



THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION
DRAINAGE SERVICES DEPARTMENT

Tolo Harbour Sewerage of Unsewered Areas, Stage II - Investigation, Design and Construction

Sai O Trunk Sewer Sewage Pumping Station

Environmental Impact Assessment Report Volume I – Main Text

AECOM Asia Co. Ltd.

March 2021

TABLE OF CONTENTS

1.	INTRODUCTION.....	1-1
1.1	Background	1-1
1.2	Purpose of the EIA Report.....	1-2
1.3	Objectives of the EIA Report.....	1-2
1.4	Structure of the Report	1-3
2.	PROJECT DESCRIPTION	2-1
2.1	Project Location and Description	2-1
2.2	Need of the Project.....	2-2
2.3	Consideration of Alternative Locations and Design Options.....	2-3
2.4	Considerations of Construction Methods and Sequences of Works.....	2-12
2.5	Selection of Preferred Scenario	2-14
2.6	Construction Programme.....	2-14
2.7	Concurrent Project.....	2-14
3.	AIR QUALITY	3-1
3.1	Introduction.....	3-1
3.2	Environmental Legislation, Standards and Guidelines	3-1
3.3	Description of the Environment and Future Trend.....	3-2
3.4	Identification of Pollution Sources.....	3-5
3.5	Assessment Methodology.....	3-6
3.6	Prediction and Evaluation of Environmental Impacts	3-7
3.7	Recommended Mitigation Measures.....	3-9
3.8	Evaluation of Residual Impacts.....	3-10
3.9	Environmental Monitoring and Audit	3-10
3.10	Conclusion.....	3-11
4.	NOISE	4-1
4.1	Introduction.....	4-1
4.2	Environmental Legislation, Standards and Criteria	4-1
4.3	Description of the Environment.....	4-3
4.4	Noise Sensitive Receivers	4-3
4.5	Identification of Environmental Impacts	4-4
4.6	Assessment Methodology.....	4-5
4.7	Prediction and Evaluation of Environmental Impacts	4-6
4.8	Mitigation of Adverse Environmental Impacts	4-7
4.9	Evaluation of Residual Impacts.....	4-11
4.10	Environmental Monitoring and Audit	4-11
4.11	Conclusion.....	4-12
5.	WATER QUALITY.....	5-1
5.1	Introduction.....	5-1
5.2	Environmental Legislation, Standards and Guidelines	5-1
5.3	Description of Environment.....	5-4
5.4	Water Sensitive Receivers.....	5-10
5.5	Assessment Methodology.....	5-10
5.6	Identification of Environmental Impacts	5-10
5.7	Evaluation of Environmental Impacts.....	5-11
5.8	Mitigation Measures	5-16
5.9	Residual Environmental Impacts	5-19
5.10	Environmental Monitoring and Audit	5-19
5.11	Conclusion.....	5-19
6.	WASTE MANAGEMENT IMPLICATIONS	6-1
6.1	Introduction.....	6-1
6.2	Environmental Legislation, Standards and Guidelines	6-1

6.3	Assessment Methodology.....	6-3
6.4	Identification and Evaluation of Potential Impacts.....	6-4
6.5	Mitigation Measures.....	6-7
6.6	Evaluation of Residual Impacts.....	6-10
6.7	Environmental Audit.....	6-10
6.8	Conclusion.....	6-11
7.	LAND CONTAMINATION.....	7-1
7.1	Introduction.....	7-1
7.2	Environmental Standards and Guidelines.....	7-1
7.3	Assessment Methodology.....	7-1
7.4	Description of the Environment.....	7-2
7.5	Site Appraisal.....	7-2
7.6	Prediction and Evaluation of Land Contamination Impacts.....	7-3
7.7	EM&A Requirements.....	7-3
7.8	Conclusion.....	7-3
8.	ECOLOGY (TERRESTRIAL AND AQUATIC).....	8-1
8.1	Introduction.....	8-1
8.2	Environmental Legislation, Standards and Guidelines.....	8-1
8.3	Assessment Methodology.....	8-3
8.4	Description of the Environment.....	8-6
8.5	Ecological Value.....	8-17
8.6	Identification of Potential Impacts.....	8-30
8.7	Prediction and Evaluation of Environmental Impacts.....	8-30
8.8	Mitigation of Adverse Environmental Impacts.....	8-40
8.9	Evaluation of Residual Impacts.....	8-41
8.10	Environmental Monitoring and Audit.....	8-41
8.11	Conclusion.....	8-41
8.12	Reference.....	8-42
9.	HAZARD TO LIFE.....	9-1
9.1	Introduction.....	9-1
9.2	Environmental Legislation, Standards and Guidelines.....	9-3
9.3	Population Data.....	9-3
9.4	Hazard Identification.....	9-3
9.5	Frequency Assessment.....	9-4
9.6	Consequence Assessment.....	9-4
9.7	Risk Assessment.....	9-4
9.8	Conclusion.....	9-5
10	LANDSCAPE AND VISUAL IMPACT.....	10-1
10.1	Introduction.....	10-1
10.2	Environmental Legislation, Standards and Criteria.....	10-1
10.3	Assessment Methodology.....	10-2
10.4	Review of Planning and Development Control Framework.....	10-6
10.5	Baseline Study.....	10-7
10.6	Landscape Impact Assessment.....	10-13
10.7	Visual Impact Assessment.....	10-16
10.8	Landscape and Visual Mitigation Measures.....	10-19
10.9	Residual Impact.....	10-21
10.10	Environmental Monitoring and Audit.....	10-28
10.11	Conclusion.....	10-28
11.	CULTURAL HERITAGE IMPACT.....	11-1
11.1	Introduction.....	11-1
11.2	Environmental Legislation, Standards and Guidelines.....	11-1

11.3	Assessment Methodology.....	11-2
11.4	Background Information.....	11-3
11.5	Baseline Condition.....	11-7
11.6	Review on Cultural Heritage Potential	11-9
11.7	Impact Assessment	11-10
11.8	Mitigation Measures	11-10
11.9	Environmental Monitoring and Audit	11-10
11.10	Conclusion.....	11-10
11.11	Bibliography.....	11-10
12.	<u>ENVIRONMENTAL MONITORING & AUDIT REQUIREMENTS.....</u>	<u>12-1</u>
12.1	Introduction.....	12-1
12.2	Air Quality Impact	12-1
12.3	Noise Impact	12-1
12.4	Water Quality Impact.....	12-1
12.5	Waste Management Implications.....	12-2
12.6	Land Contamination	12-2
12.7	Ecological Impact	12-2
12.8	Hazard to Life	12-2
12.9	Landscape and Visual Impact.....	12-2
12.10	Cultural Heritage Impact.....	12-3
13.	<u>IMPLEMENTATION SCHEDULE OF THE PROPOSED MITIGATION MEASURES</u>	<u>13-1</u>
14.	<u>SUMMARY OF ENVIRONMENTAL OUTCOMES.....</u>	<u>14-1</u>
14.1	Overview	14-1
14.2	Environmental Benefits of the Project.....	14-1
14.3	Environmentally Friendly Designs Recommended.....	14-1
14.4	Key Environmental Problems Avoided and Compensation Area Included.....	14-2
14.5	Population and Environmentally Sensitive Areas Protected.....	14-3
14.6	Environmental Protection Measures Recommended	14-3
15.	<u>CONCLUSIONS</u>	<u>15-1</u>
15.1	Introduction.....	15-1
15.2	Air Quality.....	15-1
15.3	Noise	15-2
15.4	Water Quality.....	15-2
15.5	Waste Management Implications.....	15-2
15.6	Land Contamination	15-2
15.7	Ecology	15-3
15.8	Hazard to Life	15-3
15.9	Landscape and Visual	15-3
15.10	Cultural Heritage.....	15-4
15.11	Overall Conclusion	15-4

List of Tables

Table 2.1	Environmental Considerations for the Alternative Locations
Table 2.2	Comparison of Alternative Location Options
Table 3.1	Hong Kong Air Quality Objectives
Table 3.2	Summary of the Latest Available Five-Year Air Quality Data at Tai Po Air Quality Monitoring Station (2015 to 2019)
Table 3.3	Air Pollutants Concentrations in 2020 Predicted from PATH-2016 Model
Table 3.4	Representative Air Sensitive Receivers
Table 3.5	Predicted Maximum 5-second Average Odour Concentration at

	Representative Air Sensitive Receivers
Table 4.1	Daytime Construction Noise Criteria
Table 4.2	Area Sensitivity Ratings
Table 4.3	Acceptable Noise Level for Fixed Plant Noise
Table 4.4	Representative Noise Sensitive Receivers
Table 4.5	Summary of Predicted Construction Noise Levels without Mitigation Measures
Table 4.6	Summary of Predicted Fixed Plant Noise Levels without Mitigation Measures
Table 4.7	Proposed Quiet PME for the Project
Table 4.8	Predicted Construction Noise Levels at Representative Noise Sensitive Receivers – Mitigated Scenario
Table 4.9	Predicted Cumulative Construction Noise Levels at Representative Noise Sensitive Receivers – Mitigated Scenario
Table 4.10	Predicted Fixed Plant Noise Level with Mitigation Measures
Table 5.1	Summary of Water Quality Objectives for Tolo Harbour and Channel WCZ
Table 5.2	Summary Statistics of Marine Water Quality in Tolo Harbour and Channel WCZ (TM6 & TM7) in 2019
Table 5.3	Summary of Baseline Water Quality Survey Results
Table 6.1	Summary of Estimated Quantities of C&D Materials Generated during Construction of the Project
Table 6.2	Summary of Waste Handling Procedures and Disposal Routes
Table 7.1	Aerial Photographs Reviewed
Table 8.1	Size of Habitats Recorded within the Assessment Area
Table 8.2	Total Abundance and Biomass of Each Faunal Group
Table 8.3	Overall Abundance and Biomass Recorded from Each Sampling Site
Table 8.4	Physical Conditions of the Spot-check Dive Sites
Table 8.5	Species, Coverage, Size, Condition and Translocation Feasibility of Corals Found at the Spot-check Dive Sites
Table 8.6	Physical Conditions of the REA Transect
Table 8.7	Ecological and Substratum Attributes of REA1
Table 8.8	Size, Health Condition and Translocation Feasibility of Coral Colony Recorded at REA1
Table 8.9	Ecological Evaluation of the Project Site
Table 8.10	Ecological Evaluation of Woodland within the Assessment Area
Table 8.11	Ecological Evaluation of Mixed Woodland within the Assessment Area
Table 8.12	Ecological Evaluation of Plantation within the Assessment Area
Table 8.13	Ecological Evaluation of Shrubland within the Assessment Area
Table 8.14	Ecological Evaluation of Grassland within the Assessment Area
Table 8.15	Ecological Evaluation of Developed Area/Wasteland within the Assessment Area
Table 8.16	Ecological Evaluation of Modified Watercourse within the Assessment Area
Table 8.17	Ecological Evaluation of Natural Watercourse within the Assessment Area
Table 8.18	Ecological Evaluation of Seashore, Subtidal Hard Bottom Habitat and Subtidal Soft Bottom Habitat within the Assessment Area
Table 8.19	Floral and Faunal Species of Conservation Importance Recorded during Previous and Recent Ecological Surveys
Table 8.20	Evaluation of Ecological Impact to Woodland within the Assessment Area
Table 8.21	Evaluation of Ecological Impact to Mixed Woodland within the Assessment Area
Table 8.22	Evaluation of Ecological Impact to Plantation within the Assessment Area
Table 8.23	Evaluation of Ecological Impact to Shrubland within the Assessment Area
Table 8.24	Evaluation of Ecological Impact to Grassland within the Assessment Area
Table 8.25	Evaluation of Ecological Impact to Developed Area/Wasteland within the Assessment Area
Table 8.26	Evaluation of Ecological Impacts to Modified Watercourse and Natural Watercourse within the Assessment Area

Table 8.27	Evaluation of Ecological Impacts to Intertidal Habitats
Table 8.28	Evaluation of Ecological Impacts to Subtidal Hard Bottom Habitat and Subtidal Soft Bottom Habitat
Table 8.29	Summary of Potential Impacts to Species of Conservation Importance Recorded in the Assessment Area
Table 10.1	Relationship between Landscape Sensitivity and Magnitude of Change in Defining Impact Significance
Table 10.2	Relationship between VSRs Sensitivity and Magnitude of Change in Defining Impact Significance
Table 10.3	Summary of the Review of Planning and Development Control Framework
Table 10.4	Baseline LRs and their Sensitivity
Table 10.5	Baseline LCAs and their Sensitivity
Table 10.6	Baseline VSRs and their Sensitivity
Table 10.7	Magnitude of Landscape Impacts during Construction and Operation
Table 10.8	Magnitude of Visual Impacts during Construction and Operation
Table 10.9	Landscape and Visual Mitigation Measures for Construction Phase
Table 10.10	Landscape and Visual Mitigation Measures for Operational Phase
Table 10.11	Significance of Landscape Impacts during Construction and Operational Phases
Table 10.12	Significance of Visual Impacts during Construction and Operational Phases
Table 13.1	Implementation Schedule of the Proposed Mitigation Measures for Air Quality Impact
Table 13.2	Implementation Schedule of the Proposed Mitigation Measures for Noise Impact
Table 13.3	Implementation Schedule of the Proposed Mitigation Measures for Water Quality Impact
Table 13.4	Implementation Schedule of the Proposed Mitigation Measures for Waste Management Implications
Table 13.5	Implementation Schedule of the Proposed Mitigation Measures for Land Contamination Issues
Table 13.6	Implementation Schedule of the Proposed Mitigation Measures for Ecological Impact
Table 13.7	Implementation Schedule of the Proposed Mitigation Measures for Hazard to Life
Table 13.8	Implementation Schedule of the Proposed Mitigation Measures for Landscape and Visual Impact
Table 13.9	Implementation Schedule of the Proposed Mitigation Measures for Cultural Heritage Impact
Table 14.1	Key Recommended Mitigation Measures