



Development at West Kowloon Cultural District

Quarterly Environmental Monitoring and Audit
(EM&A) Report (November 2018 - January 2019)

March 2019

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Executive summary

This Quarterly EM&A Report presents the monitoring works at both the main works of M+ Museum and Lyric Theatre Complex conducted from 1 November 2018 to 31 January 2019.

The impact stage EM&A programme for the Project includes air quality, noise, water quality, waste, landscape and visual monitoring. The recommended environmental mitigation measures were implemented on site and regular inspections were carried out to ensure that the environmental conditions are acceptable.

The EM&A programme was carried out by the ET in accordance with the EM&A Manual requirements. It is concluded from the environmental monitoring and audit works that adequate environmental mitigation measures have been implemented by the contractors where appropriate in the reporting quarter.

Exceedance of Action and Limit Levels

Four exceedances of Action Level of 24-hour TSP for Air Quality were recorded. There was no breach of Limit levels for Air Quality (1-hour TSP and 24-hour TSP) and Noise in this reporting quarter.

Implementation of Mitigation Measures

Construction phase weekly site inspections were carried out to confirm the implementation measures undertaken by the Contractors in the reporting quarter. The status of implementation of mitigation measures during the reporting quarter is shown in **Appendix C**.

Landscape and visual impact inspections were conducted as part of the abovementioned weekly site inspections during the reporting quarter. No adverse comment on landscape and visual aspects was made during these inspections.

Record of Complaints

Three environmental complaints were received during the reporting quarter.

Record of Notification of Summons and Successful Prosecutions

No notification of summons and successful prosecution were recorded in the reporting quarter.

1 Introduction

1.1 Background

Mott MacDonald Hong Kong Limited (MMHK) was commissioned to undertake the Environmental Team (ET) services (including environmental monitoring and audit (EM&A)) for the construction of M+ Museum Main Works (Contract No.: CC/2015/3A/022) and Lyric Theatre Complex including the Foundation Works (Contract No.: CC/2015/3A/014) and L1 Contract (Contract No. CC/2017/3A/030) at West Kowloon Cultural District (WKCD) (The Project) as part of the WKCD development. The Project Proponent is the West Kowloon Cultural District Authority (WKCDA). The construction works and EM&A programme for M+ Museum and Lyric Theatre Complex commenced on 31 October 2015 and 1 March 2016 respectively. The overall works for the WKCD fall under two separate categories of Designated Project (DP) of the Environmental Impact Assessment Ordinance (EIAO), namely an “engineering feasibility study of urban development projects with a study area covering more than 20 ha or involving a total population of more than 100 000” (Item 3 of Schedule 3) and “an underpass more than 100m in length under the built areas” (Item A.9, Part I, Schedule 2). An Environmental Permit No. EP-453/2013/B (EP) was issued with respect to the “Underpass Road and Austin Road Flyover Serving the West Kowloon Cultural District” which specifically includes the abovementioned category of DP under Item A.9, Part I, Schedule 2 of the EIAO. The captioned projects include part of the abovementioned underpass road located within the site boundary also falls under this same category.

The M+ museum development aims to provide an iconic presence for the M+ museum, semi-transparent vertical plane, housing education facilities, a public restaurant and museum offices. At ground and lower levels, generous access will be provided to the park and other West Kowloon Cultural District facilities, alongside a public resource centre, theatres, retail and dining, and back-of-house functions.

The 1,200-seat Lyric Theatre Complex will be Hong Kong’s first world-class facility for dance performances, including ballet, contemporary and Chinese dance forms. In the run up to the opening of further major performing arts venues in the WKCD, it will also be used for a wide variety of performing arts events including drama, opera and musical performances. The Lyric Theatre Complex will act as a platform for Hong Kong’s leading arts organisations, and be a new major venue to show programmes from Asia and worldwide.

The Quarterly EM&A Report is prepared in accordance with the Clause 3.4 of the Environmental Permit No. EP-453/2013/B. This Quarterly EM&A Report presents the monitoring works conducted from 1 November 2018 to 31 January 2019. The purpose of this report is to summarise the findings in the EM&A of the project over the reporting period.

1.2 Project Organisation

The organisation chart and lines of communication with respect to the on-site environmental management structure together with the contact information of the key personnel are shown in **Appendix A**.

1.3 Environmental Status in the Reporting Period

During the reporting period, construction works at M+ Museum undertaken include:

- Structure
 - Podium GF: Falsework, formwork and rebar at K-L/7-9, E-F/11-14, K-M/4-6, Stair at J/9-10

- Podium RF: Falsework, formwork and rebar
- Podium 2F: Scaffold & formwork dismantling
- CSF RT/F: Scaffold & formwork dismantling
- RDE 8-11F: Slab rebar & column preparation
- Facade
 - Installation of panels on M+ tower
 - Erection of 1MF scaffold for 1MF Installation
- MEP
 - Cast-in items as per concrete pouring schedule
 - Fix work at M+ podium, RRE and CSF
 - Remaining work at DCS plant room, Sea Water Pump Cells and Heat Exchanger plant room
- ABWF
 - RDE material delivery and block work up to 4/F
 - M+ material delivery and block work up to 11/F
- External
 - Trench reinstatement
 - FS pipe, ICT, PW connection

During the reporting period, construction works at Lyric Theatre Complex undertaken include:

- Bulk excavation works at Main Cofferdam
- Drainage work (PIW works)
- Extended basement structure construction of Area 06

The Construction Works Programme of the Project is provided in **Appendix B**. A layout plan of the Project is provided in **Figure 1**.

2 Summary of EM&A Requirements

2.1 Monitoring Requirements

In accordance with the EM&A Manual, environmental parameters including air quality, noise, landscape and visual have been monitored. The specific parameters, monitoring frequency and the respective Action and Limit levels are given in **Table 2.1**. Locations of the monitoring stations are provided in **Figure 1**.

Table 2.1: Summary of Impact EM&A Requirements

Parameters	Descriptions	Locations	Frequencies	Action level	Limit level
Air Quality	24-Hour TSP	AM1 - International Commerce Centre	At least once every 6 days	143.6 µg/m ³	260 µg/m ³
	1-Hour TSP	AM1 - International Commerce Centre	At least 3 times every 6 days	273.7 µg/m ³	500 µg/m ³
	24-Hour TSP	AM2A – Austin Road West opposite to The Harbourside Tower 1	At least once every 6 days	151.1 µg/m ³	260 µg/m ³
	1-Hour TSP	AM2A – Austin Road West opposite to The Harbourside Tower 1	At least 3 times every 6 days	274.2 µg/m ³	500 µg/m ³
Noise	Leq, 30 minutes	NM1A- Podium level of The Harbourside Tower 1	Weekly	When one documented complaint is received from any one of the sensitive receivers	75 dB(A)
Landscape & Visual	Monitor implementation of proposed mitigation measures during the construction stage	As described in Table 9.1 and 9.2 of the EM&A Manual	Bi-weekly	N/A	N/A

Given that the Project covers only a small part of the whole WKCD area (i.e. M+ Museum, Lyric Theatre Complex and respective portions of underpass road), it was proposed that the EM&A programme for the Project should only require 1 noise monitoring station and 2 air quality monitoring stations located closest to the Project area. Currently, the works under the captioned project are confined in the western part of the WKCD site. Therefore, only the monitoring stations AM1, AM2 were set up. However, the electricity supply at AM2 was suspended from 31 August 2016 and was no longer available. In order to have a more secure electricity supply, an alternative air monitoring location (AM2A) was identified at Austin Road West opposite to The Harbourside Tower 1, which is close to Lyric Theatre Complex site entrance. This alternative air monitoring location was approved by EPD on 28 September 2016. Approval from the management office of the International Commerce Centre has been granted on 29 February 2016 for conducting noise monitoring at the alternative noise monitoring location identified at the podium floor (NM1A) which is free from screening to the construction activities. Therefore, 2 air quality monitoring stations and 1 noise impact monitoring station were confirmed for the impact monitoring.

2.2 Environmental Mitigation Measures

Environmental mitigation measures have been recommended in the EM&A Manual. Summary of implementation status of the environmental mitigation measures is provided in **Appendix C**.

3 Summary of EM&A Monitoring Results

3.1 Monitoring Data

In accordance with the EM&A Manual, impact monitoring has been conducted in the reporting quarter. Meteorological data for the reporting quarter have been extracted from Hong Kong Observatory and presented in **Appendix D**. Monitoring data with graphical presentation for the reporting quarter are shown in **Appendix E**. A summary on the monitoring results are presented in **Table 3.1**.

Table 3.1: Summary of Monitoring Data

Parameter	Monitoring Location	Minimum	Maximum	Average
Air Quality				
1 hour TSP	AM1	37	136	79
1 hour TSP	AM2A	50	211	100
24 hour TSP	AM1	40	140	80
24 hour TSP	AM2A	38	253	112
Construction Noise				
Leq(30min)	NM1A	68	69	68

3.2 Monitoring Exceedances

Summary of the exceedances in the reporting quarter is tabulated in **Table 3.2**.

Table 3.2: Summary of Exceedances

Monitoring Station	Parameter	No. of Exceedance		Action Taken
		Action Level	Limit Level	
Air Quality				
AM1	1 hour TSP	0	0	N/A
	24 hour TSP	0	0	N/A
AM2A	1 hour TSP	0	0	N/A
	24 hour TSP	4	0	N/A
Construction Noise				
NM1A	Leq(30min)	0	0	N/A

3.2.1 1-hour TSP Monitoring

All 1-hour TSP monitoring was conducted as scheduled in the reporting quarter. No Action/ Limit Level exceedance was recorded.

3.2.2 24-hour TSP Monitoring

All 24-hour TSP monitoring was conducted as scheduled in the reporting quarter. Four exceedances of Action Level of 24-hour TSP for Air Quality were recorded, while there were no Limit Level exceedance.

3.2.3 Construction Noise Monitoring

All construction noise monitoring was conducted as scheduled in the reporting quarter. No Action/ Limit Level exceedance was recorded.

3.2.4 Landscape and Visual Monitoring

All landscape and visual impact inspections were conducted as scheduled in the reporting quarter. No adverse comment on landscape and visual aspects was recorded.

4 Waste Management

4.1 M+ Museum

As advised by the Contractor, 14.8 tonnes, 1,133.4 tonnes and 607.1 tonnes of inert C&D material were disposed of as public fill to Chai Wan Public Fill Barging Point, Tuen Mun Area 38 and Tseung Kwan O Area 137 Public Fill respectively, while 716.1 tonnes of general refuse were disposed of at SENT landfill. 442.4 tonnes of metals, 1.8 tonnes of paper/cardboard packaging, 0 tonne of plastic and 525.0 tonne of timber were collected by recycling contractors in the reporting quarter. 0 tonne of inert C&D materials were reused on site. 0 tonne of inert C&D materials were reused in other projects and 2,475.8 tonnes of inert C&D materials were disposed to sorting facility. 0 tonne of chemical wastes was collected by licensed contractors in the reporting quarter.

The actual amounts of different types of waste generated by the activities of construction works at M+ Museum in the reporting quarter are shown in **Appendix F**.

4.2 Lyric Theatre Complex

As advised by the Contractor, 29,048.74 tonnes, 12,211.67 tonnes, and 14.73 tonnes of inert C&D material were disposed of as public fill to Tseung Kwan O Area 137, Tuen Mun Area 38, and Chai Wan Public Fill Barging Point respectively, while 168.2 tonnes of general refuse were disposed of at SENT landfill. 476.3 tonnes of metals, 0.4 tonnes of paper/cardboard packaging, 1.2 tonne of plastic and 0 tonne of timber were collected by recycling contractors in the reporting quarter. 0 tonne of inert C&D materials was reused on site. 318.0 tonnes of fill materials were imported for use at site and 201,421.7 tonnes of inert C&D materials were reused in other projects. 10.9 tonnes of inert C&D materials were disposed to sorting facility and 0 tonne of chemical wastes were collected by licensed contractors in the reporting quarter.

The actual amounts of different types of waste generated by the activities of construction works at Lyric Theatre Complex in the reporting quarter are shown in **Appendix F**.

5 Environmental Non-conformance

Four exceedances of Action Level of 24-hour TSP for Air Quality were recorded at monitoring station AM2A, while there was no breach of Limit Level for Air Quality and Action or Limit Levels for Noise monitoring in the reporting quarter. Details of the exceedances are as follows:

The measured 24-hr TSP level on 8 Nov and 20 Nov 2018 was 152 $\mu\text{g}/\text{m}^3$ and 181 $\mu\text{g}/\text{m}^3$ respectively. Investigation revealed that the contractors have already implemented dust mitigation measures to reduce the dust impact from the construction activities. The poor ambient air quality on 8 Nov 2018 and the dusty construction work without proper mitigation measures conducted near AM2A monitoring station by another contractor on 8 Nov and 20 Nov 2018 might have contributed to the exceedance of 24-hr TSP. It is believed that with proper mitigation measures implemented by the other contractor for construction activities located near the AM2A monitoring station, the exceedance could have been avoided. Therefore, the exceedance is deemed non-project related.

While on 22 Dec 2018 and 14 Jan 2019, the measured level was at 253 $\mu\text{g}/\text{m}^3$ and 171 $\mu\text{g}/\text{m}^3$ respectively. It is revealed that the contractors have already implemented dust mitigation measures to reduce the dust impact from their construction works. Uncovered debris was found on 19 Dec 2018 during weekly site inspection, but it was no longer found on site on 22 Dec 2018. Therefore, it is deemed that the contribution from the uncovered debris to the exceedance on 22 Dec 2018 was minor. Moreover, it should be noted that there have been construction works carried out by another contractor at Austin Road West during the concerned monitoring period with no dust mitigation measures provided. This may also have contributed to the 24-hr TSP exceedance during the concerned monitoring period.

Nonetheless, the contractors were reminded to strengthen the implementation of dust control measures.

Three environmental complaints and no notifications of summons or successful prosecution were received in the reporting quarter.

On 17 Dec 2018, EPD referred a letter from the office of District Councilor Mr. Derek Hung. The environmental-related issues of the complaint included construction noise was generated from 7 a.m. every day and insufficient dust mitigation measures were provided which led to dust to nearby residents. Investigation results revealed that no noisy works were conducted at 7 a.m. every day for both construction sites. The contractors have already been implementing various noise and dust mitigation measures to reduce noise and dust impact to nearby residents.

Another environmental complaint was received from EPD on 8 Jan 2019. The environmental-related issues of the complaint includes muddy water from wheel washing flowed out of the site; the volume of the broadcast system at site entrance was too loud; and no dust suppression measures were provided. It is deemed that the concerned construction site entrance of Gammon Construction Limited mentioned in the complaint is likely the site entrance of Lyric Theatre Complex. The concerned contractor has been implementing various mitigation measures to prevent muddy water from flowing out of the site boundary. For the broadcast system at the concerned site entrance, the contractor has already carried out follow up actions in response to the complaint. It is also noted that the contractors of both construction sites have been implementing dust suppression measures. As the concerned Austin Road West was used by various contractors, it did not directly imply the complaint was only attributable to Lyric Theatre Complex.

The third environmental complaint was received from Buildings Department on 22 Jan 2019. The environmental-related issues of the complaint to Lyric Theatre Complex include vehicles being washed at the site entrance leading to muddy water being discharged to the street; and dust generated during site operation was not properly addressed. It is revealed that the contractor has been implementing various mitigation measures to prevent muddy water from flowing out of the site boundary and has already implemented immediate actions to further control the wheel washing performed at the site

entrance. The contractor has also been implementing dust suppression measures to control dust generated from construction works.

Moreover, it should be noted that besides the construction sites of Lyric Theatre Complex and M+ Museum, there have been construction works carried out by another contractor at Austin Road West, which may also have contributed to the abovementioned nuisance. Nevertheless, the contractors were reminded to strengthen the implementation of the recommended mitigation measures to reduce the environmental nuisance to the nearby residents.

The cumulative statistics on complaints, notifications of summons and successful prosecutions were provided in **Appendix G**.

6 Comments, Recommendations and Conclusion

6.1 Comments

Based on the observations made during site audits and landscape inspections, and construction dust and noise monitoring results, no non-compliances and exceedances of air quality and noise limits were recorded.

6.2 Recommendations

Reviewing the implementation of the recommended mitigation measures in the EM&A Manual, it was observed that they were effective and efficient in controlling the potential impacts due to construction of the project during the reporting period. Review of the effectiveness and efficiency of the EM&A programme will continue, and recommendations will be provided to remediate any potential impacts due to the project and to improve the EM&A programme if deficiencies of the existing EM&A programme are identified.

6.3 Conclusion

The EM&A programme as recommended in the EM&A Manual has been undertaken since the construction works of M+ Museum main works commenced on 31 October 2015, and the construction of Lyric Theatre Complex commenced on 1 March 2016.

Monitoring of air quality and noise with respect to the Project is underway. In particular, the 1-hour TSP, 24-hour TSP, noise level (as Leq, 30 minutes) under monitoring have been checked against established Action and Limit levels. Four exceedances of Action Level of 24-hour TSP for Air Quality were recorded. There was no breach of Limit levels for Air Quality (1-hour TSP and 24-hour TSP) and Noise in this reporting quarter.

Three environmental complaints were received during the reporting quarter. No notification of summons and no successful prosecution were received during the reporting quarter.

Weekly construction phase site inspections and bi-weekly landscape and visual impact inspections were conducted during the reporting quarter as required. It was observed that the Contractor had implemented all possible and feasible mitigation measures to mitigate the potential environmental impacts during construction phase works.

Figure 1 Site Layout Plan and Monitoring Stations

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