and nutrients.

6.5 Water Quality Impact

Although the existing cement depot is located adjacent to Tolo Harbour, no wastewater will be generated from normal plant operation. Water collected from surface drainage in the works site will be re-used onsite after sedimentation.

During the excavation works, soil surfaces would be exposed. Suspended particles will be present in the surface runoff. As the construction site is located near Tolo Harbour, the coastal waters could be potentially be impacted by sediment laden and polluted runoff if the construction runoff is not properly controlled. Pollution sources will include the excavated material with rain wash, wash water from dust suppression sprays. No fuel, oil and other lubricants from maintenance of construction vehicles and mechanical equipment will be allowed. In addition, 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.

Domestic sewage would be generated from the site 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 site.

During operational phase, there is no effluent discharge to the adjacent water body. Adverse water quality impact is not anticipated.

6.6 Mitigation Measures

Since only land based construction activities will be undertaken, minimal water quality impact arising from the project is anticipated. However, in order to ensure that no adverse environmental impacts will arise during construction, good practices outlined in ProPECC PN 1/94 "Construction Site Drainage" shall be followed:

Effluent generated from construction activities and surface runoff will be recirculated or recycle as far as practical.

Surface run-off will be collected by the site drainage (Figure 6.2). The collected water shall be re-used on site via adequately designed sand/silt removal facilities and pH adjustment such as sand traps, silt traps and sediment basins. Channel or earth bunds or sand bag barriers shall be provided on site to properly direct stormwater to such silt removal facilities.

The excavated materials and open stockpile of construction material shall be covered by tarpaulin to prevent storm runoff from washing across exposed soil surface.

Earthworks final surfaces shall be well compacted and the subsequent permanent work or surface protection should be carried out as soon as practical after the final surfaces are formed to prevent erosion caused by rainstorms.

Water used in ground boring and drilling shall be recirculated as far as practicable after sedimentation. When there is need for final disposal, the wastewater shall be discharged into storm drains via silt removal facilities.

All vehicles shall be kept clean before they leave a construction site to ensure no earth, mud, debris is deposited on roads. A wheel washing facilities shall be provided at the site exit, if practicable, and wash water shall have sand and silt settled out or removed before being discharged into the storm drains.

Debris and rubbish generated on-site shall be collected, handled and disposed of properly to avoid entering the nearby coastal waters. All fuel tanks and storage area 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.

The site workforce shall use the properly maintained portable chemical toilets is on-site.

During operation, regular environmental audit shall be conducted to check the environmental performance of daily operation to ensure that no effluents will be discharged into Tolo Harbour illegally.

6.7 Conclusion

The potential water quality impact arising from the construction and operation of the proposed cement silos addition works have been assessed. No wastewater will be discharged from the

plant during operation. Therefore, there will have no operation phase water quality impact. 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, adverse residual impacts on water quality are not anticipated.

7 VISUAL IMPACT ASSESSMENT

7.1 Introduction

This section assesses the likely visual impact of the new cement silos and proposes mitigation measures to alleviate the impact caused.

The existing cement depot is located at the junction of Ting Kok Road and Yu On Street, Tai Po. It is located at the edge of a rocky shore, facing Tolo Harbour to the south and surrounded by hills and residential developments on the other sides. The Shuen Wan Golf Driving Range is located to the west of the shore. Several workplaces, e.g. a wholesale fish market, a shipyard and a government Marine Department office, are located adjacent to the cement depot.

7.2 Assessment Criteria

The visual impact evaluation and assessment have been carried out in accordance with the project study brief, criteria and guidelines stated in Annexes 10 and 18 of the TM-EIA.

7.3 Assessment Methodology

The assessment of the potential visual impact of the proposed works has two distinct stages:

- Baseline survey and,
- Visual impact assessment.

7.3.1 Baseline Survey

The baseline survey of views towards the proposed development is carried out by identifying:

- The visual envelope within which the proposed development maybe contained either wholly or partially within views. This also includes indirect effects such as temporary construction activities.
- The visually sensitive receivers (VSRs) within the visual envelope whose views will be affected by the scheme. The sensitivity of each VSR group is also influenced by the distance and direction of view to the proposed development. The potential receivers include the following three groups:
  (a) Views from residences – the most sensitive receivers due to the potential of intrusion on the visual amenity and quality of life;
  (b) View from workplaces – less sensitive than above due to visual amenity being less important within the work environment, and;
  (c) View from public areas – including all areas apart from the above, e.g. public parks, recreation grounds, footpaths, roads etc. Sensitivity of this group is relatively low and

will depend on the transitory nature of the receiver with views being typically glimpsed rather than sustained for long periods.

The baseline survey described and recorded by photograph typical views from within each of the visual envelope form the basis of the visual character and quality of the sites. The sensitivity of each receiver group and quality of views are classed in accordance to the following criteria:

- High – for example, residential properties;
- Medium – for example, recreational facilities or partially screened views; and,
- Low – for example, workplaces, school etc.

7.3.2 Visual Impact Assessment

The assessment of potential visual impact was based on:

- Identification of the sources of visual impact and their magnitude that would be generated during construction and operation.
- Identification of the principal visual impact with particular consideration given to the degree of change to the baseline conditions.

The impact assessment comprises the comparison of the typical existing views identified in the baseline survey of the key receiver groups and the potential views after construction works are completed. Both present and future VSRs are considered. The visual impact results from the consideration of the following factors:

- character of existing view;
- quality of existing view;
- context, location and distance of the VSR;
- duration of the potential impacts;
- visual receiver group sensitivity;
- number of viewers at VSR group;
- degree of change to existing views; and
- other views available to visual receiver group and cumulative effects on views of this and other neighboring developments.

The magnitude of change to the views is classified as follows:

- High – for example, the majority of viewers affected / major changes in view;
- Medium – for example, many viewers affected / moderate change in view; and,
- Low – for example, few viewers affected / minor change in view.

The degree of impact is considered as follows:

- Significant – adverse/ beneficial impact where the proposal would cause significant deterioration or improvement in existing landscape quality;
- Moderate – adverse / beneficial impact where the proposal would cause a noticeable deterioration or improvement in existing landscape quality;
- Slight – adverse / beneficial impact where the proposal would cause a barely perceptible deterioration or improvement in the existing landscape quality; and
- Negligible – no discernible change in the existing landscape quality.

The analysis of the visual significance threshold, the correlation between magnitude of change and sensitivity / quality, is based on the matrix detailed in Table 7.1

Table 7.1: Impact matrix

Magnitude of Change	Sensitivity / Quality		
	Low	**Medium**	**High**
Low	Slight Impact	Slight / Moderate Impact	Moderate Impact
Medium	Slight / Moderate Impact	Moderate Impact	Moderate / Significant Impact
High	Moderate Impact	Moderate / Significant Impact	Significant Impact

7.4 Methodology for Determination of Mitigation Measures

The identification of the visual impacts will highlight those sources of conflict requiring design solutions or modifications to reduce the impacts and, if possible, blend the development with the surrounding visual context. The proposed visual mitigation measures are described and illustrated by means of simple photomontage and will take into account factors including;

- Selection of location by taking into account the shielding effect of existing silos;
- Shape of the proposed silos shall be compatible with the existing silos;
- Make use of suitable colour scheme, which will be compatible with the surrounding environment.

7.5 Residual Impact

Residual impact is the impact remaining after the proposed mitigation measures have been implemented.

The level of impact is derived from the magnitude of change which the proposals will cause to the view which would have existed during this period if the proposed scheme had not been constructed and its ability to tolerate change. The ability to tolerate change is described as its quality and sensitivity, taking into accounts the beneficial effects of the proposed mitigation. The level of residual impacts can be derived from the matrix provided in Table 7.1 above.

The overall evaluation of 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 TM-EIA as shown in Table 7.2.

Table 7.2: Overall evaluation of visual impact.

Beneficial	Acceptable	Acceptable with mitigation measures	Unacceptable	Undetermined
The project will complement the visual character of its setting, will follow the relevant planning objectives and will improve overall visual quality	There will be no significant visual effects caused by the appearance of the project or no interference with key view	There are some adverse effects, but these can be eliminated, reduced or offset to a large extent by specific measures	The adverse effects are considered too excessive and would not be reduced to an acceptable level by mitigation	Significant adverse effects are likely but the extent to which they may occur or may be mitigated cannot be determined from the study. Further detailed study will be required for the specific effects in question.

7.6 Review of Planning and Development Control Framework

The existing cement depot and its adjacent waterfront area is neither covered by the draft Tai Po Outline Zoning Plan No. S/TP/16 nor the approved Ting Kok Outline Zoning Plan No. S/NE-TK/8. On the draft Tai Po Area 27 (Part) Layout Plan No. L/TP 27/1A, the cement depot site is zoned "Other Specified Uses" annotated 'Sand / Cement / Aggregate Depot and /or Marine-related industries'.

7.7 Assessment Results

7.7.1 Existing Visual Context and Visually Sensitive Receivers (VSRs)

The proposed additional cement silos are located adjacent to the existing silos. Within the visual envelope, the Visually Sensitive Receivers (VSRs) have been identified.

A low-rise villa, *Casa Marina III,* which located 100m away from the centre of the project site, is under construction and was identified as VSR 1. Two other residential areas, the *Fortune Garden* and *Tycoon Place,* were identified as VSR 2 and VSR3 respectively. All these residents are currently enjoying the bay view of the Tolo Harbour with a partial view of the existing cement depot.

VSRs other than residential area within the visual envelope were also identified. The Tolo Harbour marine traffic was identified as VSR 4. The pedestrians, cyclists and road users of Ting Kok Road were identified as VSR 5.

The visual envelope and visually sensitive receivers are shown on Fig. 7.1. Other features within the visual envelope, for example the fish wholesale market and the Tai Po Sheun Wan Temporary Golf Diving Range, were identified having very low visual sensitivity and therefore not included in the visual impact assessment. Details of VSRs are summarized in Table 7.3.

Table 7.3: Summary of visually sensitive receivers

VSR Number	Location	Type of viewers	Existing View	Distance to nearest visual impact source	Sensitivity to Change and Visual Intrusion
VSR 1	Casa Marina III	Resident	Bay view with a partial view of the existing cement depot, which is partially shaded by roadside village trees.	100 m	High
VSR 2	Fortune Garden	Resident	Bay view with the existing cement depot in a long distance.	400 m	Medium
VSR 3	Tycoon Place	Resident	Bay view with the existing cement depot in a long distance	500 m (from high level)	Medium
VSR 4	Tolo Harbour marine traffic	Local commuters, fishing boats, tourist vessels, transitory views	Residential development and the existing cement depot can be seen along the shore.	Adjacent	Low
VSR 5	Ting Kok Road and the associated cycling track	Pedestrian, cyclist, road users, transitory views	Mainly shaded by roadside landscape. Existing cement depot can be seen in small section of the road.	Adjacent	Low

7.7.2 Visual Impact

In this study, different silo locations are considered. The proposed silo is located adjacent to the existing silos and is considered as the best position within the site. The present position helps to reduce the visual impact from different angles by making use of the screening effect of existing silos. In addition, as the proposed silos is located closer to the cement tankers loading bay. There is no need to construct a long conveyor for cement unloading, which could cause additional visual intrusion.

The visual impact on each VSR were carried out as following:

VSR 1 Casa Marina III

Fig. 7.2 shown the side view of the cement depot from Casa Marina III at ground level. Two of the proposed silos will be nearly shielded off by the existing silos and leaving only one additional silo will be seen from some of the residents in Casa Marina III. Village trees and other landscape features will further shield this additional silo. The magnitude of change is low and the sensitivity of the viewer groups is high. Moderately adverse visual impact is predicted during construction and operation.

VSR 2 Fortune Garden

A small portion of the resident has a partial view of the cement depot. As the bay view is in front of the cement depot, it will not be obstructed by the proposed silos. The visual impact is further reduced with the long distance between the VSR and the depot. The magnitude of change is low and the sensitivity of the viewer group is medium. Slight / moderate adverse visual impact is predicted during construction and operation.

VSR 3 Tycoon Place

Tycoon Place located at a higher level and is 500 m away from the project. The magnitude of change is low and the sensitivity of the VSR is also low. Slight visual impact is predicted during construction and operation.

VSR 4 Tolo Harbour Marine traffic

The marine traffic in the adjacent Tolo Harbour water is mainly local commuters, fishing boat, tourist vessels and transitory viewers. These activities have relatively low sensitivity to potential visual impact. The elevation view from the Harbour is shown in Fig. 7.3 and only one additional silo will be seen form that view. The magnitude of change is low and slight visual impact is predicted during construction and operation.

VSR 5 Ting Kok Road and the associated cycling track

The existing trees planted along the Ting Kok Road will shield off the view of road users and cyclist towards the cement depot. It is predicted that the magnitude of change is low and slight visual impact is predicted during construction and operation.

Table 7.4: Summary of visual impact

VSR number	Location	Type of viewer group	Magnitude of change and source of impact	Sensitivity to change and visual intrusion	Significance threshold of visual impact during construction (refer to Table 7.1)	Significance threshold of visual impact during operation (assuming no mitigation measures)(refer to Table 7.1)
VSR 1	Casa Marina III	Resident	Low	High	Moderate adverse	Moderate adverse
VSR 2	Fortune Garden	Resident	Low	Medium	Slightly / Moderate adverse	Slightly / Moderate adverse
VSR 3	Tycoon Place	Resident	Low	Medium	Slightly / Moderate adverse	Slightly / Moderate adverse
VSR 4	Tolo Harbour Marine Traffic	Local commuters, fishing boats tourist vessels, transitory views	Low	Low	Slightly adverse	Slightly adverse
VSR 5	Ting Kok Road and the associated cycling track	Cyclist, road users, transitory views	Low	Low	Slightly adverse	Slightly adverse

7.8 Recommended Mitigation Measures

During construction stage, it will not be possible to totally screen the construction works for the silos. As the proposed silos will be located inside the existing site boundary, the existing site boundary wall will screen the ground level work site. Permanent mitigation measures are not required as the construction period is temporary.

In the operational phase, the following recommended mitigation measures are proposed to reduce the visual impact. The photomontages showing views from Casa Marina III, Fortune Garden, Tolo Harbour and Ting Kok Road are shown in Fig. 7.4 to 7.7 respectively.

- The height and shape of the additional silos should be similar to those of the existing silos in order to be compatible with the existing baseline situation.

- Two options are proposed. One option is to paint all silos in deep green colour, which is more compatible with the surrounding environment (hilly mountain) when viewing from the sea and VSRs from Fortune garden (Fig 7.5 and 7.6). Another option is to leave the surface of the silos in non-reflective grey white (Fig. 7.4). This scheme will be more compatible to the background when viewing from Casa Marina III. As Casa Marina III is the major affected sensitive receiver, the second scheme is recommended.

- The proposed noise barrier around the cement unloading bay should be painted deep green in order to provide screening effect and reduce the visual impact (Fig.7.7).

With the mentioned design options, the proposed new silos should blend in satisfactorily into the surrounding visual content. The visual impact caused by the proposed silos is reduced and all VSRs will only have slightly or negligible visual impact.

7.9 Conclusion

The proposed additional cement silos will locate adjacent to the existing silos and within the existing depot boundary. Several visually sensitive receivers are identified and slightly to moderate visual impact will be induced by the project.

To reduce the visual impact on those VSRs, mitigation measures regarding the design details are recommended. The height and shape of the additional silos will be constructed similar to those of the existing silos. Proposed noise barrier under the silos will be erected. It will provide screening effect. The surface of the barrier will also be painted deep green, while the surface of the silo is left in non-reflective grey white colour. With these measures, the proposed silos will be more compatible with the surrounding environment and planned setting.

It is concluded that with the recommended mitigation measures incorporated, the visual impact will be mimimised. The overall evaluation of visual impact will be acceptable with the mitigation measures.

8 WASTE MANAGEMENT

8.1 Introduction

This section identifies the types of wastes that are likely to be generated during the construction and operation of the additional silos. Potential environmental impacts associated with the handling and disposal of these waste arising 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.

8.2 Assessment Criteria and Methodology

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 operational 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
- impact on the capacity of waste collection, transfer and disposal facilities.

If not properly managed, the handling and disposal of waste materials may cause environmental nuisance and impact. 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.

8.3 Prediction and Evaluation of Environmental Impacts

8.3.1 Construction Phase

The proposed site is within the existing cement depot boundary and 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 cement silos and this will mainly consist of fill material. The volume of excavated material is estimated to be approximately 1000m^3. In order to maximize landfill life, Government policy prohibits the disposal of C&D materials to landfill if it contains more than 20% inert materials by volume. Considering the inert nature of the excavated material, the materials can be directed to the public filling area at Tuen Mun Area 38 for reclamation purpose.

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 impact 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 impact are not expected to arise during the construction works.

8.3.2 Operational Phase

The additional cement silos are purely for storage purpose only. Therefore no cement waste is anticipated during the silo operation. In addition, maintenance of cement tankers is not allowed in the Depot, therefore no chemical waste will be generated. The only waste generated on-site will be the sediment from sediment tank and the general refuse from workforce.

8.3.3 Mitigation Measures

The following recommended measures in minimization, storage, transportation and disposal should be incorporated into an on-site waste management plan for the construction and operational phase.

Site Planning

Good site planning and design shall be adopted to reduce over-ordering and waste generation. The work site shall be arranged and managed to facilitate the proper management of waste and materials.

Storage, Collection and Transport of Waste

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

- Where practicable, different types of waste should be segregated, stockpiled and stored in different containers or skips to enhance, reuse or recycle of materials and their proper disposal;
- 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 authorized or licensed waste hauliers 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, and to ensure that illegal disposal of waste does not occur; and
- Maintain records of the quantities of waste generated, recycled and disposed.

General Refuse

General refuse should be stored in enclosed bins or compaction units separated from chemical wastes. A reputable waste collector should be employed by the contractor to remove general refuse from the site regularly to minimize odor, pest and litter impacts. The burning of refuse on construction sites is prohibited by law.

Training

Training shall be provided to all personnel working on site. The training shall promote the concept of general site cleanliness and encourage all workers to reduce, reuse and recycle waste.

8.4 Conclusion

With the implementation of the recommended mitigation measures on waste management practices and pollution control measures for the construction phases of the additional silos, 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.

9 ECOLOGY

As the proposed project site is within the existing industrial premises, there will not be any impacts on local ecology.

10 CULTURAL HERITAGE

As the proposed project site is within the existing industrial premises, there will not be any impacts on site of cultural importance or listed buildings.

11 IMPLEMENTATION SCHEDULES

In order to reduce the potential impact due to the construction and operation of the cement works, the following tables summarize the implement schedules during the design, construction and operation of the cement works

Implementation Schedule of Mitigation Measures for Air Quality Control on the Cement Works

Environmental Protection Measures	Timing	Implementation Agent	Stage			Standard / Requirement
			D	C	O	
Fully enclosed piping system to transfer cement from barge to silos	Throughout the operation of the cement works	Plant Operator	√		√	Air Pollution Control Ordinance, Best Practical Means for Cement Work BPM 3/1
The unloading points and silos are equipped with dust collector in compliance with BPM 3/1	Throughout the operation of the cement works	Plant Operator	√		√	Air Pollution Control Ordinance, Best Practical Means for Cement Work BPM 3/1
Bucket Elevator are fully enclosed	Throughout the operation of the cement works	Plant Operator	√		√	Air Pollution Control Ordinance, Best Practical Means for Cement Work BPM 3/1
Dust-laden air is filtered through bag filter and vented to the dust collectors	Throughout the operation of the cement works	Plant Operator	√		√	Air Pollution Control Ordinance, Best Practical Means for Cement Work BPM 3/1
All assess and route roads within the premises shall be paved and adequately wetted	Throughout the operation of the cement works	Plant Operator	√		√	Air Pollution Control Ordinance, Best Practical Means for Cement Work BPM 3/1
Storage silo fitted with audible high level alarm and interlocking the material filling line	Throughout the operation of the cement works	Plant Operator	√		√	Air Pollution Control Ordinance, Best Practical

						Means for Cement Work BPM 3/1
Installation of water spray system beside the dust collector on top of the silos	Throughout the operation of the cement works	Plant Operator	√		√	Air Pollution Control Ordinance
Emergency Plan for Explosion	Operational Period	Plant Operator			√	Air Pollution Control Ordinance
Regular watering of the site by an automated watering system at an interval of every 30 minutes	Throughout the operation of the cement works	Constractor / Plant Operator		√	√	TM-EIA, Air Pollution Control Ordinance
Stop the operation of the West Wing Concrete Batching Plant	Construction Period	K. Wah Concrete		√		TM-EIA, Air Pollution Control Ordinance
Regular water spray on the construction site during excavation work and material handling	Construction Period	Contractor		√		TM-EIA, Air Pollution Control (Construction Dust) Regulation
Use of tarpaulin to cover the exposed soil in after working hour	Construction Period	Contractor		√		TM-EIA, Air Pollution Control (Construction Dust) Regulation
Vehicle Washing Facilities including a high jet pressure water jet shall be provided at every desirable or designated vehicle exit point	Construction Period	Contractor		√		TM-EIA, Air Pollution Control (Construction Dust) Regulation

* Note: D- Design Phase, O- Operational Phase, C- Construction Phase

Implementation Schedule of Mitigation Measures for Noise Control on the Cement Works

Environmental Protection Measures	Timing	Implementation Agent	Implementation Stage			Standard / Requirement
			D	C	O	
Adoption of quieter Power Mechanical Equipment	Construction Period	Contractor		√		Noise Control Ordinance (Cap. 500) and Annex 5 of TM – EIA
Adoption of moveable noise barrier for Drilling Rig	Construction Period	Contractor		√		Noise Control Ordinance (Cap. 500) and Annex 5 of TM-EIA
Adoption of quieter screw conveyor barge	Throughout the operation of the cement work	Plant Operator	√		√	Noise Control Ordinance (Cap. 500) and Annex 5 of TM- EIA
Erection of barrier under the silos	Throughout the operation of the cement work	Plant Operator	√		√	Noise Control Ordinance (Cap. 500) and Annex 5 of TM-EIA
Checking that the Cement Depot not operation between 11:00 pm – 7:00 am	Throughout the operation of the cement work	EPD			√	Noise Control Ordinance (Cap. 500) and Annex 5 of TM-EIA

* Note: D- Design Phase, O- Operational Phase, C- Construction Phase

Implementation Schedule of Mitigation Measures for Noise Control for the Ocean Going Vessel and Barges

Environmental Protection Measures	Timing	Implementation Agent	Implementation Stage			Standard / Requirement
			D	C	O	
Allocate of the anchorage position as shown in Fig.5.6 in EIA report	Throughout the operation of the cement work	Marine Department / EPD			√	Noise Control Ordinance (Cap. 500) and Annex 5 of TM-EIA
Ensure the maximum projected sound pressure level of the vessel of the non-unloading side not greater than 91 dB(A).	Throughout the operation of the cement work	Plant Operator			√	Noise Control Ordinance (Cap. 500) and Annex 5 of TM-EIA
Apply double anchorage to fix the vessel	Throughout the operation of the cement work	Vessel Operator			√	Noise Control Ordinance (Cap. 500) and Annex 5 of TM-EIA
Orient the cement unloading part of the ocean vessel away from the noise sensitive receivers in Ma On Shan and Planned White Head	Throughout the operation of the cement work	Vessel Operator			√	Noise Control Ordinance (Cap. 500) and Annex 5 of TM-EIA
Checking that the ocean going vessel is located in proper position and orientation (the unloading side facing away from the sensitive receivers in Ma On Shan and Planned Whitehead)	Throughout the operation of the cement work	Marine Department / EPD			√	Noise Control Ordinance (Cap. 500) and Annex 5 of TM-EIA
Checking that the ocean vessel not operation between 11:00 pm – 7:00 am	Throughout the operation of the cement work	EPD			√	Noise Control Ordinance (Cap. 500) and Annex 5 of TM-EIA

* Note: D- Design Phase, O- Operational Phase, C- Construction Phase

Implementation Schedule of Mitigation Measures for Water Quality Control

Environmental Protection Measures	Timing	Implementation Agent	Implementation Stage			Standard / Requirement
			D	C	O	
Works should be programmed to avoid the rainy season whenever possible to minimize storm runoff. If work during rainy season cannot be avoided, precautions should be taken to prevent soil erosion	Construction Period	Contractor		√		Practice Note for Professional Persons on Construction Site Drainage, Professional Persons, EPD, 1994 (ProPECC PN 1/94)
Earth bund should be constructed to direct the runoff to sand/silt removal	Construction Period	Contractor		√		Practice Note for Professional Persons on Construction Site Drainage Professional Persons, EPD, 1994 (ProPECC PN 1/94)
Sand/silt removal facilities should be checked and cleaned regularly to ensure these facilities are working in good conditions	Construction Period	Contractor		√		Practice Note for Professional Persons on Construction Site Drainage, Professional Persons, EPD, 1994 (ProPECC PN 1/94)
Earthworks final surfaces should be well compacted	Construction Period	Contractor		√		Practice Note for Professional Persons on Construction Site Drainage, Professional Persons, EPD, 1994 (ProPECC PN 1/94)
Water used in ground boring and drilling should be as far as practicable be recirculated after sedimentation.	Construction Period	Contractor		√		Practice Note for Professional Persons on Construction Site Drainage, Professional Persons, EPD, 1994 (ProPECC PN 1/94)
All vehicles should be cleaned before they leave a construction site	Construction Period	Contractor		√		Practice Note for Professional

						Persons on Construction Site Drainage, Professional Persons, EPD, 1994 (ProPECC PN 1/94)
Wastewater generated from the washing down of mixer trucks and drum mixers and similar equipment should be recycled as far as practicable. Surplus wastewater may be discharged into foul sewers after treatment in silt removal and pH adjustment facilities.	Construction Period	Contractor		√		Practice Note for Professional Persons on Construction Site Drainage, Professional Persons, EPD, 1994 (ProPECC PN 1/94)
Debris and rubbish generated on-site should be collected, handled and disposed of properly to avoid entering the nearby coastal waters.	Construction Period	Contractor		√		Practice Note for Professional Persons on Construction Site Drainage, Professional Persons, EPD, 1994 (ProPECC PN 1/94)
All fuel tanks and storage area 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.	Construction Period	Contractor		√		Practice Note for Professional Persons on Construction Site Drainage, Professional Persons, EPD, 1994 (ProPECC PN 1/94)
The site workforce shall use the properly maintained portable chemical toilets is on-site	Construction and Operational Period	Plant Operator		√	√	Practice Note for Professional Persons on Construction Site Drainage, Professional Persons, EPD, 1994 (ProPECC PN 1/94)

* Note: D- Design Phase, O- Operational Phase, C- Construction Phase

Implementation Schedule of Mitigation Measures for Waste Management

Environmental Protection Measures	Timing	Implementation Agent	Implementation Stage			Standard / Requirement
			D	C	O	
Maintenance of records of quantities of waste generated, recycled and disposal, including disposal location	Throughout the construction of the cement work	Contractor		√		Waste Disposal Ordinance (Cap 354), Annex 7 of TM-EIA
Where practicable, different types of waste should be segregated, stockpiled and stored in different containers or skips to enhance, reuse or recycle of materials and their proper disposal	Throughout the construction of the cement work	Contractor		√		Waste Disposal Ordinance (Cap 354), Annex 7 of TM-EIA
Maintain records of the quantities of waste generated, recycle and disposed. A ticketing system can be develop to facilitate tracking of loads and ensure illegal disposal of waste does not occur.	Throughout the construction of the cement work	Contractor		√		Waste Disposal Ordinance (Cap 354), Annex 7 of TM-EIA
Educate workers on the keeping site cleanliness and appropriate waste management	Throughout the construction of the cement work	Contractor		√		Waste Disposal Ordinance (Cap 354), Annex 7 of TM-EIA
Handle and store waste in a manner which ensures that it is held securely without loss or leakage, thereby minimizing the potential for pollutions.	Throughout the construction of the cement work	Contractor		√		Waste Disposal Ordinance (Cap 354), Annex 7 of TM-EIA
Use authorized or licensed waste hsuliers to collect specific categories of waste	Throughout the construction of the cement work	Contractor		√		Waste Disposal Ordinance (Cap 354), Annex 7 of TM-EIA
All necessary waste disposal permits should be obtained	Throughout the construction of the cement work	Contractor		√		Waste Disposal Ordinance (Cap 354), Annex 7 of TM-EIA
Remove waste and maintain waste storage areas regularly	Throughout the construction of the cement work	Contractor		√		Waste Disposal Ordinance (Cap 354), Annex 7 of TM-EIA

General refuse will be collected from lidded bins and delivered to central collection point and will be stored in containers to prevent windblown litter, vermin, water pollution and visual impact	Throughout the construction of the cement work	Contractor		√		Waste Disposal Ordinance (Cap 354), Annex 7 of TM-EIA

* Note: D- Design Phase, O- Operational Phase, C- Construction Phase

Implementation Schedule of Mitigation Measures for Visual Impact

Environmental Protection Measures	Timing	Implementation Agent	Implementation Stage			Standard / Requirement
			D	C	O	
The design of the addition silo should be circular to increase the visual compatibility	During the design stage	Engineer	√			Annex 10 of TM – EIA
The high of the silo should be the same as the existing silos to increase the visual compatibility	During the design stage	Engineer	√			Annex 10 of TM – EIA
The external façade of the silo shall be left in grey white colour to reduce reflection and increase the visual compatibility	Throughout the operation of the cement work	Plant Operator			√	Annex 10 of TM – EIA
Use of deep green noise barrier for the cement unloading bay	Throughout the operation of the cement work	Plant Operator			√	Annex 10 of TM – EIA
Construction of hoarding surround the site	Construction Period	Contractor		√		Annex 10 of TM – EIAO

* Note: D- Design Phase, O- Operational Phase, C- Construction Phase

12 ENVIRONMENTAL MONITORING & AUDIT REQUIREMENT

12.1 Air Quality

Given the small size of the construction site and low level of construction activities, it is considered that the air quality monitoring and audit in the construction phase are not required provided that all proposed air quality mitigation measures are adopted. During operation, routine monitoring of the depot will be required under the specific process licence conditions of APCO.

12.2 Noise

Given the small number of Power Mechanical Equipment adopted in the construction stage and the small size of the construction site, it is considered that the noise monitoring and audit in construction phase are not required provided that all proposed noise mitigation measures are adopted. During operation, the operational noise will be controlled by Noise Control Ordinance.

12.3 Water Quality

Surface run-off from construction and operational phase will be collected by existing drainage system and re-used on site. There will be no discharge to the Tolo Harbour. It is therefore considered that water quality monitoring and audit are not required.

13 ENVIRONMENTAL OUTCOME

The 3 additional cement silos will increase the storage of cement capacity. There will not be any increased throughput or operational capacity to the existing operations as a result of the increased silo capacity. Hence, the barge waiting and berthing time, and the operational frequency for cement loading and unloading will be reduced. In addition, the duration of nighttime depot operation will be shortened, resulting in further improvement of air quality and noise nuisance on the nearby sensitive receivers.

The proposed anchorage location and the orientation of the ocean going vessel are also selected to avoid adverse environmental impact. The proposed location of the ocean going vessel will be located at a distance greater than 710m with the unloading side of the ocean going vessel facing away from the planned Whitehead receivers. These implementation will ensure that the noise level due to the ocean going vessel at the nearby sensitive receivers comply with the noise limits.

In order to minimize the visual impact of the planned silos, the planned silos will be erected close to the existing silos and far away from the major sensitive receivers (e.g. Casa Marina III). Besides, the height, shape and color of the proposed silos will be similar to the existing silos to increase the environmental compatibility.

14 CONCLUSION

The proposed project site is within the existing industrial premises. There will not be any impacts on local ecology, landscaping, site of cultural importance or listed buildings.

The following procedures will be implemented in order to avoid adverse environmental effect:

- Operation time restriction (2300 – 0700) is proposed to control the noise from the cement depot and the ocean vessel within the nighttime noise limit as stipulated in NCO.
- In order to reduce the operational noise due to ocean vessel, the unloading side of the ocean vessel will be faced away from the sensitive receivers in Ma On Shan and Planned Whitehead development.
- The location of the proposed cement silos will be constructed in the far side away from Casa Marina III in order to minimize the noise and air quality impact. In addition, the proposed silos will be located behind the existing silos such that the visual impact can be reduced.

The major mitigation measures during construction and operational phases are summarized in Table 14.1.

Table 14.1: Major mitigation measures for construction and operational phases

Environmental Issues		**Mitigation Measures**
Air Quality	Construction (Dust)	• Complied with the Air Pollution Control Regulation (Construction Dust)
	Operation (Fugitive Dust Emission)	• Complied with the Guidance Note on the Best Practicable Means for Cement Works (Cement Depot) • Application with the new licence for Specified Process (Cement Works) and observed for the licence conditions
Noise	Construction	• Use of Quiet Plant • Use of Portable Noise Barrier • Good Site Practices
	Operation	• Use of electric screw conveyor barge • Erection of noise barrier under the cement silos • Restriction the operation time of the cement depot and ocean vessel
Water Quality	Construction (Surface run-off)	• Complied with ProPECC PN 1/94 “Construction Site Drainage”
	Operation	Not Required
Visual Impact	Construction	• Adoption of Hoarding
	Operation (Visual intrusion)	• Adopted similar height as the existing silos for additional silos • Adopted same shape and colour as existing silos for additional silos • Paint the barrier below the silos into deep green
Waste Management	Construction	• Good storage, collection and transport practices of Waste • Waste dispose at appropriate disposal areas
	Operation	Not Required

With the above mitigation measures implemented, no unacceptable residual impacts are anticipated during the construction and operational phases. Due to the small number of Power Mechanical Equipment and small size of the construction site, it is considered that environmental monitoring and auditing are not required provided that all the proposed mitigation measures listed in the EIA report are implemented.