



PROJECT No.: TCS/00874/16

**CEDD CONTRACT NO. CV/2012/05 –
BATHING BEACH AT LUNG MEI, TAI PO**

**POST-CONSTRUCTION MONITORING AND AUDIT
REPORT (MAY TO JUNE 2022)**

PREPARED FOR
WELCOME CONSTRUCTION CO., LTD.

Quality Index

Date	Reference No.	Prepared By	Certified By
13 July 2022	TCS00874/16/600/R0799v2	 Nicola Hon Environmental Consultant	 T.W. Tam Environmental Team Leader

Revision	Date	Description
1	8 July 2022	First submission
2	13 July 2022	Amended according to the IEC's comments

Environmental Permit No. EP-388/2010

Development of a Bathing Beach at Lung Mei, Tai Po

Independent Environmental Checker Verification


Reference Document/Plan

Document/Plan to be Certified/ Verified:	5 th Post-Construction Phase Landscape EM&A
Date of Report:	13 July 2022
Date received by IEC:	14 July 2022

Reference EP Condition / Updated EM&A Manual Requirement

Environmental Permit Condition / Updated EM&A Manual Reference	Section 11.4.2
The post-construction phase landscape EM&A will be reported on a bi-monthly basis for a period of one year after completion of the project. The ET will prepare post-construction phase EM&A Reports on a bi-monthly (once every two months) basis to be submitted within two weeks of the end of the reporting period. The reports will be submitted to the Contractor(s), IEC, ER and EPD, as appropriate.	

IEC Verification

I hereby verify that the above referenced document/ plan complies with the above referenced condition / section of EP-388/2010 / Updated EM&A Manual	
Mr Kelvin So	Date: 14 July 2022
Independent Environmental Checker	

Our ref: P:\Projects\0206709 IEC for Lung Mei EM&A\07_ET Submission\47_Post Construction EM&A Report

EXECUTIVE SUMMARY

- ES.01 Civil Engineering and Development Department (hereafter referred as “CEDD”) is the Project Proponent and the Permit Holder of *Agreement No. CE 59/2005 (EP) Development of a Bathing Beach at Lung Mei, Tai Po* (hereinafter referred as “the Project”), which is a Designated Project to be implemented under Environmental Permit number EP-388/2010 (hereinafter referred as “the EP-388/2010” or “the EP”).
- ES.02 Welcome Construction CO., Ltd is a Main Contractor (hereinafter referred as “Contractor”) responsible for construction of the Project. Action-United Environmental Services & Consulting (hereinafter referred as “AUES”) has been commissioned by the Contractor as the Environmental Team for the Project (hereinafter referred as “the ET”) to perform relevant Environmental Monitoring and Audit (EM&A) programme in accordance with the EM&A Manual approved under the Environmental Impact Assessment Ordinance (EIAO).
- ES.03 All civil works under the Project were substantial completed in late August 2020 with substantial completion of works/substantial completion certificate issued by CEDD. According to the updated EM&A Manual (Jan 2018) S.2.2, cessation of EM&A programme is subject to the satisfactory completion of the EM&A Final Review Report, agreement with the IEC and approval from EPD. The Final Review EM&A Report for Construction Phase prior verified by IEC was submitted EPD on 7 July 2021.
- ES.04 According to the EM&A Manual Section 9.2, post-construction phase Landscape and Visual auditing is required during a 12-month establishment period. Moreover, mangrove seedling planting was implemented according to the approved Mangrove Seedling Planting Proposal before the operation of the beach. After planting, 1 year monitoring will be undertaken to check the performance and health conditions of the planted individuals on monthly basis.
- ES.05 According the EM&A Manual Section 11.4.2, the post-construction phase landscape EM&A will be reported on a bi-monthly basis for a period of one year after completion of the project. As clarified by CEDD, post-construction phase monitoring commenced in September 2021.
- ES.06 This is the 5th Post-construction Monitoring and Audit Report presents the result of landscape EM&A and mangrove seedling planting monitoring for **1st May** and **30th June 2022** (hereinafter referred as “the Reporting Period”).

ENVIRONMENTAL MONITORING AND AUDIT ACTIVITIES

- ES.07 The post-construction phase monitoring activities under the EM&A programme in the Reporting Period are summarized in the following table.

Issues	Monitoring Parameters / Inspection	Date
Landscape & Visual	Landscape and visual inspection	13 th & 30 th May 2022 9 th and 25 th June 2022
Ecology	Mangrove post-monitoring	30 th May 2022 25 th June 2022

- ES.08 The bi-weekly landscape and visual inspection were undertaken in the Reporting Period. The Contractor was reminded to follow the observation provided in the checklist with their horticulture sub-contractor. The Contractor advised that follow up actions for observation of drainage problem at Western Groyne and Eastern Groyne and the replanting in the enlarged planted near Eastern box culvert are under discussion with relevant department.
- ES.09 Although the mortality of the mangrove seedling were more than 50% in previous months, the cause(s) of the event has been identified in the report. AFCD expressed no comment on the proposed remedial actions and the proposed resumption of normal monitoring frequency via

email on 6th January 2022. In the Reporting Period, monthly mangrove post-monitoring were undertaken on 30th May 2022 and 25th June 2022.

- ES.10 Based on the observation from Sep 2021 to June 2022, only the seedlings at the landward side thrive. The seedlings at the seaward side showed poor health and death even at Location 3, which the general condition of the seedling is the best result among 3 locations. Those poor health seedlings with no sign of re-sprout and are expected to decline and be washed away by the tidal over time.
- ES.11 According to the Event and Action Plan, a proposal should be submitted to relevant government departments for remedial action and implement the action to solve the event. "Proposal of Mangrove Seedling Replanting" prepared by the Contractor have been submitted to EPD and AFCD on 3rd May 2022 and the Proposal was agreed by EPD on 17th June 2022.
- ES.12 Replanting of mangrove seedling was conducted by the Contractor on 28th June 2022 according to the agreed "Proposal of Mangrove Seedling Replanting". Mangrove post-monitoring on monthly basis will continue until the end of establishment period in the end of August 2022.

ENVIRONMENTAL COMPLAINT

- ES.13 No environmental complaint was recorded or received in the Reporting Period.

NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

- ES.14 No environmental summons or successful prosecutions were recorded in the Reporting Period.

REPORTING CHANGE

- ES.15 No reporting changes were made in the Reporting Period

FUTURE KEY ISSUES

- ES.16 As remedial action for mortality of the mangrove seedling more than 50%, the Contractor replanted the mangrove seedlings on 28th June 2022 at more landward side locations to improve the survival rate. The condition of existing and newly planted mangrove seedlings would be closely monitored.
- ES.17 The Contractor was reminded that the environmental mitigation measures shall be properly implemented and maintained where applicable, as per the Mitigation Implementation Schedule, in the operational phase.

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1. INTRODUCTION

1.1 BACKGROUND

- 1.1.1 Civil Engineering and Development Department (hereafter referred as “CEDD”) is the Project Proponent and the Permit Holder of *Agreement No. CE 59/2005 (EP) Development of a Bathing Beach at Lung Mei, Tai Po* (hereinafter referred as “the Project”), which is a Designated Project to be implemented under Environmental Permit number EP-388/2010 (hereinafter referred as “the EP-388/2010” or “the EP”).
- 1.1.2 Welcome Construction CO., Ltd is a Main Contractor (hereinafter referred as “Contractor”) responsible for construction of the Project. Action-United Environmental Services & Consulting (hereinafter referred as “AUES”) has been commissioned by the Contractor as the Environmental Team for the Project (hereinafter referred as “the ET”) to perform relevant Environmental Monitoring and Audit (EM&A) programme in accordance with the EM&A Manual approved under the Environmental Impact Assessment Ordinance (EIAO).
- 1.1.3 The major construction activities of the Project comprise construction of 200-metre long bathing beach with a groyne at each end, a shark prevention net; a public car park; retaining walls; and the associated roadworks, drainage and sewerage works. Layout plan of the Project is shown in [Appendix A](#).
- 1.1.4 All civil works under the Project were substantially completed in late August 2020 with substantial completion of works/substantial completion certificate issued by CEDD. According to the updated EM&A Manual (Jan 2018) S.2.2, cessation of EM&A programme is subject to the satisfactory completion of the EM&A Final Review Report, agreement with the IEC and approval from EPD. The Final Review EM&A Report for Construction Phase prior verified by IEC was submitted EPD on 7 July 2021.
- 1.1.5 According to the EM&A Manual Section 9.2, post-construction phase Landscape and Visual auditing is required during a 12-month establishment period. Moreover, mangrove seedling planting was implemented according to the approved Mangrove Seedling Planting Proposal before the operation of the beach. After planting, 1 year monitoring will be undertaken to check the performance and health conditions of the planted individuals on monthly basis.
- 1.1.6 According the EM&A Manual Section 11.4.2, the post-construction phase landscape EM&A will be reported on a bi-monthly basis for a period of one year after completion of the project. As clarified by CEDD, post-construction phase monitoring commenced in September 2021.
- 1.1.7 This is the 5th Post-construction Monitoring and Audit Report presents the result of landscape EM&A and mangrove seedling planting monitoring for **1st May** and **30th June 2022**.

2. PROJECT ORGANIZATION AND MONITORING REQUIREMENT

2.1 PROJECT ORGANIZATION AND MANAGEMENT STRUCTURE

2.1.1 Organization structure and contact details of relevant parties with respect to on-site environmental management are shown in *Appendix B*.

2.2 PARAMETERS AND REQUIREMENTS

2.2.1 Landscape mitigation are detailed in the Landscape Plan which approved by EPD on 14 July 2021. According to the EM&A Manual Section 9.2, measures undertaken by both the Contractor(s) and the specialist Landscape Sub-Contractor during the construction phase and first year post-construction will be audited by the Registered Landscape Architect of the ET, to ensure compliance with the intended aims of the measures. Site inspections should be undertaken at least once every two weeks throughout the landscaping plants establishment period when planting works are being undertaken.

2.2.2 Mangrove seedling planting was implemented according to the approved Mangrove Seedling Planting Proposal before the operation of the beach. After planting, 1 year monitoring will be undertaken to check the performance and health conditions of the planted individuals on monthly basis. Remedial action will be discussed with AFCD in the event of unsuccessful mangrove seedling planting and follow an approved Event and Action Plan.

2.3 EVENT AND ACTION PLAN

2.3.1 Event and Action Plan for Mangrove Seedling Planting under the EM&A Manual Table 7.1 will be followed.

Monitoring Criteria	Event	Action	
		Environmental Team Leader/ Environmental Manager (Employed by CEDD)	CEDD
Mangrove Seedling Survival	More than 25 % of mortality of mangrove seedling recorded during the establishment of planting.	1. Notify CEDD and check with horticulturist to find out the cause of the event(s).	1. Identify and report the cause(s) of the event.
		2. Undertake bi-weekly monitoring to observe the growth performance of the seedling. The normal monitoring schedule will be resumed if the cause(s) of the event have been identified.	2. Notify relevant government departments (i.e. EPD and AFCD).
	More than 50 % of mortality of mangrove seedling recorded during the establishment of planting.	1. Notify CEDD and check with horticulturist to find out the cause of the event(s).	1. Identify and report the cause(s) of the event.
		2. Undertake weekly monitoring to observe the growth performance of the seedling. The normal monitoring schedule will be resumed if the cause(s) of the event have been identified.	2. Submit proposal to relevant government departments (ie EPD and AFCD) for remedial action and implement the action to solve the event.

3. MONITORING RESULTS OF POST-CONSTRUCTION MONITORING

3.1 GENERAL

- 3.1.1 As clarified by CEDD, post-construction phase monitoring commenced on 1st September 2021. The following sub-section summarized the post-construction monitoring results.

3.2 RESULTS OF LANDSCAPE AND VISUAL

- 3.2.1 Due to prolong raining and thunderstorm in the 4th week of May, the scheduled monitoring needed to be postponed to 30th May 2022. The landscape and visual inspection were undertaken on **13th & 30th May 2022 and 9th & 25th June 2022**. The inspection results in form of checklists are shown in **Appendix C**.
- 3.2.2 The Contractor was reminded to follow the observation provided in the checklist with their horticulture sub-contractor. The Contractor advised that follow up actions for observation of drainage problem at Western Groyne and Eastern Groyne and the replanting in the enlarged planted near Eastern box culvert are under discussion with relevant department.
- 3.2.3 The landscape and visual inspection in next Reporting Period is scheduled on 2nd and 4th week of July 2022 and 2nd and 4th week of August 2022, subject to the weather condition.

3.3 RESULTS OF MANGROVE MONITORING

- 3.3.1 Mangrove post-monitoring was undertaken on **30th May 2022 and 25th June 2022** and the mortality were all over 50%. Although the mortality of the mangrove seedling were more than 50%, as the cause(s) of the event has been identified in the report. AFCD expressed no comment on the proposed remedial actions the proposed resumption of normal monitoring frequency via email on 6th January 2022.
- 3.3.2 According to the Event and Action Plan, a proposal should be submitted to relevant government departments for remedial action and implement the action to solve the event. "Proposal of Mangrove Seedling Replanting" prepared by the Contractor have been submitted to EPD and AFCD on 3rd May 2022 and the Proposal was agreed by EPD on 17th June 2022.
- 3.3.3 Based on the observation from Sep 2021 to June 2022, only the seedlings at the landward side thrive. The seedlings at the seaward side showed poor health and death even at Location 3, which the general condition of the seedling is the best result among 3 locations. Those poor health seedling with no sign of re-sprout and is expected to decline and be washed away by the tidal over time.
- 3.3.4 Since the mangrove distribution and survival is primarily determined by sea level and its fluctuations, other secondary factors are air temperature, salinity, ocean currents, storms, shore slope, and soil substrate also affect the establishment rate. Both *Aegiceras corniculatum* and *Avicennia marina* are mostly at the outer fringe (seaward) among other mangroves and *Avicennia marina* is also a pioneer species, however, even those species fail to establish at location 1 and location 2.
- 3.3.5 From our observation, it is suspected that the condition of location 1 and location 2, especially the seaward side is not optimal for the seedlings to establish and grow. The Contractor is recommended to replant the seedlings and review if the planting location should be moved to a more landward side or other locations (like next to location 3 which the current condition of the seedlings is good) to improve the survival rate.
- 3.3.6 Detailed post-planting monitoring reports of the mangrove seedling planting are shown in **Appendix D**.
- 3.3.7 The post-monitoring in next Reporting Period is scheduled on 4th week of July 2022 4th week of August 2022, subject to the weather condition.

3.4 REPLANTING OF MANGROVE SEEDLING

- 3.4.1 As remedial action for mortality of the mangrove seedling more than 50%, the Contractor replanted the mangrove seedlings on 28th June 2022 at more landward side locations to improve the survival rate, according to the agreed “Proposal of Mangrove Seedling Replanting”. Mangrove post-monitoring on monthly basis will continue until the end of establishment period in the end of August 2022.
- 3.4.2 The replanting work was basically followed the agreed “Proposal of Mangrove Seedling Replanting”, whereas the exact quantity of replanting was made reference to the site condition and monitoring result of June 2022. The summary of quantity, location and species of mangrove seedling replanting are shown in below *Tables 3-1* and *3-2*. The location of Mangrove Seedling Replanting is illustrated in [Appendix E](#).

Tables 3-1 Summary of Mangrove Seedling Replanting in Location 3

	Location 3 (25 th June 2022)	Replanted in Location 3	Adjusted baseline in Location 3
<i>Aegicera Corniculatum</i>	37	3	40
<i>Avicennia Marina</i>	34	7	41
<i>Kandellia Obovata</i>	30	13	43
Live (unidentifiable as no leaves)	3	n/a	3
Total	104	23	127

Tables 3-2 Summary of Mangrove Seedling Replanting in Location 4

	Location 1 (25 th June 2022)	Location 2 (25 th June 2022)	Replanted in Location 4	Adjusted baseline in Location 4
<i>Aegiceras Corniculatum</i>	13	14	96	123
<i>Avicennia Marina</i>	4	0	96	100
<i>Kandellia Obovata</i>	4	0	96	100
Live (unidentifiable as no leaves)	0	0	n/a	n/a
Total	21	14	288	323

3.5 ENVIRONMENTAL COMPLAINT

- 3.5.1 No environmental complaint was recorded or received in the Reporting Period.

3.6 NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

- 3.6.1 No environmental summons or successful prosecutions were recorded in the Reporting Period.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

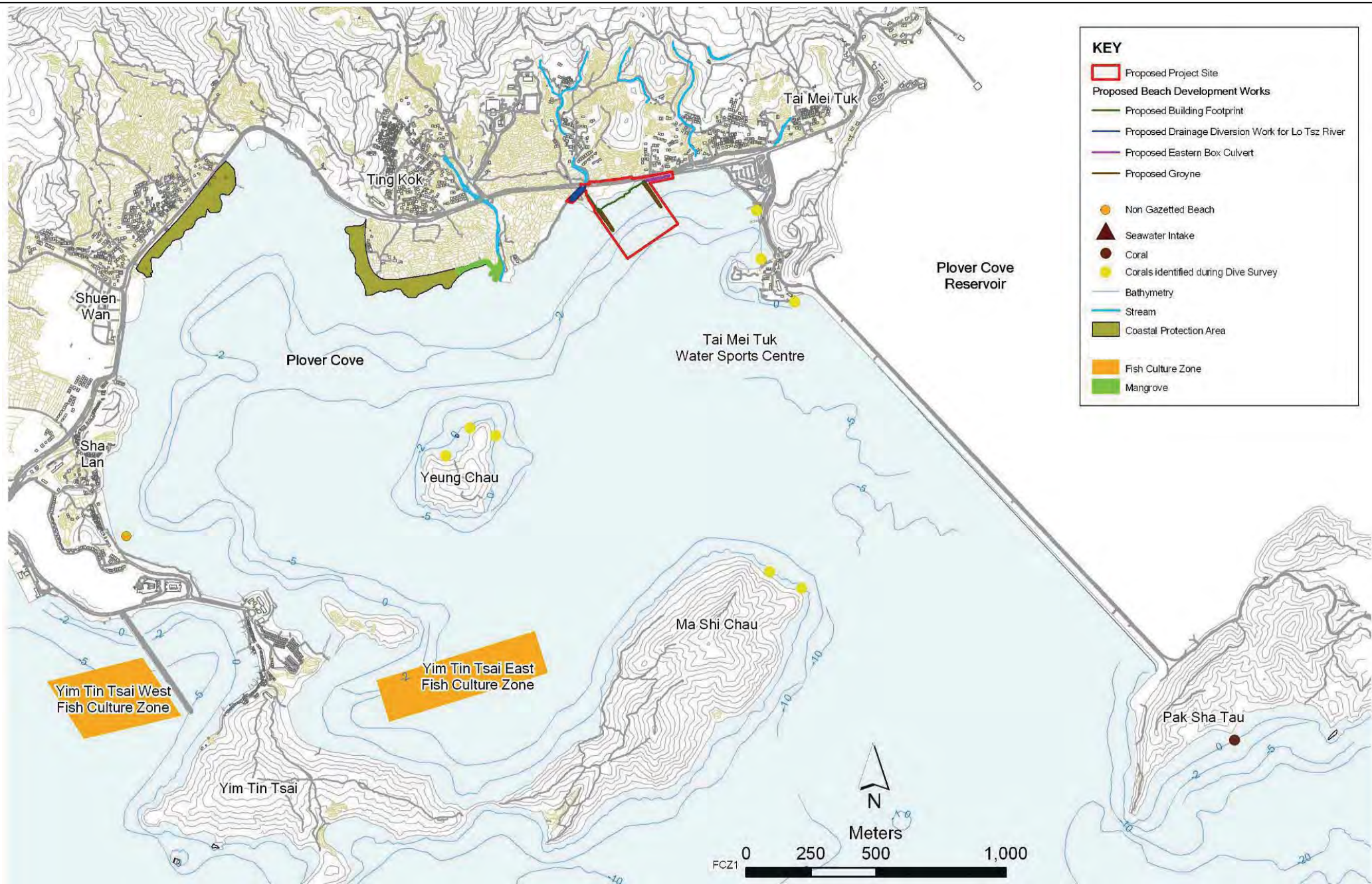
- 4.1.1 This is the 5th Post-construction Monitoring and Audit Report presents the result of landscape EM&A and mangrove seedling planting monitoring for 1st May and 30th June 2022
- 4.1.2 Due to prolong raining and thunderstorm in the 4th week of May, the scheduled monitoring needed to be postponed to 30th May 2022. The landscape and visual inspection were undertaken on 13th & 30th May 2022 and 9th & 25th June 2022. The Contractor was reminded to follow the observation provided in the checklist with their horticulture sub-contractor.
- 4.1.3 The Contractor was reminded to follow the observation provided in the checklist with their horticulture sub-contractor. The Contractor advised that follow up actions for observation of drainage problem at Western Groyne and Eastern Groyne and the replanting in the enlarged planted near Eastern box culvert are under discussion with relevant department.
- 4.1.4 Mangrove post-monitoring was undertaken on 30th May 2022 and 25th June 2022 and the mortality were all over 50%. Although the mortality of the mangrove seedling were more than 50%, as the cause(s) of the event has been identified in the report. AFCD expressed no comment on the proposed remedial actions and the proposed resumption of normal monitoring frequency via email on 6th January 2022.
- 4.1.5 Based on the observation from Sep 2021 to June 2022, only the seedlings at the landward side thrive. The seedlings at the seaward side showed poor health and death even at Location 3, which the general condition of the seedling is the best result among 3 locations. Those poor health seedlings with no sign of re-sprout and are expected to decline and be washed away by the tidal over time. For the poor health seedlings, there is no sign to re-sprout and is expected to decline and be washed away by the tidal over time. The Contractor is recommended to replant the seedlings and review if the planting location should be moved to a more landward side or other locations (like next to location 3 which the current condition of the seedlings is good) to improve the survival rate.
- 4.1.6 According to the Event and Action Plan, a proposal should be submitted to relevant government departments for remedial action and implement the action to solve the event. "Proposal of Mangrove Seedling Replanting" prepared by the Contractor have been submitted to EPD and AFCD on 3rd May 2022 and the Proposal was agreed by EPD on 17th June 2022.
- 4.1.7 Replanting of mangrove seedling was conducted by the Contractor on 28th June 2022 according to the agreed "Proposal of Mangrove Seedling Replanting". Mangrove post-monitoring on monthly basis will continue until the end of establishment period in the end of August 2022.

4.2 RECOMMENDATIONS

- 4.2.1 As remedial action for mortality of the mangrove seedling more than 50%, the Contractor replanted the mangrove seedlings on 28th June 2022 at more landward side locations to improve the survival rate. The condition of existing and newly planted mangrove seedlings would be closely monitored.
- 4.2.2 The Contractor was reminded that the environmental mitigation measures shall be properly implemented and maintained where applicable, as per the Mitigation Implementation Schedule, in the operational phase.

Appendix A

Layout Plan of the Project



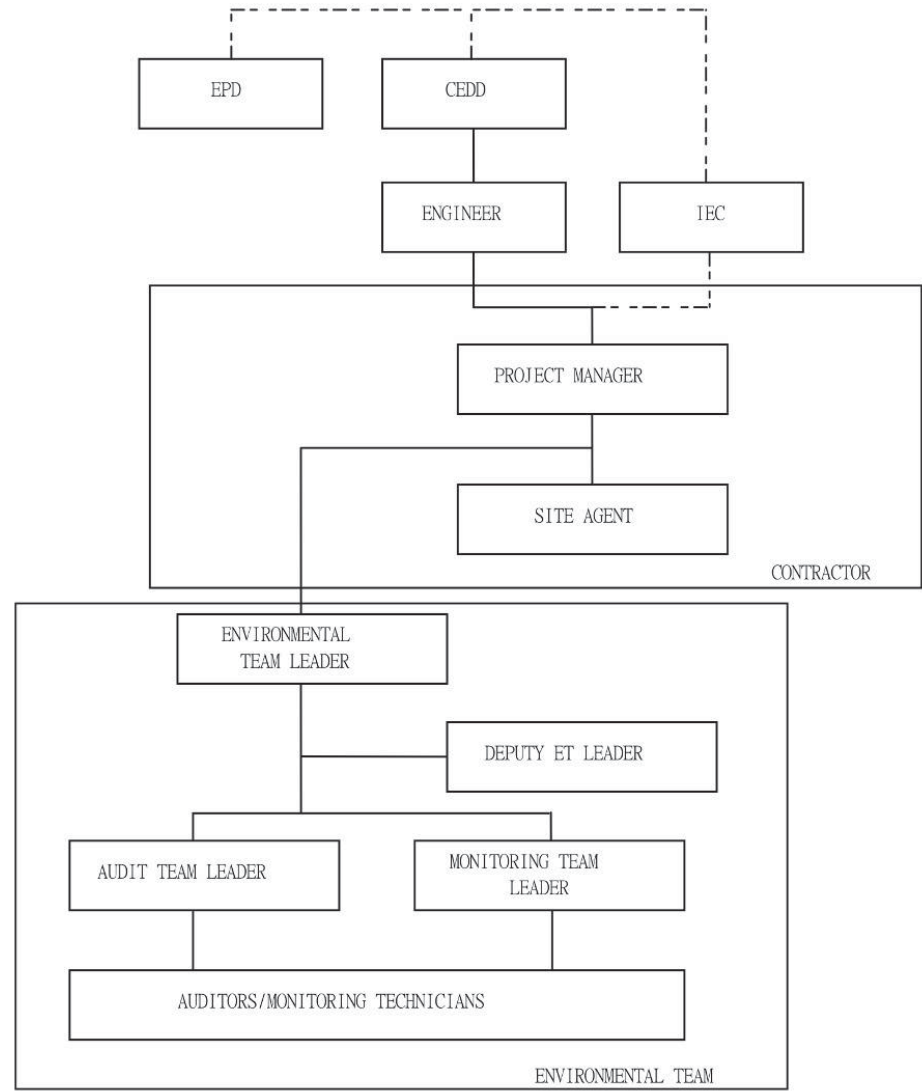
KEY

- Proposed Project Site
- Proposed Beach Development Works
- Proposed Building Footprint
- Proposed Drainage Diversion Work for Lo Tsz River
- Proposed Eastern Box Culvert
- Proposed Groyne
- Non Gazetted Beach
- ▲ Seawater Intake
- Coral
- Corals identified during Dive Survey
- Bathymetry
- Stream
- Coastal Protection Area
- Fish Culture Zone
- Mangrove

Client CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Main Contractor 偉金建築有限公司 Welcome Construction Co., Ltd.	Agreement No.: CE 59/2005(EP)	ENVIRONMENTAL MONITORING AND AUDIT MANUAL	FIGURE 1.1		
		Project Title: DEVELOPMENT OF A BATHING BEACH AT LUNG MEI, TAI PO	Figure Title: PROJECT LOCATION AND ENVIRONMENTAL SENSITIVE RECEIVERS	Checked TF	Scale AS SHOWN	Rev. 1
		Designed -	Drawn AM	Date 13/03/2007		

Appendix B

Organization Structure and Contact Details



* EPD may contact any parties if necessary

KEY
 - - - - COMMUNICATION CHANNEL
 ——— LINE OF PROJECT MANAGEMENT RESPONSIBILITY

Client



CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Main Contractor



偉金建築有限公司
Welcome Construction Co., Ltd.

Agreement No.: CE 59/2005(EP)
 Project Title:
 DEVELOPMENT OF A BATHING BEACH AT LUNG MEI, TAI PO

ORGANISATION STRUCTURE



Contact Details of Key Personnel – CV/2012/05

Organization	Project Role	Name of Key Staff	Tel No.	Fax No.
CEDD	Engineer's Representative	Mr. LAM Chi Kuen, Leo	2762 5556	2714 2054
ERM	Independent Environmental Checker	Mr. Kelvin So	2271 3156	2723 5660
Welcome	Project Manager	Mr. Frankie Lui	9420 4834	2682 3222
AUES	Environmental Team Leader	T. W. Tam	2959 6059	2959 6079
AUES	Environmental Consultant	Nicola Hon	2959 6059	2959 6079

Legend:

CEDD (Engineer) – Civil Engineering and Development Department

Welcome (Contractor) – Welcome Construction Company Limited

ERM (IEC) – Environmental Resources Management

AUES (ET) – Action-United

Appendix C

Landscape and Visual Inspection Checklist



Date/ Time: 13th May 2022 Weather: ~~Fine/ Overcast/ Rain/ Windy~~

Item	Mitigation Measures				Actions/ Remarks
		Yes	No	N/A	
1	Vegetation Management				
1.1	Is the irrigation sufficient?	✓			
1.2	Any physical damage observed on the plant?	✓			The plants in the Eastern box culvert planters were removed for several months without replacement.
1.3	Any potential incursion, fire, pollution, and surface erosion, etc.	✓			Some of the plants in the planters on the Western groyne were wilted for several months without replacement.
1.4	Is the soil drain well?		✓		Poor soil drainage is found in one planter for several months on the Eastern groyne.
1.5	Are the weeds controlled at an acceptable level?	✓			<i>Mikania micrantha</i> and weeds were found in the planters on the Western groyne.
1.6	Are the debris controlled at an acceptable level?	✓			
1.7	Are the plants planted in right place according to the landscape plan?	✓			
1.8	Are the plantings including species, size and plants quality completed following the landscape plan?	✓			Some of the <i>Angelonia angustifolia</i> in the planters along the Ting Kok Road were wilted and removed.
2	Protection of trees				
2.1	The physical protection (fencing) is in place?	✓			
2.2	Any poor health condition or dead tree observed?		✓		
2.3	Any poor practice of pruning observed?		✓		
2.4	Are the trees planted in right place according to the landscape plan?	✓			
2.5	The tree supporting system are in good condition?		✓		<ul style="list-style-type: none"> ● Some ties and stakes were detached at the Western box culvert. ● Some ties and stakes already girdled and



Item	Mitigation Measures				Actions/ Remarks
		Yes	No	N/A	
					affected the growth of the trees. ● Some unnecessary ties are attached between the trees.
2.6	Any event(s) observed may properly hinder the tree growth?		✓		
3	Architectural design and treatment of all structures (where practicable), retaining walls, elevated road structures and other engineering works.				
3.1	Implementation and maintenance of mitigation measures, to ensure conformity with agreed designs?	✓			

Summary and follow up actions / Remarks:

1. Some of the plants in the planters on the Western groyne were wilted and should be removed (Photo I).
2. Poor soil drainage is found in one planter on the Eastern groyne which should be urgently mitigated (Photo J).
3. More ties and stakes were detached at Western box culvert (Photo K).
4. The plants in the Eastern box culvert planters were removed without replacement (Photo L).
5. Some ties and stakes are already girdled and affected the growth of the trees and some unnecessary ties are attached to the trees (Photo M and Photo N).
6. Some of the *Angelonia angustifolia* in the planters along the Ting Kok Road were wilted and removed (Photo O).
7. *Mikania micrantha* and weeds were found in the planters on the Western groyne (Photo P).
8. The Contractor should handle the prolonged outstanding follow-up works as soon as possible.

Follow up action by contractor:

1. The Contractor was reminded to follow the observation provided in the checklist with their horticulture sub-contractor.

Reminders:

1. Girdling by the ties and stakes was observed on some of the trees. The Contractor(s) is/are required to adjust the ties and remove the unnecessary ties to avoid damage to the tree as a matter of urgency or tree replacement may be required before rejection from maintenance authority during handover.
2. The Contractor(s) is/are reminded to check the guying and staking of all retained/newly planted trees to ensure the tree supporting systems are properly installed, in order and not causing any damage to the trees.
3. The Contractor(s) is/are reminded to replant the plants at the Western groyne and the Eastern box culvert, and tackle the poor soil drainage issue on the Eastern groyne.



4. The Contractor(s) is/are reminded to remove the *Mikania micrantha* and other weeds on the Western groyne.
5. The Contractor(s) is/are reminded to replant *Angelonia angustifolia* at the planters along the Ting Kok Road following the landscape plan.
6. Urgent rectification by the Contractor(s) is required to achieve sufficient establishment for plantings



Photo Record:

Photo A.



General view (1)

Photo B.



General view (2)

Photo C.



General view (3)

Photo D.



General view (4)



Photo E.



General view (5)

Photo F.



General view (6)

Photo G.



General view (7)

Photo H.



General view (8)



Photo I.



Some of the plants in the planters on the Western groyne were wilted and removed.

Photo J.



Poor soil drainage is found in one planter on the Eastern groyne.

Photo K.



Some ties and stakes were detached at the Western box culvert.

Photo L.



No plants in the Eastern box culvert planters.



Photo M.



Some ties and stakes already girdled and affected the growth of the trees.

Photo N.



Some ties and stakes already girdled and affected the growth of the trees. Some unnecessary ties are attached to the trees.

Photo O.



Some of the *Angelonia angustifolia* in the planters along the Ting Kok Road were wilted and removed.

Photo P.



Mikania micrantha and weeds were found in the planters on the Western groyne.



Date/ Time: 30th May 2022 Weather: ~~Fine/ Overcast/ Rain/ Windy~~

Item	Mitigation Measures				Actions/ Remarks
		Yes	No	N/A	
1	Vegetation Management				
1.1	Is the irrigation sufficient?	✓			
1.2	Any physical damage observed on the plant?	✓			The plants in the Eastern box culvert planters were removed for several months without replacement.
1.3	Any potential incursion, fire, pollution, and surface erosion, etc.	✓			Some of the plants in the planters on the Western groyne were wilted for several months without replacement.
1.4	Is the soil drain well?		✓		Poor soil drainage with water logging is found in one planter for several months on the Eastern groyne.
1.5	Are the weeds controlled at an acceptable level?	✓			Undesirable species like <i>Mikania micrantha</i> and weeds were found in the planters on the Western groyne.
1.6	Are the debris controlled at an acceptable level?	✓			
1.7	Are the plants planted in right place according to the landscape plan?	✓			
1.8	Are the plantings including species, size and plants quality completed following the landscape plan?	✓			Some of <i>Angelonia angustifolia</i> in the planters along the Ting Kok Road were wilted or missing.
2	Protection of trees				
2.1	The physical protection (fencing) is in place?	✓			
2.2	Any poor health condition or dead tree observed?		✓		
2.3	Any poor practice of pruning observed?		✓		
2.4	Are the trees planted in right place according to the landscape plan?	✓			
2.5	The tree supporting system are in good condition?		✓		● Some ties and stakes were detached at the Western box culvert.



Item	Mitigation Measures				Actions/ Remarks
		Yes	No	N/A	
					<ul style="list-style-type: none"> ● Some ties and stakes already girdled and affected the growth of the trees. ● Some unnecessary ties are attached between the trees.
2.6	Any event(s) observed may properly hinder the tree growth?		✓		
3	Architectural design and treatment of all structures (where practicable), retaining walls, elevated road structures and other engineering works.				
3.1	Implementation and maintenance of mitigation measures, to ensure conformity with agreed designs?	✓			

Summary and follow up actions / Remarks:

1. Some of the plants in the planters on the Western groyne were wilted and should be removed (Photo I).
2. Poor soil drainage is found in one planter on the Eastern groyne which should be urgently mitigated (Photo J).
3. More ties and stakes were detached at Western box culvert (Photo K).
4. The plants in the Eastern box culvert planters were removed without replacement (Photo L).
5. Some ties and stakes are already girdled and affected the growth of the trees and some unnecessary ties are attached between the trees (Photo M and Photo N).
6. Some of the *Angelonia angustifolia* in the planters along the Ting Kok Road were wilted and removed (Photo O).
7. *Mikania micrantha* and weeds were found in the planters on the Western groyne (Photo P).
8. The Contractor should handle the prolonged outstanding follow-up works as soon as possible.

Follow up action by contractor:

1. The Contractor was seriously reminded to urgently follow up in accordance with the above mentioned observations/remarks provided in the checklist with their horticulture sub-contractor.

Reminders:

1. Trunk Girdling by the ties and stakes was observed on some of the trees. The Contractor(s) is/are required to adjust the ties and remove the unnecessary ties to avoid damage to the tree as a matter of urgency or tree replacement may be required before rejection from maintenance authority during handover.
2. The Contractor(s) is/are reminded to adjust or remove if necessary the guying and staking of all retained/newly planted trees to ensure the tree supporting systems are properly installed, in order



to avoid further damage of newly planted trees or the final maintenance department(s) will not accept during handover stage.

3. The Contractor(s) is/are reminded to replant the plants at the Western groyne and the Eastern box culvert, and tackle the poor soil drainage issue on the Eastern groyne.
4. The Contractor(s) is/are reminded to remove the *Mikania micrantha* and other weeds on the Western groyne.
5. The Contractor(s) is/are reminded to replant *Angelonia angustifolia* at the planters along the Ting Kok Road following the landscape plan.
6. Urgent rectification by the Contractor(s) is required to achieve sufficient establishment for plantings



Photo Record:

Photo A.



General view (1)

Photo B.



General view (2)

Photo C.



General view (3)

Photo D.



General view (4)



Photo E.



General view (5)

Photo F.



General view (6)

Photo G.



General view (7)

Photo H.



General view (8)



Photo I.



Some of the plants in the planters on the Western groyne were wilted and removed.

Photo J.



Poor soil drainage and serious water logging is found in one planter on the Eastern groyne.

Photo K.



Some ties and stakes were detached at the Western box culvert.

Photo L.



No plants in the Eastern box culvert planters.



Photo M.



Some ties and stakes already girdled and affected the growth of the trees.

Photo N.



Some ties and stakes already girdled and affected the growth of the trees. Some unnecessary ties are attached between the trees.

Photo O.



Some of the *Angelonia angustifolia* in the planters along the Ting Kok Road were wilted and removed.

Photo P.



Mikania micrantha and weeds were found in the planters on the Western groyne.



Date/ Time: 9th June 2022 Weather: ~~Fine~~/~~Overcast~~/~~Rain~~/~~Windy~~

Item	Mitigation Measures				Actions/ Remarks
		Yes	No	N/A	
1	Vegetation Management				
1.1	Is the irrigation sufficient?	✓			
1.2	Any physical damage observed on the plant?	✓			The plants in the Eastern box culvert planters were removed for several months without replacement.
1.3	Any potential incursion, fire, pollution, and surface erosion, etc.	✓			Some of the plants in the planters on the Western groyne were wilted for several months without replacement.
1.4	Is the soil drain well?		✓		Poor soil drainage with water logging is found in one planter for several months on the Eastern groyne.
1.5	Are the weeds controlled at an acceptable level?	✓			Undesirable species like <i>Mikania micrantha</i> and weeds were found in the planters on the Western groyne.
1.6	Are the debris controlled at an acceptable level?	✓			
1.7	Are the plants planted in right place according to the landscape plan?	✓			
1.8	Are the plantings including species, size and plants quality completed following the landscape plan?	✓			Some of <i>Angelonia angustifolia</i> in the planters along the Ting Kok Road were wilted or missing.
2	Protection of trees				
2.1	The physical protection (fencing) is in place?	✓			
2.2	Any poor health condition or dead tree observed?		✓		
2.3	Any poor practice of pruning observed?		✓		
2.4	Are the trees planted in right place according to the landscape plan?	✓			
2.5	The tree supporting system are in good condition?		✓		● Some ties and stakes were detached at the Western box culvert.



Item	Mitigation Measures				Actions/ Remarks
		Yes	No	N/A	
					<ul style="list-style-type: none"> ● Some ties and stakes already girdled and affected the growth of the trees. ● Some unnecessary ties are attached between the trees.
2.6	Any event(s) observed may properly hinder the tree growth?		✓		
3	Architectural design and treatment of all structures (where practicable), retaining walls, elevated road structures and other engineering works.				
3.1	Implementation and maintenance of mitigation measures, to ensure conformity with agreed designs?	✓			

Summary and follow up actions / Remarks:

1. Some of the plants in the planters on the Western groyne were wilted and should be removed (Photo I).
2. Poor soil drainage with water logging is found in one planter on the Eastern groyne which should be urgently mitigated (Photo J).
3. More ties and stakes were detached at Western box culvert (Photo K).
4. The plants in the Eastern box culvert planters were removed without replacement (Photo L).
5. Some ties and stakes are already girdled and affected the growth of the trees and some unnecessary ties are attached between the trees (Photo M and Photo N).
6. Some of *Angelonia angustifolia* in the planters along the Ting Kok Road were wilted and removed (Photo O).
7. Undesirable species like *Mikania micrantha* and weeds were found in the planters on the Western groyne (Photo P).
8. The Contractor should handle the prolonged outstanding follow-up works as soon as possible.

Follow up action by contractor:

1. The Contractor was seriously reminded to urgently follow up in accordance with the above mentioned observations/remarks provided in the checklist with their horticulture sub-contractor.

Reminders:

1. Trunk Girdling by the ties and stakes was observed on some of the trees. The Contractor(s) is/are required to adjust the ties and remove the unnecessary ties to avoid damage to the tree as a matter of urgency or tree replacement may be required before rejection from maintenance authority during handover.
2. The Contractor(s) is/are reminded to adjust or remove if necessary the guying and staking of all retained/newly planted trees to ensure the tree supporting systems are properly installed, in order



- to avoid further damage of newly planted trees or the final maintenance department(s) will not accept during handover stage.
3. The Contractor(s) is/are reminded to replant the plants at the Western groyne and the Eastern box culvert, and tackle the poor soil drainage issue on the Eastern groyne.
 4. The Contractor(s) is/are reminded to remove the *Mikania micrantha* and other weeds on the Western groyne.
 5. The Contractor(s) is/are reminded to replant *Angelonia angustifolia* at the planters along the Ting Kok Road following the landscape plan.
 6. Urgent rectification by the Contractor(s) is required to achieve sufficient establishment for plantings



Photo Record:

Photo A.



General view (1)

Photo B.



General view (2)

Photo C.



General view (3)

Photo D.



General view (4)



Photo E.



General view (5)

Photo F.



General view (6)

Photo G.



General view (7)

Photo H.



General view (8)



Photo I.



Some of the plants in the planters on the Western groyne were wilted and removed.

Photo J.



Poor soil drainage with water logging is found in one planter on the Eastern groyne.

Photo K.



Some ties and stakes were detached at the Western box culvert.

Photo L.



No plants in the Eastern box culvert planters.



Photo M.



Some ties and stakes already girdled and affected the growth of the trees.

Photo N.



Some ties and stakes already girdled and affected the growth of the trees. Some unnecessary ties are attached between the trees.

Photo O.



Some of the *Angelonia angustifolia* in the planters along the Ting Kok Road were wilted and removed.

Photo P.



Mikania micrantha and weeds were found in the planters on the Western groyne.



Date/ Time: 25th June 2022 Weather: Fine/ Overcast/ Rain/ Windy

Item	Mitigation Measures				Actions/ Remarks
		Yes	No	N/A	
1	Vegetation Management				
1.1	Is the irrigation sufficient?	✓			
1.2	Any physical damage observed on the plant?	✓			The plants in the Eastern box culvert planters were removed for several months without replacement.
1.3	Any potential incursion, fire, pollution, and surface erosion, etc.	✓			Some of the plants in the planters on the Western groyne were wilted for several months without replacement.
1.4	Is the soil drain well?		✓		Poor soil drainage with water logging is found in one planter for several months on the Eastern groyne.
1.5	Are the weeds controlled at an acceptable level?	✓			Undesirable species like <i>Mikania micrantha</i> and weeds were found in the planters on the Western groyne.
1.6	Are the debris controlled at an acceptable level?	✓			
1.7	Are the plants planted in right place according to the landscape plan?	✓			
1.8	Are the plantings including species, size and plants quality completed following the landscape plan?	✓			Some of <i>Angelonia angustifolia</i> in the planters along the Ting Kok Road were wilted or missing.
2	Protection of trees				
2.1	The physical protection (fencing) is in place?	✓			
2.2	Any poor health condition or dead tree observed?		✓		
2.3	Any poor practice of pruning observed?		✓		
2.4	Are the trees planted in right place according to the landscape plan?	✓			
2.5	The tree supporting system are in good condition?		✓		● Some ties and stakes were detached at the Western box culvert.



Item	Mitigation Measures				Actions/ Remarks
		Yes	No	N/A	
					<ul style="list-style-type: none"> ● Some ties and stakes already girdled and affected the growth of the trees. ● Some unnecessary ties are attached between the trees.
2.6	Any event(s) observed may properly hinder the tree growth?		✓		
3	Architectural design and treatment of all structures (where practicable), retaining walls, elevated road structures and other engineering works.				
3.1	Implementation and maintenance of mitigation measures, to ensure conformity with agreed designs?	✓			

Summary and follow up actions / Remarks:

1. Some of the plants in the planters on the Western groyne were wilted and should be removed (Photo I).
2. Poor soil drainage is found in one planter on the Eastern groyne which should be urgently mitigated (Photo J).
3. More ties and stakes were detached at Western box culvert (Photo K).
4. The plants in the Eastern box culvert planters were removed without replacement (Photo L).
5. Some ties and stakes are already girdled and affected the growth of the trees and some unnecessary ties are attached between the trees (Photo M and Photo N).
6. Some of *Angelonia angustifolia* in the planters along the Ting Kok Road were wilted and removed (Photo O).
7. Undesirable species like *Mikania micrantha* and weeds were found in the planters on the Western groyne (Photo P).
8. The Contractor should handle the prolonged outstanding follow-up works as soon as possible.

Follow up action by contractor:

1. The Contractor was seriously reminded to urgently follow up in accordance with the above mentioned observations/remarks provided in the checklist with their horticulture sub-contractor.

Reminders:

1. Trunk Girdling by the ties and stakes was observed on some of the trees. The Contractor(s) is/are required to adjust the ties and remove the unnecessary ties to avoid damage to the tree as a matter of urgency or tree replacement may be required before rejection from maintenance authority during handover.
2. The Contractor(s) is/are reminded to adjust or remove if necessary the guying and staking of all retained/newly planted trees to ensure the tree supporting systems are properly installed, in order



- to avoid further damage of newly planted trees or the final maintenance department(s) will not accept during handover stage.
3. The Contractor(s) is/are reminded to replant the plants at the Western groyne and the Eastern box culvert, and tackle the poor soil drainage issue on the Eastern groyne.
 4. The Contractor(s) is/are reminded to remove the *Mikania micrantha* and other weeds on the Western groyne.
 5. The Contractor(s) is/are reminded to replant *Angelonia angustifolia* at the planters along the Ting Kok Road following the landscape plan.
 6. Urgent rectification by the Contractor(s) is required to achieve sufficient establishment for plantings



Photo Record:

Photo A.



General view (1)

Photo B.



General view (2)

Photo C.



General view (3)

Photo D.



General view (4)



Photo E.



General view (5)

Photo F.



General view (6)

Photo G.



General view (7)

Photo H.



General view (8)



Photo I.



Some of the plants in the planters on the Western groyne were wilted and removed.

Photo J.



Poor soil drainage with water logging is found in one planter on the Eastern groyne.

Photo K.



Some ties and stakes were detached at the Western box culvert.

Photo L.



No plants in the Eastern box culvert planters.



Photo M.



Some ties and stakes already girdled and affected the growth of the trees.

Photo N.



Some ties and stakes already girdled and affected the growth of the trees. Some unnecessary ties are attached between the trees.

Photo O.



Some of the *Angelonia angustifolia* in the planters along the Ting Kok Road were wilted and removed.

Photo P.



Mikania micrantha and weeds were found in the planters on the Western groyne.



Signature:

		Signature	Date
Audited by	Registered Landscape Architect		30/6/2022
Checked by	Environmental Team Leader		
	Independent Environmental Checker		

Appendix D

Detailed Post-planting Monitoring Reports of Mangrove Seedling Planting

**INSPECTION REPORT
FOR POST-PLANTING MONITORING OF
THE MANGROVE SEEDLING PLANTING AT
BATHING BEACH AT LUNG MEI**

30TH MAY 2022





Contents

1	Introduction	2
2	The site and Mangrove Seedlings Location	2
3	Mangrove Seedlings Description	4
4	Summary and Remedial actions	8
5	Appendix A – Location of the planting sites	9



1 Introduction

Saraca Urban Forest (SUF) has been appointed to carry out the post-planting monitoring of the mangrove seedling planting at Bathing Beach at Lung Mei, Tai Po. The mangrove seedlings were inspected by Desmond Tang on 30th May 2022 on the ground during low tide.

The objectives of the report are:

- 1) To evaluation of the current condition, the performance and health conditions of the planted mangrove seedlings; and
- 2) To recommend the remedial actions.

2 The site and Mangrove Seedlings Location

The mangrove seedlings are in 3 planting locations, that are at Portion B near Western Open Channel and Western Groyne and near Eastern Groyne at the tidal zone of 1.2 to 1.6 mPD (Appendix A)



Photo 2.1 General view of the mangrove in location 1



Photo 2.2 General view of the mangrove in location 2



Photo 2.3 General view of the mangrove in location 3



3 Mangrove Seedlings Description

All the seedlings in all 3 locations were inspected. The condition of all the seedlings was comparable to the previous inspection. In general, no *Mikania micrantha* and observable pollution in the 3 plantings locations and nearby environment. Only a few seedlings have the sign of pest but which is insignificant to the health of the seedlings. According to the Mangrove Seedling Proposal, the total number of seedlings was 382. However, only 342 seedlings could be found during the initial post-planting monitoring. The total number of seedlings was gradually decreasing for location 1 and 2. Those seedlings were dead, decayed and washed away by the tidal wave between the period of planting and the initial post-planting monitoring.

For location 1, only around 20% of the seedlings were found alive and only the seedlings on the most landward side have leaves (Photo 3.1). The poor health seedlings (no leaves but still alive) are gradually declining and most of the seedlings were dead or washed away.

For location 2, A large amount of the seedlings were dead (Photo 3.2) and washed away, some of them remain very short dead stem and other disappeared. It is suspected that the dead seedling is dried out, decayed and washed away by the tidal wave. Only the seedlings on the most landward side have leaves (Photo 3.3) and several poor health seedlings (no leaves but still alive) are also gradually declining.

For location 3, most of the seedlings have normal foliage density and are in good condition (Photo 3.4). A small portion of the seedlings at the seaward side was in poor condition (no leaves but still alive) and dead (Photo 3.5).



General information about the seedlings at the 3 locations is summarized in the table below: (Figures in the table are the actual seedlings number on site, as some of the dead and decayed seedlings were expected to be washed away by the tidal wave, it will be listed as “Suspected decayed and washed away”)

	Location 1	Location 2	Location 3	Total
<i>Aegiceras Corniculatum</i>	13	14	37	64
<i>Avicennia Marina</i>	4	0	35	39
<i>Kandellia Obovata</i>	5	0	30	35
Live (unidentifiable as no leaves)	0	0	2	2
Dead	20	6	6	32
Total	42	20	110	172
Suspected decayed and washed away				382-172=210

Mortality Rate = 63%



Photo 3.1 The seedling on the most landward side has leaves and is in good condition



Photo 3.2 large amount of the seedlings were dead and in poor condition, some of them with very short dead stem remain



Photo 3.3 The seedling on the most landward side has leaves and is in good condition



Photo 3.4 Seedling with good condition



Photo 3.5 Dead and poor condition seedlings at the seaward side



4 Summary and Remedial actions

Based on the observation from Sep 2021 to May 2022, only the seedlings at the landward side thrive. The seedlings at the seaward side showed poor health and death even at location 3, which the general condition of the seedling is the best among those 3 locations. Those poor health seedlings with no sign to re-sprout and are expected to decline and be washed away by the tidal over time, which could be concluded in the recent inspections.

Since the mangrove distribution and survival is primarily determined by sea level and its fluctuations, other secondary factors are air temperature, salinity, ocean currents, storms, shore slope, and soil substrate also affect the establishment rate. Both *Aegiceras corniculatum* and *Avicennia marina* are mostly at the outer fringe (seaward) among other mangroves and *Avicennia marina* is also a pioneer species, however, even those species fail to establish at location 1 and location 2. From our observation, it is suspected that the condition of location 1 and location 2, especially the seaward side is not optimal for the seedlings to establish and grow. It is highly recommended that the contractor should replant the seedlings and the planting locations should be further landward side or other locations (like next to location 3 (Photo 3.6) which the current condition of the seedlings is good) to improve the survival rate.



Photo 3.6 The area next to location 3



5 Appendix A – Location of the planting sites



Map 5.1 Location 1 and 2 (near Western Open Channel and Western Groyne)



Map 5.2 Location 3 (Near Eastern Groyne)

**INSPECTION REPORT
FOR POST-PLANTING MONITORING OF
THE MANGROVE SEEDLING PLANTING AT
BATHING BEACH AT LUNG MEI**

25TH JUN 2022





Contents

1	Introduction	2
2	The site and Mangrove Seedlings Location	2
3	Mangrove Seedlings Description	4
4	Summary and Remedial actions	9
5	Appendix A – Location of the planting sites	10



1 Introduction

Saraca Urban Forest (SUF) has been appointed to carry out the post-planting monitoring of the mangrove seedling planting at Bathing Beach at Lung Mei, Tai Po. The mangrove seedlings were inspected by Desmond Tang on 25th Jun 2022 on the ground during low tide.

The objectives of the report are:

- 1) To evaluation of the current condition, the performance and health conditions of the planted mangrove seedlings; and
- 2) To recommend the remedial actions.

2 The site and Mangrove Seedlings Location

The mangrove seedlings are in 3 planting locations, that are at Portion B near Western Open Channel and Western Groyne and near Eastern Groyne at the tidal zone of 1.2 to 1.6 mPD (Appendix A)



Photo 2.1 General view of the mangrove in location 1



Photo 2.2 General view of the mangrove in location 2



Photo 2.3 General view of the mangrove in location 3



3 Mangrove Seedlings Description

All the seedlings in all 3 locations were inspected. The condition of all the seedlings was comparable to the previous inspection. In general, no *Mikania micrantha* and observable pollution in the 3 plantings locations and nearby environment. Only a few seedlings have the sign of pest but which is insignificant to the health of the seedlings. According to the Mangrove Seedling Proposal, the total number of seedlings was 382. However, only 342 seedlings could be found during the initial post-planting monitoring. The total number of seedlings was gradually decreasing for locations 1 and 2. Those seedlings were dead, decayed and washed away by the tidal wave between the period of planting and the initial post-planting monitoring.

For location 1, only around 20% of the seedlings were found alive and only the seedlings on the most landward side have leaves (Photo 3.1). The poor health seedlings (no leaves but still alive) are gradually declining and most of the seedlings were dead or washed away.

For location 2, A large amount of the seedlings were dead (Photo 3.2) and washed away, some of them remain with very short dead stems and others disappeared. It is suspected that the dead seedling is dried out, decayed and washed away by the tidal wave. Only the seedlings on the most landward side have leaves (Photo 3.3) and several poor health seedlings (no leaves but still alive) are also gradually declining.

For location 3, most of the seedlings have normal foliage density and are in good condition (Photo 3.4). A small portion of the seedlings at the seaward side was in poor condition (no leaves but still alive) and dead (Photo 3.5). Pest infestation is observed in all 3 species (approximate 15 seedlings) (Photo 3.6 and Photo 3.7).



General information about the seedlings at the 3 locations is summarized in the table below: (Figures in the table are the actual seedlings number on site, as some of the dead and decayed seedlings were expected to be washed away by the tidal wave, it will be listed as “Suspected decayed and washed away”)

	Location 1	Location 2	Location 3	Total
<i>Aegiceras Corniculatum</i>	13	14	37	64
<i>Avicennia Marina</i>	4	0	34	38
<i>Kandellia Obovata</i>	4	0	30	34
Live (unidentifiable as no leaves)	0	0	3	3
Dead	17	4	6	27
Total	38	18	110	166
Suspected decayed and washed away				382-166=216

Mortality Rate = 64%



Photo 3.1 The seedling on the most landward side has leaves and is in good condition

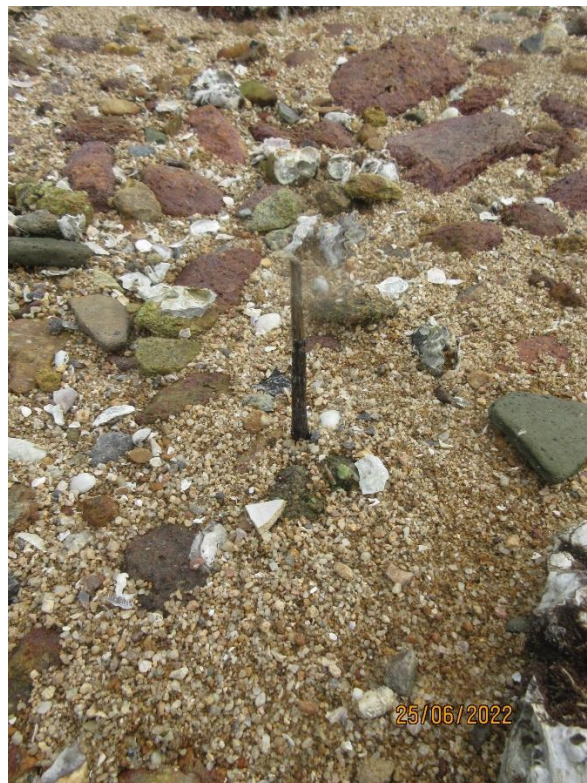


Photo 3.2 large amount of the seedlings were dead and in poor condition, some of them with very short dead stems remain

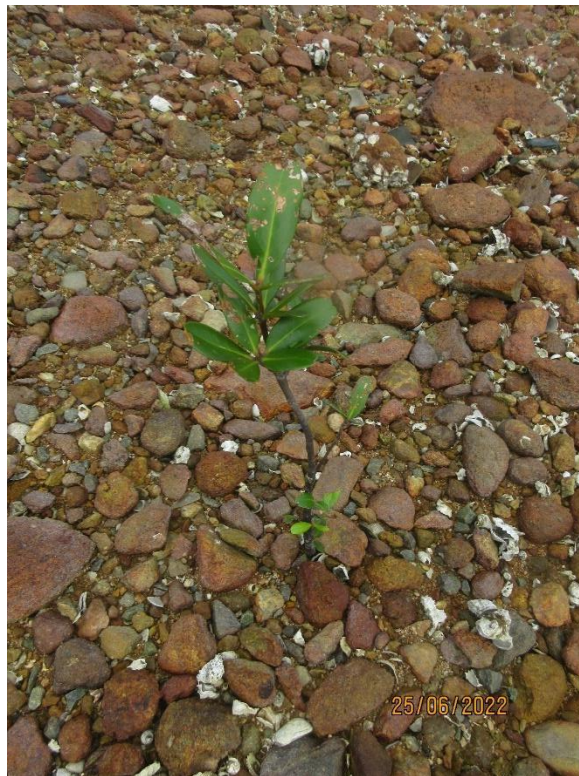


Photo 3.3 The seedling on the most landward side has leaves



Photo 3.4 Seedling in good condition



Photo 3.5 Dead and poor condition seedlings at the seaward side



Photo 3.6 Pest infestation



Photo 3.7 Pest infestation



4 Summary and Remedial actions

Based on the observation from Sep 2021 to Jun 2022, only the seedlings on the landward side thrive. The seedlings on the seaward side showed poor health and death even at location 3, which the general condition of the seedling is the best among those 3 locations. Those poor health seedlings with no sign of re-sprout and expected to decline and be washed away by the tidal over time, which could be concluded in the recent inspections.

Since the mangrove distribution and survival are primarily determined by sea level and its fluctuations, other secondary factors are air temperature, salinity, ocean currents, storms, shore slope, and soil substrate also affect the establishment rate. Both *Aegiceras corniculatum* and *Avicennia marina* are mostly at the outer fringe (seaward) among other mangroves and *Avicennia marina* is also a pioneer species, however, even those species fail to establish at location 1 and location 2. From our observation, it is suspected that the condition of location 1 and location 2, especially the seaward side is not optimal for the seedlings to establish and grow. It is highly recommended that the contractor should replant the seedlings and the planting locations should be further landward side or in other locations (like next to location 3 (Photo 3.6) where the current condition of the seedlings is good) to improve the survival rate.



Photo 3.6 The area next to location 3



5 Appendix A – Location of the planting sites



Map 5.1 Location 1 and 2 (near Western Open Channel and Western Groyne)



Map 5.2 Location 3 (Near Eastern Groyne)

Appendix E

Location of Mangrove Seedling Replanting

