

**SHAPING** OUR AIRPORT  
OUR FUTURE



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

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

**24 November 2017**

Airport Authority Hong Kong

# Agenda

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



# Latest Progress of the 3RS Project: Apr-Oct 2017

- Completed the 11kV submarine cable diversion and associated works in May 2017
- Continue with the diversion works of aviation fuel pipelines after the end of the last egret breeding season (Apr-Jul 2017)
- Continue with the land formation works (including sand blanket laying, ground improvement works & preparation for seawall construction)
- Proceed with land-based construction works on existing airport island
  - North runway crossover taxiway works
  - Terminal 2 expansion works including Automated People Mover (APM) depot and antenna farm & sewage pumping station
  - Existing APM system modification works
  - Baggage Handling System (BHS) & APM tunnel works



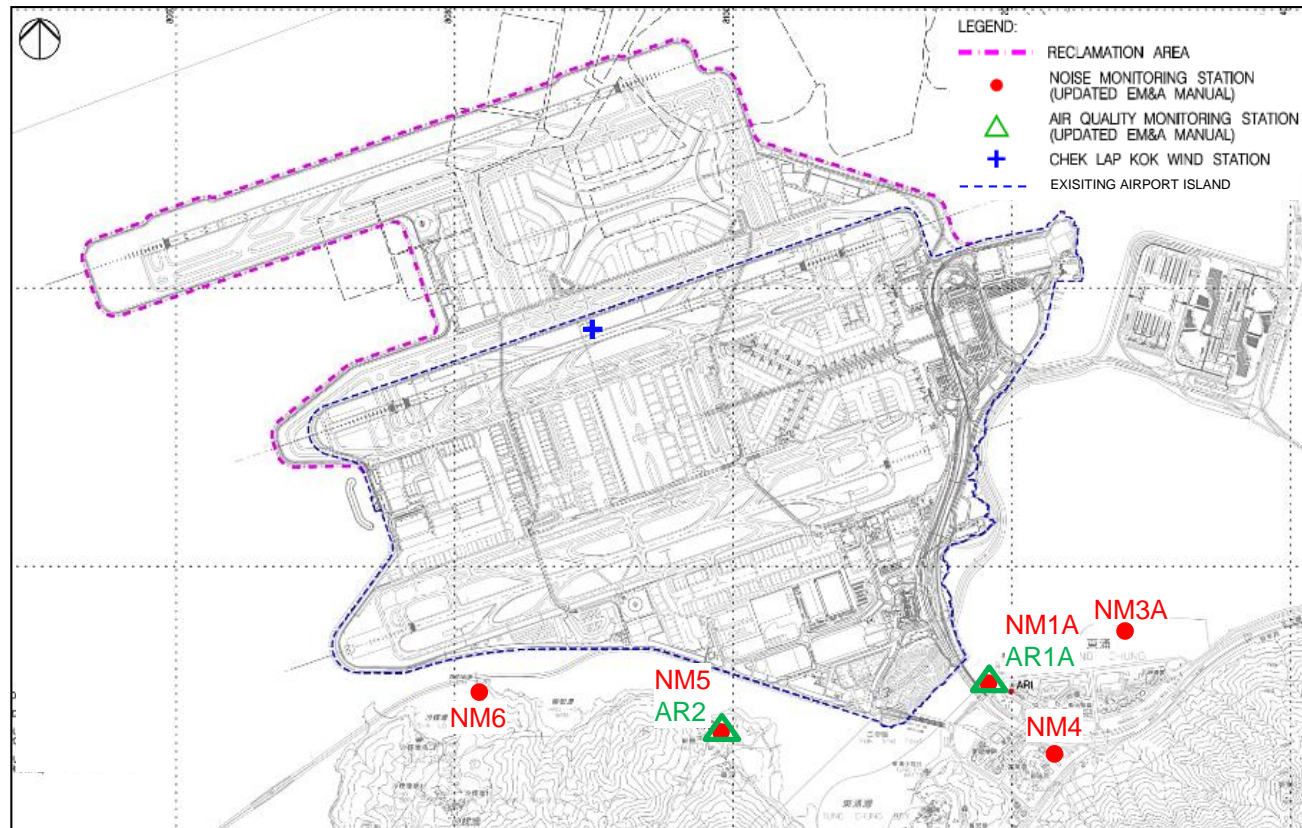
# EM&A Updates



# EM&A Monitoring Status: Apr-Oct 2017

## Air Quality (2 stations) & Noise Monitoring (5 stations)

- 237 air quality and 151 noise monitoring events
- No exceedance of project-related Action/ Limit Levels was recorded

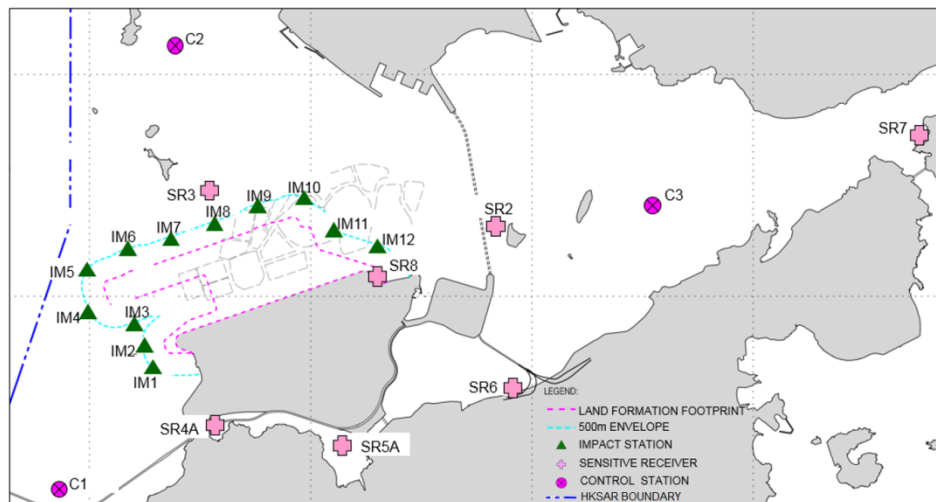




# EM&A Monitoring Status: Apr-Oct 2017 (cont'd)

## General Impact and Early Regular Deep Cement Mixing (DCM) Water Quality Monitoring (22 stations)

- 12 impact stations, 7 sensitive receiver stations and 3 control stations
- 3 days per week, at mid-flood and mid-ebb tides
- Monitoring parameters including dissolved oxygen (DO), suspended solids, turbidity, total alkalinity, chromium and nickel
- 90 monitoring events
- No exceedance of project-related Action/ Limit Levels was recorded



## Initial Intensive DCM Monitoring

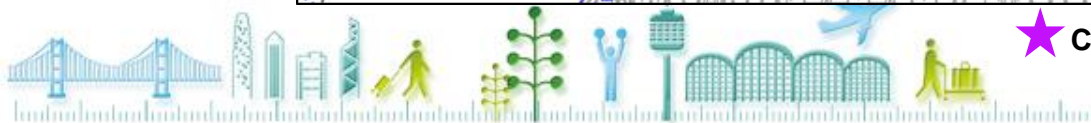
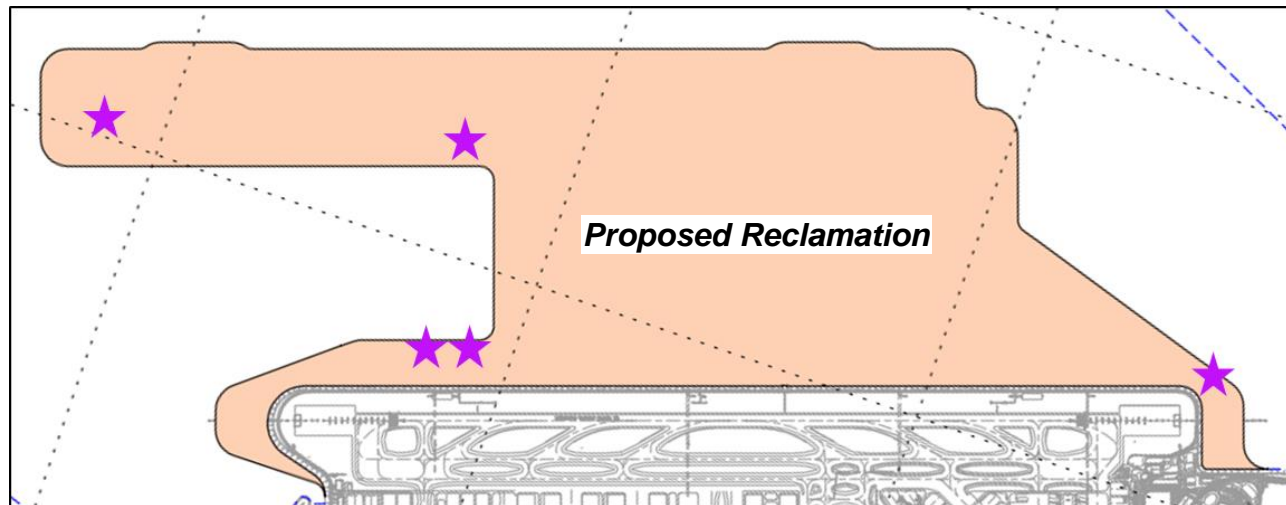
- Fieldwork, laboratory analysis & assessment completed in Oct 2017
- Reaffirmed no adverse water quality impact associated with DCM works



# EM&A Implementation: Apr-Oct 2017 (1)

## Dolphin Exclusion Zone (DEZ)

- Trained dolphin observers were deployed by contractors for continuous monitoring of the DEZ for DCM works
- Up to 19 stations were implemented
- A cumulative total of 347 observers were trained
- 4 Chinese White Dolphin (CWD) sightings occurred during the period in which works were temporarily suspended in accordance with the DEZ Plan, with a cumulative total of 5 sightings



# EM&A Implementation: Apr-Oct 2017 (2)

## Marine Mammal Watching Plan

- A cumulative total of 155 observers were trained
- No CWD was observed during the deployment of silt curtain

## Marine Travel Routes and Management Plan for Construction and Associated Vessels

- A cumulative total of 771 skippers were trained





# EM&A Implementation: Apr-Oct 2017 (3)

## Construction Noise Management

- Initiated & implemented Permit-to-work system with contractors
- 7 Construction Noise Permit (CNP) trainings were provided

## Spill Response Management

- A cumulative total of 33 drills were conducted (both marine-based & land-based contracts)



# CWD Monitoring Status: Apr-Oct 2017

## Vessel-based line-transect survey

- 14 complete sets of Vessel-based line-transect surveys covering NEL, NWL, AW, WL & SWL survey areas
- Around 3,141km survey effort

## Land-based theodolite tracking

- 35 sessions of Land-based monitoring: 21 sessions at Lung Kwu Chau (LKC) & 14 sessions at Sha Chau (SC)
- Around 210 hours survey effort

## Passive Acoustic Monitoring (PAM)

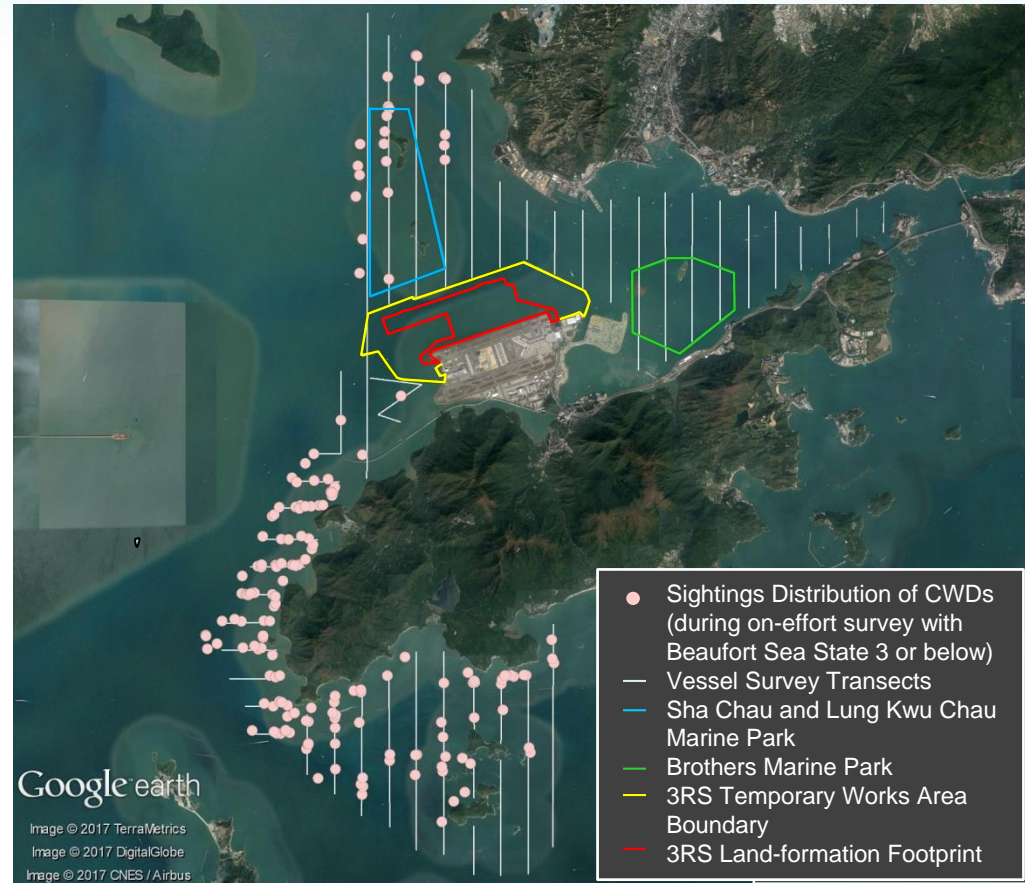
- On-going deployment of underwater PAM, about 5 weeks per deployment
- Data analysed on annual basis
- Ecological Acoustic Recorder (EAR) slightly repositioned inside Sha Chau Lung Kwu Chau Marine Park (SCLKCMP) to minimise risk on marine safety due to increase in marine traffic

WLMM042 Spy-hopping



# CWD Monitoring Results – Vessel-based: Apr-Oct 17

- A total of 170 sightings of CWDs with 559 individuals sighted
- 148 sightings of CWDs with 504 individuals sighted during on-effort survey with Beaufort Sea State 3 or below
- No CWD was recorded in NEL survey area
- Group size of CWDs ranged from 1 to 15 individuals per group, average was 3.29





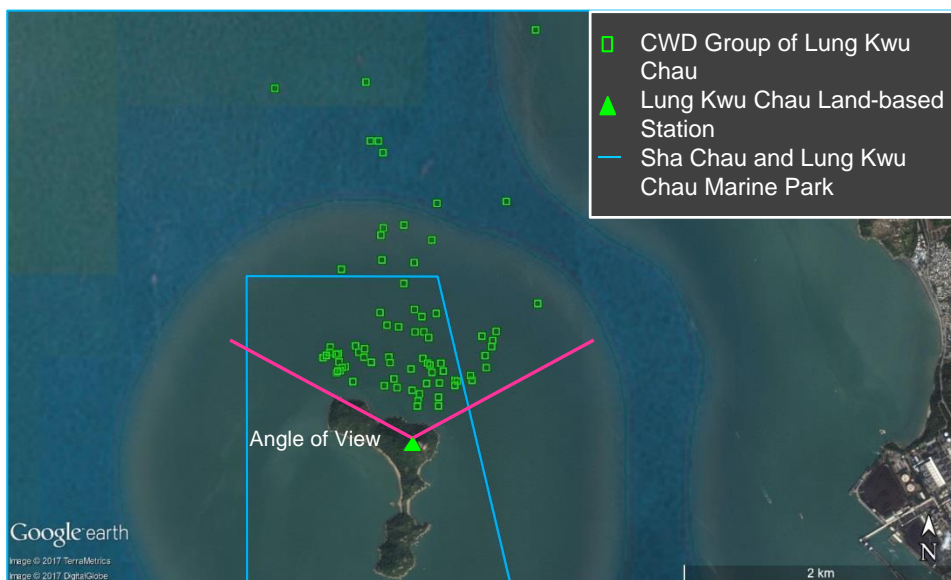
# CWD Monitoring Results – Vessel-based: Apr-Oct 17 (cont'd)

- 32 sightings were recorded with the presence of mother-and-calf, mother-and-unspotted juvenile, or mother-and-spotted juvenile pairs
- A total of 137 CWD individuals were identified altogether 258 times by Photo Identification
- Preliminary data and observations are in line with the findings from 2016
- Detailed analysis will be conducted after full year data for 2017 is available

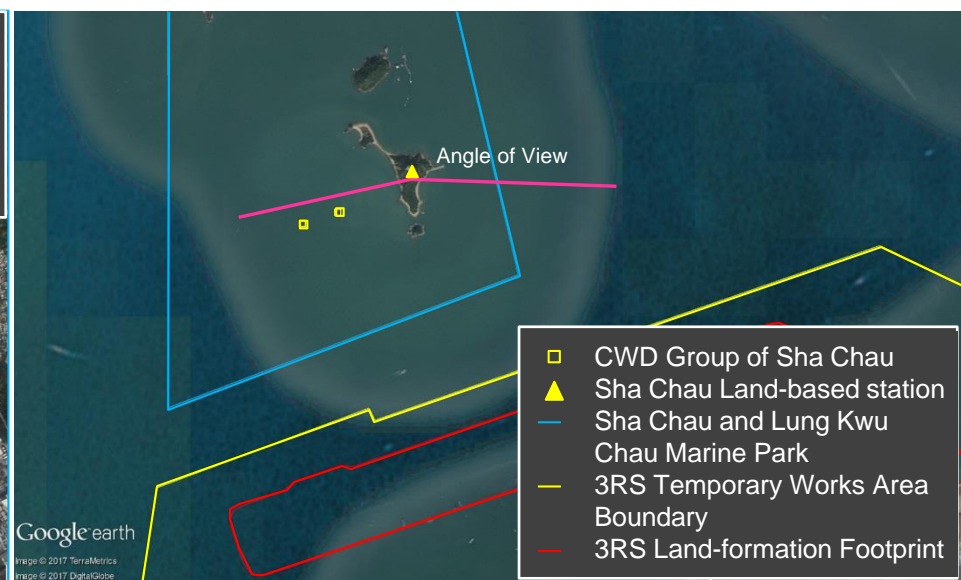


# CWD Monitoring Results – Land-based: Apr-Oct 17

- A total of 76 CWD groups were tracked from LKC station
- A total of 2 CWD groups were tracked from SC station
- Preliminary data and observations are in line with the findings from 2016
- Detailed analysis will be conducted after full year data for 2017 is available



*1<sup>st</sup> fix location of CWD groups tracked from LKC station*



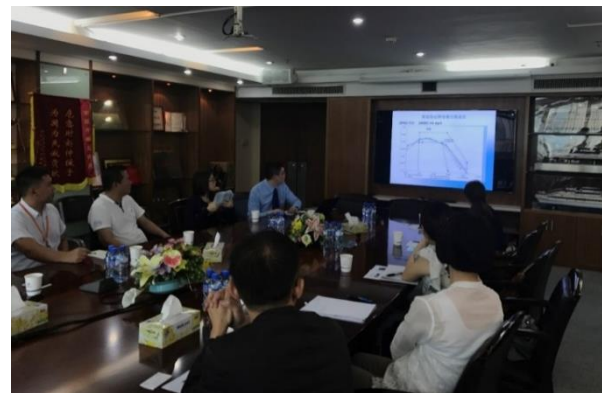
*1<sup>st</sup> fix location of CWD groups tracked from SC station*





# SkyPier Plan Implementation: Jan-Oct 2017

- Total no. of diverted High Speed Ferry (HSF) trips from Jan-Oct 17: 7,917
- Average no. of diverted HSF trips per day: 26
- Maximum daily number of HSF movements, all routes: 97 (below the maximum daily cap number of 125)
- All of the diverted HSF trips comply with the average speed within 15 knots
- Instantaneous speeding within Speed Control Zone (SCZ) (about 1% of all diverted HSF trips) were all related to navigation or public safety reasons (i.e. due to strong waves and tidal currents or need to give way to other vessels), except 2 cases due to late deceleration.
- Skipper meetings were held with Ferry Operator representatives to review and discuss the deviation cases.
- Preliminary data and observations are in line with the findings from 2016, i.e. no observable impacts on CWD



*A total of 5 skipper meetings were held in Jan & Jun 17 to review the deviation cases and to share experience & recommendations to further strengthen the implementation of SkyPier Plan.*



# Stakeholder Engagement: Apr-Oct 2017



# Stakeholder Engagement Complaints & Enquiries Handling

	2015 (from 28 Dec)	2016 (Full Year)	2017 (Jan – Oct)
Complaints	0	1	6
Enquiries	0	25	13
<b>Total</b>	<b>0</b>	<b>26</b>	<b>19</b>



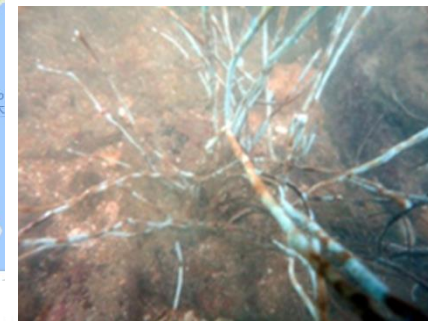
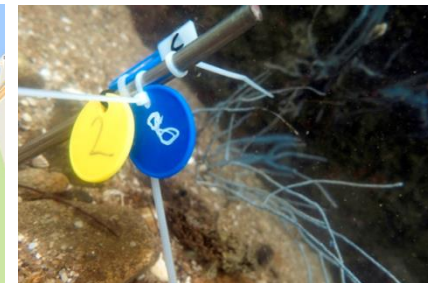
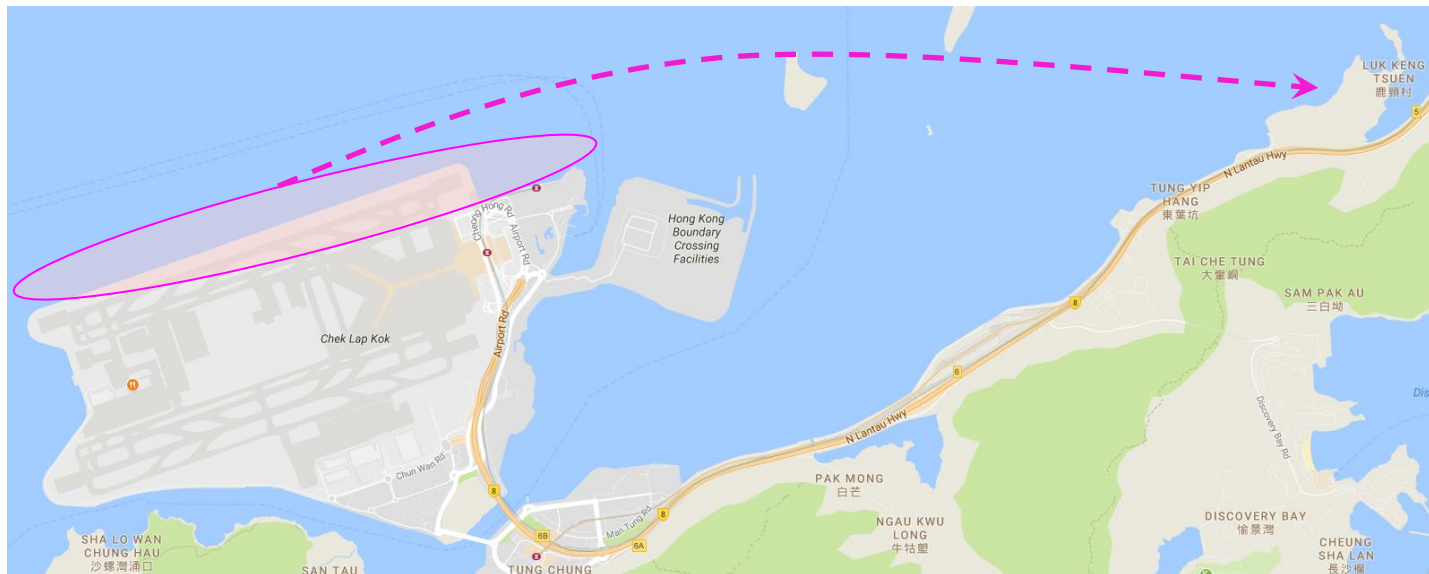
# Report on Coral Translocation & Coral Transplantation





# Coral Translocation

- Coral translocated from airport's existing northern seawall to recipient sites at Yam Tsai Wan (YTW)
- Translocation works completed in Jan 2017: 384 coral colonies were translocated
- Post-monitoring programme: 8 rounds of surveys over 27 months





# Coral Translocation – Post-Monitoring

- Post-translocation monitoring conducted in Jan, Feb, Mar & Apr 2017
- Increase in Partial Mortality (PM) was observed in Apr – both tagged & control corals
- PM is calculated by averaging the percentage of dead coral tissue coverage of all sampled colonies
- PM occurring in both tagged & control corals; immediate follow up actions were conducted including liaison with Agriculture, Fisheries & Conservation Department (AFCD), additional *ad-hoc* monitoring and investigations.



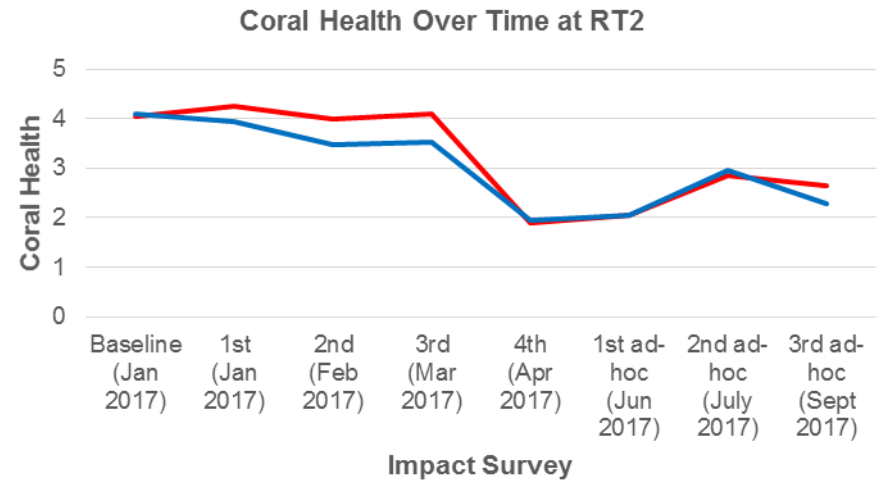
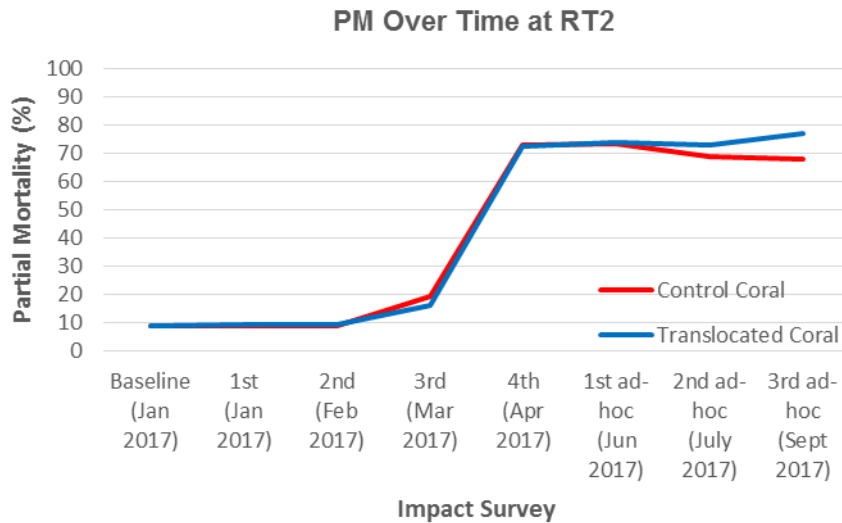
# Coral Translocation – *Ad-hoc* Monitoring & Follow-up Actions

- Initial check of the coral conditions, including additional monitoring in Jun, Jul & Sep 2017 of all translocated (tagged and untagged) and control corals at recipient site (RT2)
- Dive check of natural corals at YTW, Sham Shui Kok (SSK) and Tai Mo To (TMT)
- Water quality monitoring
- Review of weather conditions, red tide, water quality monitoring data
- Substrate check and review of sediment deposition
- Review of other projects and their translocated corals
- Consultation with coral experts on the potential cause(s) of the significant increase in PM



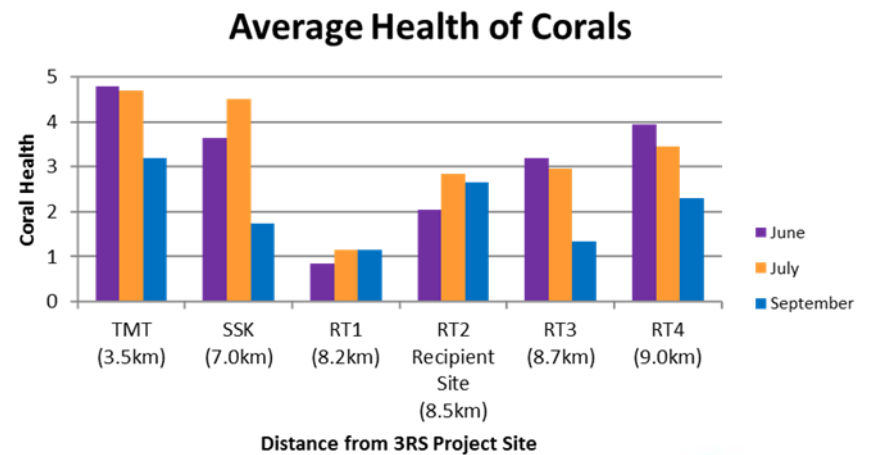
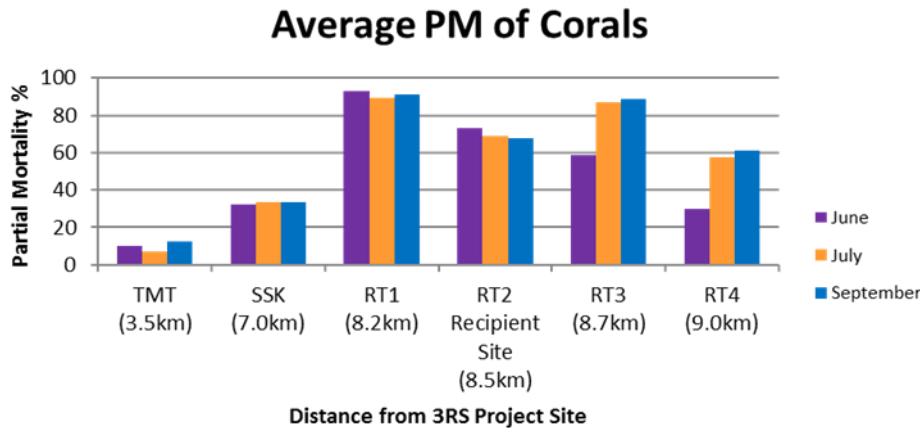
# Coral Translocation – Ad-hoc Monitoring Conclusion

- Coral condition (for both tagged & control corals) has generally stabilised since identification of high PM in Apr, further significant PMs not observed during *ad-hoc* monitoring



# Coral Translocation – *Ad-hoc* Monitoring Conclusion (cont'd)

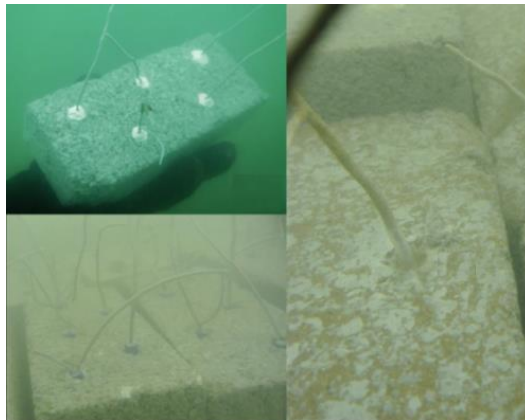
- Natural corals at SSK & TMT (both sites closer to 3RS work site) are comparatively healthier than the ones at YTW with lower PM
- High mortality rate occurred only locally at YTW (furthest from 3RS work site), thus coral mortality is unlikely to be project-related
- No apparent link between 3RS works and high PM at YTW



# Further Initiative – Beyond EP Requirements

## Coral Transplantation Trial Study (1)

- A trial study was initiated and conducted to address comments from the Advisory Council on the Environment (ACE)
- In partnership with HKU and expert reviewer of the University at Buffalo
- Coral fragments were clipped and coral colonies were cut from big substrata
- The fragments and colonies were fixed on cement blocks and moved to the nursery / recipient site at YTW
- Transplantation works completed in Feb 2017: 56 whole colonies & 460 fragments were transplanted



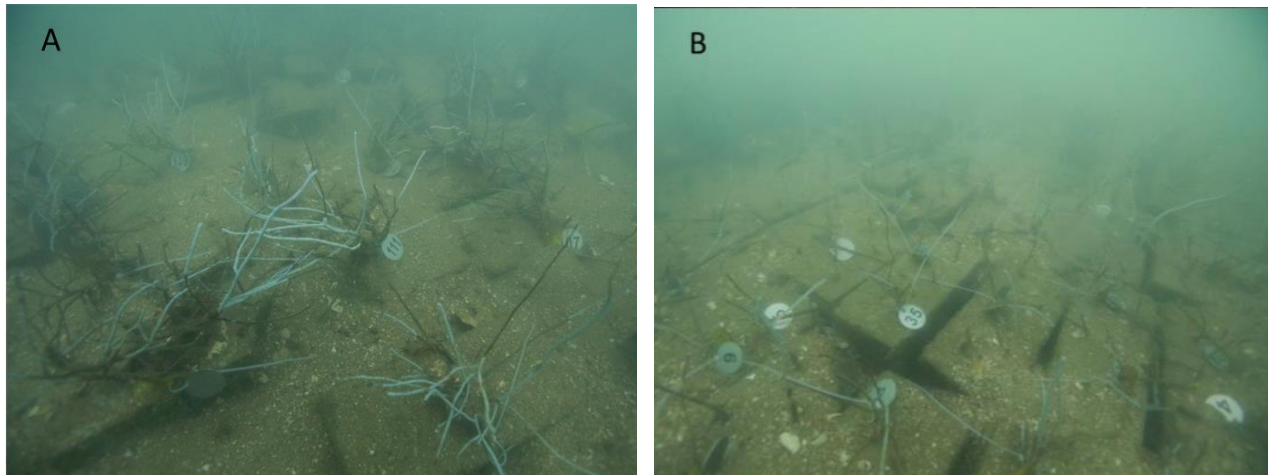


# Further Initiative – Beyond EP Requirements

## Coral Transplantation Trial Study (2)

### Post-Monitoring

- Post-transplantation monitoring surveys commenced in Mar 2017
- Post-monitoring programme: 9 rounds of surveys over 39 months
- Steel tags were used for identifying monitoring individuals
- Photographic records are used to analyse the percentage of live tissue cover of transplanted corals and control corals



*Whole colony (A) and fragment (B) transplants marked with steel tags for monitoring*



# Further Initiative – Beyond EP Requirements

## Coral Transplantation Trial Study (3)

### Post-Monitoring – Initial Observations

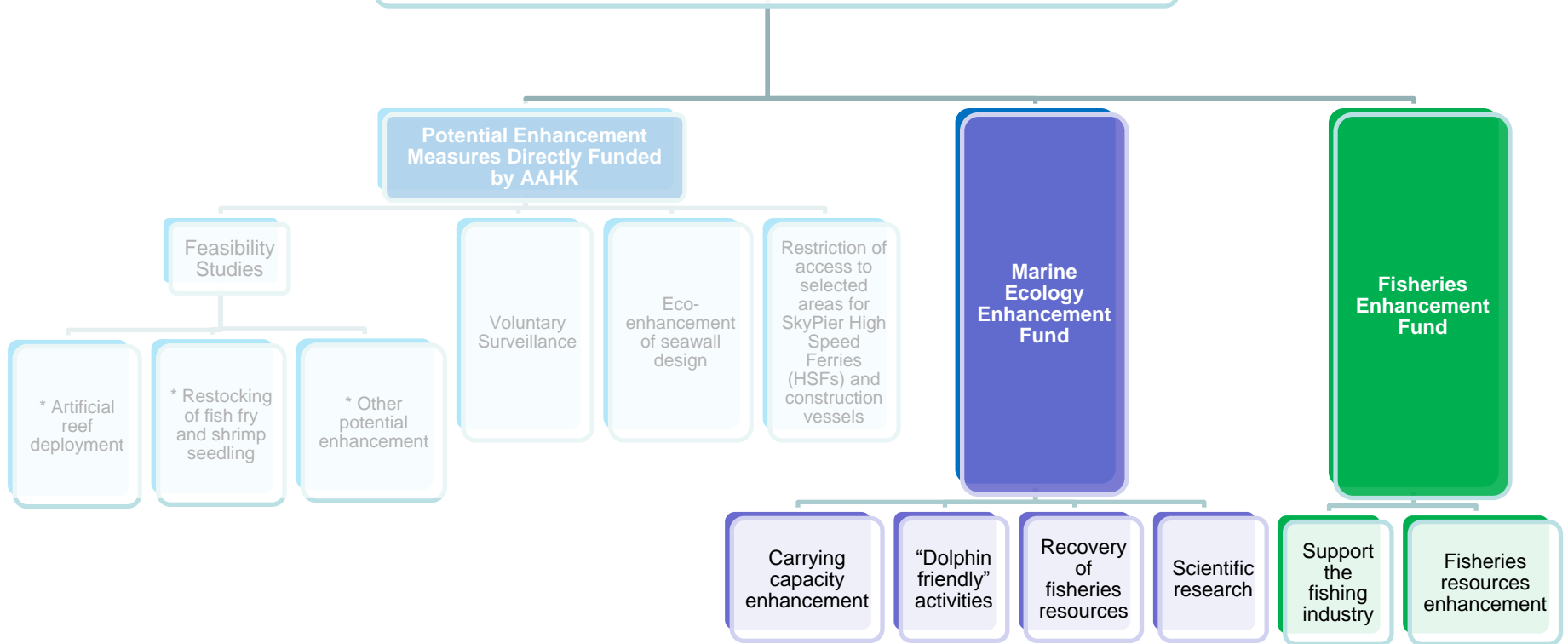
- Polyps extended from transplanted colonies showed sign of feeding
- Marine fauna observed around the nursery indicated transplanted biomass providing habitat (Pipefish, Seahorse, Wasp Fish, Gobi Fish, Invertebrates)
- Transplanted colonies have lower PM and within the expected range compared to the control colonies
- Next post-monitoring survey scheduled in Jan 2018



# Marine Ecology and Fisheries Enhancement Strategy



# Marine Ecology and Fisheries Enhancement Strategy (MEFES)



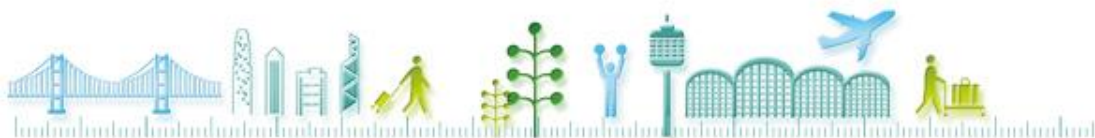
*\* Implementation would be subject to outcome of feasibility studies*



# Marine Ecology Enhancement Fund (MEEF) & Fisheries Enhancement Fund (FEF)

Timeline	Activities
Jul 2017	Result announcement of funded projects for Year 2017-18 <ul style="list-style-type: none"><li>• MEEF: 5 projects (\$4.23M)</li><li>• FEF: 4 projects (\$2.93M)</li></ul>
Dec 2017 – Jan / Feb 2018	Application period for Year 2018-19
Feb – May 2018	Application assessment
Jul 2018	Results announcement of funded projects for Year 2018-19

- Details of the Funds are available in the 3RS dedicated website  
MEEF: <http://env.threerunwaysystem.com/en/meef/index.html>  
FEF: <http://env.threerunwaysystem.com/en/fef/index.html>





# Year 2017-18 MEEF Funded Projects

Project Title	Applicant Organisation	Funded Amount (HK\$)
Reproductive Biology of the Dominant Octocoral <i>Guaia</i> in Hong Kong Western Waters	The Chinese University of Hong Kong	499,650
Revealing cryptic faunal biodiversity in Hong Kong western waters using environmental DNA approach	The Education University of Hong Kong	499,420
Monitoring of population dynamics of Indo-Pacific humpback dolphins ( <i>Sousa chinensis</i> ) in Lingding Bay of the Pearl River Delta region	South China Sea Fisheries Research Institute, Chinese Academy of Fishery Sciences	1,383,000
Contributing to Marine Spatial Planning: working with fishing communities to map areas of dolphin and active fishing gear overlap	SMRU (HONG KONG) Limited	849,500
Virtopsy for characterization and documentation of injury and death caused by human interaction, in stranded Indo-Pacific humpbacked dolphins ( <i>Sousa chinensis</i> ) in the Hong Kong waters	Tung Wah College	1,002,120
		<b>\$4.23 M</b>

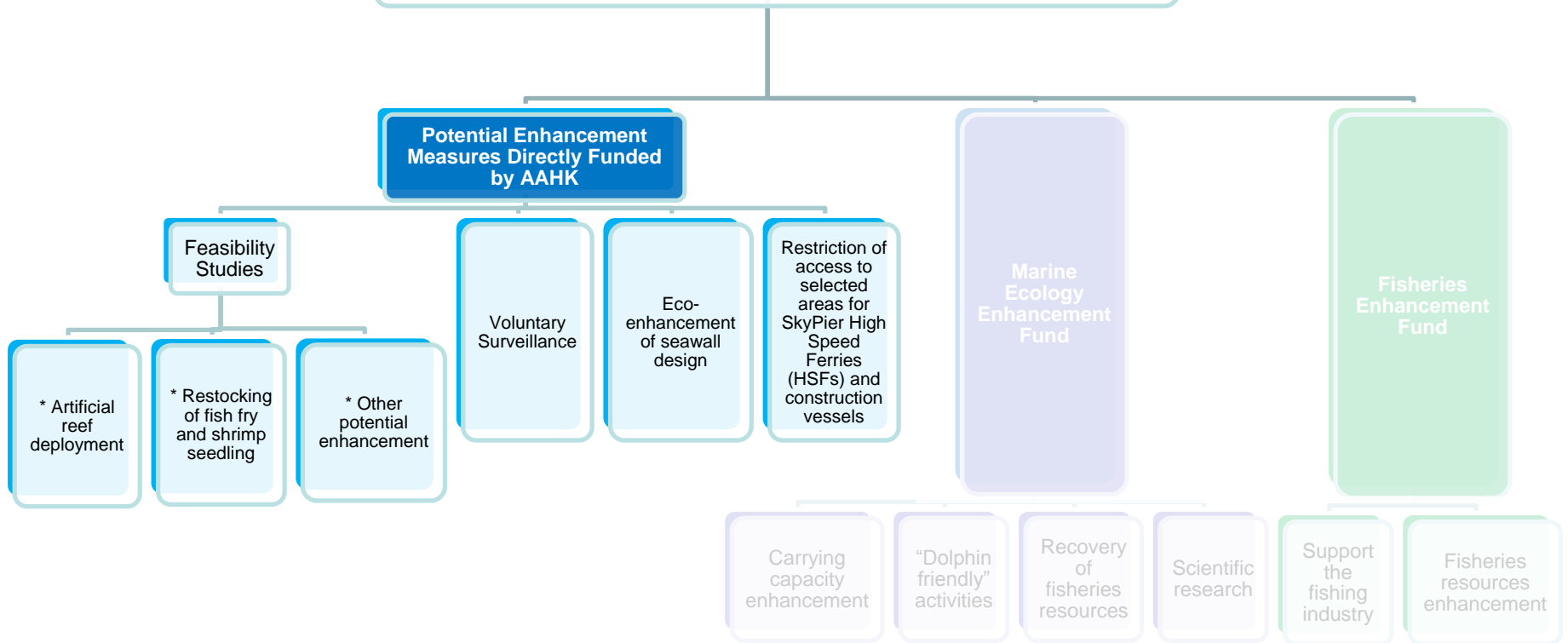


# Year 2017-18 FEF Funded Projects

Project Title	Applicant Organisation	Funded Amount (HK\$)
Pearl Farming Pilot Project	Aberdeen Fisherwomen Association	1,477,600
Study on the Current Status of Capture Fisheries Industry in Hong Kong and Strategy towards Sustainable Fisheries Development	Hong Kong Fishery Alliance	500,000
Installation of Radar Reflector for Fishing Vessels under 15m	Aberdeen Fisherwomen Association	800,000
Hong Kong Fisheries Festival - Planning and Feasibility Study	Hong Kong Fishery Alliance	150,000
		<b>\$2.93 M</b>



# Marine Ecology and Fisheries Enhancement Strategy (MEFES)



\* Implementation would be subject to outcome of feasibility studies



# Potential Enhancement Measures

Potential Enhancement Measures	Status
<b>Eco-enhancement of seawall design</b>	Incorporated into detailed design, construction contractors to build
<b>Voluntary surveillance &amp; potential measures that may aid or assist in the effective management of Marine Parks</b>	Feasibility studies have been conducted, will proceed with preparation and/ or procurement of pilot tests
<b>Artificial reef deployment</b>	
<b>Fish restocking / Fish fry release</b>	



# Eco-enhancement of Seawall Design

- Reviewed overseas experience of seawall designs with eco-enhancement
- Key ecological considerations
  - Roughness
  - Space and voids
  - Rock pools
  - Gentle slope
- Other considerations
  - Avoid bird attraction for aircraft operational safety
  - Structural integrity and security





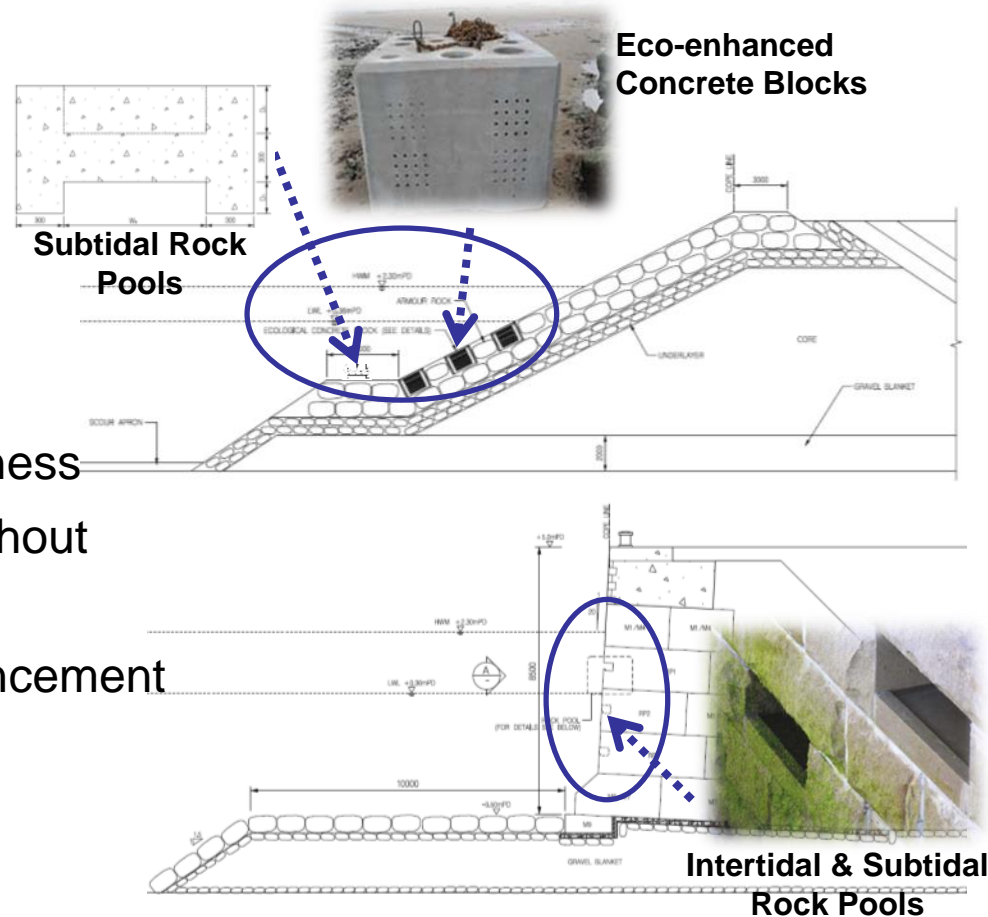
# Eco-enhancement of Seawall Design (cont'd)

- To enrich or enhance the marine biodiversity and ecological value of artificial seawalls

- Eco-enhancement designs
  - Enhanced Concrete Blocks
  - Rock Pools

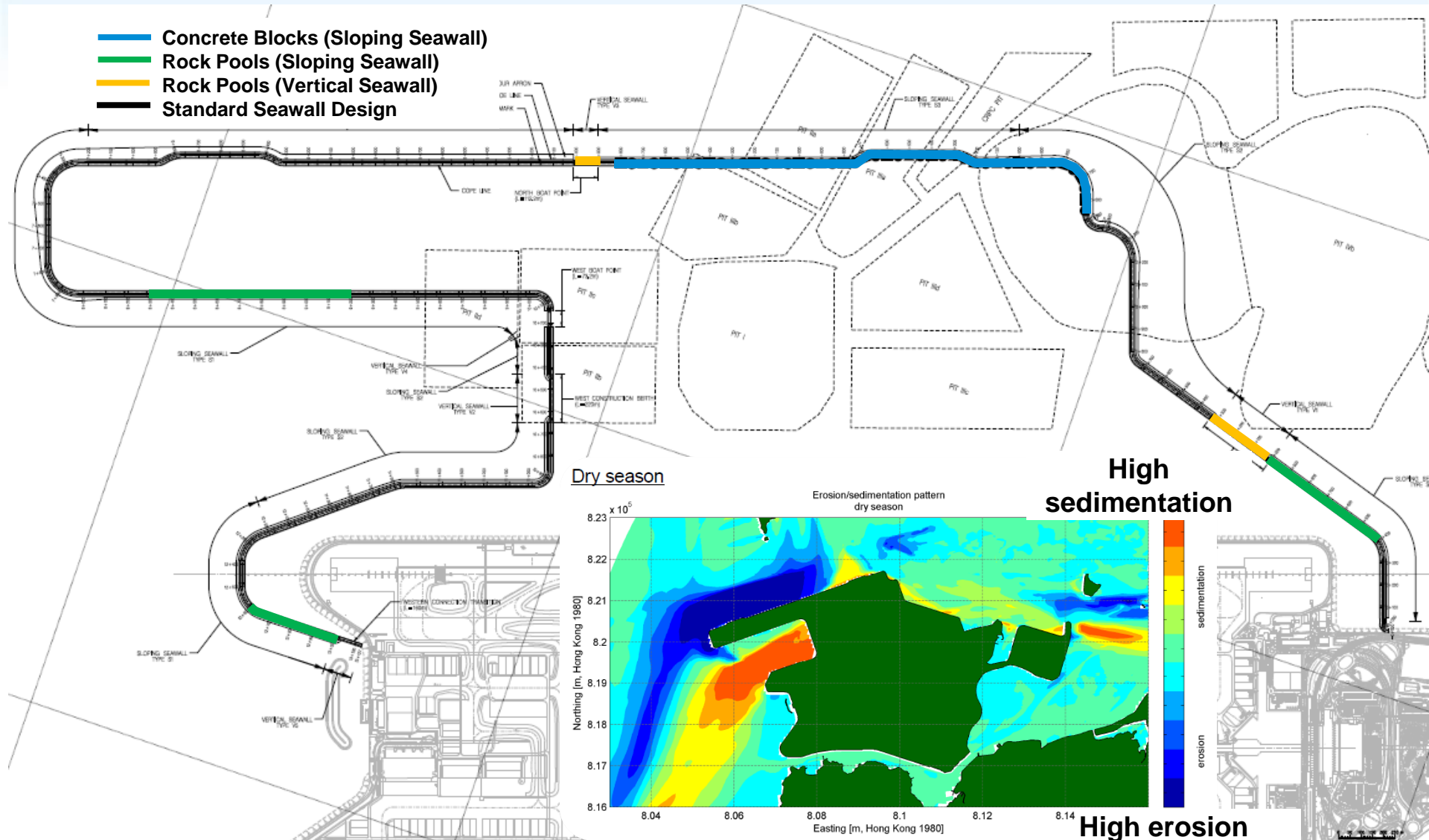
- Monitoring to compare effectiveness
  - Between seawalls with & without eco-enhancement
  - Between different eco-enhancement features

*\* Preliminary design subject to finalisation*



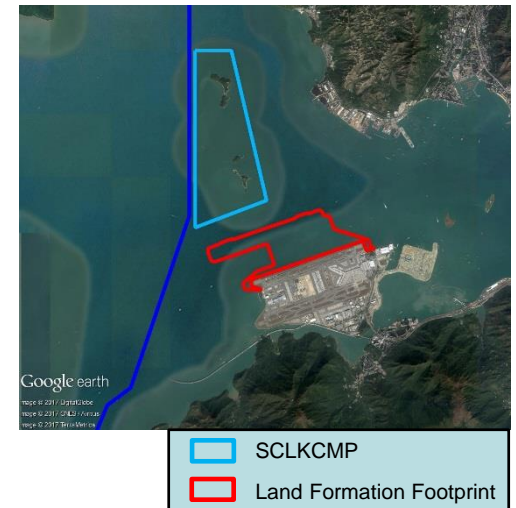
# Indicative Locations of Eco-enhanced Seawall

- █ Concrete Blocks (Sloping Seawall)
- █ Rock Pools (Sloping Seawall)
- █ Rock Pools (Vertical Seawall)
- █ Standard Seawall Design



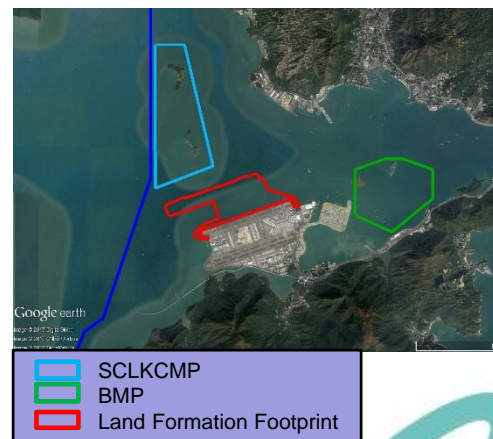
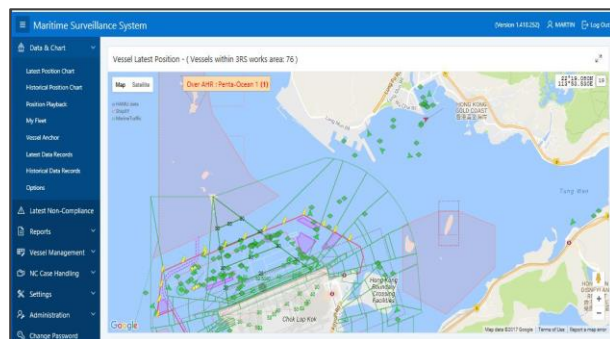
# Measures that may aid or assist in the effective management of Marine Parks – Voluntary Surveillance

- To record occurrences of suspected non-compliances / prohibited activities within Marine Parks
- A pilot test within SCLKCMP is proposed for a period of around 6 months, covering daytime & night-time
  - Using existing CWD EM&A efforts: Vessel-based surveys & Land-based theodolite tracking
  - Additional patrol efforts
- Information to be shared with AFCD including patterns of activities monitored



# Measures that may aid or assist in the effective management of Marine Parks – Other Measures

- Using existing Automatic Identification System (AIS) data at Marine Traffic Control Centre (MTCC) or similar
  - Pilot test to monitor for around 6 months, covering SCLKCMP and The Brothers Marine Park (BMP)
  - To record potential speeding & anchored vessels within Marine Parks
  - Information to be shared with AFCD including patterns of activities monitored



# Artificial Reef Deployment

- Have potential to increase productivity of fisheries resources

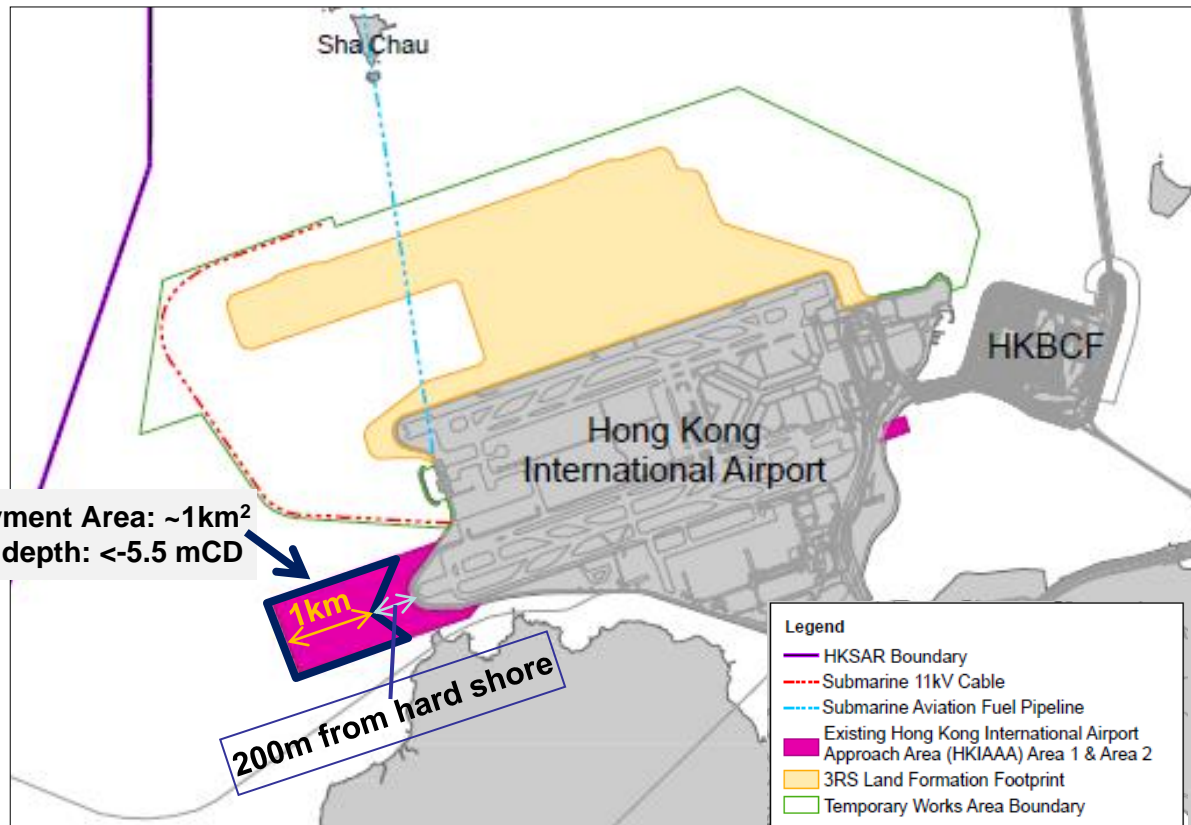
Key Considerations	Lessons Learnt
Fish aggregation / attraction but not enhancing fisheries resources	<ul style="list-style-type: none"> <li>• At least 200m from existing natural rocky reefs</li> <li>• At least 200m between reef group</li> </ul>
Materials (e.g. used tyres, waste materials) were unstable and not durable	<ul style="list-style-type: none"> <li>• Use of quarry rocks / concrete blocks</li> </ul>
Low dissolved oxygen in deep water	<ul style="list-style-type: none"> <li>• Deploy in shallower waters, but with at least 4.5m clearance for navigational safety</li> </ul>
Movement / fragmentation of Artificial Reef (AR)	<ul style="list-style-type: none"> <li>• Avoid areas of strong currents and waves</li> </ul>
Subsidence / burial of AR	<ul style="list-style-type: none"> <li>• Conduct engineering design for anti-subsidence</li> <li>• Avoid areas of high sedimentation</li> </ul>
Lack of interstitial space / void and complexity for colonisation	<ul style="list-style-type: none"> <li>• Use AR materials (e.g. quarry rocks) with different sizes</li> <li>• Provide range of space / void of 0.5 – 3m</li> <li>• Provide irregular and rough surface</li> </ul>
Lack of effective fishery management	<ul style="list-style-type: none"> <li>• Restrict fishing activities</li> </ul>
Difficult to assess effectiveness	<ul style="list-style-type: none"> <li>• Determine suitable monitoring locations and methods</li> </ul>





# Artificial Reef Deployment (cont'd)

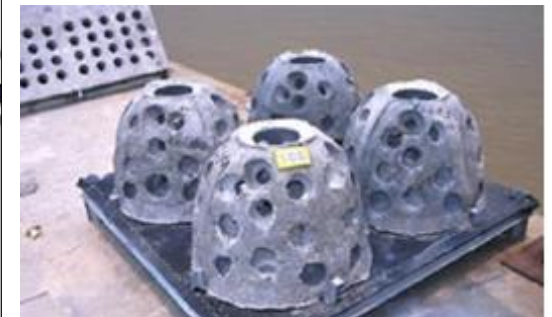
- Within existing Hong Kong International Airport Approach Area (HKIAAA) & outside 3RS works area
- After completion of majority of seawall formation works
- Subject to successful authorisation under Foreshore and Sea-bed (Reclamations) Ordinance (FS(R)O)



Recommended Density:  
~1500m<sup>3</sup> / km<sup>2</sup>



Quarry Rock



Concrete Blocks (e.g. Reef Balls)

# Fish Restocking / Fish Fry Release

- Have potential to restore or enhance populations with good stocking practice
- Common practices: release of native and locally depleted species with commercial value

Key Considerations	Lessons Learnt
Reduce ecosystem functioning	<ul style="list-style-type: none"> <li>• Consider proper release methodology and mechanisms</li> <li>• Consider appropriate restocking species and locations</li> </ul>
Change in communities structure	
Reduce genetic variation of wild stock	<ul style="list-style-type: none"> <li>• Source from hatchery based on local fish source</li> <li>• Consider hatchery with good nursery technique and genetic management</li> <li>• Selection of fish stock from different hatcheries</li> </ul>
Low survival of released fish (unable to adapt to the natural environment)	
Reproductive fitness of released fish (cannot sustain for further recruitment)	
Lack of effective fishery management	<ul style="list-style-type: none"> <li>• Release at site with limited fishing activities and suitable / healthy habitat</li> </ul>
Unfavourable environmental condition / degraded habitat	
Difficult to assess the effectiveness	<ul style="list-style-type: none"> <li>• Effectiveness is easier to monitor for species with high site fidelity</li> <li>• Consider suitable monitoring methods</li> </ul>



# Fish Restocking / Fish Fry Release (cont'd)

## To be implemented in two phases

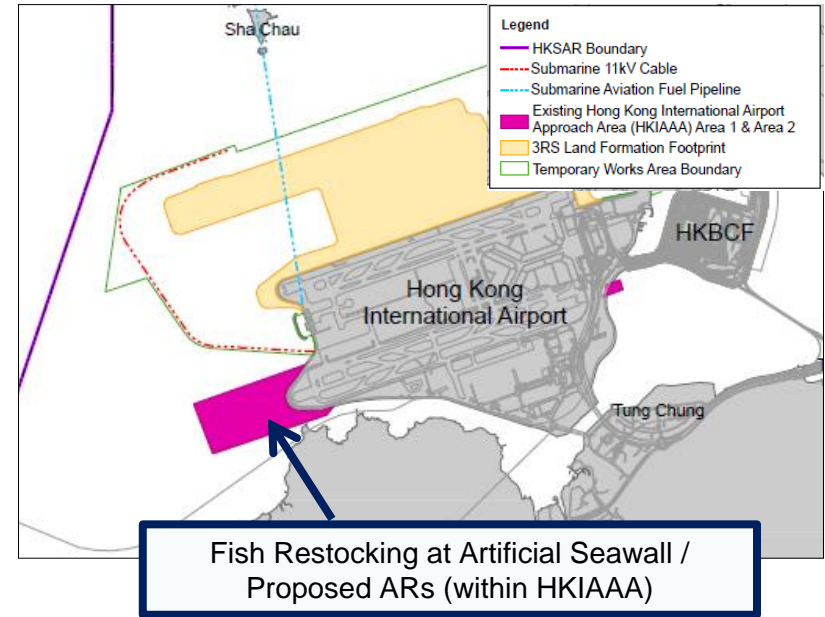
- Phase 1: at artificial seawall area, before AR deployment
- Phase 2: at the newly deployed AR area

## Fish species to be released

- High commercial value
- Native & available in nearby hatcheries, e.g. groupers, seabreams, croakers

## Other considerations

- Restocking density
- Avoid low DO (summer) and low water temperature (winter) periods



# Next Steps

Potential Measures	Key Actions	Timeline
<b>Eco-enhancement of seawall design</b>	<ul style="list-style-type: none"> <li>Design under finalisation</li> </ul>	In progress
<b>Voluntary surveillance and using existing MTCC AIS monitoring data</b>	<ul style="list-style-type: none"> <li>Arrange pilot tests</li> <li>Discuss with AFCD on future reporting / communication protocol</li> <li>Review effectiveness of the measures from the pilot tests</li> </ul>	Late 2017 – 2018
<b>Artificial reef deployment</b>	<ul style="list-style-type: none"> <li>Arrange pilot tests</li> <li>Procure detailed engineering design</li> <li>Conduct pre-deployment monitoring</li> <li>Undertake statutory process (e.g. FS(R)O)</li> <li>Arrange AR deployment &amp; post-deployment monitoring</li> </ul>	Late 2017 – 2021
<b>Fish restocking / Fish fry release</b>	<ul style="list-style-type: none"> <li>Arrange pilot tests</li> <li>Procure fish fry release</li> <li>Phase 1: Fish release and conduct monitoring (pre- and post-)</li> <li>Phase 2: Fish release and conduct monitoring (post-)</li> </ul>	Phase 1: Late 2017 – 2019  Phase 2: 2020 – 2021

- Members of the ACE were briefed on the potential measures & welcomed AA's proactive discussion with the ACE



# 2RS Enhancement Works

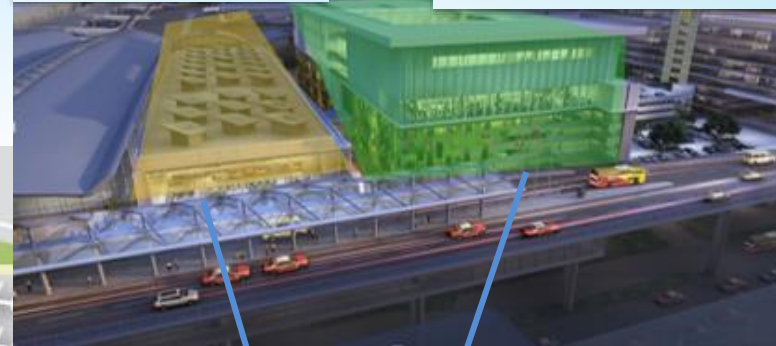




# Terminal 1 Expansion

T1 Annex Building

Car Park 4 Extension

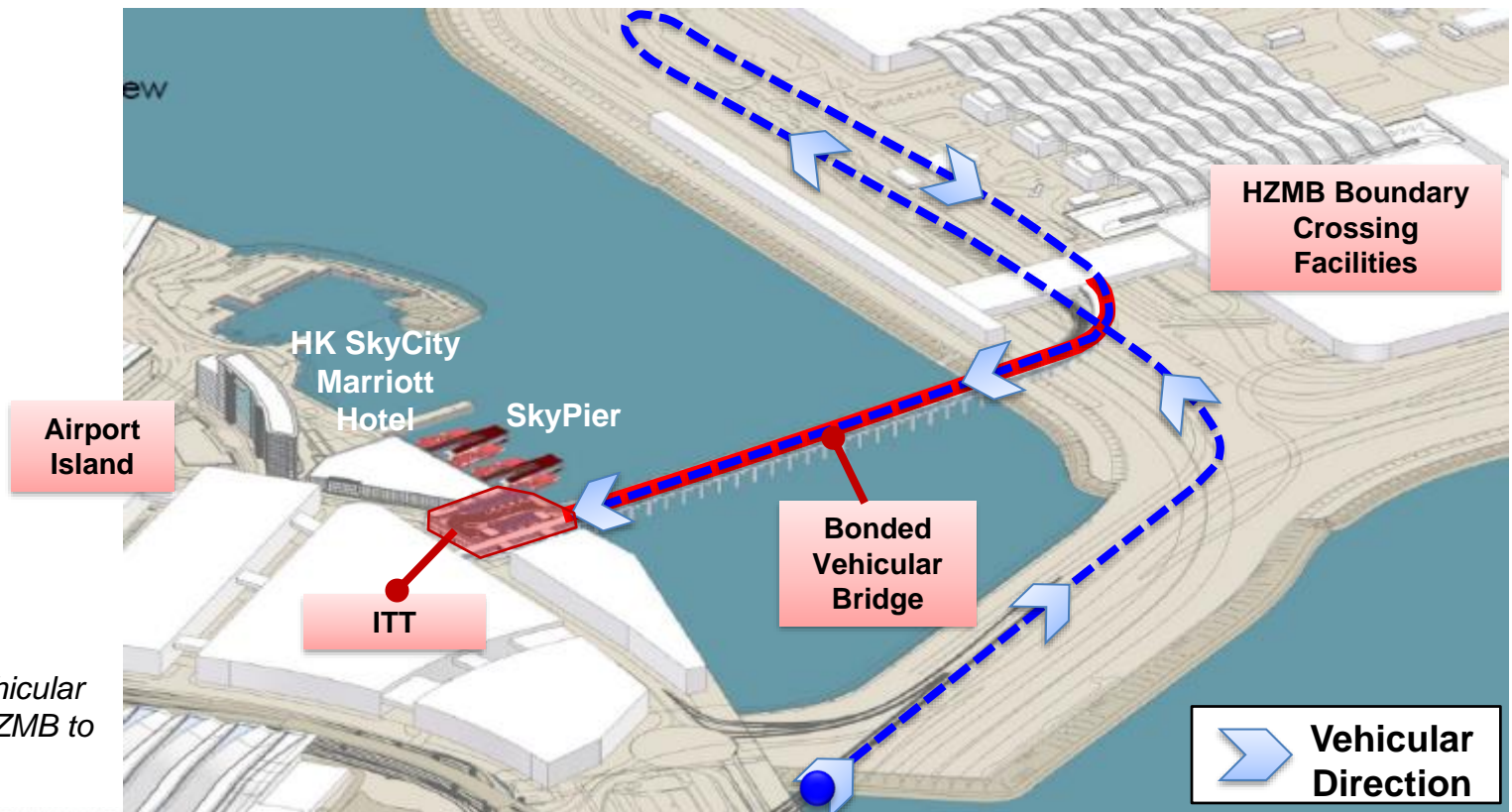


\* For illustrative purpose only

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# Intermodal Transfer Terminal

- To build a vehicular bridge connecting Hong Kong-Zhuhai-Macao Bridge (HZMB) Boundary Crossing Facilities (BCF) and the Intermodal Transfer Terminal (ITT). The journey takes about 5 minutes by car.
- Passengers can travel directly to the restricted area of the airport for transfer to other countries by the HZMB, and also to Zhuhai & Macao from the airport.



# Intermodal Transfer Terminal Statutory Approval Process

	2017	2018	2019	2020	2021	2022
Environmental Impact Assessment Study (EIA)		[Orange bar spanning 2017 and 2018]				
Legal Procedure		[Orange bar spanning 2018, 2019, and 2020]				
ITT Construction			[Orange bar spanning 2019, 2020, and 2021]			
Vehicular Bridge Construction				[Orange bar spanning 2020, 2021, and 2022]		

\* The timetable above is for reference only.



# Thank You

