

# Expansion of Hong Kong International Airport into a Three-Runway System

**9<sup>th</sup> Professional Liaison Group Meeting**

**19 December 2019**

Airport Authority Hong Kong

# Agenda

1. Latest Progress of the 3RS Project
2. EM&A Updates
3. Coral Translocation & Transplantation
4. Marine Ecology and Fisheries Enhancement Strategy
5. 3RS Marine Park Designation



# Latest Progress of the 3RS Project



# 3RS Work Progress

Activity	Status
Deep Cement Mixing (DCM) works	Substantially completed
Reclamation works	In progress
Terminal 2 expansion works and foundation and substructure works	In progress
Automated People Mover (APM) depot	Substantially completed
Design and build contracts of new APM and the new high-speed baggage handling system	In progress
Third runway and associated works	In progress





# Work Progress – Reclamation (1)

## Sloping Seawall

Feb 2019



## Vertical Seawall

Nov 2019



## DCM Works

Nov 2019



## Reclamation Filling

Nov 2019





# Work Progress – Reclamation (2)

10 Nov 2019





# Work Progress – Reclamation (3)

10 Nov 2019





# Work Progress – Reclamation (4)

10 Nov 2019





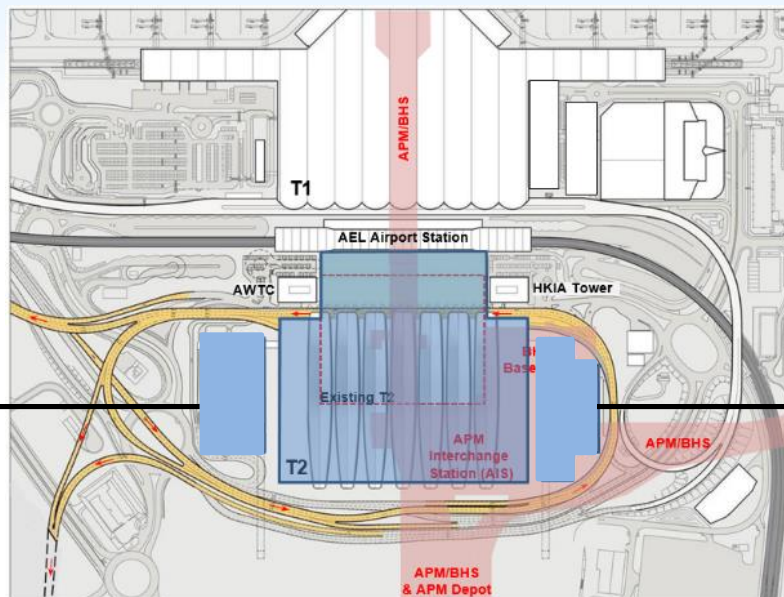
# Work Progress – APM Depot

17 Sep 2019





# Work Progress – Terminal 2 Expansion



South Annex Building

BHS / AIS Basement





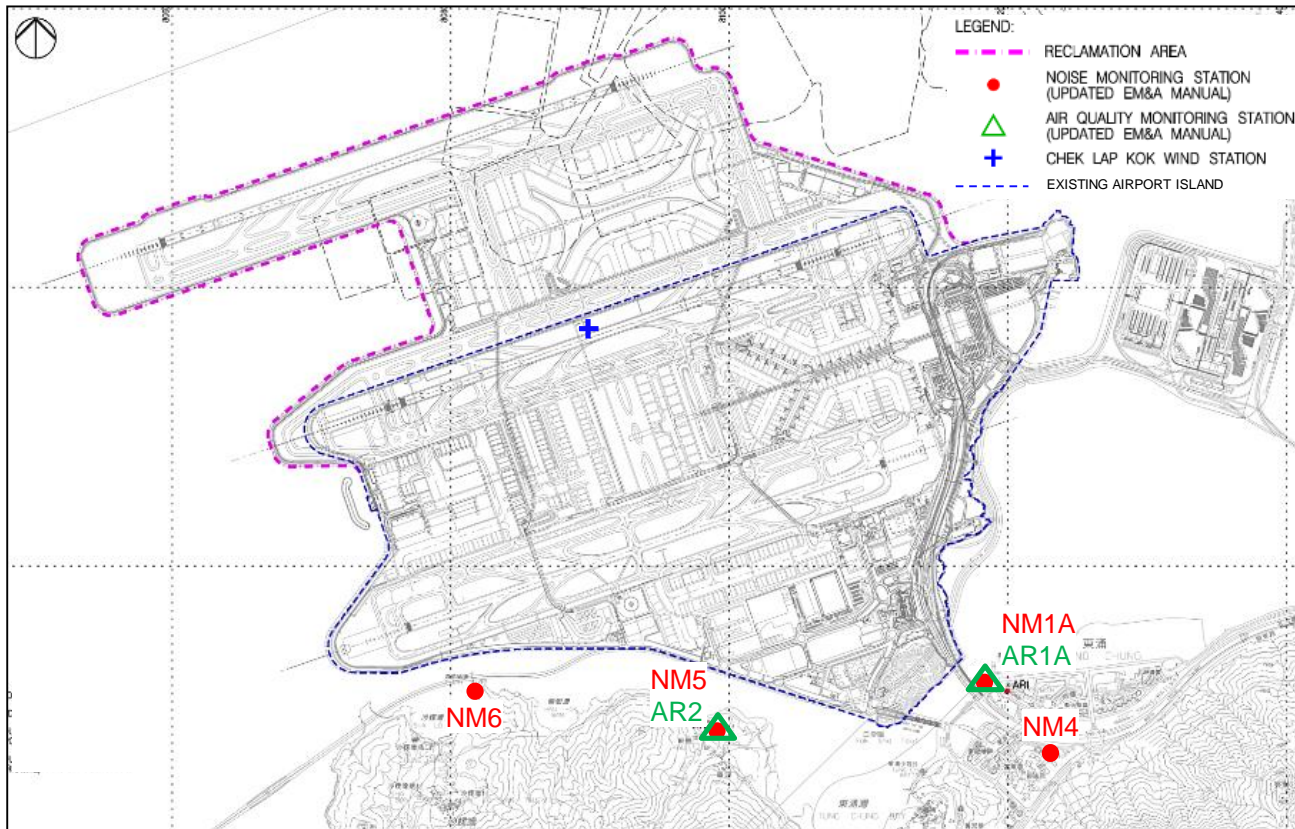
# EM&A Updates



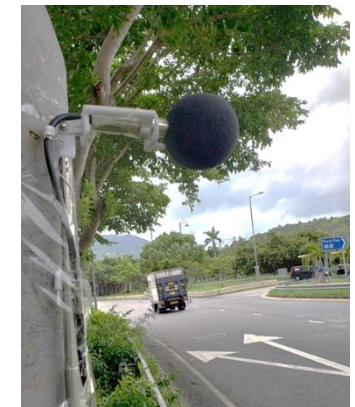
# EM&A Monitoring Status (Jun – Nov 2019) (1)

## Air Quality (2 stations) & Noise Monitoring (4 stations)

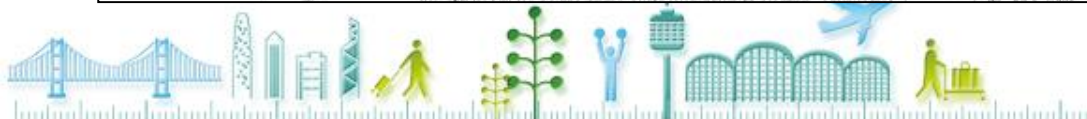
- 192 air quality and 104 noise monitoring events
- No exceedance of project-related Action/ Limit Levels was recorded



Air quality monitoring equipment (AR2)



Noise monitoring equipment (NM1A)

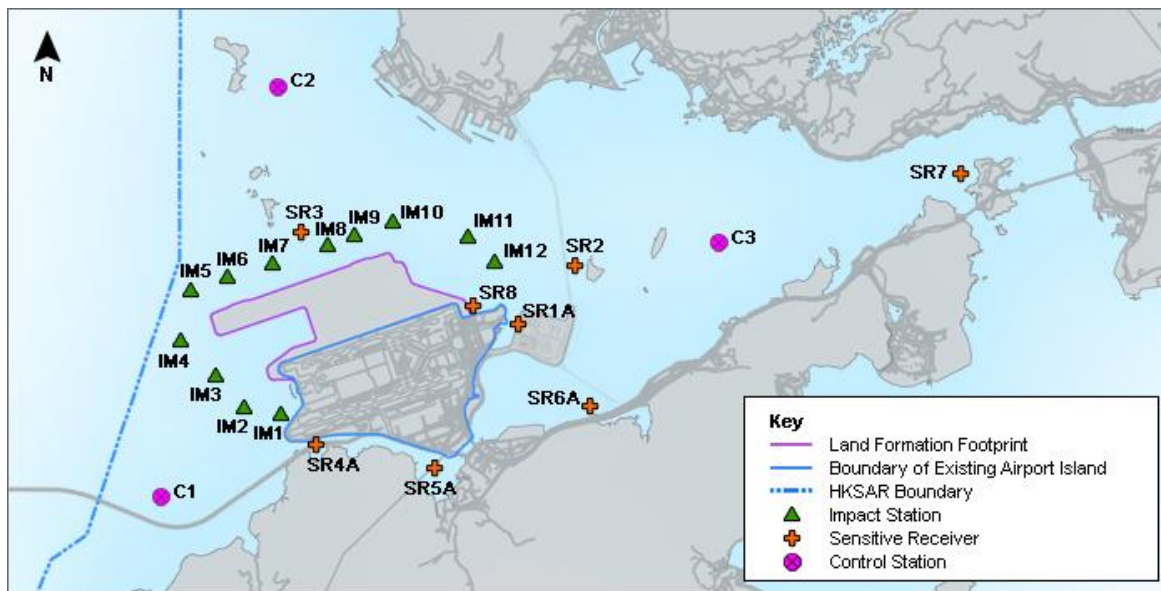




# EM&A Monitoring Status (Jun – Nov 2019) (2)

## General Impact & Regular DCM Water Quality Monitoring (23 stations)

- 12 impact stations, 8 sensitive receiver stations and 3 control stations
- 78 monitoring events
- No exceedance of project-related Action/ Limit Levels was recorded
- SR6 was slightly shifted since August 2019 due to Tung Chung New Town Extension construction activities (SR6A)



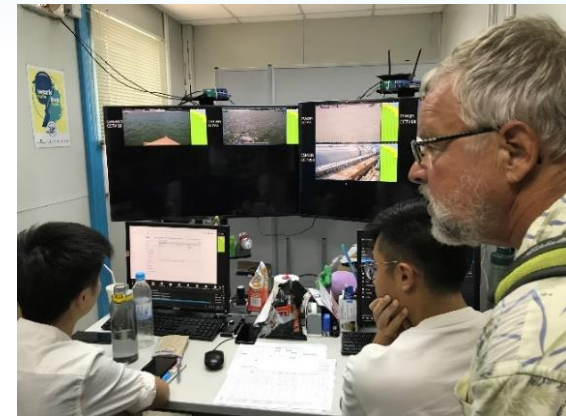
*Water quality monitoring & sampling*



# EM&A Implementation (Jun – Nov 2019) (1)

## Dolphin Exclusion Zone (DEZ)

- 3-14 dolphin observation stations were deployed by contractors for continuous monitoring of the DEZs
- No Chinese White Dolphin (CWD) was sighted within DEZs in the reporting period
- Dolphin Experts audited the performance of using CCTV system for DEZ monitoring



*Dolphin Experts auditing the use of CCTV system*

## Refresher Training by Dolphin Experts

- Conducted QA/QC check for CWD monitoring team



*QA/QC check by Dolphin Experts*





# EM&A Implementation (Jun – Nov 2019) (2)

## Environmental Recognition Scheme

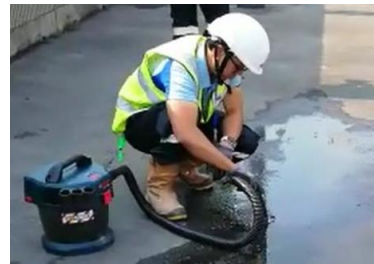
- Contractors were assessed on quarterly basis and recognised for their good site practices and innovative initiatives
- Themes put forward included air pollution control and discharge quality & control
- Since the launch of the scheme in 2018, 9 awards were presented to 8 contractors



*Dust suppression – use of automated mist sprayers & sprinklers*



*Air quality – deployment of electric vehicles*



*Discharge quality – use of special vacuum cleaners*



*Quiz & competition to enhance frontline's awareness*

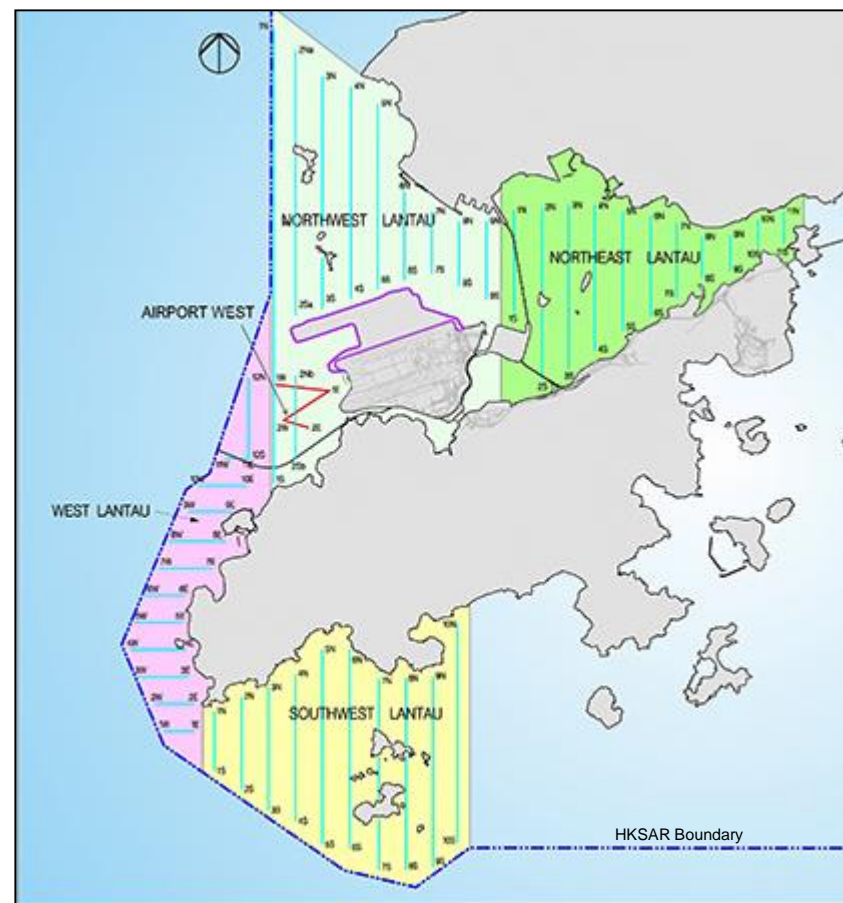
## Pay for Environment Scheme

- Initiated by AAHK in 2019 with a purpose to commend contractors' good environmental implementation practices and to enhance environmental awareness and performances
- Performance is assessed on monthly basis, with criteria including proactive participation in environmental monitoring and audit, compliance to Government's legislations and appointment of relevant specialists



# CWD Monitoring Results – Vessel Line Transect Survey (Jun – Nov 2019)

- 12 rounds of vessel line transect surveys, covering a total distance of approx 2,709 km
- 108 groups of CWDs with 403 dolphins sighted
- About 60% of CWD sightings were recorded in WL survey area, followed by SWL and NWL survey areas
- The waters off Lung Kwu Chau (LKC) remain as important habitats for CWDs in Hong Kong
- Average CWD group size was 3.6, ranging from 1 to 17 dolphins; 17 sightings were recorded with the presence of mother-and-unspotted calf or mother-and-unspotted juvenile pairs



# CWD Monitoring Results – Land-based Theodolite Tracking (Jun – Nov 2019)

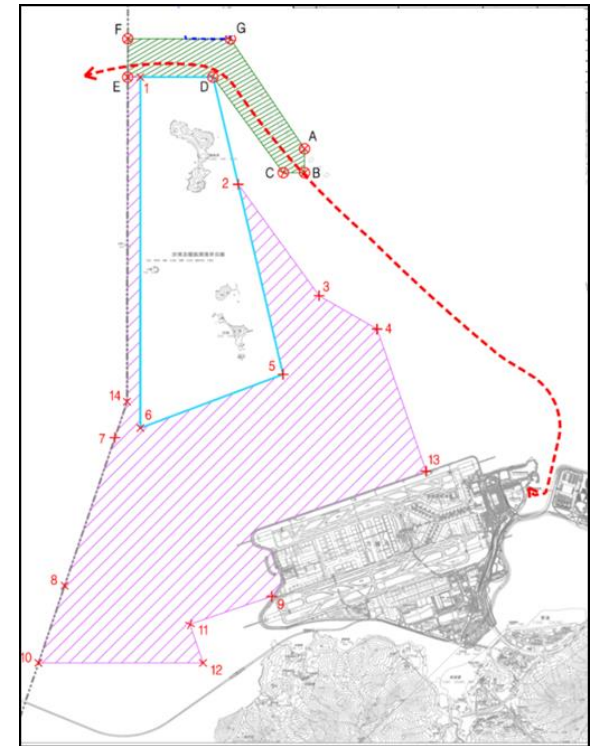
- 18 days (~108 hours of effort) Land-based Theodolite Tracking were conducted on Lung Kwu Chau (LKC) and Sha Chau (SC)
- 23 CWD groups were tracked from LKC station, ranging from 1 to 5 CWDs
- No CWD groups were tracked from SC station





# Implementation of Marine Traffic Route and Management Plan for High Speed Ferries of SkyPier (SkyPier Plan) (Jun – Nov 2019)

- Total number of diverted HSF trips\*: 3,521
- Diverted SkyPier HSF trips\* with average speed within 15 knots: 100%
- Maximum daily no. of SkyPier HSF movement: 102 (within the maximum daily cap of 125 movements)
- Daily average SkyPier HSF movements: 81 (within the maximum annual daily cap of 99 movements)
- In addition to Zhuhai and Macau routes, 15-knots speed limit at CWD hotspots in Hong Kong also applies to SkyPier north bound HSF operation from 1 July 2019



LEGEND:

 Marine Prohibited Zone for SkyPier High Speed Ferries

\* To and from Zhuhai & Macau



# Complaints and Enquiries Handling

	2015 (from 28 Dec)	2016 (Full Year)	2017 (Full Year)	2018 (Full Year)	2019 (Jan-Nov)
Complaints	0	1	7	8	1
Enquiries	0	25	16	19	18
<b>Total</b>	<b>0</b>	<b>26</b>	<b>23</b>	<b>27</b>	<b>19</b>



# Coral Translocation & Transplantation





# Coral Translocation

- Translocated 384 coral colonies (attached to boulders of <50 cm diameter) from the northern seawall of existing airport island to Yam Tsai Wan (YTW) in January 2017

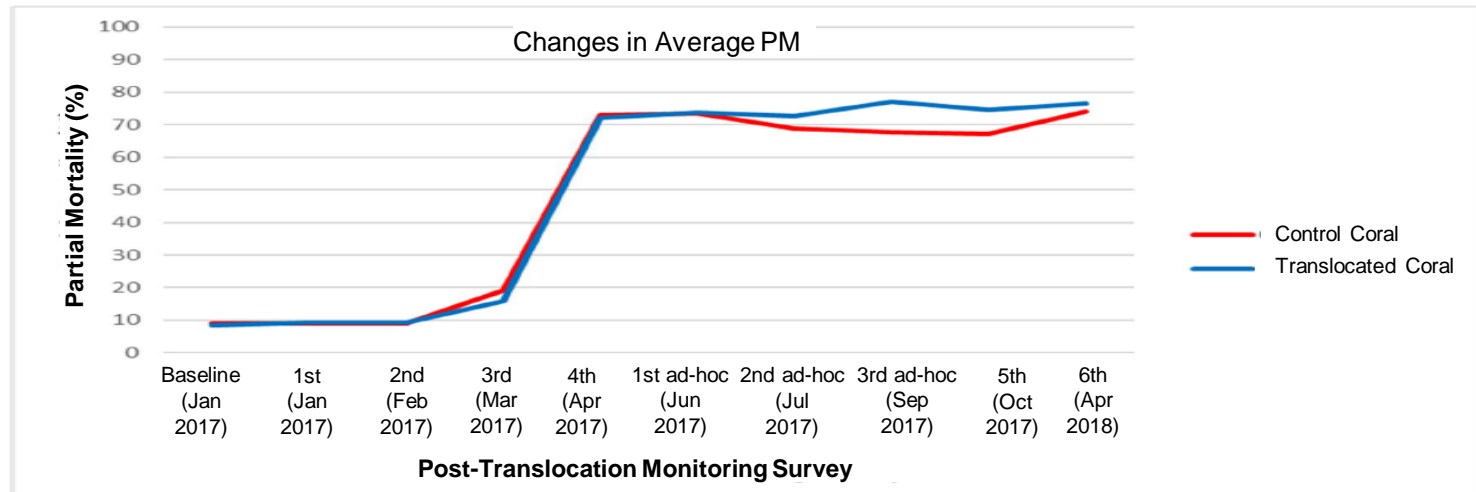


*Gorgonian coral colonies  
(Guaiaigorgia sp.)*



# Coral Translocation – Post-Monitoring

- 11 rounds of post-translocation monitoring completed from January 2017 to April 2019
  - 6 rounds of planned monitoring; 3 ad-hoc and 2 further rounds of monitoring



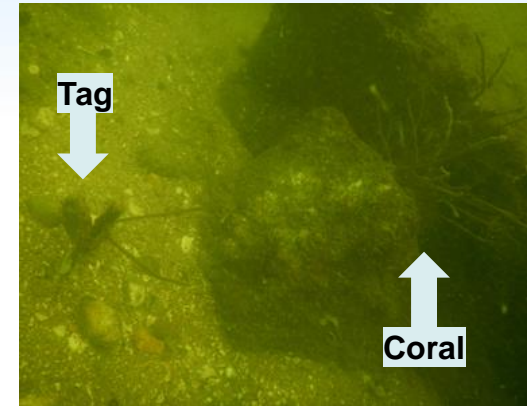
- A high partial mortality (PM) event observed in April 2017 (tagged and control corals); likely a discrete incident caused by an interplay of environmental factors
- Translocated coral conditions and PM stabilised after the event for remaining surveys
- 1<sup>st</sup> additional round (October 2018): some natural and translocated colonies were lost due to Typhoon Mangkhut
- Final additional round (April 2019): 38 of 85 tagged colonies and 11 of 20 control colonies survived (PM: 20-95% for translocated colonies; 20-90% for control colonies)



# Further Initiative – Beyond EP Requirements

## Coral Transplantation Trial Study

- Feasibility of increasing the number of coral colonies to be moved



*Translocated coral*



*Translocated corals attached to boulders of <50cm diameter*

- Suitable coral colonies had already been translocated
- Further translocation from northern seawall not feasible

- Investigated feasibility of transplanting coral colonies



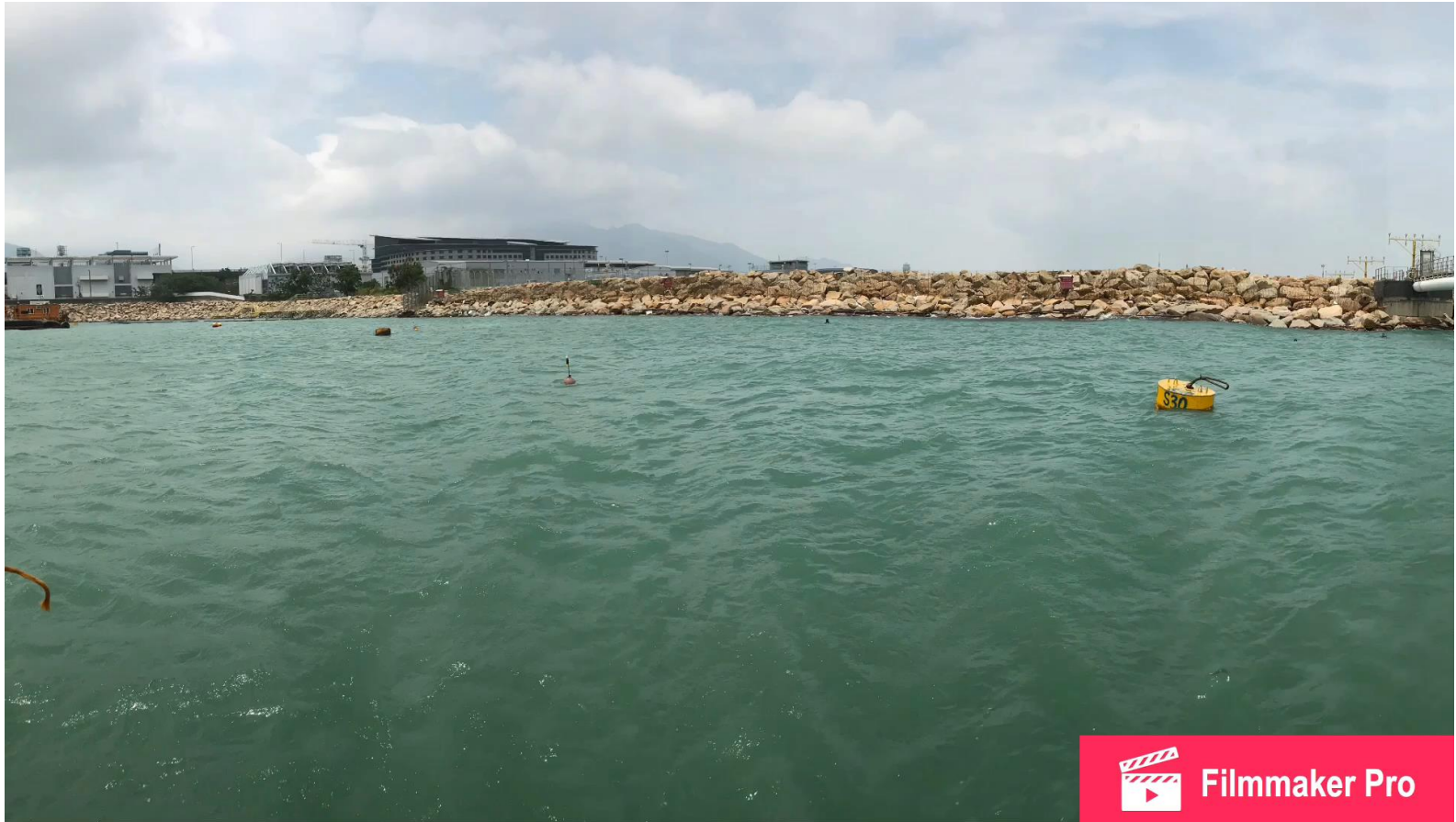


# Coral Transplantation Study – Recipient Site

- YTW again identified as suitable recipient site among six options



# Coral Transplantation Study (video)

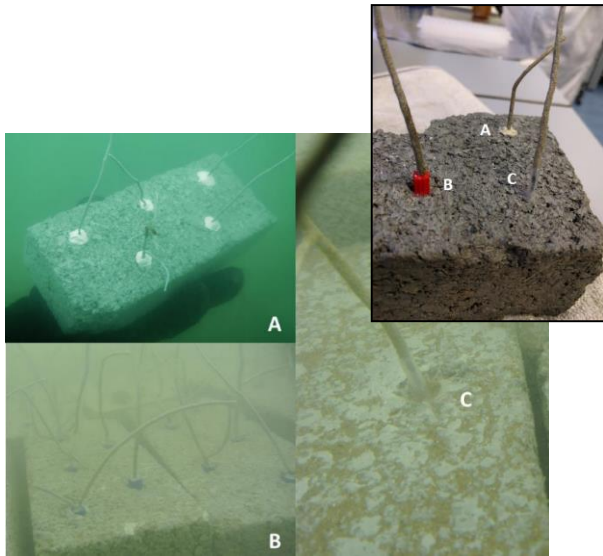


# Coral Transplantation Study

- Different methods for moving coral fragments and whole colonies identified
- Coral fragments and colonies transplanted in January 2017

## Fragments (>10cm)

- 460 transplanted,  
100 tagged and  
monitored



## Whole colonies

- 56 transplanted,  
50 tagged and monitored



## Natural Colonies

- Naturally occurring at YTW,  
50 tagged and monitored





# Coral Transplantation Study – Post-Monitoring (1)

- Post-transplantation monitoring completed from March 2017 to September 2019

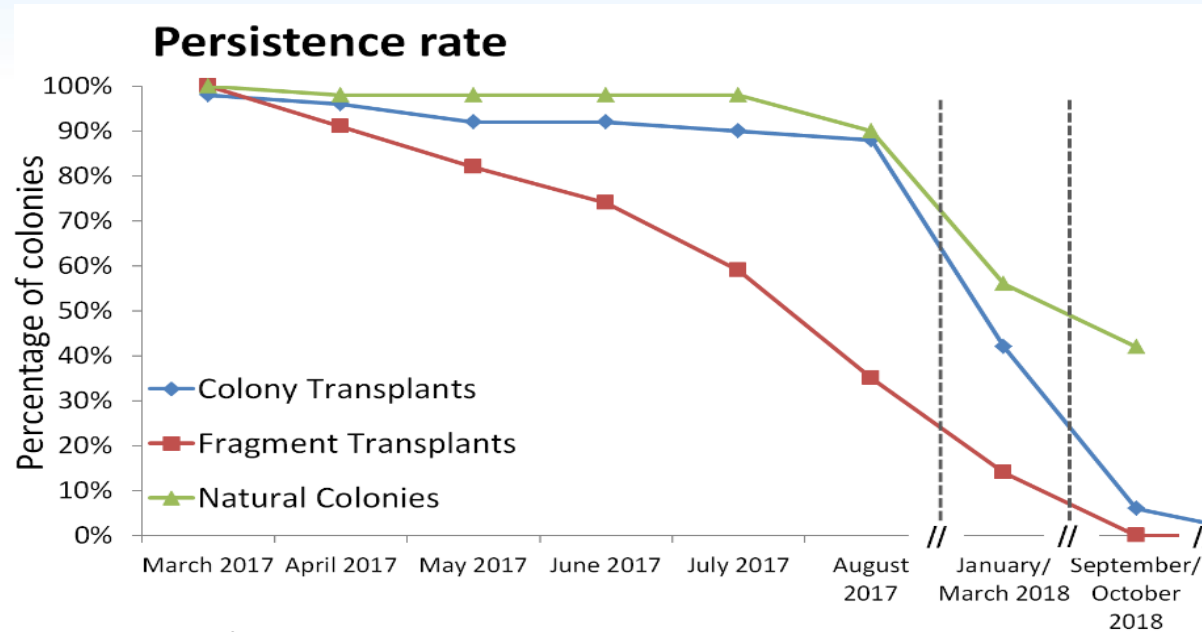
Second Annual Monitoring Summary:

	Fragments	Whole Colonies	Natural (Control) Colonies
Mortality Rate	68%	88%	48%
Detachment Rate	90%	10%	30%
Persistence Rate	0%	6%	42%
No. Surviving	0	3	21

- By October 2018, only 3 monitored whole colony transplants survived
- Both translocated and natural colony health declined, the transplant location was deemed unsuitable



# Coral Transplantation Study – Post-Monitoring (2)



- Potential reasons for complete mortality and detachment
  - Transplantation stress
  - Very hot summer / very cold winter waters
  - Sedimentation
  - Typhoons (Merbok, Hato, Mangkhut) – influx of freshwater and sediment and strong wave action
- In general, whole colony transplants survived better than fragments



# Coral Transplantation Study – Second Exercise (1)

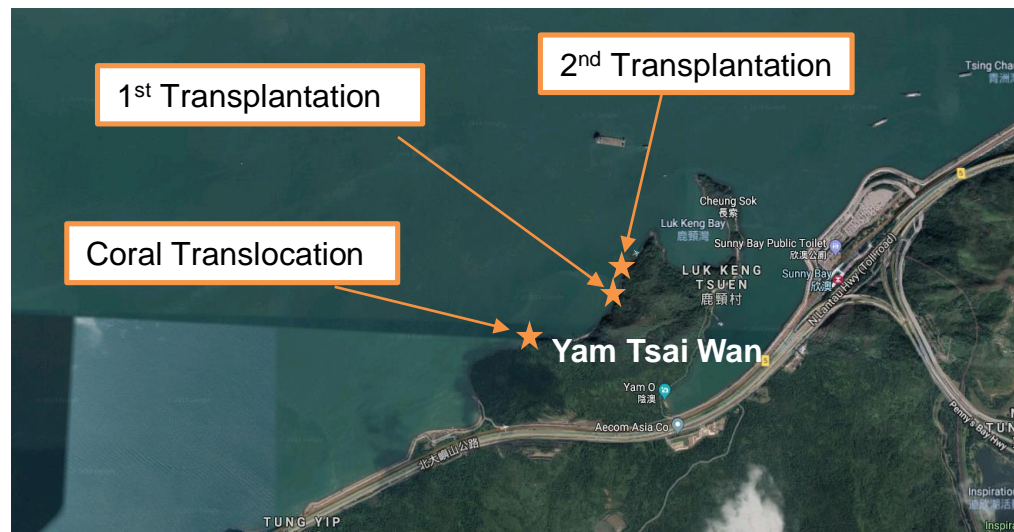
- AA initiated and conducted a second coral transplantation exercise
  - Spread the risk of the coral transplants
  - Maintain a viable nursery that supports a healthy population of corals
- More colonies were identified and moved from the northern seawall of existing airport island to YTW in May 2018





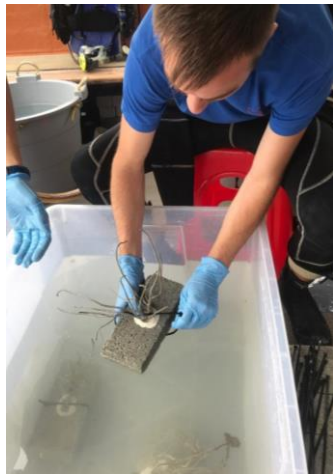
# Coral Transplantation Study – Second Exercise (2)

- Taking into account experience gained in the 1<sup>st</sup> transplantation exercise:
  - Transplanting fragments discontinued
  - YTW East identified with less sedimentation
  - Cleaning of transplanted colonies and removal of dead branches
  - Transplants located along a transect (not clustered together as in the 1<sup>st</sup> transplantation exercise)
  - Data loggers for water quality monitoring



# Coral Transplantation Study – Second Exercise (3)

- 527 colonies transplanted at YTW East in May 2018
- 100 transplanted corals and 50 naturally occurring corals as control samples tagged for monitoring
- 3 fragments and 1 colony surviving from the 1<sup>st</sup> transplantation relocated to YTW East



*Cleaning transplanted colonies*



*Transplanted colony*



*Natural colony*



*Tags*

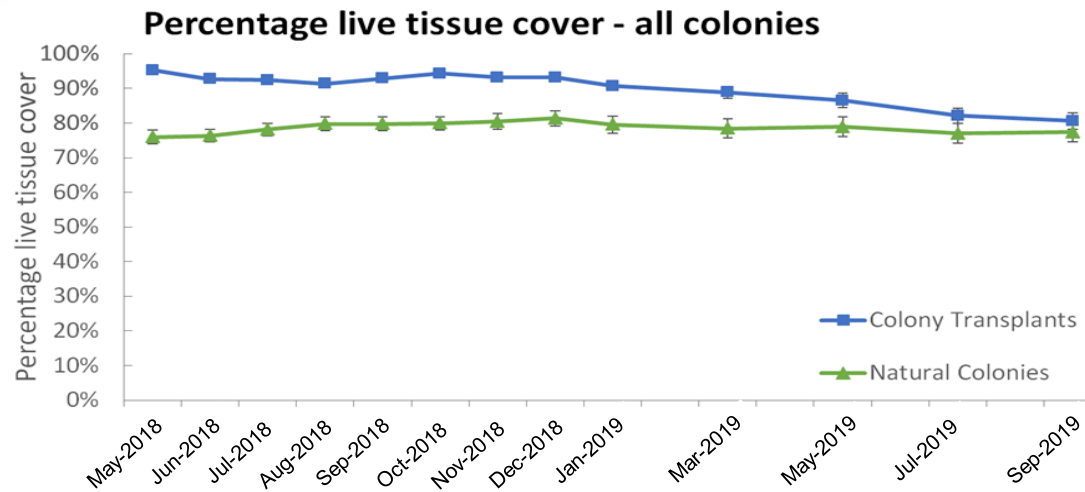


*Diver taking photos of transplants*



# Coral Transplantation Study – Second Exercise (4)

- 2<sup>nd</sup> exercise post-transplantation monitoring completed from June 2018 to September 2019



- 98 of 100 colony transplants and 47 of 50 natural colonies survived; stable and high percentage live tissue cover
- Marine fauna observed on and around the corals over the course of monitoring



Seahorse



Crab



Wispy waspfish



Ovulid snail





# Coral Transplantation Study – Summary

- 1<sup>st</sup> transplantation exercise: both transplanted and natural corals health declined; recipient site is unsuitable
- 2<sup>nd</sup> transplantation exercise:
  - Corals are spread along a transect at YTW East – a more exposed area to current, hence lower sedimentation
  - Both transplanted and natural corals are healthy – high persistence rate and high live tissue cover



# Marine Ecology and Fisheries Enhancement Strategy



# Marine Ecology Enhancement Fund (MEEF)

- About HK\$18 million has been granted to 13 projects since 2017, 4 of them are multiple-year projects

No. of Funded Projects and Total Funded Amount	Approved MEEF projects in Year 2019/20 (July 2019 – June 2020)
6 Numbers, ~HK\$6.31M	<p><b>Dolphins related projects</b></p> <ul style="list-style-type: none"><li>Conservation Ecology of Chinese White Dolphins across the Pearl River Estuary Phase 3: Connectivity, Metapopulation Structure and Source-Sink Dynamics</li><li>What Do Dolphins Do At Night?: Filling Knowledge Gaps in Night Time Range and Behaviour Activities of Chinese White Dolphins in Hong Kong</li><li>Three-dimensional forensic scene investigation of marine vessel interaction in Indo-Pacific humpbacked dolphins and Indo-Pacific finless porpoises in the Hong Kong waters</li></ul> <p><b>Other projects</b></p> <ul style="list-style-type: none"><li>Impact of microplastics on the Chinese horseshoe crab <i>Tachypleus tridentatus</i> in Hong Kong western waters (Phase II)</li><li>Value of peri-urban and small-scale mangrove forests in the Pearl River estuary as fish habitats</li><li>Habitat conservation by high resolution mapping of population connectivity: oyster reef recruitment patterns in the Pearl River Delta</li></ul>





# Fisheries Enhancement Fund (FEF)

- About HK\$11 million has been granted to 8 projects since 2017, 3 of them are multiple-year projects

## No. of Funded Projects and Total Funded Amount

## First Batch of Approved FEF projects in Year 2019/20 (July 2019 – June 2020)

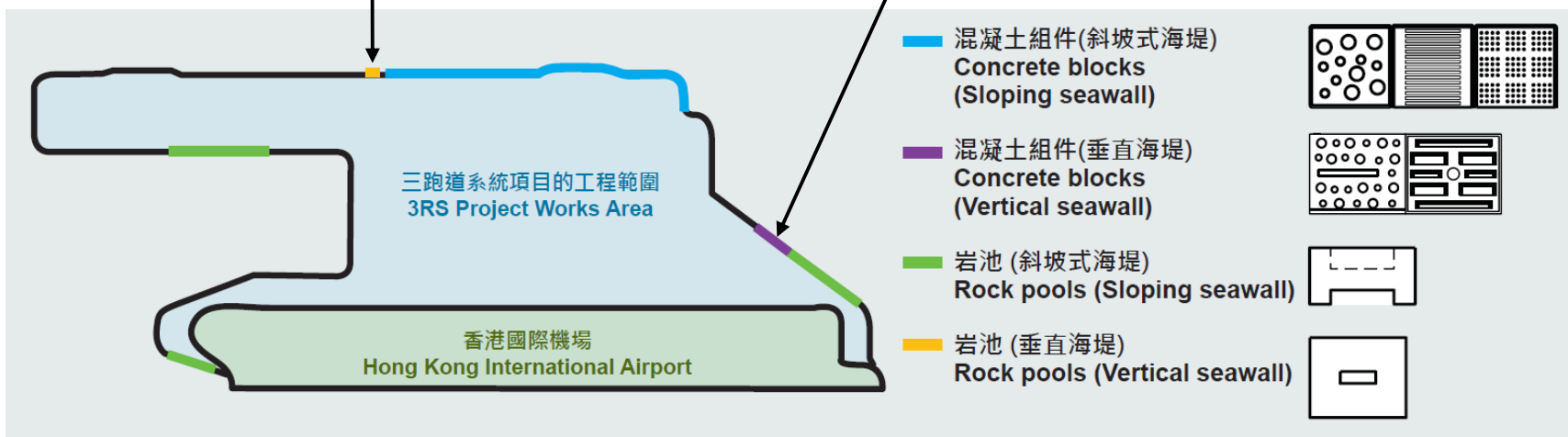
5 Numbers,  
~HK\$4.36M

- Pearl Farming Pilot Project
- Training of Fishermen for the Development of Mobile Application to Support the Sales of Local Capture Fisheries
- Study of the Cumulative Impact of Reclamation Works in Hong Kong and Adjacent Waters on the Fisheries Industry
- Sustainable Aquaculture Development Project – bivalve farming
- Sustainable Aquaculture Development Pilot Project – Australian Redclaw Crayfish



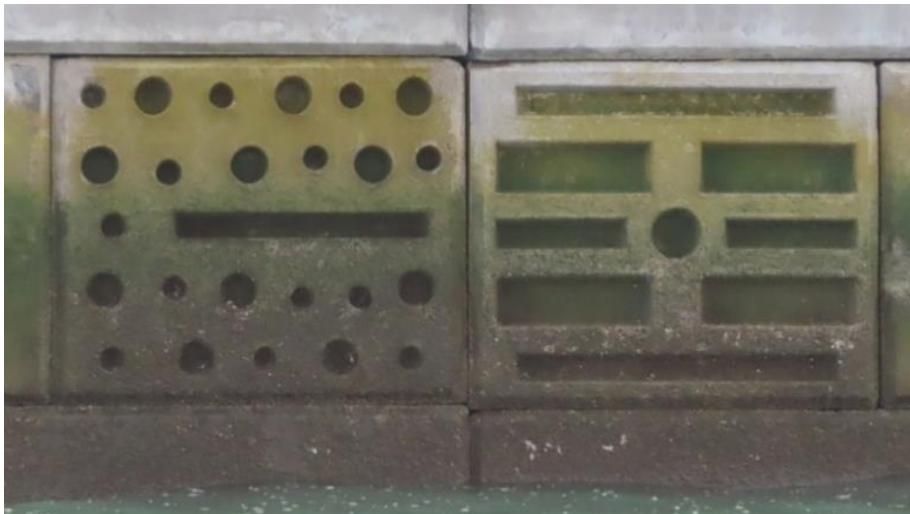
# Eco-enhancement of Seawall Design (1)

- Eco-enhanced seawalls are located at both high and low intertidal ranges to promote colonisation of intertidal and subtidal species at artificial seawalls
- 5 different types of eco-enhanced seawall blocks are proposed



# Eco-enhancement of Seawall Design (2)

- Small scale pools, grooves and pits to increase surface heterogeneity of substrata and provide habitat for intertidal organisms
- Rock pools provide refuge and shelter for intertidal and subtidal mobile organisms from current and wave actions
- Vertical seawall have rock pools designed with small openings to minimise attraction to waterbirds





# Eco-enhancement of Seawall Design (videos)



# Pilot Test on Fish Restocking



**1<sup>st</sup> Batch Fish Release**  
~7,000 fingerlings  
May 2019

- Pre-release monitoring by cage-trapping, hand-lining and BRUVS (May 2019)
- Post-release monitoring by cage-trapping and hand-lining (monthly in June – November 2019)
- Post-release monitoring by BRUVS (3 times during the first week after release; then monthly in June – November 2019)



**2<sup>nd</sup> Batch Fish Release**  
~1,300 fingerlings;  
200 with acoustic tags  
September 2019

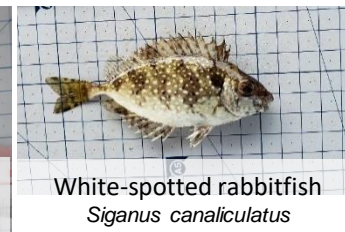
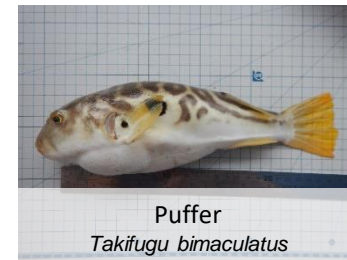
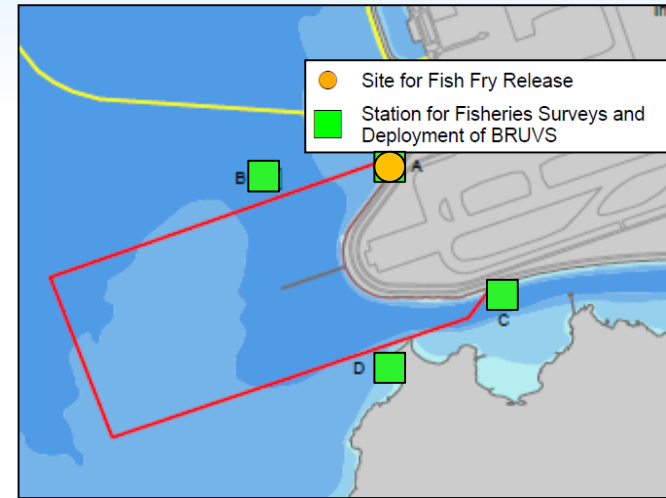
- Fish tagging before release operation (August – September 2019)
- Post-release monitoring by acoustic telemetry (3 times during the first week after release; then monthly in October 2019 – March 2020)



# Pilot Test on Fish Restocking – Post-Monitoring for 1st Batch of Release (1)

## By Cage-trapping and Hand-lining Preliminary results

- Monitoring period: June – November 2019 (monthly)
- None of the released fishes (i.e. black seabream, yellowfin seabream and green grouper) were recorded
- Very low abundance and biomass of fish (common and widespread species in western waters) were captured by cage-trapping and hand-lining



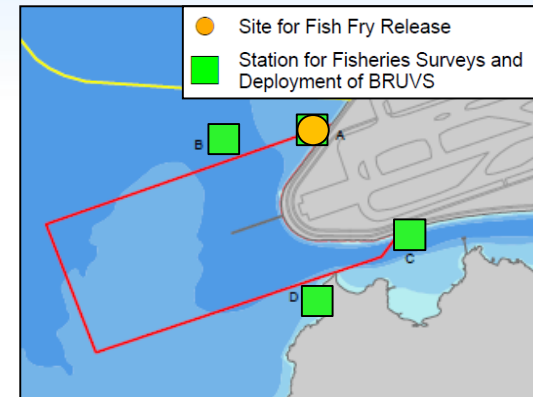


# Pilot Test on Fish Restocking – Post-Monitoring for 1st Batch of Release (2)

By BRUVS

## Preliminary results

- Monitoring period: May – November 2019 (3 times during the first week after release; then monthly interval)
- None of the released fishes (i.e. black seabream, yellowfin seabream and green grouper) were recorded
- Very low abundance of small fish (common and widespread species in western waters) with <15cm in length was recorded



Spotnose ponyfish  
*Nucleola nuchalis*



Yellowtail scad  
*Aulateus melanocephalus*



Shortnose ponyfish  
*Leiognathus brevirostris*



White-spotted rabbitfish  
*Siganus canaliculatus*



# Pilot Test on Fish Restocking – 2nd Batch Fish Release

- In September 2019
- Released species: black seabream, green grouper
- Size: ~10-25 cm each
- Quantity: ~1,300 fingerlings (200 with acoustic tags)

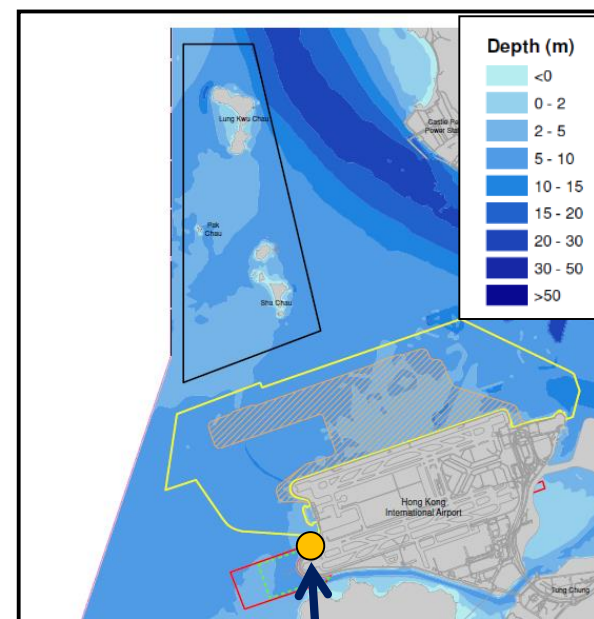
*Fish in cage and release*



*Black seabream*



*Green grouper*



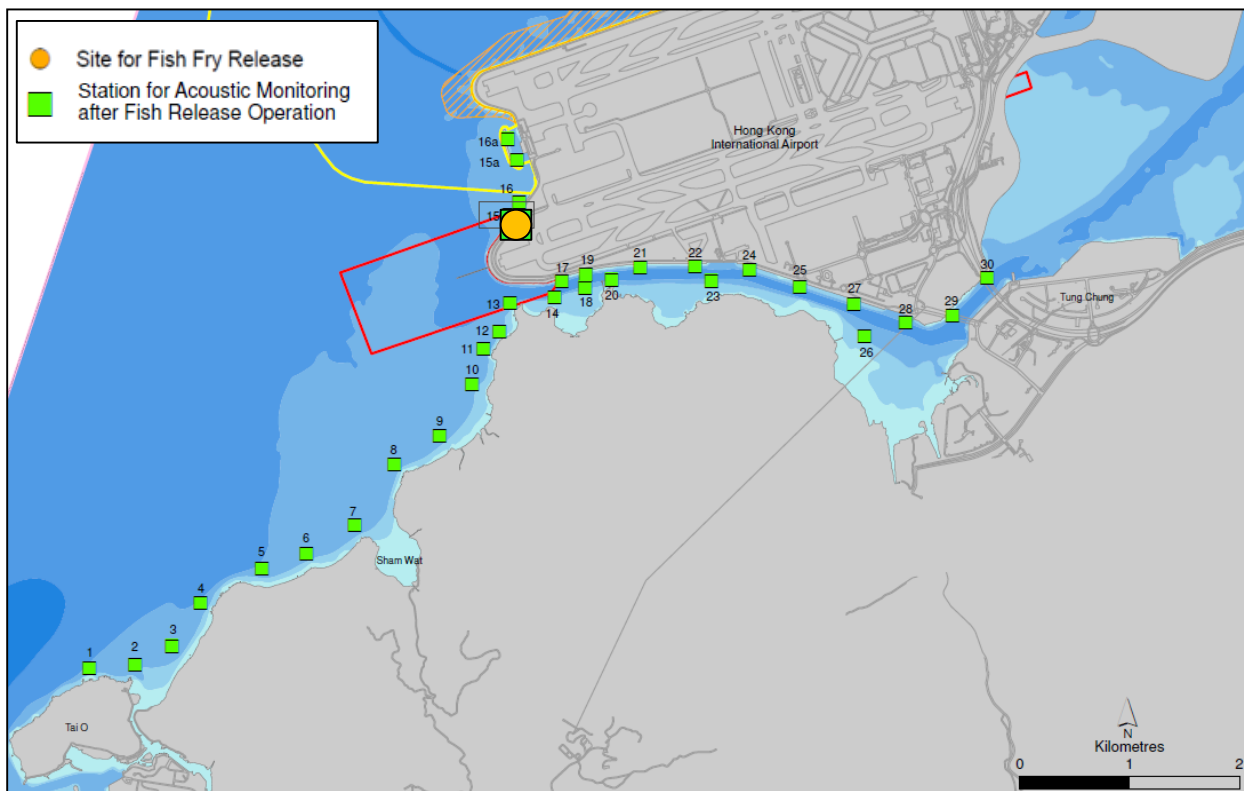
Fish Restocking at Artificial Seawall  
(within HKIAAA No. 1)



# Pilot Test on Fish Restocking – Post-Monitoring for 2nd Batch of Release (1)

## By Acoustic Telemetry

- Monitoring area covers a wide range from Tung Chung to Tai O and the artificial seawall at the west of HKIA



*Acoustic tags and receiver*



*Acoustic receiver under deployment*



*Acoustic receiver attached to a buoy*

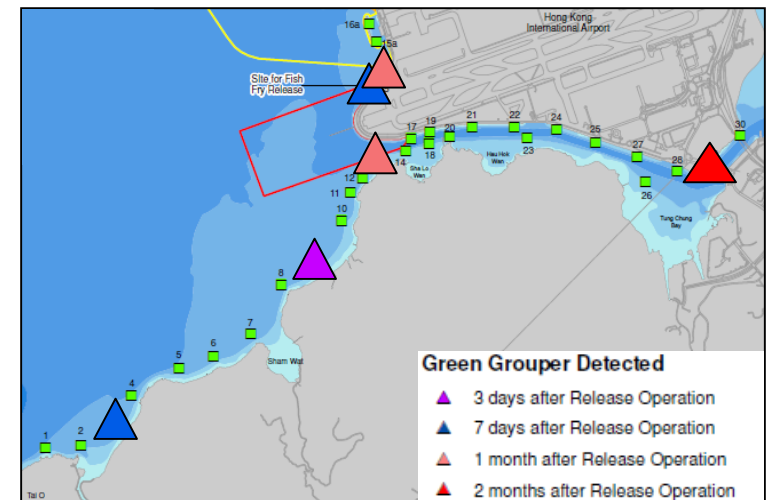
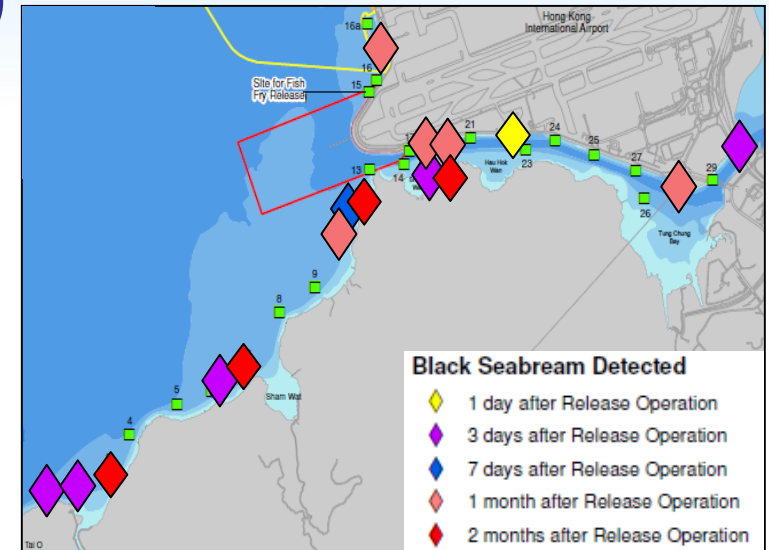




# Pilot Test on Fish Restocking – Post-Monitoring for 2nd Batch of Release (2)

## By Acoustic Telemetry Preliminary results

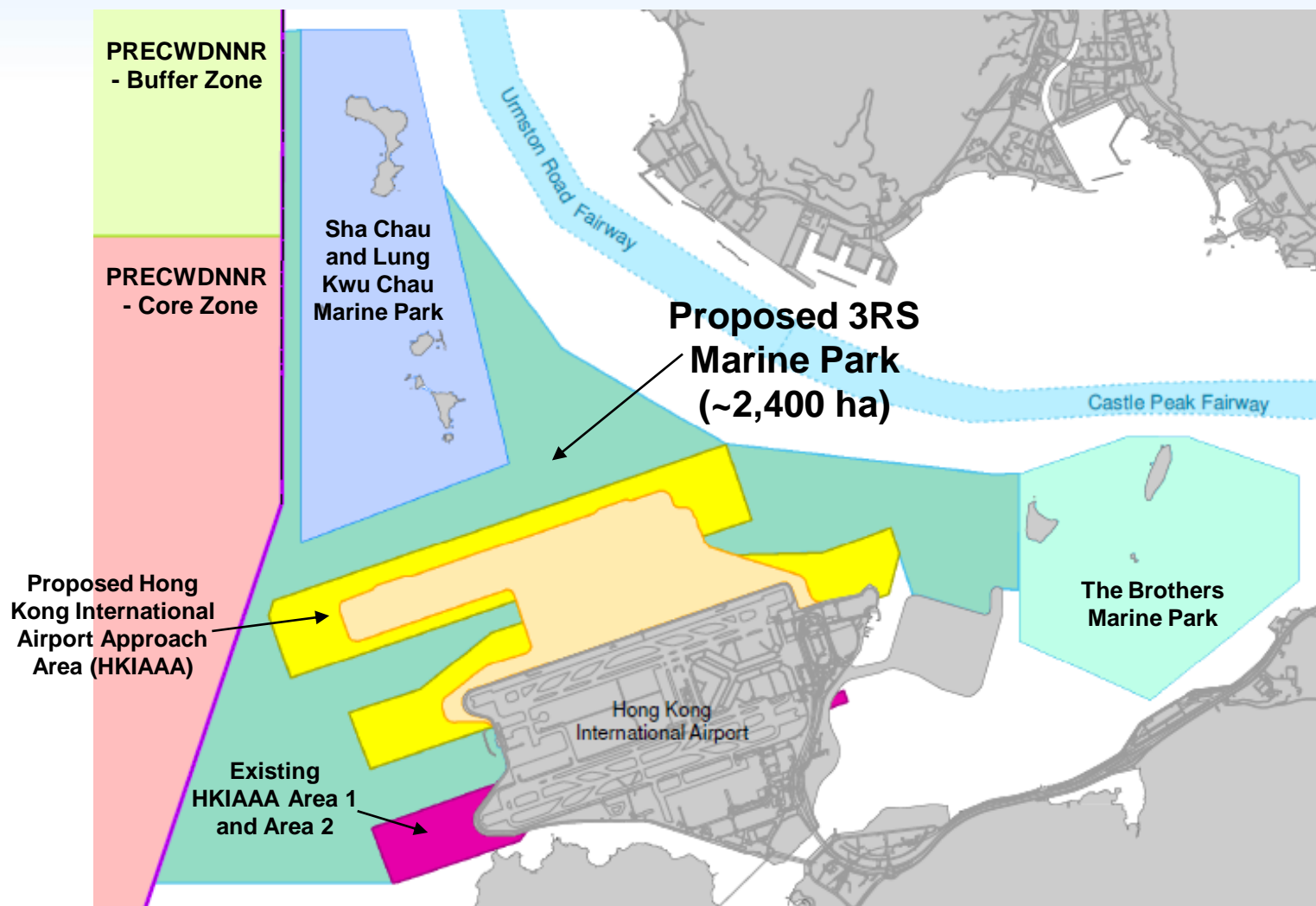
- Monitoring period: September 2019 – March 2020 (3 times during the first week after release; then monthly interval)
- Both species of tagged fish (black seabreams and green groupers) were detected after 2 months of release operation – near the release location, Tai O, Sham Wat, Sha Lo Wan and Tung Chung



# 3RS Marine Park Designation



# Extent of 3RS Marine Park





# Proposed SMART Goals for 3RS Marine Park

## Proposed SMART goals

- To assist in the recovery of CWD usage of North Lantau waters (i.e. Northeast Lantau and Northwest Lantau survey areas)
- With reference to a set of quantitative indicators, including CWD abundance, density and underwater acoustic data, collected within the first 6 years after designation of 3RS Marine Park

## Proposed monitoring framework

- CWD usage, in terms of abundance and density, within the first 6 years after designation of 3RS Marine Park (i.e. 2025-2027 and 2028-2030 three-year data) will be monitored and evaluated against pre-3RS Project construction levels (i.e. 2014-2016)
- Available vessel line-transect data including 3RS EM&A programme and AFCD Long-term Marine Mammal Monitoring would be used
- Available underwater acoustic data will also be evaluated to supplement information on CWD usage of North Lantau waters

*\* SMART refers to the five principles of Specific, Measurable, Achievable, Results-focused and Time-bound*

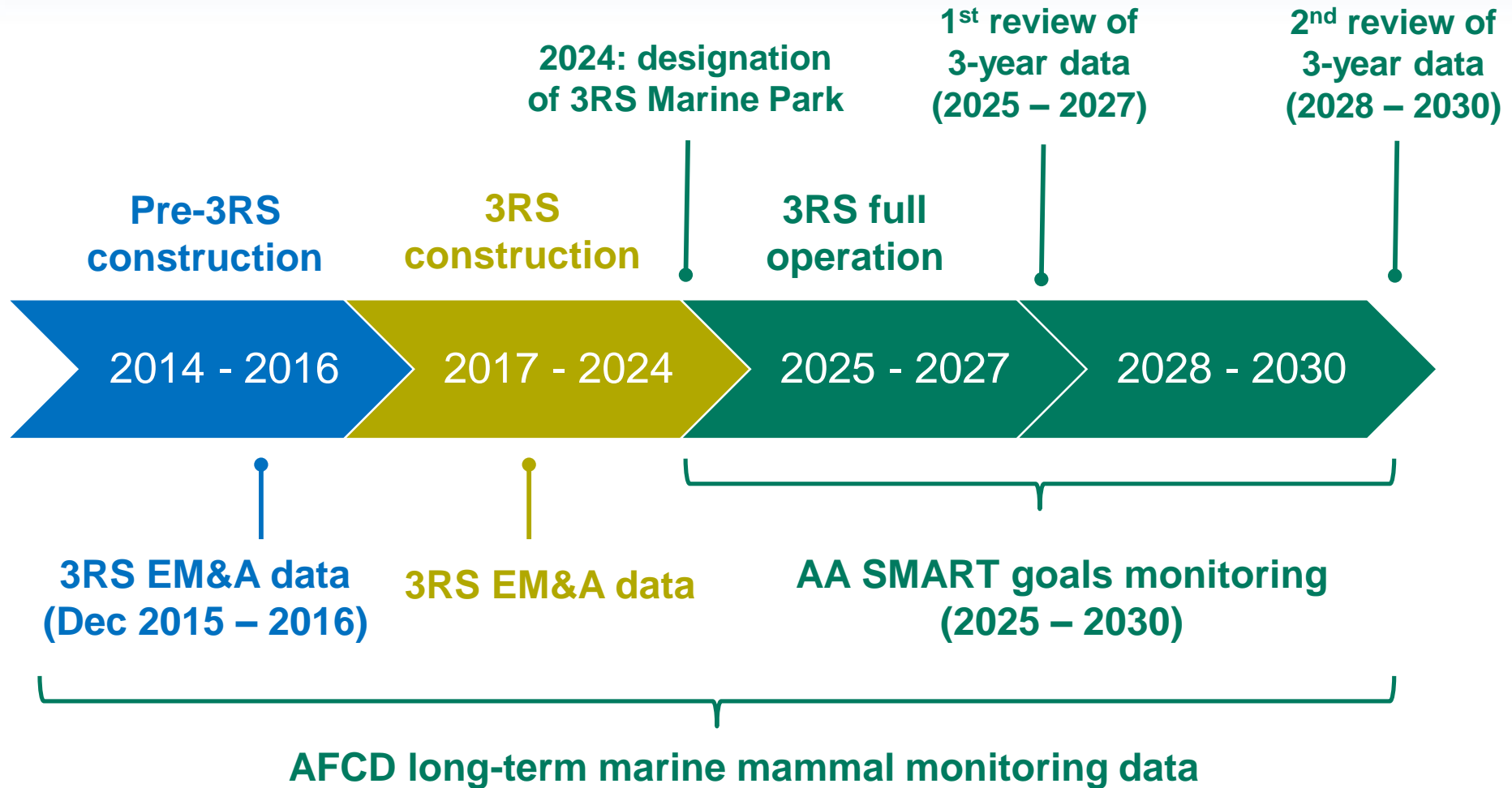


# Proposed quantitative indicators to evaluate CWD usage

Indicator	Data collection method	Unit	Remarks
Abundance	Vessel line-transect survey	Number	<ul style="list-style-type: none"> <li>Data could be used to determine day-time CWD usage within and in the vicinity of 3RS Marine Park over time</li> </ul>
Density		Number per 100 km <sup>2</sup>	<ul style="list-style-type: none"> <li>CWD density could be more representative in determining CWD usage within NWL &amp; NEL survey areas given the change in size of CWD habitats after 3RS land formation</li> </ul>
Underwater Acoustic Data	C-POD	Detection Positive Minute (DPM) per day	<ul style="list-style-type: none"> <li>Data could serve to determine day-time and night-time CWD usage within and in the vicinity of 3RS Marine Park over time</li> </ul>



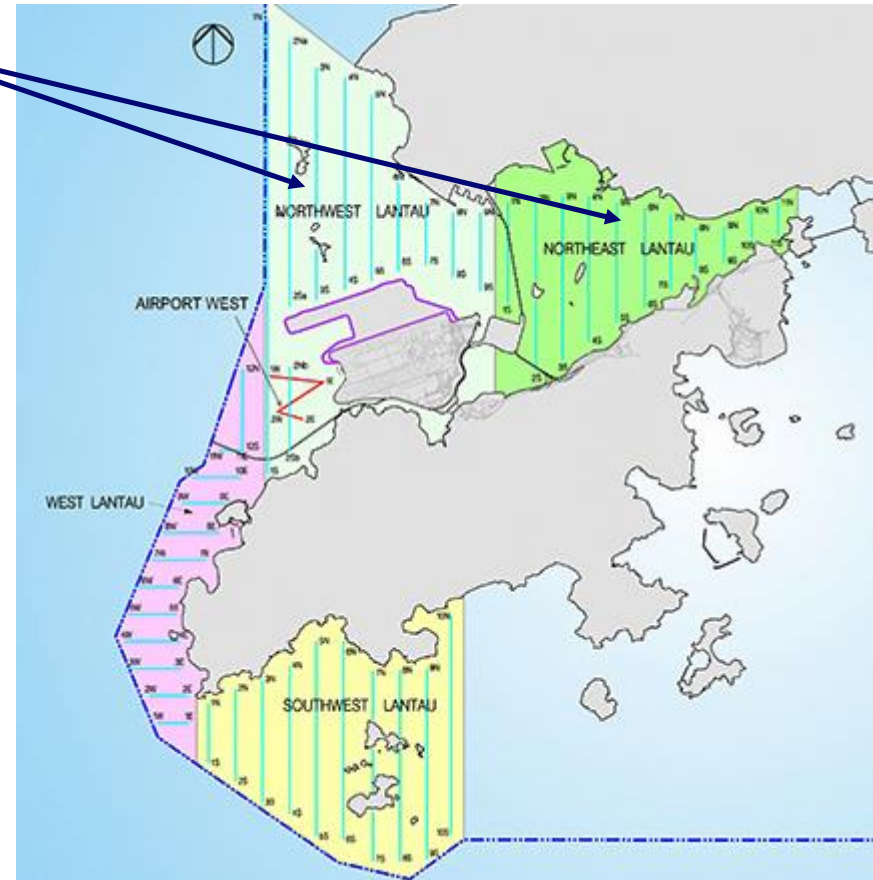
# Available vessel line-transect data to assess CWD abundance & density (1)



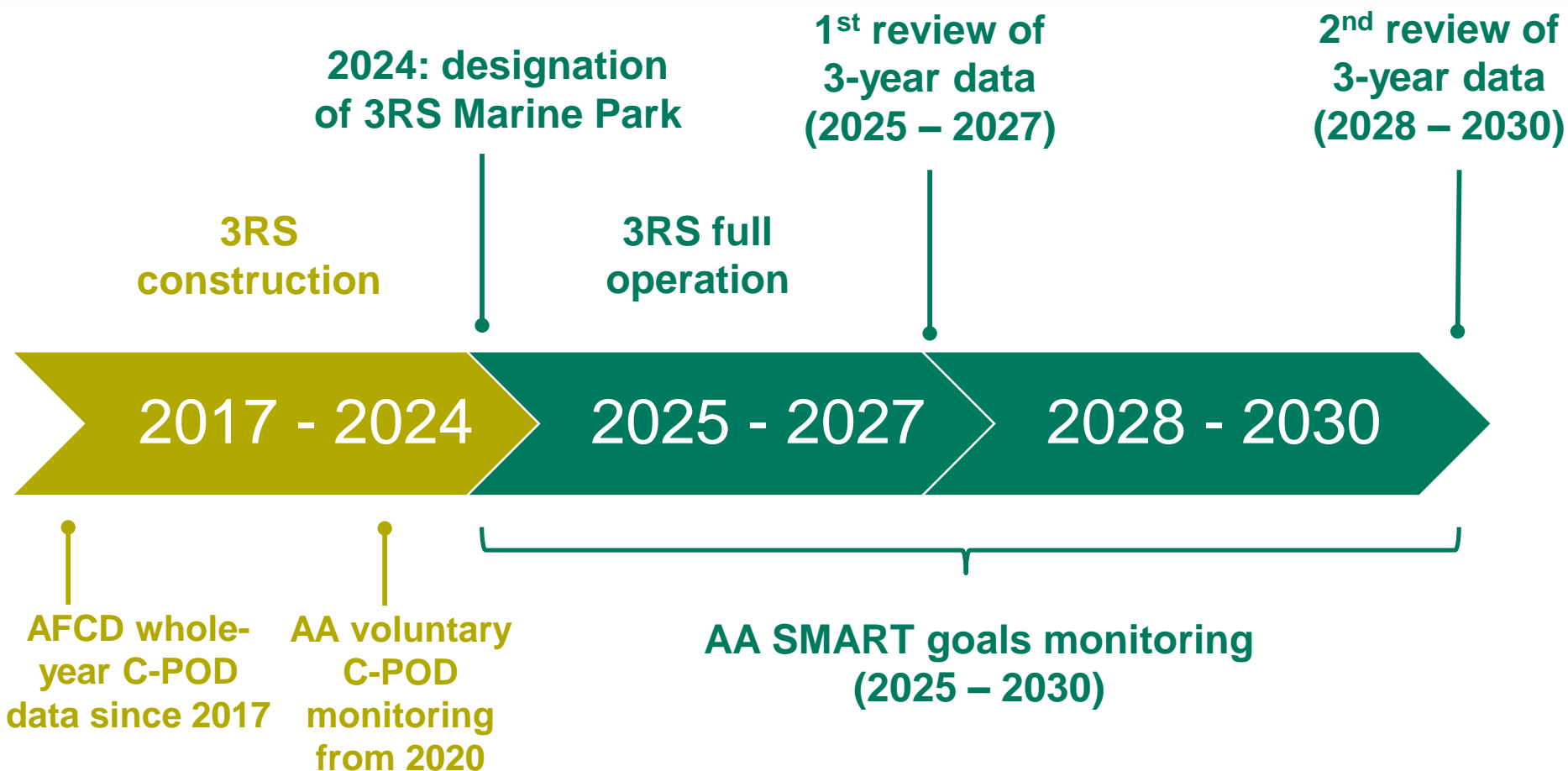


# Available vessel line transect data to assess CWD abundance & density (2)

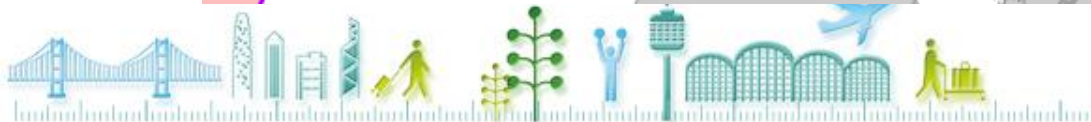
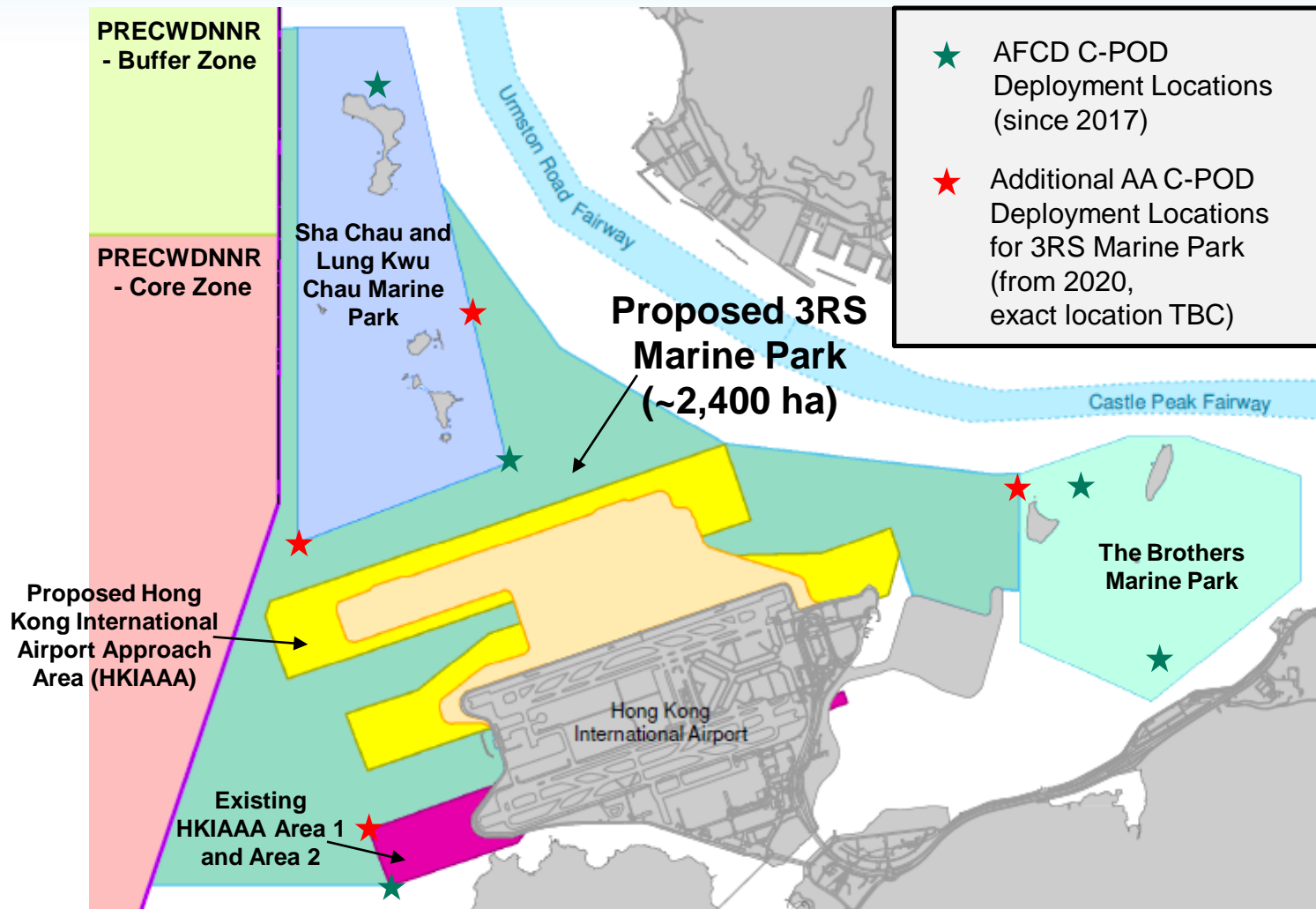
Line-transect survey data in Northwest Lantau (NWL) & Northeast Lantau (NEL) to evaluate CWD abundance & density within / in the vicinity of 3RS Marine Park



# Available underwater acoustics data by C-POD

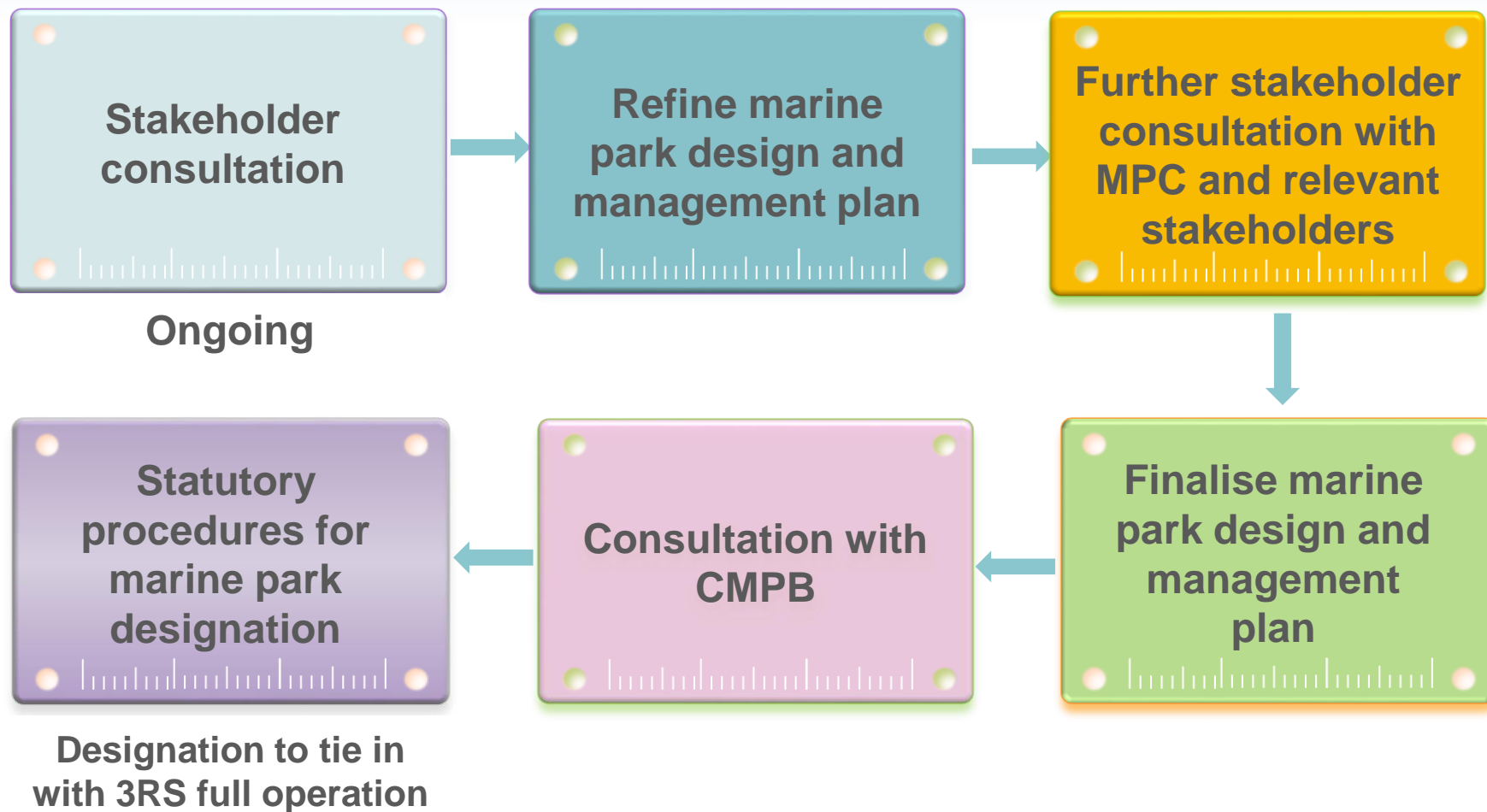


# Underwater acoustics monitoring locations by C-POD





# Way Forward



Thank You

