

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

Updated Environmental Monitoring and Audit  
Manual

December 2020

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**This Updated Environmental Monitoring and Audit Manual**

**has been reviewed and certified by**

**the Environmental Team Leader (ETL) in accordance with**

**Condition 3.1 of Environmental Permit No. EP-489/2014.**

**Certified by:**



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Terence Kong  
Environmental Team Leader (ETL)  
Mott MacDonald Hong Kong Limited

**Date**

**31 December 2020**



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Attn: Mr. Lawrence Tsui, Principal Manager, Environmental Compliance

31 December 2020

Dear Sir,

**Contract No. 3102**  
**3RS Independent Environmental Checker Consultancy Services**

**Updated EM&A Manual**

We refer to the Updated EM&A Manual submitted by Environmental Team on 3 December 2020 with minor amendment on 31 December 2020. A consolidated Updated EM&A Manual under Condition 3.1 of the Environmental Permit No. EP-489/2014 is submitted and certified by the ET Leader on 31 December 2020.

We would like to inform you that we have no adverse comment on the captioned submission. Therefore we write to verify the captioned submission in accordance with the requirement stipulated in Condition 1.9 of EP-489/2014.

Should you have any query, please feel free to contact the undersigned at 3922 9376.

Yours faithfully,  
AECOM Asia Co. Ltd.

Jackel Law  
Independent Environmental Checker



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# 1 Introduction

## 1.1 Purpose of the Manual

- 1.1.1.1 In accordance with Condition 3.1 of Environmental Permit (EP) (EP No. EP-489/2014), an updated Environmental Monitoring and Audit (EM&A) Manual shall be prepared before the commencement of construction works. The first submission of Updated EM&A was made to the Environmental Protection Department (EPD) on 18 September 2015, and finalised and release via the project's dedicated website in January 2016.
- 1.1.1.2 The purpose of this updated EM&A Manual (hereafter referred to as the Manual) is to guide the setup of an EM&A programme to ensure compliance with the recommendations in the approved Environmental Impact Assessment (EIA) Report (Register No. AEIAR-185/2014), to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action. This Manual outlines the monitoring and audit programme proposed for the "Expansion of Hong Kong International Airport into a Three-Runway System" (the project).
- 1.1.1.3 In this updated submission, Section 5 incorporates revised sensitive receiver water quality monitoring locations. Section 10 incorporates an alternative method for passive acoustic monitoring of Chinese White Dolphin and the alternative approach for undertaking Dolphin Exclusion Zone Monitoring.

## 1.2 Project Description

- 1.2.1.1 The project will consist of a new third runway with associated taxiways, aprons (or aircraft stands), as well as new passenger concourse buildings and expansion of the existing Terminal 2 (T2) building. Included in the project will be related airside and landside works and associated ancillary and supporting facilities.

### 1.2.2 Land Formation

- 1.2.2.1 Based on the preferred airport development option identified, land is required to be formed to the north of the existing airport island, which will provide a platform for the development. The proposed land formation works will mainly include:
- Land formation of not more than 650 ha to the north of the existing airport island with partial construction over the contaminated mud pits. The area of land formation is defined to be the area at and above the high water mark of +2.3 mPD; and
  - Modification and integration of the existing seawall at the northern, western and eastern sides of the existing North Runway into the new land formation and re-provisioning of new seawall around the land formation.

### 1.2.3 Airfield Facilities

#### 1.2.3.1 The proposed airfield facilities will mainly include:

- Construction of a third runway, related taxiway systems, associated airfield infrastructure, aircraft navigational aids, approach lighting systems and new Hong Kong International Airport Approach Area (HKIAAA) beacons;
- Construction of the third runway passenger concourse (TRC) aprons;
- Temporary closure and modification of the existing North Runway along with related taxiway systems; and
- Expansion of the freighter aprons in the existing Midfield area between the existing North and South runways.

### 1.2.4 Passenger Facilities

#### 1.2.4.1 The proposed passenger facilities will mainly include:

- Construction of the TRC and passenger fixed link bridges;
- Expansion of the existing passenger T2;
- Extension of the automated people mover (APM) and associated depot and maintenance / stabling areas; and
- Expansion of the baggage handling system (BHS) and associated baggage halls and early bag store.

### 1.2.5 Ancillary Facilities

#### 1.2.5.1 New ancillary facilities will be provided to support the operational needs of the TRC and airfield facilities. These ancillary facilities will be located on the west and east sides of the proposed land formation area (i.e. within the western support area and the eastern support area respectively) and will accommodate utility buildings, airport support developments, air cargo staging, catering, aircraft maintenance, aircraft engine run-up (engine testing) facilities, ground services equipment area, early bag storage facility, fire station, fire training facility, petrol fuelling station, new air traffic control towers (ATCTs), Hong Kong Observatory (HKO) facility, mobile phone system antenna towers, stores, security gate houses, etc.

### 1.2.6 Infrastructure and Utilities

#### 1.2.6.1 The proposed infrastructure and utilities will mainly include:

- Expansion of the landside and airside road network in the passenger, cargo and maintenance areas and landside transportation facilities, including new car parks;
- Construction of new airside road access, including the construction of new airside road tunnels and ramps, to connect the new third runway facilities with the existing airport;
- Modification to existing and construction of new land based infrastructure including the seawater cooling and flushing system, stormwater drainage system, greywater system, sewerage network and potable water supply, Towngas supply, 132 kV / 11 kV and other power supply networks; communication networks; and

- Modifications and re-provisions to existing marine facilities including the underwater aviation fuel pipelines between Hong Kong International Airport (HKIA) and the off-airport fuel receiving facilities at Sha Chau, the associated underwater 11 kV cable and pilot cable and sea rescue boat points.

1.2.6.2 The key project components are shown in **Drawing No. MCL/P132/EMA/1-001 to MCL/P132/EMA/1-004**.

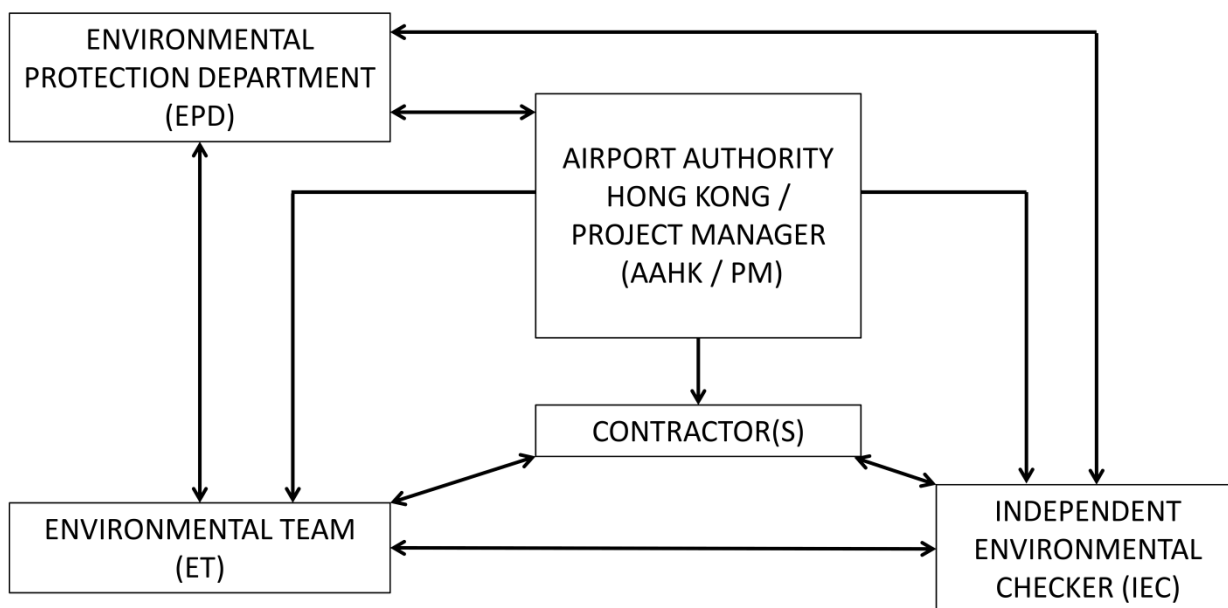
### 1.3 Tentative Construction Programme

1.3.1.1 The tentative programme for operation of the three-runway system (3RS) will be in 2024. Given the scale and complexity of the project, construction and the concurrent runway operational configuration will be implemented in phases. The tentative phasing programme is provided in **Appendix A** which is based on the currently available information. This programme is subject to change during the detailed design stage.

### 1.4 Project Organisation

1.4.1.1 The proposed project organisation is shown in **Chart 1-1** below.

**Chart 1-1: Project Organisation Chart**





## 1.4.2 Airport Authority Hong Kong (AAHK)

- 1.4.2.1 AAHK is the project proponent for the development of the project, and will assume overall responsibility for the project.

## 1.4.3 Environmental Protection Department (EPD)

- 1.4.3.1 EPD is the statutory enforcement body for environmental protection matters in Hong Kong.

## 1.4.4 Project Manager (PM)

- 1.4.4.1 The Project Manager (PM) or the PM's Representative is responsible for overseeing the construction works and for ensuring that the works are undertaken by the Contractor in accordance with the specification and contract requirements. The duties and responsibilities of the PM with respect to EM&A include:

- To monitor the Contractor's compliance with Contract Specifications, including the effective implementation and operation of the environmental mitigation measures;
- To employ an Independent Environmental Checker (IEC) to audit the results of the EM&A works carried out by the Environmental Team (ET);
- To monitor Contractors' compliance with the requirements in the EP and updated EM&A Manual;
- To facilitate ET's implementation of the EM&A programme;
- To participate in joint site inspection by the ET and IEC;
- To oversee the implementation of the agreed Event and Action Plan in the event of any exceedance; and
- To adhere to the procedures for carrying out complaint investigation.

## 1.4.5 Contractors

- 1.4.5.1 The Contractors employed by AAHK, including Contractors working on the project on a joint venture (JV) basis, should report to the PM or the PM's Representative. The duties and responsibilities of the Contractors include:

- To comply with the relevant contract conditions and specifications on environmental protection;
- To facilitate ET's monitoring and site inspection activities;
- To participate in the site inspections undertake by the ET and IEC, and undertake any corrective actions;
- To provide information / advice to the ET regarding works programme and activities which may contribute to the generation of adverse environmental impacts;
- To submit proposals on mitigation measures in case of exceedance of Action and Limit Levels in accordance with the Event and Action Plans;
- To implement measures to reduce impact where Action and Limit Levels are exceeded; and
- To adhere to the complaint handling procedures in accordance with this Manual and the Complaint Management Plan.

## 1.4.6 Environmental Team (ET)

1.4.6.1 A full time on-site ET should be employed by the AAHK / PM to conduct the EM&A programme no later than one month before the commencement of construction of the project. The ET should not be in any way an associated body of the Contractor or the IEC for the project. The ET should be headed by the full time on-site ET Leader (ETL). The ETL should have relevant professional qualifications in environmental control and possess at least seven years of experience in EM&A or environmental management. Suitably qualified staff should be included in the ET, and resources for the implementation of the EM&A programme should be allocated to enable fulfilment of the project's EM&A requirements during construction of the project. The ET should report to AAHK / PM and the duties should include:

- To carry out field sampling, field measurement, testing, assessment, and reporting for various environmental parameters as required in this EM&A Manual;
- To analyse the EM&A data, review the success of EM&A programme and the adequacy of mitigation measures implemented, confirm the validity of the EIA predictions and identify any adverse environmental impacts arising and recommend suitable mitigation measures;
- To monitor compliance with conditions in the EP, environmental protection, pollution prevention and control regulations and contract specifications;
- To carry out regular site inspection at least once per week so as to investigate and audit Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation;
- To report on the EM&A results to the AAHK / PM, IEC, EPD and Contractors;
- To vet the Contractor's method statements, design plans and submissions and check that the relevant environmental protection and pollution control measures have been included and are sufficient to comply with contractual and statutory requirements;
- To inform the AAHK / PM, IEC and Contractors the recommend suitable mitigation measures in the case of exceedance of Action and Limit Levels in accordance with the Event and Action Plans;
- To liaise with the IEC on all environmental performance matters, and ensure timely submission of all relevant EM&A pro forma for IEC's approval;
- To provide advice to the Contractors on environmental improvement, awareness and enhancement matters, etc. on site;
- To prepare, certify and submit the Baseline, Monthly, Quarterly, Annual and Final EM&A Review Reports to the AAHK / PM, IEC and EPD timely;
- To keep a contemporaneous log-book of each and every instance or circumstance or change of circumstances, which may affect the compliance with the recommendations of the approved EIA Report and the EP; and
- To set up and manage the dedicated complaint hotline and email channel, and manage the complaint handling procedures in accordance with this Manual and the Complaint Management Plan.

### 1.4.7 Independent Environmental Checker (IEC)

1.4.7.1 The IEC is empowered to audit the environmental performance of construction, but is independent from the management of construction works. As such, the IEC should not be in any way an associated body of the Contractor or the ET for the project. A full time on-site IEC with a supporting team should be employed by the AAHK / PM no later than one month prior to the commencement of the construction of the project. The IEC should be a person who has relevant professional qualifications in environmental control and at least seven years of experience in EM&A or environmental management. The duties and responsibilities of the IEC are:

- To provide proactive advice to the AAHK / PM on EM&A matters related to the project;
- To verify the environmental acceptability of permanent and temporary works and relevant design plans;
- To review and verify the monitoring data and all submissions in connection with the EP, any subsequent Variations of EP (VEPs) and / or Further EP (FEPs), and EM&A reports submitted by the ET;
- To arrange and conduct at least monthly site inspections of the works during the construction phase, and to carry out ad hoc inspections if significant environmental problems are identified;
- To validate and check the accuracy of environmental monitoring;
- To audit the compliance with the complaint handling procedures in accordance with this Manual and the Complaint Management Plan;
- To verify the ET's log-book and the investigation result of any environmental exceedance, non-compliance and complaint cases, compliance with the agreed Event and Action Plan and the effectiveness of corrective actions / measures;
- To feedback audit results to the ET by signing off relevant EM&A pro forma;
- To verify EM&A reports that have been certified by the ETL;
- To audit EIA recommendations and requirements against the status of implementation of environmental mitigation measures on site;
- To report the works conducted, and the findings, recommendations and improvements of the site inspections, after reviewing ET's and Contractor's works, to the AAHK / PM on a monthly basis; and
- To review the effectiveness of the EM&A programme, EIA recommendations and the adequacy of mitigation measures implemented.

## 2 Air Quality Impact

### 2.1 Construction Air Quality Monitoring

#### 2.1.1 General

2.1.1.1 The project is anticipated to give rise to construction dust impacts. The key activities that would potentially result in dust emissions include land formation works; construction works on the newly formed land and on the existing airport island; operation of concrete batching plants, asphalt batching plants, crushing plant, and barging points; haul roads; diversion of submarine fuel pipeline; diversion of submarine 11 kV cable; and modifications to existing outfalls. Construction phase dust monitoring is considered necessary to check and ensure compliance that the relevant recommended mitigation measures are properly implemented.

2.1.1.2 The key objectives of the construction phase dust monitoring are:

- To identify the extent of dust impact during construction phase on sensitive receivers;
- To audit the compliance of the Contractor with regard to dust control, contract conditions and the relevant dust impact criteria;
- To determine the effectiveness of mitigation measures to control fugitive dust emission from activities during the construction phase;
- To recommend further mitigation measures if found to be necessary; and
- To comply with Action and Limit Levels for air quality as defined in this Manual.

#### 2.1.2 Air Quality Parameters

2.1.2.1 Monitoring and audit of 24-hour Respirable Suspended Particulates (RSP or PM<sub>10</sub>) and 24-hour Fine Suspended Particulates (FSP or PM<sub>2.5</sub>) levels are not proposed. This is because even under the hypothetical worst case Tier 1 mitigated scenario both 24-hour RSP and 24-hour FSP would comply with the corresponding Air Quality Objectives (AQO) at all Air Sensitive Receivers (ASR) throughout the construction period, except the limited non-compliance with the AQO for 24-hour RSP at up to three ASR in three of the eight construction years. Hence no significant RSP or FSP impacts are anticipated. Therefore, only 1-hour Total Suspended Particulates (TSP) will be monitored and audited at the proposed monitoring locations. Details of the proposed monitoring locations are presented in **Section 2.1.5**.

2.1.2.2 One-hour TSP levels shall be measured to indicate the impacts of construction dust on air quality. The TSP levels shall be measured by following the standard high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B. Upon approval of the AAHK / PM, as an alternative to using high volume sampling method, 1-hour TSP levels can be measured by direct reading methods which are capable of producing comparable results as that by the high volume sampling method, to indicate short event impacts.

2.1.2.3 All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and any other local atmospheric factors affecting or affected by site conditions etc. shall be recorded down in detail. A sample data sheet is shown in **Appendix B**. The ET may develop project specific data sheet to suit this EM&A programme.

### 2.1.3 Monitoring Equipment

#### Technical Specifications as Presented in the Original EM&A Manual

2.1.3.1 High volume sampler (HVS) shall be used for carrying out the 1-hour TSP monitoring.

2.1.3.2 The ET is responsible for provision of the monitoring equipment. They shall ensure that sufficient number of samplers with an appropriate calibration kit is available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. The samplers shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals. All the equipment, calibration kit, filter papers, etc. shall be clearly labelled.

2.1.3.3 Initial calibration of dust monitoring equipment shall be conducted upon installation and thereafter at bi-monthly intervals. The transfer standard shall be traceable to the internationally recognised primary standard and be calibrated annually. The calibration data shall be properly documented for future reference by the concerned parties such as the IEC. All the data shall be converted into standard temperature and pressure condition.

2.1.3.4 The flow-rate of the sampler before and after the sampling exercise with the filter in position shall be verified to be constant and be recorded down in the data sheet as shown in **Appendix B**.

2.1.3.5 If the ET proposes to use a direct reading dust meter to measure 1-hour TSP levels, they shall submit sufficient information to the IEC to prove that the instrument is capable of achieving a comparable result as that of the HVS and may be used for the 1-hour sampling. The instrument shall also be calibrated regularly, and the 1-hour sampling shall be determined periodically by HVS to check the validity and accuracy of the results measured by direct reading method.

**2.1.3.6** Wind data monitoring equipment shall also be provided and set up at conspicuous locations for logging wind speed and wind direction near to the dust monitoring locations. The equipment installation location shall be proposed by the ET and agreed with the IEC. For installation and operation of wind data monitoring equipment, the following points shall be observed:

- The wind sensors shall be installed on masts at an elevated level 10 m above ground so that they are clear of obstructions or turbulence caused by the buildings;
- The wind data shall be captured by a data logger. The data recorded in the data logger shall be downloaded periodically for analysis at least once a month;
- The wind data monitoring equipment shall be re-calibrated at least once every six months; and
- Wind direction shall be divided into 16 sectors of 22.5 degrees each.

**2.1.3.7** In exceptional situations, the ET may propose alternative methods to obtain representative wind data upon approval from the AAHK / PM and agreement from the IEC.

Proposed Use of Portable Direct Reading Dust Meter and Existing Wind Data from Chek Lap Kok Wind Station

**2.1.3.8** Based on the provisions and requirements set out in **Section 2.1.3.5** above, a proposal of using portable direct reading dust meter in undertaking the EM&A for the 3RS project was submitted to the IEC, and agreement from the IEC was obtained. The proposal concluded that the portable direct reading dust meter is capable to provide comparable results of monitoring data as that provided by HVS, and with the benefits of allowing prompt and direct results for the EM&A reporting. The portable direct reading dust meter will be calibrated every year against HVS to check the validity and accuracy of the results measured by direct reading method.

**2.1.3.9** On the other hand, the proposed use of existing wind data from Chek Lap Kok Wind Station operated by HKO for wind data collection instead of setting up a separate station near the existing station was submitted to the IEC. Agreement from the AAHK / PM and IEC's approval was obtained.

## **2.1.4 Laboratory Measurement / Analysis**

**2.1.4.1** A clean laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments, to handle the dust samples collected, shall be available for sample analysis, and equipment calibration and maintenance. The laboratory should be the Hong Kong Laboratory Accreditation Scheme (HOKLAS) accredited or other internationally accredited.

**2.1.4.2** If a site laboratory is set up or a non-HOKLAS accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment shall be approved by the AAHK / PM and the measurement procedures should be witnessed by the IEC. Measurement performed by the laboratory shall be demonstrated to the satisfaction of the AAHK / PM and the IEC. The IEC shall conduct regular audit to the measurement performed by the laboratory to ensure the accuracy of measurement results. The ET shall provide the AAHK / PM with one copy of the Title 40 of the Code of Federal regulations, Chapter 1 (part 50), Appendix B for his reference.

**2.1.4.3** Filter paper of 8" X 10" shall be labelled before sampling of TSP. It shall be a clean filter paper with no pin holes, and shall be conditioned in a humidity controlled chamber for over 24-hour and be pre-weighed before use for the sampling.

**2.1.4.4** After sampling, the filter paper loaded with dust shall be kept in a clean and tightly sealed plastic bag. The filter paper is then returned to the laboratory for reconditioning in the humidity controlled chamber followed by accurate weighing by an electronic balance with a readout down to 0.1 mg. The balance shall be regularly calibrated against a traceable standard.

**2.1.4.5** All the collected samples shall be kept in a good condition for six months before disposal.

## **2.1.5 Monitoring Locations**

### Technical Specifications as Presented in the Original EM&A Manual

**2.1.5.1** Two separate air quality monitoring locations are proposed and summarised in **Table 2-1**. The status and locations of dust sensitive receivers may change after issuing this Manual. If such cases exist, the ET should propose updated monitoring locations and seek agreement from EPD, and agreement from the AAHK / PM and IEC before baseline monitoring commences.

**Table 2-1: Construction Air Quality Monitoring Stations**

ID	ID Adopted in EIA	Description	Monitoring Parameters
AR1	TC-13	Seaview Crescent Block 1	1-hour TSP
AR2	ST-1	Village house at Tin Sum	1-hour TSP

**2.1.5.2** When alternative monitoring locations are proposed, the following criteria, as far as practicable, shall be followed:

- At the site boundary or such locations close to the major dust emission source;
- Close to the sensitive receptors; and
- Take into account the prevailing meteorological conditions.

**2.1.5.3** Monitoring equipment must be positioned, sited and orientated properly. The ET should agree with the AAHK / PM in consultation with the IEC on the position of the samplers for the installation of the monitoring equipment. When positioning the samplers, the following points shall be noted:

- A horizontal platform with appropriate support to secure the samplers against gusty wind shall be provided;
- No two samplers shall be placed less than 2 m apart;
- The distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;
- A minimum of 2 m of separation from walls, parapets and penthouses is required for rooftop samplers;
- A minimum of 2 m separation from any supporting structure, measured horizontally is required;
- No furnace or incinerator flue is nearby;
- Airflow around the sampler is unrestricted;
- The sampler is more than 20 m from the dripline;
- Any wire fence and gate, to protect the sampler, shall not cause any obstruction during monitoring;
- Permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
- A secured supply of electricity is needed to operate the samplers.

**2.1.5.4** The ET may, depending on site conditions and monitoring results, decide whether additional monitoring locations should be included or any monitoring locations could be removed / relocated during any stage of the construction phase.

#### Updated Monitoring Locations

**2.1.5.5** Based on the provisions and requirements set out in **Sections 2.1.5.1** and **2.1.5.2** above, a change in monitoring location was proposed for AR1 (Block 1 at Seaview Crescent), and agreement was obtained from the AAHK / PM and IEC and EPD. The location of the alternative monitoring station, AR1A, is shown in **Drawing No. MCL/P132/EMA/2-001**. The location of the originally proposed monitoring location AR1 is also shown in the same drawing for easy reference. **Table 2-2** summarises the updated locations of the construction air quality monitoring stations.

**2.1.5.6** A change of the monitoring location in both the baseline and subsequent impact monitoring for AR1 was identified necessary as access was not granted for setting up the onsite monitoring station. The new monitoring location AR1A is situated in close proximity to Seaview Crescent and it is also considered to be a representative location for monitoring the construction phase air quality impact from the project.

**Table 2-2: Updated Locations of Construction Air Quality Monitoring Stations**

ID	ID Adopted in EIA	Description	Monitoring Parameters
AR1A <sup>(1)</sup>	-	Man Tung Road Park	1-hour TSP
AR2	ST-1	Village house at Tin Sum	1-hour TSP

Note: (1) alternative air quality monitoring location



## 2.1.6 Baseline Monitoring

- 2.1.6.1** Baseline monitoring should be conducted at all designated monitoring locations, see **Table 2-1**, for at least 14 consecutive days before commencement of construction work to obtain ambient 1-hour TSP samples. The commencement date of baseline monitoring shall be agreed between the ET / IEC / AAHK / PM to ensure timely submission of the baseline monitoring report to EPD. The selected baseline monitoring stations should reflect baseline conditions at the stations. One-hour TSP sampling shall also be done at least three times per day. The baseline monitoring will provide data for the determination of the appropriate Action Levels with the Limit Levels set against statutory or otherwise agreed limits. General meteorological conditions (wind speed, wind direction and precipitation) and notes regarding any significant adjacent dust producing sources should also be recorded throughout the baseline monitoring period.
- 2.1.6.2** Before commencing the baseline monitoring, the ET shall inform the IEC of the baseline monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the baseline monitoring results. During the baseline monitoring, there should not be any construction dust generating activities in the vicinity of the monitoring stations.
- 2.1.6.3** In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the ET shall carry out the monitoring at alternative locations that can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring locations should be approved by the AAHK / PM and agreed with the IEC.
- 2.1.6.4** In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET should liaise with the IEC and EPD to agree on an appropriate set of data to be used as baseline reference and submit to EPD for approval.
- 2.1.6.5** Ambient conditions may vary seasonally and should be reviewed once every six months. If the ET considers that significant changes in the ambient conditions have risen, a repeat of the baseline monitoring may be carried out to update the baseline levels and air quality criteria after consultation and agreement with the AAHK / PM, IEC and EPD. The monitoring should be undertaken at times when Contractor's activities are not generating dust, at least in the proximity of the monitoring stations. Should change in ambient conditions be determined, the baseline levels and, in turn, the air quality criteria, shall be revised. The revised baseline levels and air quality criteria shall be agreed with the IEC and EPD. If the ET considers that significant changes in the ambient conditions have risen but a repeat of the 14-day baseline monitoring is not found feasible due to the presence of ongoing construction work, the ET may propose an alternative method for updating the baseline levels and air quality criteria but this shall be subject to the agreement with the IEC and EPD.

## 2.1.7 Impact Monitoring

- 2.1.7.1** The monthly schedule of the compliance and impact monitoring programme should be drawn up by the ET one month prior to the commencement of the scheduled construction period.
- 2.1.7.2** The ET should carry out impact monitoring throughout the entire course of the Works. For 1-hour TSP monitoring, the sampling frequency of at least three times in every six days should be undertaken when the highest dust impact is expected to occur. Highest dust impacts will be determined by the actual construction site condition, program and the works to be carried out. Before commencing the impact monitoring, the ET should inform the IEC of the impact monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the impact monitoring results.
- 2.1.7.3** In case of non-compliance with the air quality criteria, more frequent monitoring exercise, as specified in the Event and Action Plan, should be conducted within 24 hours after the result is obtained. This additional monitoring shall be continued until the excessive dust emission or the deterioration in air quality is rectified.

## 2.1.8 Event and Action Plan

- 2.1.8.1** Baseline 1-hour TSP monitoring was conducted for 14 consecutive days between 6 November 2015 and 27 November 2015 at two air quality monitoring stations of AR1A and AR2. The Action Levels for 1-hr TSP during impact monitoring are established based on the measured baseline TSP levels for assessing the impact and compliance during the construction of the project. **Table 2-3** shows the air quality criteria, namely Action Level (AL) and Limit Level (LL) to be used. Should non-compliance of the air quality criteria occurs, actions in accordance with the Event and Action Plan in **Table 2-4** should be carried out.

**Table 2-3: Action and Limit Levels for Air Quality**

Parameters	Action Level <sup>[1]</sup>	Limit Level (µg/m <sup>3</sup> )
1-hour TSP Level in µg/m <sup>3</sup>	For baseline level ≤ 384 µg/m <sup>3</sup> , Action Level = (130% of baseline level + Limit Level)/2 For baseline level > 384 µg/m <sup>3</sup> , Action Level = Limit Level	500

Note:

[1] According to the latest submission of Baseline Monitoring Report approved by EPD, the Action Levels for AR1A and AR2 are 306 µg/m<sup>3</sup> and 298 µg/m<sup>3</sup> respectively.

**Table 2-4: Event and Action Plan for Air Quality**

Event	ET	IEC	Action AAHK / PM	Contractor
<b>Action Level</b>				
1. Exceedance for one sample	1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform IEC and AAHK / PM; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method.	1. Notify Contractor.	1. Rectify any unacceptable practice; 2. Amend working methods if appropriate.
2. Exceedance for two or more consecutive samples	1. Identify source; 2. Inform IEC and AAHK / PM; 3. Advise the AAHK / PM on the effectiveness of the proposed remedial measures; 4. Increase monitoring frequency to daily; 5. Discuss with IEC and Contractor on remedial actions required 6. If exceedance continues, arrange meeting with IEC and AAHK / PM 7. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise AAHK / PM on the effectiveness of the proposed remedial measures; 5. Supervisor implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	1. Submit proposals for remedial actions to IEC within three working days of notification; 2. Implement the agreed proposals; 3. Amend proposal if appropriate.
<b>Limit Level</b>				
1. Exceedance for one sample	1. Identify the source, investigate the causes of exceedance and propose remedial measures; 2. Inform AAHK / PM and Contractor. If the exceedance is valid, inform EPD; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; 5. Assess effectiveness of Contractor's remedial actions and keep AAHK / PM, IEC and EPD informed of the results.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise AAHK / PM on the effectiveness of the proposed remedial measures; 5. Monitor the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within three working days of notification; 3. Implement the agreed proposals; 4. Amend proposal if appropriate.
2. Exceedance for two or more consecutive sample	1. Notify AAHK / PM, IEC, Contractor and EPD; 2. Identify source; 3. Repeat measurement to confirm finding;	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss amongst AAHK / PM, ET, and Contractor on the	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. In consultation with IEC, agree with the Contractor on the remedial	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within three working days of notification;

Event	ET	IEC	Action AAHK / PM	Contractor
	4. Increase monitoring frequency to daily; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with AAHK / PM and IEC to discuss the remedial actions to be taken; 7. Assess effectiveness of Contractor's remedial actions and keep AAHK / PM, IEC and EPD informed of the results; 8. If exceedance stops, cease additional monitoring.	potential remedial actions; 4. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise AAHK / PM accordingly; 5. Monitor the implementation of remedial measures.	measures to be implemented; 4. Ensure remedial measures properly implemented; 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	3. Implement the agreed proposals; 4. Resubmit proposals if problem still not under control; 5. Stop the relevant portion of works as determined by AAHK / PM until the exceedance is abated.

### 2.1.9 Mitigation Measures

2.1.9.1 Appropriate dust suppression measures should be adopted as required under the Air Pollution Control (Construction Dust) Regulation as well as the Specified Process licences for the concrete batching plants, asphalt batching plants and rock crushing plant. A control programme can be instigated to monitor the construction process in order to enforce dust controls and modify methods of works where feasible to reduce the dust emission down to acceptable levels. The implementation schedule of the recommended air quality mitigation measures is presented in **Appendix C**.

## 2.2 Operational Air Quality Monitoring

### 2.2.1 General

2.2.1.1 The operational air quality impact assessment presented as part of the EIA Report has concluded that the operation of the project will not give rise to adverse residual air quality impacts. The assessment findings for Year 2031 3RS scenario indicated that cumulative NO<sub>2</sub>, RSP, FSP, SO<sub>2</sub> and CO levels comply with the relevant AQOs at all ASR. Nevertheless, to be prudent, it is proposed that AAHK should carry out regular reviews of the operation phase air quality monitoring results and relevant operation data in order to:

- Monitor the variations in pollutant concentrations and compare these with the operation air quality assessment results presented in the EIA Report;
- Determine the effectiveness of AAHK's measures and initiatives aimed at further reducing air pollutant emissions from airport activities and operations; and
- Identify follow-up actions and / or further investigation that may be undertaken where necessary with a view to further reducing air emissions associated with the operation of the project.

## 2.2.2 Regular Review of Air Quality Monitoring Results

### Existing Air Quality Monitoring Stations

**2.2.2.1** While the establishment of additional air quality monitoring station was not identified necessary, the EIA Report recommended that the current airport air quality monitoring stations shall be maintained. These include three air quality monitoring stations (AQMSs) operated by AAHK, with one at Sha Chau (SC) and two on the existing airport island, namely the North Station (PH1) and South Station (PH5), as shown in **Drawing No. MCL/P132/EMA/2-002**. The AQMS at Tung Chung (TC) operated by EPD is also shown in the drawing.

**2.2.2.2** The PH1 and PH5 stations are positioned on the airport island close to the existing north runway (or the future middle runway after the airport expansion) and the existing south runway respectively; the SC station is over 2.8 km to the north of the expanded airport island; while the TC station is located on the southeast side of the airport island. This network of existing AQMSs is considered to be able to provide representative monitoring data on the air quality on the expanded airport island and its surrounding areas. Therefore, the AQMSs currently operated by AAHK are to be maintained and the monitoring data obtained from these stations should be used, together with that from the TC AQMS operated by EPD, for regular reviews of the operation phase air quality.

**2.2.2.3** **Table 2-5** summaries the existing AQMSs operated by AAHK.

**Table 2-5: Operational Air Quality Monitoring**

Station ID	Station Name	Location	Operated by	Monitoring Parameters
SC	Sha Chau	Sha Chau	Airport Authority	Conc. of NO <sub>2</sub> , RSP, FSP, O <sub>3</sub> , SO <sub>2</sub> and CO reported on hourly basis
PH1	North Station	Existing airport island	Airport Authority	Conc. of NO <sub>2</sub> , RSP, FSP, O <sub>3</sub> , SO <sub>2</sub> and CO reported on hourly basis
PH5	South Station	Existing airport island	Airport Authority	Conc. of NO <sub>2</sub> , RSP, FSP, O <sub>3</sub> , SO <sub>2</sub> and CO reported on hourly basis

### Existing Monitoring Equipment

**2.2.2.4** The existing monitoring equipment of NO<sub>2</sub>, RSP, FSP, O<sub>3</sub>, SO<sub>2</sub> and CO at the three AQMSs operated by AAHK are summarised in **Table 2-6**. As the equipment may be replaced due to certain period of utilisation, the monitoring equipment shall be reviewed by the ET prior to the monitoring during operational phase of the project.

**Table 2-6: The Existing Monitoring Equipment Adopted at South Station, North Station and Sha Chau Station**

Parameters	Adopted Technique	Existing monitoring equipment
NO <sub>2</sub>	Gas Phase Chemiluminescence	Ecotech EC9841B / Thermo Scientific 42i
RSP	Drawing air through a filter at a constant rate, continuously weighing the filter and calculating near real-time mass concentrations	TEOM 1405DF Ambient Particulate Monitor
FSP		
O <sub>3</sub>	Non-dispersive ultraviolet (UV) photometer	Thermo Scientific 49i/ Ecotech EC9810B
SO <sub>2</sub>	Ultraviolet Fluorescence	Thermo Scientific 43i/ Ecotech EC9850B
CO	Gas Filter Correlation photometry	Thermo Scientific 48i/ Ecotech EC9830B

#### Selection of Air Quality Parameters for Review

**2.2.2.5** NO<sub>x</sub> is the key air pollutant associated with airport operations. The source contribution breakdown for the cumulative annual average NO<sub>2</sub> impact at the key sensitive areas under the 3RS scenario in the worst assessment year of 2031 presented in Table 5.5.2 of the EIA Report are reproduced in **Table 2-7** below. The dominant emission sources were identified to be from ambient emissions, which contributed in most cases more than 60% of the total NO<sub>2</sub> concentrations. This is followed by proximity infrastructure emissions (10 – 30%) and airport-related emissions (< 10%), except for Sha Lo Wan.

**Table 2-7: Concentration Breakdown for the Cumulative Annual NO<sub>2</sub> Impact at the Key Sensitive Area under the 3RS scenario in Year 2031**

Area	ASR	Airport Related Emission (µg/ m <sup>3</sup> )	Proximity Infrastructure Emission (µg/ m <sup>3</sup> )	Ambient (µg/ m <sup>3</sup> )	Cumulative Impact (µg/ m <sup>3</sup> )
Tung Chung	TC-22	2	9	22	33
Tung Chung West	TC-P7	2	6	22	30
Tung Chung East	TC-P12	2	4	22	28
Sha Lo Wan	SLW-1	12	4	20	36
Tuen Mun <sup>[1]</sup>	TM-10	2 <sup>[1]</sup>	9	27	38

Note:

[1] Airport related emission is included in ambient in PATH model for Tuen Mun area

**2.2.2.6** Based on the operational air quality assessment findings presented in the EIA Report, NO<sub>2</sub> is considered as the key parameter for which the available monitoring data obtained at AAHK's AQMSs together with that obtained at EPD's AQMS in TC should be regularly reviewed during the operation phase of the project. The regular review shall also analyse and present the measured NO and NO<sub>x</sub> concentrations for estimating the pollutant contribution due to airport operations. To be prudent, available monitoring data on RSP and FSP should also be included in the regular reviews.

### Frequency of Review

- 2.2.2.7 It is recommended that the first review of NO<sub>2</sub>, RSP and FSP monitoring results should be carried out after the first year of operation of 3RS. Regular review should then be carried out at regular interval of at least every five years during the first 20 years of operation of the project. The frequency of the reviews may be subject to changes depending on the review results.

## **2.2.3 Operational Phase Air Quality Monitoring and Audit Requirements**

- 2.2.3.1 During the regular review of NO<sub>2</sub>, RSP and FSP monitoring results, a detailed examination of the temporal and spatial variations of pollutant levels measured at AAHK's AQMSs shall be presented and the analysis shall also take into consideration the available monitoring data obtained at EPD's AQMS in TC. With consideration of the available data including those on meteorological conditions (i.e., wind direction, wind speed, temperature, precipitation, etc), the review shall characterise the mean seasonal and diurnal variation of pollutant concentrations, with a view to evaluating the significance of the contribution of air quality impact from airport emissions on the nearby air sensitive receivers. Also, the regular review shall include the compilation of an updated inventory of major emission sources, including emissions from aircraft landing take-off (LTO) cycle, associated with the airport operations. AAHK shall collect the relevant information for development of the latest airport emissions inventory as part of the review.
- 2.2.3.2 As part of the regular review, the effectiveness of existing measures and initiatives implemented by AAHK aimed at further reducing air pollutant emissions from airport operation shall also be evaluated. Follow-up actions and/or further investigation work that may be undertaken where necessary with a view to further reducing air emissions associated with the operation of the project should be recommended as part of the regular review.
- 2.2.3.3 The detailed air quality monitoring and auditing requirements should be presented as part of the Airport Operation related Emissions Control Plan that shall be submitted no later than 3 months before the operation of the project in accordance to EP Condition 2.24.

## 3 Hazard to Human Life

### 3.1 Introduction

- 3.1.1.1 A hazard identification workshop has been conducted in the EIA Report to identify potential hazards associated with the construction and operation phase of the project. Mitigation measures have also been explored to prevent the hazards from happening and they will be implemented in the project.
- 3.1.1.2 A hazard assessment has been conducted in the EIA Report which concluded that the risk level for the construction phase is within the acceptable region and mitigation measure is not required. The risk level for the operation phase has been evaluated to be in As Low As Reasonably Practicable (ALARP) region and the major risk contributor is aircraft refuelling operation. Practicable and cost effective mitigations have been proposed to reduce the risk of aircraft refuelling operation.

### 3.2 Recommendation

- 3.2.1.1 The recommended measures as outlined in the Implementation Schedule included as **Appendix C** in this EM&A Manual should be implemented to meet the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) requirements.



## 4 Noise Impact

### 4.1 Aircraft Noise Monitoring

#### 4.1.1 Aircraft Noise Monitoring and Audit Requirements

4.1.1.1 As per the requirements set out in Section 7, Appendix C of the EIA Study Brief, the aircraft noise monitoring and audit plan shall:

- Provide data and information for verifying predictions on the effectiveness of measures to mitigate aircraft noise impact of the project;
- Formulate audit requirements, including any necessary compliance and post-project audit program, in order to review the monitoring data and identify any remedial works, as necessary, required to address unacceptable or unanticipated aircraft noise impacts; and
- Provide tools, procedures and supplementary information, including noise descriptor and flight tracks, which are useful and relevant for communicating the aircraft noise of the project to the general public.

4.1.1.2 The Procedures for Mitigation of Aircraft Noise that shall be submitted no later than 3 months before the operation of the project in accordance to EP Condition 2.21.

#### 4.1.2 Program Elements

4.1.2.1 Taking into account the EIA Study Brief requirements as described above, it is proposed that the aircraft noise monitoring and audit plan should consist of the following key elements:

- An exercise by AAHK to verify predictions on the effectiveness of measures to mitigate aircraft noise impact and the preparation of a Prediction Verification Report;
- Review Report, prepared on an annual basis by AAHK, for detailing the compliance with noise abatement procedures and unanticipated events, as well as any further necessary investigation and/or remedial action(s); and
- Noise Contour Report, prepared in at least every five years by AAHK, to compare actual airport operation to forecast airport operation with respect to aircraft noise, taking into account data collected on actual aircraft operational levels, fleet mix, runway and flight track utilizations; and produce an updated noise contour using the most currently available and internationally accepted noise modelling methodology.

- 4.1.2.2 In addition to the above reporting requirements, AAHK shall continue to engage with the neighbouring communities in the vicinity of HKIA, other stakeholders and interested parties on aircraft noise issues associated with the operation of the project.

#### 4.1.3 Prediction Verification

- 4.1.3.1 The purpose of this task is for verification of predictions on the effectiveness of measures to mitigate aircraft noise impact of the project. This verification exercise shall be undertaken upon availability of relevant airport operation data for the first full year operation of the third runway of the project. A Prediction Verification Report, certified by the ETL and verified by the IEC, shall be submitted to EPD for approval.
- 4.1.3.2 As part of the prediction verification exercise, AAHK should collect radar data showing airport and flight operations for the first full year operation of the proposed third runway from Civil Aviation Department (CAD). Based on the radar data collected, the AAHK should carry out aircraft noise contour simulation. Similar approach adopted to process radar data for the prevailing scenario contour as presented in Chapter 7 of the EIA Report might be applied (individual radar data be pre-processed and annual daily average noise contours be produced by Integrated Noise Model (INM) for daily results) and the detailed methodology shall be agreed with EPD. The computational model to be used shall also be agreed with EPD prior to the analysis.
- 4.1.3.3 The Noise Exposure Forecast (NEF) 25 contour prepared based on radar data should be compared against the noise contours presented in Chapter 7 of the EIA Report for verifying the effectiveness of measures to mitigate the aircraft noise impact of the project. If the comparison of contours shows a reasonable converge, this would imply the aircraft noise prediction by computer simulation with forecast, assumptions and proposal of mitigation measures would reliably reflect that by actual airport and flight operations. In case discrepancies are observed, explanation shall be given and analysed as part of the Prediction Verification Report.
- 4.1.3.4 It shall be noted that the noise contours presented in Chapter 7 of the EIA Report are based on reasonable assumptions and input data including air traffic forecast, runway mode of operation, flight tracks and flight track utilisation, and proposed mitigation measures. Therefore, whilst it is being compared with the one generated by actual airport and flight operations, variances within reasonable ranges are envisaged and considered acceptable. Having said that, it is essential to ensure that with the mitigation measures recommended in the EIA Report, no additional noise sensitive receivers should be subject to adverse environmental impact under the requirements of the EIAO-TM. Detailed examination should be followed especially for those areas with major variances and the underneath rationale(s) will be elaborated.

#### 4.1.4 Review Report

- 4.1.4.1 The Review Report, prepared on an annual basis by AAHK shall include an analysis of how well aircraft flight follow each of the aircraft noise mitigation measures recommended in Chapter 7 of the EIA Report. Information to be collected shall include available radar data showing airport and flight operations from CAD, and this is to be analysed in terms of flight tracks and runway utilisation for checking the effective implementation of the noise reduction measures. AAHK may make references to available operational noise data collated by the relevant authorities. Wind record in the year should also be collected from HKO. The Review Report should review the data collected including measured noise levels at representative locations, statistics of flight tracks, flight tracks dispersion and aircraft using proposed mitigation measures and existing noise mitigation measures, etc.
- 4.1.4.2 The annual review and reporting process will allow AAHK to measure exactly how it stands compared to predicted operations used in the preparation of the EIA Report. If there are any major variances / discrepancies / abnormalities that are observed during the ongoing process of data collection and analysis for preparation of the annual review when compared with the assumptions / measures adopted in the assessment, early investigation shall be carried out for identification of the possible causes of the variances / discrepancies / abnormalities and whether these would significantly affect the aircraft noise environment.

#### 4.1.5 Noise Contour Report

- 4.1.5.1 As the aircraft noise impact assessment was undertaken on the basis of projected air traffic movements and estimated fleet mix, it is recommended that at regular intervals of at least every five years during the first 20 operational years of the project, actual flight data obtained from local Air Traffic Control radar systems should be acquired and analysed with a similar aircraft noise modelling methodology to confirm the representativeness of the earlier noise analyses. The first Noise Contour Report shall be prepared upon availability of the airport operation data for the first full year operation of the third runway of the project. In accordance with the requirements set out in Condition 2.22 of the EP, an updated NEF 25 contour shall also be submitted no later than 3 months after a full year of operation of the 3RS project. Similar approach adopted to process radar data for prevailing scenario contour might be applied and the detailed methodology shall be agreed with EPD.
- 4.1.5.2 At such time that it is determined that the noise contours obtained using actual airport data may start to encroach onto any additional noise sensitive receivers, or when it is considered that there are major deviations from the assumptions adopted in the EIA Report, additional analysis would be necessary to update the NEF 25 contour. The need and feasibility of introducing additional mitigation measures should also be assessed to ensure that no adverse environmental impact would be resulted from the implementation of the project with respect to aircraft noise.

#### 4.1.6 Community Liaison

- 4.1.6.1 AAHK has been actively engaging with neighbouring communities in the vicinity of the airport, other stakeholders groups and interested parties to communicate issues and gauge views on aircraft noise and other environmental aspects. Briefings and airport visits are organised to explain subjects including but not limited to flight paths under the planned 3RS and the proposed aircraft noise mitigation measures. These engagement activities will continue after commencement of the project and a community liaison plan that presents details of the planned programme, including proposed communication channels, tools, procedures and supplementary information, including noise descriptor and flight tracks in accordance with Section 7.3, Appendix C of the Study Brief and activities that would facilitate communications with stakeholders on aircraft noise issues, will be developed by AAHK as part of the detailed Aircraft Noise Monitoring and Audit Plan presented in **Section 4.1.7** below.

#### 4.1.7 Detailed Aircraft Noise Monitoring and Audit Plan

- 4.1.7.1 The above subsections set out a clear EM&A framework with respect to aircraft noise. It is not yet mature to define all the monitoring and audit details as at the course of assessment whilst the EM&A task will only be started with operation commencement of the third runway of the project because computation model and data analysis tools are in rapid evolution nowadays.
- 4.1.7.2 Prior to commencement of project operation, a detailed Aircraft Noise Monitoring and Audit (ANM&A) Plan, proposing (i) work programme; (ii) actual data collection; (iii) methodologies / procedures, including proposed computation model, to process data into indicators of measures / assumptions adopted; (iv) quality control and assurance procedure; (v) action / investigation plan if any non-compliance, including associated Action and Limit Levels; (vi) community liaison plan; (vii) relevant proforma forming part of the reports; (viii) any foreseeable uncertainties, etc, should be submitted to EPD for agreement.
- 4.1.7.3 In accordance with the requirements set out in EP Condition 2.23, the ANM&A Plan shall include information on aircraft noise monitoring at representative locations in Tung Chung, Ma Wan, Tsing Yi, Tsuen Wan, Ting Kau, Siu Lam and Tuen Mun. The ANM&A Plan shall make use of available aircraft noise and flight track monitoring data including measured noise levels in terms of dB(A) and their distribution, flight tracks, aircraft fleet mix data and other relevant information at the above-mentioned locations. The ANM&A Plan shall also include an action plan, as approved by Director-General of Civil Aviation, to review the noise data to assess the effectiveness of the mitigation measures and to take appropriate action with reference to the prevailing internationally recognised standards in aircraft noise mitigation.

- 4.1.7.4** Before submission to the Director of Environmental Protection for approval, the ANM&A Plan shall be certified by the ETL and verified by the IEC as conforming to the information and recommendations described in the EIA Report, and taking into account any specific requirements with respect to the latest in-situ conditions of the project.
- 4.1.7.5** When developing the detailed plan, references should be made to relevant international guidelines such as SAE ARP4721 Part 1 – Monitoring Aircraft Noise and Operations in the Vicinity of Airports: System Description, Acquisition, and Operation, if applicable, for the purpose of review and describe the project operation. The latest monitoring and audit practice / presentation adopted by similar international airports should be reviewed and reference during the course of preparation of this detailed plan.

## **4.2 Fixed Noise Sources Monitoring**

### **4.2.1 Maximum Permissible Sound Power Levels of Fixed Plant**

- 4.2.1.1** The maximum permissible sound power levels of the identified fixed noise sources of the project were predicted in the EIA Report. The specified sound power levels should be implemented and refined by the Contractor as appropriate to ensure that the noise impact associated with the fixed plant operations would comply with the noise standards stipulated in the EIAO-TM and Noise Control Ordinance (NCO).

### **4.2.2 Commissioning Test**

- 4.2.2.1** Prior to the operation of the project, the Contractor should conduct noise commissioning tests for all major fixed plant noise sources (excluding the ground noise sources associated with the aircraft taxiing and the operation of auxiliary power units (APUs)) within HKIA to ensure the noise emission at the fixed plant noise source comply with the EIA Report assessed scenario. The test should be carried out by a qualified person possessing at least seven years of noise control experience and a corporate membership of Hong Kong Institute of Acoustics or equivalent. The noise commissioning test report should be submitted to the AAHK / PM, ET and IEC for approval. The ET and IEC should review design changes to ensure the cumulative noise impact from fixed noise sources comply with the EIA Report assessed scenario.
- 4.2.2.2** Noise commissioning tests are also required for noise enclosure of aircraft engine run-up facilities. ISO 10847 – In-situ determination of insertion loss of outdoor noise barriers of all types shall be employed to ensure the required noise reduction (insertion loss) in the EIA Report (at least 15 dB(A)) would be achieved. The test should be carried out by a qualified person possessing at least seven years of noise control experience and a corporate membership of Hong Kong Institute of Acoustics or equivalent. The noise commissioning test report should be submitted to the AAHK / PM, ET and IEC for approval.
- 4.2.2.3** No adverse noise impacts are anticipated from aircraft taxiing and APU operation, hence no environmental monitoring and audit is proposed.

### 4.2.3 Mitigation Measures

- 4.2.3.1 The relevant noise mitigation measures have been recommended in the EIA Report. The implementation schedule of the mitigation measures is given in **Appendix C**.

## 4.3 Construction Airborne Noise Monitoring

### 4.3.1 Noise Parameter

- 4.3.1.1 The construction noise level should be measured in terms of the A-weighted equivalent continuous sound pressure level ( $L_{eq}$ ).  $L_{eq(30 \text{ minutes})}$  should be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays. For all other time periods, a Construction Noise Permit (CNP) under the NCO would apply.
- 4.3.1.2 As supplementary information for data auditing, statistical results such as  $L_{10}$  and  $L_{90}$  should also be obtained for reference. A sample data record sheet based on the one presented in the “EM&A Guidelines for Development Projects in Hong Kong” is shown in **Appendix B** for reference.

### 4.3.2 Monitoring Equipment

- 4.3.2.1 As referred to in the Technical Memorandum (TM) issued under the NCO, sound level meters in compliance with the International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) specifications should be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement the accuracy of the sound level meter should be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agrees to within 1.0 dB.
- 4.3.2.2 Noise measurements should be made in accordance with standard acoustical principles and practices in relation to weather conditions. Handheld wind meter should be used for measuring and checking the wind speed (in m/s) during the noise monitoring.
- 4.3.2.3 The ET is responsible for the availability of monitoring equipment and should ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation should be clearly labelled.

### 4.3.3 Monitoring Locations

#### Technical Specifications as Presented in the Original EM&A Manual

- 4.3.3.1 The noise monitoring locations are summarised in **Table 4-1**. The status and locations of noise sensitive receivers may change after issuing this manual. If such case exists, the ET should propose updated monitoring locations and seek approval from the AAHK / PM and agreement from the IEC and EPD of the proposal.

**Table 4-1: Construction Noise Monitoring Stations**

ID	ID adopted in EIA	Description
NM1	TC-1	Seaview Crescent Block 1
NM2	TC-5	Tung Chung West Development (Monitoring to start after occupation of development in 2023/24, subject to the construction programme of the project)
NM3	TC-30	Ho Yu College
NM4	TC-37	Ching Chung Hau Po Woon Primary School
NM5	TS-1	House, Tin Sum
NM6	SLW-1	House No. 1, Sha Lo Wan

**4.3.3.2** When alternative monitoring locations are proposed, the monitoring locations should be chosen based on the following criteria:

- Monitoring at sensitive receivers close to the major site activities which are likely to have noise impacts;
- Monitoring at the noise sensitive receivers as defined in the Technical Memorandum; and
- Assurance of minimal disturbance to the occupants during monitoring.

**4.3.3.3** The monitoring station should normally be at a point 1 m from the exterior of the sensitive receivers building facade and be at position 1.2 m above the ground. If there is a problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements should be made. For reference, a correction of +3 dB(A) should be made to the free field measurements. The ET should agree with the IEC on the monitoring position and the corrections adopted. Once the positions for the monitoring stations are chosen, the baseline monitoring and the impact monitoring should be carried out at the same positions.

#### Updated Monitoring Locations

**4.3.3.4** Based on the provisions and requirements set out in **Sections 4.3.3.1** and **4.3.3.2** above, a change in monitoring location was proposed for NM1, NM2 and NM3. Agreement from the AAHK / PM, IEC and EPD's approval were obtained for the changes. The locations of the alternative monitoring stations, including NM1A, NM2\* and NM3A, are shown in **Drawing No. MCL/P132/EMA/4-001**. The locations of the originally proposed monitoring locations (NM1, NM2 and NM3) are also shown in the same drawing for easy reference. **Table 4-2** summarises the updated locations of the construction noise monitoring stations.

**4.3.3.5** The noise monitoring location in both the baseline and subsequent impact monitoring for NM1 was changed to NM1A as access to NM1 was not granted for setting up an onsite monitoring station.



- 4.3.3.6** The noise monitoring location in both the baseline and subsequent impact monitoring for NM3 was changed to NM3A also as access to NM3 was not granted for setting up an onsite monitoring station. Moreover, when construction works of Tung Chung East Development near NM3A is in place, the monitoring will be temporary suspended with duration subjected to the programme of the development works and actual site conditions, and will be resumed when the development works is completed. Actual arrangement of this station will be reflected in relevant Monthly EM&A Reports.
- 4.3.3.7** Baseline noise monitoring at NM2 was undertaken at NM2\* as Tung Chung West Development had not yet been constructed. When the future residential buildings in Tung Chung West Development become occupied, the impact monitoring would be carried out at a representative location with noise sensitive land uses and the exact location will be proposed by the ET for agreement with the IEC and EPD prior to commencement of the impact monitoring.

**Table 4-2: Construction Noise Monitoring Stations**

ID	ID adopted in EIA	Description
NM1A <sup>(1)</sup>	-	Man Tung Road Park
NM2* <sup>(1)</sup> / NM2	TC-5	Tung Chung Battery* / Tung Chung West Development (Monitoring to start after occupation of development in 2023/24, subject to the construction programme of the project)
NM3A <sup>(1)</sup>	-	Site Office at the northern edge of the reclaimed land (Monitoring to be temporarily suspended during construction works of Tung Chung East Development subject to programme of the works and actual site conditions)
NM4	TC-37	Ching Chung Hau Po Woon Primary School
NM5	TS-1	House, Tin Sum
NM6	SLW-1	House No. 1, Sha Lo Wan

Note: (1) alternative noise monitoring location

#### 4.3.4 Baseline Monitoring

- 4.3.4.1** The ET should carry out baseline noise monitoring prior to the commencement of the project-related construction activities. The baseline monitoring should be carried out daily for a period of at least two weeks. The commencement date of baseline monitoring shall be agreed between the ET / IEC / AAHK / PM to ensure timely submission of the baseline monitoring report to EPD. Before commencing the baseline monitoring, the ET should develop and submit to the IEC the baseline monitoring programme such that the IEC can conduct on-site audit to check accuracy of the baseline monitoring results.
- 4.3.4.2** There should not be any construction activities in the vicinity of the stations during the baseline monitoring.
- 4.3.4.3** In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET should liaise with the AAHK / PM, IEC and EPD to agree on an appropriate set of data to be used as a baseline reference and submit to the AAHK / PM and IEC for agreement and EPD for approval.



### 4.3.5 Impact Monitoring

**4.3.5.1** Noise monitoring should be carried out at all the designated monitoring stations when there are project-related construction activities undertaken. The monitoring frequency should depend on the scale of the construction activities. The following is an initial guide on the regular monitoring frequency for each station on a weekly basis when noise generating activities are underway:

- One set of measurements between 0700-1900 hours on normal weekdays.

**4.3.5.2** If construction works are extended to include works during the hours of 1900-0700 as well as public holidays and Sundays, additional impact monitoring (including monitoring locations) during respective periods of restricted hours should be subject to the CNP requirements by EPD. Applicable permits under NCO should also be obtained by the Contractor.

**4.3.5.3** For schools located near the HKIA (e.g. NM4), noise monitoring should be carried out at the monitoring stations for the schools during the school examination periods. The ET should liaise with the school's personnel and the Examination Authority to ascertain the exact dates and times of all examination periods during the course of the contract.

**4.3.5.4** In case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in the Event and Action Plan in **Table 4-4**, should be carried out. This additional monitoring should be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

### 4.3.6 Event and Action Plan for Noise

**4.3.6.1** The Action and Limit Levels for construction noise are defined in **Table 4-3**. Should non-compliance of the criteria occur, action in accordance with the Event and Action Plan in **Table 4-4**, should be carried out.

**Table 4-3: Action and Limit Levels for Construction Noise**

Time Period	Action	Limit
0700-1900 hours on normal weekdays	When one valid documented complaint is received.	75* dB(A)
Note: * reduce to 70 dB(A) for schools and 65 dB(A) during school examination periods.		

**Table 4-4: Event and Action Plan for Construction Noise**

Event	ET	IEC	Action AAHK / PM	Contractor
Action Level	<ol style="list-style-type: none"> <li>1. Notify AAHK / PM, IEC and Contractor;</li> <li>2. Carry out investigation;</li> <li>3. Report the results of investigation to the AAHK / PM, IEC and Contractor;</li> <li>4. Discuss with IEC and Contractor on remedial measures required;</li> <li>5. Increase monitoring frequency to check mitigation effectiveness.</li> </ol>	<ol style="list-style-type: none"> <li>1. Review the investigation results submitted by the ET;</li> <li>2. Review the proposed remedial measures by the Contractor and advise the AAHK / PM accordingly;</li> <li>3. Advise AAHK / PM on the effectiveness of the proposed remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> <li>3. In consolidation with IEC, agree with the Contractor on the remedial measures to be implemented;</li> <li>4. Supervise the implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Submit noise mitigation proposals to AAHK / PM and IEC;</li> <li>2. Implement noise mitigation proposals.</li> </ol>
Limit Level	<ol style="list-style-type: none"> <li>1. Inform AAHK / PM, IEC and Contractor;</li> <li>2. Repeat measurements to confirm findings;</li> <li>3. Inform EPD after confirming the validity of exceedance;</li> <li>4. Increase monitoring frequency;</li> <li>5. Identify source and investigate the cause of exceedance;</li> <li>6. Carry out analysis of Contractor's working procedures;</li> <li>7. Discuss with AAHK / PM, IEC and Contractor on remedial measures required;</li> <li>8. Assess effectiveness of Contractor's remedial actions and keep AAHK / PM, IEC and EPD informed of the results;</li> <li>9. If exceedance stops, cease additional monitoring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss amongst AAHK / PM, ET and Contractor on the potential remedial actions;</li> <li>2. Review contractor's remedial actions whenever necessary to assure their effectiveness and advise AAHK / PM accordingly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> <li>3. In consolidation with IEC, agree with the Contractor on the remedial measures to be implemented;</li> <li>4. Supervise the implementation of remedial measures;</li> <li>5. If exceedance continues, consider stopping the Contractor to continue working on that portion of work which causes the exceedance until the exceedance is abated.</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance;</li> <li>2. Submit proposals for remedial actions to AAHK / PM and IEC within three working days of notification;</li> <li>3. Implement the agreed proposals;</li> <li>4. Submit further proposal if problem still not under control;</li> <li>5. Stop the relevant portion of works as instructed by AAHK / PM until the exceedance is abated.</li> </ol>

### 4.3.7 Mitigation Measures

4.3.7.1 Recommended construction noise control and mitigation measures are proposed in the EIA Report. The Contractor should be responsible for the design and implementation of these measures under the supervision of the AAHK / PM and be monitored by the ET. The implementation schedule of the recommended noise mitigation measures is presented in **Appendix C**.

## 4.4 Road Traffic and Marine Traffic Noise Monitoring

4.4.1.1 No adverse road or marine traffic noise impacts are anticipated from operation of the project, hence no environmental monitoring and audit is proposed.

## 5 Water Quality Impact

### 5.1 Construction Water Quality Monitoring

#### 5.1.1 Introduction

**5.1.1.1** The main potential water quality impact during construction phase is the release of suspended solids (SS) during land formation. Water jetting and field joint excavation works for the submarine cable diversion may also generate some SS release. Environmental monitoring for these marine works are described in **Section 5.1.8**.

**5.1.1.2** The potential risk of contaminants released from pore water during ground improvement via deep cement mixing (DCM) within the contaminated mud pit areas has also been identified as a concern. While the results of the water quality impact assessment suggests that potential contaminant release from pore water would be insignificant, it is recognised that full scale ground improvement works over the completed and capped contaminated mud pits (CMPs) have not previously been implemented in Hong Kong. Therefore, specific environmental monitoring for the initial DCM activities are included as part of the EM&A requirements and are described in **Section 5.1.9**.

#### 5.1.2 Water Quality Parameters

**5.1.2.1** Monitoring of Dissolved Oxygen (DO), Dissolved Oxygen Saturation (DO%), pH, temperature, turbidity, salinity, and SS should be undertaken at all designated monitoring locations. Current speed and direction should also be measured at all monitoring locations except for sensitive receivers that are enclosed or surrounded by silt curtains (namely SR1A and SR8).

**5.1.2.2** For monitoring of DCM works, there will be an initial intensive monitoring of DO, DO%, pH, temperature, turbidity, salinity, total alkalinity, SS, heavy metals and nutrients at designated DCM-specific monitoring stations. Thereafter, total alkalinity and two representative heavy metals will be monitored at the general monitoring locations.

**5.1.2.3** The general and DCM-specific monitoring locations are described in **Section 5.1.5**. All parameters should be measured in-situ while total alkalinity should be measured on-site and SS, heavy metals and nutrients which should be determined by laboratory. DO should be presented in mg/L and in % saturation.

**5.1.2.4** Other relevant data should also be recorded, including monitoring location, time, tidal stages, weather conditions, sea conditions and any special phenomena and work underway at the construction site.

### 5.1.3 Sampling Procedures and Monitoring Equipment

5.1.3.1 Water samples for all monitoring parameters should be collected, stored, preserved and analysed according to the Standard Methods, APHA 22<sup>nd</sup> ed. and/or other methods as agreed by the EPD. In-situ measurements at monitoring locations including temperature, DO, turbidity, pH, salinity and water depth should be collected by equipment with the characteristics and functions listed in the following sections.

5.1.3.2 Sample data record sheets based on the one presented in the “EM&A Guidelines for Development Projects in Hong Kong” are shown in **Appendix B** for reference.

5.1.3.3 The following monitoring equipment and facilities should be provided by the ET.

#### **Dissolved Oxygen and Temperature Measuring Equipment**

5.1.3.4 The instrument should be portable and weatherproof using a DC power source. It should have a membrane electrode with automatic temperature compensation complete with a cable. The equipment should be capable of measuring:

- A dissolved oxygen level in the range of 0-20 mg/L and 0-200 % saturation; and
- A temperature of 0-45 degree Celsius with a capability of measuring to  $\pm 0.1$  degree Celsius

#### **pH Measuring Equipment**

5.1.3.5 A portable pH meter capable of measuring a range between 0.0 and 14.0 should be provided to measure pH under the specified conditions according to the Standard Methods, APHA.

#### **Turbidity Measurement Instrument**

5.1.3.6 The instrument should be portable and weatherproof using a DC power source. It should have a photoelectric sensor capable of measuring turbidity between 0-1000 NTU.

#### **Salinity**

5.1.3.7 A portable salinometer capable of measuring salinity in the range of 0-40 ppt should be provided for measuring salinity of the water at each monitoring location.

#### **Total Alkalinity**

5.1.3.8 A digital titrator capable of dispensing 0.002ml at one single dispense should be provided to measure the amount of sulphuric acid used in determination of total alkalinity.

### **Nutrient, Heavy Metals and Suspended Solids (SS)**

- 5.1.3.9** A water sampler comprising a transparent PVC cylinder with a capacity of not less than two litres, and could be effectively sealed with latex cups at both ends, should be used. The sampler should have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (e.g. Kahlsico Water Sampler or a similar instrument approved by the AAHK / PM and ET).
- 5.1.3.10** Water samples for nutrients, heavy metals and SS analysis should be stored in high density polythene bottles with no preservatives added, packed in ice (cooled to 4 °C without being frozen), and delivered to the laboratory within 24 hours of collection.

### **Water Depth Detector**

- 5.1.3.11** A portable, battery-operated echo sounder should be used for the determination of water depth at each designated monitoring station. The unit would either be handheld or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.

### **Positioning Device**

- 5.1.3.12** A hand-held or boat-fixed type digital Global Positioning System (dGPS) with way point bearing indication or other equivalent instrument of similar accuracy should be provided and used during monitoring to ensure the monitoring vessel is at the correct location before taking measurements.

### **Calibration of In-situ Instruments**

- 5.1.3.13** In-situ monitoring instruments for the monitoring of temperature, DO, turbidity, pH and salinity should be checked, calibrated and certified by a laboratory accredited under HOKLAS (or other international accreditation scheme that is HOKLAS-equivalent) before use, and subsequently re-calibrated at three monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standard solutions before use.
- 5.1.3.14** Wet bulb calibration for the DO meter should be carried out before commencement of monitoring and after completion of all measurements each day. A zero check in distilled water should be performed with the turbidity probe at least once per monitoring day. The probe should then be calibrated with a solution of known NTU. In addition, the turbidity probe should be calibrated at least twice per month to establish the relationship between turbidity readings (in NTU) and levels of suspended solids (in mg/L). Accuracy check of the digital titrator should be performed at least once per monitoring day.
- 5.1.3.15** For the on-site calibration of field equipment, the BS 1427:2009, Guide to on-site test methods for the analysis of waters should be observed.

- 5.1.3.16 Sufficient stocks of spare parts should be maintained for replacements when necessary. Backup monitoring equipment should also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration etc.

#### 5.1.4 Laboratory Measurement / Analysis

- 5.1.4.1 Analysis of nutrients, heavy metals and SS should be carried out in a HOKLAS laboratory (or other international accredited laboratory that is HOKLAS-equivalent). Sufficient water samples should be collected at the monitoring stations for carrying out the laboratory nutrients, heavy metals and SS determination. The nutrients, heavy metals and SS determination work should start within 24 hours after collection of the water samples. The analysis of nutrients, heavy metals and SS should follow the standard methods summarised in **Table 5-1**.

**Table 5-1: Laboratory Analysis for SS, Nutrients and Heavy Metals**

Parameters	Instrumentation	Analytical Method	Reporting Limit
Suspended Solid (SS)	Analytical Balance	APHA 2540D	2 mg/L
<b>Nutrients</b>			
Ammonia as N	FIA	APHA 4500	0.01 mg/L
Unionised ammonia (NH <sub>3</sub> )*	By calculation	By calculation	By calculation
Nitrite as N	FIA	APHA 4500	0.01 mg/L
Nitrate as N	FIA	APHA 4500	0.01 mg/L
TKN as N	Titration	APHA 4500	0.1 mg/L
Total Phosphorus	Colorimetric	APHA 4500	0.01 mg/L
Reactive Phosphorus	FIA	APHA 4500	0.01 mg/L
<b>Heavy Metals</b>			
Cadmium (Cd)	ICP-MS	USEPA 6020A	0.1 µg/L
Chromium (Cr)	ICP-MS	USEPA 6020A	0.2 µg/L
Copper (Cu)	ICP-MS	USEPA 6020A	0.2 µg/L
Nickel (Ni)	ICP-MS	USEPA 6020A	0.2 µg/L
Lead (Pb)	ICP-MS	USEPA 6020A	0.2 µg/L
Zinc (Zn)	ICP-MS	USEPA 6020A	1 µg/L
Arsenic (As)	ICP-MS	USEPA 6020A	1 µg/L
Silver (Ag)	ICP-MS	USEPA 6020A	0.1 µg/L
Mercury (Hg)	ICP-MS	APHA 7470A	0.05 µg/L

Note:

\* Calculation based on the laboratory result of ammonia nitrogen (NH<sub>4</sub>-N) and in-situ measured pH, salinity and temperature.

- 5.1.4.2 If in-house or non-standard methods are proposed, details of the method verification should, if required, be submitted to EPD. In any circumstances, the sample testing should have comprehensive quality assurance (QA) and quality control (QC) programmes. The laboratory should be prepared to demonstrate the QC programmes to EPD or their representative if and when required.

**5.1.4.3** Additional duplicate samples may be required by EPD for inter laboratory calibration. Remaining samples after analysis should be kept by the laboratory for three months in case repeat analysis is required.

**5.1.4.4** If a site laboratory is set up or a non-HOKLAS and non-international accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment, analytical procedures, and QC shall be approved by EPD. All the analysis shall be witnessed by the AAHK / PM. The ETL shall provide the AAHK / PM and IEC with one copy of the relevant chapters of the “APHA Standard Methods for the Examination of Water and Wastewater” 22<sup>nd</sup> edition and any other relevant document for their reference.

### 5.1.5 Monitoring Locations

#### General Monitoring Locations (during absence of the enhanced silt curtain)

**5.1.5.1** A total of 25 water quality monitoring locations (comprising 14 impact stations, eight sensitive receiver stations and three control stations) have been proposed for the construction and post-construction phases. The coordinates are shown in **Table 5-2** and the locations are shown in **Drawing No. MCL/P132/EMA/5-001** and **MCL/P132/EMA/5-002b**. The final locations and number of monitoring points should be agreed with EPD at least two weeks before undertaking any works.

**Table 5-2: Water Quality Monitoring Stations (baseline and impact monitoring)**

Monitoring Stations	Coordinates			Parameters		
	Description	Easting	Northing	Baseline Monitoring	Impact Monitoring (excl. intensive DCM)	Construction Activities Monitored
C1	Control	804247	815620	DO, pH,	<u>General Parameters</u>	<u>General Parameters</u>
C2	Control	806945	825682	Temperature, Salinity,	DO, pH,	From commencement of advance marine works (submarine 11 kV cable diversion) until completion of all marine filling works for land formation
C3 <sup>(1)</sup>	Control	817803	822109	Turbidity, SS	Temperature, Salinity, Turbidity, SS	
SR2 <sup>(1)</sup>	Planned marine park / hard corals at The Brothers / Tai Mo To	814166	821463		<u>DCM Parameters</u> Total Alkalinity, Two Representative Heavy Metals	<u>DCM Parameters</u> From commencement until completion of all marine-based DCM works
IM1	Impact	806458	818351	DO, pH,	<u>General Parameters</u>	<u>General Parameters</u>
IM7	Impact	806835	821349	Temperature, Salinity, Turbidity, SS Total Alkalinity	DO, pH, Temperature, Salinity, Turbidity, SS <u>DCM Parameters</u> Total Alkalinity, Two Representative Heavy Metals	From commencement of land formation until completion of all marine filling works <u>DCM Parameters</u> From commencement until completion of all marine-based DCM works
IM2	Impact	806193	818852	DO, pH,	<u>General Parameters</u>	<u>General Parameters</u>
IM3	Impact	806019	819411	Temperature,		

Monitoring Stations	Coordinates			Parameters		
	Description	Easting	Northing	Baseline Monitoring	Impact Monitoring (excl. intensive DCM)	Construction Activities Monitored
IM4	Impact	805039	819570	Salinity, Turbidity, SS Total Alkalinity	DO, pH, Temperature, Salinity, Turbidity, SS <u>DCM Parameters</u> Total Alkalinity, Two Representative Heavy Metals	From commencement of land formation until completion of nearest 1 km of seawall <u>DCM Parameters</u> From commencement until completion of all marine-based DCM works
IM5	Impact	804924	820564			
IM6	Impact	805828	821060			
IM8	Impact	807838	821695			
IM9*	Impact	808811	822094	DO, pH, Temperature, Salinity, Turbidity, SS, Total Alkalinity, Heavy metals and Nutrients		<u>General Parameters</u> From commencement of land formation until completion of nearest 1 km of seawall <u>DCM Parameters</u> From commencement until completion of all marine-based DCM works
IM12*	Impact	811519	821162			
IM10*	Impact	809838	822240			
IM11*	Impact	810545	821501			
IM13	Impact (for submarine 11 kV cable diversion)	Mobile station (500 m envelope of water jetting works)		n/a	<u>General Parameters only</u> DO, pH, Temperature, Salinity, Turbidity, SS	<u>General Parameters only</u> From commencement until completion of water jetting works
IM14	Impact (for submarine 11 kV cable diversion)	Mobile station (500 m envelope of field joint excavation works)				<u>General Parameters only</u> From commencement until completion of field joint excavation works
SR1A <sup>(2)(3)</sup>	Hong Kong-Zhuhai-Macao Bridge (HZMB) Hong Kong Boundary Crossing Facilities (HKBCF) Seawater Intake for cooling	812586 812660 (since 5 Jan 2019)	820069 819977	DO, pH, Temperature, Salinity, Turbidity, SS	<u>General Parameters only</u> DO, pH, Temperature, Salinity, Turbidity, SS	<u>General Parameters only</u> From commencement of advance marine works (submarine 11 kV cable diversion) until completion of all marine filling works for land formation



Monitoring Stations	Coordinates			Parameters		
	Description	Easting	Northing	Baseline Monitoring	Impact Monitoring (excl. intensive DCM)	Construction Activities Monitored
SR3	Sha Chau and Lung Kwu Chau Marine Park / fishing and spawning grounds in North Lantau	807571	822147			
SR4A <sup>(3)</sup>	Sha Lo Wan	807810	817189			
SR5A <sup>(3)</sup>	San Tau Beach SSSI	810696	816593			
SR6 <sup>(4)</sup>	Tai Ho Bay, Near Tai Ho Stream SSSI	814663	817899			
SR6A <sup>(4)</sup>		814739	817963			
		(since 8 Aug 2019)				
SR7	Ma Wan Fish Culture Zone (FCZ)	823742	823636			
SR8 <sup>(5)</sup>	Seawater Intake for cooling at Hong Kong International Airport (East)	811593	820417			
		(before 1 Jul 2017)				
		811418	820246			
		(1 Jul 2017 to 4 Jan 2019)				
		811623	820390			
		(since 5 Jan 2019)				

## Notes:

\* Denotes monitoring stations for providing baseline nutrient and heavy metal data for DCM-specific monitoring

- (1) According to the Baseline Water Quality Monitoring Report, C3 station is not adequately representative as a control station of impact/ SR stations during the flood tide. The control reference has been changed from C3 to SR2 from 1 September 2016 onwards.
- (2) With the operation of HKBCF, water quality monitoring at SR1A was commenced on 25 October 2018. The monitoring location of SR1A was shifted closer to the intake to better reflect the water quality in the immediate vicinity starting from 5 January 2019. The approval from the IEC and EPD on the updated monitoring location had been sought before the relocation.
- (3) The monitoring locations for SR1, SR4 and SR5 have been updated (to SR1A, SR4A and SR5A) based on the Baseline Water Quality Monitoring Report.
- (4) As the access to SR6 was obstructed by the construction activities and temporary structures for Tung Chung New Town Extension, the monitoring location has been relocated to SR6A starting from 8 August 2019. The approval from the IEC and EPD on the updated monitoring location had been sought before the relocation.
- (5) The monitoring location for SR8 is subject to further changes due to silt curtain arrangements and the progressive relocation of this seawater intake. The approval from the IEC and EPD on the updated monitoring location had been sought before the relocation.

**5.1.5.2** For SR8, the monitoring location has been modified slightly due to the installation of localised silt curtains which are required for protecting this sensitive receiver. To ensure the water quality monitoring at this location is able to represent the water quality at the seawater intake, the monitoring location will be moved closer to the intakes and within the area protected by the localised silt curtain.

**5.1.5.3** For submarine 11 kV cable diversion works, two specific impact stations (IM13 and IM14) are proposed for the construction phase. These impact stations will be mobile stations located within a 500 m envelope of the respective water jetting / field joint excavation works. The indicative areas are shown in **Drawing No. MCL/P132/EMA/5-001**. Exact locations will depend on the tidal conditions (i.e. the impact station should always be downstream of the respective water jetting / field joint excavation works). In case where relocation of the impact stations is required, a minimum of 2 mobile impact stations at representative locations should be proposed by ET and approved by the AAHK / PM and IEC.

**5.1.5.4** The status and locations of water sensitive receivers may change after issuing this Manual. If such case exists, the ETL should propose updated monitoring locations and seek approval from the IEC and EPD. The selection of these locations should follow the below criteria:

- Impact (IM) stations should be within the 500 m envelope of construction works;
- Sensitive receivers (SR) stations should be at close proximity to key sensitive receivers; and
- Control stations (C), as far as practicable, should be at representative locations of the water body being monitored while undisturbed by the project.

Impact Monitoring Locations (during deployment of the enhanced silt curtain)

**5.1.5.5** During deployment of the enhanced silt curtain as specified in the Silt Curtain Deployment Plan, some of the IM stations surrounding the land formation footprint (IM1 to IM12) will be relocated to the locations shown in **Drawing No. MCL/P132/EMA/5-002c** to maintain an appropriate buffer distance away from the enhanced silt curtain. The coordinates are shown in **Table 5-3**.

**Table 5-3: Location of IM1 to IM12 during Deployment of the Enhanced Silt Curtains**

Monitoring Stations	Easting	Northing
IM1	807132	817949
IM2	806166	818163
IM3	805594	818784
IM4	804607	819725
IM5	804867	820735
IM6	805828	821060
IM7	806835	821349
IM8	808140	821830
IM9	808811	822094
IM10	809794	822385
IM11	811460	822057
IM12	812046	821459

**5.1.5.6** After the enhanced silt curtain is removed, the location of IM1 to IM12 will revert to the locations shown in **Drawing No. MCL/P132/EMA/5-002b**.

### DCM-Specific Monitoring Locations

**5.1.5.7** For the initial intensive DCM-specific water quality monitoring programme, monitoring should be conducted within 3 months of commencement of actual full scale DCM works and as soon as there are five DCM rigs working within a work front of 500m x 500m within the CMPs. Details of the DCM-specific water quality monitoring programme are specified in the Detailed Plan on DCM. A total of 12 monitoring stations will be deployed with the following arrangement:

- i. Two monitoring stations upstream and at 150 m envelope of DCM group works area (Control stations);
- ii. Five monitoring stations downstream and at 150 m envelope of DCM group works area (Impact 1 stations);
- iii. Five monitoring stations downstream and at 250 m envelope of DCM group works area (Impact 2 stations);
- iv. Monitoring stations should be at least 50 m apart; and
- v. Downstream monitoring stations should be perpendicular to the tidal direction.

**5.1.5.8** **Drawing No. MCL/P132/EMA/5-003** shows an indicative arrangement for the DCM work front.

**5.1.5.9** After completion of the initial intensive DCM-specific water quality monitoring programme, DCM monitoring locations will revert to the general (control and impact) monitoring locations presented in **Table 5-2**.

### **5.1.6 Baseline Monitoring**

**5.1.6.1** Baseline conditions for water quality shall be established and agreed with EPD prior to the commencement of works. The purpose of the baseline monitoring is to establish ambient conditions prior to the commencement of the marine works and to demonstrate the suitability of the proposed impact and control monitoring stations. The baseline conditions shall be established by measuring DO, DO%, pH, temperature, turbidity, salinity, and SS at all designated stationary monitoring stations. To provide the baseline water quality for the DCM-specific monitoring, total alkalinity shall be measured at all the relevant stationary impact stations, plus nutrients and heavy metals at the “IM\*” stations (which represent the contaminated mud pit locations). The measurements should be taken three days per week, at mid-flood and mid-ebb tides, for at least four weeks prior to the commencement of marine works. Samples should be taken at three depths (at 1m below surface, at mid-depth, and at 1m above bottom) for locations with water depth >6m. For locations with water depth between 3m and 6m, two depths (surface and bottom) should be taken. Locations with water depth <3m, only surface depth should be taken. The commencement date of baseline monitoring shall be agreed between the ET / IEC / AAHK / PM to ensure timely submission of the baseline monitoring report to EPD. Duplicate water samples should be taken and analysed.

**5.1.6.2** As far as possible there should not be any marine construction activities in the vicinity of the stations during the baseline monitoring.

5.1.6.3 In exceptional cases when insufficient baseline monitoring data or questionable results are obtained, the ET should seek approval from the IEC and EPD on an appropriate set of data to be used as baseline reference.

5.1.6.4 Baseline monitoring schedule should be faxed to EPD at least two weeks prior to the commencement of baseline monitoring. The interval between two sets of monitoring should be not less than 36 hours.

### 5.1.7 Efficiency of Silt Curtain System

5.1.7.1 Type II and/or Type III silt curtains (as defined by the United States Army Corporation of Engineers (USACE) classification system for silt curtains) have been recommended in the EIA Report. These are to be implemented as a double layer arrangement. Details of the silt curtain arrangements and the pilot test on the efficiency of the silt curtain system are specified in the Silt Curtain Deployment Plan. The ET should conduct tests to confirm that the silt curtain system specified in the Silt Curtain Deployment Plan satisfies the requirements in the EIA Report.

5.1.7.2 A pilot test should be carried out during the early stage of construction to confirm whether the silt removal efficiency of the double layer floating type silt curtains can achieve 61 % silt removal efficiency for sand blanket laying and marine filling activities. The pilot test should be undertaken during the highest current speed condition (covering both flood and ebb tide) and include measurements of current speed and direction, turbidity and suspended solids. The water quality monitoring points to be selected should be close to the locations of the marine works. Monitoring should be conducted on both sides of the silt curtains deployed. If the pilot test is conducted in dry season, a verification test should be carried out during wet season at the highest current speed condition to re-confirm the findings. The details for the pilot test should be proposed by the ET and agreed with the IEC and EPD, taking into account of the Contractor's proposed actual locations of the works.

5.1.7.3 Regardless of the measured efficiency of the silt curtain system, the Event and Action Plan should only be based on the monitoring results at the designated stationary monitoring stations.

### 5.1.8 General Impact Monitoring

5.1.8.1 During marine construction works, impact monitoring should be undertaken at all designated monitoring stations three days per week (refer to **Table 5-2** for the activities to be monitored). Monitoring should be undertaken at mid-flood (within  $\pm 1.75$  hour of the predicted time) and mid-ebb (within  $\pm 1.75$  hour of the predicted time) tides. Samples should be taken at three depths (at 1m below surface, at mid-depth, and at 1m above bottom) for locations with water depth  $>6\text{m}$ . For locations with water depth between 3m and 6m, two depths (surface and bottom) should be taken. Locations with water depth  $<3\text{m}$ , only surface depth should be taken. The interval between two sets of monitoring should be not less than 36 hours except when the Action Level and/or Limit Level is/are exceeded, in which case the monitoring frequency may be increased. For DCM impact monitoring, please refer to **Section 5.1.9**.

5.1.8.2 Two consecutive measurements of DO concentrations (mg/L), DO saturation (%) and turbidity (NTU) should be taken in-situ according to the stated sampling method. Where the difference in value between the first and second measurement of DO or turbidity parameters is more than 25 % of the value of the first reading, the reading should be discarded and further readings would be taken. Water samples for SS (mg/L) measurements should be collected at the same depths. Duplicate water samples should be taken and analysed.

5.1.8.3 In addition to the above in-situ measurements, water temperature and pH should be determined at all designated monitoring stations at the same depths, as specified above. The monitoring location / position, time, weather conditions and any special phenomena should also be recorded.

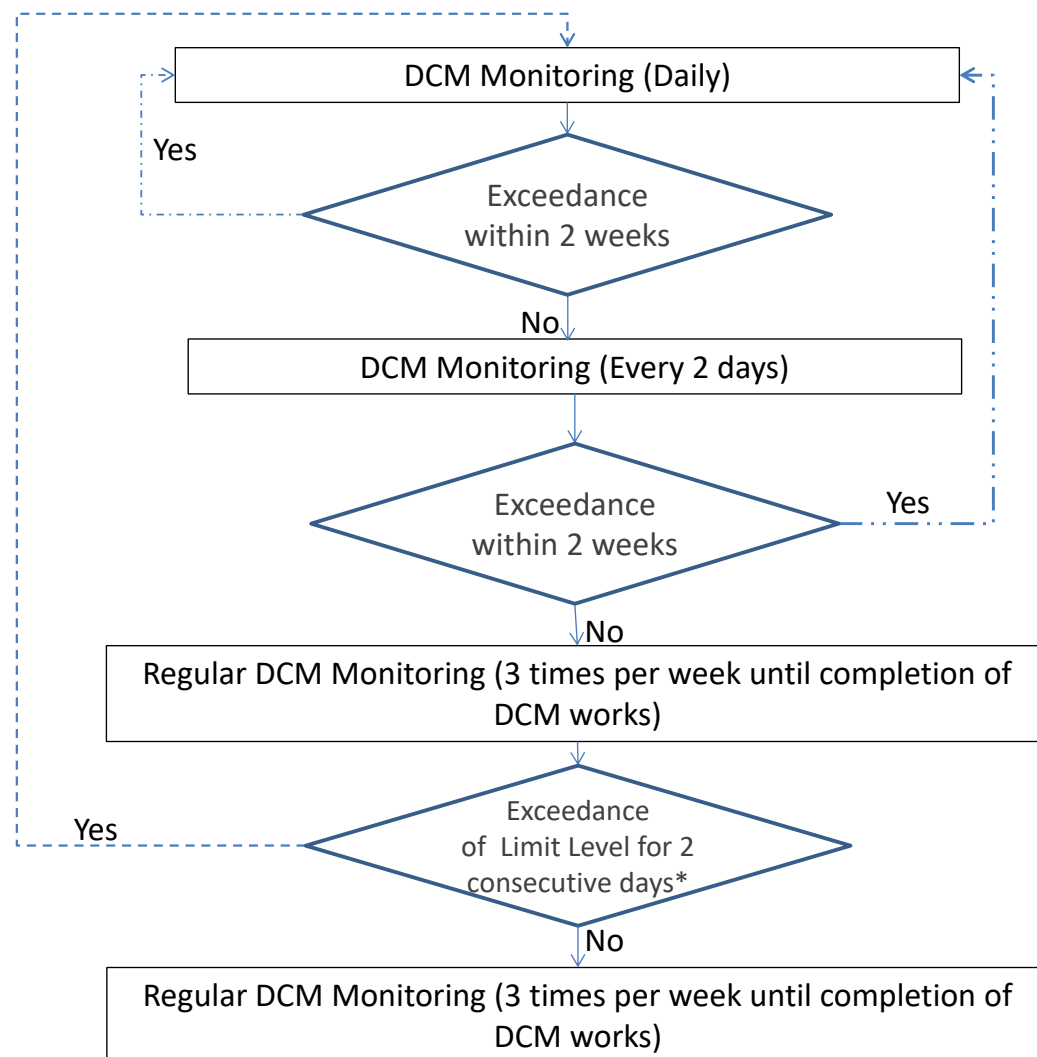
### 5.1.9 DCM Impact Monitoring

#### Initial Intensive DCM Monitoring

5.1.9.1 According to the current design, DCM would be conducted within the CMPs during land formation. As specified in the Detailed Plan for DCM, within 3 months of the commencement of full-scale DCM works and as soon as there are five DCM rigs working within a work front of 500 m x 500 m within the CMPs, the ET is required to conduct an initial intensive DCM-specific water quality monitoring programme for a period of at least four weeks to ensure that the criteria for various contaminants are complied. This would be conducted for a group of five DCM rigs as specified in **Section 5.1.5.7**.

5.1.9.2 Daily monitoring at mid-flood (within  $\pm 1.75$  hour of the predicted time) and mid-ebb (within  $\pm 1.75$  hour of the predicted time) tides is required during the initial intensive DCM monitoring as shown in **Chart 5-1**. Samples should be taken at three depths (at 1m below surface, at mid-depth, and at 1 m above bottom) for locations with water depth >6m. For locations with water depth between 3 m and 6 m, two depths (surface and bottom) should be taken. Locations with water depth <3m, only surface depth should be taken.

5.1.9.3 Two consecutive measurements of DO, DO%, pH, temperature (°C), turbidity (NTU), and salinity (ppt) should be taken in-situ according to the stated sampling method. Water samples for total alkalinity (ppm), SS (mg/L), nutrients (mg/L) and heavy metals (µg/L) measurements should be collected at the same depths. Monitoring parameters for nutrients and heavy metals include those listed in **Table 5-1**. Duplicate water samples should be taken and analysed. If no exceedance (referring to those that are attributable to DCM works as determined by the findings of exceedance investigation reports) is recorded within two weeks, then the monitoring frequency can be reduced to every two days. If no exceedance is recorded after another two weeks, the initial intensive DCM specific monitoring will be terminated and DCM monitoring will continue as part of the regular DCM monitoring.

**Chart 5-1: Flow Chart for DCM Monitoring**

\* During regular DCM monitoring, exceedances for total alkalinity and the two representative heavy metals should be confirmed by ET and verified by the IEC as project-related.

#### Regular DCM Monitoring

**5.1.9.4** After completion of the initial intensive DCM monitoring, regular DCM monitoring will be conducted as part of the general impact monitoring presented in **Section 5.1.8** for the remaining duration of the DCM works. During this period, total alkalinity and two representative heavy metals will be monitored at all stationary control and impact monitoring stations as specified in **Table 5-2**. The two representative heavy metals shall be proposed by the ET taking into account the findings of the initial intensive DCM monitoring. The selection criteria for determining the representative heavy metals should include but not limited to the following:

- Low natural (baseline) concentrations in the marine environment
- Present in elevated concentrations in the CMPs (based on past vibrocores taken from the CMPs)
- Concentrations in the CMPs should be higher than in non-contaminated mud pit areas; and
- Not associated with strong temporal variations and/or external influences (e.g. Pearl River Delta discharges, construction activities by concurrent projects)

**5.1.9.5** Two consecutive measurements of total alkalinity (ppm) should be taken according to the stated sampling and analysis method, and laboratory water samples for heavy metals (µg/L) measurements should be collected at the same depths. Duplicate water samples should be taken and analysed.

**5.1.9.6** During this regular DCM monitoring period, if there is any exceedance of the Limit Levels for total alkalinity and the two representative heavy metals for two consecutive sampling days and such exceedance is confirmed by the ET (with verification by the IEC) to be a result of the DCM works, intensive DCM monitoring will be re-initiated as shown in **Chart 5-1**. Monitoring parameters during the intensive DCM monitoring will be the same as those conducted for the initial intensive DCM monitoring until such time as no further exceedances are detected and regular DCM monitoring resumes.

#### **5.1.10 Post-Construction Monitoring**

**5.1.10.1** Upon completion of all marine construction works, a post project water quality monitoring exercise should be carried out for four weeks, in the same manner as the impact monitoring during construction phase.

#### **5.1.11 Event and Action Plan for Water Quality**

**5.1.11.1** The Action Level and Limit Level for water quality (excluding sensitive receiver stations representing seawater intakes) are defined in **Table 5-4**.

**Table 5-4: Action and Limit Levels for Water Quality**

Parameters	Action Level	Limit Level
DO in mg/L (Surface, Middle & Bottom)	Surface and Middle 5 percentile of baseline data for surface and middle layer	Surface and Middle 5 mg/L or 1 percentile of baseline data for surface and middle layer for Fish Culture Zone (SR7) 4 mg/L or 1 percentile of baseline data for surface and middle layer for other stations
	Bottom 5 percentile of baseline data for bottom layer	Bottom 2 mg/L or 1 percentile of baseline data for bottom layer
Temperature in °C (for intensive DCM monitoring only)	1.8°C above the temperature recorded at representative control stations at the same tide of the same day	2°C above the temperature recorded at representative control stations at the same tide of the same day
SS in mg/L	95 percentile of baseline data or	99 percentile of baseline data or
Turbidity in NTU	120% of upstream control station at the same tide of the same day,	130% of upstream control station at the same tide of the same day,
Total Alkalinity in ppm	whichever is higher	whichever is higher
Nutrient		
Ammonia (NH <sub>3</sub> )		
Unionised ammonia (NH <sub>3</sub> ) (with 0.021 mg/L as the upper limit)		
Nitrite (NO <sub>2</sub> )		
Nitrate (NO <sub>3</sub> )		
TKN		
Total Phosphorus		
Reactive Phosphorus		
Heavy Metals		
Cadmium (Cd)		
Chromium (Cr)		
Copper (Cu)		
Nickel (Ni)		
Lead (Pb)		
Zinc (Zn)		
Arsenic (As)		
Silver (Ag)		
Mercury (Hg)		

**Notes:**

1. For DO measurement, non-compliance occurs when monitoring result is lower than the limits.
2. For parameters other than DO, non-compliance of water quality results when monitoring results is higher than the limits.
3. Depth-averaged results are used unless specified otherwise.
4. All the figures given in the table are used for reference only and the EPD may amend the figures whenever necessary.
5. For all mobile impact stations, the baseline data will be represented by the nearest stationary monitoring station.



**5.1.11.2** The Action Level and Limit Level for water quality impact monitoring have been established and presented in the Baseline Water Quality Monitoring Report. The summary tables of the Action Level and Limit Level for water quality are presented in **Table 5-5** and **Table 5-6**.

**Table 5-5: Action and Limit Levels for General Impact Water Quality Monitoring and Regular DCM Monitoring**

Parameters	Action Level		Limit Level	
DO in mg/L (Surface, Middle & Bottom)	Surface and Middle		Surface and Middle	
	4.5 mg/L		4.1 mg/L 5 mg/L for Fish Culture Zone (SR7) only	
	Bottom		Bottom	
	3.4 mg/L		2.7 mg/L	
Suspended Solids (SS) in mg/L	23	or 120% of upstream control station at the same tide of the same day, whichever is higher	37	or 130% of upstream control station at the same tide of the same day, whichever is higher
Turbidity in NTU	22.6		36.1	
Total Alkalinity in ppm	95		99	
Representative Heavy Metals for regular DCM monitoring (chromium and nickel)	Same as that for the intensive DCM monitoring		Same as that for the intensive DCM monitoring	

Note:

1. For DO measurement, non-compliance occurs when monitoring result is lower than the limits.
2. For parameters other than DO, non-compliance of water quality results when monitoring results is higher than the limits.
3. Depth-averaged results are used unless specified otherwise.
4. The Action and Limit Levels specified in this table does not apply to SR1A and SR8 (see **Section 5.11.1.3**).

**Table 5-6: Action and Limit Levels for Intensive DCM Monitoring**

Parameters	Action Level		Limit Level	
DCM-Specific Parameters				
Temperature in °C	1.8°C above the temperature recorded at upstream control stations at the same tide of the same day		2°C above the temperature recorded at upstream control stations at the same tide of the same day	
Total Alkalinity in ppm	95	or 120% of upstream control station at the same tide of the same day, whichever is higher	99	or 130% of upstream control station at the same tide of the same day, whichever is higher
Nutrient (mg/l)				
Ammonia (NH <sub>3</sub> )	0.18		0.20	
Unionised ammonia (NH <sub>3</sub> ) (with 0.021 mg/L as the upper limit)	0.01		0.01	
Nitrite (NO <sub>2</sub> )	0.12		0.13	
Nitrate (NO <sub>3</sub> )	1.05		1.18	
TKN	0.6		0.7	
Total Phosphorus	0.06		0.07	
Reactive Phosphorus	0.04		0.04	
Heavy Metals (µg/l)				
Cadmium (Cd)	0.1		0.1	
Chromium (Cr)	0.2		0.2	
Copper (Cu)	1.9		5.1	
Nickel (Ni)	3.2		3.6	
Lead (Pb)	0.2	0.2		
Zinc (Zn)	6	8		
Arsenic (As)	3	4		
Silver (Ag)	0.1	0.1		
Mercury (Hg)	0.05	0.05		
Other Water Quality Parameters				
DO in mg/L (Surface and Middle)	80% of upstream control station* at the same tide of the same day or 4 mg/l, whichever is lower		70% of upstream control station* at the same tide of the same day or 4 mg/l, whichever is lower	
DO in mg/L (Bottom)	80% of upstream control station* at the same tide of the same day or 2 mg/l, whichever is lower		70% of upstream control station* at the same tide of the same day or 2 mg/l, whichever is lower	
Suspended Solids (SS) in mg/L	120% of upstream control station* at the same tide of the same day		130% of upstream control station* at the same tide of the same day	
Turbidity in NTU				

Note:

1. Non-compliance of water quality results when monitoring results is higher than the limits, except for DO measurement whereby non-compliance results when monitoring results is lower than the limits.
2. Depth-averaged results are used unless specified otherwise.
3. For Cd, Cr, Pb, Ag and Hg, the percentile values are below detection limit, hence the Action and Limit Levels represent detection limit.
4. Where the water quality results at control stations for individual parameters are below detection limit, the value of the detection limit will be adopted.
5. (\*) Upstream control station refers to average of the two control station results, unless the difference between the two control station results is >25%, in which case the higher (for SS and turbidity) and lower (for DO) of the two shall apply.

**5.1.11.3** For sensitive receiver stations representing seawater intakes for cooling (e.g. SR1A and SR8), only the Action and Limit Levels for SS parameter would be applicable (as the operation of these intakes would not be significantly affected by the other water quality parameters). At these cooling water intakes, the Action and Limit Levels for SS are dependent on the operational tolerance of individual intakes. The ET will propose suitable Action and Limit Levels for SS at individual sensitive receiver stations representing seawater intakes. This shall be agreed with the IEC and the respective operators of the intakes prior to commencement of construction activities or commencement of operation of the seawater intake (whichever is later) and documented in the Baseline Monitoring Report and EM&A reports.

**5.1.11.4** As agreed with the IEC and the respective operators, the Action and Limit Levels for SR1A and SR8 are shown in **Table 5-7**.

**Table 5-7: Action Level and Limit Level for SR1A and SR8**

SS (mg/l)	Action Level	Limit Level
SR1A	33	42
SR8	52	60

**5.1.11.5** The actions in accordance with the Event and Action Plan in **Table 5-8** and **Table 5-9** should be carried out if the water quality assessment criteria are exceeded at any designated monitoring points.

**Table 5-8: Event and Action Plan for General Impact Water Quality Monitoring**

Event	ET	IEC	Action AAHK / PM	Contractor
Action Level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurement to confirm findings;</li> <li>2. Identify reasons for non-compliance and sources of impact;</li> <li>3. Inform IEC and Contractor;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IEC and Contractor;</li> <li>6. Repeat in-situ monitoring on the day after the exceedance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET and Contractor on the mitigation measures;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise AAHK / PM accordingly;</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with IEC on the proposed mitigation measures;</li> <li>2. Make agreement on the mitigation measures to be implemented;</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform AAHK / PM and confirm receipt of ET's notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Provide report of the status and condition of plant, equipment and mitigation measures to ET</li> <li>5. Consider changes of working methods;</li> <li>6. Discuss with ET and IEC and propose mitigation measures.</li> </ol>

Event	ET	IEC	Action AAHK / PM	Contractor
Action Level being exceeded by more than two consecutive sampling days	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurement to confirm findings;</li> <li>2. Identify reasons for non-compliance and sources of impact;</li> <li>3. Inform IEC and Contractor;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IEC and Contractor;</li> <li>6. Ensure mitigation measures are implemented;</li> <li>7. Repeat in-situ monitoring on the day after the exceedance and prepare to increase the monitoring frequency to daily.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET and Contractor on the mitigation measures;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise AAHK / PM accordingly;</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with IEC on the proposed mitigation measures;</li> <li>2. Make agreement on the mitigation measures to be implemented;</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform AAHK / PM and confirm receipt of ET's notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Provide report of the status and condition of plant, equipment and mitigation measures to ET</li> <li>5. Consider changes of working methods;</li> <li>6. Discuss with ET and IEC and propose mitigation measures to AAHK / PM and IEC within three working days;</li> <li>7. Implement the agreed mitigation measures.</li> </ol>
Limit Level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurement to confirm findings;</li> <li>2. Identify reasons for non-compliance and sources of impact;</li> <li>3. Inform IEC, Contractor and EPD;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with AAHK / PM, IEC and Contractor;</li> <li>6. Ensure mitigation measures are implemented;</li> <li>7. Repeat in-situ monitoring on the day after the exceedance and prepare to increase the monitoring frequency to daily</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET and Contractor on the mitigation measures;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise AAHK / PM accordingly;</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET, IEC and Contractor on the proposed mitigation measures;</li> <li>2. Request Contractor to critically review the working methods;</li> <li>3. Make agreement on the mitigation measures to be implemented;</li> <li>4. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform AAHK / PM and confirm receipt of ET's notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Provide report of the status and condition of plant, equipment and mitigation measures to ET</li> <li>5. Consider changes of working methods;</li> <li>6. Discuss with AAHK / PM, ET and IEC and propose mitigation measures to AAHK / PM and IEC within three working days;</li> <li>7. Implement the agreed mitigation measures.</li> </ol>

Event	ET	IEC	Action AAHK / PM	Contractor
Limit Level being exceeded by more than one consecutive sampling days	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurement to confirm findings;</li> <li>2. Identify reasons for non-compliance and sources of impact;</li> <li>3. Inform IEC, Contractor and EPD;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with AAHK / PM, IEC and Contractor;</li> <li>6. Ensure mitigation measures are implemented;</li> <li>7. Increase the in-situ monitoring frequency to daily until no exceedance of Limit Level for two consecutive days.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET and Contractor on the mitigation measures;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise AAHK / PM accordingly;</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with IEC, ET and Contractor on the proposed mitigation measures;</li> <li>2. Request contractor to critically review the working methods;</li> <li>3. Make agreement on the mitigation measures to be implemented;</li> <li>4. Assess the effectiveness of the implemented mitigation measures;</li> <li>5. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit Level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform AAHK / PM and confirm receipt of ET's notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Provide daily report of the status and condition of plant, equipment and mitigation measures to ET until no further exceedance;</li> <li>5. Consider changes of working methods;</li> <li>6. Discuss with AAHK / PM, ET and IEC and propose mitigation measures to AAHK / PM and IEC within three working days;</li> <li>7. Implement the agreed mitigation measures;</li> <li>8. As directed by AAHK / PM, to slow down or to stop all or part of the construction activities.</li> </ol>

Note: Where the Action Level is the same as the Limit Level, the actions specified for Limit Level exceedances shall apply.

**Table 5-9: Event and Action Plan for DCM Process**

Event	ET	IEC	Action AAHK / PM	Contractor
Action Level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurement to confirm findings;</li> <li>2. Identify reasons for non-compliance and sources of impact;</li> <li>3. Inform IEC and Contractor;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IEC and Contractor;</li> <li>6. During intensive DCM monitoring and if not already undertaking daily monitoring, increase monitoring frequency in accordance with <b>Chart 5.1</b> (applies to DCM-specific parameters only). During regular DCM monitoring, repeat monitoring on the day after the exceedance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET and Contractor on the mitigation measures;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise AAHK / PM accordingly;</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with IEC on the proposed mitigation measures;</li> <li>2. Make agreement on the mitigation measures to be implemented;</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform AAHK / PM and confirm receipt of ET's notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Provide report of the status and condition of plant, equipment and mitigation measures to ET;</li> <li>5. Consider changes of working methods;</li> <li>6. Discuss with ET and IEC and propose mitigation measures.</li> </ol>

Event	ET	IEC	Action AAHK / PM	Contractor
Action Level being exceeded by more than two consecutive sampling days	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurement to confirm findings;</li> <li>2. Identify reasons for non-compliance and sources of impact;</li> <li>3. Inform IEC and Contractor;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IEC and Contractor;</li> <li>6. Ensure mitigation measures are implemented;</li> <li>7. During intensive DCM monitoring and if not already undertaking daily monitoring, increase monitoring frequency in accordance with <b>Chart 5.1</b> (applies to DCM-specific parameters only). During regular DCM monitoring, repeat monitoring on the day after the exceedance and prepare to increase the monitoring frequency to daily.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET and Contractor on the mitigation measures;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise AAHK / PM accordingly;</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with IEC on the proposed mitigation measures;</li> <li>2. Make agreement on the mitigation measures to be implemented;</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform AAHK / PM and confirm receipt of ET's notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Provide report of the status and condition of plant, equipment and mitigation measures to ET;</li> <li>5. Consider changes of working methods;</li> <li>6. Discuss with ET and IEC and propose mitigation measures to AAHK / PM and IEC within 3 working days;</li> <li>7. Implement the agreed mitigation measures.</li> <li>8. As directed by AAHK / PM, to slow down all or part of the construction activities.</li> </ol>
Limit Level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurement to confirm findings;</li> <li>2. Identify reasons for non-compliance and sources of impact;</li> <li>3. Inform IEC, Contractor and EPD;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IEC, AAHK / PM and Contractor;</li> <li>6. Ensure mitigation measures are implemented;</li> <li>7. During intensive DCM monitoring and if not already undertaking daily monitoring, increase monitoring frequency in accordance with <b>Chart 5.1</b> (applies to DCM-specific parameters only). During regular DCM monitoring, repeat monitoring on the day after the exceedance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET and Contractor on the mitigation measures;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise AAHK / PM accordingly;</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with IEC, ET and Contractor on the proposed mitigation measures;</li> <li>2. Request Contractor to critically review the working methods;</li> <li>3. Make agreement on the mitigation measures to be implemented;</li> <li>4. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform AAHK / PM and confirm receipt of ET's notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Provide report of the status and condition of plant, equipment and mitigation measures to ET;</li> <li>5. Consider changes of working methods;</li> <li>6. Discuss with AAHK / PM, ET and IEC and propose mitigation measures to AAHK / PM and IEC within three working days;</li> <li>7. Implement the agreed mitigation measures.</li> </ol>

Event	ET	IEC	Action AAHK / PM	Contractor
Limit Level being exceeded by more than one consecutive sampling days	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurement to confirm findings;</li> <li>2. Identify reasons for non-compliance and sources of impact;</li> <li>3. Inform IEC, Contractor and EPD;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IEC, AAHK / PM and Contractor;</li> <li>6. Ensure mitigation measures are implemented;</li> <li>7. During intensive DCM monitoring and if not already undertaking daily monitoring, increase monitoring frequency in accordance with <b>Chart 5.1</b> (applies to DCM-specific parameters only). During regular DCM monitoring, re-initiate the intensive DCM monitoring in accordance with <b>Chart 5.1</b>.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET and Contractor on the mitigation measures;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise AAHK / PM accordingly;</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with IEC, ET and Contractor on the proposed mitigation measures;</li> <li>2. Request contractor to critically review the working methods;</li> <li>3. Make agreement on the mitigation measures to be implemented;</li> <li>4. Assess the effectiveness of the implemented mitigation measures;</li> <li>5. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit Level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform AAHK / PM and confirm receipt of ET's notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Provide report of the status and condition of plant, equipment and mitigation measures to ET;</li> <li>5. Consider changes of working methods;</li> <li>6. Discuss with AAHK / PM, ET and IEC and propose mitigation measures to AAHK / PM and IEC within three working days;</li> <li>7. Implement the agreed mitigation measures;</li> <li>8. As directed by AAHK / PM, to stop all or part of the construction activities.</li> </ol>

## 5.1.12 Mitigation Measures

5.1.12.1 The implementation schedule of the recommended water quality mitigation measures is presented in **Appendix C**.

## 5.2 Operation Water Quality Monitoring

### 5.2.1 Introduction

5.2.1.1 As it has been assessed that there would not be any significant changes in the water quality during operation of the project, no marine water quality monitoring is considered necessary during the operation phase.

5.2.1.2 Water quality monitoring for the spent cooling water discharges will be undertaken in accordance with the future Water Pollution Control Ordinance (WPCO) license conditions.

5.2.1.3 Water quality monitoring is proposed for the greywater treatment facility during commissioning of the facility to ensure the treated effluent quality complies with the reuse standards as defined in the EIA Report, which are reproduced in **Table 5-10**.

**Table 5-10: Treated Effluent Quality Criteria for Greywater Treatment Facility**

Parameters	Criteria Level
SS	≤ 5 mg/L
BOD <sub>5</sub>	≤ 10 mg/L
COD	≤ 50 mg/L
Oil and Grease	≤ 10 mg/L
Surfactants (total)	≤ 5 mg/L
<i>E. coli</i>	< 1 count / 100ml
pH	6.0 – 9.0
Turbidity	< 2 NTU
Faecal Coliforms	Non detectable / 100ml

### 5.2.2 Commissioning Test for Greywater Treatment Facility

**5.2.2.1** During commissioning of the greywater treatment facility, monitoring of pH, turbidity, SS, 5-day Biological Oxygen Demand (BOD<sub>5</sub>), Chemical Oxygen Demand (COD), oil and grease, *E.coli*, faecal coliforms and surfactants for the treated effluent should be undertaken to ensure the treatment facility will be able to treat the greywater to levels in compliance with the reuse standards as listed in **Table 5-10**. Details of the proposed monitoring for treated effluent including the monitoring location, monitoring frequency, effluent sampling and testing methods should be proposed by the ET, which will then be checked by the IEC for agreement with the AAHK / PM and EPD at least two weeks before commencement of the commissioning.

**5.2.2.2** During operation of the greywater treatment facility, regular water quality monitoring for the treated effluent discharges will be undertaken, which shall monitor compliance of the treated effluent against both the reuse standard specified in **Table 5-10**, and the discharge standard (for discharge to foul sewer) as per the future WPCO license conditions for discharge to foul sewer. Reuse of the treated effluent shall be suspended if the monitoring results do not comply with the reuse standards. The treated greywater will be discharged to the sewerage system until the greywater treatment system resumes compliance.



## 6 Sewerage and Sewage Treatment Implications

### 6.1 Construction Phase Monitoring

- 6.1.1.1 After implementation of the recommended mitigation measure for sewage from construction workforce as detailed in **Appendix C**, no sewerage impacts are expected from the site during construction stage. No specific sewage monitoring during construction phase is thus required.

### 6.2 Operation Phase Monitoring

- 6.2.1.1 The gravity sewer from the airport discharge manhole to Tung Chung Sewage Pumping Station (TCSPS) will be upgraded by AAHK to cater for the ultimate design sewage flow from the expanded airport. AAHK will start planning construction of the gravity sewer upgrading in 2022 or when the sewage flow in the affected gravity sewer exceeds 80% of the design capacity of the sewer, whichever is earlier, so as to ensure timely completion of the mitigation works before the flow would exceed the design capacity of the sewer. For this, it is recommended that AAHK should conduct annual monitoring for the sewage flow build-up of the gravity sewer from the airport discharge manhole to TCSPS from 2020 onwards, i.e., one year before the scheduled commencement of operation of the proposed third runway.
- 6.2.1.2 Moreover, in order to ensure the additional sewage generated from the 3RS project would not impose adverse impacts in respect of sewage septicity and odour issues on the existing sewerage networks including the public sewerage system, it is recommended to start routine monitoring of hydrogen sulphide (H<sub>2</sub>S) levels for the sewerage system of 3RS upon commencement of operation of the project,
- 6.2.1.3 The ET should propose suitable method for carrying out the annual sewage flow monitoring for the concerned gravity sewer as well as details of the routine H<sub>2</sub>S monitoring system for the sewerage system of 3RS, which shall be checked by IEC and agreed by the AAHK / PM and EPD at least one year before commencement of operation of 3RS.

## 7 Waste Management Implications

### 7.1 Construction Phase Monitoring

#### 7.1.1 Monitoring Requirements

- 7.1.1.1** Waste Management Plan (WMP) for the construction of the project was submitted to EPD no later than 3 months before the commencement of construction in accordance to EP Condition 2.19. The Contractors are responsible for waste management activities during construction phase. The Contractors must ensure that all wastes produced during the construction phase are handled, stored and disposed of in accordance with EPD's regulations and requirements and in line with good waste management practices. Contract-specific WMPs should be prepared and implemented by individual Contractors in accordance with Environment, Transport and Works Bureau (ETWB TC(W)) No. 19/2005 Environmental Management on Construction Site and the Construction WMP. The contract-specific WMPs shall be updated from time to time and shall be reviewed and advised by the ET. All submissions shall be submitted to AAHK / PM for agreement and verified by the IEC.
- 7.1.1.2** The Contractors should also refer to the Construction and Demolition Material Management Plan (C&DMMP) which will be submitted to Public Fill Committee (PFC) before commencement of construction of the project to facilitate them in the preparation of the contract-specific WMP. The C&DMMP should provide ways to minimise the generation and maximise the reuse of the construction and demolition (C&D) material at the construction phase of the project. The C&DMMP should also describe the arrangement for collection and disposal of C&D materials to be generated from the construction phase.
- 7.1.1.3** During construction phase, the Contractors should perform regular site inspection (at least once per week) to determine if wastes are being managed in accordance with approved procedures and the contract-specific WMP. Waste materials generated during the construction works, such as inert C&D material, general refuse and chemical wastes, are recommended to be monitored on a weekly basis to ensure that proper storage, transportation and disposal practices are being implemented. This monitoring of waste management practices will ensure that these solid and liquid wastes are not disposed into the nearby harbour waters. The Contractors would be responsible for the implementation of any mitigation measures to minimise waste or redress problems arising from the waste materials.

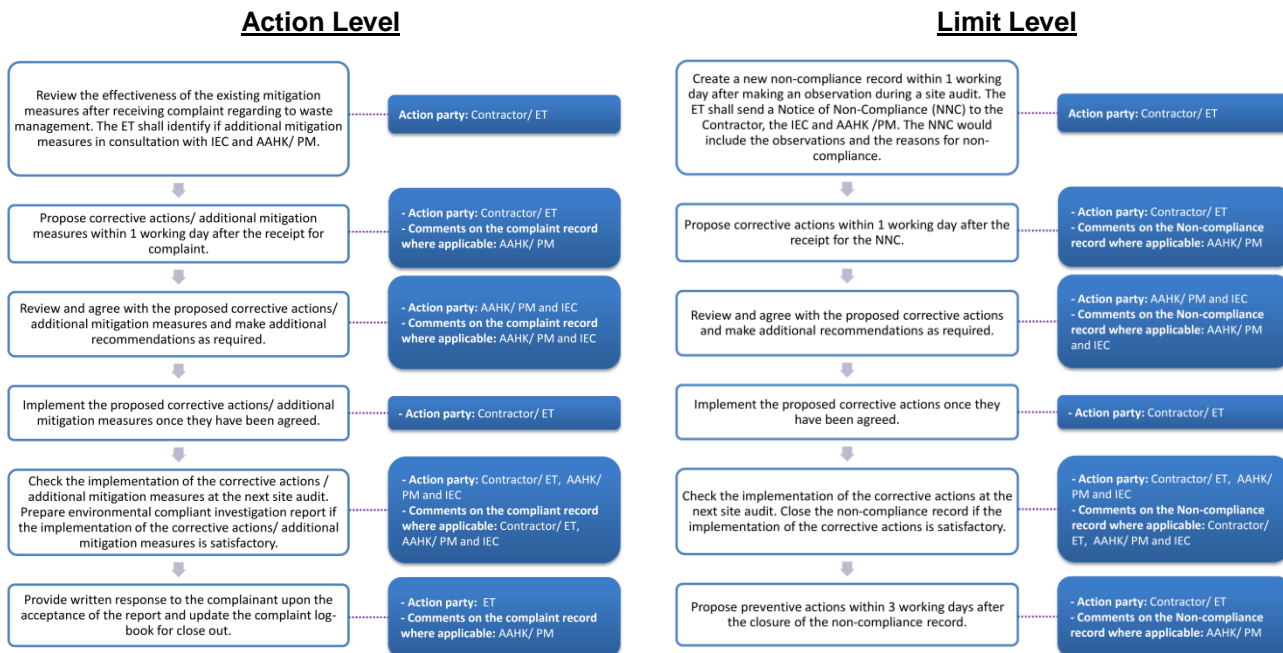
## 7.1.2 Audit Requirements

- 7.1.2.1** It is recommended that the waste generated during construction phase should be audited periodically (at least once per week) by the ET to determine if wastes are being managed in accordance with approved procedures and the contract-specific WMPs. The audits should look at all aspects of waste management including waste generation, storage, transportation and disposal. An appropriate audit programme would be to undertake a first audit near the commencement of the construction works, and then to audit periodically thereafter. In addition, routine site inspections by the Contractors should check the implementation of the recommended good site practices and other waste management mitigation measures. The results of the waste management audits should be reported in the EM&A reports.
- 7.1.2.2** In case of any complaint is received, the ET shall check compliance with the procedures for carrying out complaint investigation and propose the necessary improvement actions. In case non-compliance of the WMP, contract-specific WMPs, any statutory and contractual requirements, the Event and Action Plan as shown in **Chart 7-1** shall be triggered.
- 7.1.2.3** The Action and Limit Levels for construction waste are defined in **Table 7-1**. Should non-compliance occur, actions in accordance with the Event and Action Plan in **Chart 7-1**, should be carried out.

**Table 7-1: Action and Limit Level of Construction Waste**

Monitoring Location	Action Level	Limit Level
Construction Area	When one valid documented complaint is received.	Non-compliance of the WMP, contract-specific WMPs, any statutory and contractual requirements

**Chart 7-1: Event and Action Plan for Non-compliance of the WMP, Contract-specific WMPs, Any Statutory and Contractual Requirements**



**7.1.2.4** The ET shall check the disposal records for C&D materials and audit the trip-ticket system (TTS) for off-site delivery of surplus inert C&D materials to the designated disposal grounds. The ET shall also check that all wastes are appropriately recorded and disposed in accordance with the contract-specific WMPs.

**7.1.2.5** A summary of all key types of waste arising and the reuse and disposal methods proposed during the construction phase is presented in **Table 7-2**.

**Table 7-2: Summary of Waste Arising during Construction Phase**

Waste Type	Key Sources of Waste Generation	Timing of Waste Generation <sup>(1)</sup>	Estimated Total Quantity of Waste Generation <sup>(1)</sup>	Waste Reuse or Disposal	Handling Methods
Inert C&D Material	Excavation for APM & BHS tunnels, new APM depot and airside tunnels; piling works for TRC & other buildings; superstructure construction works; surplus surcharge material; modification of existing northern seawall; excavation and demolition as well as superstructure construction works for T2 expansion; excavation for improvement of road networks; and Horizontal Directional Drilling (HDD) for diversion of existing submarine pipelines	Q1 of 2016 to Q3 of 2024	9,543,500 m <sup>3</sup> (in-situ volume)	About 3,639,230 m <sup>3</sup> of the inert C&D materials generated would be reused on-site as fill materials for the proposed land formation works. The remaining 5,904,270 m <sup>3</sup> would be delivered off-site to any identified projects that need fill materials and/or to the government's PFRF for beneficial use by other projects in Hong Kong.	Segregation of inert C&D material to avoid contamination from other waste arising Stockpile areas should be covered and applied with regular water spraying
Non-inert C&D Material	Site clearance of the golf course area; demolition works for T2 expansion; and superstructure construction works for various buildings / facilities	Q3 of 2017 to Q3 of 2024	96,200 m <sup>3</sup> (in-situ volume)	The non-inert C&D material will be disposed of at landfills after on-site sorting and segregation of recyclable materials	Separation of non-inert C&D materials from inert C&D materials Stored in compatible containers in designated area on-site
Excavated Marine Sediments	Excavation at the cable field joint area	Q3 of 2017	About 10,200 m <sup>3</sup> (in-situ volume)	Type 1 open sea disposal for Category L sediment or Type 1 open sea disposal at dedicated sites for Category Mp sediment, according to PNAP ADV-21 (subject to endorsement by MFC of CEDD and EPD as well as obtaining dumping permit from EPD under DASO)	Stockpile with tarpaulin covers with earth bunds and sand bags barriers, if applicable.
	Piling works of the TRC, APM & BHS tunnels, airside tunnels and other facilities on the proposed land formation area	Q4 of 2017 to Q2 of 2023	About 705,350 m <sup>3</sup> (in-situ volume)	Treatment by cement mixing and stabilisation and on-site reuse of treated sediments as backfilling materials in accordance with the Proposal of Further Development on Treatment Level / Details and Reuse Mode for Marine Sediment. <sup>(2)</sup>	
	Piling works of marine sections of the approach lights for the third runway	2018 to 2019 (subject to detailed design)	Western approach lights: about 530 m <sup>3</sup> of marine sediments (in-situ volume) Eastern approach lights: about 1,060 m <sup>3</sup> of DCM-treated sediment (in-situ volume)	Treatment by cement mixing and stabilisation and on-site reuse of treated sediments as backfilling materials in accordance with the Proposal of Further Development on Treatment Level / Details and Reuse Mode for Marine Sediment. <sup>(2)</sup>	

Waste Type	Key Sources of Waste Generation	Timing of Waste Generation <sup>(1)</sup>	Estimated Total Quantity of Waste Generation <sup>(1)</sup>	Waste Reuse or Disposal	Handling Methods
	Piling works of new HKIAAA beacons	2018 to 2019 (subject to detailed design)	About 220 m <sup>3</sup> (in-situ volume)	Treatment by cement mixing and stabilisation and on-site reuse of treated sediments as backfilling materials in accordance with the Proposal of Further Development on Treatment Level / Details and Reuse Mode for Marine Sediment. <sup>(2)</sup>	
	Basement works of T2 expansion	Q3 of 2017 to Q4 of 2019	About 50,730 m <sup>3</sup> (in-situ volume)	Treatment by cement mixing and stabilisation and on-site reuse of treated sediments as backfilling materials in accordance with the Proposal of Further Development on Treatment Level / Details and Reuse Mode for Marine Sediment. <sup>(2)</sup>	
	Excavation works of APM depot	Q1 of 2018 to Q3 of 2020	About 9,770 m <sup>3</sup> (in-situ volume)	Treatment by cement mixing and stabilisation and on-site reuse of treated sediments as backfilling materials in accordance with the Proposal of Further Development on Treatment Level / Details and Reuse Mode for Marine Sediment. <sup>(2)</sup>	
Chemical Waste	Used cleansing fluids, solvents, lubricating oil, waste fuel, etc., from maintenance and servicing of construction plant and equipment	2016 to Early 2024	Anticipated as small quantity To be quantified in the site Waste Management Plan to be prepared by the Contractor	Disposal of at the Chemical Waste Treatment Centre or other licensed recycling facilities	Stored in compatible containers in designated area on-site
General Refuse & Floating Refuse	Food scraps, waste paper, empty containers, etc. generated from the construction workforce	2016 to Early 2024	General refuse: maximum daily arising of up to 9,100 kg	Encourage segregation of recyclable materials (e.g., paper, tin-cans, etc.) for collection by outside recyclers Collection of non-recyclable refuse by a reputable collector for disposal at designated landfill sites.	Provide on-site collection points together with recycling bins
	Floating refuse trapped or accumulated in the newly constructed seawall	2017 to Early 2024	Floating refuse: roughly 65 m <sup>3</sup> /year to be collected from the newly constructed seawall	Collection by a reputable waste collector for disposal at designated landfill sites	Provide on-site collection points

Note: (1) Timing and the quantity of waste generation was based on the information provided in the EIA Report of the Project. The update information on waste generation is provided in "Construction Waste Statistic" presented in the EM&A Reports.

(2) Proposal of Further Development on Treatment Level / Details and Reuse Mode for Marine Sediment was developed in accordance with the Waste Management Plan (WMP) of 3RS and has been approved by EPD. The details of the proposal can be found in Table 4.1 of the online version of 3RS WMP.

### 7.1.3 Mitigation Measures

- 7.1.3.1 The implementation schedule of the recommended waste management mitigation measures is presented in **Appendix C** and the WMP.

## 7.2 Operation Phase Monitoring

- 7.2.1.1 Wastes produced during operation phase would be generated by a variety of landside and airside activities and mainly comprise of general refuse, chemical waste, sludge from greywater treatment plant and floating refuse that may be trapped on the artificial seawall of the expanded airport site.
- 7.2.1.2 Operation WMP shall be submitted to EPD no later than 3 months before the commencement of operation of the project in accordance to EP Condition 2.25.
- 7.2.1.3 During operation phase, weekly inspection should be carried out along the artificial seawall of the expanded airport island to check for any entrapment or accumulation of floating refuse by contractor. Where an appreciable amount of floating refuse is found on the artificial seawall during the weekly inspection, the locations of such refuse will be recorded and arrangements with the contractor will immediately be made to collect and clear the refuse from the seawall.
- 7.2.1.4 With the implementation of the recommended mitigation measures for handling, transportation and disposal of the identified waste arisings, no adverse residual impacts are anticipated during operation phase of the project. Therefore, no other specific waste monitoring during operation phase is required.

## 8 Land Contamination

### 8.1 Construction Phase Monitoring

- 8.1.1.1 Since some of the assessment areas (i.e. fuel tank room within T2 building, fuel tank room to the west of CAD antenna farm, seawater pump house and switching station, pumping station and fire training facility) were not accessible for site reconnaissance, further site reconnaissance would be conducted once these areas are accessible in order to identify any land contamination concern for the areas. Subject to the further site reconnaissance findings, a supplementary Contamination Assessment Plan (CAP) for additional site investigation (SI) (if necessary) shall be prepared by the ET in accordance with EP Condition 2.20 and submitted to EPD for endorsement prior to the commencement of SI at these areas.
- 8.1.1.2 Since all the areas identified with potential contamination issues are under on-going use, the SI works are proposed to be carried out after removal / decommissioning of the concerned facilities but prior to the commencement of construction works at those areas.
- 8.1.1.3 After completion of the SI, the Contamination Assessment Report (CAR) will be prepared and submitted to EPD for approval prior to the commencement of construction works at the golf course, the underground and above-ground fuel storage tank areas, emergency power generation units, airside petrol filling station and fuel tank room. Should remediation be required, Remediation Action Plan (RAP) and Remediation Report (RR) will be prepared for EPD's approval prior to commencement of the proposed remediation and any construction works respectively.
- 8.1.1.4 All soil and groundwater remediation works should be carried out to clean up to levels in compliance with the relevant Risk-based Remediation Goals (RBRG) prior to commencement of any construction works at all areas identified with contamination issues (if any).
- 8.1.1.5 During construction phase, EM&A is to be carried out in the form of regular site inspections. All related procedures and facilities for handling or storage of chemicals and chemical wastes will be audited regularly to ensure they are in order, intact and reported in the EM&A reports accordingly.

### 8.2 Operation Phase Monitoring

- 8.2.1.1 As land remediation is not anticipated during the operation phase, no environmental monitoring and audit for land contamination is considered necessary.



## 9 Terrestrial Ecological Impact

### 9.1 Ecological Mitigation Measures

- 9.1.1.1 Mitigation measures were recommended in accordance with Annex 16 of the EIAO-TM. The recommended mitigation measures extracted from Section 12.7 of EIA Report are listed below and the implementation schedule is presented in **Appendix C**. In relation to the pre-construction egret survey, the requirement of submission of an Egret Survey Plan is also specified in EP Condition 2.14.

#### Avoidance

##### Land Formation Area

- 9.1.1.2 The land formation area is not located in a habitat of high ecological sensitivity, therefore the impact to terrestrial ecology is greatly avoided in the project design stage and no specific terrestrial ecological mitigation measures is deemed necessary for the loss of terrestrial habitat.

##### HDD Daylighting Location

- 9.1.1.3 The originally proposed daylighting location is immediately opposite the existing AFRF which minimises the pipe connection works. However given the presence of the egret, the daylighting location is now shifted northwards. This measure aims to avoid direct impacts to the egret (an avoidance measure based on the outcomes of the impact assessment) and furthermore, the daylighting location and mooring of flat top barge, if required, will be kept away from the egret (original daylighting location refers to Section 12.6.3.1 of the EIA Report and alternative location specified as blue zone in **Drawing MCL-P132-EMA-9-001**). The vegetation at the northeastern side of Sheung Sha Chau Island near the proposed daylighting location is short and shrubby which is less suitable for egret use. Only a small works area (about 10 m x 10 m) will be needed at the tentative daylighting location. This alternative is chosen as the preferred option owing to the ecological concerns, despite a longer pipe connection being required. The final daylighting location within the blue zone is subject to further adjustment to avoid direct encroachment on the egret, giving due consideration to the findings of the pre-construction monitoring for Sha Chau egret, which was conducted before the commencement of the HDD drilling works at HKIA. With the adjustment of the daylighting location, direct encroachment onto the egret will be avoided.

##### Timing of Construction Works

- 9.1.1.4 All HDD and related construction works on Sheung Sha Chau Island will all be scheduled outside the ardeids' breeding season (between April and July). No night-time construction work will be allowed on Sheung Sha Chau Island during all seasons except the contingency event as specified in Sections 12.6.3.4 and 12.6.3.5 of the EIA Report. With these avoidance measures the impact can be largely minimised.

## Minimisation

### Preservation of Nesting Vegetation

- 9.1.1.5 The HDD daylighting location proposed in the blue zone identified in **Drawing MCL-P132-EMA-9-001** will be located within a rock area near the seashore, whilst the connecting pipelines will be aligned along the seashore (above the shoreline). This proposed arrangement will avoid the need for tree cutting, therefore trees that are used by ardeids for nesting will be preserved.

## 9.2 Pre-construction Egretty Survey

- 9.2.1.1 As a mitigation measure to avoid disturbance to the egretty, the HDD daylighting location and associated works will be conducted outside the Sha Chau egretty's boundary. The location of the HDD daylighting location is indicated as blue zone in **Drawing MCL-P132-EMA-9-001**. It is noted that the egretty's status and location could change from time to time even in the absence of human disturbance. Therefore, a pre-construction survey is recommended to update the latest boundary of the egretty during the breeding season before commencement of the HDD drilling works at HKIA. The survey will update the latest boundary of the egretty and to ensure the daylighting location will avoid direct encroachment on the egretty. Subject to the pre-construction survey findings, the daylighting location/ works area will be adjusted to avoid the future egretty location.
- 9.2.1.2 The pre-construction survey has been conducted once per month in the breeding season, i.e. between April and July, prior to the commencement of HDD drilling works. The survey works was conducted by qualified ecologist with at least three years' experience on egretty monitoring. Ardeid species and abundance were recorded whilst the latest boundary of the egretty was identified. The information collected through the pre-construction survey was incorporated into the Egretty Survey Plan, which has been submitted to EPD no later than 1 month before the commencement of HDD drilling works. The result of the egretty survey and the decision on HDD daylighting location has been agreed with EPD and Agriculture Fisheries and Conservation Department (AFCD) by submission of an Egretty Survey Plan prior to the commencement of HDD drilling works.

## 9.3 Ecological Monitoring

- 9.3.1.1 During the HDD construction works period from August to March, ecological monitoring shall be undertaken monthly at the HDD daylighting location on Sheung Sha Chau Island to identify and evaluate any impacts with appropriate actions taken as required to address and minimise any adverse impact found. Attention shall also be given to the months either side of the ardeids breeding season, i.e. March and August, to identify any early or late breeding activities that might be subject to disturbance. The monitoring during works period shall be undertaken by experienced ecologist competent in detecting any potential disturbance to the egretty.

# 10 Marine Ecological Impact

## 10.1 Introduction

**10.1.1.1** The EIA Report has predicted the project would lead to some ecological impacts and has recommended a series of measures to avoid, minimise, and mitigate the impacts to an acceptable level. According to EIAO-TM Annex 16, an ecological EM&A programme would be needed to ensure the recommended measures are properly implemented. In addition, the EM&A programme also serves other purposes, including but not limited to verifying the accuracy of the ecological assessment study, detecting any unpredicted ecological impacts and recommending adaptive management in response to unpredicted impacts.

**10.1.1.2** It is recommended that an EM&A programme for ecology be undertaken during the baseline (pre-construction), construction, post-construction and operation phases of the project. The objectives of the pre-construction phase EM&A are to undertake baseline monitoring for the corals and Chinese White Dolphins (CWDs). The construction, post-construction and operational audit objectives are to ensure that the ecological mitigation measures recommended in the EIA Report are carried out as specified and are effective. The construction and operation phase monitoring will be to monitor the CWDs over the construction period and also determine the effectiveness of the mitigation on CWD numbers. The EM&A will also be undertaken to verify the predictions in the EIA Report.

## 10.2 Ecological Monitoring

### 10.2.1 Background

**10.2.1.1** It is predicted in the EIA Report that there will be direct impact on the coral communities along the northern seawall of the existing airport island. A pre-construction phase dive survey is recommended in the EIA Report to review the feasibility of coral translocation and preparation of translocation and monitoring plan where necessary. It is also predicted in the EIA Report that the area immediately north of the existing airport platform, which is predominantly used as a travelling area for the CWD, will be affected by the project but that alternative routes for travelling east and west during construction phase and initial operational phase will be available to CWDs, potentially shifted to an area further north of the new platform.

- 10.2.1.2 In addition, habitat will be lost permanently as a result of the 3RS project and there will be construction phase disturbance to the CWDs movement and behaviour. Therefore, it is proposed to conduct ecological monitoring during the baseline, construction, post-construction and operation phases of the project, with the aims to monitor the effects on the CWDs over the construction period, including the potential shift in the CWD travelling areas and habitat use, to monitor the effectiveness of the High Speed Ferry (HSF) speed and routing restrictions to the CWDs, as well as the proposed new Marine Park (when it comes into operation) on CWD distribution and numbers. Post-construction refers to the 12 months period after the completion of marine works while operational monitoring refers to the completion of the 3RS project as a whole.
- 10.2.1.3 The CWD monitoring will be conducted by the ET, led by a CWD monitoring team leader with five years of post-graduate experience in CWD monitoring. An overarching goal of these surveys is to provide a dataset that can be compatible with the AFCD long term monitoring, be stratified in such a way as to allow the calculation of density and abundance for the various different phases listed above and to facilitate the calculation of trends from these estimates, providing some assessment of how the project and cumulative effects may be impacting the CWDs.
- 10.2.1.4 Methods of the baseline, construction, post-construction and operation phase surveys will be as consistent as possible with the AFCD long-term monitoring programme to allow for direct comparisons of results among different phases, thus allowing an evaluation of trends and impact assessments. Further details are provided below.
- 10.2.1.5 Regular meetings with the Authority and relevant Government Departments e.g. EPD and AFCD will be arranged on a quarterly basis when the construction phase surveys commence to review CWD distribution and abundance trends. The data collected from vessel line transect survey, land-based surveys and theodolite tracking and the Passive Acoustic Monitoring (PAM) will be reviewed to derive the distribution and abundance trends, which will be checked against the transect survey conducted under other projects and AFCD's long-term monitoring. It will also be conducted in conjunction with the review of stranding data to interpret the full picture of CWD's latest status during construction phase. It is expected that the 3RS reclamation activities would result in the temporary movement of CWDs away from 3RS works areas during the construction period, and this may be indicated by a further decline in CWD abundance in the Northwest Lantau survey area over the period of construction. Actions may also be explored, where necessary, for remediating unpredictable impacts or changes in abundance that are identified during the monitoring, recognising that actions that serve to prolong the period of reclamation activity may in themselves have an adverse impact on CWDs.

## 10.2.2 Pre-construction Phase Coral Dive Survey

**10.2.2.1** It is proposed to conduct a pre-construction phase dive survey for corals along the northern and northeastern seawall of the existing airport island and at the daylighting location on Sha Chau that may subject to direct habitat loss and disturbance as a precautionary measure prior to marine construction works. The aim is to identify any coral colonies suitable for translocation. The potential for coral translocation will depend on the conservation value, the health status and the translocation feasibility. A detailed coral translocation plan has been submitted to EPD no later than 3 months before the commencement of marine construction works at areas with potential to affect coral colonies in accordance to EP Condition 2.12. The determination of the translocation was based on the conservation importance of the coral species (including hard corals, soft corals and octocorals), the coral health conditions, size of the communities and feasibility for translocation (e.g. attached to large boulders but <50 cm in diameter and considered as manageable of translocation with minimal destruction of the coral communities). Locations of pre-construction coral dive surveys for the directly affected site are shown in **Drawing No. MCL/P132/EMA/10-001**, the locations for the potential recipient site(s) were determined as part of the translocation plan. In addition, it should be noted that the daylighting location on Sha Chau will be finalised based on the findings from the pre-construction egretry survey as indicated in **Section 9.2**, as well as to avoid affecting any coral colonies in the area. Therefore, pre-construction phase coral dive survey will only be carried out at Sha Chau if there are any marine works with potential to affect coral colonies as identified by the ET. The preliminary methodology for coral dive survey will be as follows:

### Coral Dive Survey at Directly Affected Site and Potential Recipient Site(s)

- 10.2.2.2** Based on the sub-tidal coral dive survey at hard substrates conducted in the EIA Report, the underwater visibility within the western Lantau waters are generally low. It is proposed to conduct the pre-construction survey at sites which would be directly affected by the project. Suitable substrates with coral communities will be identified, supervised by qualified marine ecologists with at least 5 years of coral dive survey experience.
- 10.2.2.3** The pre-construction survey was conducted by spot-check dive followed by Rapid Ecological Assessment (REA) should coral communities recorded. The survey was conducted at hard bottom subtidal habitats along the northern artificial seawall of the existing airport island, and at the proposed daylighting location on Sha Chau as shown in **Drawing No. MCL/P132/EMA/10-001** during daytime. If coral communities suitable for translocation are identified at these directly affected sites, coral dive surveys including spot-check dive followed by REA will also be conducted at potential recipient site(s).
- 10.2.2.4** The spot-check dive survey was conducted by swimming in a search pattern along pre-determined areas at a density sufficient to cover any major coral areas and to assess the type of benthos existing in the proposed survey area, recording any presence of hard corals (order Scleractinia), octocorals (sub-class Octocorallia), and black corals (order Antipatharia). Information including estimated number of colonies, number of species, coral cover, and partial mortality (if any) will be recorded during the actual dive.

#### 10.2.2.5 The following data was recorded during the survey:

- Temperature, time and date;
- Location (GPS);
- Depth range;
- Visibility;
- Substratum type (i.e. hard substratum seabed, intertidal rocky area); and
- Other invertebrates present.

10.2.2.6 Any special features encountered in the coral areas, such as non-typical reef structures, unusual coral species associations, unique or peculiar assemblages of the local incipient reef formations, and reefs that are almost completely dominated by one particular species, will be recorded.

10.2.2.7 Representative photographs of the habitat and coral species, and other ecological features will be taken to facilitate the determination of suitable similar habitats as recipient site.

#### Rapid Ecological Assessment Survey

10.2.2.8 With reference to the data collected during the spot-check dive survey, REA surveys will be carried out at locations where coral communities were identified and at potential recipient site(s). Transects of 100m in length will be laid following the contour of the seabed at areas where corals communities identified during the spot-check dives / at potential recipient site(s).

10.2.2.9 The REA survey will be conducted underwater in a two-tier approach to assess the sub-littoral substrata and benthic organisms in an area:

- Tier I assessed the relative coverage of major benthic groups and substrata.
- Tier II provided an inventory of sedentary/ sessile benthic taxa, which will be ranked in terms of their abundance at the survey site.

10.2.2.10 The taxon categories will be ranked in terms of relative abundance of individuals, rather than the contribution to benthic cover along each transect. The ranks will be made by visual assessments of abundance, rather than quantitative counts of each taxon.

10.2.2.11 The benthic coverage, taxon abundance, and ecological attributes of the transects will be recorded in a swath of about 2m wide, with about 1m on either side of the transects.

10.2.2.12 Representative photographs of any important ecological features and corals will be taken to facilitate the determination of suitable similar habitats as recipient site and as baseline information for future post-translocation monitoring.

### 10.2.3 CWD Monitoring Phases

**10.2.3.1** The CWD monitoring by vessel surveys will be conducted during baseline, construction, post construction and operational phases. Supplementary surveys including land-based theodolite tracking and underwater acoustic monitoring using PAM or equivalent devices are also proposed to provide additional information (such as behaviour change of CWD associated with concurrent activities and habitat use of CWD during day and night) for facilitating the review of effectiveness of mitigation measures proposed and the need for adaptive management.

**10.2.3.2** Monitoring for CWDs is proposed to be conducted by vessel surveys at a frequency of two full surveys per month of the Northeast Lantau (NEL) and Northwest Lantau (NWL) covering the Airport West (AW), West Lantau (WL) and Southwest Lantau (SWL) transects, including focal follows and photo-identification, during the baseline, construction, post-construction and operational phases. The full surveys refer to completion of two survey transects for NEL / NWL, WL and SWL per month, irrespective of the number of days of effort required. Ad hoc monitoring of other CWD habitat areas will be undertaken as required and on an as-needed basis to be determined during the course of the monitoring. The monitoring periods for vessel surveys will be as follows:

- 1) *Baseline Monitoring* – 6 months of baseline surveys has been undertaken before the commencement of land-formation related construction works at a frequency of two full surveys per month. The commencement date of baseline survey was agreed between the ET / IEC / AAHK / PM to ensure timely submission of the baseline monitoring report to EPD and relevant authorities. The purpose of the baseline monitoring is to establish pre-construction conditions prior to the commencement of the marine construction works. The vessel-based dolphin monitoring transects in baseline monitoring are shown in **Drawing No. MCL/P132/EMA/10-002**.
- 2) *Construction Phase Monitoring* – This will be conducted for the duration of the land-formation related construction works for the project at a frequency of two full surveys per month with regular reviews on frequency on at least an annual basis. The purpose of the construction phase monitoring is to evaluate conditions during construction and provide data for the preparation of Marine Park establishment and management plan.
- 3) *Post Construction Phase Monitoring* – This will be conducted upon the completion of marine construction works for 12 months at a frequency of two full surveys per month. The purpose of the post construction phase monitoring is to evaluate conditions after completion of all marine works and collect data for the review of recovery of the marine environment.
- 4) *Operation Phase Monitoring* - This will be conducted for a period of at least 12 months after the full implementation of proposed Marine Park at a frequency of two full surveys per month. The main purpose of the monitoring is to detect any rebound in use of areas north and east of HKIA during the implementation of the proposed Marine Park as mitigation for habitat loss for the airport expansion, and to evaluate the overall, long-term impacts of the project on CWDs. The vessel based dolphin monitoring transects in construction, post-construction and operation phases monitoring are shown in **Drawing No. MCL/P132/EMA/10-003**, with transects for



operation phase monitoring subject to refinement based on the actual boundaries for the extension of Hong Kong International Airport Approach Areas (HKIAAA) and 3RS Marine Park.

**10.2.3.3** The vessel monitoring data will be used to monitor the effectiveness of the mitigation measures proposed for the amelioration of construction, post-construction and operation phase impacts. In particular, the vessel monitoring data in the northwest Lantau area together with the data of marine traffic tracking system (e.g. Automatic Identification System (AIS) data) will be used as an audit tool to review and determine the effectiveness of the reduction in speed for the diverted SkyPier HSF on disturbance to the CWDs around the north of Sha Chau and Lung Kwu Chau Marine Park (SCLKCMP) (see Drawing No. **MCL/P132/EMA/10-002**). In addition to the proposed vessel transect monitoring, some additional monitoring is proposed in the form of land-based theodolite tracking, combined with underwater acoustic monitoring to provide additional information on CWD behaviour and occurrence during 3RS construction works to supplement the details on CWD abundance patterns obtained from vessel transect surveys. The main aim for these two monitoring types is to supplement the vessel transect survey findings detailed above and to help in verifying the predictions in the EIA Report. The effectiveness of these additional measures in monitoring data collection will be reviewed during the construction phase, to confirm the need and required frequency that will be applied for post-construction and operation phase monitoring.

**10.2.3.4** Land-based theodolite tracking is proposed to cover the 6-months baseline and it will also cover the whole duration of the land formation related construction works to provide adequate seasonal data with the data serving to provide fine-scale information on CWD behaviour and activity during construction, specifically swimming and movement patterns of CWD groups, and to further capture CWD response to vessels and travel patterns. The theodolite station established on Sha Chau is proposed to be used, given its good aspect overlooking the proposed 3RS reclamation area north of HKIA. Another land-based monitoring station at north of Lung Kwu Chau is proposed to supplement the vessel monitoring data in determining the effectiveness of the reduction in speed for the SkyPier HSF on disturbance to the CWDs (**Drawing No. MCL/P132/EMA/10-004**). The frequency of the theodolite tracking will be two days per month at both Sha Chau station and Lung Kwu Chau station during the 6-month baseline monitoring survey and the first six months of SkyPier HSF route diversion and speed restriction plan implementation (hereafter referred to as SkyPier HSF Plan). During the construction phase, the frequency of the theodolite tracking for impact monitoring will be one day per month at the Sha Chau station and one day per month at the Lung Kwu Chau station. The frequency of CWD land-based monitoring will be subject to review after reviewing the data from the baseline monitoring and from the initial six months of SkyPier HSF Plan implementation. Should any changes in the theodolite stations or tracking frequency be proposed as a result of the review, the proposed changes will be agreed with EPD and AFCD. Any available land-based survey data collected near the Lung Kwu Tan and Urmston Road areas by other projects will also be reviewed to supplement the survey results for the report to Advisory Council on the Environment (ACE) on the effectiveness of the mitigation measures on CWDs.



**10.2.3.5** Underwater acoustic monitoring using PAM or equivalent devices as adopted in the EIA assessment will also be undertaken during the same periods including 6 months of baseline and within the whole duration for land formation related construction works. Data would be used in tracking diurnal patterns of CWD presence and vocal activity, and providing information on ambient noise level in the underwater environment. As the information obtained from these surveys does not quantify CWD density and abundance, it is not useful to set an Action / Limit Level based on data from these supplemental PAM or equivalent devices. It is proposed to deploy the PAM station at the southern water of SCLKCMP boundary in order to coincide and supplement the data collected from the land-based monitoring station at south of Sha Chau (**Drawing No. MCL/P132/EMA/10-005**), which will be subject to review. Should any changes in the PAM station be proposed as a result of the review, the proposed changes will be agreed with EPD and AFCD.

**10.2.3.6** In conjunction with the above monitoring efforts, and given the uncertainty on the levels of HSF traffic from SkyPier / the Intermodal Transfer Terminus (ITT) in future years, the EM&A will also monitor actual numbers of HSFs operating from SkyPier after the HZMB and HKBCF commence operations by obtaining HSF movement data including AIS vessel tracking data from the SkyPier operators.

## **10.2.4 CWD Monitoring Methods**

### Small Vessel Line Transect Surveys

**10.2.4.1** Vessel-based CWD surveys provide data for density and abundance estimation and other assessments using distance-sampling methodologies, specifically, line-transect analysis. These surveys also include photo-identification of individual dolphins within the monitoring area when conditions are suitable, to provide data on individual use of this specific area. Focal follow data from the vessel may also potentially be collected, depending on a series of factors such as the presence of special features for identification of individuals (like presence of scratches, nick marks, cuts, wounds and distinguished color patterns) and favourable weather conditions.

**10.2.4.2** The surveys involve small vessel line-transect data collection and have been designed to be similar to, and consistent with, previous surveys for monitoring of small cetaceans in Hong Kong. The survey was designed to provide systematic, quantitative measurements of density, abundance and habitat use by line transect methods.

**10.2.4.3** The transects to be monitored will cover NEL, NWL, AW, WL and SWL and will be consistent with the AFCD long-term monitoring programme (except AW) during the baseline, construction, post-construction and operation phases. Due to the progressive extension of the works area that will be demarcated by floating booms during construction and permanent land formation footprint during operation, the transects will be adjusted in the construction, post-construction and operation phases to outside the area that can no longer be accessed by the survey vessel. The AW transect has not been previously surveyed in the AFCD programme due to the restrictions of HKIAA. Nevertheless, this transect was established during the EIA of the 3RS project, with the aim to collect project specific baseline information within the HKIAAA to fill the data gap that was not covered by the AFCD programme. This will provide a larger sample size for estimating the densities and patterns of movement in the broader study area of the project. The baseline, construction, post construction and operation phase line transects

are shown in **Drawing No. MCL/P132/EMA/10-002** and **MCL/P132/EMA/10-003** respectively.

- 10.2.4.4** A 15-20 m vessel with a flying bridge observation platform about 4 to 5 m above water level and unobstructed forward view, and a team of three to four observers will be deployed to undertake the surveys. Two observers are to be on search effort at all times when following the transect lines with a constant speed of 7 to 8 knots (i.e. 13 to 15 km per hour), one using binoculars and the other using unaided eyes and recording data.
- 10.2.4.5** When CWDs are seen, the observer team will be taken off-effort, the dolphins will be approached and photographed for photo-ID information (using a Canon 7D [or similar] camera and long 300 mm+ telephoto lens), then followed until they leave the study area or are lost. At that point, the boat returns (off effort) to the survey line and begins to survey on effort again. CWD density (D), abundance (N), and their associated precision (CV) will only be calculated from dolphin sightings and effort data collected under conditions of Beaufort 0-3 and visibility of approximately 1200 m or greater (in practice, surveys should normally be postponed when visibility is below 1 km and/or when Beaufort 5 is reached), using conventional line transect methods and the formulae as detailed below:

$$\hat{D} = \frac{n \hat{f}(0) \hat{E}(s)}{2 L \hat{g}(0)}$$

$$\hat{N} = \frac{n \hat{f}(0) \hat{E}(s) A}{2 L \hat{g}(0)}$$

$$CV = \sqrt{\frac{\text{var}(n)}{n^2} + \frac{\text{var}[\hat{f}(0)]}{[\hat{f}(0)]^2} + \frac{\text{var}[\hat{E}(s)]}{[\hat{E}(s)]^2} + \frac{\text{var}[\hat{g}(0)]}{[\hat{g}(0)]^2}}$$

- 10.2.4.6** Based on the vessel survey data, seasonal differences in dolphin density and use of the study area will then be examined annually, using the solar seasons (Winter: December-February, Spring: March-May, Summer: June-August, Autumn: September-November) and/or oceanographic seasons (Dry: October-March, Wet: April-September).
- 10.2.4.7** Focal follows of dolphins would be used for providing supplementary information only where practicable (i.e. when individual dolphins or small stable groups of dolphins with members that could be readily identified with unaided eyes during observations and weather conditions are favourable). These involve the boat following (at an appropriate distance to minimize disturbance) an identifiable individual dolphin for an extended period of time, and collecting detailed data on its location, behaviour, response to vessels, and associates. This type of data allows information to be gathered on the movement paths and travel corridors used by dolphins in the survey region.

### Land-based Surveys and Theodolite Tracking

**10.2.4.8** Land-based monitoring has been able to obtain fine-scale information on the time of day and movement patterns of the CWDs. A digital theodolite (Sokkia/Sokkisha Model DT5 or similar equipment) with 30-power magnification and 5-s precision will be used to obtain the vertical and horizontal angle of each dolphin and vessel position. Angles are converted to geographic coordinates (latitude and longitude) and data will be recorded using *Pythagoras* software, Version 1.2 (Gailey & Ortega-Ortiz, 2002). This method delivers precise positions of multiple spatially distant targets in a short amount of time. The technique is fully non-invasive, and allows for time and cost-effective descriptions of dolphin habitat use patterns at all times of day (Würsig et al. 1991; Piwetz et al. 2012). Examples of modern statistical techniques to describe movements relative to habitat and anthropogenic influences are described in Gailey et al. (2007) and Lundquist et al. (2012).

**10.2.4.9** Land-based observation and theodolite tracking station will be set up at two locations facing east/south/west on the southern slopes of the island of Sha Chau, and an audit location for SkyPier HSF facing north, northeast, and northwest, at Lung Kwu Chau. The proposed location (D and E) are shown with position coordinates, height of station and approximate distances of consistent theodolite tracking capabilities for CWDs in **Table 10-1** and shown in **Drawing MCL/P132/EMA/10-004**.

**Table 10-1: Land-based Survey Station Details**

Station	Location	Geographical Coordinates	Station Height (m)	Approx. Tracking Distance (km)
D	Sha Chau	22° 20' 43.5" N 113° 53' 24.66" E	45.66	2
E	Lung Kwu Chau	22° 22' 44.83" N 113° 53' 0.2" E	70.40	3

**10.2.4.10** The frequency of the theodolite tracking will be two days per month at both the Sha Chau station and Lung Kwu Chau station during the 6-month baseline monitoring and during the initial six months of implementation of the SkyPier HSF Plan. The monitoring frequency during the construction phase for marine works will be one day per month at both Sha Chau station and Lung Kwu Chau station. The monitoring frequency and stations in the construction phase are subject to review based on the baseline monitoring findings and a review of the effectiveness of the SkyPier HSF Plan route diversion and speed control measures during the first six months that these are in effect. Surveys will be undertaken during a period of about 5-6 hours per day from the monitoring stations, with some days longer than this but others truncated due to weather-related deterioration of sighting conditions. Three surveyors (one theodolite operator, one computer operator, and one person scanning with binoculars) will be involved in each survey. Observers will search for dolphins using unaided eyes and handheld binoculars (7X50). A theodolite tracking session will be initiated when an individual CWD or group of CWD is located. Where possible, a distinguishable individual will be selected, based on colouration, within the group. The focal individual is then continuously tracked via the theodolite, with a position recorded each time the dolphin surfaces. If an individual cannot be positively distinguished from other members, the group will be tracked by recording positions based on a central point within the group whenever the CWDs surface (Bejder, 2005; Martinez, 2010). Tracking continues until animals are lost from view, move beyond the range of reliable visibility (>1-3 km, depending on station height), or environmental conditions obstruct visibility (e.g., intense haze, Beaufort sea state >4, or sunset), at which the research effort will be terminated. During the baseline phase, in addition to the tracking of CWDs, all vessels that move within 2-3 km of the station will be tracked, with effort made to obtain at least two positions for each vessel. It is anticipated that this will not be feasible during the construction phase in the 3RS construction area, and possibly for some space outside this area also, due to the anticipated high volume of construction-related traffic.

#### Theodolite Tracking Data Analysis

**10.2.4.11** Theodolite tracking will include focal follows of CWD groups and vessels (the latter to be undertaken when possible). Focal follow data will be filtered to include only CWD tracks with greater than 2 positional fixes and 10 minutes or greater in duration. The ten minute window has been statistically validated for theodolite tracking analyses (Gailey et al. 2007, Lundquist 2012), and such a logical bound is also described in Turchin (1998). If two consecutive dolphin tracks are more than 5 min apart, they will be split and analysed separately. A broad time of day category is assigned for each track (morning = first position recorded before 12 pm; afternoon = first position recorded at 12 pm or later). CWD response variables that will be calculated for each track include mean reorientation rate, swimming speed and linearity. Reorientation rate is the degrees per minute of changes in direction of a tracked individual or group of CWDs. Mean swimming speed is calculated by dividing the distance travelled by the duration between two consecutive positions (Gailey et al. 2007). Linearity is an index of net movement ranging from 0 to 1, with 0 equating to no net movement and 1 equating to straight line movement. It is calculated by taking the sum of distances travelled for each leg and dividing by the net distance between the first and last fix of a track.

**10.2.4.12** In order to evaluate variation in CWD movement patterns in the presence of vessels, it is necessary to establish a distance threshold. Consistent with general practice and the data gathered for the EIA of this study, when vessels are within 500 m of the focal individual or group, they will be considered present. The 500 m threshold was chosen since Sims et al. (2012) showed that most vessels exceeded background noise when less than 500m away, but not at greater distances. The threshold has been used in other marine mammal situations for similar reasons and direct measurement of animal reactions, such as in Lundquist et al. (2012) for southern right whales (*Eubalaena australis*). As it is not possible to record geographic locations of all targets simultaneously, positions for CWDs and vessels will be interpolated *post hoc* (i.e. during analysis in the lab), allowing for a more precise estimation of vessel distances from dolphins at a given time. All types of vessels within 500m are considered, including high speed ferries. The high speed ferries travel through the area much more rapidly than fishing, recreational, industrial vessels carrying cargo and will therefore be noted and assessed as a separate category.

**10.2.4.13** *ArcMap* will be used to plot CWD and vessel positions, *Microsoft Excel* will be used to conduct computational analysis of leg speed, and linearity and *R* statistical software will be used to perform statistical analyses. Data will be tested for normality and transformed if residuals are not normally distributed. Because dolphin focal follows tend to vary in duration, each CWD track is split into 10-minute segments. In order to reduce pseudo-replication, analysis will be run to determine the temporal lag at which two segments from the same focal group are no longer auto-correlated. Univariate statistical analyses (one-factor Analysis of Variance, ANOVA) will be run to evaluate variation between factors.

**10.2.4.14** Similar to vessel-based surveys, seasonal differences in relative CWD occurrence and use of the study area will be examined for land-based surveys, using both the solar seasons (Winter: Dec-Feb, Spring: Mar-May, Summer: Jun-Aug, Autumn: Sep-Nov) and oceanographic seasons (Dry: Oct-Mar, Wet: Apr-Sep; see Chen et al. 2010). In addition, behavioural descriptions and potential avoidance/association by CWDs relative to vessels or other on-water anthropogenic activities will be analysed by multi-variate analyses, as in Gailey et al. (2007) and Lundquist et al (2012).

### Passive Acoustic Monitoring (PAM)

- 10.2.4.15** Acoustic data will be gathered to listen for CWDs occurrence patterns and to obtain anthropogenic noise information simultaneously. Autonomous PAM was designed to provide daytime and night-time information on CWD occurrence and vocal activity. This work involves a type of PAM (Wiggins and Hildebrand 2007) termed an Ecological Acoustic Recorder (EAR) (Lammers et al. 2008), with bottom-mounted broad-band recording capability operable from 20 Hz to 32 kHz. The EAR is proposed to be positioned at the south of Sha Chau Island to coincide with the land-based theodolite survey (**Drawing No. MCL/P132/EMA/10-005**). Analysis (by a specialized team of acousticians) involves manually browsing through every acoustic recording and logging the occurrence of vessel transits and other unusual sounds. This approach for data analysis is adopted because generally high ambient noise conditions in these waters have meant that an automatic algorithm cannot be reliably used to detect dolphin sounds. All data therefore need to be re-played by computer and listened to by human ears for accurate assessment of dolphin group presence. Vessels will be logged when discrete transits passing the EAR can be differentiated from background noise, and thus there can be more than one vessel detection per file.
- 10.2.4.16** To improve the length of deployments, speed of data gathering, and efficiency in data analysis, the C-POD and its successor the F-POD (developed by Chelonia Limited, UK) are proposed in replacement of the previous EAR in early 2021 at the same location. The C-POD/F-POD can detect cetaceans by recognising the trains of echolocation clicks in the range 20-160 kHz and records the click trains automatically. The C-POD has also been adopted by the AFCD in marine mammal monitoring for collection of useful data on night-time usage of dolphins at the SCLKCMP and the Brothers Marine Park (BMP). Analysis is performed using the proprietary software (CPOD.exe/FPOD.exe developed by Chelonia Limited, UK). Objective automated data analyses to detect and identify echolocation click trains produced by marine mammals are conducted. The click data detected by the C-POD/F-POD are processed using the KERNOF classifier in the software to identify click trains and their likely sources and to ensure similar sounds, such as boat sonar noise in the ambient environment, are not counted as dolphin detection. Experienced analysts then perform visual validation to assess the overall rate of false dolphin detection positive minutes (DPMs) as identified by the classifier. The visual validation is based on a representative sampling of all detections and examining the characteristics of clicks, multi-path clusters, and click trains.
- 10.2.4.17** Comparisons of CWD detections during theodolite tracks with corresponding C-POD/F-POD click records will be made *post hoc*, that is after both sets of data have been separately analysed, positions are known, and the positions can be compared to frequencies of CWD detections.
- 10.2.4.18** A review of CWD sightings from the land-based survey data in relation to the PAM device will also be undertaken to provide data on the approximate locations of the CWDs at the time their signals are detected. Thus, overlaps of land-based CWD sightings and the PAM records of CWDs will be analysed.

### 10.2.5 Review of Construction Phase CWD Monitoring Programme

- 10.2.5.1 Subject to details of the marine construction programme established during the detailed design stage, the aforementioned CWD monitoring programme will be reviewed by the ET. Where the CWD monitoring programme requires revision or updating according to the detailed construction programme, the ET will revise or update the monitoring programme accordingly, and the revised monitoring programme will be verified by IEC before submission to EPD and AFCD for approval prior to commencement of the marine construction works.

### 10.2.6 Cumulative Impacts for Travel Corridors/ Areas and Connectivity between Core Habitat Areas

- 10.2.6.1 It is clear from past and present data that the area north of the existing airport is used for a variety of CWD behavioural functions, including travel between Northwest and Northeast Lantau. The longer that cumulative construction activities exist in and near this general area, the greater will be the effect on efficient habitat use of CWD, with both the project and the HZMB Hong Kong Link Road (HKLR) / HKBCF / Tuen Mun-Chek Lap Kok Link (TM-CLKL) projects forcing the CWDs to move further north towards the Tuen Mun area. However, the corridor/ area between the project and waters to the north should still be available and useable for CWDs to transit between western and eastern waters north of the airport. As these implications could increase with all the projects being constructed and implemented concurrently, a long-term monitoring programme is recommended, consistent with that being undertaken by AFCD (i.e. by using vessel transect monitoring) as discussed in **Section 10.2.4** above.

## 10.3 Detailed Implementation of Dolphin Exclusion Zone

### 10.3.1 Dolphin Exclusion Zone Plan

- 10.3.1.1 According to Environmental Permit No. EP-489/2014 Condition 3.1(v), detailed implementation of Dolphin Exclusion Zone (DEZ) shall be included in this updated EM&A Manual. This section provides the technical guidelines for the implementation of DEZ. The actual marine construction activities that require the implementation of DEZ were determined in the DEZ Plan, which was prepared by the ET based on an objective assessment of noise levels and noise intensities from different marine construction activities as methodologies were finalised.
- 10.3.1.2 A DEZ with 250 m radius from the boundary of the works will be established for marine construction activities that require the implementation of DEZ. The DEZ Plan has been submitted to EPD for approval at least 1 month prior to commencement of construction activities requiring DEZ. The DEZ serves as a short-term approach to provide appropriate and immediate action should CWDs be sighted within the DEZ for construction activities requiring a DEZ. Should the Action Level for CWD monitoring be exceeded, the DEZ monitoring area shall be increased to 500 m for daytime works until the ET notify the resume of the 250 m DEZ. Details of the DEZ are described below:



### 10.3.2 Daytime Monitoring of Dolphin Exclusion Zone

- 10.3.2.1** In the 3RS EIA Report, the impact significances of acoustic disturbance from daytime and night-time reclamation related construction works were evaluated as “Low-Moderate” and “Moderate” respectively. DEZs have been adopted in Hong Kong for other previous projects involving similar marine works activities as the 3RS project and are therefore proposed as a precautionary and a mitigation measure respectively to address the impacts identified from certain daytime and night-time marine works activities.
- 10.3.2.2** A DEZ set at a certain distance from potentially harmful marine works activities (e.g. certain marine works known to be very noisy) will be established during all periods of each of the marine construction activities requiring a DEZ. The DEZ monitoring will be carried out from the shore or on a stationary barge or vessel depending on the type of construction activity requiring the DEZ, with an unobstructed elevated view of the DEZ, by using naked eyes and occasionally with the aid of binoculars (e.g. Steiner Navigator 7X50 HD-stabilized Compass or model with similar or more advanced specification) for confirmation, or by using combination of high definition pan-tilt-zoom network camera and closed-circuit television system (CCTV). The use of CCTV or alternative approach proposed by the contractor for achieving effective DEZ monitoring must be tested in the site before actual use for DEZ monitoring, and all the tests shall be witnessed and verified by AAHK, ET and IEC. The actual monitoring locations will be proposed in the DEZ Plan which will be determined by the ET and thereafter subject to update based on the marine construction programme.
- 10.3.2.3** At least two dolphin observers will carry out the monitoring on shift (e.g. rotate every 30 minutes), in order to minimise fatigue. The dolphin observers must be adequately trained and qualified, preferably with a degree in biological sciences or equivalent, experience in observing dolphins, and basic knowledge of literature on CWDs in Hong Kong. The dolphin observers should be appointed by, but must be independent of, the construction contractor. The dolphin observers shall be trained by the ET, who shall also provide regular competence checking on the effective implementation of the DEZ.
- 10.3.2.4** Prior to the commencement of construction activities that require the implementation of a DEZ, the DEZ will be thoroughly scanned for dolphins for an initial period of 30 minutes. If dolphins are observed in the DEZ, the dolphin observers will immediately inform the Site Supervisor or relevant person through mobile phone or handheld transceivers to delay the commencement of the construction activities in the works area within the DEZ, until the dolphins leave and the DEZ is continuously free of dolphin for a period of 30 minutes.
- 10.3.2.5** If dolphins are observed within the DEZ during construction works, the dolphin observers will inform the Site Supervisor or relevant person through mobile phone or handheld transceivers to cease the construction activities within the DEZ. The dolphin observers will continue to monitor the dolphins. When the dolphins leave the DEZ and the DEZ is clear of dolphins for a period of 30 minutes, the dolphin observers will inform the Site Supervisor or relevant person that the construction activities within the DEZ could be resumed.



- 10.3.2.6** If dolphins are observed in close vicinity but outside the DEZ, the dolphin observers will also inform the Site Supervisor about the presence of the dolphins. The dolphin observers will remain in position and closely observe the movement of the dolphins as well as searching for the appearance of any other dolphins within the DEZ.
- 10.3.2.7** All vessel captains involved in construction activities in and around the DEZ shall be advised to pay special attention to the presence of dolphins around the DEZ and to use appropriate slow speed when travelling within or near to the DEZ area in order to reduce chance of collision with or other adverse impacts to the dolphins.
- 10.3.2.8** In case of injury or live-stranded dolphins being found within the DEZ, the dolphin observers will immediately inform the Site Supervisor to suspend the construction activities within the works area around the DEZ and contact AFCD through “1823” marine mammal stranding hotline.
- 10.3.2.9** Each DEZ monitoring team has to fill in a data record sheet for data keeping purpose when they are on duty. General information not limited to those listed below will be recorded at the beginning of the monitoring:
- Date;
  - Surveyors;
  - Monitoring Location;
  - Construction Activity;
  - Weather;
  - Beaufort Sea State;
  - Commencement Time of Monitoring; and
  - Commencement Time of Construction Activity.
- 10.3.2.10** In case dolphins are detected within the DEZ, the information included but not limited to the following will be recorded:
- Sighting No.;
  - Group Size;
  - First Sighting Time within DEZ;
  - Last Sighting Time within DEZ;
  - Cessation Time of Construction Work;
  - Re-start Time of Construction Work;
  - Location of Dolphins; and
  - Behaviour.

### **10.3.3 Night-time Monitoring of Dolphin Exclusion Zone**

- 10.3.3.1** The PAM result during the 3RS EIA study suggested that night-time CWD activity in the 3rd runway footprint area may be more extensive than previously thought, and therefore implications for disturbance and loss of area could be higher than the daytime use alone would indicate. Therefore, the implementation of an effective DEZ monitoring scheme during night-time periods was also recommended in the 3RS EIA Report.

- 10.3.3.2** Night-time DEZ monitoring will be conducted by using night vision device (NVD) that greatly enhance the small amount of available light at night to make visual observing of CWDs possible. The NVD is suggested to be in the form of hand-held, head-mounted or tripod-mounted units depending on the location of the DEZ monitoring station (e.g. ATN model PS15-CGTI Night Vision Goggles with 3X lens or model with similar or more advanced specification and performance).
- 10.3.3.3** Similar to daytime DEZ monitoring, the use of NVD to assist the implementation of DEZs shall be carried out from the shore or a stationary barge or other vessel, and experienced personnel shall be used, dedicated 100% to the dolphin searching effort (i.e. not ancillary to other activities). Night-time DEZ monitoring will follow a similar procedure to the daytime DEZ monitoring except for the complete use of NVD over naked eyes for scanning. It is recommended that two night-time observers scan the exclusion zone, with appropriate staggered rest periods to avoid eye fatigue and general fatigue.
- 10.3.3.4** All selected NVD shall be tested before actual use for night-time DEZ monitoring. This test is to be conducted by experienced dolphin-monitoring researchers, preferably at a site or sites where dolphins occur with regularity and can be tracked by theodolite in the late afternoon hours, so that visual day-time tracking can be “handed off” to night-time NVD sighting as darkness descends. All tests shall be witnessed and verified by the AAHK/ PM, ET and IEC. Only after such dedicated testing has provided confidence that the NVD technique allows for reliable detection of dolphin at night shall the use of NVD be adopted. The feasibility of using PAM involving the use of hydrophones or automated cetacean detectors with real-time data capability, or CCTV involving high definition network camera with night vision could be explored by the Contractor for the DEZ monitoring in case the NVD is found to be ineffective for night-time CWD detection. Alternative night-time monitoring devices, including using PAM or CCTV should be witnessed and verified by the AAHK/ PM, ET and IEC with satisfactory performance, prior to the adoption for implementation of night-time DEZ monitoring.

## 10.4 Acoustic Decoupling

- 10.4.1.1** According to Environmental Permit No. EP-489/2014 Condition 3.1(v), detailed implementation of acoustic decoupling shall be included in this updated EM&A Manual. This section provides the technical guidelines for the acoustic decoupling devices to be implemented to minimise the indirect disturbance to CWD during marine construction.
- 10.4.1.2** CWD whistle communication frequencies in the 4-8 kHz octave band are well above the frequencies produced by most large vessels used in shipping and marine construction activities. Based on available experience in Hong Kong, these types of vessels are not considered to be a significant source of acoustic disturbance. Main engines of the proposed working vessels are therefore not considered to be a significant source of acoustic disturbance and will not be considered as source of noise and vibration. However, there is still a small possibility that noise would be transmitted from the noisy Powered Mechanical Equipment (PME) on vessels (i.e. air compressors, generators and winch generators) into the sea. Therefore, acoustic decoupling measures for noisy equipment which are not embedded on vessels are required to minimise the possible noise impact on CWD / marine ecology.

- 10.4.1.3 Noise isolation pad could be one of the acoustic decoupling devices to separate the noisy PME from the deck or hull in order to reduce noise transmission to the sea via the vessel. The size of the isolation pad for the identified noisy PME should be large enough to cover the whole base with thickness of at least 24 mm. A schematic diagram of noise isolation pad is shown **Drawing MCL/P132/EMA/10-006**.
- 10.4.1.4 The noisy PME on vessels should be fixed on noise isolation pad instead of directly mount on the deck. Contractor should ensure the foundation of equipment is flat and level prior to installation. Adequate clearance all around the PME should be kept to avoid direct vibration transmission to other materials and machineries.

## 10.5 Action/Limit Levels and Event Action Plan for CWD

- 10.5.1.1 As mentioned in Section 10.2.1.5 and the EIA Report, it is expected that the 3RS reclamation activities would result in the temporary movement of CWDs away from 3RS works areas during the construction period, and this may be indicated by a further decline in CWD abundance in the Northwest Lantau survey area over the period of construction. As part of the set of required mitigation measures for the construction of the project, an Event and Action Plan framework has been developed that is intended to detect any deterioration in ambient environmental quality that could endanger CWDs or result in an overall decline in CWD numbers in Lantau waters (NEL, NWL, AW, WL and SWL) as a whole below a certain threshold level. Appropriate remedial actions are described and would be taken as part of the plan, intended to prevent unacceptable deterioration in environmental quality or a reduction in CWD numbers in Lantau waters as a whole below the Limit Level that may be caused by 3RS construction works.
- 10.5.1.2 The Event and Action Plan has been reviewed and consolidated based on the data from the baseline CWD monitoring surveys, with reference to historical data on some key parameters that are indicative of the health of the CWD population (and specifically the portion that uses Hong Kong waters as part of their range), and can be monitored as part of regular EM&A efforts during construction, providing early warning when particularly serious impacts may be occurred. The results would be used as a management tool, so that if the decline in overall CWD encounter rate is determined to be from the 3RS construction process, appropriate measures may then be triggered / considered to minimise possible impacts with short term response to events after reviewing the monitoring data for each month. A set of criteria that may trigger certain identified actions have been developed and are detailed in the following sections.

### 10.5.2 Action Response Approach

- 10.5.2.1 The approach proposed for formulating the AL and LL for construction phase CWD monitoring involves using the encounter rate. The encounter rate provides a direct indicator of the health of CWD population and it can be determined from the EM&A effort (i.e. CWD monitoring). Actions will be taken when these levels in the overall Lantau waters covering NWL, AW, NEL, WL and SWL have been triggered.

- 10.5.2.2 Both the Encounter Rate of Number of Dolphin Sightings (STG) and Encounter Rate of Number of Dolphins (ANI) from the baseline survey are adopted as the parameters for determining the AL and LL. The calculation of the CWD encounter rates for determining AL and LL made use of the dataset from the CWD Baseline Monitoring undertaken for this project as part of the EM&A requirement under the Environmental Impact Assessment Ordinance (EIAO). The formulas for calculating STG and ANI encounter rates are shown below:

Quarterly Encounter Rate of Number of Dolphin Sightings (STG)

$$STG = \frac{\text{Total No. of On – effort Sightings}}{\text{Total amount of Survey Effort (km)}} \times 100$$

Quarterly Encounter Rate of Number of Dolphins (ANI)

$$ANI = \frac{\text{Total No. of Dolphins from All On – effort Sightings}}{\text{Total amount of Survey Effort (km)}} \times 100$$

- (Notes: 1. Only data collected under Beaufort 3 or below condition was used;  
2. A quarter refers to three survey months, and data collected within a quarter was counted and calculated to obtain the total no. of on-effort sightings, total no. of dolphins from on-effort sightings and total amount of survey effort)

- 10.5.2.3 According to the approved 3RS EIA Report, 3RS construction works are expected to result in CWDs temporarily moving away from the project works area during the construction phase. The use of the encounter rate approach, making use of the quarterly dolphin vessel survey findings to compare with baseline STG and ANI values provides a short to medium term frequency method for monitoring and responding appropriately to changes in CWD abundance as project works progress. It is proposed that AL and LL are established for Lantau waters covering NEL, NWL, AW, WL and SWL as a whole, as it has been anticipated in the EIA Report that the number of CWDs in North Lantau waters will decline due to the project, and CWDs may move to other areas around Lantau including West Lantau and Southwest Lantau. A combined encounter rate can present a general picture of the entire waters around the Project area and Lantau.
- 10.5.2.4 Natural seasonal fluctuations of CWD encounter rates across the four seasons may cause non-project related triggering of the AL and/or the LL, therefore historical CWD data has been reviewed to take into account the effect of seasonal fluctuations on the CWD encounter rate. The seasonal variations of CWD quarterly encounter rates based on the AFCD long term marine mammals monitoring over the past six years covering the NEL, NWL, WL and SWL waters were reviewed. The findings showed that in general, the first quarter or winter/spring (Q1, i.e. January to March) of the year is the low season for CWD encounters, with the values of STG and ANI consistently being the lowest during Q1 compared to other quarters over the years with a decreasing trend. The CWD encounter rates generally increase in late spring/ early summer (Q2, i.e. April to June). The CWD baseline monitoring conducted between mid-December 2015 and mid-June 2016 for the 3RS project shows a similar trend (i.e. encounter rates are lowest in during Q1 (winter/spring) and increase during Q2 (late spring/early summer)).

**10.5.2.5** The dataset of the CWD Baseline Monitoring for this project has been taken mainly during Q1 to Q2 of 2016, during which time the quarterly encounter rates for STG and ANI were collected in the Q1, thereby capturing the low season. The dataset is therefore suitable for establishing the AL and/or LL for future impact monitoring. Review of the AL and LL has been undertaken in the 1<sup>st</sup> annual EM&A report with full year data collected covering the peak season encounter rates. It is recommended to maintain the existing AL/LL derived from the CWD Baseline Monitoring Report. The criteria for triggering the AL and LL during CWD impact monitoring are detailed in **Table 10-2** and **Table 10-3** below.

**Table 10-2: Approach for Defining Action Level and Limit Level**

**NEL, NWL, AW, WL and SWL as a Whole**

Action Level	Running quarterly* STG & ANI < low season quarterly encounter rates derived from baseline monitoring data
Limit Level	Two consecutive running quarterly^ (3-month) STG & ANI < low season quarterly encounter rates derived from baseline monitoring data

**Table 10-3: Derived Values of Action Level and Limit Level**

**NEL, NWL, AW, WL and SWL as a Whole**

Action Level	Running quarterly* STG < 1.86 & ANI < 9.35
Limit Level	Two consecutive running quarterly^ (3-month) STG < 1.86 & ANI < 9.35

[Notes for Table 10-2 and Table 10-3:

\*Action Level – running quarterly STG & ANI will be calculated from the three preceding survey months; If both quarterly STG and ANI are lower than the baseline values 1.86 and 9.35 respectively the AL will be triggered.

^Limit Level – two consecutive running quarterly encounter rates will be reviewed; If both STG and ANI for two consecutive running quarters are lower than the baseline values, the Limit Level will be triggered.]

**10.5.2.6** The adoption of the running quarter encounter rate approach will allow a short to medium term response to events that may trigger the AL / LL after reviewing the monitoring data for each month. This is preferable to the traditional quarterly encounter rate approach whereby AL / LL may only be triggered after 3 to 4 months of impact monitoring. Therefore, the running quarter encounter rate approach is expected to be more effective in mitigating short term effects that may arise from 3RS construction phase impacts.

**10.5.2.7** The review of encounter rates has been undertaken in the 1<sup>st</sup> annual EM&A report with full year data collected covering the peak season encounter rates, and no update to the Event and Action Plan for CWD was recommended. Should any updates to the Event and Action Plan be required in subsequent annual review when more data are available, agreement will be sought from the EPD / AFCD after certification by the ETL and verification by the IEC prior to implementation of the updated Event and Action Plan.

### **10.5.3 Event and Action Plan for CWD**

**10.5.3.1** Details of events and actions corresponding to the AL and LLs are presented in **Table 10-4**.

**Table 10-4: Event and Action Plan for CWD**

Event	Dolphin Expert / ETL	IEC	Action	
			AAHK / PM	Contractor
Action Level	<ol style="list-style-type: none"> <li>1. Check monitoring data;</li> <li>2. Repeat data analysis to confirm findings;</li> <li>3. Review all available and relevant data covered in the EM&amp;A and the survey data collected at the Lantau waters, i.e. NWL, SWL, WL and NEL to ascertain the exceedance is due to natural variation or works related;</li> <li>4. Identify source(s) of impact;</li> <li>5. Inform the AAHK/ PM, IEC and Contractor;</li> <li>6. Instruct an increase in the DEZ area to be monitored from 250m to 500m for daytime works; and</li> <li>7. Increase site inspection and audit frequency to ensure all the dolphin protective and/or precautionary measures (e.g. consider enhancing dolphin watch patrols, phasing of construction works, review of construction methods, etc.) and other relevant measures are fully and properly implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET and the Contractor;</li> <li>2. Check the data review outcome by ET with the ETL; and</li> <li>3. Conduct additional site inspection and audit with ET to ensure all the dolphin protective measures are fully and properly implemented and advise AAHK / PM the audit results and findings accordingly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss the need for increase site inspection and audit frequency proposed by ET with the ETL, IEC, and the Contractor; and</li> <li>2. Check the audit results and findings from ET and IEC.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the AAHK /PM and confirm notification of the non-compliance in writing;</li> <li>2. Conduct site inspection and audit with the ETL and IEC; and</li> <li>3. Ensure all the dolphin protective measures are fully and properly Implemented.</li> </ol>
Limit Level	<ol style="list-style-type: none"> <li>1. Check monitoring data;</li> <li>2. Repeat statistical data analysis to confirm findings;</li> <li>3. Review all available and relevant data covered in the EM&amp;A and the survey data collected at the Lantau waters, i.e. NWL, SWL, WL and NEL to ascertain the exceedance is due to natural variation or project related;</li> <li>4. Identify source(s) of impact;</li> <li>5. Inform the AAHK / PM, IEC and Contractor;</li> <li>6. Repeat review with the Contractor representatives and IEC to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary;</li> <li>7. Review previous occurrence of non-compliance events to investigate if there is a longer term trend that needs attention; and</li> <li>8. ET provides evidence of the suspected source of impact that may be caused by any of the construction activity under works contracts of the project, ET arranges a meeting to discuss with AAHK / PM, IEC and Contractors on the need for further monitoring and/or any other potential mitigation measures (e.g. consider modified design, or consider controlling or temporarily stopping relevant marine works etc.), consultation with EPD and AFCD and submit to IEC any proposal on additional dolphin monitoring and/or</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET and Contractor;</li> <li>2. Discussing monitoring results and findings with the ET, Dolphin Experts and the Contractor;</li> <li>3. Review with the Contractor representatives and ET to ensure all the dolphin protective measures are fully and properly implemented;</li> <li>4. Discuss further mitigation measures with AAHK / PM, ET and Contractor;</li> <li>5. Review proposals for additional monitoring and any other mitigation measures submitted by ET and Contractor and advise AAHK / PM of the results and findings accordingly; and</li> <li>6. Supervise / audit the implementation of additional monitoring and/or any other mitigation</li> </ol>	<ol style="list-style-type: none"> <li>1. Convene an expert panel involving IEC (and dolphin experts), EPD and AFCD to review the situation and determine any necessary actions based on the options / mitigation details as proposed by the ET/ Contractors.</li> <li>2. Discuss further mitigation measures with the ET, IEC and Contractor; and</li> <li>3. Supervise the implementation of additional monitoring and/or any other mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the AAHK/ PM and confirm notification of the non-compliance in writing;</li> <li>2. Discuss further mitigation measures with the ETL, IEC and AAHK / PM;</li> <li>3. Review with ET and IEC again to ensure all the dolphin protective measures are fully and properly implemented and carried out additional measures when advised by ET and agreed by AAHK / PM and IEC;</li> <li>4. Jointly submit with ET to IEC and expert panel a proposal of additional dolphin monitoring and/or any other mitigation measures when necessary; and</li> <li>5. Implement the agreed additional dolphin monitoring and/or any other</li> </ol>



Event	Dolphin Expert / ETL	IEC	Action AAHK / PM	Contractor
	mitigation measures for certification where necessary.	measures and advise AAHK / PM the results and findings accordingly.		mitigation measures.

## 10.6 Ecological Audit Requirement

### 10.6.1 Baseline, Construction and Post-Construction Phases

**10.6.1.1** Specific marine ecological mitigation and precautionary measures are proposed for the construction phase in the EIA Report. The Project Design Team and Contractor should be responsible for the design and implementation of these measures under the supervision of the AAHK / PM and monitored by the ET. The implementation schedule of the recommended ecological mitigation measures is presented in **Appendix C**. The key construction phase mitigation and precautionary measures for the CWDs are:

- **Acoustic decoupling of noisy construction equipment** – Air compressors and other noisy equipment (i.e. generators and winch generators) that must be mounted on construction vessels will be acoustically-decoupled to the greatest extent as feasible, for instance by using noise isolation pad. These noise isolation pad should be made of materials having a density in excess of 250 kg/m<sup>3</sup> of thickness at least 24mm with vibration absorbing efficiency of at least 10 dB;
- **Construction vessel speed limits, predefined vessel routing and skipper training** – A “Marine Travel Routes and Management Plan for Construction and Associated Vessels” has been prepared by the ET and submitted to the relevant Authority according to EP Condition 2.9 no later than 3 months prior to the commencement of construction for approval, to define the routings for construction vessels within Hong Kong waters;
- **Dolphin Exclusion Zones** – DEZ will be implemented during certain marine construction works known to be very noisy (e.g. ground improvement, water jetting works for submarine cables diversion, open trench dredging at the field joint locations and seawall construction, etc.). Details of the actual marine construction activities that require the implementation of DEZ will be determined in the DEZ Plan when the detailed design of the construction works are available;
- **Spill response plan** – According to EP Condition 2.16, a Spill Response Plan has been submitted by the ET no later than 3 months before the commencement of construction of the project; and
- **SkyPier high speed ferries’ speed and routing restrictions** – According to EP Condition 2.10, a Marine Travel Routes and Management Plan for High Speed Ferries of SkyPier has been submitted by the ET no later than 3 months before the commencement of construction of the project.

**10.6.1.2** Further details are provided in the Implementation Schedule provided in **Appendix C**.

**10.6.1.3** In addition to the above measures, the EP Condition 2.11 also require the Project Proponent to submit a Marine Mammal Watching Plan no later than 3 months before the commencement of reclamation related marine works or works involving deployment of silt curtains of the project.

**10.6.1.4** During the pre-construction, construction phase and post-construction phases the Contractors will be required to undertake the following ecological measures of the recommended EIA mitigation and precautionary measures, while the ET will conduct the ecological monitoring and conduct regular site inspection to review the implementation of mitigation measures. The IEC will be required to conduct regular site audit and to verify the submissions and findings prepared by the ET:

- Implementation of acoustic decoupling for land formation works and the vessel restrictions requirements, as provided by the specifications prepared prior to commencement of marine construction works;
- Implementation of the DEZ during marine works in accordance with the specifications prepared by the ET prior to commencement of marine construction works;
- The ET shall review and submit the “Marine Travel Routes and Management Plan for Construction and Associated Vessels”, to be verified by the IEC, no later than 3 months before the commencement of construction of the project and audit the construction vessel adherence to this specification. During the construction phase, the ET is required to review the specific Plan submitted by the Contractors regularly, where necessary, the Plan shall be reviewed to reflect the marine travel routes arrangement of the construction and associated vessels in different phases of the marine works;
- The ET shall review and submit the Spill Response Plan, to be verified by the IEC, no later than 3 months before the commencement of construction of the project;
- The ET shall review and submit the “Marine Travel Routes and Management Plan for High Speed Ferries of SkyPier”, to be verified by the IEC, no later than 3 months before the commencement of construction of the project. The ET is required to audit the compliance of SkyPier high speed ferries’ speed and routing restrictions in accordance with the Plan. A review report on the effectiveness of the proposed mitigation measures on CWD will be provided to ACE summarising and analysing the data gathered from the initial 6 months of SkyPier HSF Plan implementation. During the construction phase, the ET is required to review the Plan regularly, where necessary, the Plan shall be reviewed to reflect the marine travel routes arrangement of the SkyPier HSF with an aim to minimise the impact on the CWD hotspot;
- The ET shall conduct the pre-construction coral dive survey at the artificial seawall at northern and northeastern airport island, and the daylighting location at Sha Chau if there are any marine works with potential to affect coral colonies is identified by the ET to check the status of *Balanophyllia* sp. and other coral species and review the feasibility of translocation. A pre-construction coral dive survey plan and report will be prepared by the ET according to EP Condition 2.12 and verified by the IEC for agreement with the Authority. A coral translocation plan shall be submitted no later than 3 months before the commencement of construction works (See **Section 10.2.2**);
- The ET is required to conduct the baseline, construction and post-construction phase dolphin monitoring and the findings to be verified by the IEC (see **Section 10.2.4**);
- The ET is required to audit the actual numbers of HSFs operating from SkyPier after the HZMB and HKBCF commence operations during construction phase by review of information obtained from the SkyPier operators, including the AIS vessel tracking data; and



- The ET is required to conduct cumulative assessment on CWD for construction phase in an annual basis by using the monitoring data collected from the vessel based, land-based and underwater acoustic monitoring (see **Section 10.2.6**).

## 10.6.2 Operational Phase

**10.6.2.1** Specific mitigation measures and precautionary measures for marine ecology during the operation phase will be implemented by AAHK. The implementation schedule of the recommended ecological mitigation measures is presented in **Appendix C**. The key operation phase mitigation measures and precautionary measures for the marine ecology are:

- Compensation of a Marine Park of size around 2,400 ha to connect between the existing SCLKCMP and BMP for the loss of marine habitats in northern Lantau waters. AAHK shall submit a Marine Park Proposal, establishment of Marine Ecology Enhancement Fund and Submission of Marine Ecology Conservation Plan according to EP Conditions 2.7 and 2.8 respectively no later than 3 months before the commencement of reclamation related marine works of the project;
- Chemical/ Oil spill response plan; and
- SkyPier high speed ferries' speed and routing restrictions.

**10.6.2.2** During the operational phase, the ET will be required to undertake the following ecological audit measures of the recommended EIA mitigation measures for a period of 12 months. The IEC will be required to verify the findings of the ET audits.

- Audit the Spill Response Plan once every 6 months for a period of one year; and
- Audit the SkyPier high speed ferries' speed and routing restrictions in accordance with the latest updated Marine Travel Routes and Management Plan for High Speed Ferries of SkyPier for once every 3 months for a period of one year.

**10.6.2.3** During the operational phase, the ET will be required to conduct the operational phase CWD monitoring, with the detailed monitoring plan (with reference to **Section 10.2.4**) submit to EPD in consultation with AFCD 3 months prior to the completion of project construction.

# 11 Fisheries Impact

## 11.1 Introduction

- 11.1.1.1** The EIA Report conducted for the 3RS indicated there will be temporary and permanent loss of fisheries habitats (and resources) and fishing ground upon completion of construction of land formation and associated marine works. The sites of fisheries importance including the Brothers Marine Park (BMP), SCLKCMP and the spawning ground for commercial fisheries resources in northern Lantau may also be affected indirectly during the construction and operational phases, as a result of change in water quality and hydrodynamics effect. A suite of mitigation measures for water quality has been proposed in the EIA Report, which could also minimise the impact on fisheries resources and fishing ground. Apart from this, a new marine protected area is proposed which will be connected with the existing SCLKCMP to the north, the BMP to the east, the marine mammals conservation area at the Mainland waters to the west, with the extended HKIAAA as fisheries no-take zone.
- 11.1.1.2** The EIA Report has concluded that, with the implementation of the recommended water quality mitigation measures and proposed establishment of new Marine Park to compensate the permanent loss of fisheries habitats (and resources) and fishing ground, no adverse residual impact on fisheries is anticipated. Apart from the above mitigation measures, the consideration of alternative construction methods e.g. use of non-dredge ground improvement methods by DCM would also reduce the potential release of contaminant to the water column and reduce the indirect impact on fisheries resources. Water quality monitoring and audit has been proposed at locations covering sites of fisheries importance during construction and operation phases to monitor the effectiveness of the proposed mitigation measures, thus fisheries specific monitoring is considered not necessary.
- 11.1.1.3** The Fisheries Management Plan has been submitted no later than 3 months before the commencement of reclamation related marine works of the project in accordance to EP Condition 2.13.

## 11.2 Mitigation Measures

- 11.2.1.1** Recommended mitigation measures for water quality that would minimise the impacts on fisheries habitats (and resources), fishing ground and fisheries activities are proposed for the construction phase in the EIA Report. The Project Design Team and Contractor should be responsible for the design and implementation of these measures under the supervision of the AAHK / PM and monitored by the ET. The implementation schedule of the recommended water quality mitigation measures is presented in **Appendix C**. Key operation phase mitigation measure for the fisheries is the establishment of a Marine Park of size around 2,400 ha for the loss of fisheries habitats (and resources) and fishing ground in northern Lantau waters.

# 12 Landscape and Visual Impact

## 12.1 Introduction

- 12.1.1.1 The EIA Report has recommended the EM&A for landscape and visual resources is undertaken during both the construction and operational phases of the project. The implementation and maintenance of landscape compensatory planting measures is a key aspect of this and shall be checked to ensure that they are fully realised and that potential conflicts between the proposed landscape measures and any other project works and operational requirements are resolved at the earliest possible date and without compromise to the intention of the mitigation measures. In addition, implementation of the mitigation measures recommended by the EIA Report shall be monitored through the construction phase site audit programme.

## 12.2 Baseline Monitoring

- 12.2.1.1 Baseline monitoring for the landscape and visual resources comprise a one-off survey was conducted within the project site boundary prior to commencement of construction works. The commencement date of baseline monitoring has been agreed between the ET / IEC / AAHK / PM to ensure timely submission of the baseline monitoring report to EPD and relevant authorities.
- 12.2.1.2 This includes a vegetation survey of the entire site area and within compounds undertaken on an “area” basis. Representative vegetation types were identified along with typical species composition. An assessment of landscape character was made against which future change can be monitored. The landscape resources and elements of particular concern are noted.
- 12.2.1.3 A photographic record of the site at the time of the contractor’s possession of the site shall be prepared by the contractor and approved by the AAHK / PM. The approved photographic record shall be submitted to the AAHK / PM, ET, IEC and EPD for record.
- 12.2.1.4 The landscape and visual baseline has been determined with reference to the Landscape Resources and Landscape Character Area maps included in the EIA Report.

## 12.3 Mitigation Measures

**12.3.1.1** The following mitigation measures are proposed to avoid and reduce the identified impacts during the construction stage and are illustrated in **Drawing MCL/P132/EMA/12-001.1 to MCL/P132/EMA/12-001.6**:

- The construction area and contractor's temporary works areas shall be minimised to avoid impacts on adjacent landscape (**CM1**);
- Reduction of construction period to practical minimum (**CM2**);
- Phasing of the construction stage to reduce visual impacts during the construction phase (**CM3**);
- Construction traffic (land and sea) including construction plants, construction vessels and barges shall be kept to a practical minimum (**CM4**);
- Erection of decorative mesh screens or construction hoardings around works areas in visually unobtrusive colours (**CM5**);
- Avoidance of excessive height and bulk of site buildings and structures (**CM6**);
- Control of night-time lighting by hooding all lights and through minimisation of night working periods (**CM7**);
- All existing trees shall be carefully protected during construction. Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in contractor's works areas (**CM8**);
- Trees unavoidably affected by the works shall be transplanted where practical. A detailed Tree Transplanting Specification shall be provided in the Contract Specification, if applicable. Sufficient time for necessary tree root and crown preparation periods shall be allowed in the project programme (**CM9**); and
- Land formation works shall be followed with advanced hydroseeding around taxiways and runways as soon as practical (**CM10**).

**12.3.1.2** The following mitigation measures are proposed to remedy and compensate unavoidable impacts during the operation phase (it should be noted that while the benefits of these mitigation measures will be felt in the operation phase, many of the measures are implemented either partially or entirely in the design phase):

- Sensitive landscape design of reclamation edge by incorporating different angles of gradient and the use of a range of armour rock sizes placed randomly in a riprap approach for an irregular appearance. Planting of native coastal plants shall be incorporated (**OM1**);
- All above ground structures, including, Vent Shafts, Emergency and Firemen's' Accesses etc. shall be, either fully integrated with the planned buildings, or sensitively designed in a manner that responds to the existing and planned urban context, and minimises potential adverse landscape and visual impacts (**OM2**);
- Sensitive design of buildings and structures in terms of scale, height and bulk (visual weight) (**OM3**);
- Use appropriate building materials and colours in built structures to create cohesive visual mass (**OM4**);
- Lighting units to be directional and minimise unnecessary light spill and glare (**OM5**);

- Greening measures, including vertical greening, green roofs, road verge planting and peripheral screen planting shall be implemented (**OM6**);
- Compensatory Tree Planting for all felled trees shall be provided to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Felling Application process under the relevant technical circulars (**OM7**);
- Streetscape (e.g. paving, signage, street furniture, lighting etc.) shall be sensitively designed in a manner that responds to the existing and planned urban context, and minimises potential adverse landscape and visual impacts (**OM8**);
- All streetscape areas and hard and soft landscape areas disturbed during construction shall be reinstated to equal or better quality (due to implementation of screen planting, road verge planting etc.), to the satisfaction of the relevant Government departments (**OM9**);
- Aesthetic improvement planting of viaduct structure through greening of structure to mitigate visual impact of viaduct form (**OM10**); and
- Sensitive design of footbridges, noise barriers and enclosures with greening (screen planting / climbers / planters) and chromatic measures (**OM11**).

**12.3.1.3** The operation phase measures listed above shall be adopted during the detailed design, and be built as part of the construction works so that they are in place at the date of commissioning of the 3RS (as stated in **Section 12.3.1.2** above).

## **12.4 Environmental Monitoring and Audit Requirements**

**12.4.1.1** An approved landscape contractor shall be employed by the contractor for the implementation of landscape construction works and subsequent maintenance operations during the 12-month establishment period. The establishment works shall be undertaken throughout the contractor's one-year maintenance period which will be within the first operation year of the project.

**12.4.1.2** All measures undertaken by both the contractor and the landscape contractor during the construction phase and first year of the operation phase shall be audited by a landscape architect, as a member of the ET, on a regular basis to ensure compliance with the intended aims of the measures. Site inspections shall be undertaken at least once every two months during the operation phase.

**12.4.1.3** The broad scope of the audit is detailed below. Operation phase auditing will be restricted to the 12-months establishment works of the landscaping proposals, with the AAHK / PM taking over the maintenance and monitoring after this period, and thus only the items below concerning this period are relevant to the operation phase:

- The extent of the agreed works areas shall be regularly checked during the construction phase. Any trespass by the contractor outside the limit of works, including and damage to existing trees and woodland all noted and remedial action determined;
- The progress of the engineering works all be regularly reviewed on site to identify the earliest practical opportunities for the landscape works to be undertaken;

- All existing trees and vegetation within the study area which are not directly affected by the works shall be retained and protected;
- The methods of protecting existing vegetation proposed by the contractors shall be acceptable and enforced;
- All landscaping works shall be carried out in accordance with the specifications;
- The planting of trees and shrubs shall be carried out properly and within the right season as far as practical;
- The species and mix of the new trees and shrubs to be planted shall be suitable; and
- The newly planted trees and grasses areas shall be maintained throughout the establishment period, particularly in respect of the following:
  - Regular watering, weeding and fertilising of all trees and shrub planting and areas of grass reinstatement;
  - Regular grass cutting for reinstated areas;
  - Firming up of trees after periods of strong winds;
  - Regular checks for eradication of pests, fungal infection, etc.;
  - Pruning of dead or broken branches; and
  - Prompt replacement of dead plants and regressing of failed areas of grass.

**12.4.1.4** The Landscape and Visual Plan shall be submitted no later than 3 months before the commencement of construction works on the formed land of the project in accordance to EP Condition 2.18.

## **12.5 Monitoring Programs**

**12.5.1.1** The design, implementation and maintenance of landscape and visual mitigation measures shall be checked to ensure that any potential conflicts between the proposed landscape measures and any other works for the project would be resolved as early as practical without affecting the implementation of the mitigation measures.

**12.5.1.2** Site inspection and audit shall be undertaken as necessary in the construction and operation phases.

**Table 12-1: Monitoring Programme for Landscape and Visual**

Stage	Monitoring Task	Monitoring Report	Form of Approval	Frequency
Detailed Design	Checking of design works against the recommendations of the landscape and visual impact assessments within the EIA shall be undertaken during detailed design and tender stage, to ensure that they fulfil the intention of the mitigation measures. Any changes to the design, including design changes on site shall also be checked.	Report by AAHK / PM confirming that the design conforms to requirements of EP.	Approved by Client	At the end of the Detailed Design Phase
Construction	Checking of the contractor's operations during the construction period.	Report on Contractor's compliance, by ET	Counter signature of report by IEC	Weekly
Establishment Works	Checking of the planting works during the twelve-month Establishment Period after completion of the construction works.	Report on Contractor's compliance, by ET	Counter signature of report by IEC	Every two months
Long Term Management (10 year)	Monitoring of the long-term management of the planting works in the period up to 10 years after completion of the construction works.	Report on Compliance by ET or Maintenance Agency as appropriate	Counter signature of report by Management Agency	Annually

## 12.6 Construction Phase & Establishment Period

**12.6.1.1** An implementation programme will be prepared as required by EIAO-TM. Reference will be made to the ETWB TC(W) No. 2/2004 on Maintenance of Vegetation and Hard Landscape Features which defines the management and maintenance responsibilities for natural vegetation and landscape works, including both soft works and hard works, and authorities for tree preservation and felling. The format of the preliminary arrangement of implementation programme is listed in **Table 12-2** below.

**Table 12-2: Preliminary Funding, Implementation, Management and Maintenance Proposal**

Landscape and Visual Mitigation Measure ID No.	Funding Agency	Implementation Agency	Management Agency	Maintenance Agency
Construction Phase				
CM1 – CM10	AAHK	Contractor	-	-
Operation Phase				
OM1, OM5, OM8, OM10, OM11	AAHK	Design Engineer	AAHK	AAHK
OM2 – OM4	AAHK	Design Engineer	Building Operator	Building Operator
OM6, OM7, OM9	AAHK	Contractor	AAHK	AAHK

**12.6.1.2** The implementation of landscape construction works and subsequent maintenance operations during the 12-month establishment period must be supervised by a qualified Landscape Resident Site Staff (Registered Landscape Architect or Professional Member of the Hong Kong Institute of Landscape Architects).

**12.6.1.3** Measures to mitigate landscape and visual impacts during construction shall be checked and monitored by a Registered Landscape Architect to ensure compliance with the intended aims of the measures.

**12.6.1.4** The progress of the engineering works shall be regularly reviewed on site to identify the earliest practical opportunities for the landscape works to be undertaken.

**12.6.1.5** The planting works shall be monitored during the first 10 years of the operation phase of the project. Any areas of vegetation which fails to establish, shall be corrected by the relevant management and maintenance parties at the earliest opportunity. The maintenance requirement of the planting works stated under the Ten-Year Management Programme is included in the monitoring requirement.

## 12.7 Event and Action Plan

**12.7.1.1** Should non-compliance of the landscape and visual impacts occur, actions in accordance with the Event and Action Plan stated in **Table 12-3** below shall be carried out.

**Table 12-3: Event and Action Plan for Landscape and Visual**

Event Action Level	Action			
	ET	IEC	AAHK / PM	Contractor
Design Check	Check final design conforms to the requirements of EP and prepare report.	Check report. Recommend remedial design if necessary.	Undertake remedial if design necessary.	
Non-conformity on one occasion	Identify source. Inform AAHK / PM and IEC. Discuss remedial actions with AAHK / PM, IEC and Contractor. Monitor remedial actions until rectification has been completed.	Check report. Check Contractor's working method. Discuss with ET and Contractor on possible remedial measures. Advise AAHK / PM on effectiveness of proposed remedial measures. Check implementation of remedial measures.	Notify Contractor. Ensure remedial measures are properly implemented.	Amend working methods to prevent recurrence of non-conformity. Rectify damage and undertake additional action necessary.
Repeated Non-conformity	Identify source. Inform AAHK / PM and IEC. Increase monitoring frequency. Discuss remedial actions with AAHK / PM, IEC and Contractor. Monitor remedial actions until rectification has been completed. If non-conformity stops, cease additional monitoring.	Check monitoring report. Check Contractor's working method. Discuss with ET and Contractor on possible remedial measures. Advise AAHK / PM on effectiveness of proposed remedial measures. Supervise implementation of remedial measures.	Notify Contractor. Ensure remedial measures are properly implemented.	Amend working methods to prevent recurrence of non-conformity. Rectify damage and undertake additional action necessary.



## 13 Cultural Heritage

- 13.1.1.1 No environmental monitoring and audit is required for marine archaeology or terrestrial cultural heritage.

# 14 Environmental Auditing

## 14.1 Site Inspection

**14.1.1.1** Site inspections provide a direct means to trigger and enforce the specified environmental protection and pollution control measures. They should be undertaken routinely by the ET to inspect the construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. With well-defined pollution control and mitigation specifications and a well-established site inspection, deficiency and action reporting system, the site inspection is one of the most effective tools to enforce the environmental protection requirements on the construction site.

**14.1.1.2** The ETL is responsible for formulating the environmental site inspection and auditing, deficiency and action reporting system, and for carrying out the site inspection works. He should prepare a proposal for site inspection and deficiency and action reporting procedures to the IEC for agreement, and to AAHK / PM for approval. The Contractor's proposal for rectification would be made known to the AAHK / PM and IEC.

**14.1.1.3** Regular site inspections led by the ETL should be carried out at least once per week. The areas of inspection should not be limited to the environmental situation, status of implementation of pollution control and mitigation measures within the construction works areas; it should also review the environmental situation outside the project sites which is likely to be affected, directly or indirectly, by the site activities. The ET should make reference to the following information in conducting the inspection:

- The EIA and EM&A recommendations / assumptions on environmental protection and pollution control mitigation measures;
- The EP conditions and any approval plans / submissions under the EP, any subsequent VEP FEP;
- On-going results of the EM&A programme;
- Works progress and programme;
- Individual works methodology proposals (which should include proposal on associated pollution control measures);
- Contract specifications on environmental protection;
- Relevant environmental protection and pollution control laws; and
- Previous site inspection results.

The ET should evaluate the overall performance of the implementation of the recommendations in the EIA Report and ensure the appropriate control measures are properly implemented. A summary of recommendations on environmental protection and pollution control mitigation measures of the EIA Report is provided in **Appendix C**.

14.1.1.4 The ET and IEC shall monitor and check the Contractors' / Operators for SkyPier HSF implementation of the relevant measures, actions, programmes and/or recommendations as given in approved EP submissions, including but not limited to the following:

- Marine Park Proposal;
- Marine Travel Routes and Management Plan for Construction and Associated Vessels;
- Marine Travel Routes and Management Plan for High Speed Ferries of SkyPier;
- Marine Mammal Watching Plan;
- Coral Translocation Plan;
- Egret Survey Plan;
- Silt Curtain Deployment Plan;
- Spill Response Plan;
- Detailed Plan of DCM;
- Landscape and Visual Plan;
- Waste Management Plan;
- Plans related to land contamination and remediation of contaminated land, if any; and
- Relics and Antiques Rescue Plan if any.

14.1.1.5 The ET should monitor and check the Contractors' implementation of the DEZ, marine mammal watching and the vessel skippers' implementation of safe vessel operations in the presence of CWDs.

14.1.1.6 The Contractor should keep the ETL updated with all relevant information on the construction contract necessary for him to carry out the site inspections. Inspection results and associated recommendations for improvements to the environmental protection and pollution control works should be submitted to the IEC and the Contractor within 24-hours for reference and for taking immediate action. The Contractor should follow the procedures and time-frame stipulated in the environmental site inspection, and the deficiency and action reporting system formulated by the ETL, to report on any remedial measures subsequent to the site inspections.

14.1.1.7 The ET should also provide advice to the Contractors on environmental improvement, awareness and on-site enhancement measures and review of latest site inspection and audit results against the previous results and flag up any persistent non-conformities or poor performing areas to the AAHK / PM and IEC.

14.1.1.8 The ET and IEC should also carry out ad hoc site inspections if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work.

## 14.2 Compliance with Legal and Contractual Requirements

14.2.1.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong with which construction activities must comply.

- 14.2.1.2 In order that the works are in compliance with the contractual requirements, relevant sections (e.g. sections related to environmental measures) of works method statements submitted by the Contractor to AAHK / PM for approval should be sent to the ETL for vetting to see whether sufficient environmental protection and pollution control measures have been included.
- 14.2.1.3 The ETL should also keep himself informed of the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violation can be prevented.
- 14.2.1.4 The Contractor should regularly copy relevant documents to the ETL so that works checking can be carried out. The document should at least include the updated Works Progress Reports, updated Works Programme, any application letters for different licences / permits under the environmental protection laws, and copies of all valid licences / permits. The site diary should also be made available for the ETL's inspection upon his request.
- 14.2.1.5 After reviewing the documentation, the ETL should advise the Contractor of any noncompliance with contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions, including any potential violation of requirements.
- 14.2.1.6 Upon receipt of the advice, the Contractor should undertake immediate action to correct the situation. AAHK / PM should follow up to ensure that appropriate action has been taken in order to satisfy contractual and legal requirements.

### 14.3 Checklist of Key EIA Assumptions

- 14.3.1.1 A checklist of key assumptions adopted in the EIA Report, including those that have become part of the EP conditions, is provided in **Appendix E**.
- 14.3.1.2 During the construction phase, the ET should perform monthly review of the relevant key EIA assumptions in the checklist to determine whether the assumptions remain valid. If any significant changes in the key EIA assumptions that would affect the EIA findings are identified, the ET should inform the AAHK/ PM and IEC, and propose suitable follow-up actions/ further investigation within 24 hours or next working day for approval by the AAHK/ PM and IEC. The findings of monthly review of the relevant key EIA assumptions should be summarised in the monthly EM&A reports.
- 14.3.1.3 During the operation phase, it is proposed that AAHK should carry out the first review of the relevant key EIA assumptions after the first year of operation of the 3RS and then the subsequent reviews at least every five years during the first 20 years of operation of the project. If any significant changes in the key EIA assumptions that would affect the EIA findings are identified, AAHK will study the implications of the identified changes to the EIA findings and where necessary propose follow-up actions/ further investigation accordingly.

## 14.4 Environmental Complaints

**14.4.1.1** In accordance with EP Condition 2.1, a Complaint Management Plan has been submitted to EPD no later than 3 months before the commencement of construction of the project. The Complaint Management Plan specifies a dedicated complaint hotline and an email channel for timely response to complaints, and describes the complaint management process.

**14.4.1.2** The Complaint Management Plan also specifies the handling of environmental complaints received from other communication channels such as via the Community and Professional Liaison Groups (CLG and PLG). All written complaints received from such other channels will be passed directly to the ET for handling in accordance with the Complaint Management Plan. For any questions or comments received from CLG / PLG members during CLG / PLG meetings, these will be responded directly in the meetings or in subsequent CLG / PLG meetings. For any other non-written complaints, the complainant will be referred to the dedicated complaint hotline and/or email channel for registering their complaint.

**14.4.1.3** The ET has set up and managed the dedicated complaint hotline and email channel in accordance with EP Condition 2.1 and the Complaint Management Plan.

### 14.4.2 Dedicated Complaint Hotline and Email Channel for the Project

**14.4.2.1** The ET established both the dedicated complaint hotline and email channel for receiving any public comments. The ET has set up and managed both the mailing address and fax number in order to receive written environmental comments raised up by the public. These channels are publicised on the dedicated project website. **Table 14-1** shows the information of all the aforesaid channels.

**Table 14-1: Environmental Complaint Channels**

Environmental Complaint Channels	Details
Dedicated Hotline Number	+852 3908 0354
Fax Number	+852 3747 6050
Dedicated Email Address	env@3rsproject.com
Mailing Address	Airport Authority Hong Kong HKIA Tower, 1 Sky Plaza Road Hong Kong International Airport Lantau, Hong Kong (Attn: Environmental Team Leader Mr Terence Kong c/o Mr Lawrence Tsui (Third Runway Division))
Dedicated Project Website Address	<a href="http://env.threerunwaysystem.com">http://env.threerunwaysystem.com</a>

### 14.4.3 Environmental Complaint Procedures

14.4.3.1 All complaints should be referred to the ET for actions. The ET should follow the procedures specified in the Complaint Management Plan to record, investigate and report on the findings of the complaint investigation. Details of the complaint procedures include the following:

- The ET shall record the details of the environmental complaint and the details of the complainant (if provided by the complainant);
- The ET shall log the details of environmental complaint in the complaint log-book;
- The ET shall inform the AAHK / PM and IEC immediately and refer the environmental complaint to relevant Contractors and other parties where applicable;
- The ET shall issue an interim reply within 3 working days to acknowledge receipt and notify the complainant of the referral of their complaint to the relevant parties where appropriate;
- The Contractor shall provide information related to the construction activities and site conditions surrounding the date, time and location of the complaint to the ET for investigation;
- The ET shall investigate the complaint to determine its validity, and assess whether the source of the problem is due to the construction activities of the project;
- The ET shall review the environmental monitoring data and conduct additional environmental monitoring if necessary;
- If the complaint is confirmed to be valid and due to the construction works of the projects, the ET shall review the effectiveness of the existing mitigation measures and identify any additional mitigation measures needed in consultation with the IEC and AAHK / PM;
- The Contractor shall check their implementation of the mitigation measures as specified and required in the EIA Report, the EM&A Manual, the EP and their works contracts, as well as any other mitigation measures previously requested by, and agreed with, the AAHK / PM, and agree with the ET and IEC on any additional mitigation measures / corrective actions / preventive actions where necessary, for ensuring environmental compliance and preventing similar environmental complaints in future;
- The ET / IEC shall undertake additional monitoring and audit to verify the updated situation and the effectiveness of the additional mitigation measures / corrective actions, if required;
- The ET shall compile the environmental complaint investigation report containing all the relevant information and responses from other parties and follow up actions taken (i.e. mitigation measures and additional monitoring) for submission to the AAHK / PM and IEC;
- The ET shall certify the environmental complaint investigation report, and obtain the IEC's verification and AAHK / PM's approval before submission of the report;
- Where comments on the environmental complaint investigation report are received, the ET shall re-submit the investigation report;

- Upon final acceptance of the environmental complaint investigation report, the ET shall provide a written response to the complainant. (except in cases where the complaint is referred from EPD). The time that would take to investigate a complaint depends on the circumstances involved and would be different for each individual case, but the complainant will be contacted within 4 weeks from the receipt of the complaint and provided with an update of the investigation, and will also be given the investigation results when available. For cases where the complaint is referred from EPD, the ET shall provide the final complaint investigation report (certified by the ET and verified by the IEC) to EPD for their reply to the complainant;
- The ET shall update the record of the complaint investigation, follow up actions and other relevant information of the complaint in the complaint log-book;
- The ET / IEC shall update their records of environmental monitoring, mitigation measures and site inspection and audit checklists to reflect any updates to the EM&A requirements associated with follow up actions / additional measures resulting from the environmental complaint investigation which needs to be implemented as part of future works to prevent re-occurrence and ensure continued environmental compliance; and
- The ET shall record the complaint, investigation findings, follow up actions and the results in the monthly EM&A reports.

**14.4.3.2** The environmental complaint process flow diagram is presented in **Drawing No. MCL/P132/EMA/14-001**.

**14.4.3.3** During the complaint investigation work, the Contractor and AAHK / PM should cooperate with the ET in providing all necessary information and assistance for completion of the investigation. If mitigation measures are identified as required during in the investigation by the ET, the Contractor should promptly carry out the mitigation works. AAHK / PM should ensure that the measures have been carried out by the Contractor.

#### **14.4.4 Environmental Complaint Reporting**

**14.4.4.1** For every environmental complaint that is confirmed to be valid and due to the project's activities, the ET shall compile an environmental complaint investigation report containing all the relevant information and responses from other parties and the follow up actions taken.

**14.4.4.2** The key areas to be covered in the environmental complaint investigation report include, but are not limited to the following:

- Details of the complaint received such as received channel, date, time etc.;
- Details of the complainant such as name, contact number, email etc. (if known);
- Description of the complaint such as date, time, location, complaint circumstances etc.;
- Details of the information from the relevant Contractors and the investigation findings;
- Details of the mitigation measures, additional monitoring and follow up actions where applicable; and
- Recommendations to prevent recurrence of similar complaint.

## 14.5 Environmental Log-book

- 14.5.1.1** The ETL keeps a contemporaneous log-book of each and every instance or circumstance or change of circumstances, which may affect the compliance with the recommendations of the EIA Report and the EP. The ETL will notify the IEC within one working day of the occurrence of any such instance or circumstance or change of circumstance. The ETL's log-book is kept readily available for inspection by all persons assisting in supervision of the implementation of the recommendations of the EIA Report (such as AAHK / PM, IEC and Contractor) and the EP or by EPD or his authorised officers in accordance to EP condition 2.2. An environmental log-book sample is shown in **Appendix D**.
- 14.5.1.2** The IEC will verify the environmental log-book. In accordance to EP condition 2.3, the IEC will notify the EPD by fax, within one working day of receipt of notification from the ETL of each and every change of circumstances or non-compliance with the recommendations of the EIA Report and the EP, which might affect the monitoring or control of adverse environmental impacts from the project.



# 15 Reporting

## 15.1 Introduction

- 15.1.1.1** The reporting requirements of EM&A are based upon a paper-documented approach. However, the same information can be provided in an electronic medium upon agreeing the format with the AAHK / PM, IEC and EPD (for construction phase), and with AAHK / PM and EPD (for operation phase). This would enable a transition from a paper / historic and reactive approach to an electronic / real time proactive approach.
- 15.1.1.2** The types of reports that the ETL should prepare and submit include baseline monitoring report, monthly EM&A report, quarterly EM&A report, annual EM&A report and final EM&A review report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly, quarterly summary and final review EM&A reports should be submitted to the EPD. The exact details of the frequency, distribution and time frame for submission should be agreed with the AAHK / PM, IEC and EPD prior to commencement of works.
- 15.1.1.3** The monthly EM&A Reports shall include a summary of all non-compliance (exceedances) of the environmental quality performance limits i.e., Action and Limit Levels. The monthly EM&A Reports shall also present a summary of the implementation status of the environmental protection, pollution control, mitigation measures and associated EM&A requirements, as recommended in the EIA Report and/or the relevant submissions made under the EP.
- 15.1.1.4** All environmental monitoring and audit data and results should be provided to the public through a dedicated website no later than two weeks after such information is available.

## 15.2 Baseline Monitoring Reports

- 15.2.1.1** The ETL should prepare and submit 4 hard copies and 1 electronic copy of relevant Baseline Monitoring Reports to EPD at least two weeks prior to commencement of construction works, except for the Baseline Monitoring Report on Water Quality and Chinese White Dolphin which shall be submitted at least two weeks prior to commencement of marine works. The Baseline Monitoring Reports should be certified by the ETL and verified by the IEC prior to submission. Copies of the Baseline Monitoring Reports should be made available to the Contractor, the AAHK / PM and IEC. The ETL should liaise with the relevant parties on the exact number of copies they require. The report format and baseline monitoring data format should be agreed with the AAHK / PM, IEC and EPD prior to submission.
- 15.2.1.2** The Baseline Monitoring Reports should include at least the following:
- i. Up to half a page of executive summary
  - ii. Brief project background information

- iii. Drawings showing locations of the baseline monitoring stations
- iv. An updated construction programme with milestones of environmental protection / mitigation activities annotated
- v. Monitoring results (in both hard and diskette copies) together with the following information:
  - Monitoring methodology
  - Name of laboratory and types of equipment used and calibration details
  - Parameters monitored
  - Monitoring locations (and depth, where relevant)
  - Monitoring date, time, frequency and duration
  - QA / QC results and detection limits
- vi. Details of influencing factors, including:
  - Major activities, if any, being carried out on the site during the period / monitoring
  - Weather conditions during the period / monitoring
  - Other factors which might affect results
- vii. Determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data, the analysis should conclude if there is any significant difference between control and impact stations for the parameters monitored
- viii. Revisions for inclusion in the EM&A Manual
- ix. Comments and conclusions

### 15.3 Monthly EM&A Reports

- 15.3.1.1 The results and findings of all EM&A work carried out during the month should be recorded in the monthly EM&A reports prepared by the ETL. 4 hard copies and 1 electronic copy of EM&A report should be prepared and submitted to EPD within two weeks after the end of each reporting month. The report should be certified by the ETL and verified by the IEC prior to submission. Copies of monthly EM&A report should be submitted to the following parties: AAHK / PM, IEC and the Contractor. Before submission of the first EM&A report, the ETL should liaise with the parties on the required number of copies and format of the monthly reports in both hard copy and electronic medium.
- 15.3.1.2 The ETL should review the number and location of monitoring stations and parameters every six months, or on as needed basis, in order to cater for any changes in the surrounding environment and the nature of works in progress.

### 15.3.2 First Monthly EM&A Report

#### 15.3.2.1 The first monthly EM&A report should include at least but not be limited to the following:

- i. Executive summary (one to two pages):
  - Breaches of Action and Limit Levels
    - Summary of Action and Limit Levels exceedance, if any, at each monitoring location during the reporting period
  - Complaint log
    - Summary of complaints received in relation to the environmental impact during the reporting period
  - Notifications of any summons and status of prosecutions
    - Summary of notifications of summons or prosecutions received during the reporting period.
  - Changes made that affect the EM&A
    - Summary of changes made during the reporting period.
  - Future key issues
    - List of the major site works scheduled to be commissioned in the coming month after the reporting period.
- ii. Basic project information:
  - Project organisation including key personnel contact names and telephone numbers
  - Scope of works of the project
  - Construction programme
  - Works undertaken during the month with illustrations (such as location of works etc.)
  - Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations (with coordinates of the monitoring locations).
- iii. A brief summary of EM&A requirements including:
  - All monitoring parameters
  - Environmental quality performance limits (Action and Limit Levels)
  - Event-Action Plans
  - Environmental mitigation measures, as recommended in the EIA Report
  - Review of the key assumptions adopted in the EIA Report
  - Environmental requirements in contract documents
- iv. Environmental status
  - Advice on status of compliance with environmental permit including the status of submissions under the environmental permit
- v. Implementation status
  - Implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report

- vi. Monitoring results (in both hard and diskette copies) together with the following information:
  - Monitoring methodology
  - Name of laboratory and types of equipment used and calibration details
  - Parameters monitored
  - Monitoring locations
  - Monitoring date, time frequency, and duration
  - Weather conditions during the period / monitoring
  - Graphical plots of the monitored parameters in the month annotated against
    - The major activities being carried out on site during the period
    - Weather conditions that may affect the monitoring results
    - Any other factors which might affect the monitoring results
    - QA / QC results and detection limits
- vii. Analysis of monitoring results, non-compliance, complaints, and notifications of summons and status of prosecutions:
  - Analysis and interpretation of monitoring results in the month
  - Any non-compliance (exceedances) of the environmental quality performance limits (Action and Limit Levels)
  - Changes made that affect the EM&A during the month
  - Summary of environmental complaints received including locations and nature of complaints, findings of the investigation, actions and follow-up measures taken and final status
  - Notification of summons and status of prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary
  - Reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures
  - Actions taken in the event of non-compliance and deficiency, and follow-up actions related to earlier non-compliance
- viii. Others
  - An account of the future key issues as reviewed from the works programme and work method statements
  - Comment on the solid and liquid waste management status during the month including waste generation and disposal records
  - Outstanding issues and deficiencies
  - Comments on effectiveness of the environmental management systems, practices, procedures and mitigation measures, recommendations (for example, any improvement in the EM&A programme) and conclusions
  - Review of the relevant key EIA assumptions

ix. Appendix

- Monitoring schedule for the present and next reporting period
- Cumulative statistics on complaints, notifications of summons and successful prosecutions
- Outstanding issues and deficiencies

### 15.3.3 Subsequent Monthly EM&A Reports

#### 15.3.3.1 The subsequent monthly EM&A reports should include the following:

- i. Executive summary (one to two pages):
  - Breaches of Action and Limit Levels
    - Summary of Action and Limit Levels exceedance, if any, at each monitoring location during the reporting period
  - Complaint log
    - Summary of complaints received in relation to the environmental impact during the reporting period
  - Notifications of any summons and status of prosecutions
    - Summary of notifications of summons or prosecutions received during the reporting period.
  - Changes made that affect the EM&A
    - Summary of changes made during the reporting period.
  - Future key issues
    - List of the major site works scheduled to be commissioned in the coming month after the reporting period.
- ii. Environmental status:
  - Advice on status of compliance with environmental permit including the status of submissions under the environmental permit
  - Review of the key assumptions adopted in the EIA Report
- iii. Implementation status:
  - Implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report

- iv. Monitoring results (in both hard and diskette copies) together with the following information:
  - Monitoring methodology
  - Name of laboratory and types of equipment used and calibration details
  - Parameters monitored
  - Monitoring locations
  - Monitoring date, time frequency, and duration
  - Weather conditions during the period / monitoring
  - Graphical plots of the monitored parameters in the month annotated against:
    - The major activities being carried out on site during the period
    - Weather conditions that may affect the monitoring results
    - Any other factors which might affect the monitoring results
    - QA / QC results and detection limits
- v. Analysis of monitoring results, non-compliance, complaints, and notifications of summons and status of prosecutions:
  - Analysis and interpretation of monitoring results in the month
  - Any non-compliance (exceedances) of the environmental quality performance limits (Action and Limit Levels)
  - Changes made that affect the EM&A during the month
  - Summary of environmental complaints received including locations and nature of complaints, findings of the investigation, actions and follow-up measures taken, and final status
  - Notification of summons and status of prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary
  - Reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures
  - Actions taken in the event of non-compliance and deficiency, and follow-up actions related to earlier non-compliance
- vi. Others
  - An account of the future key issues as reviewed from the works programme and work method statements
  - Comment on the solid and liquid waste management status during the month including waste generation and disposal records
  - Outstanding issues and deficiencies
  - Comments on effectiveness of the environmental management systems, practices, procedures and mitigation measures, recommendations (for example, any improvement in the EM&A programme) and conclusions
  - Review of the relevant key EIA assumptions

vii. Appendix

- Monitoring schedule for the present and next reporting period
- Cumulative statistics on complaints, notifications of summons and successful prosecutions
- Outstanding issues and deficiencies

**15.3.3.2** Some information concerning the EM&A works, such as the EM&A requirements would remain unchanged throughout the EM&A programme. In the subsequent monthly EM&A Reports, the first monthly EM&A Report can be referred instead of repeating the description of the unchanged information.

## 15.4 Quarterly EM&A Report

**15.4.1.1** A quarterly EM&A report should be produced and should contain at least the following information. In addition, the first quarterly summary report should also confirm if the monitoring work is proving effective and that it is generating data with the necessary statistical power to categorically identify or confirm the absence of impact attributable to the works.

- i. Up to half a page executive summary
- ii. Basic project information including a synopsis of the project organization and programme, and a synopsis of works undertaken during the quarter
- iii. A brief summary of EM&A requirements including:
  - Monitoring parameters
  - Environmental quality performance limits (Action and Limit Levels)
  - Environmental mitigation measures, as recommended in the EIA Report
  - Review of the key assumptions adopted in the EIA Report
- iv. Drawings showing the project area, environmental sensitive receivers and the locations of the monitoring and control stations
- v. Implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report
- vi. Graphical plots of the monitored parameters over the past four months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against:
  - The major activities being carried out on site during the period
  - Weather conditions during the period
  - Any other factors which might affect the monitoring results
- vii. Advice on the solid and liquid waste management during the quarter including waste generation and disposal records
- viii. A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit Levels)

- ix. A brief review of the reasons for and the implications of any non-compliance, including a review of pollution sources and working procedures
- x. A summary description of actions taken in the event of non-compliance and any follow-up procedures related to any earlier non-compliance
- xi. A summary of all environmental complaints received including locations and nature of complaints, findings of the investigation, actions and follow-up measures taken, and final status
- xii. Comments on the effectiveness and efficiency of the mitigation measures; recommendations on any improvements in the EM&A programme and conclusions for the quarter
- xiii. Proponents' contacts and any hotline telephone number for the public to make enquiries.

## 15.5 Annual EM&A Report

**15.5.1.1** An annual EM&A report should be produced and should contain at least the following information.

- i. One to two pages of executive summary
- ii. Basic project information including a synopsis of the project organization and programme and a synopsis of works undertaken during the past 12 months
- iii. A brief summary of EM&A requirements including:
  - Monitoring parameters
  - Environmental quality performance limits (Action and Limit Levels)
  - Environmental mitigation measures, as recommended in the EIA Report
  - Review of the key assumptions adopted in the EIA Report
- iv. Drawings showing the project area, environmental sensitive receivers and the locations of the monitoring and control stations
- v. Implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report
- vi. Graphical plots of the monitored parameters over the past 12 months for representative monitoring stations annotated against:
  - The major activities being carried out on site during the period
  - Weather conditions during the period
  - Any other factors which might affect the monitoring results
- vii. Advice on the solid and liquid waste management during the past 12 months including waste generation and disposal records



- viii. A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit Levels)
- ix. A brief review of the reasons for and the implications of any non-compliance, including a review of pollution sources and working procedures
- x. A summary description of actions taken in the event of non-compliance and any follow-up procedures related to any earlier non-compliance
- xi. A summary of all environmental complaints received including locations and nature of complaints, findings of the investigation, actions and follow-up measures taken, and final status
- xii. Comments on the effectiveness and efficiency of the mitigation measures; recommendations on any improvements in the EM&A programme and conclusions for the quarter
- xiii. Proponents' contacts and any hotline telephone number for the public to make enquiries.

## 15.6 Final EM&A Review Report

**15.6.1.1** The EM&A program could be terminated upon completion of those construction activities that have the potential to cause significant environmental impacts, and / or the completion of post-construction monitoring requirements.

**15.6.1.2** The proposed termination by the Contractor should only be implemented after the proposal has been endorsed by the AAHK / PM and IEC followed by final approval from the EPD.

**15.6.1.3** The final EM&A report should include, inter alia, the following information:

- i. An executive summary
- ii. Basic project information including a synopsis of the project organization and programme, contacts of key management, and a synopsis of work undertaken during the entire construction period
- iii. A brief summary of EM&A requirements including:
  - Monitoring parameters
  - Environmental quality performance limits (Action and Limit Levels)
  - Environmental mitigation measures, as recommended in the EIA Report
  - Review of the key assumptions adopted in the EIA Report
- iv. Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations

- v. Advice on the implementation status of environmental and pollution control / mitigation measures, as recommended in the EIA Report, summarised in the updated implementation status pro forma
- vi. Graphical plots of the monitoring parameters over the construction period for representative monitoring stations, including the post-project monitoring annotated against:
  - The major activities being carried out on site during the period
  - Weather conditions during the period
  - Any other factors which might affect the monitoring results
  - The baseline condition
- vii. Compare the EM&A data with the EIA predictions
- viii. Effectiveness of the solid and liquid waste management
- ix. A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit Levels)
- x. A brief account of the reasons the non-compliance including a review of pollution sources and working procedures
- xi. A summary of the actions taken against the non-compliance
- xii. A summary of all environmental complaints received the investigation, actions and follow-up measures taken to address the complaints
- xiii. A review of the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness)
- xiv. A summary of notifications of summons and successful prosecutions for breaches of the current environmental protection / pollution control legislations, locations and nature of the breaches, investigation, follow-up actions taken and results
- xv. A review of the practicality and effectiveness of the EM&A programme (e.g. effectiveness and efficiency of the mitigation measures), and recommendation on any improvement in the EM&A programme
- xvi. A conclusion to state the return of ambient and / or the predicted scenario as per EIA findings

## 15.7 Data Keeping

- 15.7.1.1 No site-based documents (such as monitoring field records, laboratory analysis records, site inspection forms, etc.) are required to be included in the EM&A reporting documents. However, any such document should be retained by the ETL / Monitoring Team and be ready for inspection upon request. All relevant information should be clearly and systematically recorded in the document. Monitoring data should also be recorded in digital format, and the software copy must be available upon request. Data format should be agreed with the AAHK / PM, IEC and EPD. All documents and data should be kept for at least one year following completion of the construction contract and one year after the completion of operation phase monitoring for construction phase EM&A and operational phase EM&A respectively.

## 15.8 Interim Notifications of Environmental Quality Limit Exceedances

- 15.8.1.1 For construction phase EM&A, with reference to the Event and Action Plan, when the environmental quality performance limits are exceeded, the ETL should immediately notify the AAHK / PM, IEC and EPD, as appropriate and should keep them informed of the results of the investigation, proposed remedial measures, actions taken, updated situation on site, need for further follow-up proposals, etc. A sample template for the interim notifications is shown in **Appendix F**. The ETL may modify the interim notification form for this EM&A programme, the format of which should be approved by AAHK / PM and agreed by the IEC.

## 16 Reference

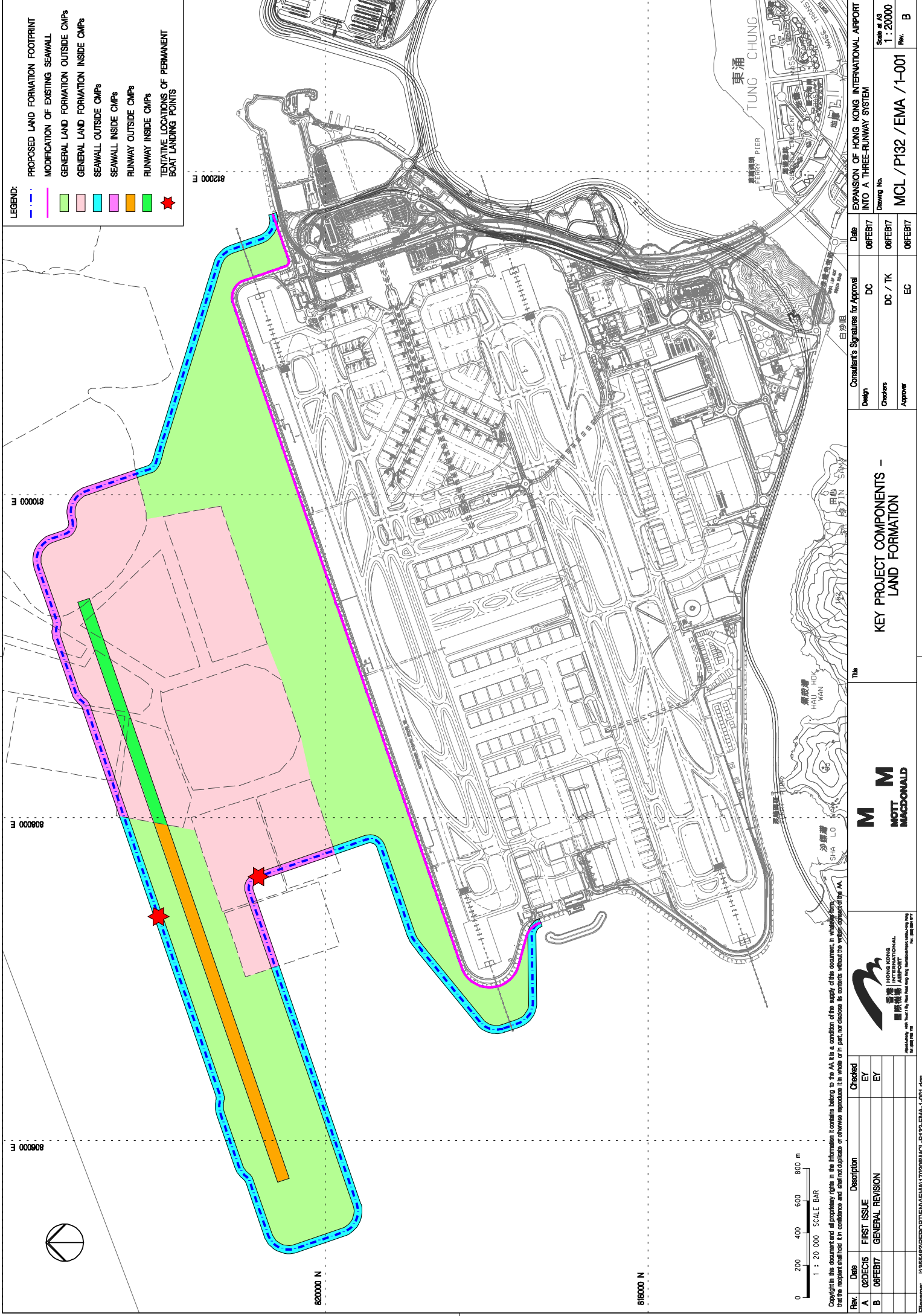
- Bejder, L. (2005). Linking short and long-term effects of nature-based tourism on cetaceans (Master's thesis). Dalhousie University, Halifax, Nova Scotia, Canada.
- Chen, T., Hung, S. K., Qiu, Y., Jia, X. & Jefferson, T. A. (2010). *Distribution, abundance, and individual movements of Indo-Pacific humpback dolphins (Sousa chinensis) in the Pearl River Estuary, China*. *Mammalia*, 74, 117-125.
- Dierauf, L. and F. M. D. Gulland. (eds) (2001). *Handbook of Marine Mammal Medicine*, second edition, CRC Press, Boca Raton, Florida. 1063 pp.
- Gailey, G. A. & Ortega-Ortiz, J. (2002). A note on a computer-based system for theodolite tracking of cetaceans. *Journal of Cetacean Research & Management*, 4(2), 213-218.
- Gailey, G., Würsig, B. & McDonald, T.L.(2007). Abundance, behavior, and movement patterns of western gray whales in relation to a 3-D seismic survey, Northeast Sakhalin Island, Russia. *Environmental Monitoring and Assessment* 134:75–91.
- Gulland, F., H. Pérez-Cortés M., J. Urbán R., L. Rojas-Bracho, G. Ylitalo, J. Weir, S. A. Norman, M. M. Muto, D., J. Rugh, C. Kreuder and T. Rowles. (2005). Eastern North Pacific Gray Whale (*Eschrichtius robustus*) Unusual Mortality Event, 1999-2000: A Compilation. U.S. Dep. Commer. NOAA Tech Memo NMFS-AFSC-150. 33p.
- Kuehl, D. W. and R. Haebler. (1995). Organochlorine, organobromine, metal, and selenium residues in bottlenose dolphins (*Tursiops truncatus*) collected during an unusual mortality event in the Gulf of Mexico, 1990. *Archives of Environmental Contaminants and Toxicology* 28: 494-499.
- Lammers, M. O., Brainard, R. E., Au, W. W. L., Mooney, T. A. & Wong, K. B. (2008). An ecological acoustic recorder (EAR) for long-term monitoring of biological and anthropogenic sounds on coral reefs and other marine habitats. *Journal of the Acoustical Society of America* 123: 1720-1728.
- Lundquist, D., Gemmell, N., & Würsig, B. (2012). Behavioural responses of dusky dolphin (*Lagenorhynchus obscurus*) groups to tour vessels off Kaikoura, New Zealand. *PLoS One*: 7:1-9, e41969.
- Martinez, E. (2010). Responses of South Island Hector's dolphin (*Cephalorhynchus hectori hectori*) to vessel activity (including tourism operations) in Akaroa Harbour, Banks Peninsula, New Zealand (Doctoral dissertation). Massey University, Auckland, New Zealand.
- NOAA Fisheries. (2004). Interim Report on the Bottlenose Dolphin (*Tursiops truncatus*) Unusual Mortality Event Along the Panhandle of Florida
- Sims, P. Q., Hung, S. K. & Würsig, B. (2012). *High-speed vessel noises in West Hong Kong waters and their contributions relative to Indo-Pacific humpback dolphins (Sousa chinensis)*. *Journal of Marine Biology*, 2012, pp. 11.
- Turchin, P. (1998) *Quantitative Analysis of Movement: Measuring and modelling population redistribution in animals and plants*. Sinauer Associates, Inc., U.S.A.

Wilkinson, D. M. (1996). National Contingency Plan for Response to Unusual Marine Mammal Mortality Events, NOAA Technical Memorandum NMFS-OPR-9, 9/96, Silver Spring, MD.

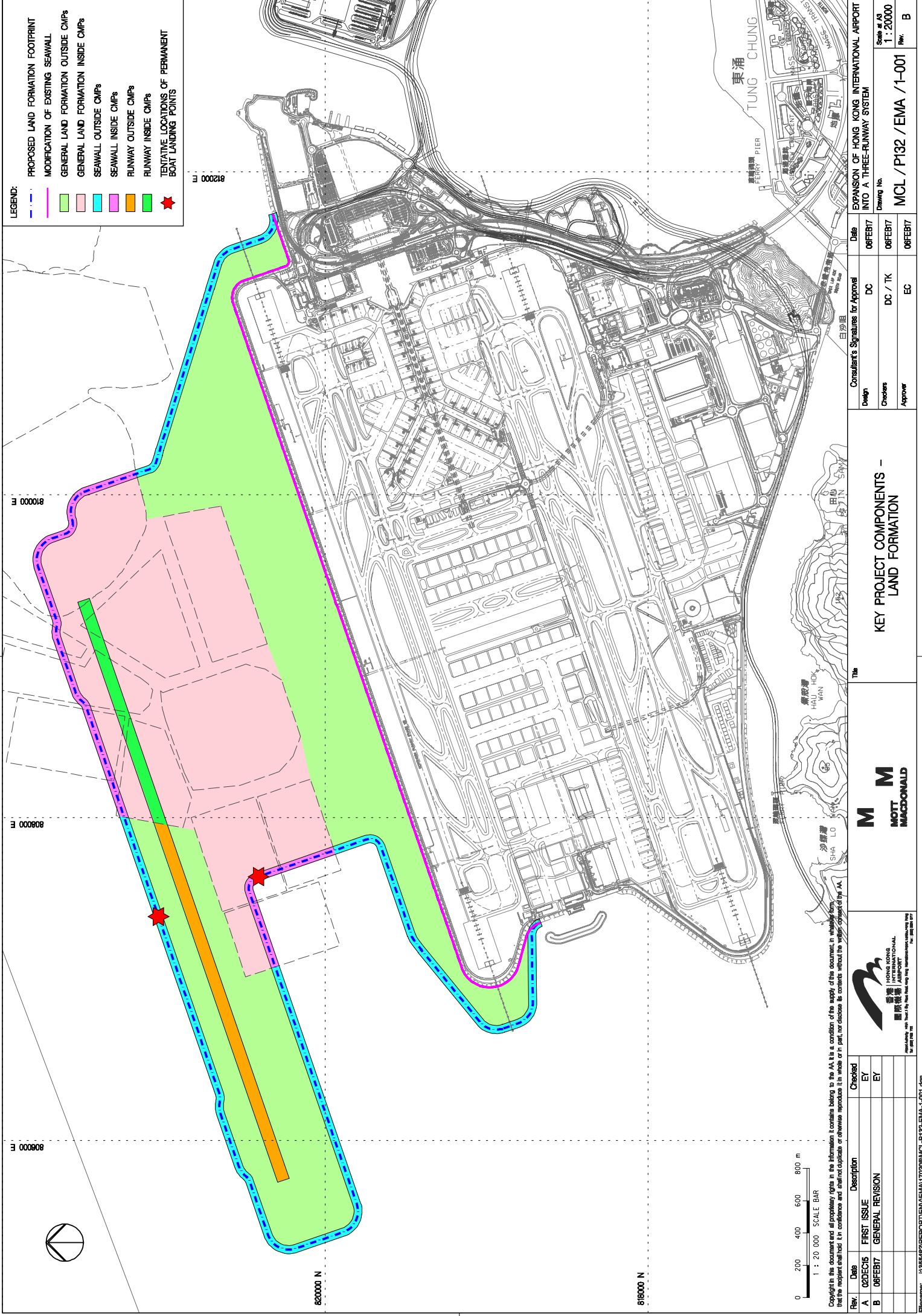
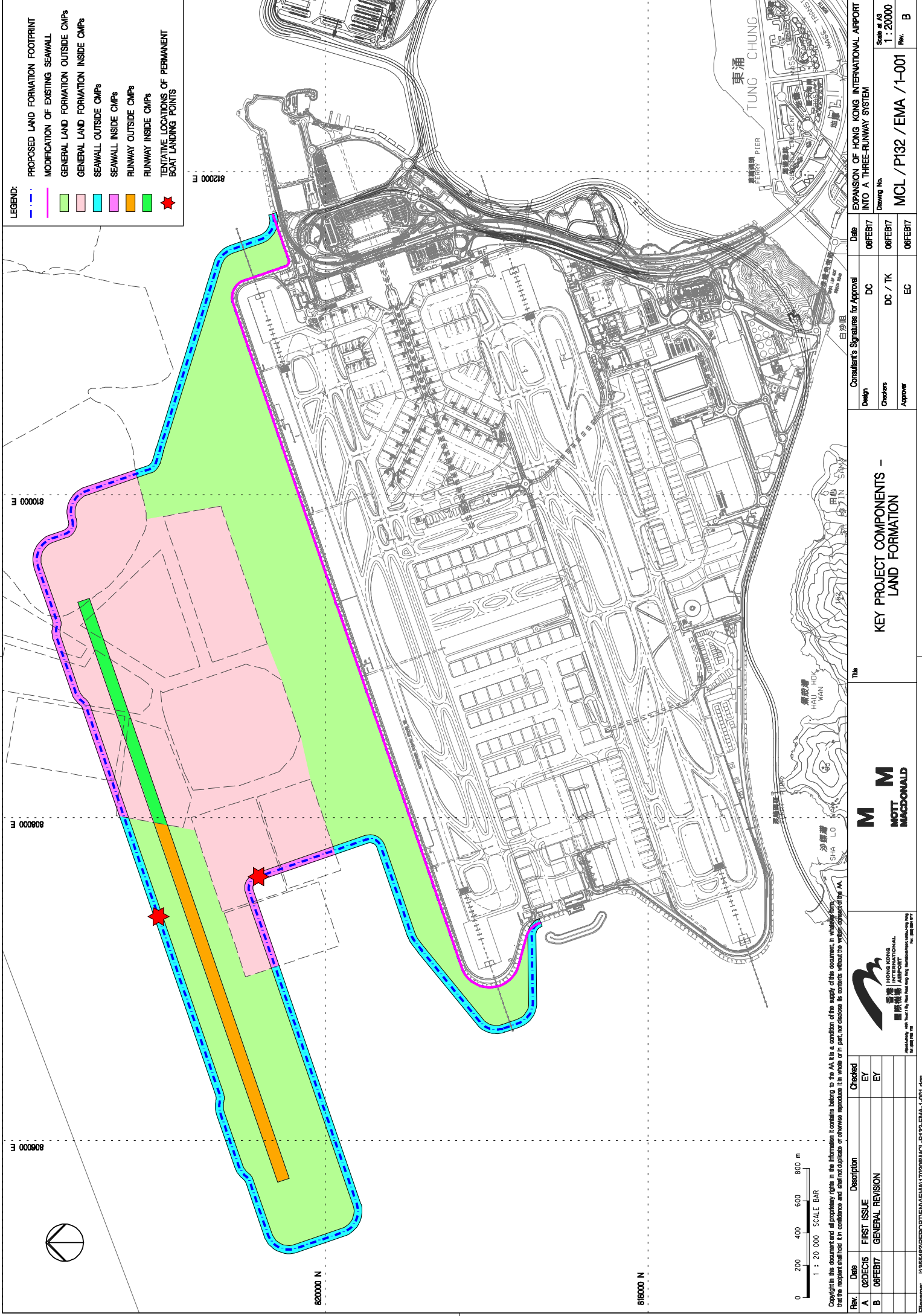
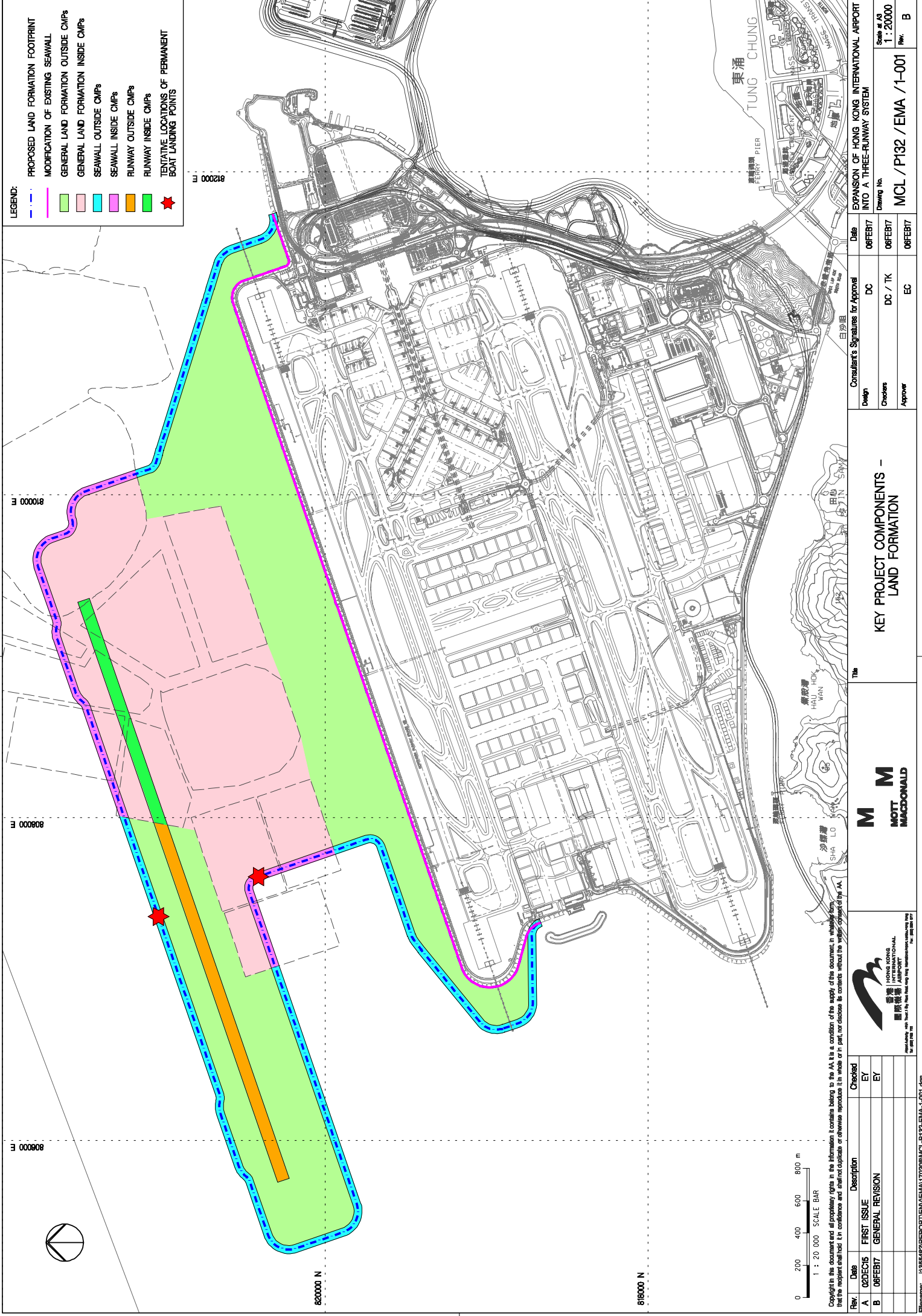
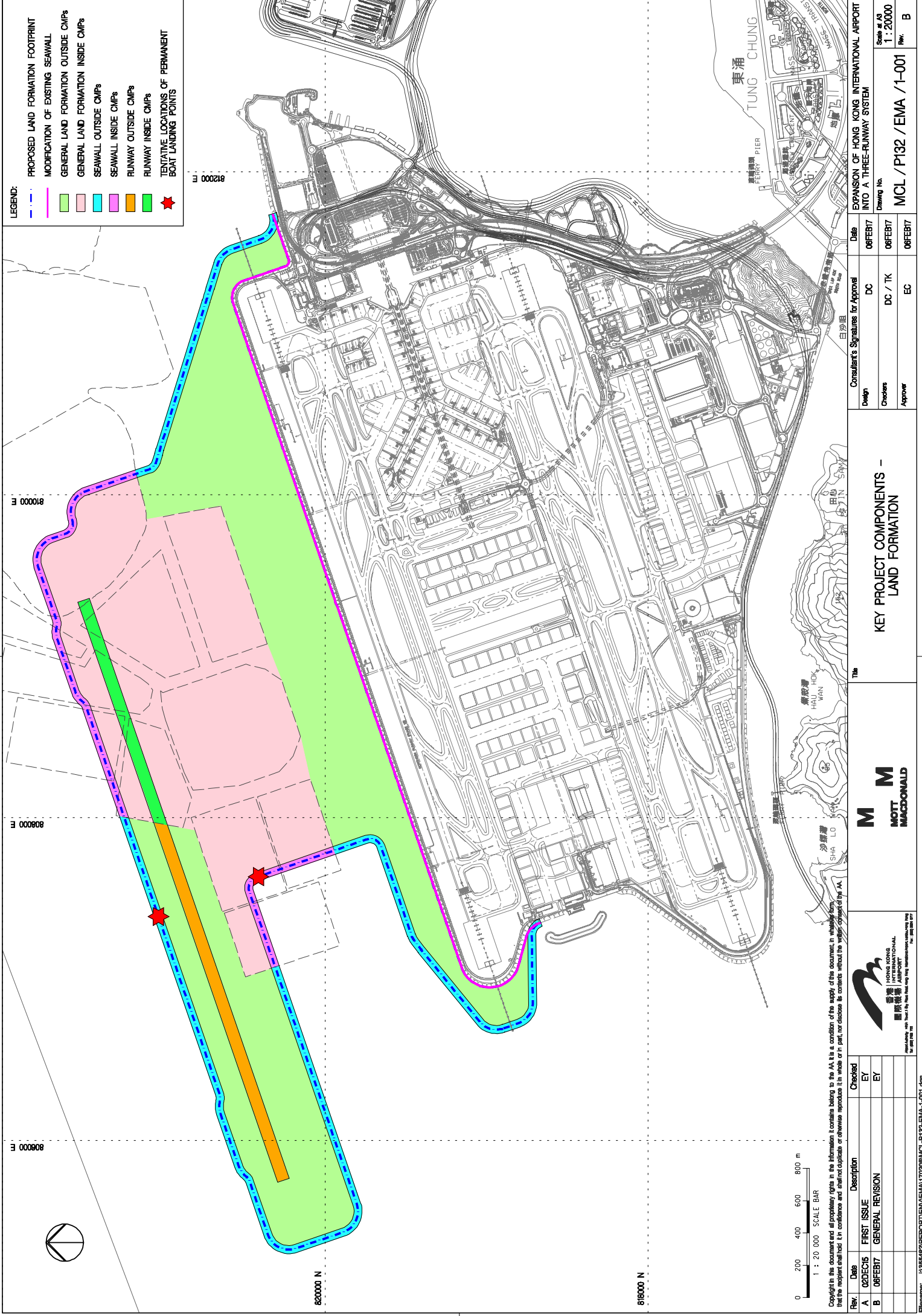
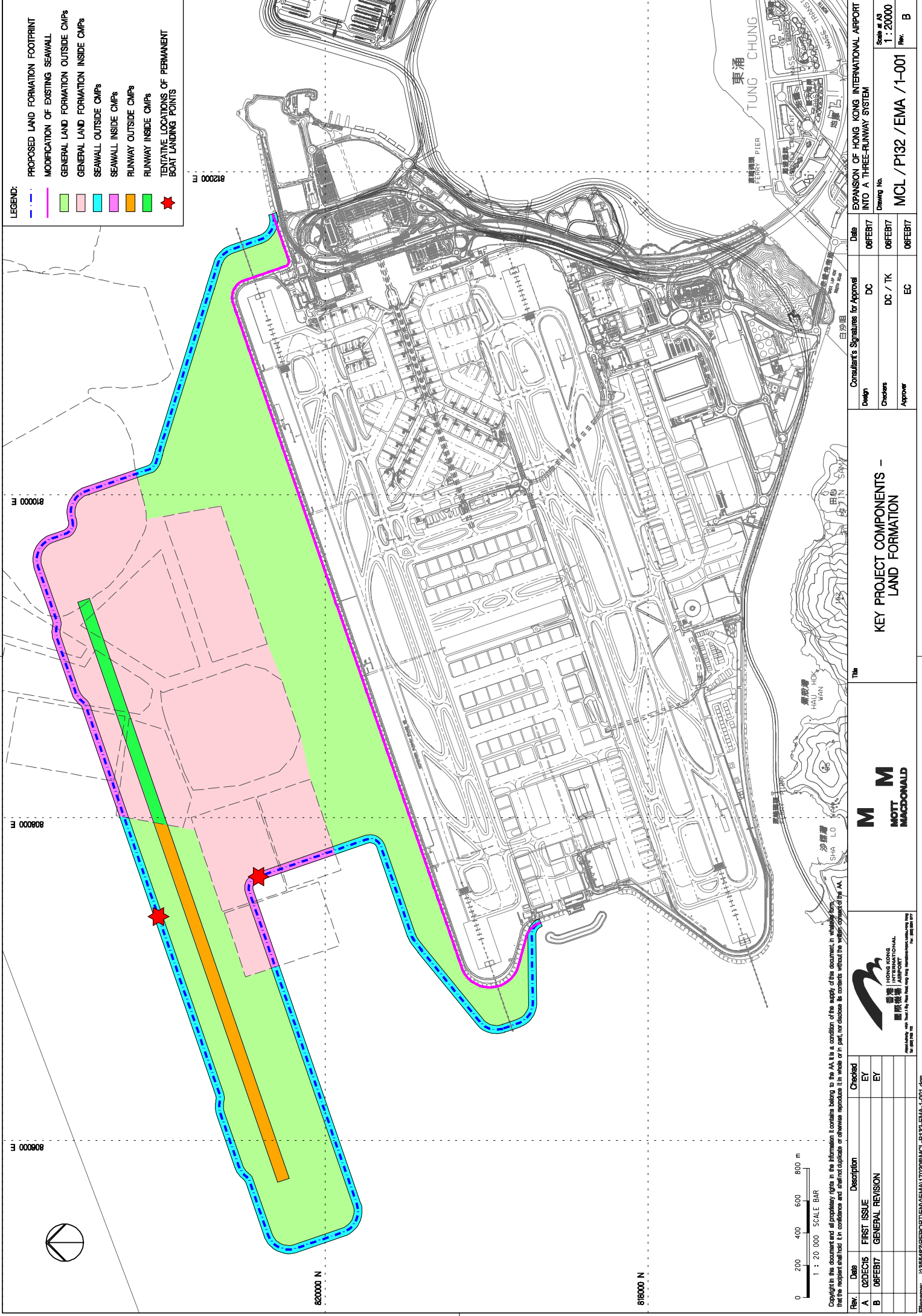
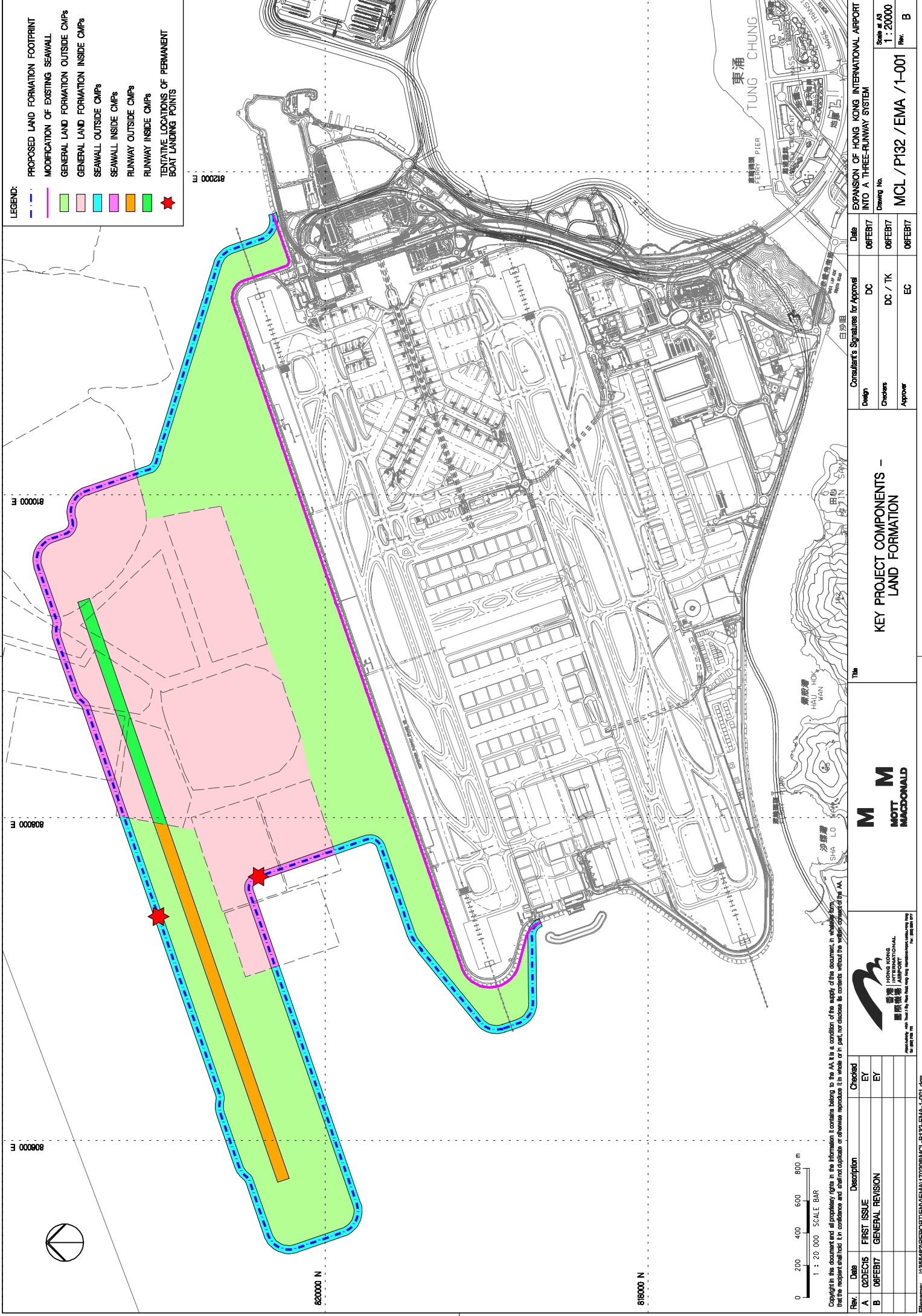
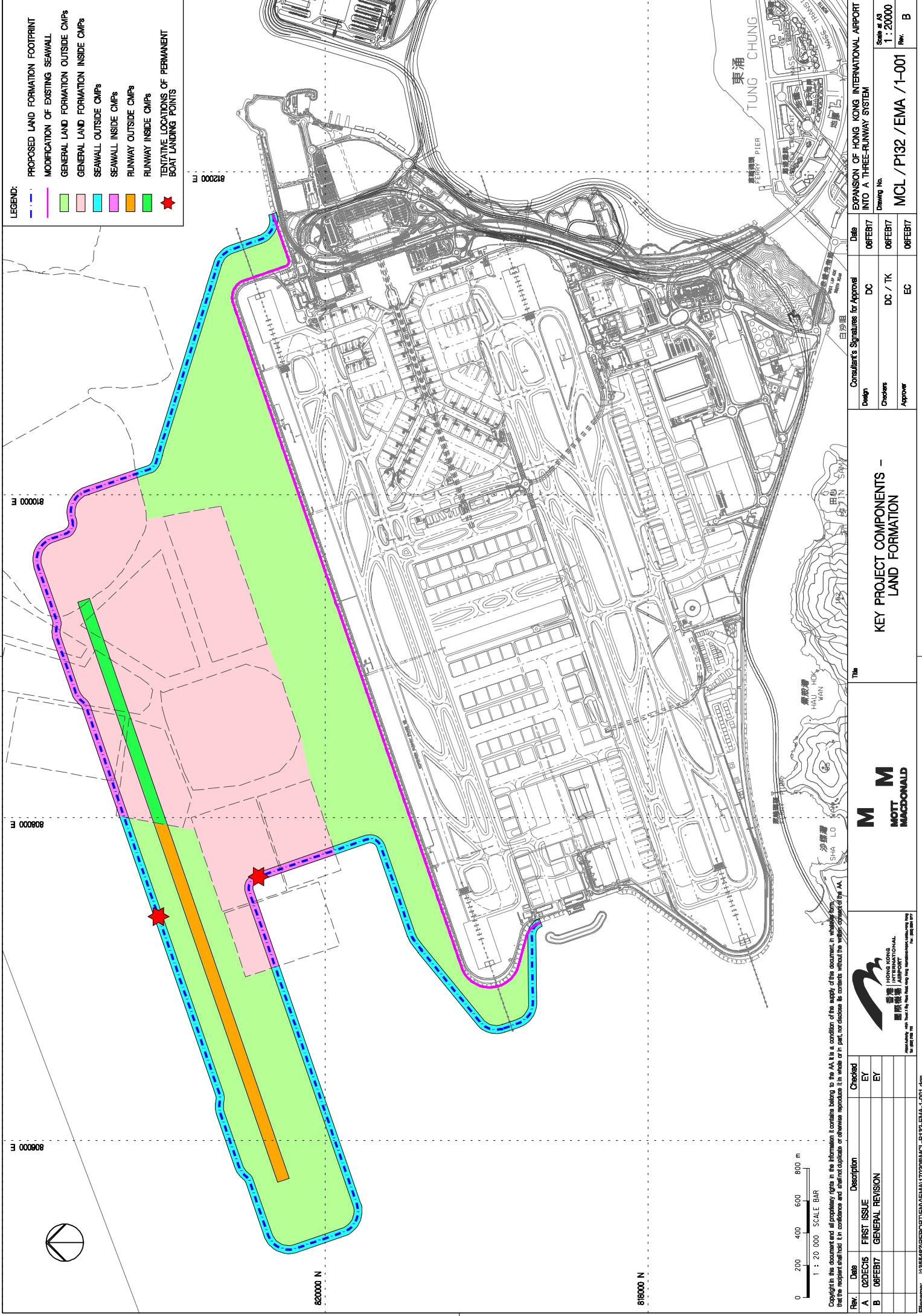
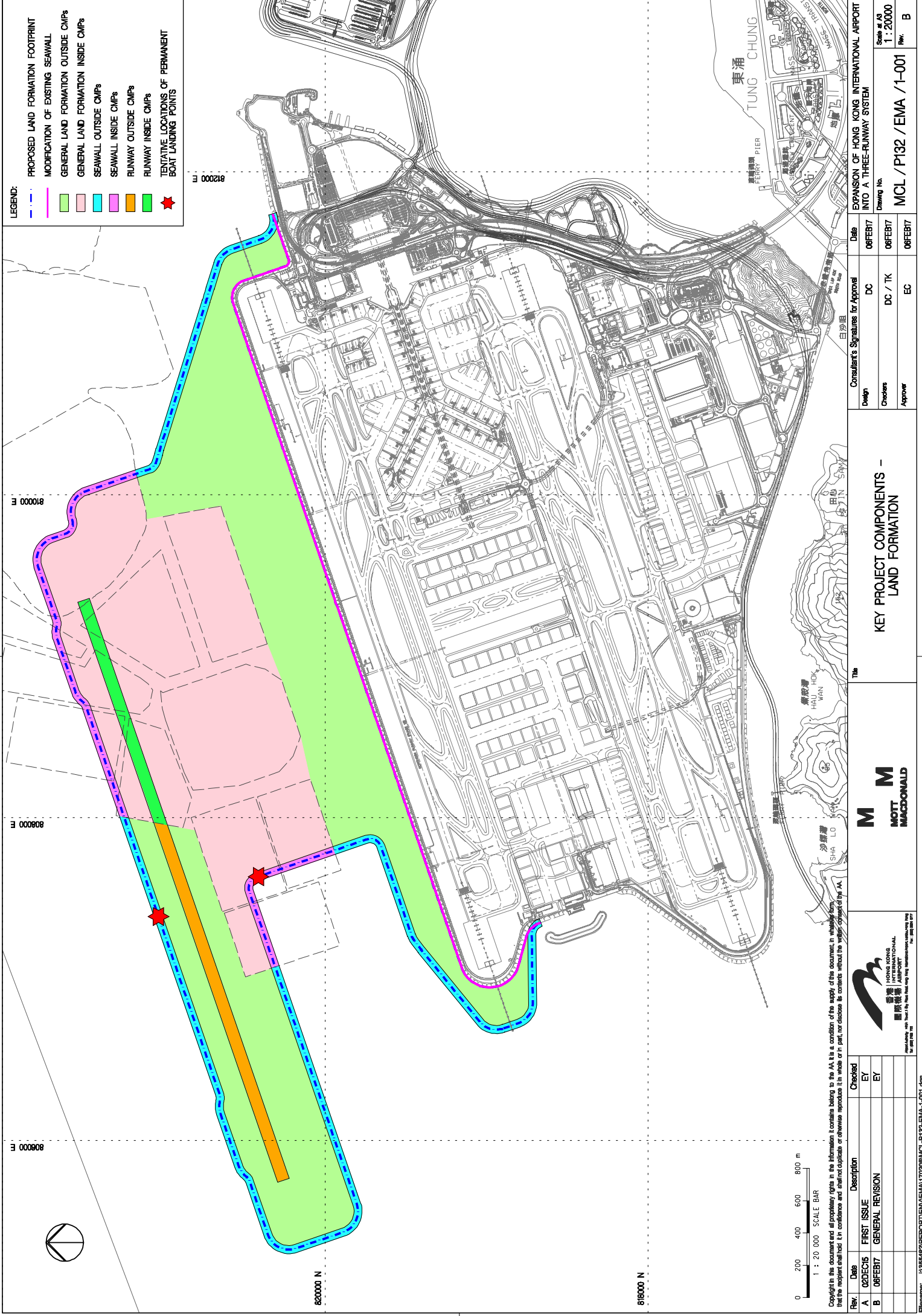
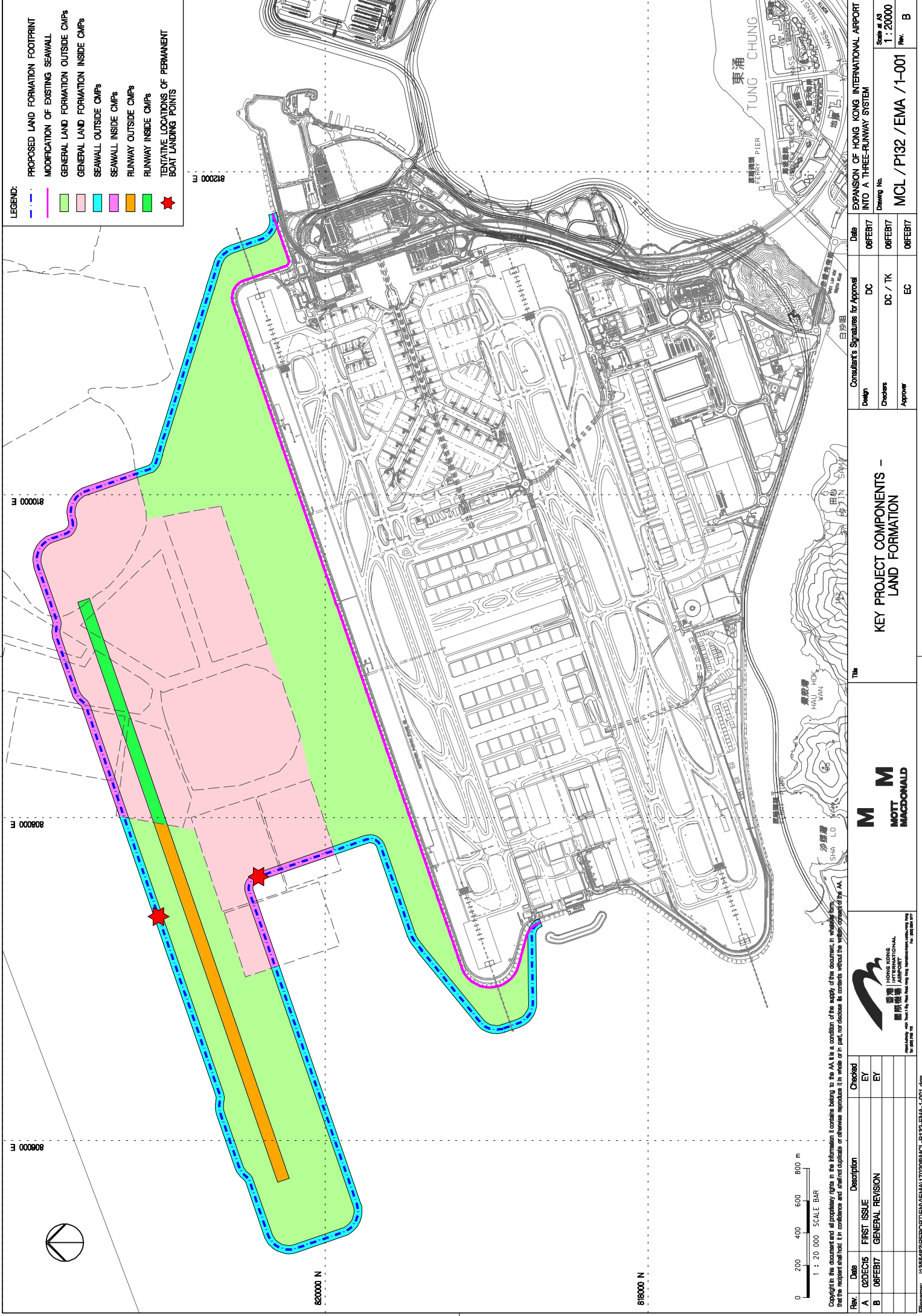
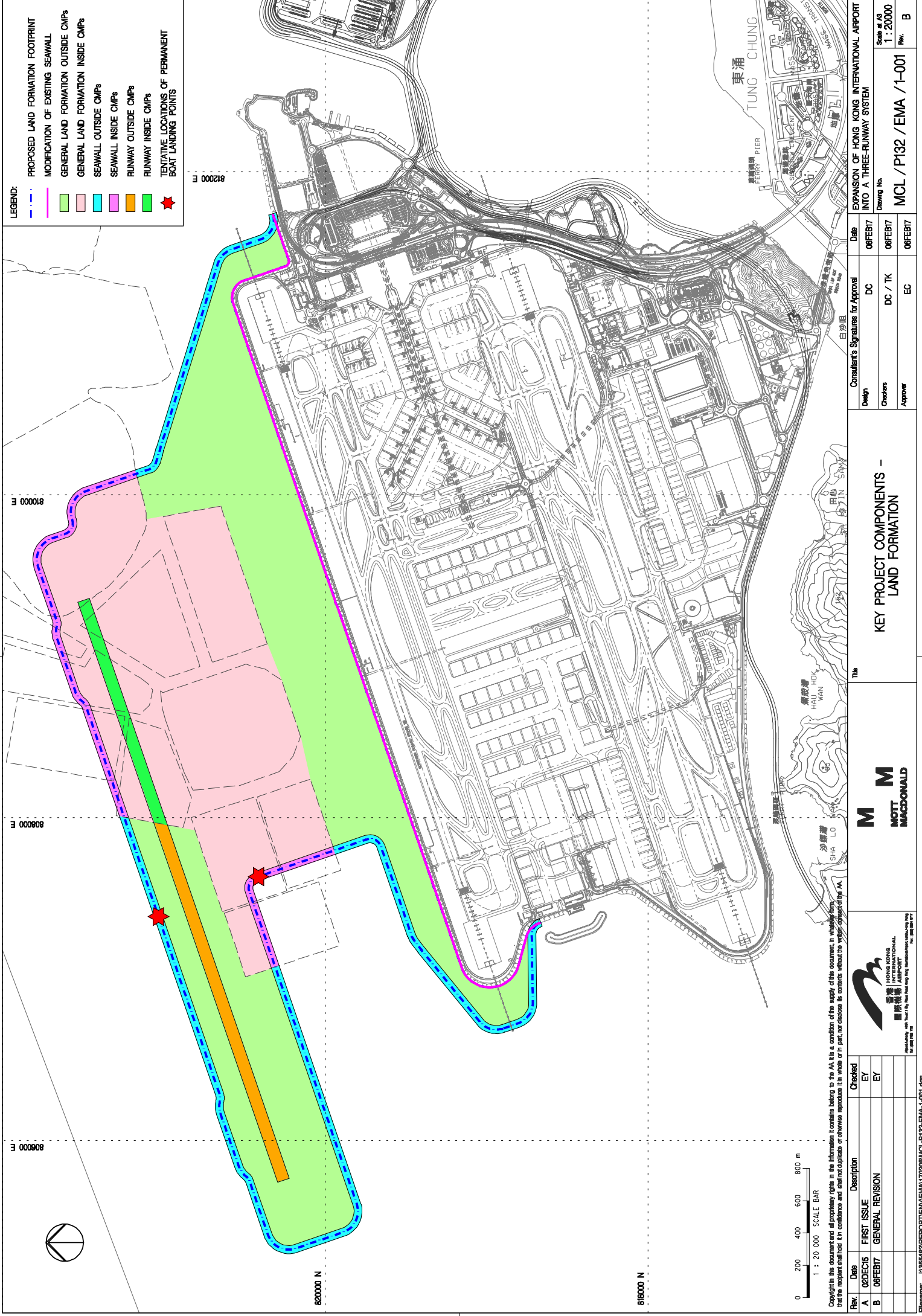
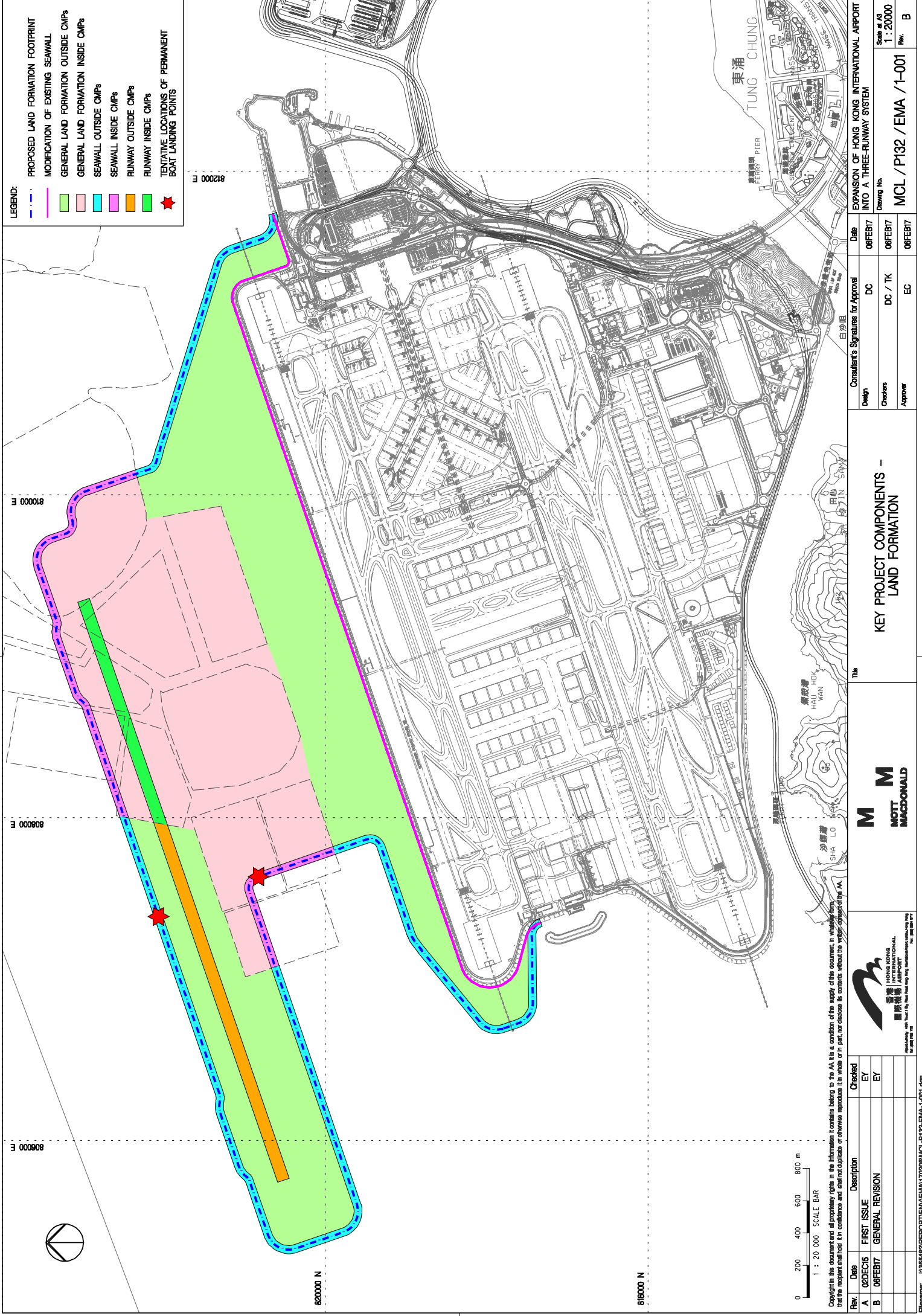
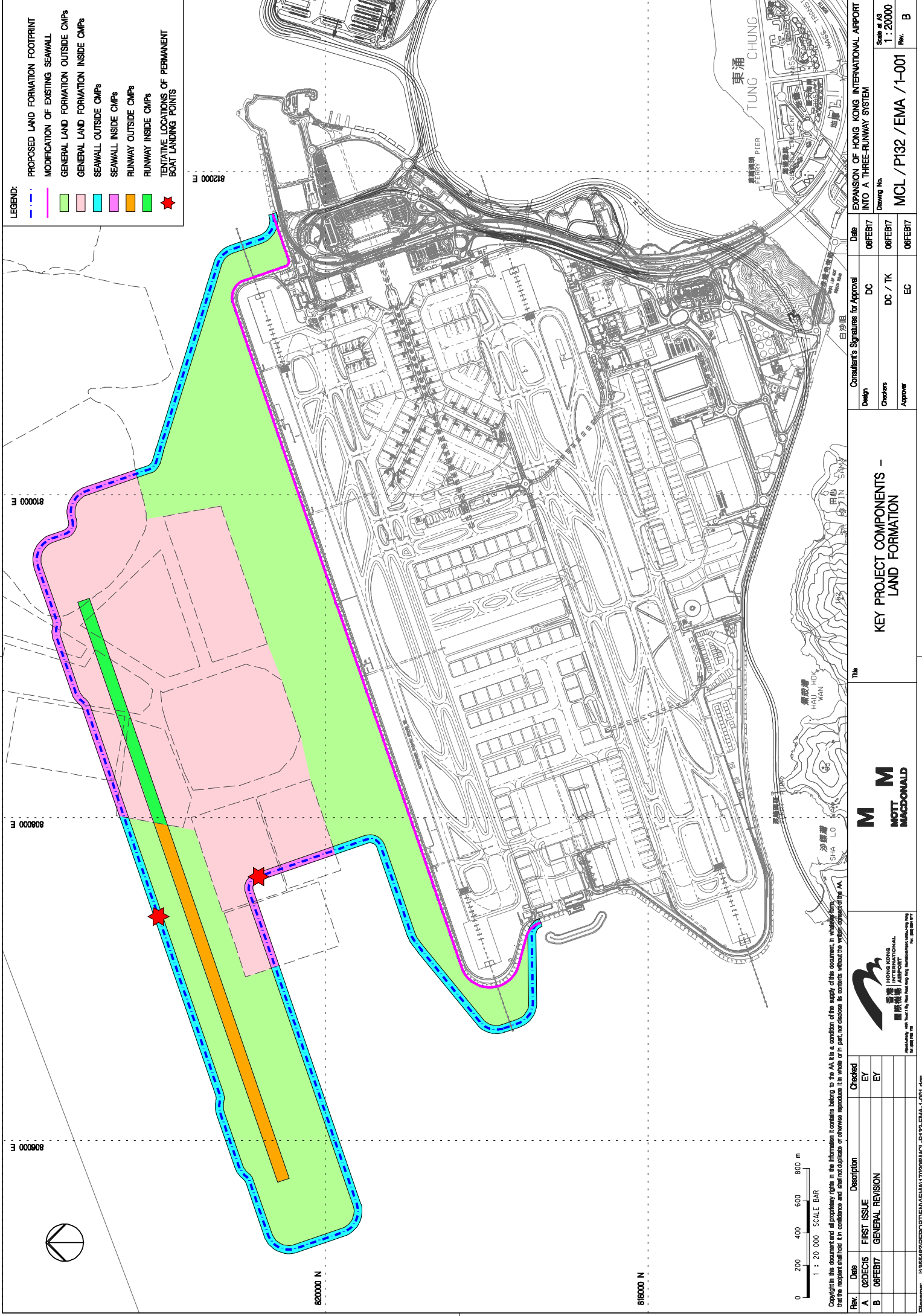
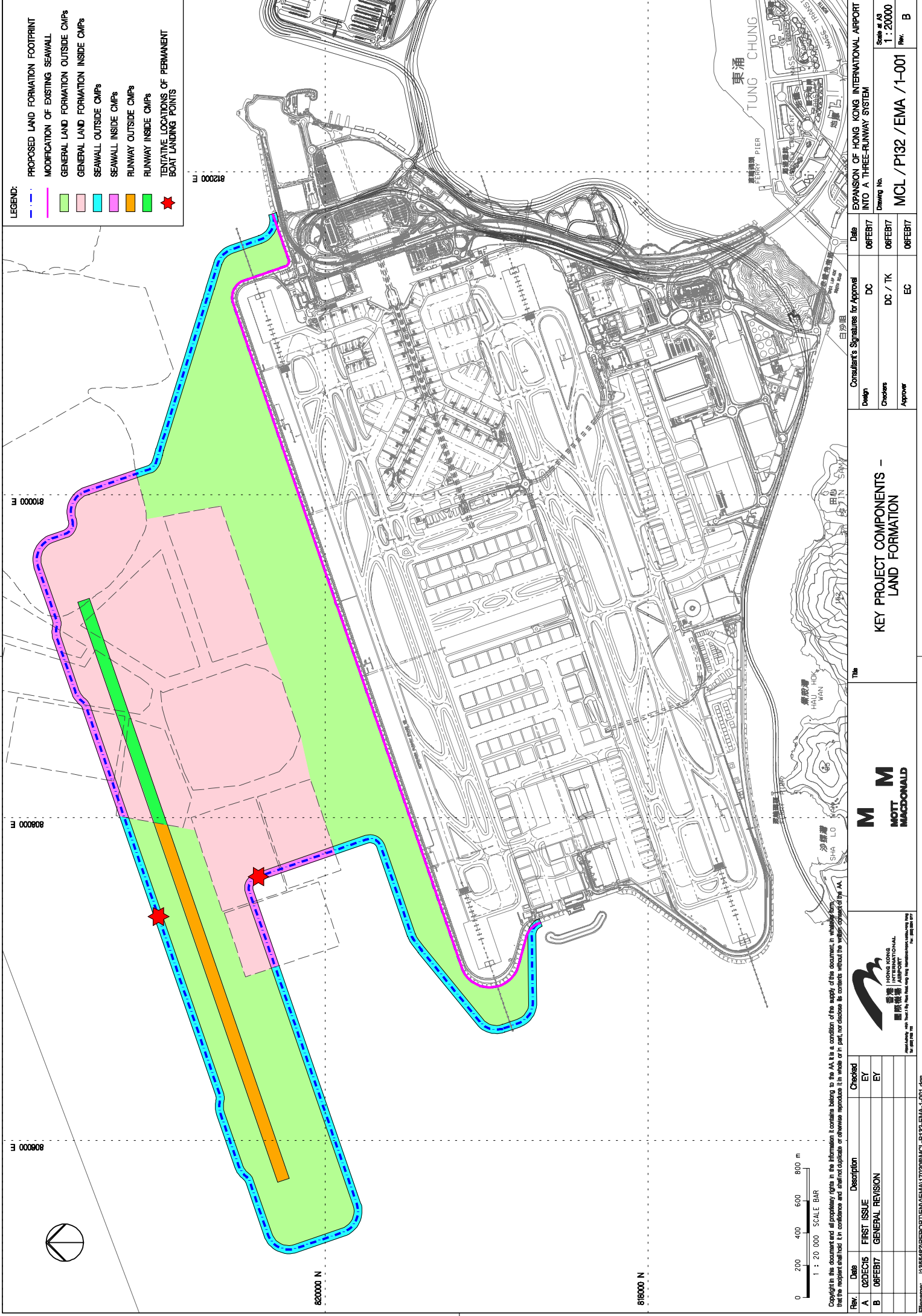
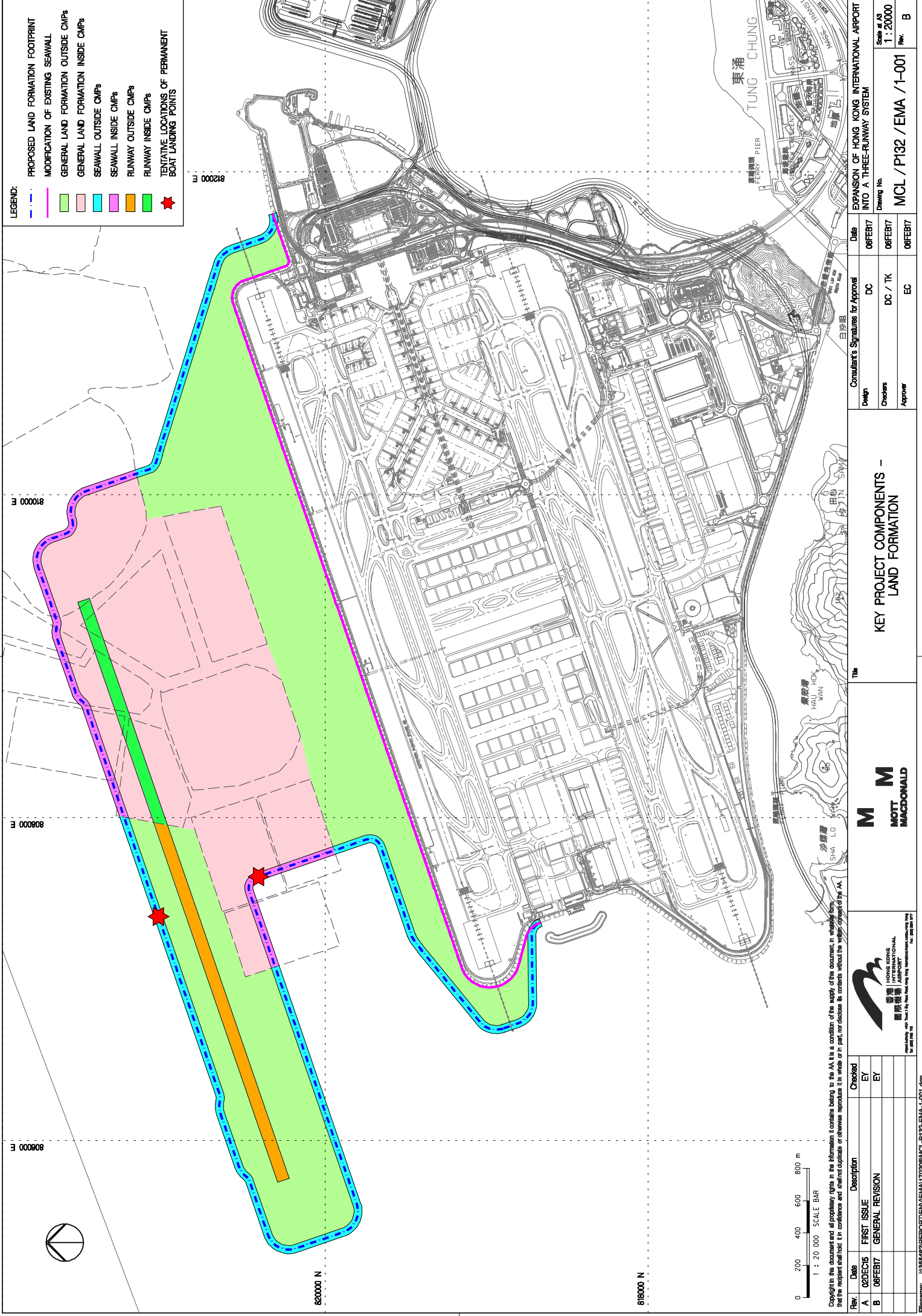
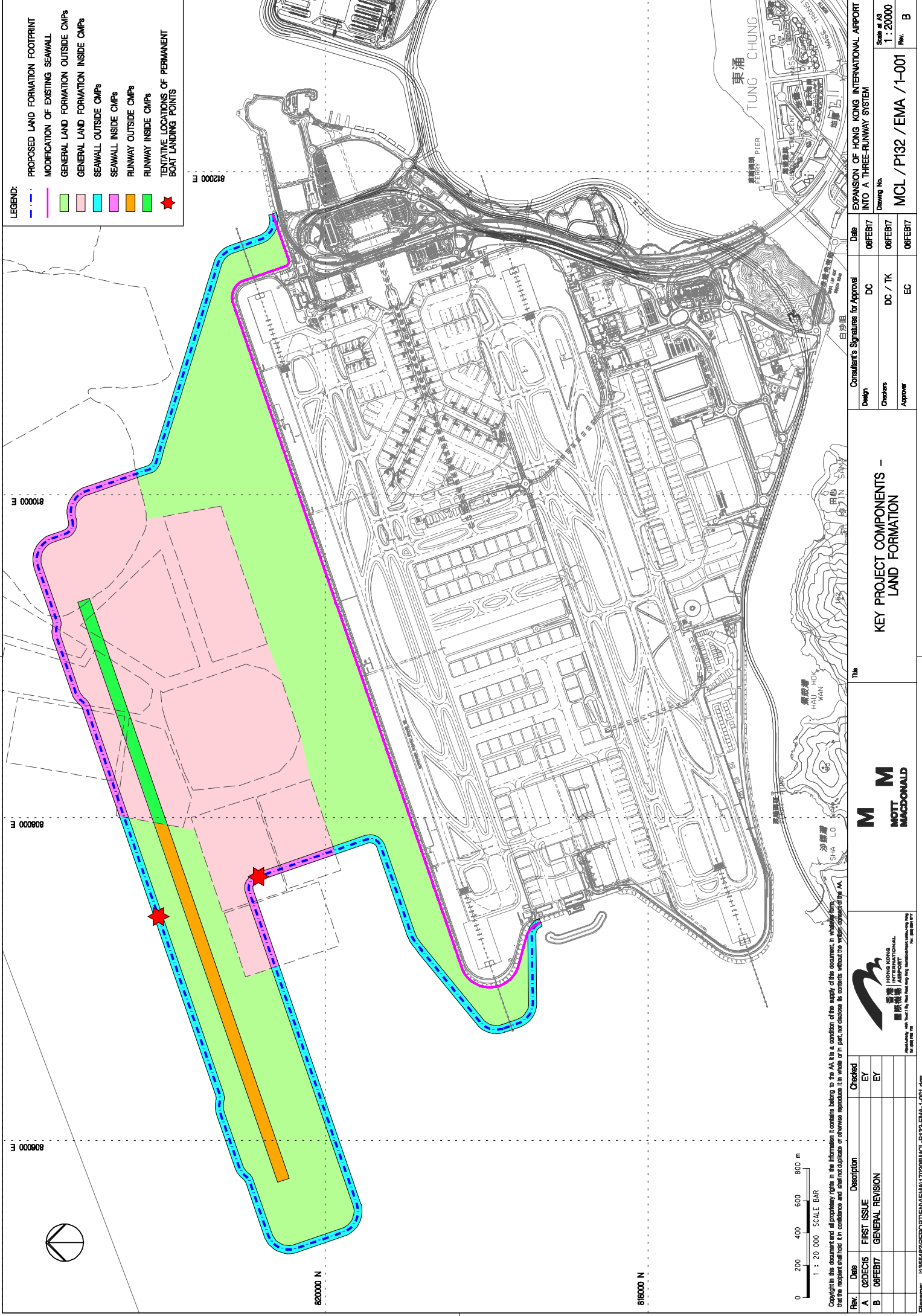
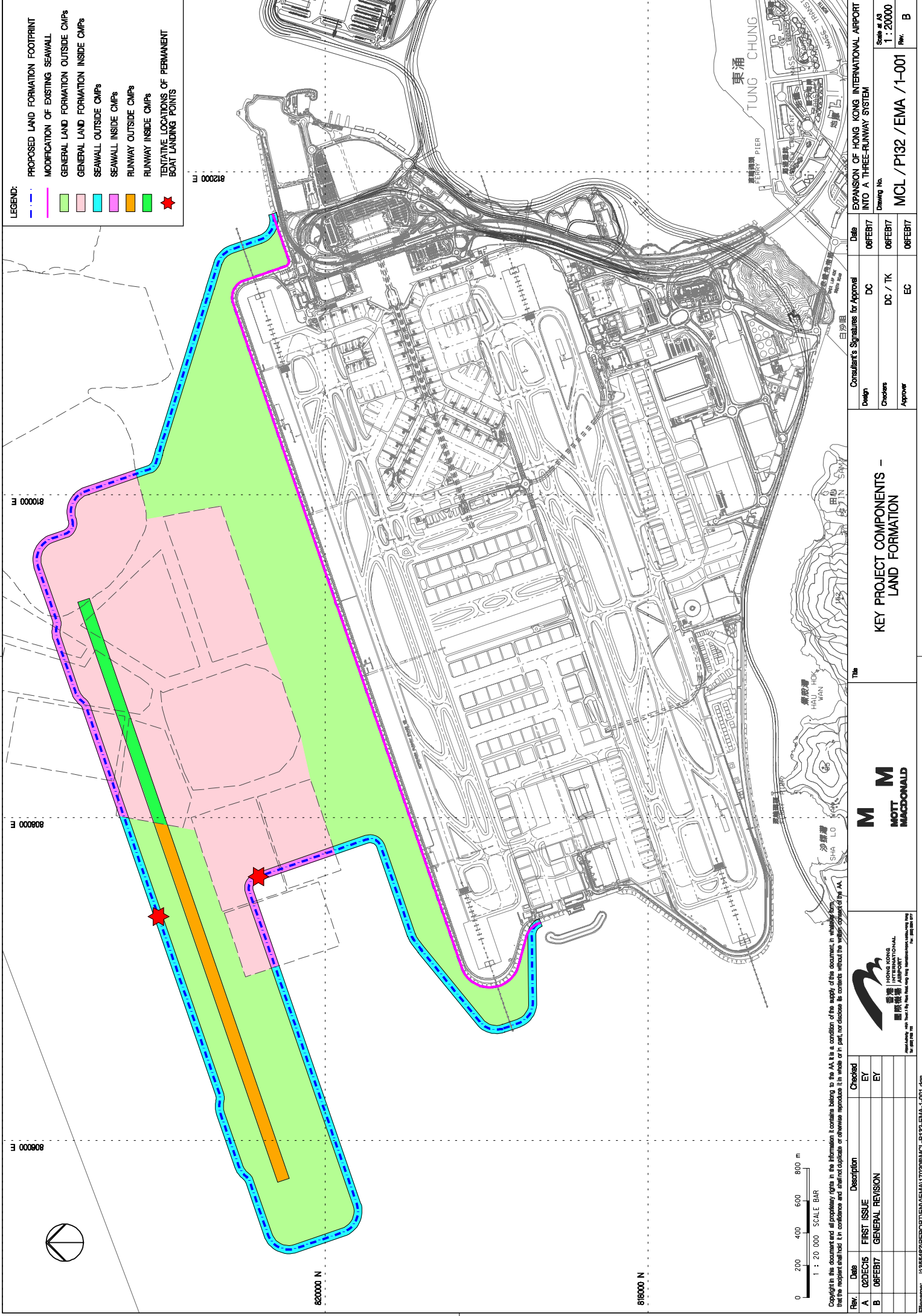
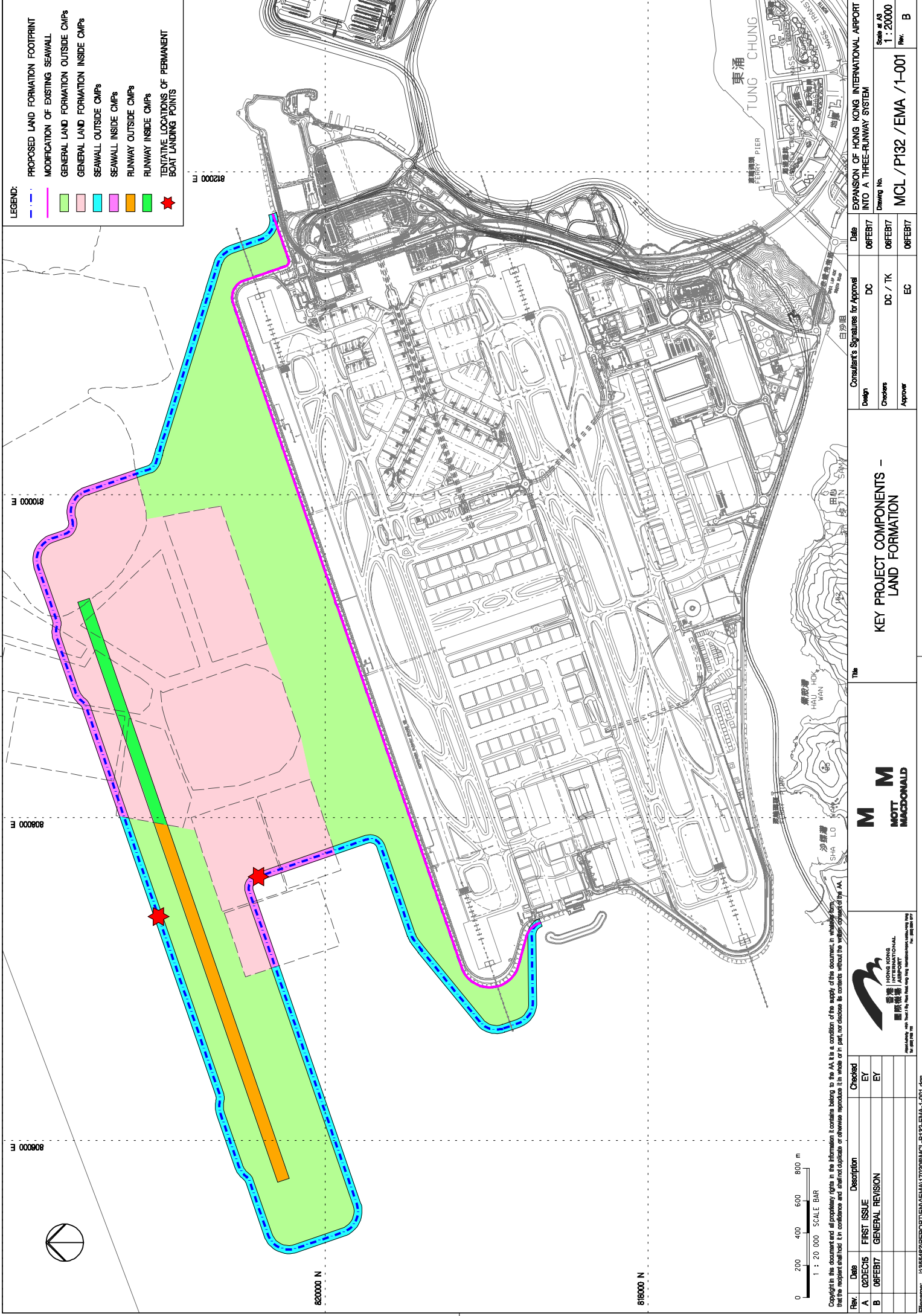
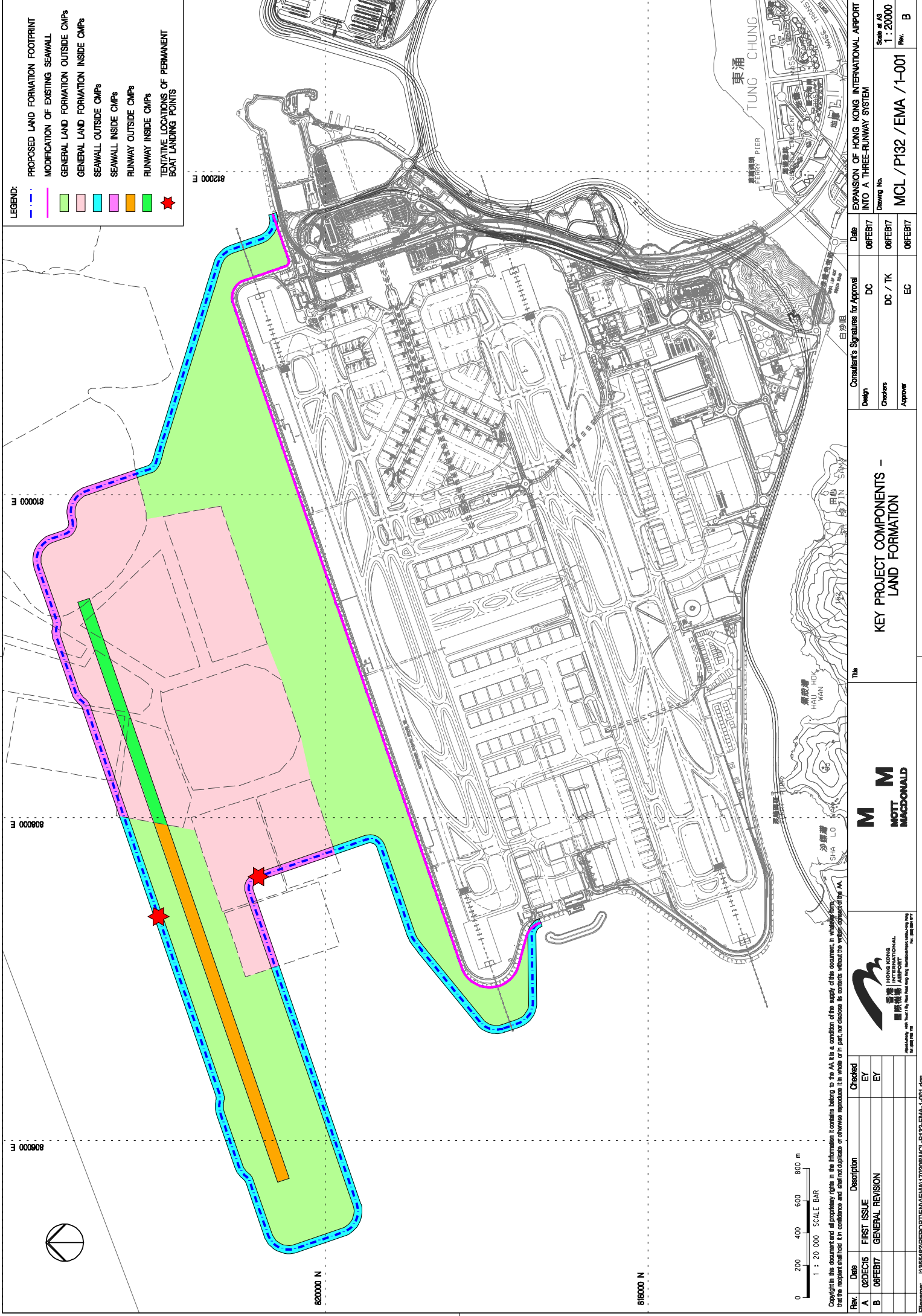
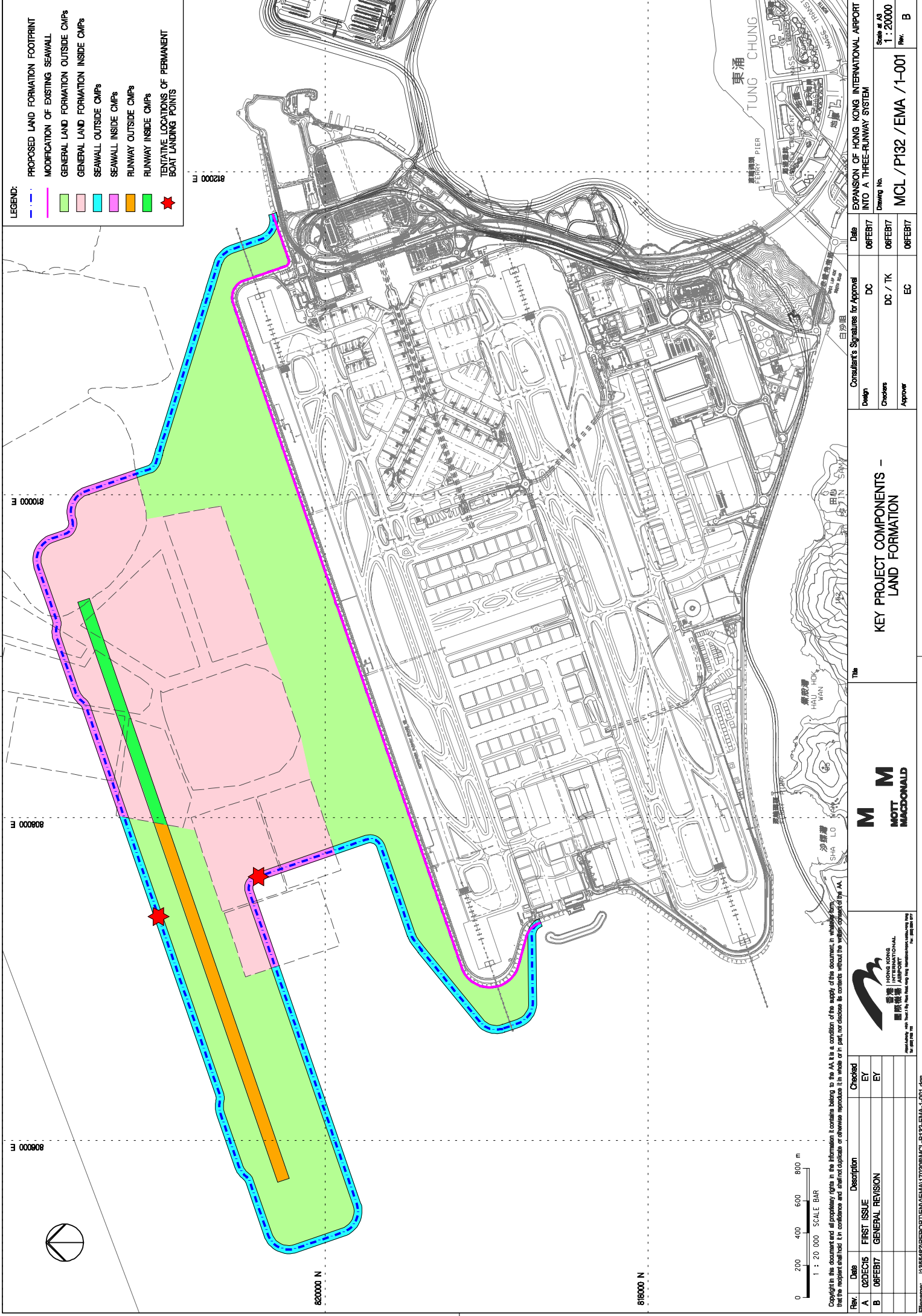
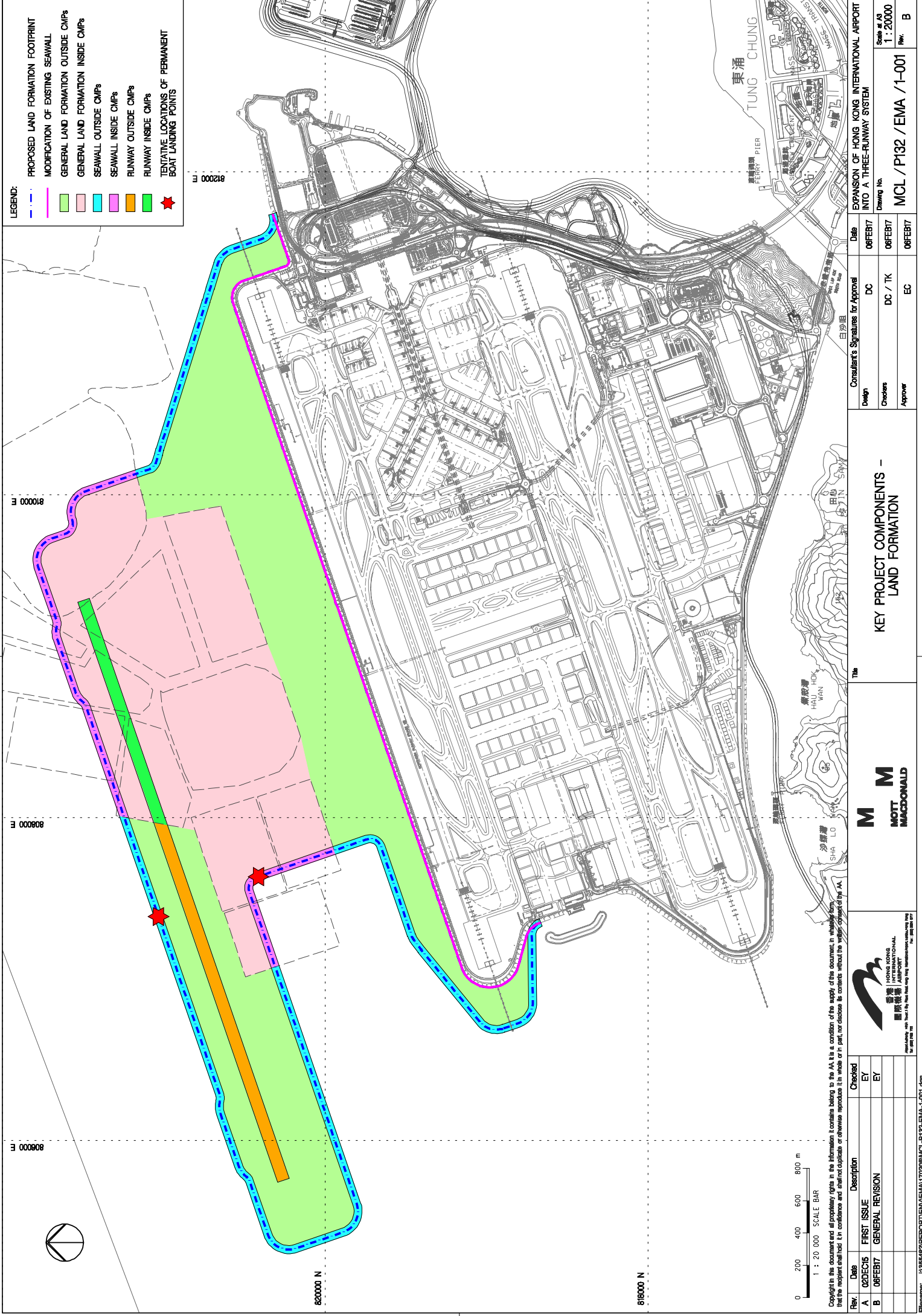
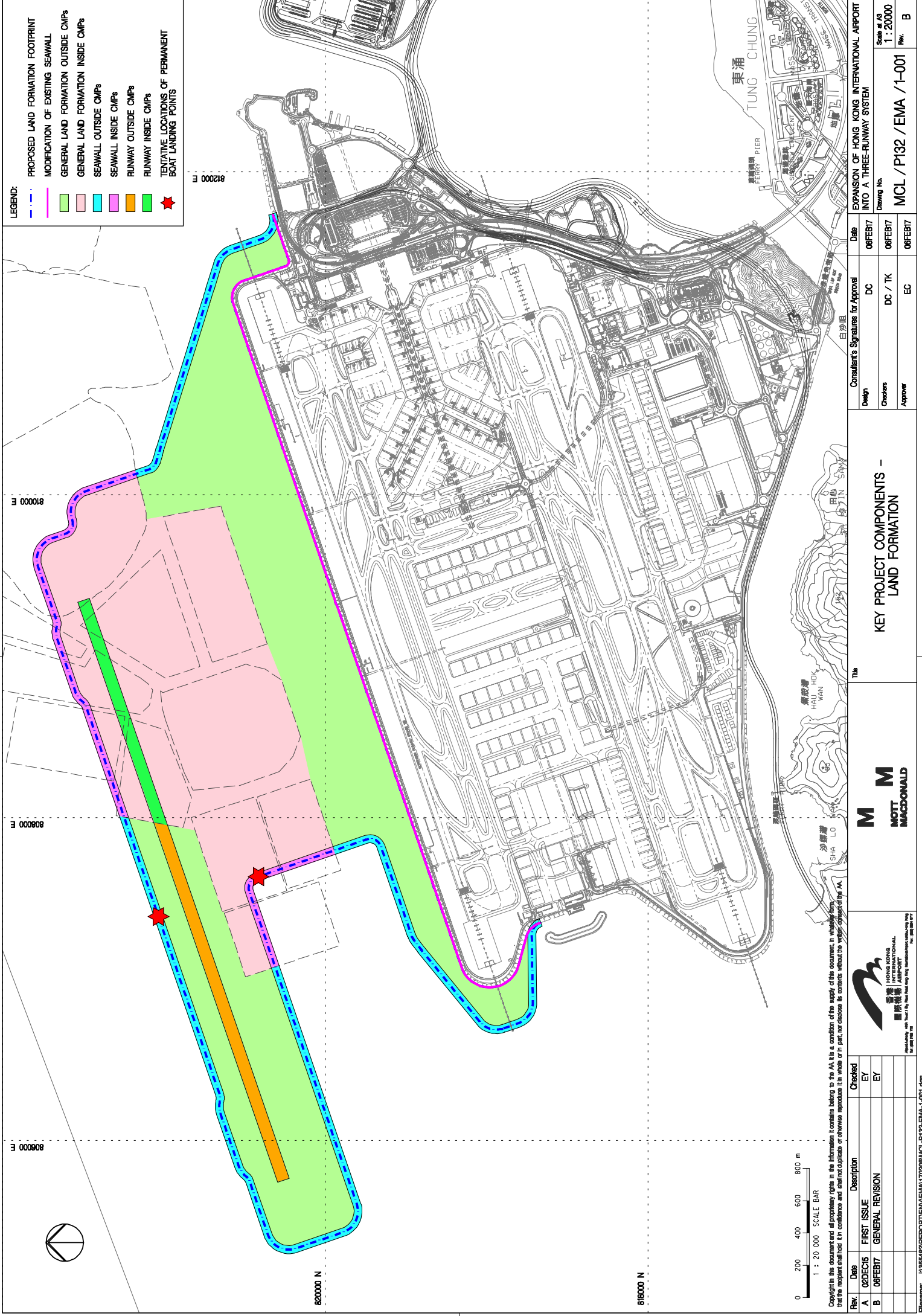
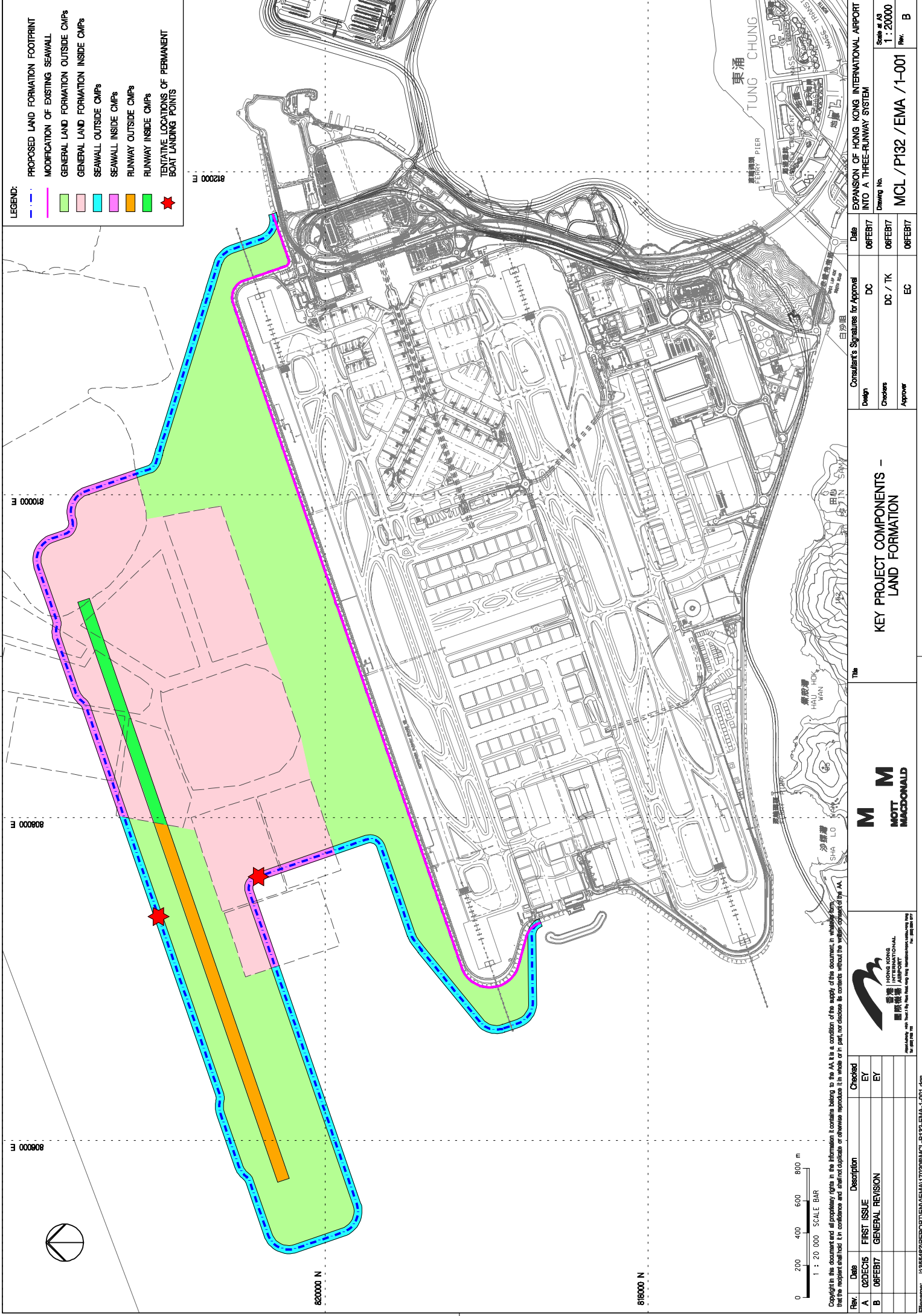
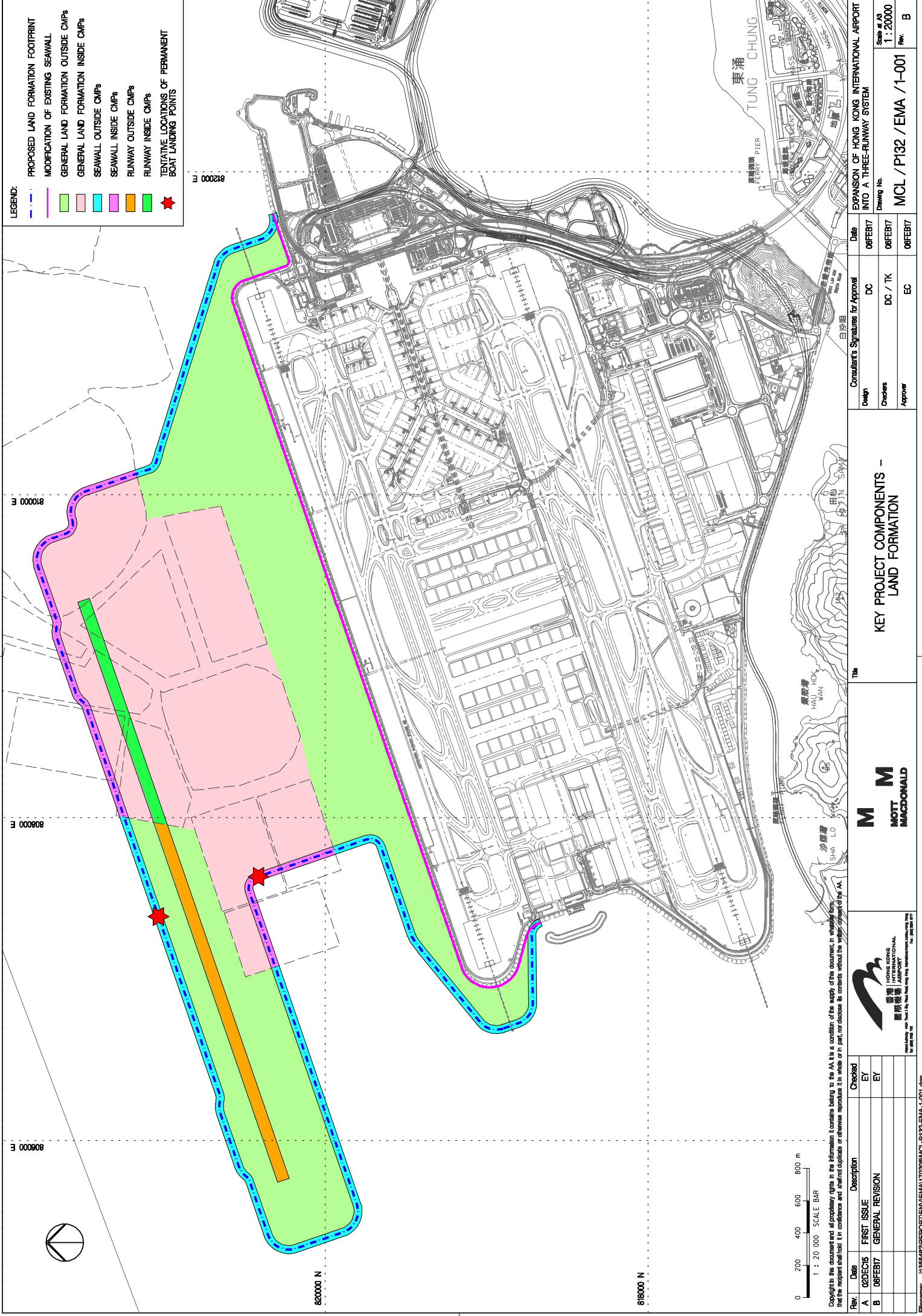
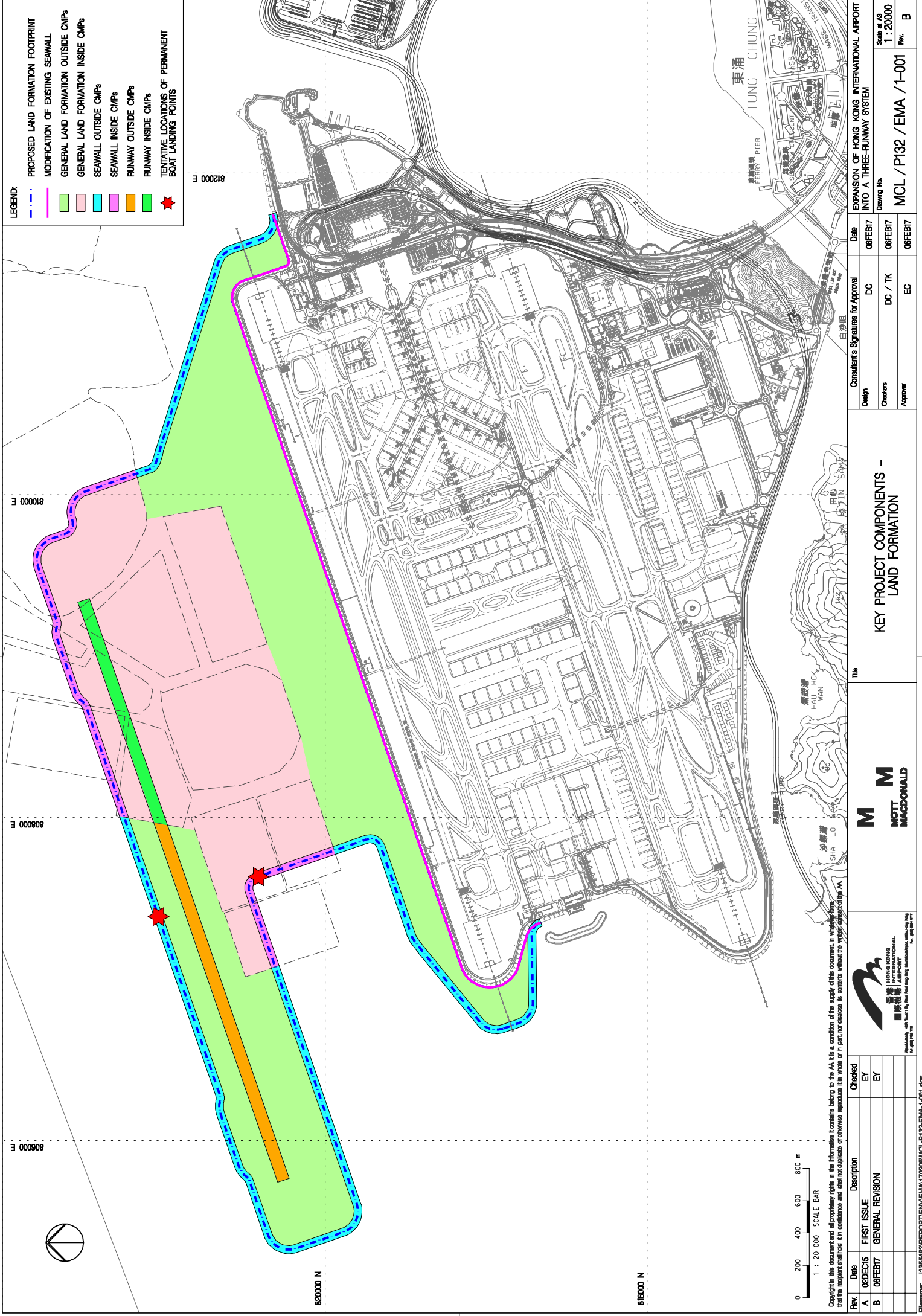
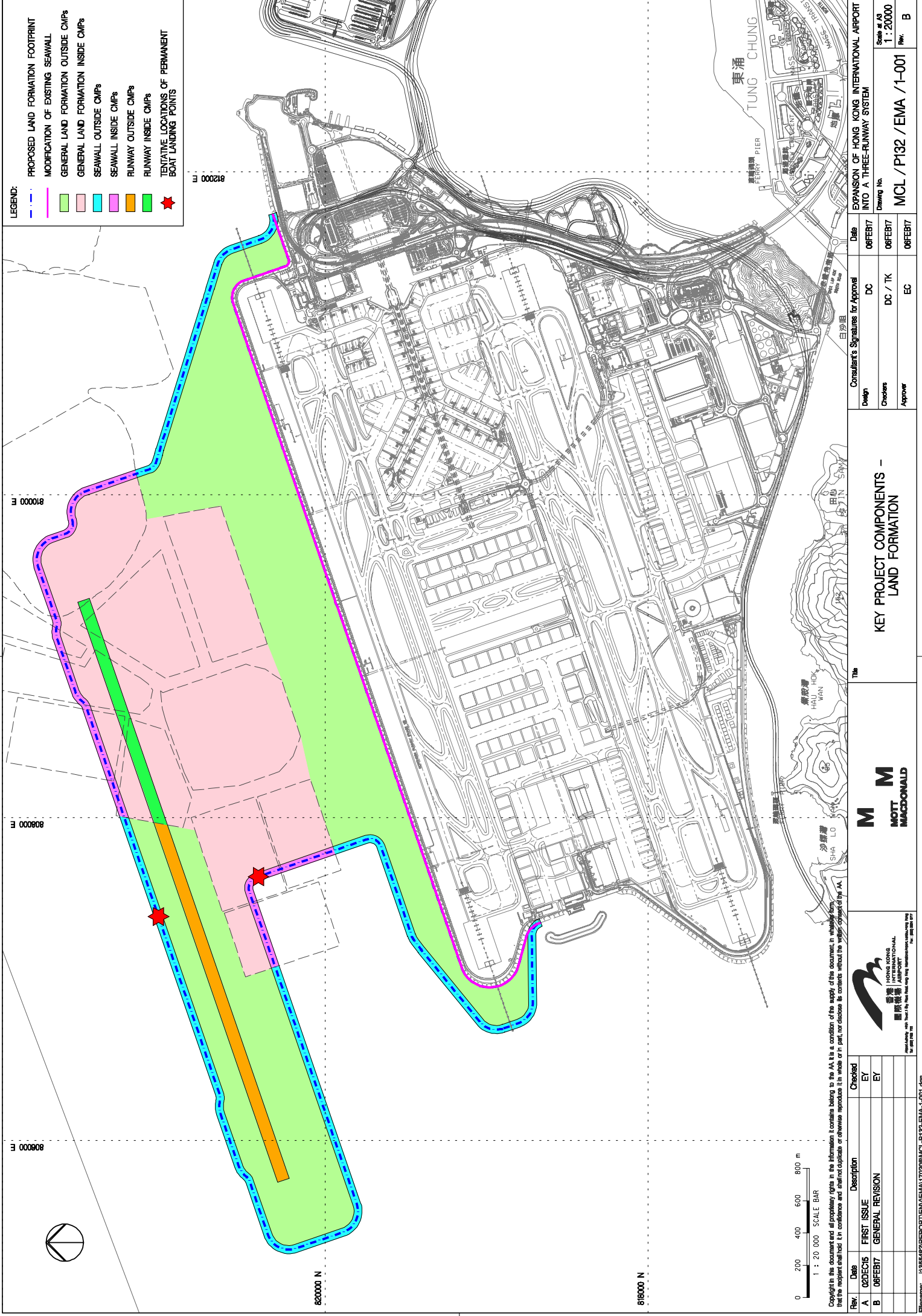
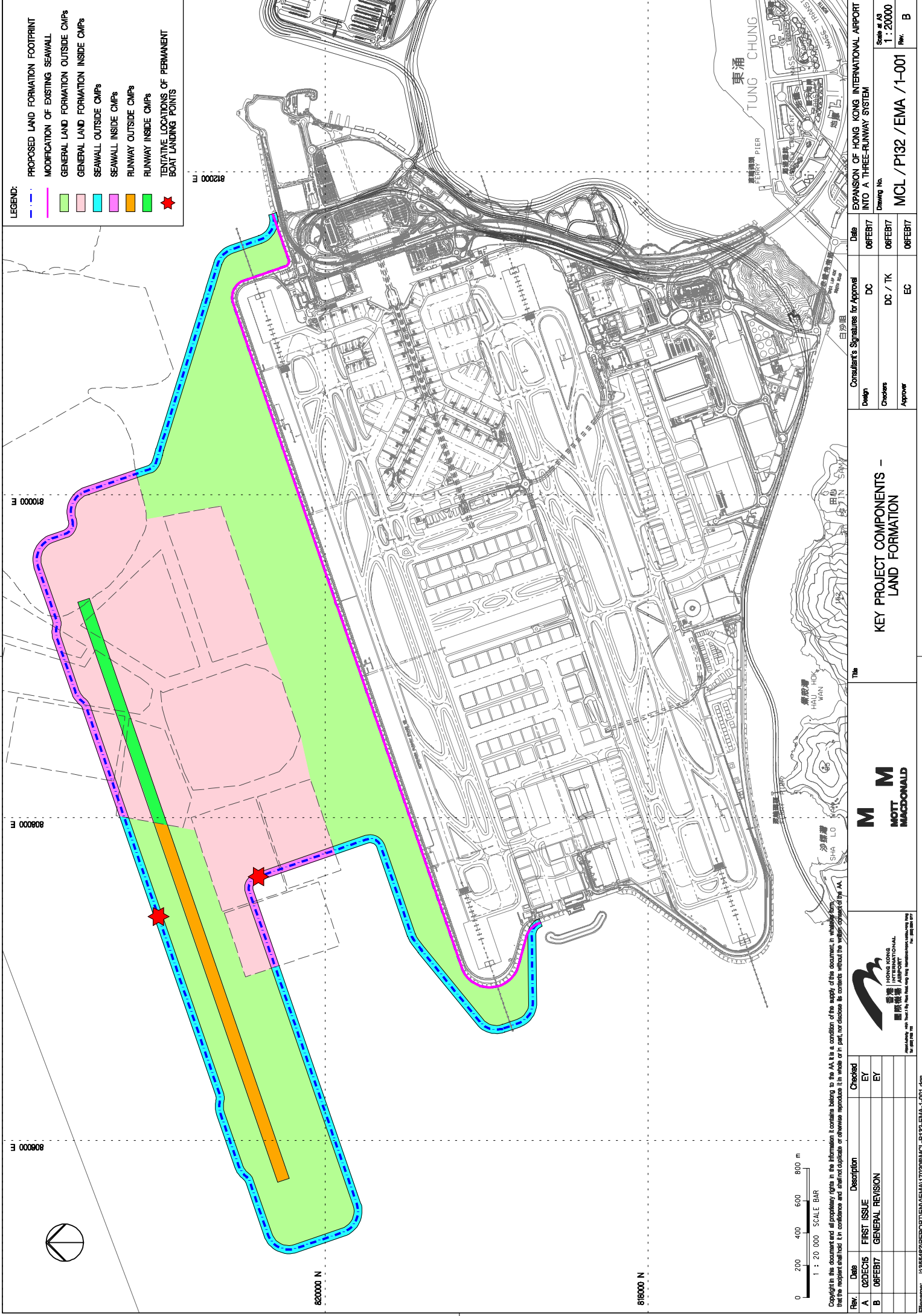
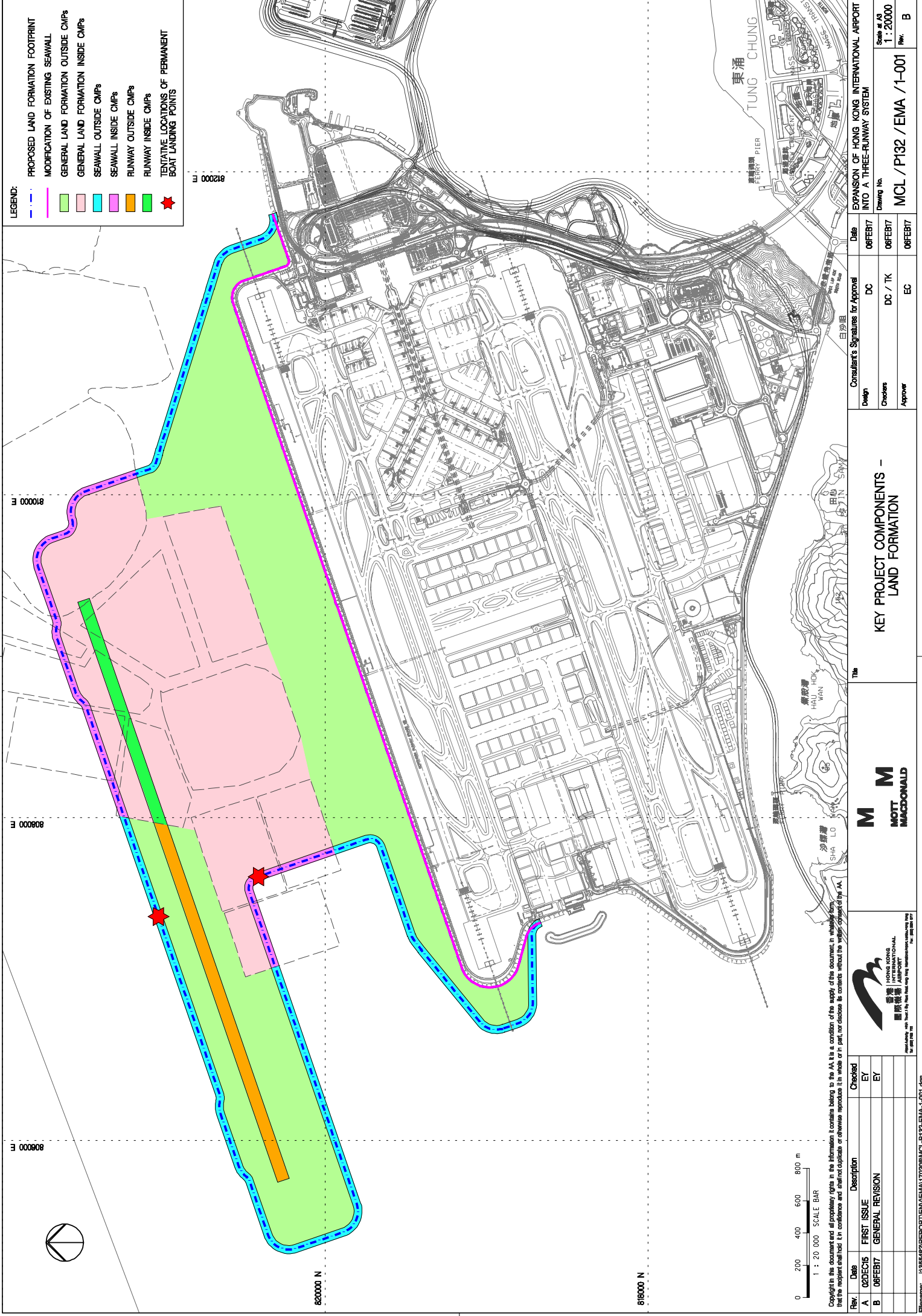
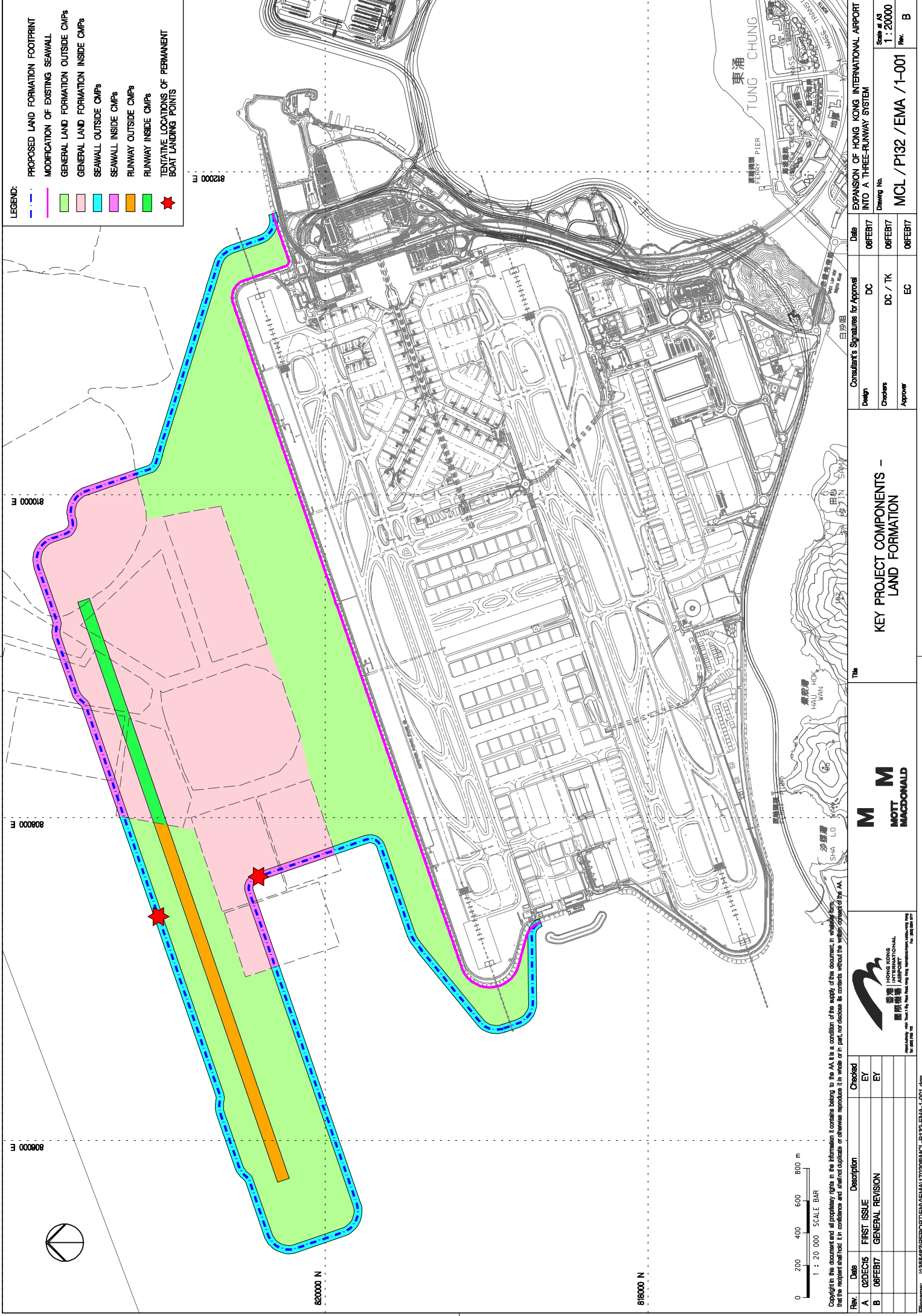
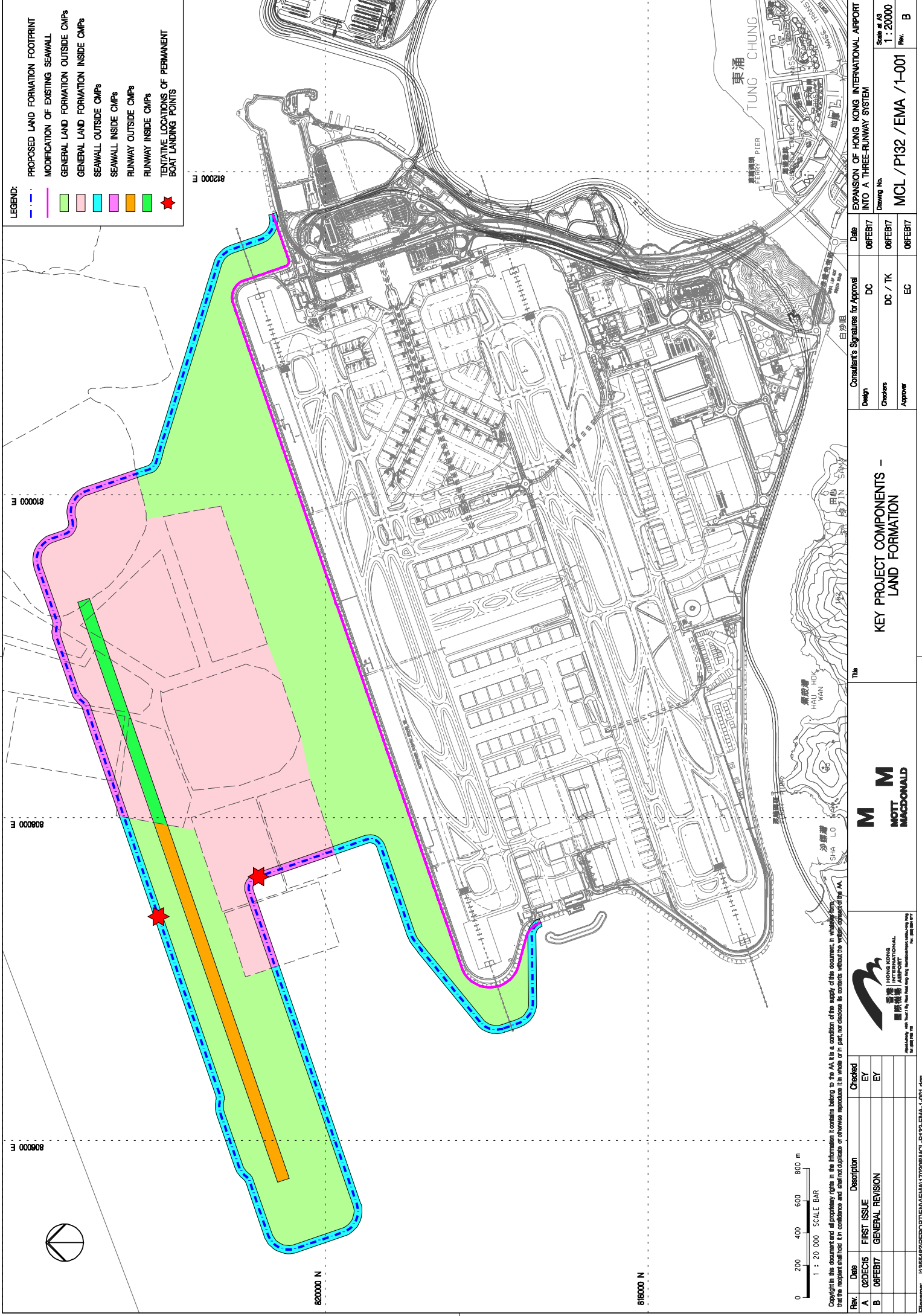
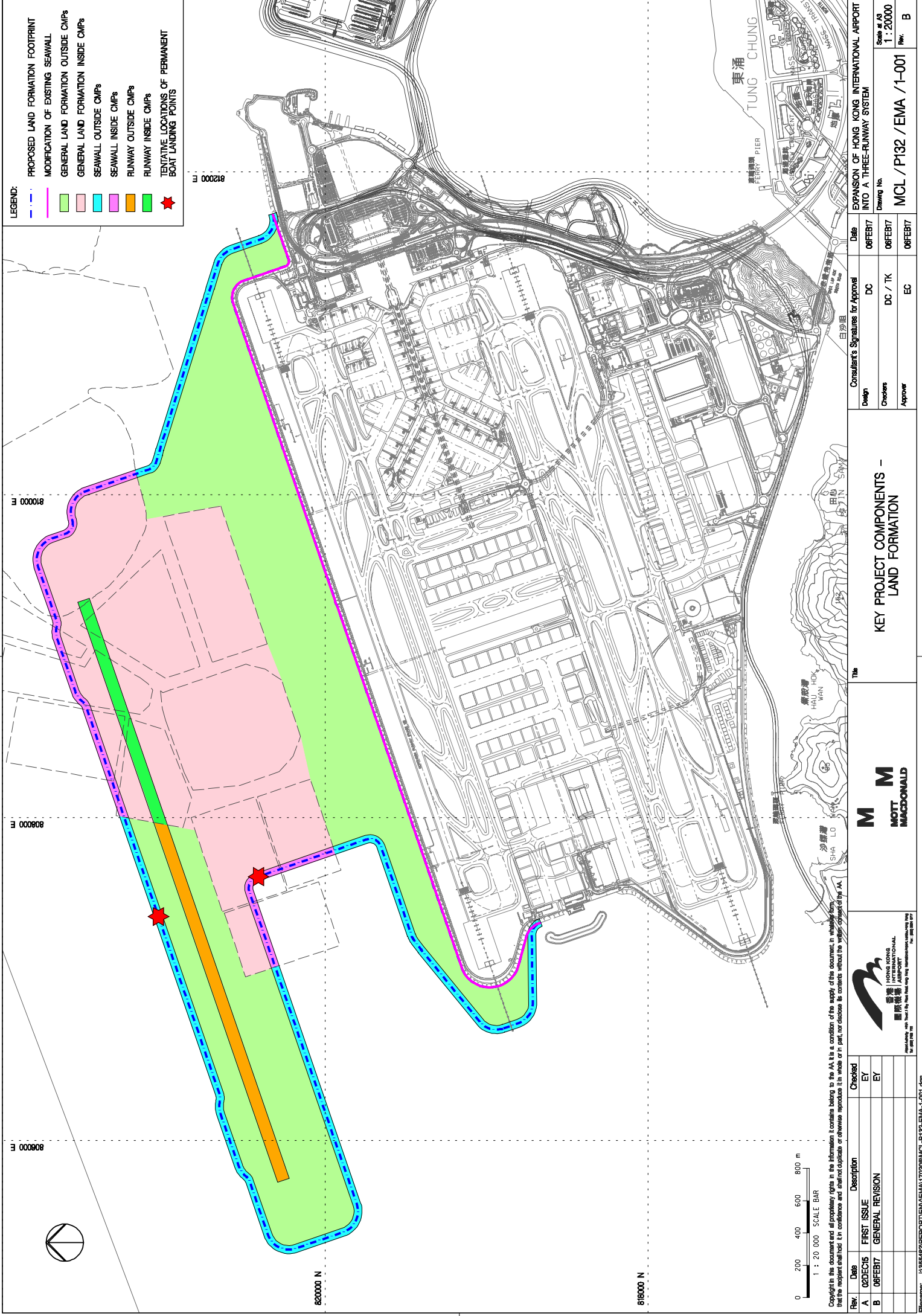
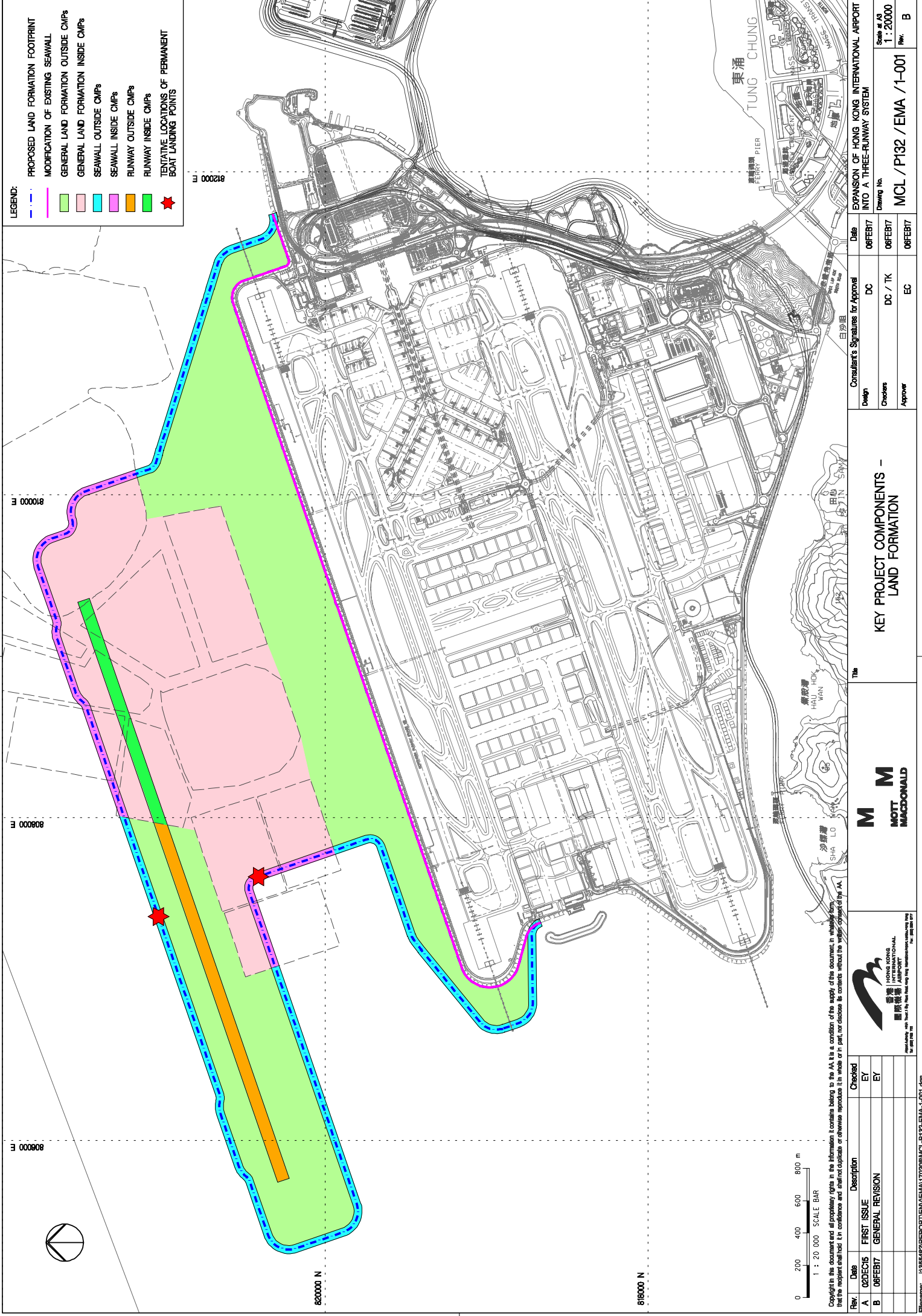
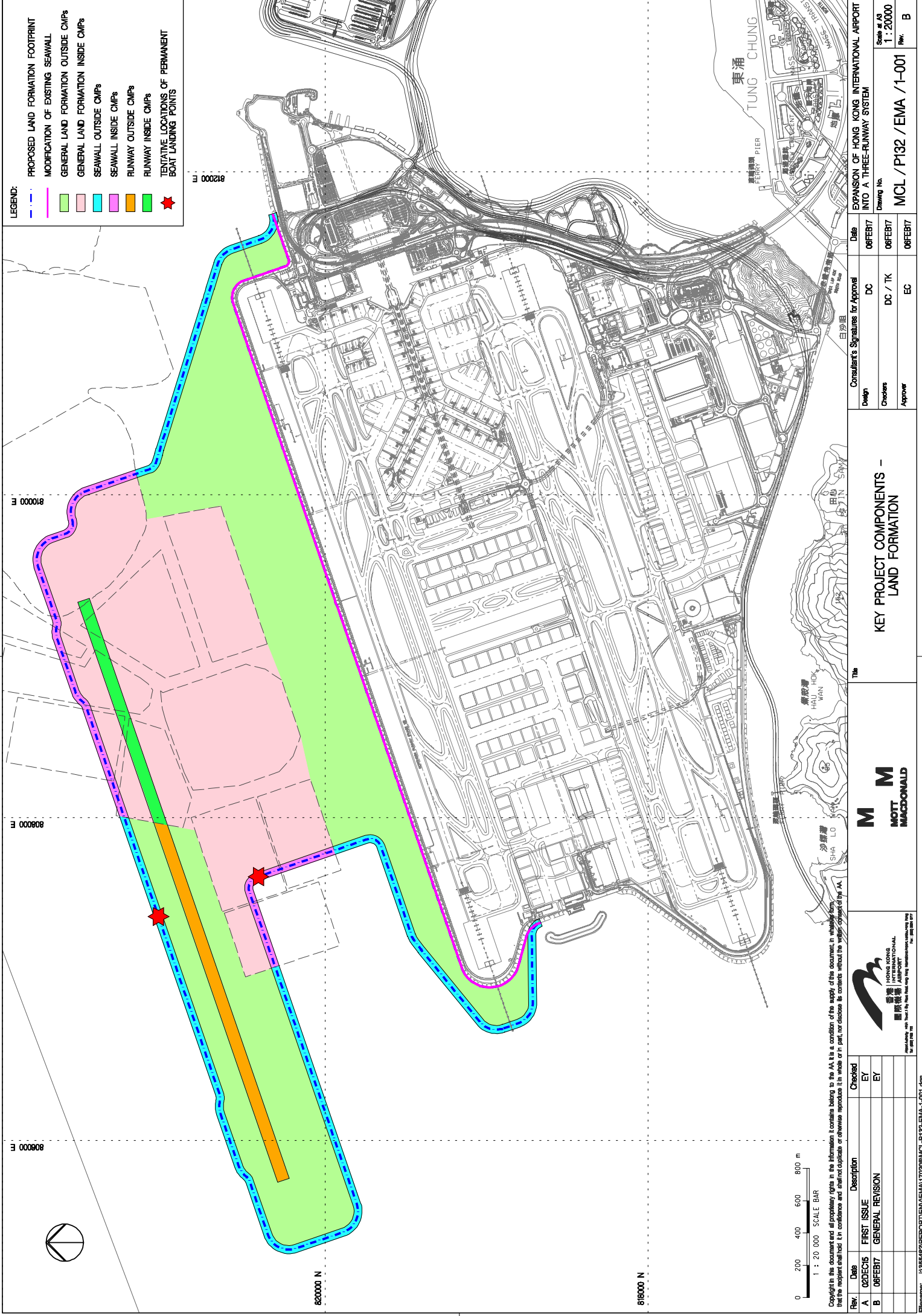
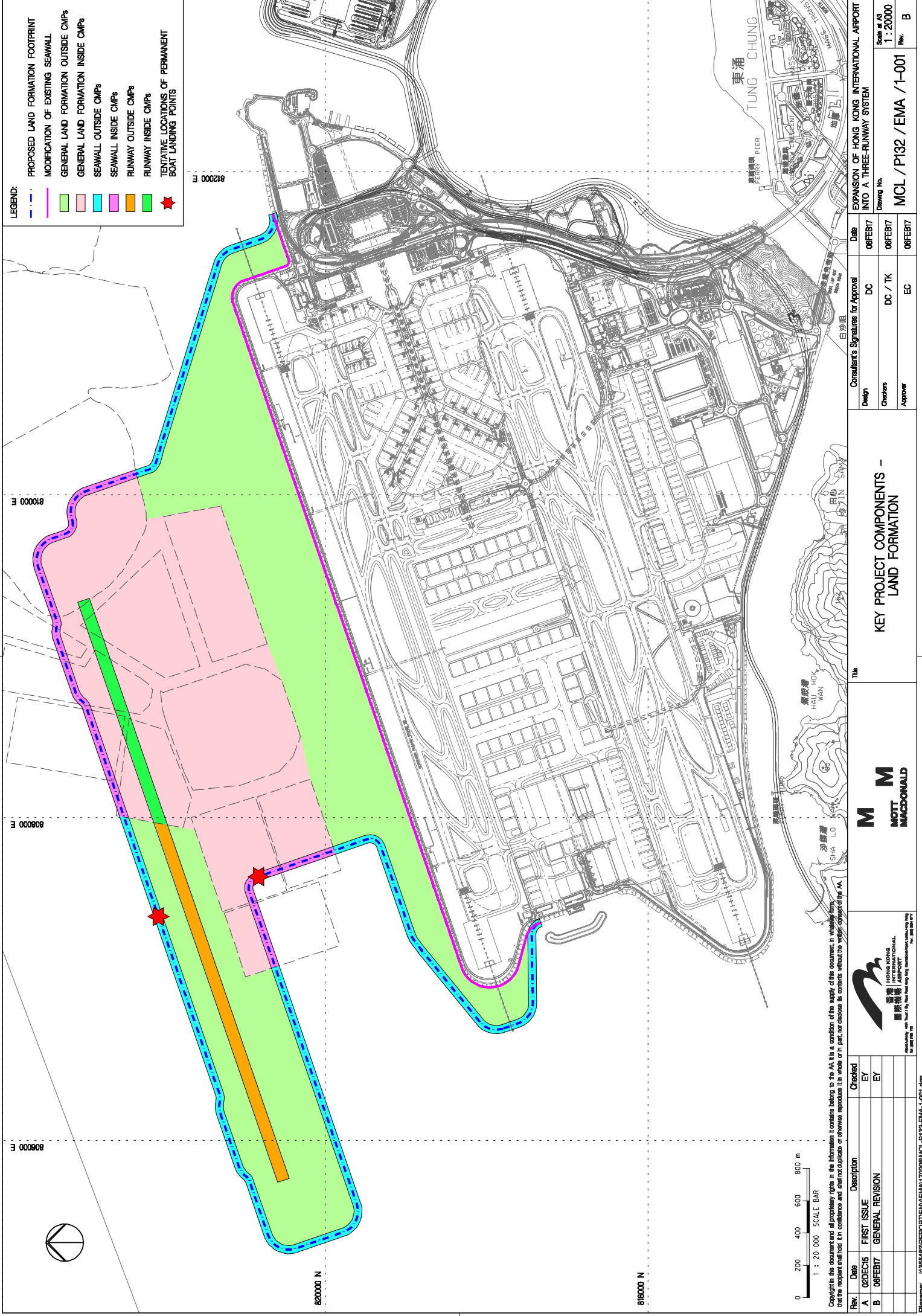
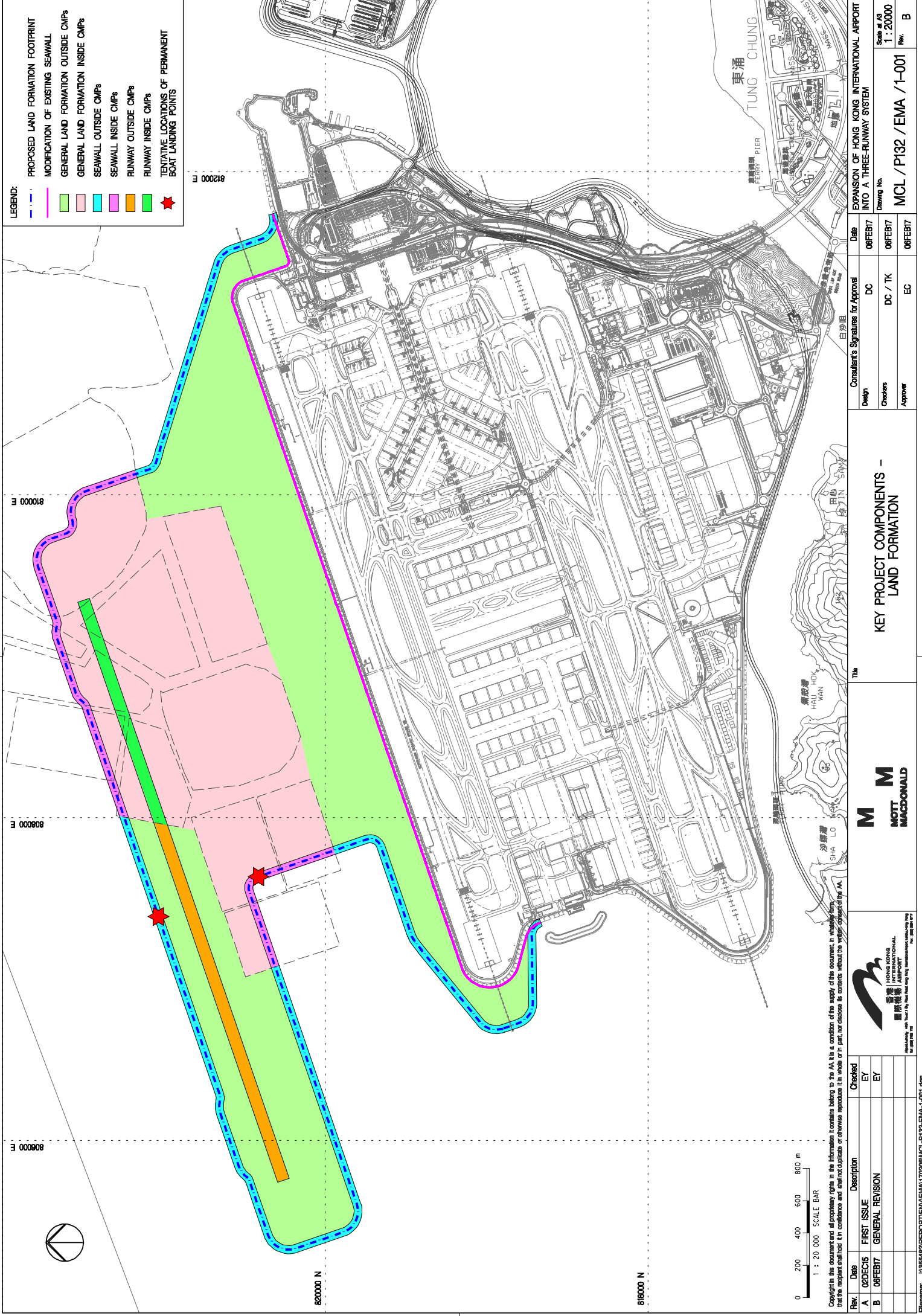
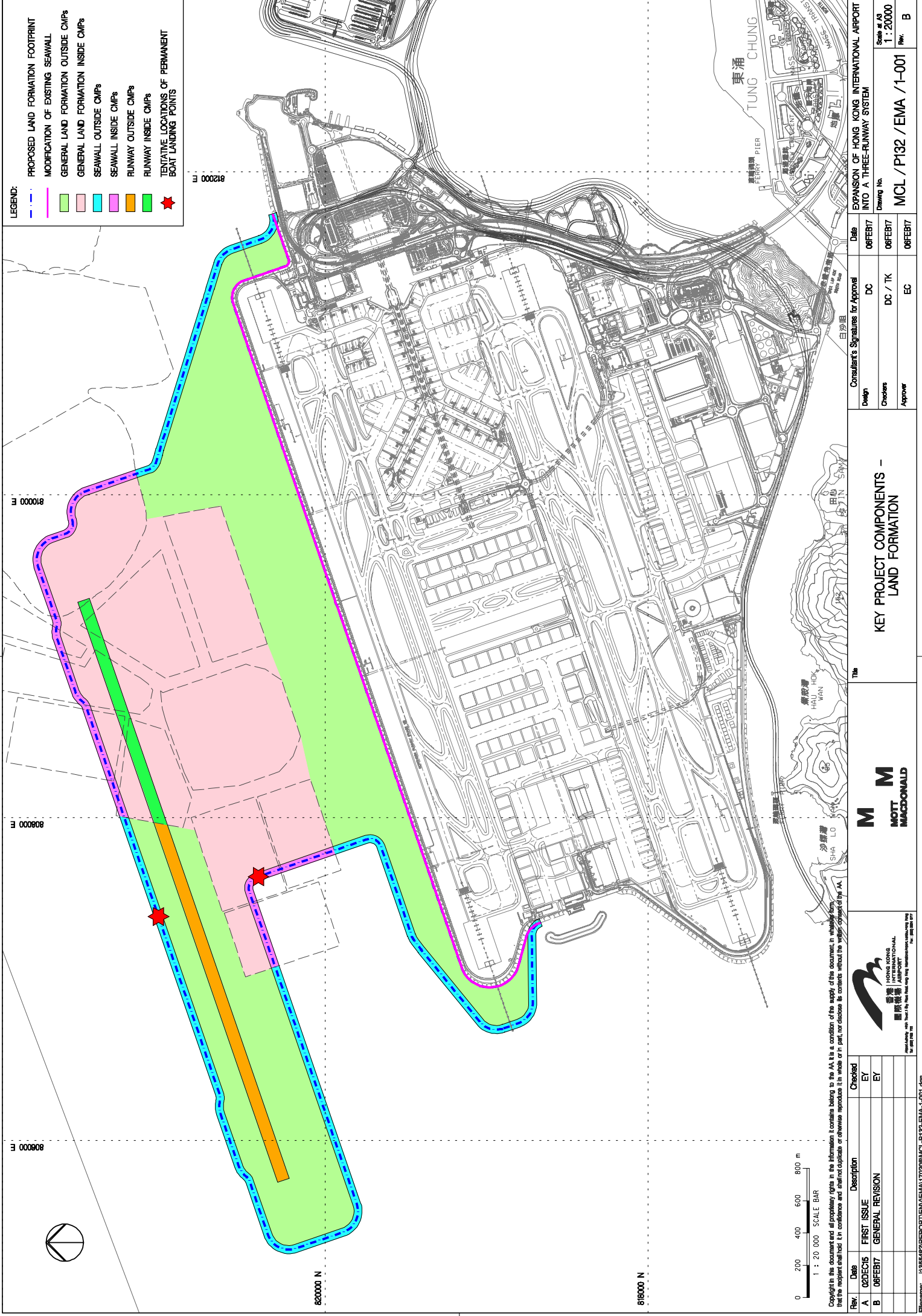
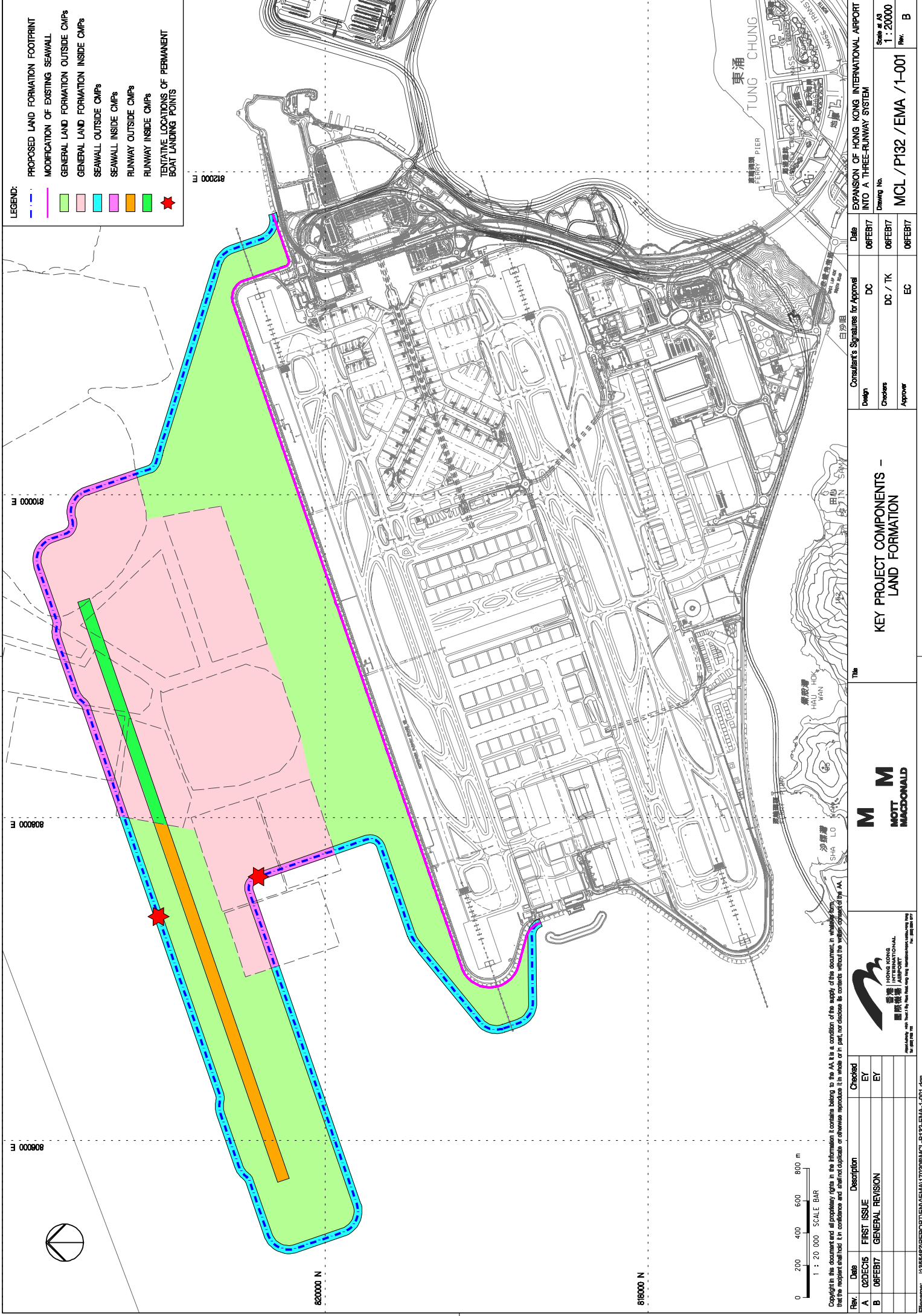
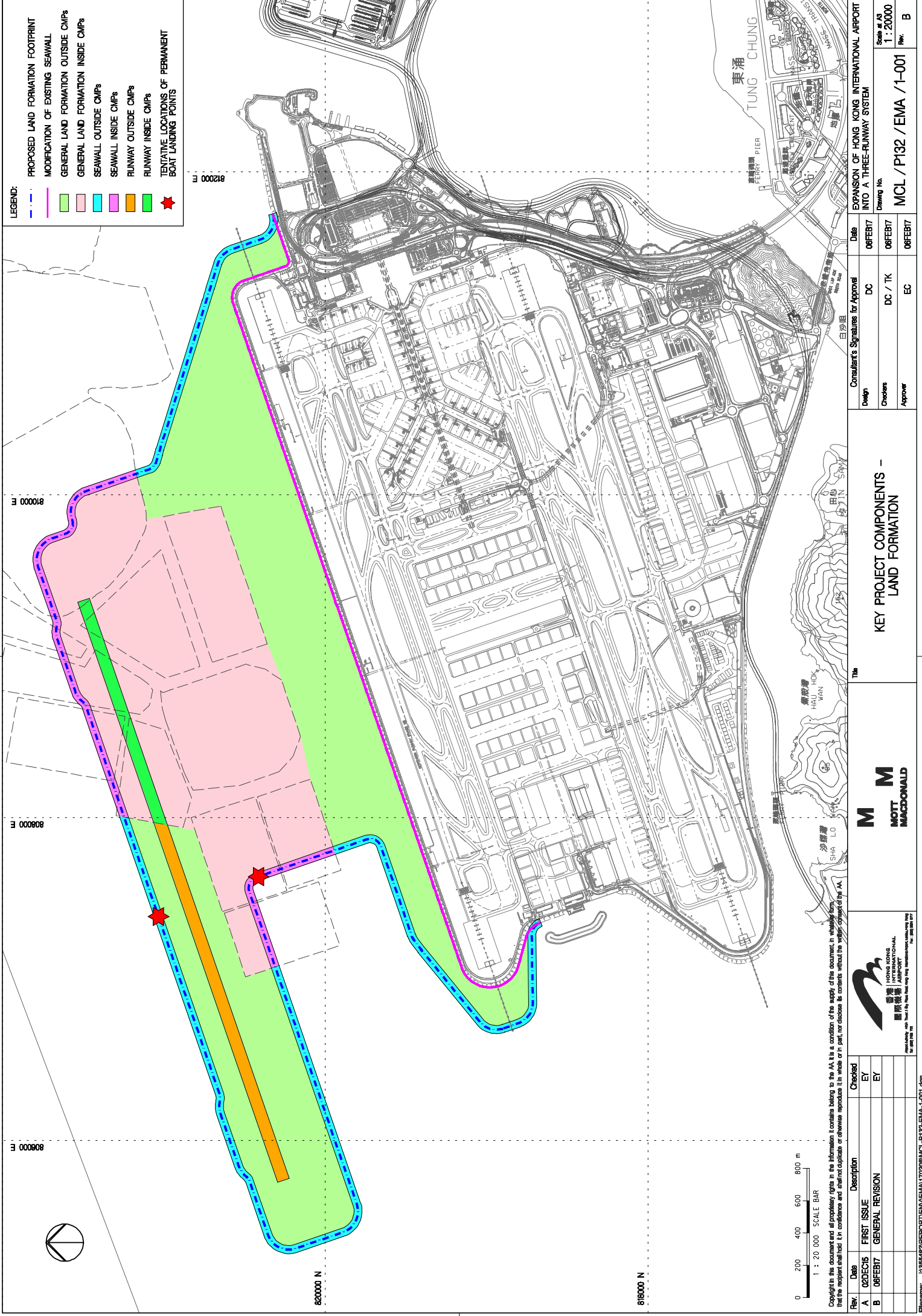
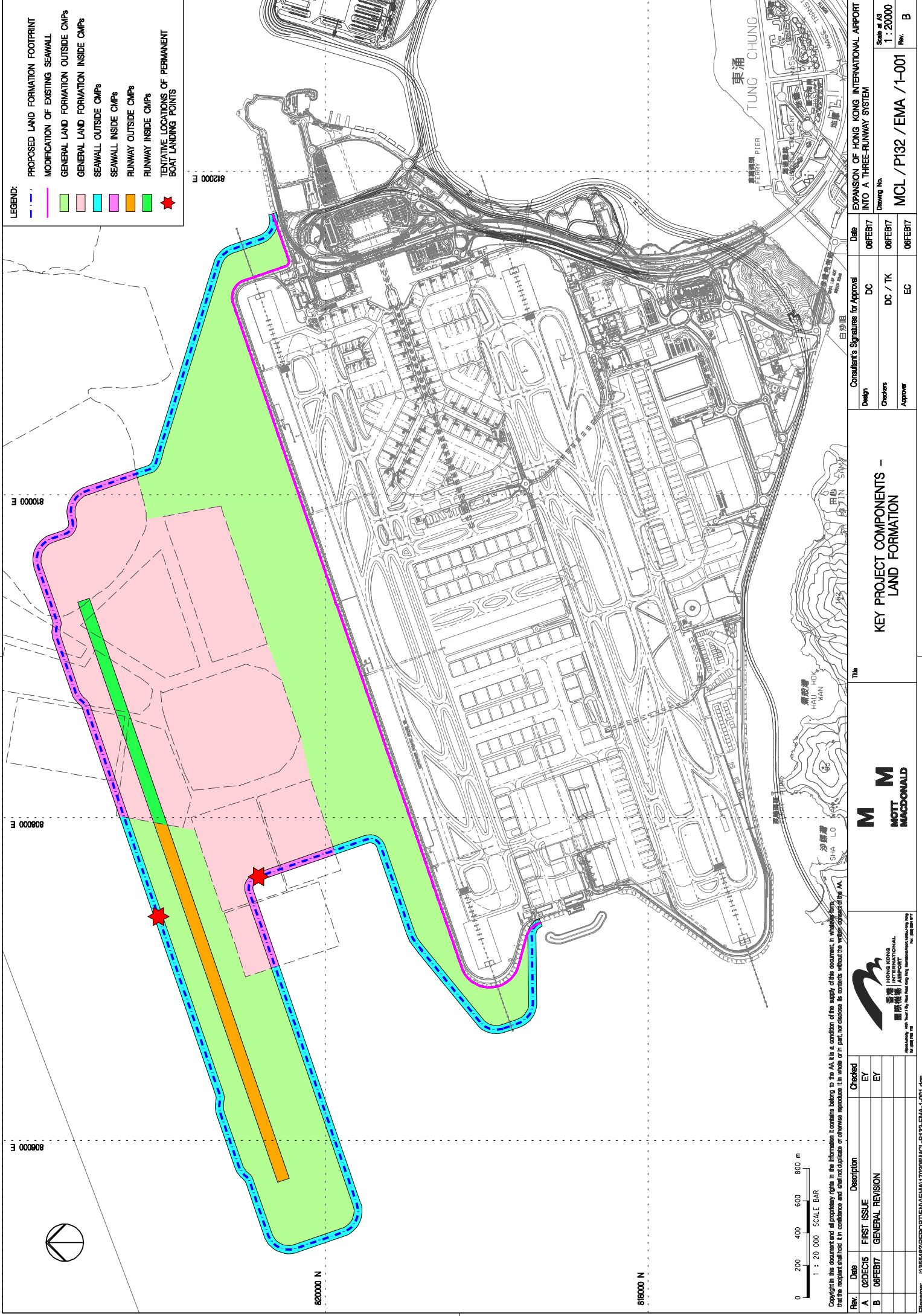
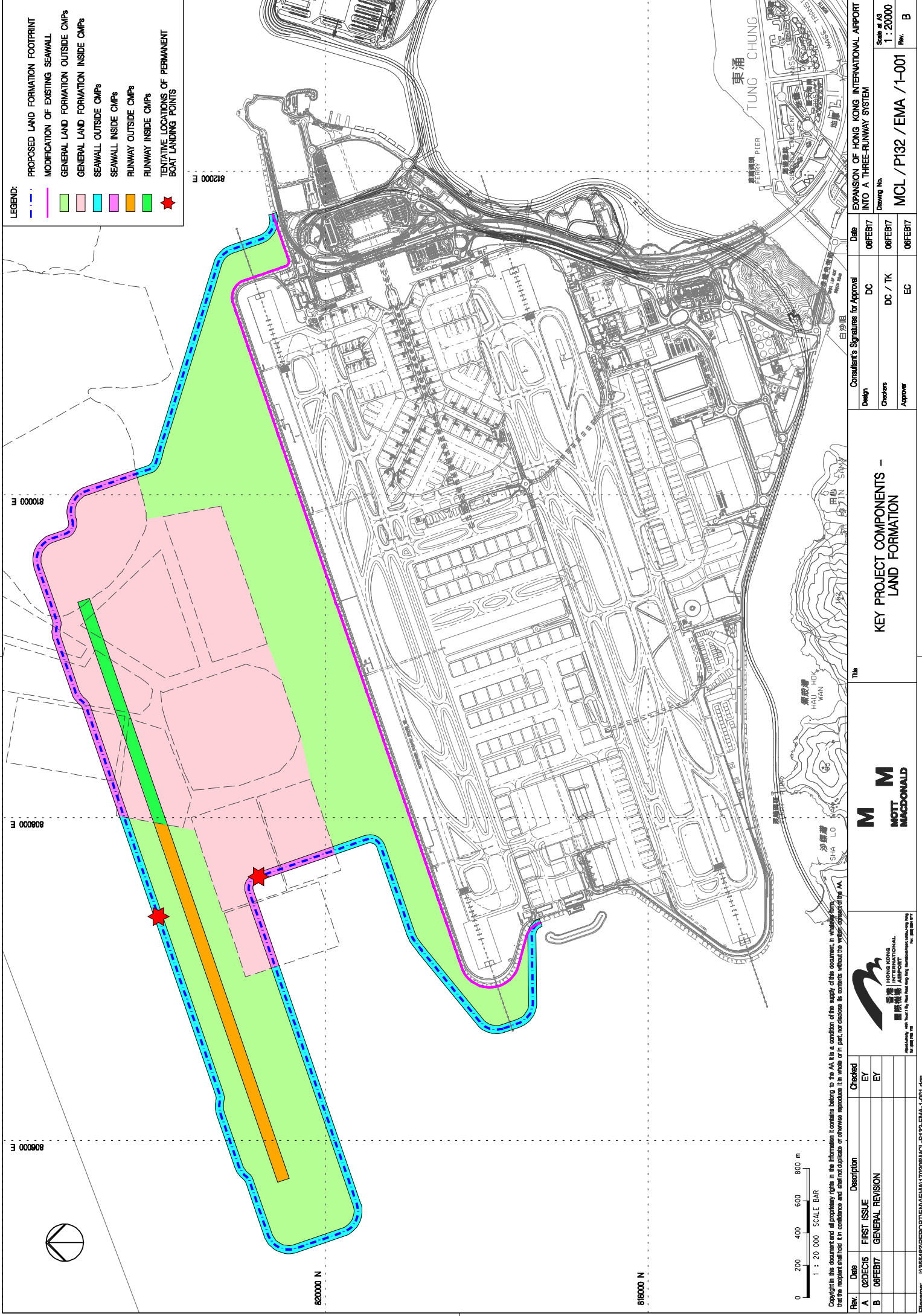
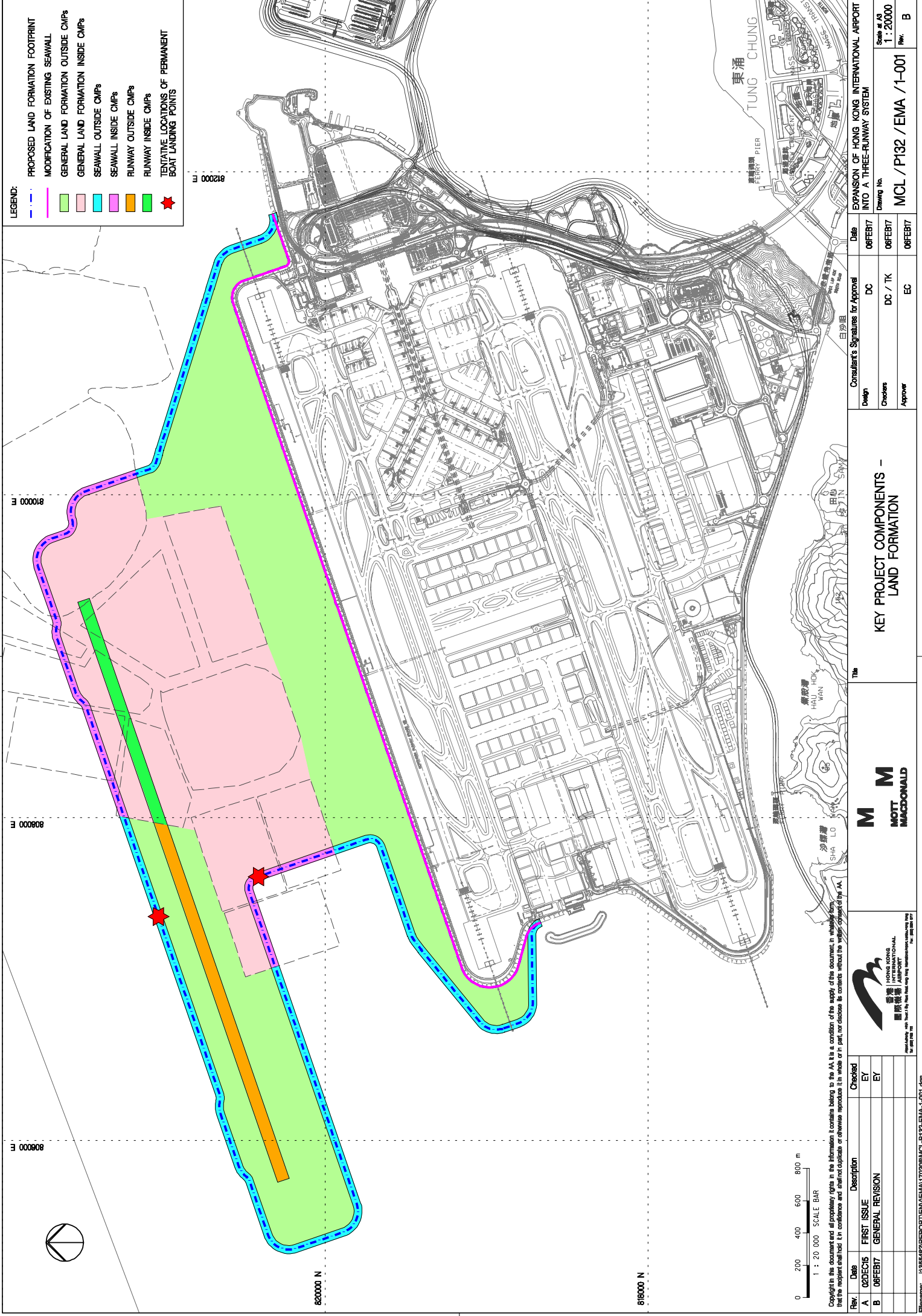
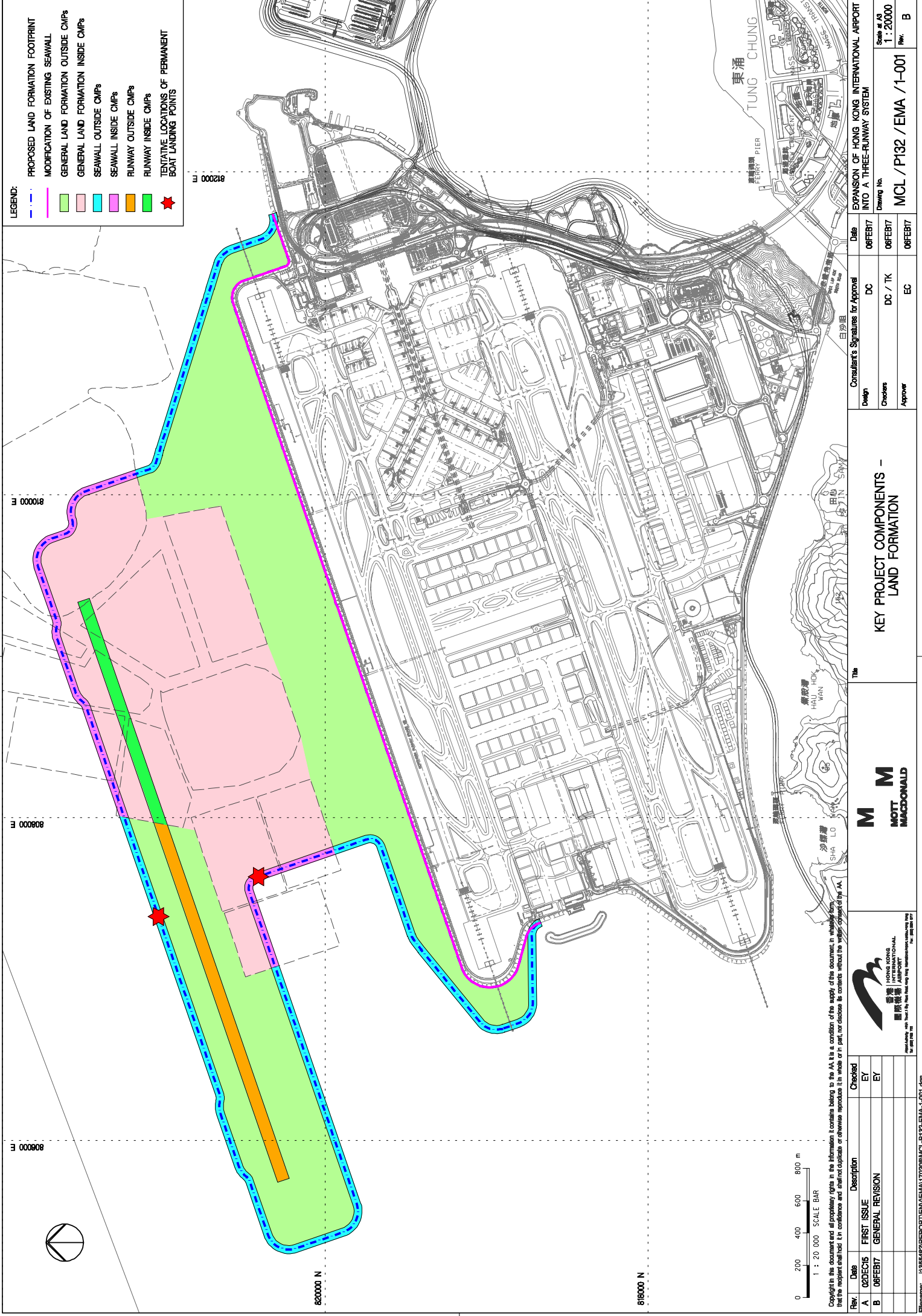
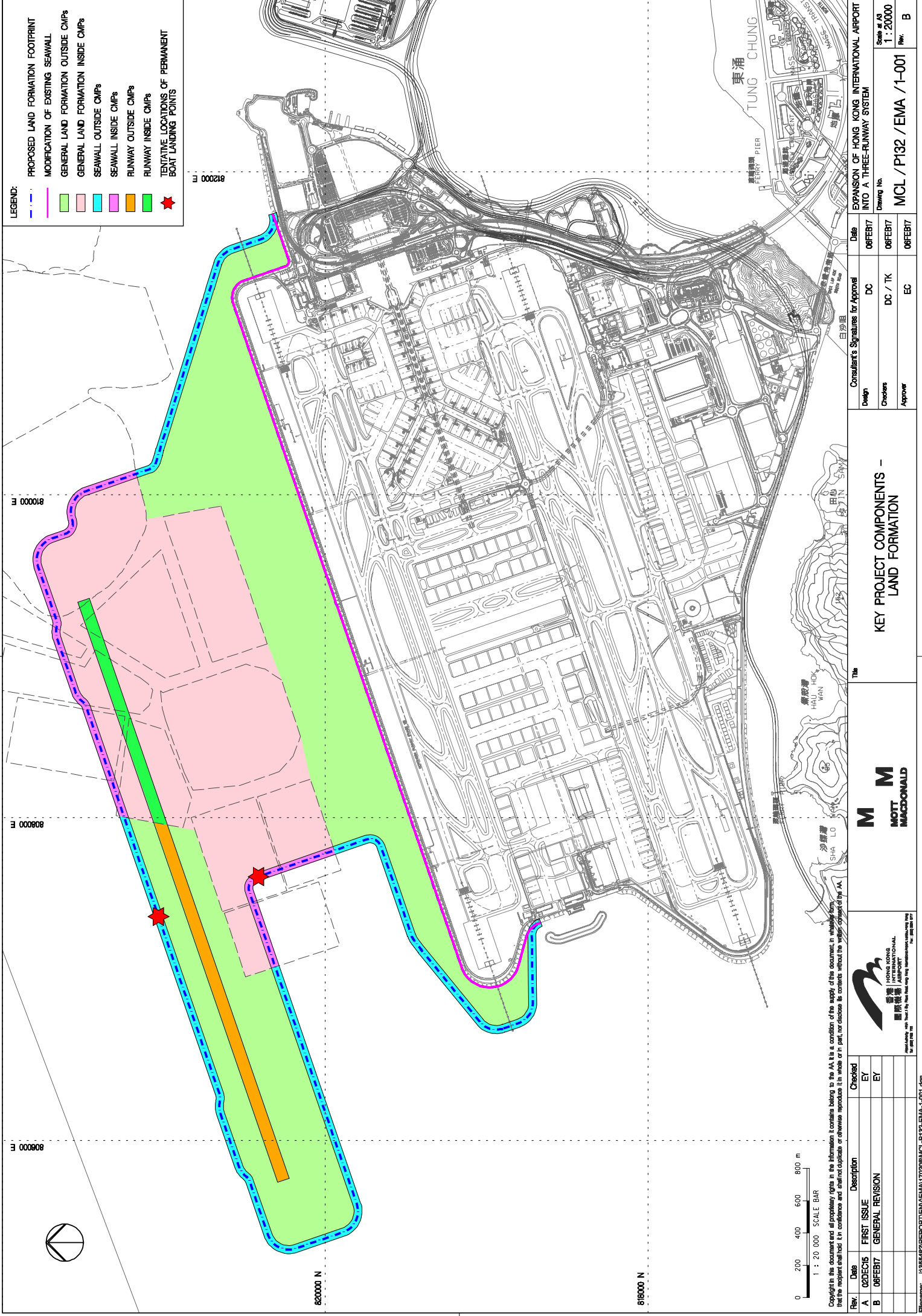
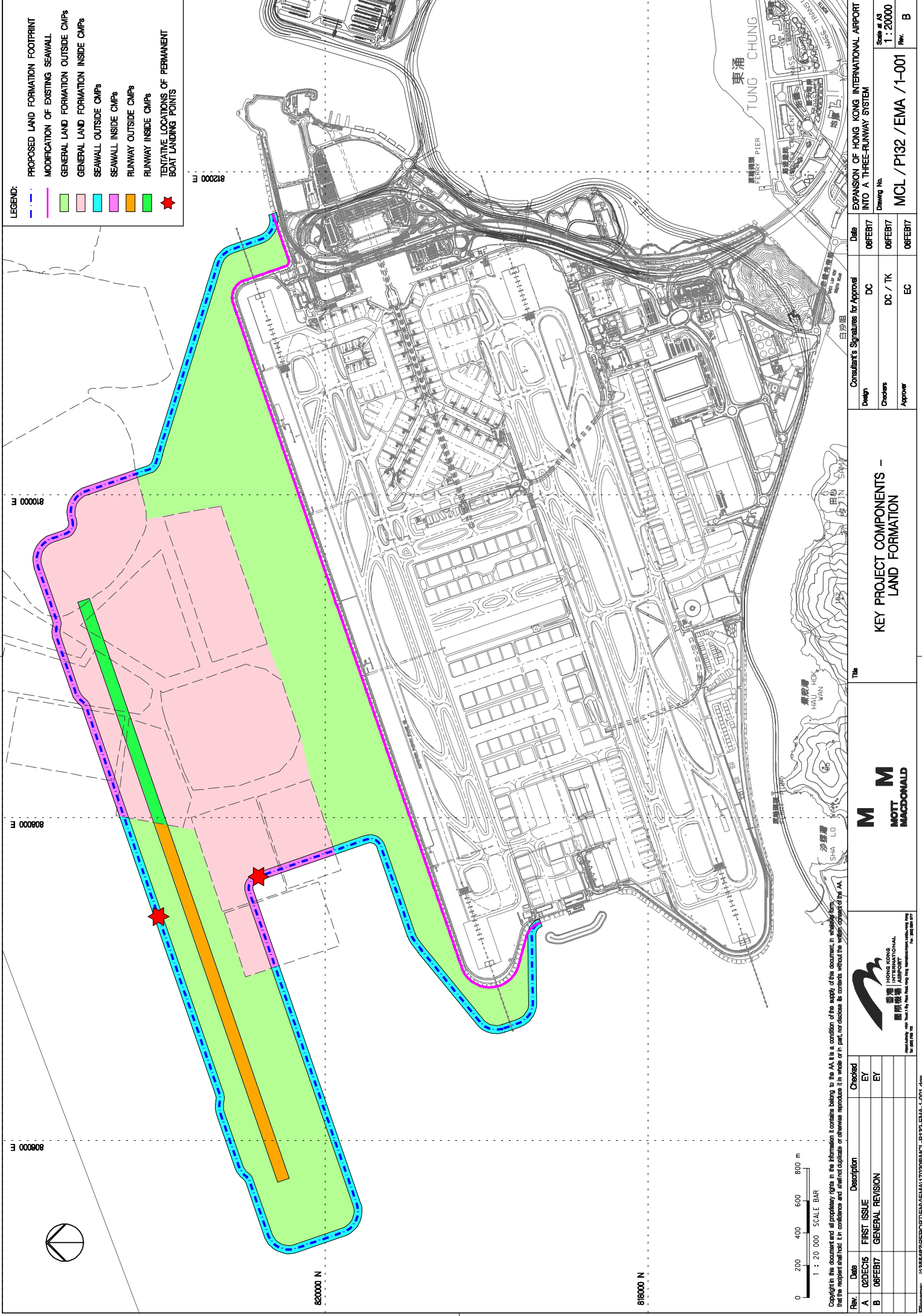
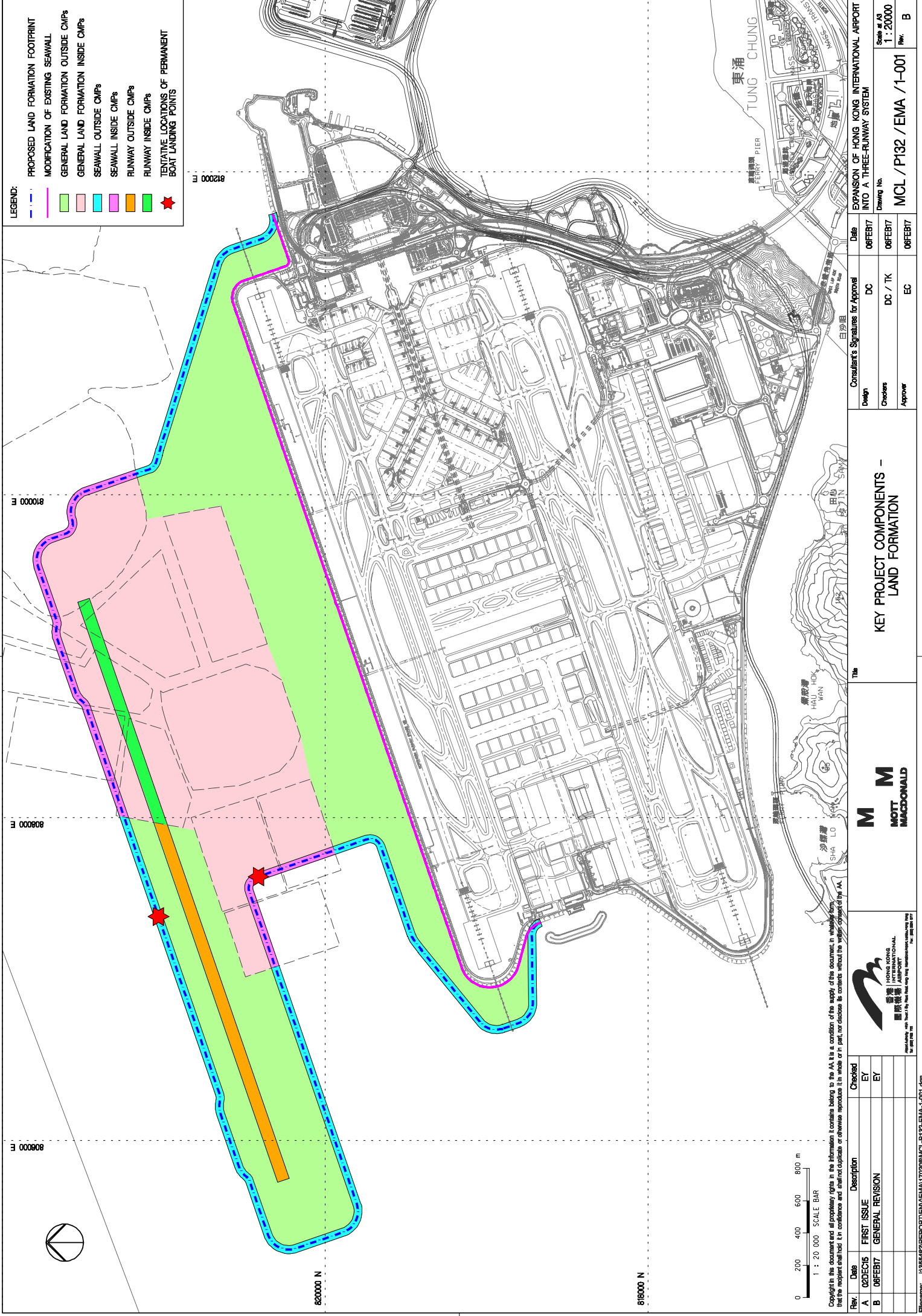
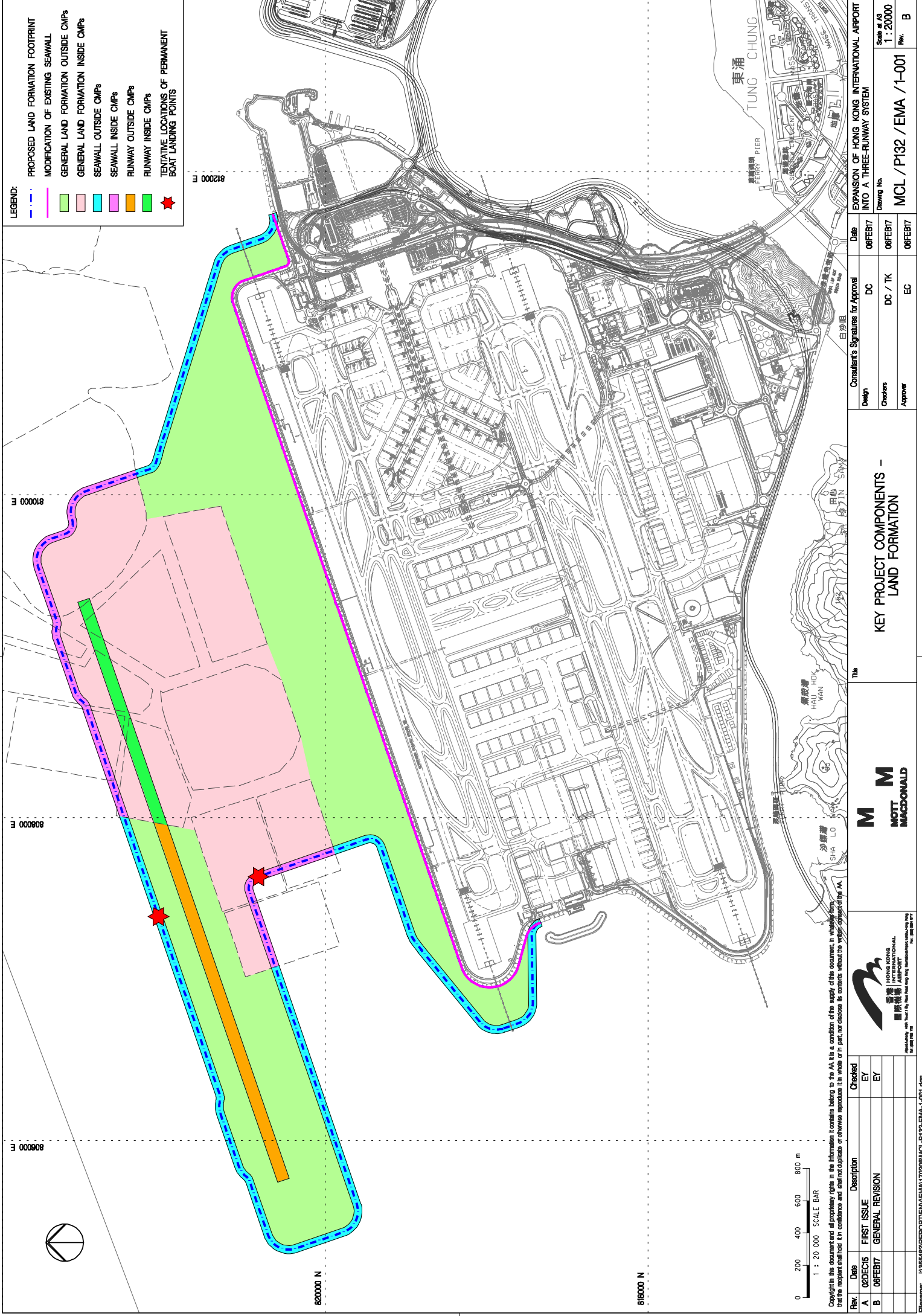
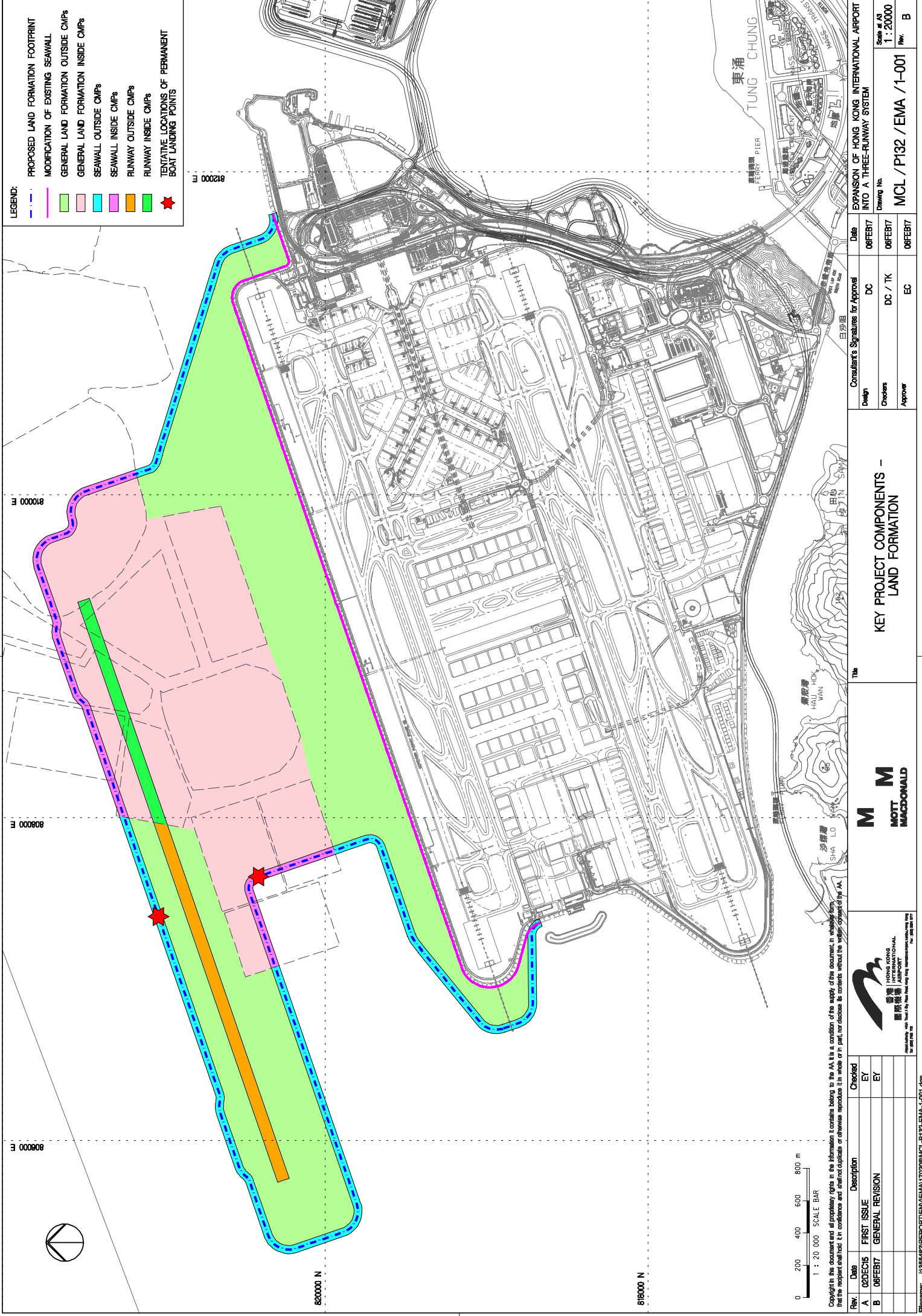
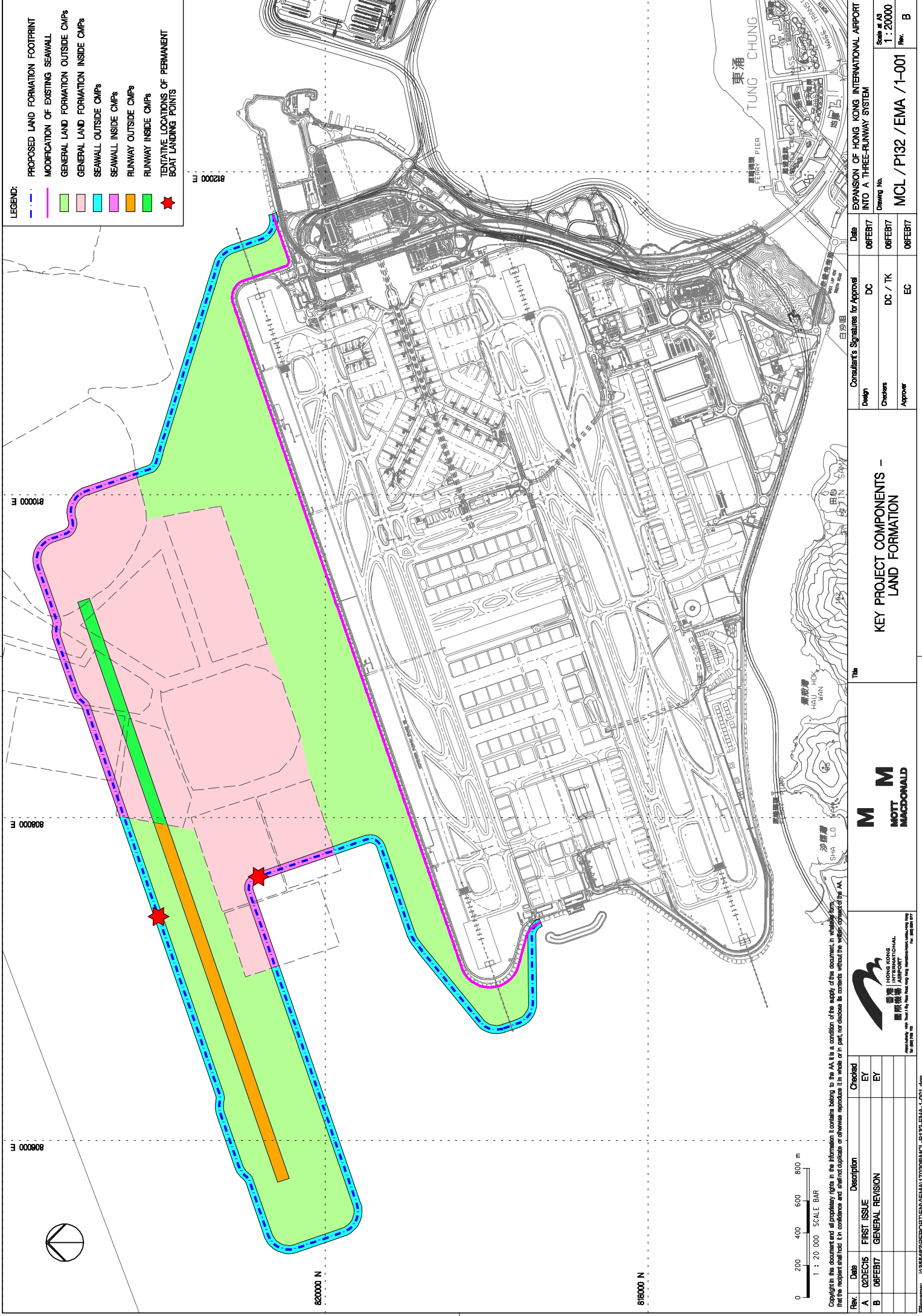
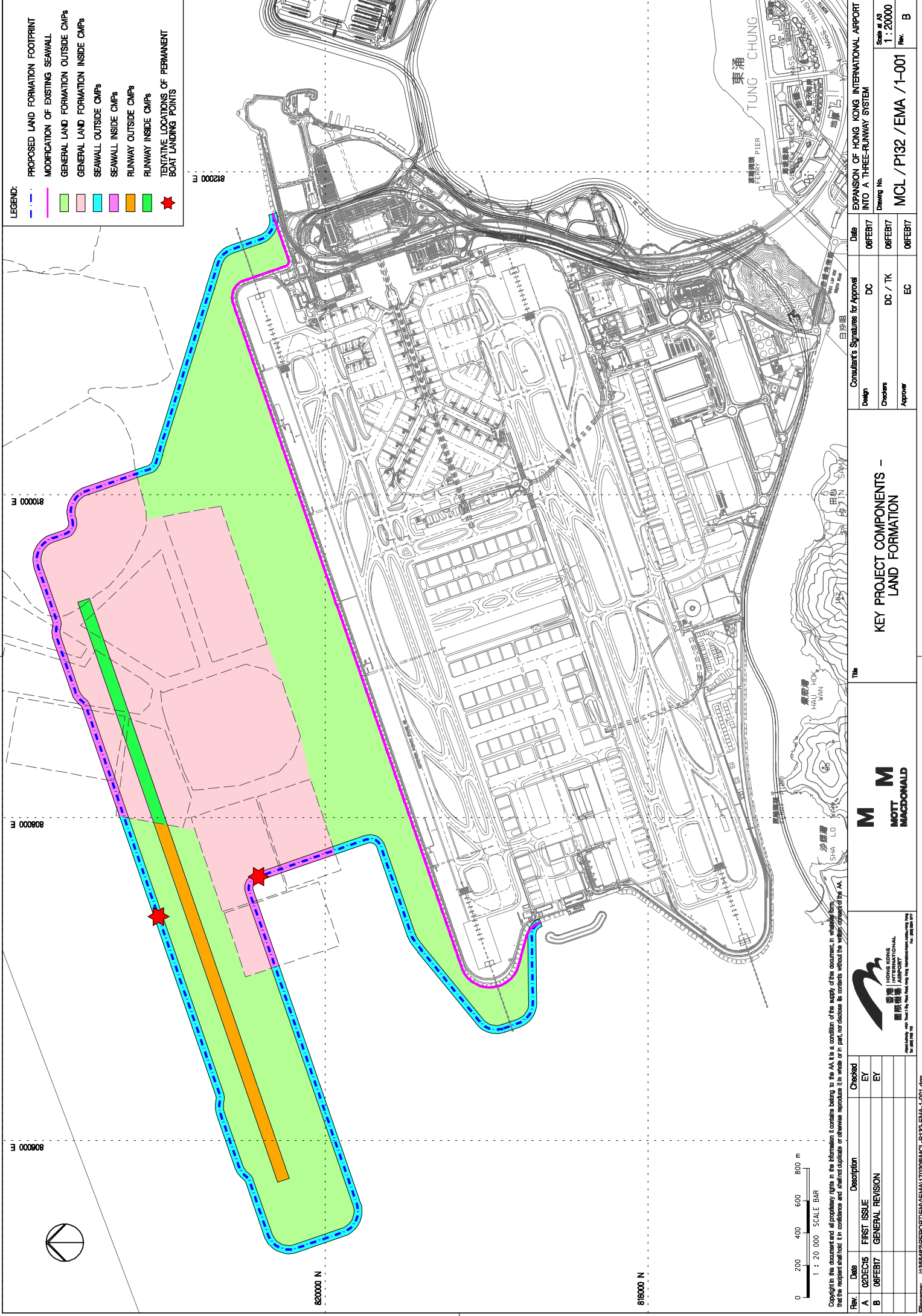
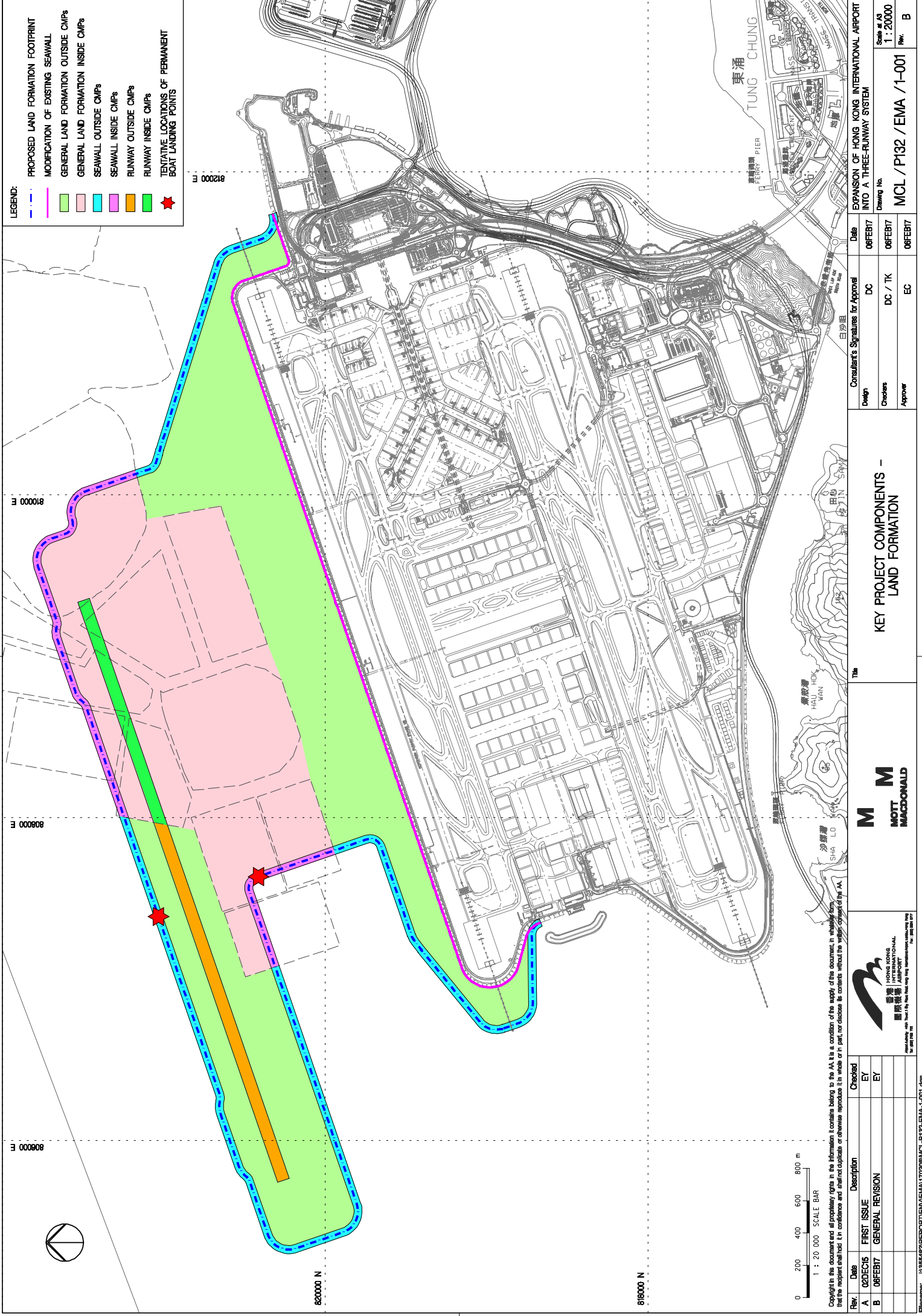
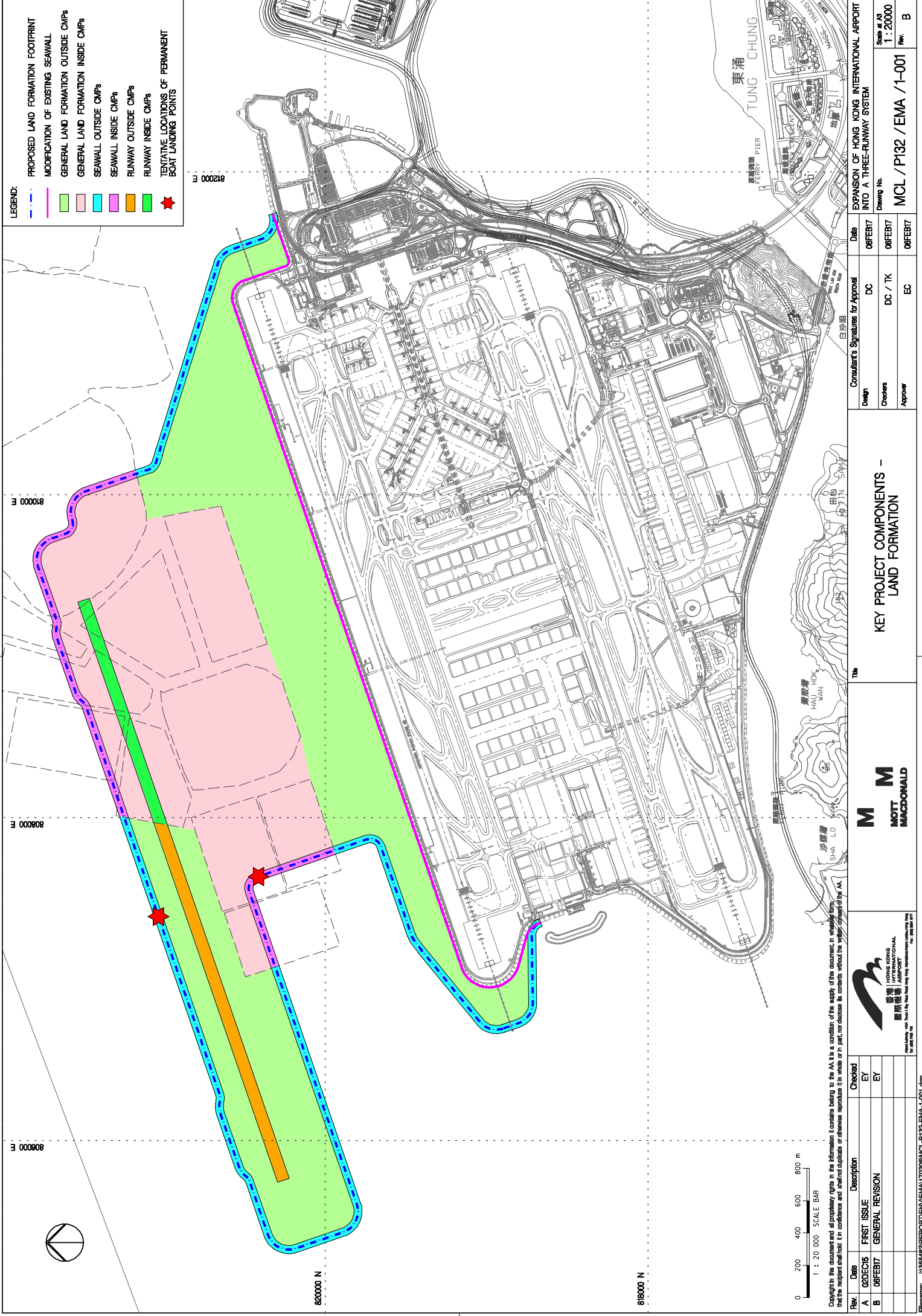
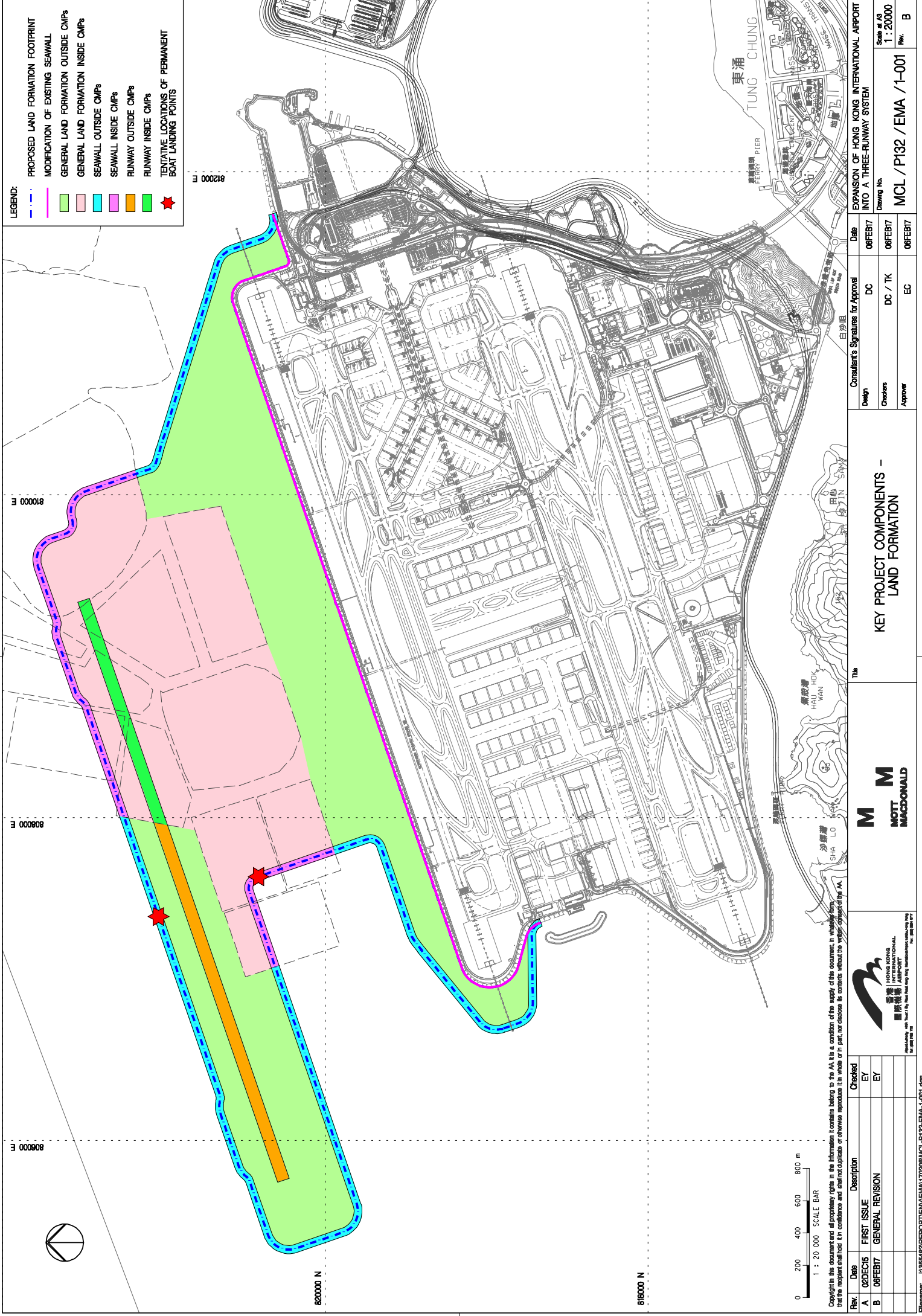
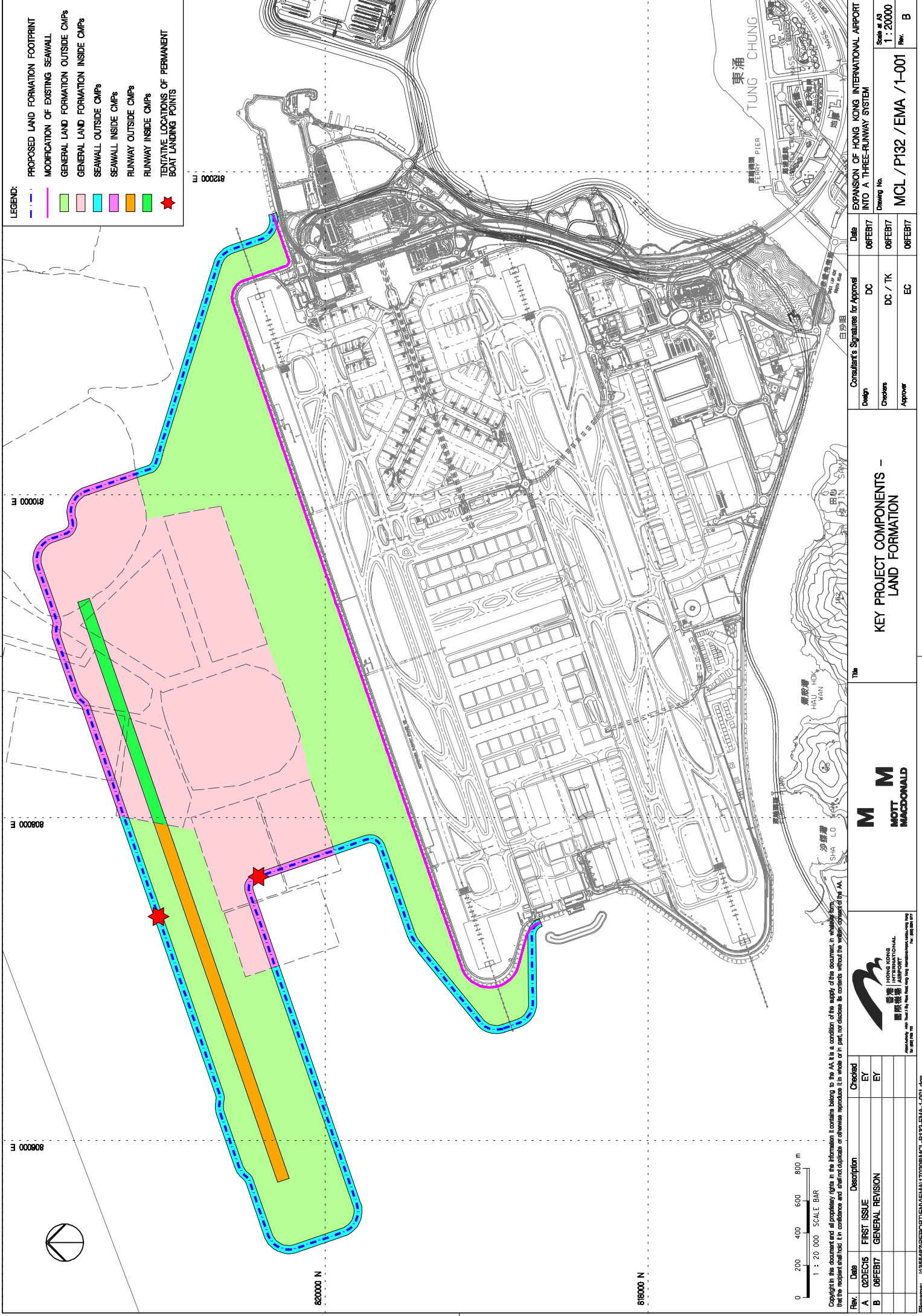
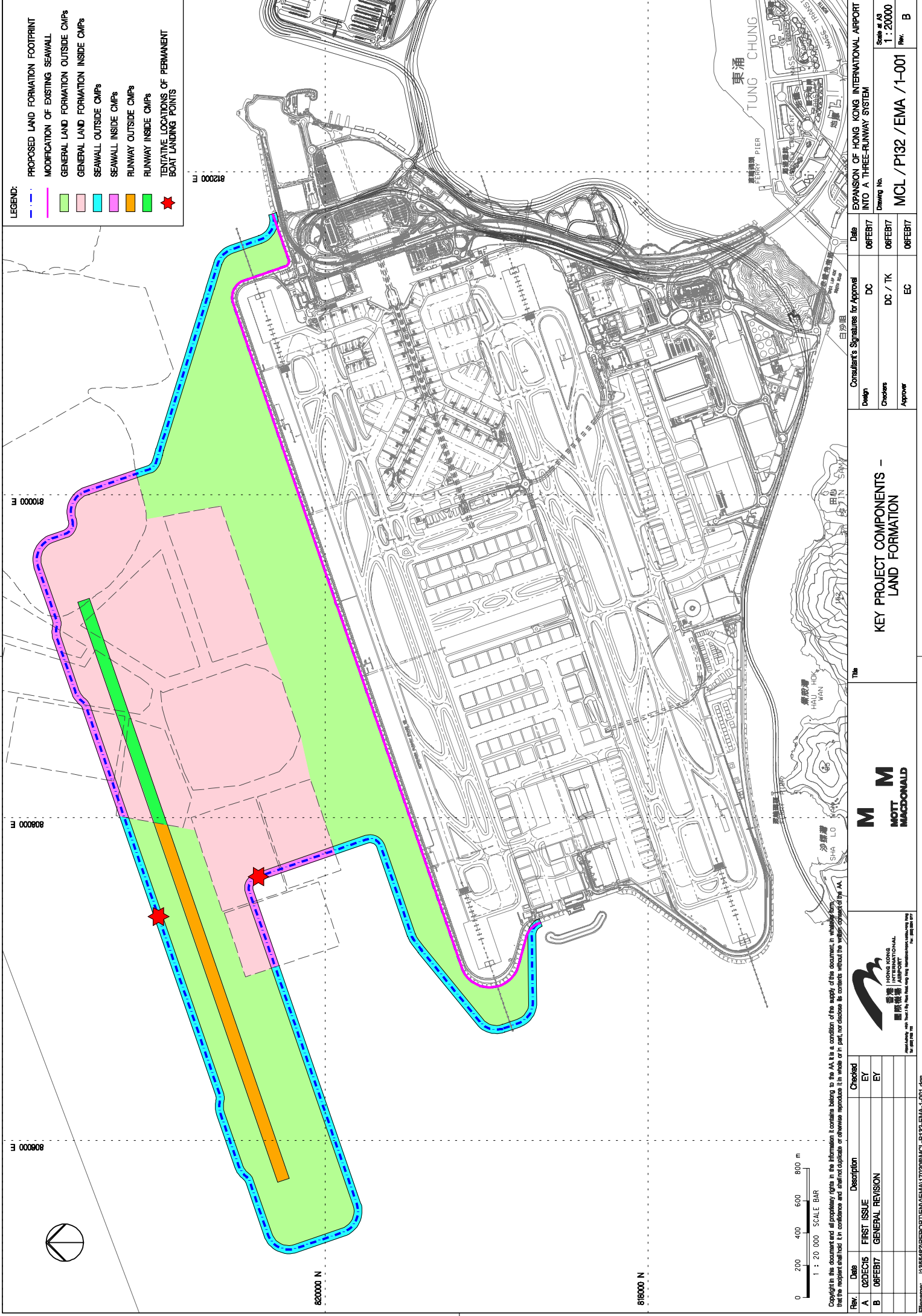
Wilkin, S. M., J. Cordaro and F. Gulland. 2012. An unusual mortality event of harbour porpoises (*Phocoena phocoena*) off central California: Increase in blunt force trauma rather than an epizootic. *Aquatic Mammals* 38:301–310.

Würsig, B., Cipriano, F. & Würsig, M. (1991). Dolphin movement patterns: information from radio and theodolite tracking studies. Pages 79-111 in K. Pryor and K. S. Norris eds. *Dolphin societies: Discoveries and puzzles*. University of California Press.

# Figures



- LEGEND:
- PROPOSED LAND FORMATION FOOTPRINT
  - MODIFICATION OF EXISTING SEAWALL
  - GENERAL LAND FORMATION OUTSIDE CMPs
  - GENERAL LAND FORMATION INSIDE CMPs
  - SEAWALL OUTSIDE CMPs
  - SEAWALL INSIDE CMPs
  - RUNWAY OUTSIDE CMPs
  - RUNWAY INSIDE CMPs
  - TENTATIVE LOCATIONS OF PERMANENT BOAT LANDING POINTS











THIS DRAWING PRESENTS ONLY THE KEY INFRASTRUCTURE DISCUSSED IN CHAPTER 4 OF THIS EIA REPORT, AND DOES NOT REPRESENT ALL THE INFRASTRUCTURE, ROADS AND UTILITIES TO BE PROVIDED AS PART OF THE PROJECT.

PROPOSED LAND FORMATION FOOTPRINT  
PROPOSED ALIGNMENT OF SUBMARINE AVIATION FUEL PIPELINES  
PROPOSED ALIGNMENT OF SUBMARINE 1Kv CABLE  
TENTATIVE ALIGNMENT OF ARSIDE ROAD TUNNELS  
TENTATIVE ALIGNMENT OF TERMINAL 2 ROAD NETWORK  
TENTATIVE ALIGNMENT OF SOUTH PERIMETER ROAD  
INDICATIVE LAYOUT OF NEW AVIATION FUEL HYDRANT SYSTEM  
TENTATIVE CARGO AREAS ROAD IMPROVEMENT WORKS  
EXISTING SUBMARINE CABLE  
PROPOSED LOCATION OF NEW / REPROVISIONED STORMWATER COLLECTION  
PROPOSED LOCATION OF NEW / REPROVISIONED SEAWATER PUMP  
EXISTING SEWAGE PUMPING STATION TO BE RELOCATED AND /  
INDICATIVE LOCATION OF NEW GREYWATER TREATMENT SYSTEM

PROPOSED LOCATION OF NEW / REPROVISIONED STORMWATER OUTFALLS  
 PROPOSED LOCATION OF NEW / REPROVISIONED SEAWATER PUMP HOUSE  
 EXISTING SEWAGE PUMPING STATION TO BE RELOCATED AND / OR UPGRADE  
 INDICATIVE LOCATION OF NEW GREYWATER TREATMENT SYSTEM



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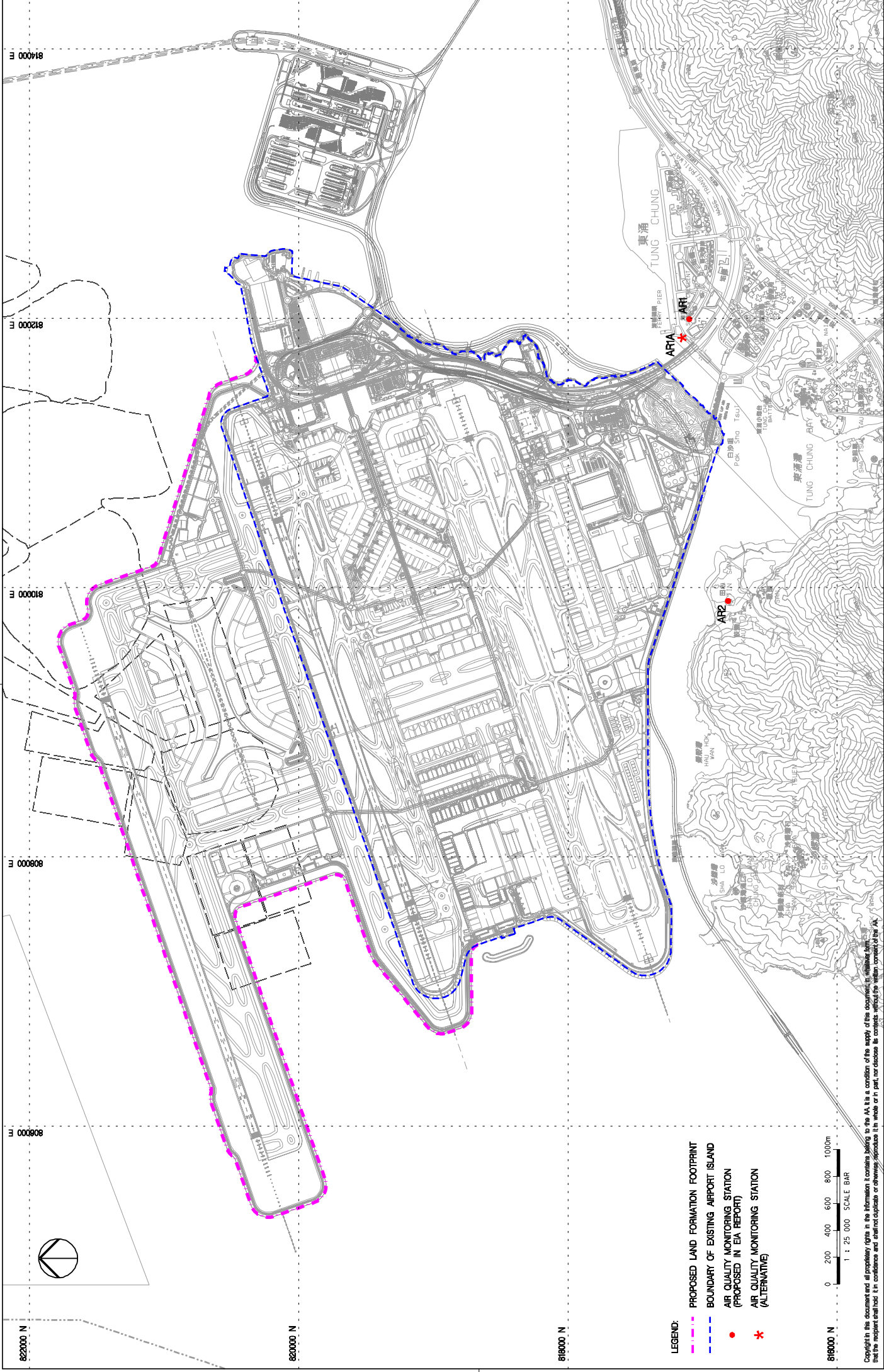
**MOTT MACDONALD**

## KEY PROJECT COMPONENTS - ROAD NETWORK AND KEY INFRASTRUCTURE

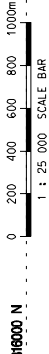
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Checkers	DC / TK	06FEB17					
Approver	EC	06FEB17					
			MCL / P132 / EMA / 1-004				B

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- LEGEND:
- PROPOSED LAND FORMATION FOOTPRINT
  - BOUNDARY OF EXISTING AIRPORT ISLAND
  - AIR QUALITY MONITORING STATION (PROPOSED IN EA REPORT)
  - AIR QUALITY MONITORING STATION (ALTERNATIVE)



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Rev.		Date	Description	Checked
A	07DEC16	FIRST ISSUE	AM	AM
	08FEB17	GENERAL REVISION	AM	AM
B				

The		Consultant's Signatures for Approval		Date	EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM	
Design		AM		08FEB17	Drawing No.	
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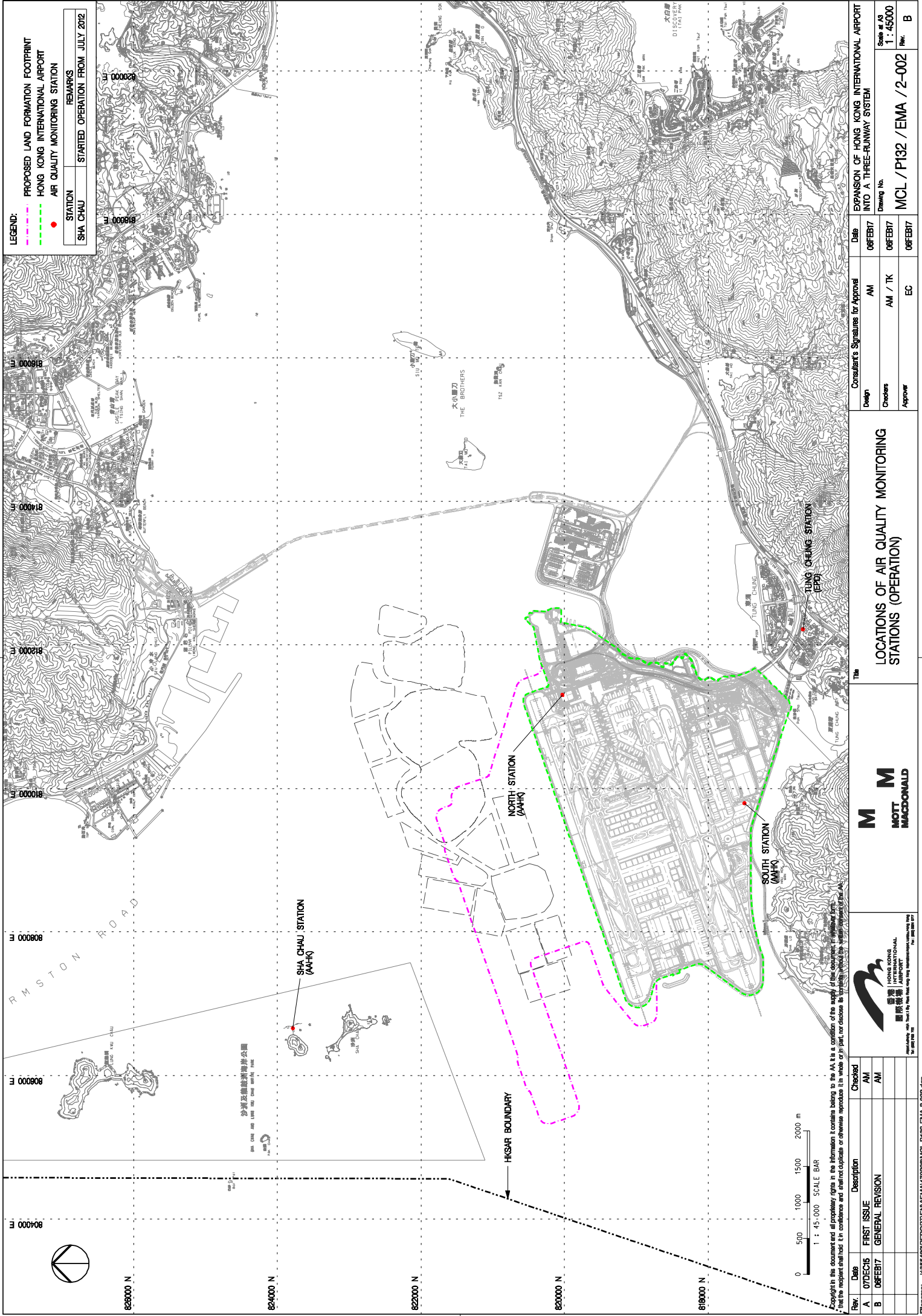
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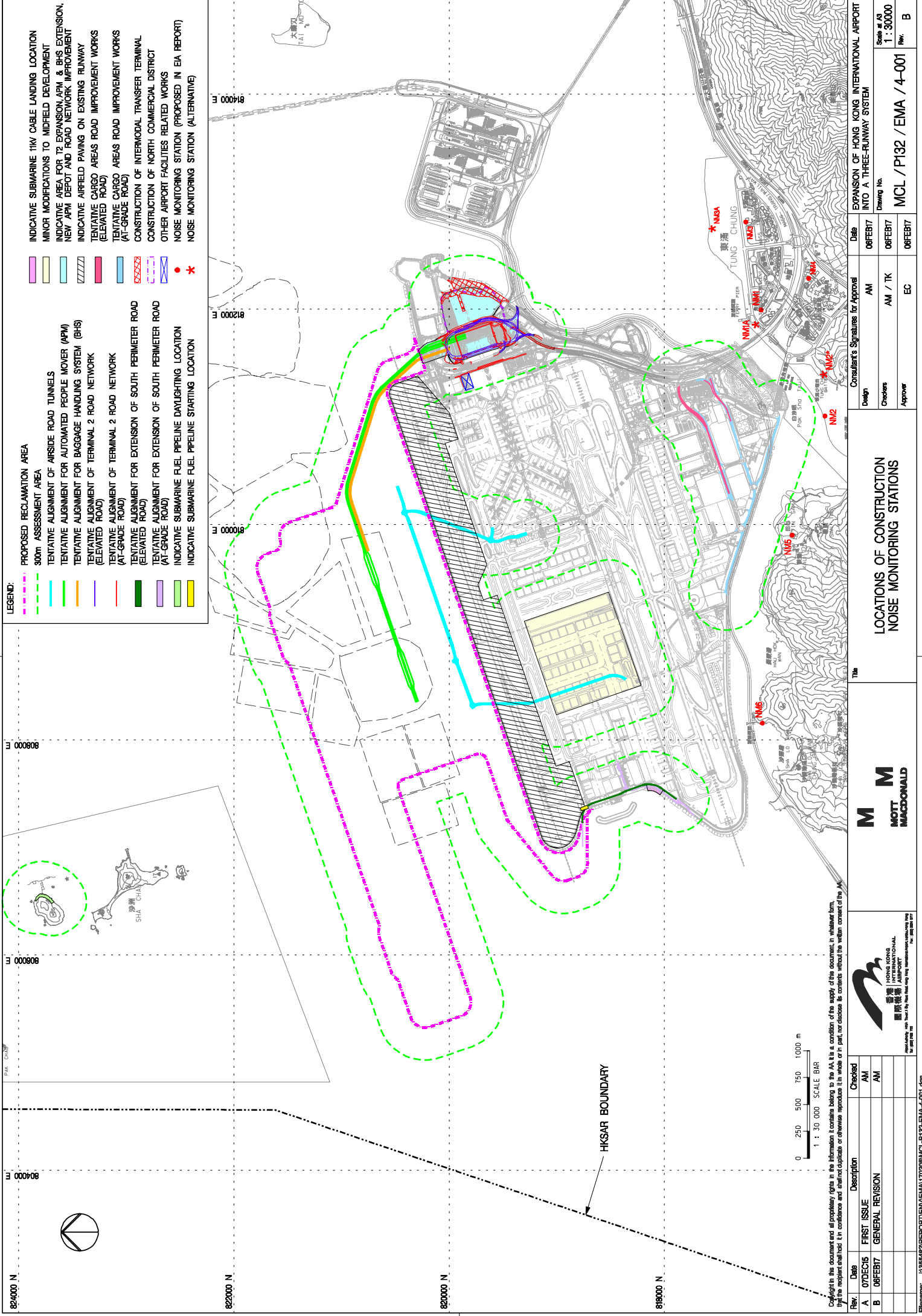
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**MOTT MACDONALD**

HONG KONG INTERNATIONAL AIRPORT  
香港國際機場

Prepared by: J538462/REPORT/EN/EMA/170208/MCL-P132-EMA-3-001.dgn





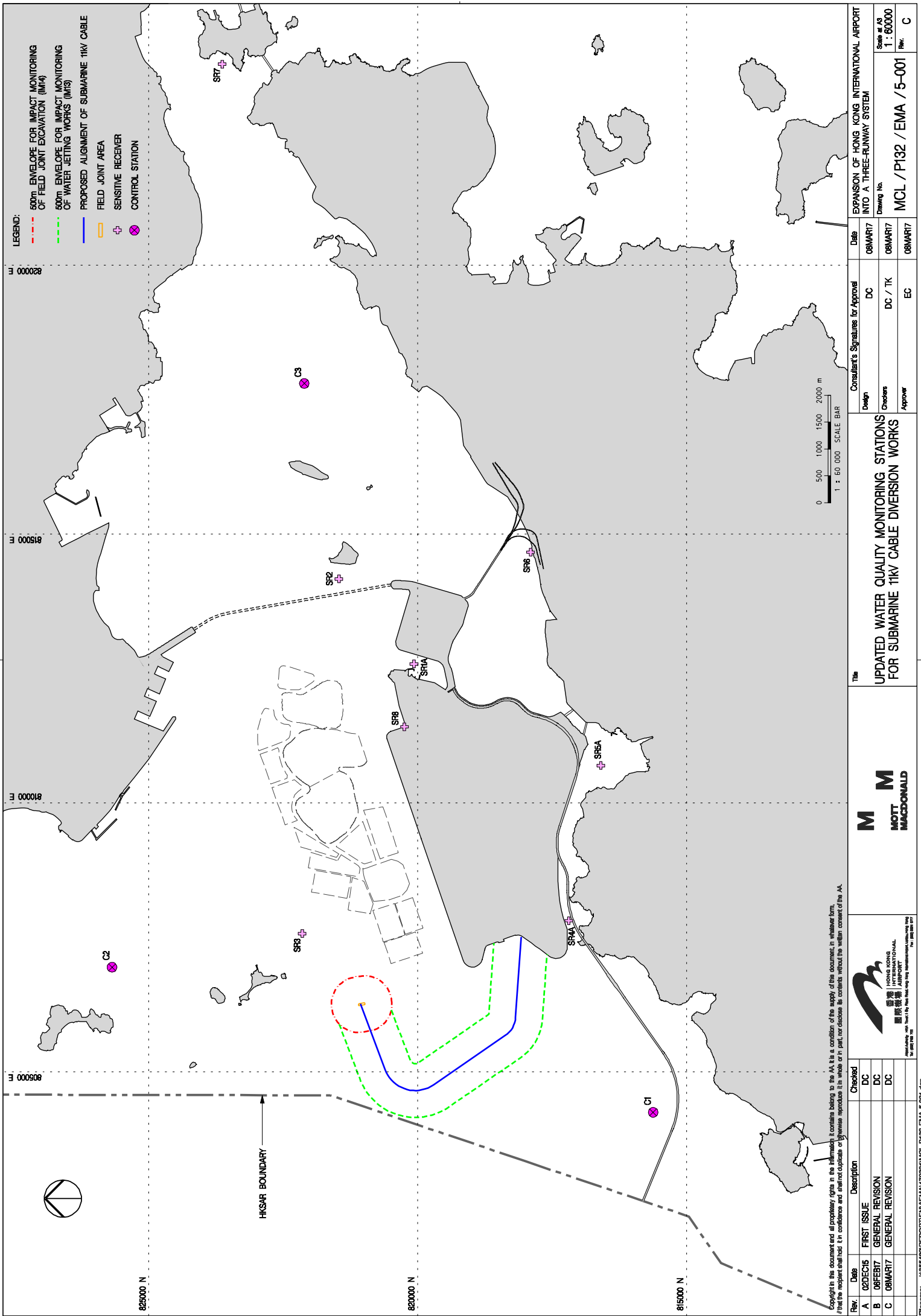


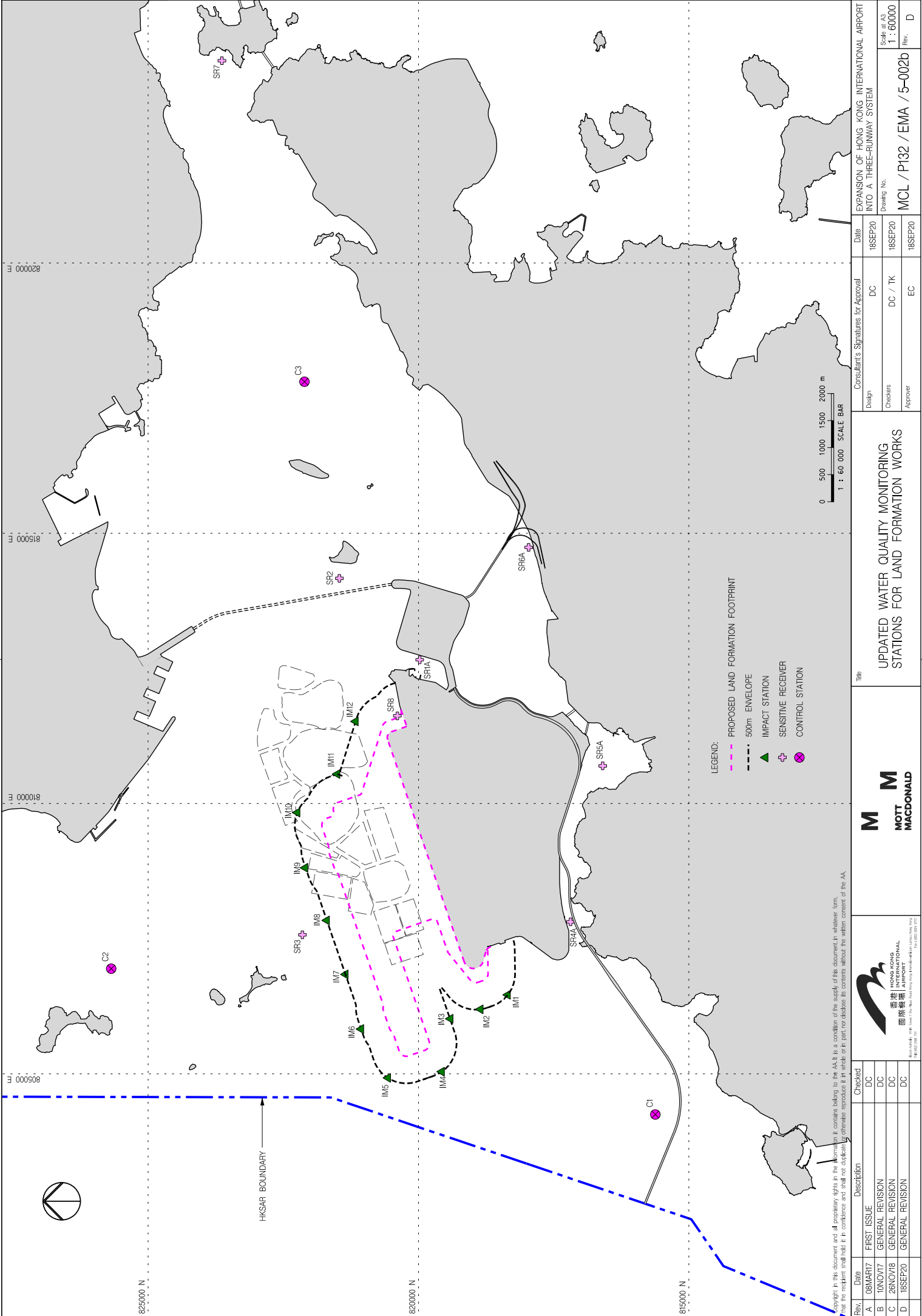
- LEGEND:**
- PROPOSED RECLAMATION AREA
  - 300m ASSESSMENT AREA
  - TENTATIVE ALIGNMENT OF AIRSIDE ROAD TUNNELS
  - TENTATIVE ALIGNMENT FOR AUTOMATED PEOPLE MOVER (APM)
  - TENTATIVE ALIGNMENT FOR BAGGAGE HANDLING SYSTEM (BHS)
  - TENTATIVE ALIGNMENT OF TERMINAL 2 ROAD NETWORK (ELEVATED ROAD)
  - TENTATIVE ALIGNMENT OF TERMINAL 2 ROAD NETWORK (AT-GRADE ROAD)
  - TENTATIVE ALIGNMENT FOR EXTENSION OF SOUTH PERIMETER ROAD (ELEVATED ROAD)
  - TENTATIVE ALIGNMENT FOR EXTENSION OF SOUTH PERIMETER ROAD (AT-GRADE ROAD)
  - INDICATIVE SUBMARINE FUEL PIPELINE DAYLIGHTING LOCATION
  - INDICATIVE SUBMARINE 11KV CABLE LANDING LOCATION
  - MINOR MODIFICATIONS TO MIDFIELD DEVELOPMENT
  - INDICATIVE AREA FOR T2 EXTENSION APM & BUS EXTENSION, NEW APM DEPOT AND ROAD NETWORK IMPROVEMENT
  - INDICATIVE AIRFIELD PAVING ON EXISTING RUNWAY (ELEVATED ROAD)
  - TENTATIVE CARGO AREAS ROAD IMPROVEMENT WORKS (AT-GRADE ROAD)
  - TENTATIVE CARGO AREAS ROAD IMPROVEMENT WORKS (AT-GRADE ROAD)
  - CONSTRUCTION OF INTERMODAL TRANSFER TERMINAL
  - CONSTRUCTION OF NORTH COMMERCIAL DISTRICT
  - OTHER AIRPORT FACILITIES RELATED WORKS
  - NOISE MONITORING STATION (PROPOSED IN EIA REPORT)
  - NOISE MONITORING STATION (ALTERNATIVE)

The		LOCATIONS OF CONSTRUCTION NOISE MONITORING STATIONS			Consultant's Signatures for Approval		Expansion of Hong Kong International Airport into a Three-Runway System	
Rev.	Date	Description	Checked	AM	Design	AM	Date	Rev.
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B	06FEB17	GENERAL REVISION	AM				06FEB17	1 : 30000
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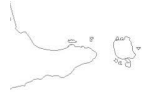






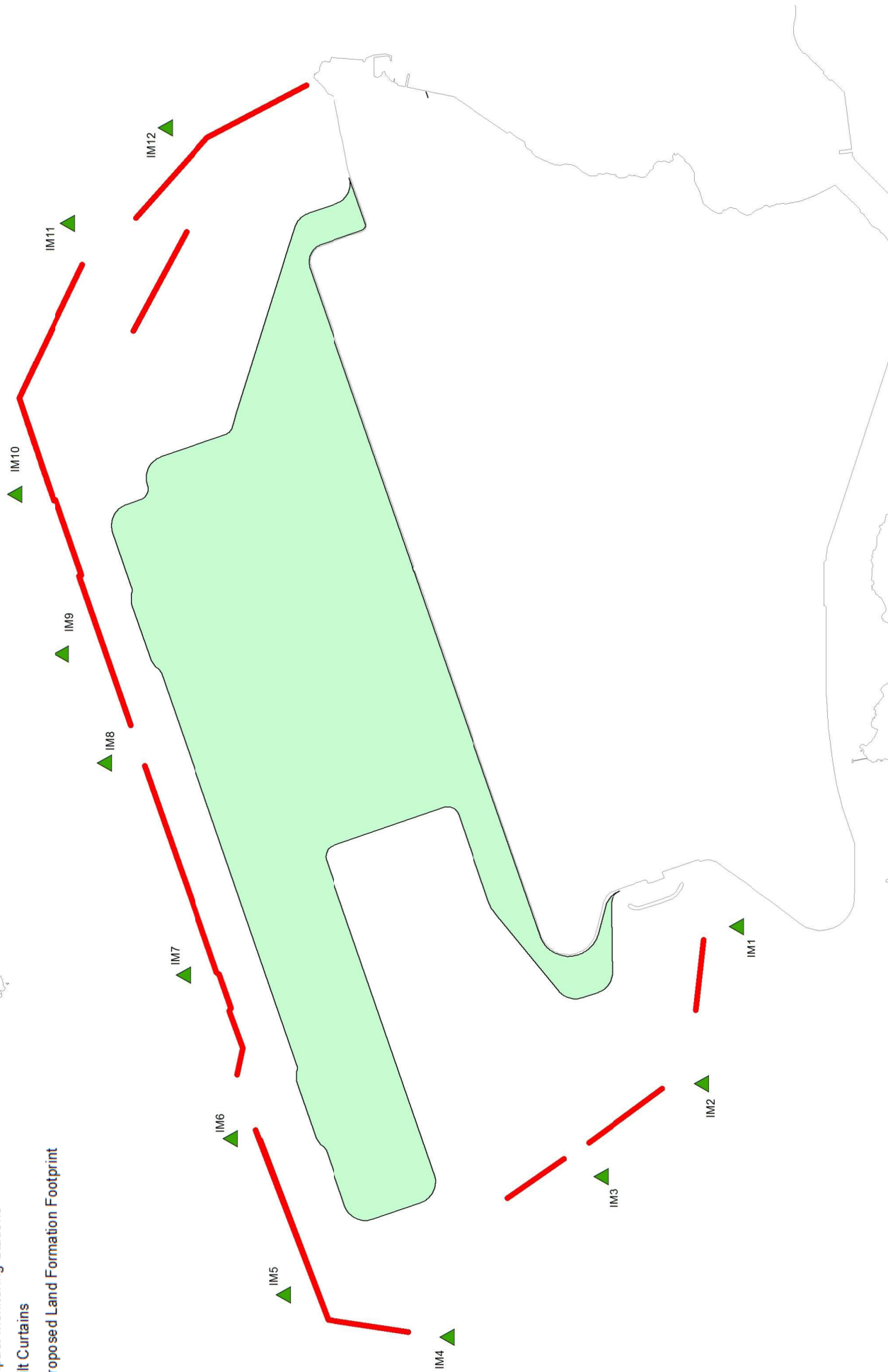
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# Legend

- ▲ Impact Monitoring Stations
- Silt Curtains
- Proposed Land Formation Footprint








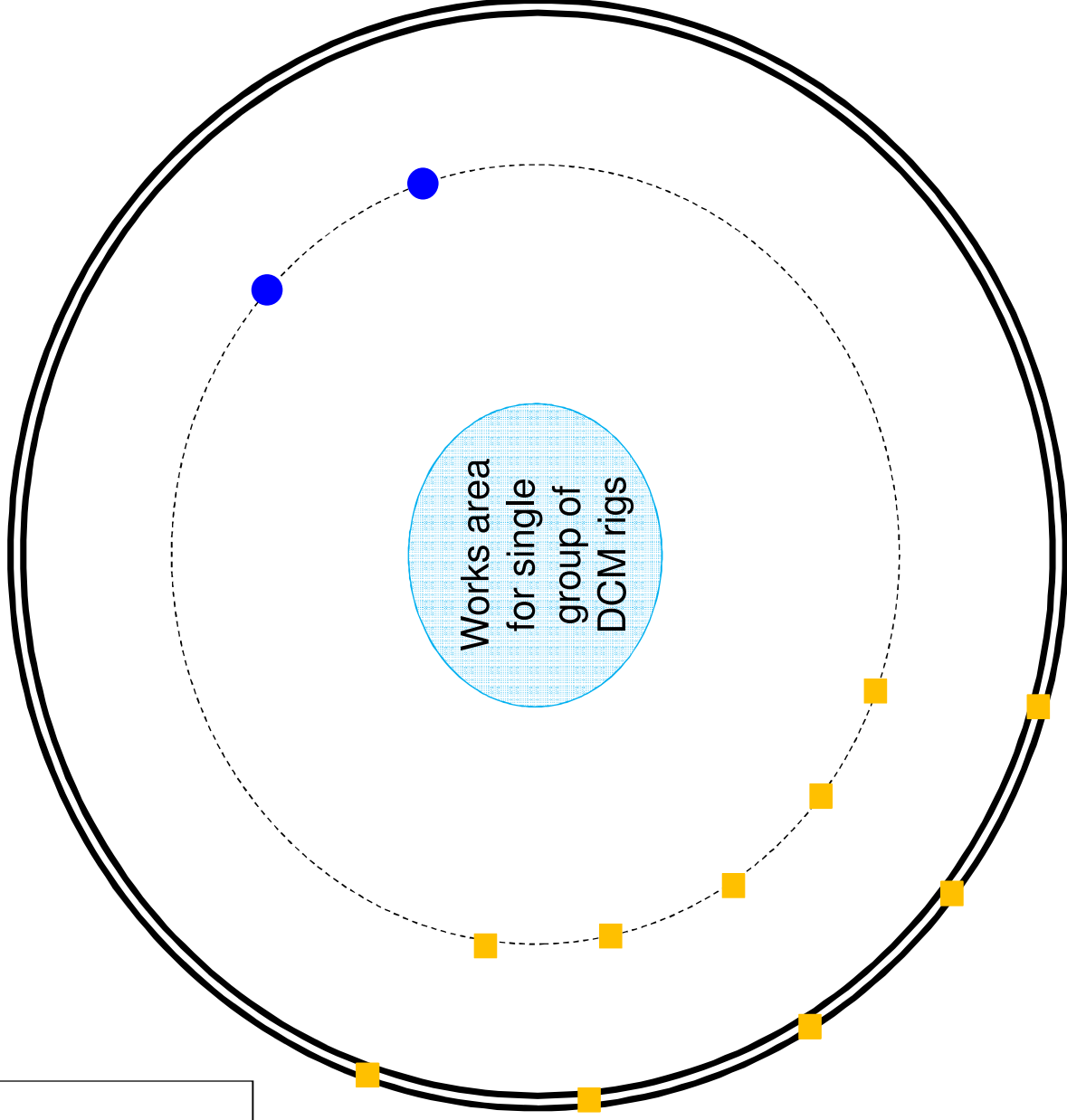
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Rev.	Date	Description	Checked	MOTT MACDONALD		Title	LOCATION OF IMPACT MONITORING (IM) STATIONS DURING ENHANCED SILT CURTAIN DEPLOYMENT				Consultant's Signatures for Approval			Date	EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM		
A	02MAY18	FIRST ISSUE	TK								Design	DC		02MAY18	Drawing No.	MCL / P132 / EMA / 5-002C	Scale # A3
											Checkers	TK		02MAY18			Rev.
											Approver	EC		02MAY18			A




**LEGEND:**

	WORKS AREA
	CONTROL STATIONS
	DOWNSTREAM IMPACT STATIONS
	150m ENVELOPE
	250m ENVELOPE



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Rev. A	Date 03FEB17	Description FIRST ISSUE	Checked TK	<div><div><div>HONG KONG INTERNATIONAL AIRPORT</div><div>香港國際機場</div><div>國際機場</div></div><div><div>Approved by: 2025</div><div>Planning, Design, Construction, Operations, Safety, Security, and Environment Department</div><div>Date: 2025-02-03</div></div></div>	<div><div>M</div><div>M</div><div>MOTT MACDONALD</div></div>	Title:  <div>INDICATIVE LOCATIONS FOR INTENSIVE DCM MONITORING STATIONS</div>	EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM			
							Consultant's Signatures for Approval		Date	
							Design	DC	03FEB17	
							Checkers	TK	03FEB17	
		Approver	EC	03FEB17	MCL / P132 / EMA / 5-003		Rev. A			
		Drawing No.						Scale at A3		

Legends

Approximate Boundary of the  
Sha Chau Egretty at the time  
of EIA study



Original Daylighting Location



Alternative Daylighting  
Location



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A	02DEC15	FIRST ISSUE	AD
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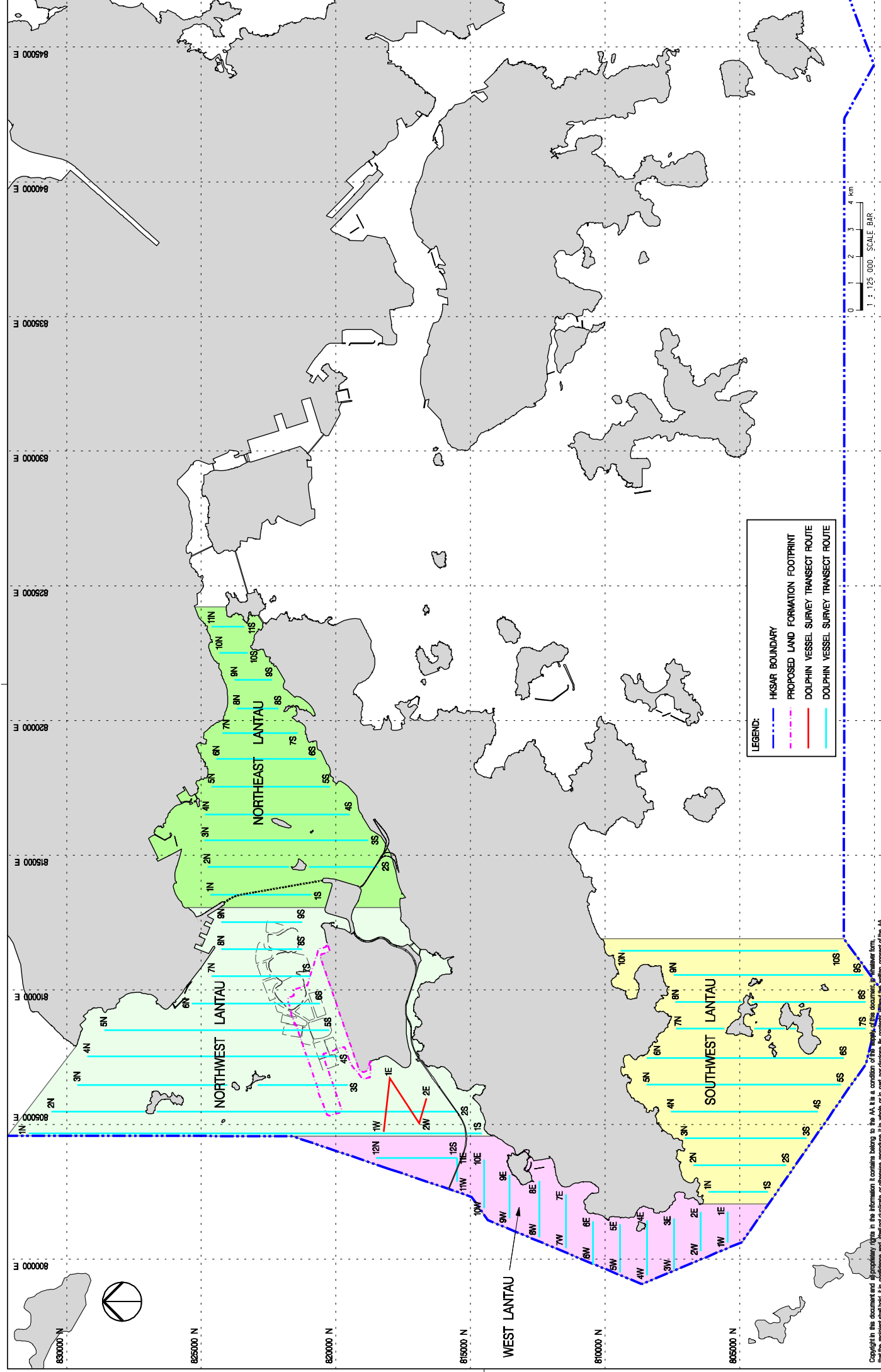
BOUNDARY OF SHA CHAU EGRETTRY  
AND ALTERNATIVES OF THE  
DAYLIGHTING LOCATIONS

Consultant's Signatures for Approval		Date
Design	PL	06FEB17
Checkers	TL / TK	06FEB17
Approver	AD	06FEB17

EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM	
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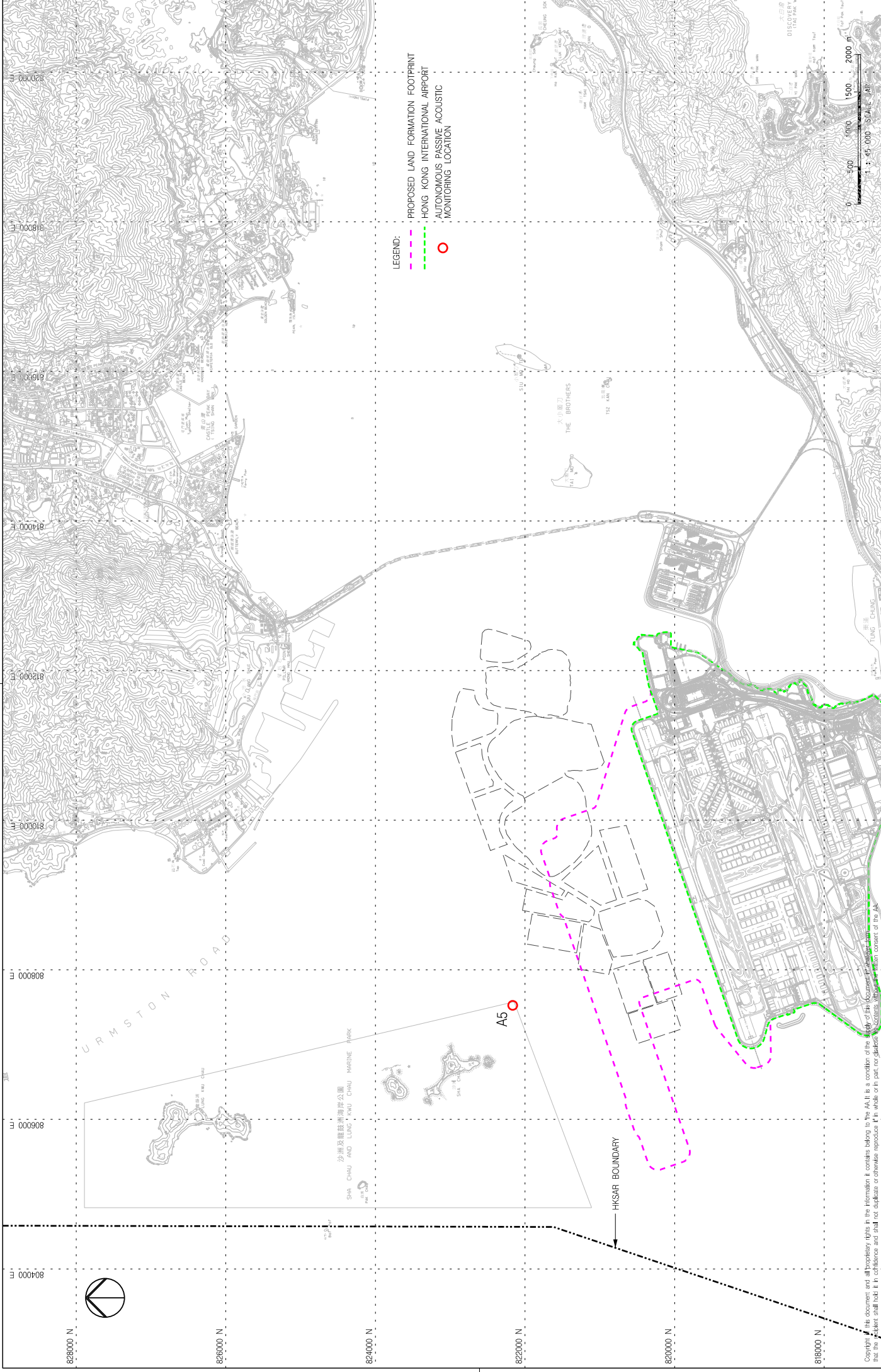
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A	02DEC16	FIRST ISSUE		JC	
	08FEB17	GENERAL REVISION		JC	
B					

Title		MOTT MACDONALD	
VESSEL BASED DOLPHIN MONITORING TRANSECTS IN BASELINE MONITORING		HONG KONG INTERNATIONAL AIRPORT	
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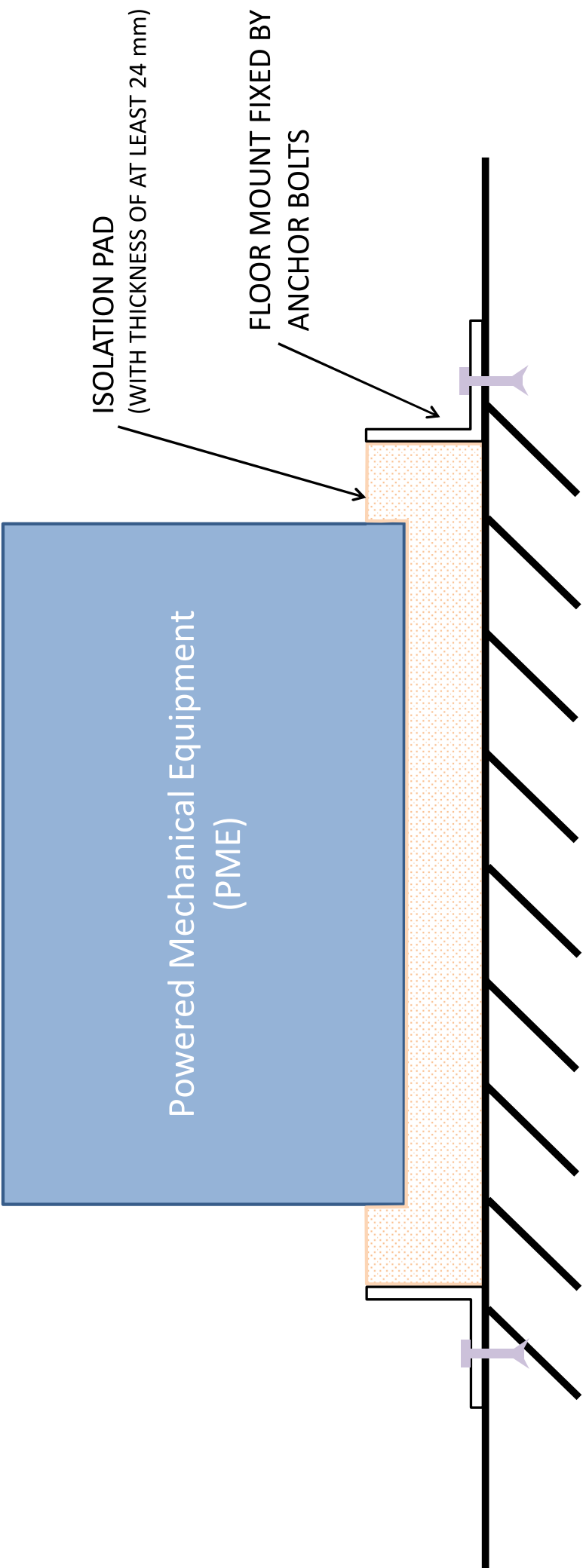




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Rev.	Date	Description	Checked	HONG KONG INTERNATIONAL AIRPORT 香港國際機場		MOTT MACDONALD		Title	SCHEMATIC DIAGRAM OF NOISE ISOLATION PAD FOR PME				Consultant's Signatures for Approval				Date	EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM			
A	02DEC15	FIRST ISSUE	AD										Design	PL			06FEB17	Drawing No.			
B	06FEB17	SECOND ISSUE	AD										Checkers	TL / TK			06FEB17	Scale: 1:1			
													Approver	AD			06FEB17	MCL / P132 / EMA / 10-006			
																		Rev.			
																		25000			
																		B			



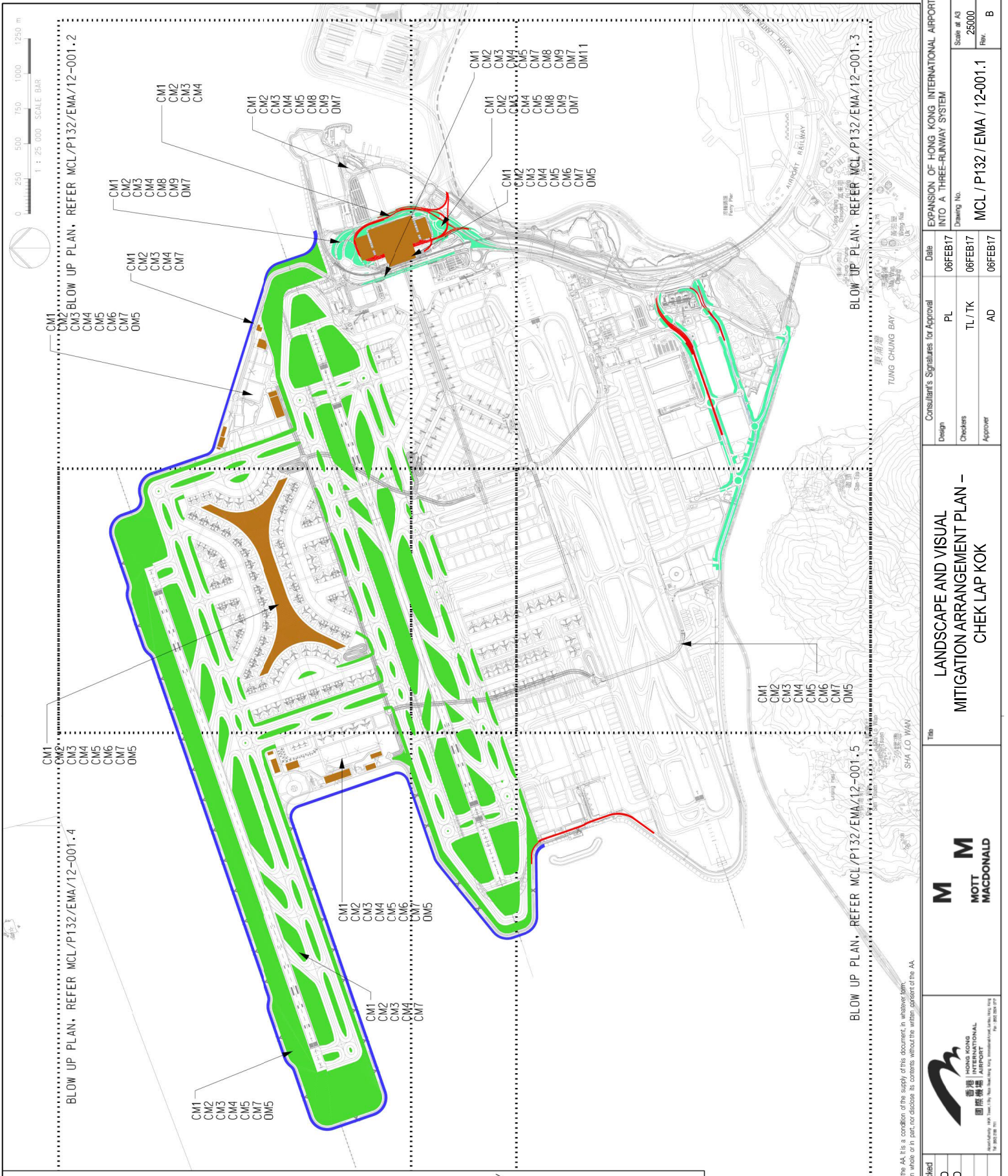
POTENTIAL MITIGATION MEASURES  
CONSTRUCTION PHASE:  
CM1 (L+V) - WORKS AREA MINIMISED  
CM2 (V) - CONSTRUCTION PERIOD REDUCED TO PRACTICAL MINIMUM  
CM3 (V) - PHASING OF THE CONSTRUCTION STAGE  
CM4 (V) - CONSTRUCTION TRAFFIC (LAND AND SEA) REDUCED TO PRACTICAL MINIMUM  
CM5 (V) - ERECTION OF DECORATIVE MESH SCREENS OR CONSTRUCTION HOARDINGS  
CM6 (V) - AVOIDANCE OF EXCESSIVE HEIGHT AND BULK OF SITE BUILDINGS AND STRUCTURES  
CM7 (V) - CONTROL OF NIGHT-TIME LIGHTING  
CM8 (L) - PROTECT EXISTING TREES  
CM9 (L) - TREES AFFECTED BY THE WORKS SHALL BE TRANSPLANTED  
CM10 (L+V) - ADVANCED HYDROSEEDING AROUND TAXIWAYS AND RUNWAYS

POTENTIAL MITIGATION MEASURES  
OPERATIONAL PHASE:  
OM1 (V) - SENSITIVE LANDSCAPE DESIGN OF RECLAMATION EDGE  
OM2 (V) - ALL ABOVE GROUND STRUCTURES SHALL BE SENSITIVELY DESIGNED  
OM3 (V) - SENSITIVE DESIGN OF BUILDINGS AND STRUCTURES IN TERMS OF SCALE, HEIGHT AND BULK (VISUAL WEIGHT)  
OM4 (V) - USE APPROPRIATE BUILDING MATERIALS AND COLOURS IN BUILT STRUCTURES  
OM5 (V) - LIGHTING UNITS TO BE DIRECTIONAL AND MINIMISE UNNECESSARY LIGHT SPILL AND GLARE  
OM6 (L+V) - GREENING MEASURES IMPLEMENTED  
OM7 (L+V) - COMPENSATORY TREE PLANTING FOR ALL FELLED TREES  
OM8 (L+V) - STREETSCAPE SHALL BE SENSITIVELY DESIGNED  
OM9 (L+V) - ALL STREETSCAPE AREAS AND HARD AND SOFT LANDSCAPE AREAS  
OM10 (V) - AESTHETIC IMPROVEMENT PLANTING OF VIADUCT STRUCTURE THROUGH GREENING OF STRUCTURE WHERE FEASIBLE  
OM11 (V) - SENSE BARRIER AND ENCLOSURES WITH GREENING (SCREENING PLANTING/Climbers/Planters) and Chromatic Measures

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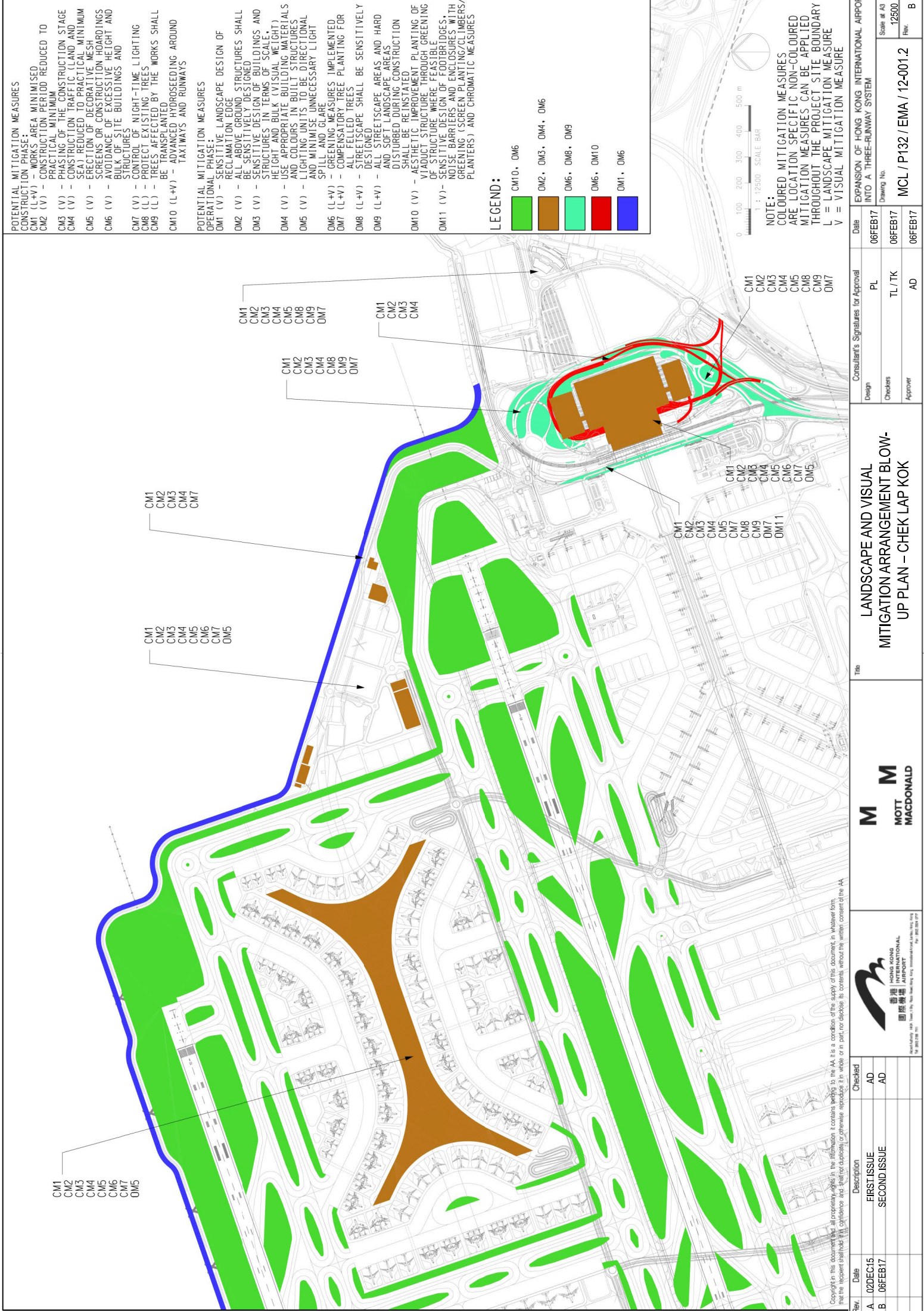
- CM10, OM6
- OM2, OM3, OM4, OM6
- OM6, OM8, OM9
- OM6, OM10
- OM1, OM6

NOTE:  
COLOURED MITIGATION MEASURES ARE LOCATION SPECIFIC NON-COLOURED MITIGATION MEASURES CAN BE APPLIED THROUGHOUT THE PROJECT SITE BOUNDARY  
L = LANDSCAPE MITIGATION MEASURE  
V = VISUAL MITIGATION MEASURE  
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Rev		Date	Description	Checked	Title		Consultant's Signatures for Approval			EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM	
A	02DEC16		FIRST ISSUE	AD	LANDSCAPE AND VISUAL MITIGATION ARRANGEMENT PLAN – CHEK LAP KOK		Design	PL		Date	06FEB17
B	06FEB17		SECOND ISSUE	AD			Checkers	TL / TK		Drawing No.	25000
							Approver	AD		Rev.	06FEB17
										MCL / P132 / EMA / 12-001.1	
										Scale at A3	
										Rev.	
										B	





POTENTIAL MITIGATION MEASURES  
CONSTRUCTION PHASE:  
CM1 (L+V) - CONSTRUCTION PERIOD REDUCED TO PRACTICAL MINIMUM  
CM3 (V) - PHASING OF THE CONSTRUCTION STAGE  
CM4 (V) - CONSTRUCTION TRAFFIC (LAND AND SEA) REDUCED TO PRACTICAL MINIMUM  
CM5 (V) - ERECTION OF DECORATIVE MESH SCREENS OR CONSTRUCTION HOARDINGS  
CM6 (V) - AVOIDANCE OF EXCESSIVE HEIGHT AND BULK OF SITE BUILDINGS AND STRUCTURES  
CM7 (V) - CONTROL OF NIGHT-TIME LIGHTING  
CM8 (L) - PROTECT EXISTING TREES  
CM9 (L) - TREES AFFECTED BY THE WORKS SHALL BE TRANSPLANTED  
CM10 (L+V) - ADVANCED HYDROSEEDING AROUND TAXIWAYS AND RUNWAYS

POTENTIAL MITIGATION MEASURES  
OPERATIONAL PHASE:  
OM1 (V) - SENSITIVE LANDSCAPE DESIGN OF RECLAMATION EDGE  
OM2 (V) - ALL ABOVE GROUND STRUCTURES SHALL BE SENSITIVELY DESIGNED  
OM3 (V) - SENSITIVE DESIGN OF BUILDINGS AND STRUCTURES IN TERMS OF SCALE, HEIGHT AND BULK (VISUAL WEIGHT)  
OM4 (V) - USE APPROPRIATE BUILDING MATERIALS AND COLOURS IN BUILT STRUCTURES  
OM5 (V) - LIGHTING UNITS TO BE DIRECTIONAL AND MINIMISE UNNECESSARY LIGHT SPILL AND GLARE  
OM6 (L+V) - GREENING MEASURES IMPLEMENTED  
OM7 (L+V) - COMPENSATORY TREE PLANTING FOR ALL FELLED TREES  
OM8 (L+V) - STREETSCAPE SHALL BE SENSITIVELY DESIGNED  
OM9 (L+V) - ALL STREETSCAPE AREAS AND HARD AND SOFT LANDSCAPE AREAS  
OM10 (V) - AESTHETIC IMPROVEMENT PLANTING OF VIADUCT STRUCTURE THROUGH GREENING OF STRUCTURE WHERE FEASIBLE  
OM11 (V) - SENSITIVE DESIGN OF FOOTBRIDGES, NOISE BARRIERS AND ENCLOSURES WITH GREENING (SCREEN PLANTING/Climbers/Planters) AND CHROMATIC MEASURES

LEGEND:  
CM10, DM6  
CM2, DM3, DM4, DM6  
CM6, DM8, DM9  
CM6, DM10  
DM1, DM6

NOTE:  
COLOURED MITIGATION MEASURES ARE LOCATION SPECIFIC NON-COLOURED MITIGATION MEASURES CAN BE APPLIED THROUGHOUT THE PROJECT SITE BOUNDARY  
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- POTENTIAL MITIGATION MEASURES
- CONSTRUCTION PHASE:
- CM1 (L+V) – WORKS AREA MINIMISED
  - CM2 (L+V) – CONSTRUCTION PERIOD REDUCED TO PRACTICAL MINIMUM
  - CM3 (V) – PHASING OF THE CONSTRUCTION STAGE
  - CM4 (V) – CONSTRUCTION TRAFFIC (LAND AND SEA) REDUCED TO PRACTICAL MINIMUM
  - CM5 (V) – ERECTION OF DECORATIVE MESH SCREENS OR CONSTRUCTION HOARDINGS
  - CM6 (V) – AVOIDANCE OF EXCESSIVE HEIGHT AND BULK OF SITE BUILDINGS AND STRUCTURES
  - CM7 (V) – CONTROL OF NIGHT-TIME LIGHTING
  - CM8 (L) – PROTECT EXISTING TREES
  - CM9 (L) – TREES AFFECTED BY THE WORKS SHALL BE TRANSPLANTED
  - CM10 (L+V) – ADVANCED HYDROSEEDING AROUND TAXIWAYS AND RUNWAYS

- POTENTIAL MITIGATION MEASURES
- OPERATIONAL PHASE:
- OM1 (V) – SENSITIVE LANDSCAPE DESIGN OF RECLAMATION EDGE
  - OM2 (V) – ALL ABOVE GROUND STRUCTURES SHALL BE SENSITIVELY DESIGNED
  - OM3 (V) – SENSITIVE DESIGN OF BUILDINGS AND STRUCTURES IN TERMS OF SCALE, HEIGHT AND BULK (VISUAL WEIGHT)
  - OM4 (V) – USE APPROPRIATE BUILDING MATERIALS AND COLOURS IN BUILT STRUCTURES
  - OM5 (V) – LIGHTING UNITS TO BE DIRECTIONAL AND MINIMISE UNNECESSARY LIGHT SPILL AND GLARE
  - OM6 (L+V) – GREENING MEASURES IMPLEMENTED
  - OM7 (L+V) – COMPENSATORY TREE PLANTING FOR ALL FELLED TREES
  - OM8 (L+V) – STREETSCAPE SHALL BE SENSITIVELY DESIGNED
  - OM9 (L+V) – ALL STREETSCAPE AREAS AND HARD SURF LANDSCAPE AREAS
  - OM10 (V) – ALL FENCED BUILDING CONSTRUCTION SHALL BE RESTRICTED
  - OM11 (V) – PLANTING OF VIGOROUS STRUCTURE THROUGH GREENING OF STRUCTURE WHERE FEASIBLE
  - OM12 (V) – SENSITIVE DESIGN OF FOOTBRIDGES, NOISE BARRIERS AND ENCLOSURES WITH GREENING (SCREEN PLANTING/CLIMBERS/PLANTERS) AND CHROMATIC MEASURES

LEGEND:

- CM10, OM6
- OM2, OM3, OM4, OM6
- OM5, OM8, OM9
- OM6, OM10
- OM1, OM6

NOTE:

COLOURED MITIGATION MEASURES ARE LOCATION SPECIFIC NON-COLOURED MITIGATION MEASURES CAN BE APPLIED THROUGHOUT THE PROJECT SITE BOUNDARY

L = LANDSCAPE MITIGATION MEASURE

V = VISUAL MITIGATION MEASURE

- CM1
- CM2
- CM3
- CM4
- CM5
- CM6
- CM7
- DM5

- CM1
- CM2
- CM3
- CM4
- CM5
- CM6
- CM7
- DM5

- CM1
- CM2
- CM3
- CM4
- CM5
- CM6
- CM7
- DM5

- CM1
- CM2
- CM3
- CM4
- CM5
- CM6
- CM7
- DM5

- CM1
- CM2
- CM3
- CM4
- CM5
- CM6
- CM7
- DM5

- CM1
- CM2
- CM3
- CM4
- CM5
- CM6
- CM7
- DM5

- CM1
- CM2
- CM3
- CM4
- CM5
- CM6
- CM7
- DM5

- CM1
- CM2
- CM3
- CM4
- CM5
- CM6
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- CM1
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- CM4
- CM5
- CM6
- CM7
- DM5

- CM1
- CM2
- CM3
- CM4
- CM5
- CM6
- CM7
- DM5

- CM1
- CM2
- CM3
- CM4
- CM5
- CM6
- CM7
- DM5

Rev.		Date	Description	Checked	Title		MOTT MACDONALD		LANDSCAPE AND VISUAL MITIGATION ARRANGEMENT BLOW-UP PLAN – CHEK LAP KOK		EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM		Scale at A3		Rev.	
A	02DEC15		FIRST ISSUE	AD							Design		PL	06FEB17	12500	B
B	08FEB17		SECOND ISSUE	AD							Checkers		TL / TK	08FEB17		
											Approver		AD	08FEB17		
											Drawing No.		MCL / P132 / EMA / 12-001.3			



## POTENTIAL MITIGATION MEASURES

CONSTRUCTION PHASE:

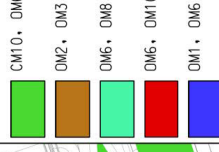
CM1 (L+V)	- WORKS AREA MINIMISED
CM2 (V)	- CONSTRUCTION PERIOD REDUCED TO PRACTICAL MINIMUM
CM3 (V)	- PHASING OF THE CONSTRUCTION STAGE
CM4 (V)	- CONSTRUCTION TRAFFIC (LAND AND SEA) REDUCED TO PRACTICAL MINIMUM
CM5 (V)	- ERECTION OF DECORATIVE MESH SCREENS OR CONSTRUCTION HOARDINGS TO AVOIDANCE OF EXCESSIVE HEIGHT AND BULK OF SITE BUILDINGS AND STRUCTURES
CM7 (V)	- CONTROL OF NIGHT-TIME LIGHTING
CM8 (L)	- PROTECT EXISTING TREES
CM9 (L)	- TREES AFFECTED BY THE WORKS SHALL BE TRANSPLANTED
CM10 (L+V)	- ADVANCED HYDROSEED AROUND TAXIWAYS AND RUNWAYS

## POTENTIAL MITIGATION MEASURES

POTENTIAL MITIGATION  
OPERATIONAL PHASE:

OM1	(V)	- SENSITIVE LANDSCAPE DESIGN OF RECLAMATION EDGE
OM2	(V)	- ALL ABOVE GROUND STRUCTURES SHALL BE SENSITIVE TO LOST ORIENTED AND BE SENSITIVE DESIGN OF BUILDINGS AND STRUCTURES DESIGN TERMS (SCALE, HEIGHT AND BUILDING MATERIALS)
OM4	(V)	- USE APPROPRIATE BUILDING MATERIALS AND COLOURS IN BUILDING STRUCTURES
OM5	(V)	- LIGHTING UNITS TO BE DIRECTIONAL AND MINIMISE UNNECESSARY LIGHT SPILL AND GLARE
OM6	(L+V)	- GREENING MEASURES IMPLEMENTED
OM7	(L+V)	- COMPENSATORY TREE PLANTING FOR ALL FELLED TREES
OM8	(L+V)	- STREETSCAPE SHALL BE SENSITIVELY DESIGNED
OM9	(L+V)	- ALL STREETSCAPE AREAS AND HARD SURF LANDSCAPE AREAS DISTURBED DURING CONSTRUCTION SHALL BE REINSTATED
OM10	(V)	- AESTHETIC IMPROVEMENT PLANTING OF VIADUCT STRUCTURE THROUGH GREENING OF STRUCTURE WHERE FEASIBLE
OM11	(V)	- SENSITIVE DESIGN OF FOOTBRIDGES, NOISE BARRIERS AND ENCLOSURES WITH GREENING (SCREEN PLANTING/CLIMBERS/ PLANTERS) AND CHROMATIC MEASURES

LEGEND:



NOTE:  
COLOURED MITIGATION MEASURES  
ARE LOCATION SPECIFIC NON-COLOURED  
MITIGATION MEASURES CAN BE APPLIED  
THROUGHOUT THE PROJECT SITE BOUNDARY  
L = LANDSCAPE MITIGATION MEASURE  
V = VISUAL MITIGATION MEASURE



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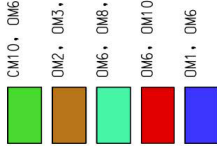
Rev.	Date	Description	Checked	 HONG KONG INTERNATIONAL AIRPORT 國際機場	 MOTT MACDONALD	Title	LANDSCAPE AND VISUAL MITIGATION ARRANGEMENT BLOW- UP PLAN – CHEK LAP KOK	EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM				Drawing No.		Scale # A3	
A	02DEC15	FIRST ISSUE	AD					Design	PL	06FEB17	Consultant's Signatures for Approval	Date	12500	Rev.	B
B	06FEB17	SECOND ISSUE	AD					Checkers	TL / TK	06FEB17	Approver	AD	MCL / P132 / EMA / 12-001.4		



POTENTIAL MITIGATION MEASURES  
CONSTRUCTION PHASE:  
CM1 (L+V) – WORKS AREA MINIMISED  
CM2 (V) – CONSTRUCTION PERIOD REDUCED TO PRACTICAL MINIMUM  
CM3 (V) – PHASING OF THE CONSTRUCTION STAGE  
CM4 (V) – MINIMISING TRAFFIC (LAND AND SEA) REDUCED TO PRACTICAL MINIMUM  
CM5 (V) – ERECTION OF DECORATIVE MESH SCREENS OR CONSTRUCTION GUARDINGS TO AVOIDANCE OF EXCESSIVE HEIGHT AND SPILLAGE  
CM6 (V) – CONTROL OF NIGHT-TIME LIGHTING  
CM7 (L) – PROTECT EXISTING TREES  
CM8 (L) – TREES AFFECTED BY THE WORKS SHALL BE TRANSPLANTED  
CM9 (L+V) – ADVANCED HYDROSEEDING AROUND TAXIWAYS AND RUNWAYS

POTENTIAL MITIGATION MEASURES  
OPERATIONAL PHASE:  
OM1 (V) – SENSITIVE LANDSCAPE DESIGN OF RECLAMATION EDGE  
OM2 (V) – ALL ABOVE GROUND STRUCTURES SHALL BE SENSITIVELY DESIGNED  
OM3 (V) – SENSITIVE DESIGN OF BUILDINGS AND STRUCTURES IN TERMS OF SCALE, HEIGHT AND BULK (VISUAL WEIGHT)  
OM4 (V) – USE APPROPRIATE BUILDING MATERIALS AND COLOURS IN BUILT STRUCTURES  
OM5 (V) – LIGHTING UNITS TO BE DIRECTIONAL AND MINIMISE UNNECESSARY LIGHT SPILL AND GLARE  
OM6 (L+V) – GREENING MEASURES IMPLEMENTED  
OM7 (L+V) – COMPENSATORY TREE PLANTING FOR ALL FELLED TREES  
OM8 (L+V) – STREETSCAPE SHALL BE SENSITIVELY DESIGNED  
OM9 (L+V) – ALL STREETSCAPE AREAS AND HARD AND SOFT LANDSCAPE AREAS  
OM10 (V) – AESTHETIC IMPROVEMENT PLANTING OF VIADUCT STRUCTURE THROUGH GREENING OF STRUCTURE WHERE FEASIBLE  
OM11 (V) – SENSITIVE DESIGN OF FOOTBRIDGES, NOISE BARRIERS AND ENCLOSURES WITH GREENING (SCREEN PLANTING/CLIMBERS/ PLANTERS) AND CHROMATIC MEASURES

LEGEND:



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A	10DEC15	FIRST ISSUE	AD
B	06FEB17	SECOND ISSUE	AD



**M M**  
**MOTT MACDONALD**

LANDSCAPE AND VISUAL  
MITIGATION ARRANGEMENT BLOW-  
UP PLAN – CHEK LAP KOK

Design	PL
Checkers	TL / TK
Approver	AD

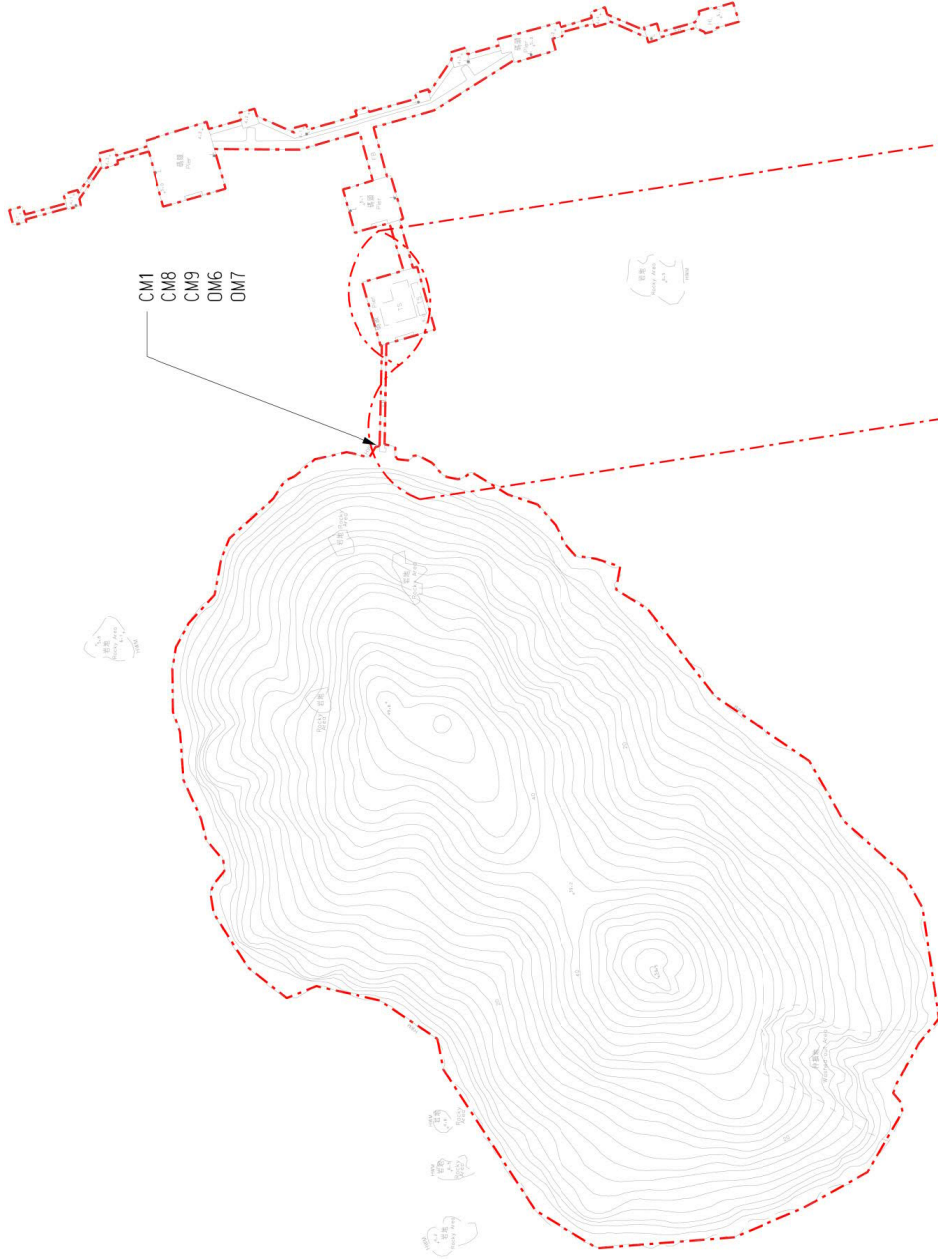
Date	06FEB17
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06FEB17	

EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM	Drawing No.	Scale at A3	Rev.
	MCL / P132 / EMA / 12-001.5	12500	B

- POTENTIAL MITIGATION MEASURES
- CONSTRUCTION PHASE:
- CM1 (L+V) – WORKS AREA MINIMISED
  - CM2 (V) – CONSTRUCTION PERIOD REDUCED TO PRACTICAL MINIMUM
  - CM3 (V) – PHASING OF THE CONSTRUCTION STAGE
  - CM4 (V) – CONSTRUCTION TRAFFIC (LAND AND SEA) REDUCED TO PRACTICAL MINIMUM
  - CM5 (V) – ERECTION OF DECORATIVE MESH SCREENS OR CONSTRUCTION HOARDINGS
  - CM6 (V) – AVOIDANCE OF EXCESSIVE HEIGHT AND BUILDINGS TYPE BUILDINGS AND STRUCTURES
  - CM7 (V) – CONTROL OF NIGHT-TIME LIGHTING
  - CM8 (L) – PROTECT EXISTING TREES
  - CM9 (L) – TREES AFFECTED BY THE WORKS SHALL BE TRANSPLANTED
  - CM10 (L+V) – ADVANCED HYDROSEEDING AROUND TAXIWAYS AND RUNWAYS
- POTENTIAL MITIGATION MEASURES
- OPERATIONAL PHASE:
- OM1 (V) – SENSITIVE LANDSCAPE DESIGN OF RECLAMATION EDGE
  - OM2 (V) – ALL ABOVE GROUND STRUCTURES SHALL BE SENSITIVELY DESIGNED
  - OM3 (V) – SENSITIVE DESIGN OF BUILDINGS AND STRUCTURES IN TERMS OF SCALE, HEIGHT AND BULK (VISUAL WEIGHT)
  - OM4 (V) – USE APPROPRIATE BUILDING MATERIALS AND COLOURS IN BUILT STRUCTURES
  - OM5 (V) – ADOPT NIGHT TIME DIRECTIONAL AND MINIMISE UNNECESSARY LIGHT SPILL AND GLARE
  - OM6 (L+V) – GREENING MEASURES IMPLEMENTED
  - OM7 (L+V) – COMPENSATORY TREE PLANTING FOR ALL FELLED TREES
  - OM8 (L+V) – STREETSCAPE SHALL BE SENSITIVELY DESIGNED
  - OM9 (L+V) – ALL STREETSCAPE AREAS AND HARD AND SOFT LANDSCAPE AREAS
  - OM10 (V) – SUSTAINED DURING CONSTRUCTION SHALL BE MAINTAINED
  - OM11 (V) – AESTHETIC IMPROVEMENT PLANTING OF VIADUCT STRUCTURE THROUGH GREENING OF STRUCTURE WHERE FEASIBLE
  - OM12 (V) – SENSITIVE DESIGN OF FOOTBRIDGES, NOISE BARRIERS AND ENCLOSURES WITH GREENING (SCREEN PLANTING/CLIMBERS/PLANTERS) AND CHROMATIC MEASURES

PROJECT SITE BOUNDARY

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Rev.	Date	Description	Checked
A	02DEC16	FIRST ISSUE	AD
B	06FEB17	SECOND ISSUE	AD



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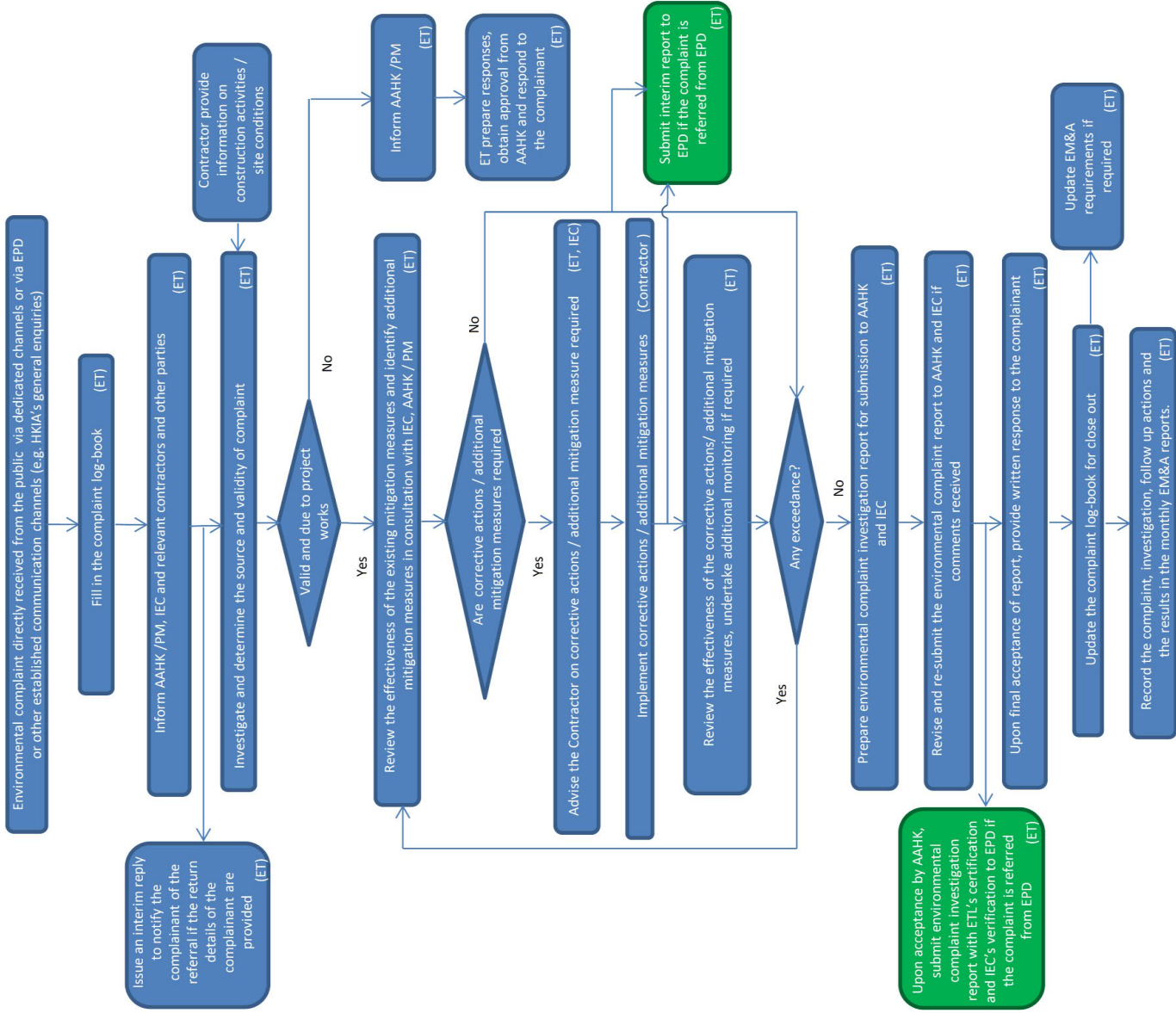
LANDSCAPE AND VISUAL  
MITIGATION ARRANGEMENT PLAN –  
SHA CHAU

Design	PL
Checkers	TL / TK
Approver	AD

Date	06FEB17
EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM	
Drawing No.	MCL / P132 / EMA / 12-001.6
Scale at A3	2000
Rev.	B

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Rev.	Date	Description	Checked
A	02DEC15	FIRST ISSUE	AD
B	06FEB17	SECOND ISSUE	AD



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**MACDONALD**

## FLOW CHART OF COMPLAINT INVESTIGATION PROCEDURES

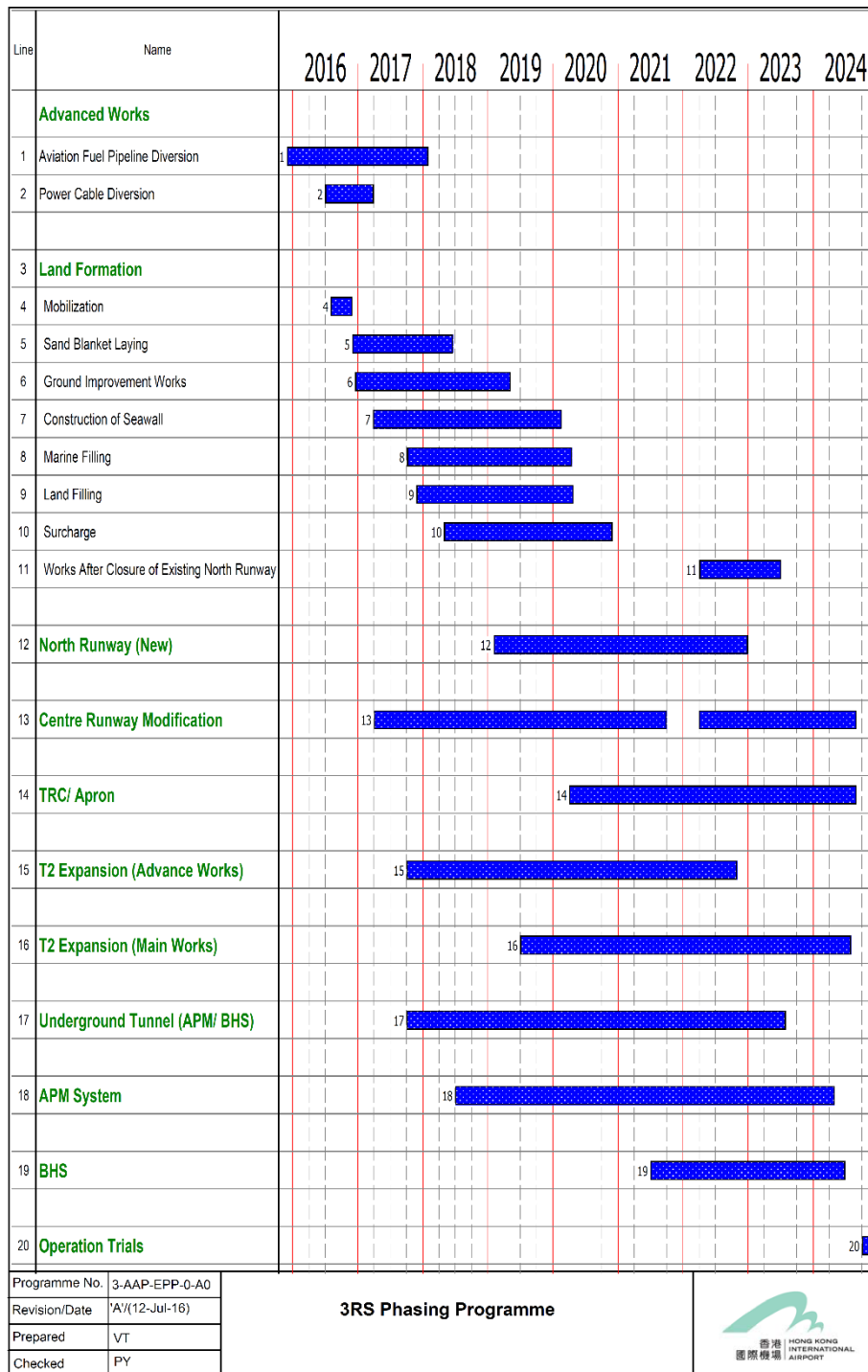
Consultant's Signatures for Approval		Date
Design	PL	06FEB17
Checkers	TL / TK	06FEB17
Approver	AD	06FEB17

# Appendices

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## Appendix A. 3RS Phasing Programme



**Appendix B.      Sampling      Environmental  
Monitoring      Data      Recording  
Sheet**

**Data Sheet for 1-hr TSP Monitoring by High Volume Sampler (HVS)**

Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time	Start (hour)	
Meter Reading	Stop (hour)	
Total Sampling Time (min.)		
Weather Conditions		Fine / Sunny / Cloudy / Rainy
Site Conditions		
Initial Flow Rate, Qsi	Pi (hpa)	
	Ti (°C)	
	Hi (cfm)	
	Qsi (Std. m <sup>3</sup> )	
Final Flow Rate, Qsf	Pf (hpa)	
	Tf (°C)	
	Hf (cfm)	
	Qsf (Std. m <sup>3</sup> )	
Average Flow Rate (Std.m <sup>3</sup> )		
Total Volume (Std.m <sup>3</sup> )		
Filter Identification No.		
Initial Wt. of Filter (g)		
Final wt. of Filter (g)		
Measured TSP Level (µg/m <sup>3</sup> )		
Observations / Remarks		

Name & DesignationSignatureDate

Field Operator: \_\_\_\_\_

\_\_\_\_\_

Checked by: \_\_\_\_\_

\_\_\_\_\_

**Data Sheet for 1-hr TSP Monitoring by Dust Meter**

Monitoring Location				
Details of Location				
Sampler Identification				
Date of Sampling				
Time of Sampling		1	2	3
Elapsed-time	Start Time			
Meter Reading	End Time			
Total Sampling Time (min.)				
Measured TSP Level ( $\mu\text{g}/\text{m}^3$ )				
Weather Conditions		Fine / Sunny / Cloudy / Rainy		
Site Conditions				
Observations / Remarks				

Name & DesignationSignatureDate

Record by: \_\_\_\_\_

Checked by: \_\_\_\_\_

**Noise Monitoring Field Record Sheet**

Monitoring Location							
Details of Location							
Date of Monitoring							
Measurement Start Time (hh:mm)							
Measurement Time Length (min.)							
Weather Conditions	Fine / Sunny / Cloudy / Rainy						
Wind Speed (m/s)							
Noise Meter Model/Identification							
Calibrator Model/Identification							
Calibration Before Measurement (dB(A))							
Calibration After Measurement (dB(A))							
Measurement Result	5min	5min	5min	5min	5min	5min	30min
L <sub>90</sub> (dB(A))							
L <sub>10</sub> (dB(A))							
L <sub>eq</sub> (dB(A))							
Major Construction Noise Source(s) During Monitoring							
Other Noise Source(s) During Monitoring							
Remarks							

Name & DesignationSignatureDate

Record by:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Checked by:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Regular Water Quality Monitoring Data Record Sheet**

Location			
Date			
Start Time (hh:mm)			
Weather			
Sea Conditions			
Tidal Mode			
Water Depth (m)			
Monitoring Results		1 <sup>st</sup> reading	2 <sup>nd</sup> reading or Duplicate
Salinity	(mg/l)		
Temperature	°C		
pH			
DO Saturation	(%)		
DO	(mg/l)		
Turbidity	(NTU)		
SS Sample ID			
SS	(mg/l)		
Observed construction activities	<100m from location		
	>100m from location		
Other Observations			

Name & DesignationSignatureDate

Recorded by :

\_\_\_\_\_

Checked by:

\_\_\_\_\_

Note: The SS results are to be filled up once they are available from the laboratory



## DCM Water Quality Monitoring Data Record Sheet

Location			
Date			
Start Time (hh:mm)			
Weather			
Sea Conditions			
Tidal Mode			
Water Depth (m)			
Monitoring Results		1 <sup>st</sup> reading	2 <sup>nd</sup> reading or Duplicate
Salinity	(mg/l)		
Temperature	°C		
pH			
DO Saturation	(%)		
DO	(mg/l)		
Sample ID			
Ammonia as N	(mg/l)		
Unionised ammonia	(mg/l)		
Nitrite as N	(mg/l)		
Nitrate as N	(mg/l)		
TKN as N	(mg/l)		
Total Phosphorus	(mg/l)		
Reactive Phosphorus	(mg/l)		
Cadmium (Cd)	(µg/l)		
Chromium (Cr)	(µg/l)		
Copper (Cu)	(µg/l)		
Nickel (Ni)	(µg/l)		
Lead (Pb)	(µg/l)		
Zinc (Zn)	(µg/l)		
Arsenic (As)	(µg/l)		
Observed construction activities	<100m from location		
	>100m from location		
Other Observations			

Name & DesignationSignatureDate

Recorded by :

\_\_\_\_\_

Checked by:

\_\_\_\_\_

Note: The nutrients and heavy metals results are to be filled up once they are available from the laboratory.

## Appendix C. Implementation Schedule

**Table C.1: Implementation Schedule**

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
Air Quality Impact – Construction Phase										
5.2.6.2	2.1	-	<b>Dust Control Measures</b> Water spraying for 12 times a day or once every two hours for 24-hour working at all active works area.	Within construction site / Duration of the construction phase	Contractor		✓			
5.2.6.3	2.1	-	Covering of at least 80% of the stockpiling area by impervious sheets. Water spraying of all dusty materials immediately prior to any loading transfer operation so as to keep the dusty material wet during material handling.	Within construction site / Duration of the construction phase	Contractor		✓			
5.2.6.4	2.1	-	Dust control practices as stipulated in the Air Pollution Control (Construction Dust) Regulation should be adopted. These practices include: Good Site Management <ul style="list-style-type: none"><li>Good site management is important to help reducing potential air quality impact down to an acceptable level. As a general guide, the Contractor should maintain high standard of housekeeping to prevent emission of fugitive dust. Loading, unloading, handling and storage of</li></ul>	Within construction site / Duration of the construction phase	Contractor		✓			

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<p>raw materials, wastes or by-products should be carried out in a manner so as to minimise the release of visible dust emission. Any piles of materials accumulated on or around the work areas should be cleaned up regularly. Cleaning, repair and maintenance of all plant facilities within the work areas should be carried out in a manner minimising generation of fugitive dust emissions. The material should be handled properly to prevent fugitive dust emission before cleaning.</p> <p>Disturbed Parts of the Roads</p> <ul style="list-style-type: none"> <li>Each and every main temporary access should be paved with concrete, bituminous hardcore materials or metal plates and kept clear of dusty materials; or</li> <li>Unpaved parts of the road should be sprayed with water or a dust suppression chemical so as to keep the entire road surface wet.</li> </ul> <p>Exposed Earth</p> <ul style="list-style-type: none"> <li>Exposed earth should be properly treated by compaction, hydroseeding, vegetation planting or seeding with latex, vinyl, bitumen within six months after the last construction activity on the site or part of the site where the exposed earth lies.</li> </ul> <p>Loading, Unloading or Transfer of Dusty Materials</p> <ul style="list-style-type: none"> <li>All dusty materials should be sprayed with water immediately prior to any loading or transfer operation so as to keep the dusty material wet.</li> </ul> <p>Debris Handling</p> <ul style="list-style-type: none"> <li>Any debris should be covered entirely by impervious sheeting or stored in a debris collection area sheltered on the top and the three sides.</li> <li>Before debris is dumped into a chute, water should be sprayed so that it remains wet when it is dumped.</li> </ul> <p>Transport of Dusty Materials</p> <ul style="list-style-type: none"> <li>Vehicle used for transporting dusty materials/spoils should be covered with tarpaulin or similar material. The cover should extend over the edges of the sides and tailboards.</li> </ul>							

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<p>Wheel washing</p> <ul style="list-style-type: none"> <li>Vehicle wheel washing facilities should be provided at each construction site exit. Immediately before leaving the construction site, every vehicle should be washed to remove any dusty materials from its body and wheels.</li> </ul> <p>Use of vehicles</p> <ul style="list-style-type: none"> <li>The speed of the trucks within the site should be controlled to about 10km/hour in order to reduce adverse dust impacts and secure the safe movement around the site.</li> <li>Immediately before leaving the construction site, every vehicle should be washed to remove any dusty materials from its body and wheels.</li> <li>Where a vehicle leaving the construction site is carrying a load of dusty materials, the load should be covered entirely by clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle.</li> </ul> <p>Site hoarding</p> <ul style="list-style-type: none"> <li>Where a site boundary adjoins a road, street, service lane or other area accessible to the public, hoarding of not less than 2.4m high from ground level should be provided along the entire length of that portion of the site boundary except for a site entrance or exit.</li> </ul>							
5.2.6.5	2.1	-	<p><b>Best Practices for Concrete Batching Plant</b></p> <p>The relevant best practices for dust control as stipulated in the Guidance Note on the Best Practicable Means for Cement Works (Concrete Batching Plant) BPM 3/2 as well as in the future Specified Process licence should be adopted. The best practices are recommended to be applied to both the land based and floating concrete batching plants. Best practices include:</p> <p>Cement and other dusty materials</p> <ul style="list-style-type: none"> <li>The loading, unloading, handling, transfer or storage of cement, pulverised fuel ash (PFA) and/or other equally dusty materials shall be carried in a totally enclosed system acceptable to EPD. All dust-laden air or waste gas generated by the process operations shall be</li> </ul>	Within Concrete Batching Plant / Duration of the construction phase	Contractor			✓		

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			properly extracted and vented to fabric filtering system to meet the required emission limit.							
			<ul style="list-style-type: none"> <li>▪ Cement, PFA and/or other equally dusty materials shall be stored in storage silo fitted with audible high level alarms to warn of over-filling. The high-level alarm indicators shall be interlocked with the material filling line such that in the event of the silo approaching an overfilling condition, an audible alarm will operate, and after 1 minute or less the material filling line will be closed.</li> <li>▪ Vents of all silos shall be fitted with fabric filtering system to meet the required emission limit.</li> <li>▪ Vents of cement/PFA weighing scale shall be fitted with fabric filtering system to meet the required emission limit.</li> <li>▪ Seating of pressure relief valves of all silos shall be checked, and the valves re-seated if necessary, before each delivery.</li> </ul>							
			Other raw materials							
			<ul style="list-style-type: none"> <li>▪ The loading, unloading, handling, transfer or storage of other raw materials which may generate airborne dust emissions such as crushed rock, sand, stone aggregate, shall be carried out in such a manner to prevent or minimize dust emissions.</li> <li>▪ The materials shall be adequately wetted prior to and during the loading, unloading and handling operations. Manual or automatic water spraying system shall be provided at all unloading areas, stock piles and material discharge points.</li> <li>▪ All receiving hoppers for unloading relevant materials shall be enclosed on three sides up to 3 m above the unloading point. In no case shall these hoppers be used as the material storage devices.</li> <li>▪ The belt conveyor for handling materials shall be enclosed on top and two sides with a metal board at the bottom to eliminate any dust emission due to wind-whipping effect. Other type of enclosure will also be accepted by EPD if it can be demonstrated that the proposed enclosure can achieve same performance.</li> </ul>							

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<ul style="list-style-type: none"> <li>All conveyor transfer points shall be totally enclosed. Openings for the passage of conveyors shall be fitted with adequate flexible seals.</li> <li>Scrapers shall be provided at the turning points of all conveyors to remove dust adhered to the belt surface.</li> <li>Conveyors discharged to stockpiles of relevant materials shall be arranged to minimize free fall as far as practicable. All free falling transfer points from conveyors to stockpiles shall be enclosed with chute(s) and water sprayed.</li> <li>Aggregates with a nominal size less than or equal to 5 mm should be stored in totally enclosed structure such as storage bin and should not be handled in open area. Where there is sufficient buffer area surrounding the concrete batching plant, ground stockpiling may be used.</li> <li>The stockpile shall be enclosed at least on top and three sides and with flexible curtain to cover the entrance side.</li> <li>Aggregates with a nominal size greater than 5 mm should preferably be stored in a totally enclosed structure. If open stockpiling is used, the stockpile shall be enclosed on three sides with the enclosure wall sufficiently higher than the top of the stockpile to prevent wind whipping.</li> <li>The opening between the storage bin and weighing scale of the materials shall be fully enclosed.</li> </ul> <p>Loading of materials for batching</p> <ul style="list-style-type: none"> <li>Concrete truck shall be loaded in such a way as to minimise airborne dust emissions. The following control measures shall be implemented:               <ol style="list-style-type: none"> <li>Pre-mixing the materials in a totally enclosed concrete mixer before loading the materials into the concrete truck is recommended. All dust-laden air generated by the pre-mixing process as well as the loading process shall be totally vented to fabric filtering system to meet the required emission limit.</li> </ol> </li> </ul>							



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						Des	C	O	Yes	No
			<p>(b) If truck mixing batching or other types of batching method is used, effective dust control measures acceptable to EPD shall be adopted. The dust control measures must have been demonstrated to EPD that they are capable to collect and vent all dust-laden air generated by the material loading/mixing to dust arrestment plant to meet the required emission limit.</p> <ul style="list-style-type: none"> <li>▪ The loading bay shall be totally enclosed during the loading process.</li> </ul> <p>Vehicles</p> <ul style="list-style-type: none"> <li>▪ All practicable measures shall be taken to prevent or minimize the dust emission caused by vehicle movement.</li> <li>▪ All access and route roads within the premises shall be paved and adequately wetted.</li> </ul> <p>Housekeeping</p> <ul style="list-style-type: none"> <li>▪ A high standard of housekeeping shall be maintained. All spillages or deposits of materials on ground, support structures or roofs shall be cleaned up promptly by a cleaning method acceptable to EPD. Any dumping of materials at open area shall be prohibited.</li> </ul>							
5.2.6.6	2.1	-	<p><b>Best Practices for Asphaltic Concrete Plant</b></p> <p>The relevant best practices for dust control as stipulated in the Guidance Note on the Best Practicable Means for Tar and Bitumen Works (Asphaltic Concrete Plant) BPM 15 (94) as well as in the future Specified Process licence should be adopted. These include:</p> <p>Design of Chimney</p> <ul style="list-style-type: none"> <li>▪ The chimney shall not be less than 3 metres plus the building height or 8 metres above ground level, whichever is the greater</li> <li>▪ The efflux velocity of gases from the main chimney shall not be less than 12 m/s at full load condition</li> <li>▪ The flue gas exit temperature shall not be less than the acid dew point</li> <li>▪ Release of the chimney shall be directed vertically upwards and not be restricted or deflected</li> </ul>	Within Asphaltic Concrete Plant / Duration of the construction phase	Contractor			✓		

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<p>Cold feed side</p> <ul style="list-style-type: none"> <li>▪ The aggregates with a nominal size less than or equal to 5 mm shall be stored in totally enclosed structure such as storage bin and shall not be handled in open area.</li> <li>▪ Where there is sufficient buffer area surrounding the plant, ground stockpiling may be used. The stockpile shall be enclosed at least on top and three sides and with flexible curtain to cover the entrance side. If these aggregates are stored above the feeding hopper, they shall be enclosed at least on top and three sides and be wetted on the surface to prevent wind-whipping.</li> <li>▪ The aggregates with a nominal size greater than 5 mm should preferably be stored in totally enclosed structure. Aggregates stockpile that is above the feeding hopper shall be enclosed at least on top and three sides. If open stockpiling is used, the stockpiles shall be enclosed on three sides with the enclosure wall sufficiently higher than the top of the stockpile to prevent wind whipping.</li> <li>▪ Belt conveyors shall be enclosed on top and two sides and provided with a metal board at the bottom to eliminate any dust emission due to the wind-whipping effect. Other type of enclosure will also be accepted by EPD if it can be demonstrated that the proposed enclosure can be achieve the same performance.</li> <li>▪ Scrapers shall be provided at the turning points of all belt conveyors inside the chute of the transfer points to remove dust adhered to the belt surface.</li> <li>▪ All conveyor transfer points shall be totally enclosed. Openings for the passages of conveyors shall be fitted with adequate flexible seals.</li> <li>▪ All materials returned from dust collection system shall be transferred in enclosed system and shall be stored inside bins or enclosures.</li> </ul> <p>Hot feed side</p> <ul style="list-style-type: none"> <li>▪ The inlet and outlet of the rotary dryer shall be enclosed and ducted to a dust extraction and collection system such as a fabric filter. The</li> </ul>							

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						Des	C	O	Yes	No
			<p>particulate and gaseous concentration at the exhaust outlet of the dust collector shall not exceed the required limiting values.</p> <ul style="list-style-type: none"> <li>▪ The bucket elevator shall be totally enclosed and the air be extracted and ducted to a dust collection system to meet the required particulates limiting value</li> <li>▪ All vibratory screens shall be totally enclosed and dust tight with close-fitted access inspection opening. Gaskets shall be installed to seal off any cracks and edges of any inspection openings.</li> <li>▪ Chutes for carrying hot material shall be rigid and preferably fitted with abrasion resistant plate inside. They shall be inspected daily for leakages.</li> <li>▪ All hot bins shall be totally enclosed and dust tight with close-fitted access inspection opening. Gaskets shall be installed to seal off any cracks and edges of any inspection openings. The air shall be extracted and ducted to a dust collection system to meet the required particulates limiting value.</li> <li>▪ Appropriate control measures shall be adopted in order to meet the required bitumen emission limit as well as the ambient odour level (2 odour units).</li> </ul> <p>Material transportation</p> <ul style="list-style-type: none"> <li>▪ The loading, unloading, handling, transfer or storage of other raw materials which may generate airborne dust emissions such as crushed rocks, sands, stone aggregates, reject fines, shall be carried out in such a manner as to minimize dust emissions.</li> <li>▪ Roadways from the entrance of the plant to the product loading points and/or any other working areas where there are regular movements of vehicles shall be paved or hard surfaced.</li> <li>▪ Haul roads inside the Works shall be adequately wetted with water and/or chemical suppressants by water trucks or water sprayers.</li> </ul> <p>Control of emissions from bitumen decanting</p>							

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						Des	C	O	Yes	No
			<ul style="list-style-type: none"> <li>The heating temperature of the particular bitumen type and grade shall not exceed the corresponding temperature limit of the same type listed in Appendix 1 of the Guidance Note.</li> <li>Tamper-free high temperature cut-off device shall be provided to shut off the fuel supply or electricity in case the upper limit for bitumen temperature is reached.</li> <li>Proper chimney for the discharge of bitumen fumes shall be provided at high level.</li> <li>The emission of bitumen fumes shall not exceed the required emission limit.</li> <li>The air-to-fuel ratio shall be properly controlled to allow complete combustion of the fuel. The fuel burners, if any, shall be maintained properly and free from carbon deposits in the burner nozzles.</li> </ul> <p>Liquid fuel</p> <ul style="list-style-type: none"> <li>The receipt, handling and storage of liquid fuel shall be carried out so as to prevent the release of emissions of organic vapours and/or other noxious and offensive emissions to the air.</li> </ul> <p>Housekeeping</p> <ul style="list-style-type: none"> <li>A high standard of housekeeping shall be maintained. Waste material, spillage and scattered piles gathered beneath belt conveyors, inside and around enclosures shall be cleared frequently. The minimum clearing frequency is on a weekly basis.</li> </ul>							
5.2.6.7	2.1	-	<p><b>Best Practices for Rock Crushing Plants</b></p> <p>The relevant best practices for dust control as stipulated in the Guidance Note on the Best Practicable Means for Mineral Works (Stone Crushing Plant) BPM 11/1 (95) as well as in the future Specified Process licence should be adopted. These include:</p> <p>Crushers</p> <ul style="list-style-type: none"> <li>The outlet of all primary crushers, and both inlet and outlet of all secondary and tertiary crushers, if not installed inside a reasonably</li> </ul>	Within Crushing Plant / Duration of the construction phase	Contractor			✓		

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<p>dust tight housing, shall be enclosed and ducted to a dust extraction and collection system such as a fabric filter.</p> <ul style="list-style-type: none"> <li>▪ The inlet hopper of the primary crushers shall be enclosed on top and 3 sides to contain the emissions during dumping of rocks from trucks. The rock while still on the trucks shall be wetted before dumping.</li> <li>▪ Water sprayers shall be installed and operated in strategic locations at the feeding inlet of crushers.</li> <li>▪ Crusher enclosures shall be rigid and be fitted with self-closing doors and close-fitting entrances and exits. Where conveyors pass through the crusher enclosures, flexible covers shall be installed at entries and exits of the conveyors to the enclosure.</li> </ul> <p>Vibratory screens and grizzlies</p> <ul style="list-style-type: none"> <li>▪ All vibratory screens shall be totally enclosed in a housing. Screenhouses shall be rigid and reasonably dust tight with self-closing doors or close-fitted entrances and exits for access. Where conveyors pass through the screenhouse, flexible covers shall be installed at entries and exits of the conveyors to the housing. Where containment of dust within the screenhouse structure is not successful then a dust extraction and collection system shall be provided.</li> <li>▪ All grizzlies shall be enclosed on top and 3 sides and sufficient water sprayers shall be installed at their feeding and outlet areas.</li> </ul> <p>Belt conveyors</p> <ul style="list-style-type: none"> <li>▪ Except for those conveyors which are placed within a totally enclosed structure such as a screenhouse or those erected at the ground level, all conveyors shall be totally enclosed with windshield on top and 2 sides.</li> <li>▪ Effective belt scraper such as the pre-cleaner blades made by hard wearing materials and provided with pneumatic tensioner, or equivalent device, shall be installed at the head pulley of designated conveyor as required to dislodge fine dust particles that may adhere to the belt surface and to reduce carry-back of fine materials on the</li> </ul>							

EIA Ref.	EM& A Ref.	EP Condi- tion	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<p>return belt. Bottom plates shall also be provided for the conveyor unless it has been demonstrated that the corresponding belt scraper is effective and well maintained to prevent falling material from the return belt.</p> <ul style="list-style-type: none"> <li>Except for those transfer points which are placed within a totally enclosed structure such as a screenhouse, all transfer points to and from conveyors shall be enclosed. Where containment of dust within the enclosure is not successful, then water sprayers shall be provided. Openings for any enclosed structure for the passage of conveyors shall be fitted with flexible seals.</li> </ul> <p>Storage piles and bins</p> <ul style="list-style-type: none"> <li>Where practicable, free falling transfer points from conveyors to stockpiles shall be fitted with flexible curtains or be enclosed with chutes designed to minimize the drop height. Water sprays shall also be used where required.</li> <li>The surface of all surge piles and stockpiles of blasted rocks or aggregates shall be kept sufficiently wet by water spraying wherever practicable.</li> <li>All open stockpiles for aggregates of size in excess of 5 mm shall be kept sufficiently wet by water spraying where practicable.</li> <li>The stockpiles of aggregates 5 mm in size or less shall be enclosed on 3 sides or suitably located to minimize wind-whipping. Save for fluctuations in stock or production, the average stockpile shall stay within the enclosure walls and in no case the height of the stockpile shall exceed twice the height of the enclosure walls.</li> <li>Scattered piles gathered beneath belt conveyors, inside and around enclosures shall be cleared regularly.</li> </ul> <p>Rock drilling equipment</p> <ul style="list-style-type: none"> <li>Appropriate dust control equipment such as a dust extraction and collection system shall be used during rock drilling activities.</li> </ul>							



EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
Air Quality Impact – Operation Phase										
5.5.2.8	2.2.5.3	-	<p>AAHK's measures and initiatives aimed at further reducing air pollutant emissions from airport activities and operations as detailed in the EIA Report, will be reviewed to identify if there are any issues about implementation of such measures/ initiatives, including:</p> <ul style="list-style-type: none"><li>• Banned all idling vehicle engines on the airside since 2008, except for certain vehicles that are exempted (This measure has already been incorporated in the model for 2031 3RS scenario simulation)</li><li>• Banning the use of APU for all aircraft at frontal stands by end 2014 (This measure has already been incorporated in the model for 2031 3RS scenario simulation)</li><li>• Requiring all saloon vehicles as electric vehicles by end 2017 (This measure has already been incorporated in the model for 2031 3RS scenario simulation)</li><li>• Increasing charging stations for EVs and electric GSE to a total of 290 by end 2018</li><li>• Conducting review on existing GSE emission performance and explore measures to further control air emissions</li><li>• Exploring with franchisees feasibility of expediting replacement of old airside vehicles and GSE with cleaner ones during tender or renewal of contracts</li><li>• Requiring all new airside vehicles to be fuel-efficient and making it a prerequisite for the licensing process;</li><li>• Providing the cleanest diesel and gasoline at the airfield;</li><li>• Requiring all of the AAHK's diesel vehicles to use biodiesel (B5);</li><li>• Promoting increased use of electric vehicles and electric ground service equipment at HKIA by provision of charging infrastructure; and</li><li>• Providing a liquefied petroleum gas (LPG) fuelling point for airside vehicles and ground service equipment.</li></ul>	Airport operation/ Operation Period	AAHK				✓	

				Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
EIA Ref.	EM& A Ref.	EP Condi- tion	Environmental Protection Measures			Des	C	O	Yes	No
Hazard to Human Life – Construction Phase										
Table 6.40	3.2	-	Precautionary measures should be established to request barges to move away during typhoons	Construction Site / Construction Period	Contractor			✓		
Table 6.40	3.2	-	An appropriate marine traffic management system should be established to minimize risk of ship collision	Construction Site / Construction Period	Contractor			✓		
Table 6.40	3.2	-	Location of all existing hydrant networks should be clearly identified prior to any construction works	Construction Site / Construction Period	Contractor			✓		
Hazard to Human Life – Operation Phase										
Table 6.40	3.2	-	A similar coating standard shall be applied to the new submarine pipeline as for the existing pipeline	Jet Fuel Submarine Pipeline / Submarine Pipeline Design and Construction Period	Design Engineer & Contractor	✓		✓		
Table 6.40	3.2	-	Checking on the integrity of the new submarine pipeline, e.g. by pigging, should be conducted during testing and commission	Jet Fuel Submarine Pipeline / Testing and Commission- ing	Contractor			✓	✓	
Table 6.40	3.2	-	After the fuel hydrant system is in operation, the as-built drawings of the underground jet fuel pipeline will be kept by AAHK. Before the commencement of any construction works, as-built drawings showing	Jet Fuel Underground Pipeline / Operation	AAHK / Contractor				✓	

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			the alignment and level of the underground fuel pipelines for the work area will be provided to the third party construction contractors.	Period of the Pipeline						
Table 6.40	3.2	-	After the fuel hydrant system is in operation, third party construction contractors are required to undertake underground pipeline detection works to ascertain the exact alignment of the underground pipeline before the commencement of works.	Jet Fuel Underground Pipeline / Operation Period of the Pipeline	AAHK / Contractor			✓		
Table 6.40	3.2	-	Monitoring of underground pipelines by the Leak Detection System which will give signal to the operator should fuel leakage occur.	Jet Fuel Underground Pipeline / Operation Period of the Pipeline	Aviation Fuel System Operator			✓		
Table 6.40	3.2	-	Study should be conducted to ensure the new pipeline can withstand the planned future loading.	Jet Fuel Underground Pipeline / Pipeline Design Period	Design Engineer	✓				
Table 6.40	3.2	-	New pressure surge calculations are required because of the changed characteristics of the hydrant network	Jet Fuel Hydrant System / Pipeline Design Period	Design Engineer	✓				
Table 6.40	3.2	-	There is a need to check the appropriate pressure drop calculations have been undertaken for the new system	Jet Fuel Hydrant System / Pipeline Design Period	Design Engineer	✓				

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						Des	C	O	Yes	No
Table 6.41	3.2	-	Improvement audit to reinforce existing refuelling practices and to achieve better compliance	Jet Fuel Hydrant System / Operation Period	AAHK			✓		
Table 6.41	3.2	-	During refuelling process, four cones are to be put in place to indicate the 6 m refuelling zone from aircraft fuelling point for the new fuel hydrant system where practicable. AAHK will communicate this recommendation to airlines and their refuelling operators as appropriate. Proper implementation of this recommendation will be checked in AAHK's future safety audits.	Hydrant pit valve / Aircraft refuelling operation	AAHK / Airlines / Into-plane operator			✓		
<b>Noise Impact – Aircraft Noise</b>										
7.3.5.3	4.1	-	<b>Aircraft Noise Mitigation Measures under Primary Operating Mode</b> Aircraft noise mitigation measures as listed below shall be implemented to minimise the impact of aircraft noise on NSRs situated near the flight paths or in the vicinity of HKIA: <ul style="list-style-type: none"> <li>Putting the existing south runway on standby where possible at night between 2300 and 0659;</li> <li>Requiring departures to take the southbound route via West Lamma Channel during east flow at night from 2300 to 0659, subject to acceptable operational and safety consideration;</li> <li>Assigning a new arrival Required Navigation Performance Track 6 for preferential use in the runway 25 direction between 2300 and 0659; and</li> <li>Implementing a preferential runway use programme when wind conditions allow such that west flow is used when departures dominate while east flow is used when arrivals dominate during night-time.</li> </ul>	Airport operation/ Operation Period	AAHK, CAD			✓		
7.3.5.3	4.1	-	<b>Consideration of Aircraft Noise in developing MLP for planned development at CDA site in Lok On Pai</b>	CDA site in Lok On Pai / during	Planning Department	✓				

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			In developing the MLP for the CDA site in Lok On Pai, the alignment of the NEF 25 contour line should be taken into account to ensure that no noise sensitive uses are situated within the NEF 25 contour in the planned development.	preparation of MLP						
<b>Noise Impact – Fixed Noise Sources</b>										
7.4.9.1	4.2	-	Ground Noise Source (Operation of Aircraft Engine Run-up Facilities) Noise enclosure with required noise reduction of at least 15 dBA at the ERUFs should be incorporated.	Within the Project site / During operation phase / Throughout operation phase	Design Architect / Contractor	✓		✓		
<b>Noise Impact – Construction Phase</b>										
7.5.6	4.3	-	<b>Good Site Practice</b>  Good site practice and noise management can significantly reduce the impact of construction site activities on nearby NSRs. The following package of measures should be followed during each phase of construction: <ul style="list-style-type: none"> <li>▪ only well-maintained plant to be operated on-site and plant should be serviced regularly during the construction works;</li> <li>▪ machines and plant that may be in intermittent use to be shut down between work periods or should be throttled down to a minimum;</li> <li>▪ plant known to emit noise strongly in one direction, should, where possible, be orientated to direct noise away from the NSRs;</li> <li>▪ mobile plant should be sited as far away from NSRs as possible; and</li> <li>▪ material stockpiles and other structures to be effectively utilised, where practicable, to screen noise from on-site construction activities.</li> </ul>	Within the Project site / During construction phase / Prior to commencement of operation	Contractor		✓			

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
7.5.6	4.3	-	<b>Adoption of QPME</b> QPME should be adopted as far as applicable.	Within the Project site / During construction phase / Prior to commencement of operation	Contractor		✓			
7.5.6	4.3	-	<b>Use of Movable Noise Barriers</b> Movable noise barriers should be placed along the active works area and mobile plants to block the direct line of sight between PME and the NSRs.	Within the Project site / During construction phase / Prior to commencement of operation	Contractor		✓			
7.5.6	4.3	-	<b>Use of Noise Enclosure/ Acoustic Shed</b> Noise enclosure or acoustic shed should be used to cover stationary PME such as air compressor and generator.	Within the Project site / During construction phase / Prior to commencement of operation	Contractor		✓			
<b>Water Quality Impact – Construction Phase</b>										
8.8.1.2 and 8.8.1.3	5.1	2.26	<b>Marine Construction Activities</b> <u>General Measures to be Applied to All Works Areas</u>	Within construction site / Duration of the	Contractor		✓			



EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<ul style="list-style-type: none"><li>▪ Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;</li><li>▪ Use of Lean Material Overboard (LMOB) systems shall be prohibited;</li><li>▪ Excess materials shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessels are moved;</li><li>▪ Plants should not be operated with leaking pipes and any pipe leakages shall be repaired quickly;</li><li>▪ Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action;</li><li>▪ All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash;</li><li>▪ The works shall not cause foam, oil, grease, litter or other objectionable matter to be present in the water within and adjacent to the works site; and</li><li>▪ For ground improvement activities including DCM, the wash water from cleaning of the drilling shaft should be appropriately treated before discharge. The Contractor should ensure the waste water meets the WPCO/TM requirements before discharge. No direct discharge of contaminated water is permitted.</li></ul> <p><u>Specific Measures to be Applied to All Works Areas</u></p> <ul style="list-style-type: none"><li>▪ The daily maximum production rates shall not exceed those assumed in the water quality assessment in the EIA Report;</li><li>▪ A maximum of 10 % fines content to be adopted for sand blanket and 20 % fines content for marine filling below +2.5 mPD prior to substantial completion of seawall (until end of Year 2017) shall be specified in the works contract document;</li><li>▪ An advance seawall of at least 200m to be constructed (comprising either rows of contiguous permanent steel cells completed above high tide mark or partially completed seawalls with rock core to high</li></ul>	construction phase						

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<p>tide mark and filter layer on the inner side) prior to commencement of marine filling activities.</p> <p><u>Specific Measures to be Applied to Land Formation Activities prior to Commencement of Marine Filling Works</u></p> <ul style="list-style-type: none"> <li>Double layer 'Type III' silt curtains to be applied around the active eastern works areas prior to commencement of sand blanket laying activities. The silt curtains shall be configured to minimise SS release during ebb tides. A silt curtain efficiency test shall be conducted to validate the performance of the silt curtains#;</li> <li>Double layer silt curtains to enclose WSRs C7a and silt screens installed at the intake points for both WSR C7a and C8 prior to commencement of construction#; and</li> <li>The silt curtains and silt screens should be regularly checked and maintained.</li> </ul> <p><u>Specific Measures to be Applied to Land Formation Activities during Marine Filling Works</u></p> <ul style="list-style-type: none"> <li>Double layer 'Type II' or 'Type III' silt curtains to be applied around the eastern openings between partially completed seawalls prior to commencement of marine filling activities. The silt curtains shall be configured to minimise SS release during ebb tides#;</li> <li>Double layer silt curtains to be applied at the south-western opening prior to commencement of marine filling activities#;</li> <li>Double layer silt curtain to enclose WSR C7a and silt screens installed at the intake points for both WSR C7a and C8 prior to commencement of marine filling activities#; and</li> <li>The silt curtains and silt screens should be regularly checked and maintained.</li> </ul> <p><u>Specific Measures to be Applied to the Field Joint Excavation Works for the Submarine Cable Diversion</u></p> <ul style="list-style-type: none"> <li>Only closed grabs designed and maintained to avoid spillage shall be used and should seal tightly when operated. Excavated materials</li> </ul>							

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			shall be disposed at designated marine disposal area in accordance with the Dumping and Sea Ordinance (DASO) permit conditions; and ▪ Silt curtains surrounding the closed grab dredger to be deployed as a precautionary measure.							
8.8.1.4	5.1	-	<b>Modification of the Existing Seawall</b> Silt curtains shall be deployed around the seawall modification activities to completely enclose the active works areas, and care should be taken to avoid splashing of rockfill / rock armour into the surrounding marine environment. For the connecting sections with the existing outfalls, works for these connection areas should be undertaken during the dry season in order that individual drainage culvert cells may be isolated for interconnection works.	At the existing northern seawall / Duration of the construction phase	Contractor		✓			
8.8.1.5	5.1	-	<b>Construction of New Stormwater Outfalls and Modifications to Existing Outfalls</b> During operation of the temporary drainage channel, runoff control measures such as bunding or silt fence shall be provided on both sides of the channel to prevent accumulation and release of SS via the temporary channel. Measures should also be taken to minimise the ingress of site drainage into the culvert excavations.	Within construction site / Duration of the construction phase	Contractor		✓			
8.8.1.6 8.8.1.7	5.1	2.27	<b>Piling Activities for Construction of New Runway Approach Lights and HKIAAA Marker Beacons</b> Silt curtains shall be deployed around the piling activities to completely enclose the piling works and care should be taken to avoid spillage of excavated materials into the surrounding marine environment. <u>For construction of the eastern approach lights at the CMPs</u> ▪ Ground improvement via DCM using a close-spaced layout shall be completed prior to commencement of piling works; ▪ Steel casings shall be installed to enclose the excavation area prior to commencement of excavation; ▪ The excavated materials shall be removed using a closed grab within the steel casings;	Within construction site / Duration of the construction phase	Contractor		✓			

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<ul style="list-style-type: none"> <li>No discharge of the cement mixed materials into the marine environment will be allowed; and</li> <li>Excavated materials shall be treated and reused on-site.</li> </ul>							
8.8.1.8	5.1	-	<p><b>Construction Site Runoff and Drainage</b></p> <p>The site practices outlined in ProPECC Note PN 1/94 should be followed as far as practicable in order to minimise surface runoff and the chance of erosion. The following measures are recommended:</p> <ul style="list-style-type: none"> <li>Install perimeter cut-off drains to direct off-site water around the site and implement internal drainage, erosion and sedimentation control facilities. Channels, earth bunds or sand bag barriers should be provided on site to direct storm water to silt removal facilities. The design of the temporary on-site drainage system should be undertaken by the Contractors prior to the commencement of construction (for works areas located on the existing Airport island) or as soon as the new land is completed (for works areas located on the new landform);</li> <li>Sand/silt removal facilities such as sand/silt traps and sediment basins should be provided to remove sand/silt particles from runoff to meet the requirements of the TM-DSS standards under the WPCO. The design of efficient silt removal facilities should make reference to the guidelines in Appendix A1 of ProPECC Note PN 1/94. Sizes may vary depending upon the flow rate. The detailed design of the sand/silt traps should be undertaken by the Contractors prior to the commencement of construction;</li> <li>All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly during rainstorms. Deposited silt and grit should be regularly removed, at the onset of and after each rainstorm to ensure that these facilities are functioning properly;</li> <li>Measures should be taken to minimize the ingress of site drainage into excavations. If excavation of trenches in wet periods is necessary, they should be dug and backfilled in short sections</li> </ul>	Within construction site / Duration of the construction phase	Contractor			✓		

EIA Ref.	EM& A Ref.	EP Condi- tion	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<p>wherever practicable. Water pumped out from foundation excavations should be discharged into storm drains via silt removal facilities;</p> <ul style="list-style-type: none"><li>▪ In the event that contaminated groundwater is identified at excavation areas, this should be treated on-site using a suitable wastewater treatment process. The effluent should be treated according to the requirements of the TM-DSS standards under the WPCO prior to discharge to foul sewers or collected for proper disposal off-site. No direct discharge of contaminated groundwater is permitted;</li><li>▪ All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facility should be provided at construction site exits. Wash-water should have sand and silt settled out and removed regularly to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains. All washwater should be treated according to the requirements of the TM-DSS standards under the WPCO prior to discharge;</li><li>▪ Open stockpiles of construction materials or construction wastes on-site should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the construction materials, soil, silt or debris from washing away into the drainage system;</li><li>▪ Manholes (including newly constructed ones) should be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and to prevent stormwater runoff being directed into foul sewers; and</li><li>▪ Precautionary measures should be taken at any time of the year when rainstorms are likely. Actions to be taken when a rainstorm is imminent or forecasted are summarized in Appendix A2 of ProPECC Note PN 1/94. This includes actions to be taken during and/or after</li></ul>							

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			rainstorms. Particular attention should be paid to the control of silty surface runoff during storm events.							
8.8.1.9	5.1	-	<b>Sewage Effluent from Construction Workforce</b> <ul style="list-style-type: none"> <li>Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site where necessary to handle sewage from the workforce. A licensed contractor should be employed to provide appropriate and adequate portable toilets and be responsible for appropriate disposal and maintenance.</li> </ul>	Within construction site / During construction phase	Contractor		✓			
8.8.1.10 8.8.1.11	5.1		<b>General Construction Activities</b> <ul style="list-style-type: none"> <li>Construction solid waste, debris and refuse generated on-site should be collected, handled and disposed of properly to avoid entering any nearby storm water drain. Stockpiles of cement and other construction materials should be kept covered when not being used.</li> <li>Oils and fuels should only be stored in designated areas which have pollution prevention facilities. To prevent spillage of fuels and solvents to any nearby storm water drain, all fuel tanks and storage areas should be provided with locks and be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank. The bund should be drained of rainwater after a rain event.</li> </ul>	Within construction site / During construction phase	Contractor		✓			
8.8.1.12 8.8.1.13	5.1	2.28	<b>Drilling Activities for the Submarine Aviation Fuel Pipelines</b> <p>To prevent potential water quality impacts at Sha Chau, the following measures shall be applied:</p> <ul style="list-style-type: none"> <li>A 'zero-discharge' policy shall be applied for all activities to be conducted at Sha Chau;</li> <li>No bulk storage of chemicals shall be permitted; and</li> <li>A containment pit shall be constructed around the drill holes. This containment pit shall be lined with impermeable lining and bunded on the outside to prevent inflow from off-site areas.</li> </ul> <p>At the airport island side of the drilling works, the following measures shall be applied for treatment of wastewater:</p>	Within construction site / During construction phase	Contractor		✓			



EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<ul style="list-style-type: none"> <li>During pipe cleaning, appropriate desilting or sedimentation device should be provided on site for treatment before discharge. The Contractor should ensure discharge water from the sedimentation tank meet the WPCO/TM requirements before discharge.</li> <li>Drilling fluid used in drilling activities should be reconditioned and reused as far as possible. Temporary enclosed storage locations should be provided on-site for any unused chemicals that needs to be transported away after all the related construction activities are completed. The requirements in ProPECC Note PN 1/94 should be adhered to in the handling and disposal of bentonite slurries.</li> </ul>							
<b>Water Quality Impact – Operation Phase</b>										
8.8.2.2	5.2	-	<b>Floating Refuse</b> Regular inspection should be carried out along the artificial seawall to check for any accumulation of floating refuse, and if necessary, regular removal of accumulated / floating refuse should be undertaken.	During operation phase	Contractor				✓	
8.8.2.3	5.2	-	<b>Storm Water Discharges</b> For stormwater discharges, the following measures should be applied to minimise contaminants in runoff: <ul style="list-style-type: none"> <li>Install and maintain roadside gullies to trap and remove silt and grit from stormwater;</li> <li>Install and maintain oil/grease interceptors for removal of oil and fuel from stormwater; and</li> <li>Runoff from aircraft and vehicle washing activities should be intercepted and discharged to foul sewer or diverted to temporary storage for subsequent removal and treatment offsite.</li> </ul>	During design and operation phase	Design Consultant / AAHK	✓		✓		
8.8.2.4	5.2	2.29	<b>Fuel Spillage</b> Precautionary measures for fuel management and spill response should include the following: <ul style="list-style-type: none"> <li>Fuel pipelines and hydrant systems should be designed with adequate protection and pressure / leakage detection systems;</li> </ul>	During design and operation phase	Design Consultant / AAHK	✓		✓		

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<ul style="list-style-type: none"> <li>A 'spill trap containment system' should be designed and provided at aircraft apron and stand areas;</li> <li>An emergency spill response plan should be in place to provide timely and effective response and remediation of spillage events;</li> <li>Spill response equipment should be available on site and regularly checked and maintained;</li> <li>Operation of the fuel supply and refuelling systems should be restricted to qualified and trained personnel with adequate knowledge of the spill response procedures in place;</li> <li>A penalty system should be set up to discourage poor practices associated with maintenance of aircraft, vehicle and refueling systems by Airport tenants and franchisees; and</li> <li>Detailed records of all spillage events should be kept and maintained.</li> </ul>							
<b>Sewerage and Sewage Treatment Implication – Operation Phase</b>										
9.7.1	6.2	-	The planned sewerage system will be designed in accordance with all the relevant standards and guidelines published by DSD. The planned and existing sewerage network are maintained and operated by AAHK in accordance with the Sewerage Manual published by DSD. In addition to continuing the odour control arrangements currently undertaken by AAHK, maintaining the design maximum retention time of the planned pumping station to not more than 2 hours, monitoring the H <sub>2</sub> S level once the 3RS is in operation and adoption of active septicity management measures that can effectively contain any future septicity problems will be included in the design for the planned 3RS sewerage system.	Sewerage system for 3RS within the expanded airport island / during design and operation phase	Design Consultant / AAHK	✓		✓		
9.7.2	6.2	-	AAHK undertakes to upgrade the existing gravity sewer by constructing a new gravity sewer with a diameter of 1,200 mm adjacent to the existing gravity sewer (1,050 mm in diameter) and then diverting the sewage flow arising from the airport and other sub-catchment in Tung Chung to the new gravity sewer. The recommended measures to mitigate the secondary impacts on air quality, noise, waste management, water quality and trees arising	Gravity sewers from the airport discharge manhole to TCSPS / 2026	Design Consultant / Contractor			✓		

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			from the construction works associated with the sewer upgrading works should also be implemented.							
9.7.3	6.2	-	TCSPS is being upgraded to increase its design capacity to cater for the future sewage arising from the catchment including the project.	TCSPS/ by end 2022	DSD (Design and construction of TCSPS upgrading is currently underway under the DSD's Agreement No. 6/2012)			✓		
9.7.4	6.2	-	SHWSTS will be upgraded to increase its design capacity to cater for the future sewage arising from the catchment including the project.	SHWSTS/ by 2026				✓		
<b>Waste Management Implication – Construction Phase</b>					EPD					
10.5.1.1	7.1	-	<p>Opportunities to minimise waste generation and maximise the reuse of waste materials generated by the project have been incorporated where possible into the planning, design and construction stages, and the following measures have been recommended:</p> <ul style="list-style-type: none"> <li>▪ The relevant construction methods (particularly for the tunnel works) and construction programme have been carefully planned and developed to minimise the extent of excavation and to maximise the on-site reuse of inert C&amp;D materials generated by the project as far as practicable. Temporary stockpiling areas will also be provided to facilitate on-site reuse of inert C&amp;D materials.</li> <li>▪ Priority should be given to collect and reuse suitable inert C&amp;D materials generated from other concurrent projects and the Government's PFRF as fill materials for the proposed land formation works.</li> <li>▪ Only non-dredged ground improvement methods should be adopted in order to completely avoid the need for dredging and disposal of marine sediment for the proposed land formation work.</li> </ul>	Project Site Area / During design and construction phase	Design Consultant / Contractor	✓	✓			

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<ul style="list-style-type: none"> <li>Excavation work for constructing the APM tunnels, BHS tunnels and airside tunnels will not be down to the CMPs beneath the fill materials in order to avoid excavating any sediments.</li> <li>For the marine sediments expected to be excavated from the piling works of TRC, APM &amp; BHS tunnels, airside tunnels and other facilities on the proposed land formation area, piling work of marine sections of the approach lights and HKIAAA beacons, basement works for some of T2 expansion area and excavation works for the proposed APM depot should be treated and reused on-site as backfilling materials in accordance with the Proposal of Further Development on Treatment Level / Details and Reuse Mode for Marine Sediment.</li> </ul>							
10.5.1.2	7.1	-	<p>The following good site practices should be performed during the construction activities include:</p> <ul style="list-style-type: none"> <li>Nomination of an approved person, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site.</li> <li>Training of site personnel in proper waste management and chemical waste handling procedures.</li> <li>Provision of sufficient waste disposal points and regular collection for disposal.</li> <li>Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks by tarpaulin/ similar material or by transporting wastes in enclosed containers. The cover should be extended over the edges of the sides and tailboards.</li> <li>Stockpiles of C&amp;D materials should be kept wet or covered by impervious sheets to avoid wind-blown dust.</li> <li>All dusty materials including C&amp;D materials should be sprayed with water immediately prior to any loading transfer operation so as to keep the dusty material wet during material handling at the barging points/ stockpile areas.</li> </ul>	Project Site Area / Construction Phase	Contractor			✓		

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<ul style="list-style-type: none"> <li>C&amp;D materials to be delivered to and from the project site by barges or by trucks should be kept wet or covered to avoid wind-blown dust.</li> <li>The speed of the trucks including dump trucks carrying C&amp;D or waste materials within the site should be controlled to about 10 km/hour in order to reduce the adverse dust impact and secure the safe movement around the site.</li> <li>To avoid or minimise dust emission during transport of C&amp;D or waste materials within the site, each and every main temporary access should be paved with concrete, bituminous hardcore materials or metal plates and kept clear of dusty materials. Unpaved parts of the road should be sprayed with water or a dust suppression chemical so as to keep the entire road surface wet.</li> </ul>							
10.5.1.3	7.1	-	<p>The following practices should be performed to achieve waste reduction include:</p> <ul style="list-style-type: none"> <li>Use of steel or aluminium formworks and falseworks for temporary works as far as practicable.</li> <li>Adoption of repetitive design to allow reuse of formworks as far as practicable</li> <li>Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal.</li> <li>Encourage collection of aluminium cans, PET bottles and paper by providing separate labelled bins to enable these wastes to be segregated from other general refuse generated by the work force.</li> <li>Any unused chemicals or those with remaining functional capacity should be collected for reused as far as practicable.</li> <li>Proper storage and site practices to minimise the potential for damage or contamination of construction materials.</li> <li>Plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste.</li> </ul>	Project Site Area / Construction Phase	Contractor			✓		

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
10.5.1.5	7.1		Inert and non-inert C&D materials should be handled and stored separately to avoid mixing the two types of materials.	Project Site Area / Construction Phase	Contractor		✓			
10.5.1.5	7.1	-	Any recyclable materials should be segregated from the non-inert C&D materials for collection by reputable licensed recyclers whereas the non-recyclable waste materials should be disposed of at the designated landfill site by a reputable licensed waste collector.	Project Site Area / Construction Phase	Contractor		✓			
10.5.1.6	7.1	-	A trip-ticket system promulgated shall be developed in order to monitor the off-site delivery of surplus inert C&D materials that could not be reused on-site for the proposed land formation work at the PFRF and to control fly tipping.	Project Site Area / Construction Phase	Contractor		✓			
10.5.1.6	7.1	2.32	The Contractor should prepare and implement a Waste Management Plan detailing various waste arising and waste management practices.	Construction Phase	Contractor		✓			
10.5.1.16	7.1	-	<p>The following mitigation measures are recommended during excavation and treatment of the sediments:</p> <ul style="list-style-type: none"> <li>On-site remediation should be carried out in an enclosed area in order to minimise odour/dust emissions;</li> <li>The loading, unloading, handling, transfer or storage of treated and untreated sediment should be carried out in such a manner to prevent or minimise dust emissions;</li> <li>All practical measures, including but not limited to speed control for vehicles, should be taken to minimise dust emission;</li> <li>Good housekeeping should be maintained at all times at the sediment treatment facility and storage area;</li> <li>Treated and untreated sediment should be clearly separated and stored separately; and</li> <li>Surface runoff from the enclosed area should be properly collected and stored separately, and then properly treated to levels in compliance with the relevant effluent standards as required by the Water Pollution Control Ordinance before final discharge.</li> </ul>	Project Site Area / Construction Phase	Contractor		✓			



EIA Ref.	EM& A Ref.	EP Condi-tion	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
10.5.1.18	7.1	-	<p>The marine sediments to be removed from the cable field joint area would be disposed of at the designated disposal sites to be allocated by the MFC. The following mitigation measures should be strictly followed to minimise potential impacts on water quality during transportation of the sediments requiring Type 1 disposal:</p> <ul style="list-style-type: none"> <li>Bottom opening of barges shall be fitted with tight fitting seals to prevent leakage of material.</li> <li>Monitoring of the barge loading shall be conducted to ensure that loss of material does not take place during transportation. Transport barges or vessels shall be equipped with automatic self-monitoring devices as specified by EPD.</li> <li>Barges or hopper barges shall not be filled to a level that would cause the overflow of materials or sediment laden water during loading or transportation.</li> </ul>	Project Site Area / Construction Phase	Contractor		✓			
10.5.1.19	7.1	-	<p>Contractor should register with the EPD as a chemical waste producer and to follow the relevant guidelines. The following measures should be implemented:</p> <ul style="list-style-type: none"> <li>Good quality containers compatible with the chemical wastes should be used;</li> <li>Incompatible chemicals should be stored separately;</li> <li>Appropriate labels must be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosive, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc;</li> <li>The contractor will use a licensed collector to transport and dispose of the chemical wastes at the approved Chemical Waste Treatment Centre or other licensed recycling facilities, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.</li> </ul>	Project Site Area / Construction Phase	Contractor		✓			
10.5.1.20	7.1	-	General refuse should be stored in enclosed bins or compaction units separated from inert C&D material. A reputable waste collector should be employed by the contractor to remove general refuse from the site for disposal at designated landfill sites. An enclosed and covered area	Project Site Area / Construction Phase	Contractor		✓			

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			should be provided to reduce the occurrence of 'wind blown' light material.							
10.5.1.21	7.1	-	The future artificial seawall of the proposed Airport expansion area should be designed to achieve a shoreline that does not have any sharp turns or abrupt indentation in order to avoid or minimise any trapped or accumulated refuse.	Design Stage	Design Consultant	✓				
10.5.1.21	7.1	-	The construction contractors will be required to regularly check and clean any refuse trapped or accumulated along the newly constructed seawall. Such refuse will then be stored and disposed of together with the general refuse.	Project Site Area / Construction Phase	Contractor		✓			
<b>Waste Management Implication – Operation Phase</b>										
10.5.2.1	7.2	-	<p>General refuse should be temporarily stored in proper container with covers, which should be regularly cleaned and checked for maintenance. General refuse should be collected on daily basis and delivered to the refuse collection point accordingly. A reputable waste collector should be employed to remove the general refuse regularly for off-site disposal at designated landfill sites in order to avoid odour nuisance or pest/vermin problem. The following waste recycling initiatives should be implemented at the expanded airport:</p> <ul style="list-style-type: none"> <li>Recycling facilities should be provided in prominent areas in passenger terminal buildings to facilitate separation of recyclable waste by passengers;</li> <li>Recycling facilities should also be provided in refuse rooms of the passenger terminal buildings to facilitate separation of recyclable waste by tenants;</li> <li>Food waste recycling programme should be implemented at the airport to collect and recycle food waste;</li> <li>Food waste can be delivered to EPD's Organic Waste Treatment Facilities for recycling as compost;</li> <li>Food &amp; beverage tenants are encouraged to recycle waste cooking oil (e.g., recycling of waste cooking oil to biodiesel);</li> </ul>	Project Site Area / Operation Phase	AAHK			✓		

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<ul style="list-style-type: none"> <li>AAHK has stepped up on-site waste separation and recycling at the Airside Waste Station to raise the amount of recyclable materials recovered from aircraft cabin waste.</li> </ul>							
10.5.2.2	7.2	-	Operators of the relevant facilities should register with EPD as a chemical waste producer and follow the guidelines stated in the "Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes". Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately. Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosive, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. Licensed collector should be deployed to transport and dispose of the chemical wastes at the approved Chemical Waste Treatment Centre or other licensed recycling facilities, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.	Project Site Area / Operation Phase	AAHK / Operators			✓		
10.5.2.3 to 10.5.2.5	7.2	-	Regular cleaning and inspection of seawall. If refuse is found during inspection, arrangements should be made to remove the refuse.	Project Site Area / Operation Phase	Contractor			✓		
<b>Land Contamination – Construction Phase</b>										
11.10.1.2 to 11.10.1.3	8.1	2.32	<p>For areas inaccessible during site reconnaissance survey:</p> <ul style="list-style-type: none"> <li>Further site reconnaissance would be conducted once the areas are accessible in order to identify any land contamination concern for the areas.</li> <li>Subject to further site reconnaissance findings, a supplementary Contamination Assessment Plan (CAP) for additional site investigation (SI) (if necessary) may be prepared and submitted to EPD for endorsement prior to the commencement of SI at these areas.</li> <li>After completion of SI, the Contamination Assessment Report (CAR) will be prepared and submitted to EPD for approval prior to start of the proposed construction works at the golf course, the underground</li> </ul>	Project Site Area inaccessible during site reconnaissance / Prior to Construction Phase	AAHK/ Contractor	✓				

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			and above-ground fuel storage tank areas, emergency power generation units, airside petrol filling station and fuel tank room. <ul style="list-style-type: none"> <li>Should remediation be required, Remediation Action Plan (RAP) and Remediation Report (RR) will be prepared for EPD's approval prior to commencement of the proposed remediation and any construction works respectively.</li> </ul>							
11.8.1.2	8.1	-	<p>If contaminated soil is identified, the following mitigation measures are for the excavation and transportation of contaminated materials (if any):</p> <ul style="list-style-type: none"> <li>To minimize the incidents of construction workers coming in contact with any contaminated materials, bulk earth-moving excavation equipment should be employed;</li> <li>Contact with contaminated materials can be minimised by wearing appropriate clothing and personal protective equipment such as gloves and masks (especially when working directly with contaminated material), provision of washing facilities and prohibition of smoking and eating on site;</li> <li>Stockpiling of contaminated excavated materials on site should be avoided as far as possible;</li> <li>The use of any contaminated soil for landscaping purpose should be avoided unless pre-treatment was carried out;</li> <li>Vehicles containing any excavated materials should be suitably covered to reduce dust emissions and/or release of contaminated wastewater;</li> <li>Truck bodies and tailgates should be sealed to prevent any discharge;</li> <li>Only licensed waste haulers should be used to collect and transport contaminated material to treatment/disposal site and should be equipped with tracking system to avoid fly tipping;</li> <li>Speed control for trucks carrying contaminated materials should be exercised. 8km/h is the recommended speed limit;</li> <li>Strictly observe all relevant regulations in relation to waste handling, such as Waste Disposal Ordinance (Cap 354), Waste Disposal</li> </ul>	Project Site Area / Construction Phase	Contractor			✓		

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			(Chemical Waste) (General) Regulation (Cap 354) and obtain all necessary permits where required; and ▪ Maintain records of waste generation and disposal quantities and disposal arrangements.							
<b>Terrestrial Ecological Impact – Construction Phase</b>										
12.10.1.1	9.2	2.14	<b>Pre-construction Egretty Survey</b> ▪ Conduct ecological survey for Sha Chau egretty to update the latest boundary of the egretty.	Breeding season (April - July) prior to commencement of HDD drilling works at HKIA	Environmental Team*		✓			
12.7.2.3 and 12.7.2.6	9.1	2.30	<b>Avoidance and Minimisation of Direct Impact to Egretty</b> ▪ The daylighting location will avoid direct encroachment to the Sheung Sha Chau egretty. The daylighting location and mooring of flat top barge, if required, will be kept away from the egretty. ▪ In any event, controls such as demarcation of construction site boundary and confining the lighting within the site will be practised to minimise disturbance to off-site habitat at Sheung Sha Chau Island.	During construction phase at Sheung Sha Chau Island	AAHK /Contractor	✓	✓			
12.7.2.5	9.1	2.30	<b>Preservation of Nesting Vegetation</b> ▪ The proposed daylighting location and the arrangement of connecting pipeline will avoid the need of tree cutting, therefore the trees that are used by ardeids for nesting will be preserved.	During construction phase at Sheung Sha Chau Island	Contractor		✓			
12.7.2.4 and 12.7.2.6	9.1	2.30	<b>Timing the Pipe Connection Works outside Ardeid's Breeding Season</b> ▪ All HDD and related construction works on Sheung Sha Chau Island will be scheduled outside the ardeids' breeding season (between	During construction phase at Sheung Sha Chau Island	AAHK/ Contractor	✓	✓			

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			April and July). No night-time construction work will be allowed on Sheung Sha Chau Island during all seasons.							
12.10.1.1	9.3	-	<b>Ecological Monitoring</b> <ul style="list-style-type: none"> <li>During the HDD construction works period from August to March, ecological monitoring will be undertaken monthly at the HDD daylighting location on Sheung Sha Chau Island to identify and evaluate any impacts with appropriate actions taken as required to address and minimise any adverse impact found.</li> </ul>	at Sheung Sha Chau Island	Environmental Team*		✓			
<b>Marine Ecological Impact – Pre-construction Phase</b>										
13.11.4.1	10.2.2	-	Pre-construction phase Coral Dive Survey	HKIAAA artificial seawall	Environmental Team*	✓				
<b>Marine Ecological Impact – Construction Phase</b>										
13.11.1.3 to 13.11.1.6	-	-	<b>Minimisation of Land Formation Area</b> <p>Minimise the overall size of the land formation needed for the additional facilities to minimise the overall loss of habitat for marine resources, especially the CWD population.</p>	Land formation footprint / during detailed design phase to completion of construction	Design Engineer and Contractor	✓	✓			
13.11.1.7 to 13.11.1.10	-	2.31	<b>Use of Construction Methods with Minimal Risk/Disturbance</b> <ul style="list-style-type: none"> <li>Use of non-dredge method for the main land formation and ancillary works including the diversion of the aviation fuel pipeline to the AFRF;</li> <li>Use of Deep Cement Mixing (DCM) method instead of conventional seabed dredging for the land formation works to reduce the risk of negative impacts through the elevation of suspended solids and contaminants on CWDs, fisheries and the marine environment;</li> </ul>	During construction phase at marine works area	Contractor		✓			

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<ul style="list-style-type: none"> <li>Use of bored piling in short duration to form the new approach lights and marker beacons for the new runway;</li> <li>Avoid bored piling during CWD peak calving season (Mar to Jun); and</li> <li>Use of HDD method and water jetting methods for placement of submarine cables and pipelines to minimise the disturbance to the CWDs and other marine ecological resources.</li> </ul>							
13.11.2.1 to 13.11.2.7	-	-	<b>Mitigation for Indirect Disturbance due to Deterioration of Water Quality</b> <ul style="list-style-type: none"> <li>Water quality mitigation measures during construction phases include consideration of alternative construction methods, deployment of silt curtain and good site practices;</li> <li>Alternative construction methods including use of non-dredge methods for ground improvement (e.g. Deep Cement Mixing (DCM), prefabricated vertical drains (PVD), sand compaction piles, steel cells, stone columns and vertical sand drains);</li> <li>Use of bored piling in short duration to form the new approach lights and marker beacons for the new runway; and</li> <li>Use of HDD method and water jetting methods for placement of undersea cables and pipelines to minimise the disturbance to the CWDs and other marine ecological resources.</li> </ul>	All works area during the construction phase	Contractor			✓		
13.11.1.12	-	-	<b>Strict Enforcement of No-Dumping Policy</b> <ul style="list-style-type: none"> <li>A policy prohibiting dumping of wastes, chemicals, oil, trash, plastic, or any other substance that would potentially be harmful to dolphins and/or their habitat in the work area;</li> <li>Mandatory educational programme of the no-dumping policy be made available to all construction site personnel for all project-related works;</li> <li>Fines for infractions should be implemented; and</li> <li>Unscheduled, on-site audits shall be implemented.</li> </ul>	All works area during the construction phase	Contractor			✓		



EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
13.11.1.13	-	-	<b>Good Construction Site Practices</b> <ul style="list-style-type: none"> <li>Regular inspection of the integrity and effectiveness of all silt curtains and monitoring of effluents to ensure that any discharge meets effluent discharge guidelines.</li> <li>Keep the number of working or stationary vessels present on-site to the minimum anytime</li> <li>Unscheduled, on-site audits for all good site practice restrictions should be conducted, and fines or penalties sufficient to be an effective deterrent need to be levied against violators.</li> </ul>	All works area during the construction phase	Contractor		✓			
13.11.5.4 to 13.11.5.13	10.3.1	-	<b>SkyPier High Speed Ferries' Speed Restrictions and Route Diversions</b> <ul style="list-style-type: none"> <li>SkyPier HSFs operating to / from Zhuhai and Macau would divert north of SCLKC Marine Park with a 15 knot speed limit to apply for the part-journeys that cross high CWD abundance grid squares as indicatively shown in <b>Drawing No. MCL/P132/EIA/13-023</b> of the EIA Report. Both the alignment of the northerly route and the portion of routings to be subject to the speed limit of 15 knots shall be finalised prior to commencement of construction based on the future review of up-to-date CWD abundance and EM&amp;A data and taking reference to changes in total SkyPier HSF numbers.</li> <li>A maximum of 10 knots will be enforced through the designated SCLKC Marine Park area at all times.</li> </ul>	Area between the footprint and SCLKC Marine Park during construction phase	AAHK	✓	✓			
13.11.5.14 to 13.11.5.18	10.3.1	2.31	<b>Dolphin Exclusion Zone</b> <p>Establishment of a 24 hr DEZ with a 250 m radius around the land formation works areas.</p> <ul style="list-style-type: none"> <li>A DEZ would also be implemented during ground improvement works (e.g. DCM), water jetting works for submarine cables diversion, open trench dredging at the field joint locations and seawall construction.</li> <li>A DEZ would also be implemented during bored piling work but as a precautionary measure only.</li> </ul>	Marine waters around land formation works area during construction phase	Environmental Team*	✓	✓			
13.11.5.19	10.4	2.31	<b>Acoustic Decoupling of Construction Equipment</b>	Around coastal works	Contractor	✓	✓			

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<ul style="list-style-type: none"> <li>Air compressors and other noisy equipment that must be mounted on steel barges should be acoustically-decoupled to the greatest extent feasible, for instance by using rubber or air-filled tyres.</li> <li>Specific acoustic decoupling measures shall be specified during the detailed design of the project for use during the land formation works.</li> </ul>	area during construction phase						
13.11.5.20	10.6.1	2.29	<b>Spill Response Plan</b> <ul style="list-style-type: none"> <li>An oil and hazardous chemical spill response plan is proposed to be established during the construction phase as a precautionary measure so that appropriate actions to prevent or reduce risks to CWDs can be undertaken in the event of an accidental spillage.</li> </ul>	Construction phase	Contractor	✓	✓			
13.11.5.21 to 13.11.5.23	10.6.1	-	<b>Construction Vessel Speed Limits and Skipper Training</b> <ul style="list-style-type: none"> <li>A speed limit of 10 knots should be strictly observed for construction vessels at areas with the highest CWD densities (as currently indicated by the 1 x 1 km grid squares in Figure 6 of <b>Appendix 13.2</b>).</li> <li>Vessels traversing through the work areas should be required to use predefined and regular routes (which would presumably become known to resident dolphins) to reduce disturbance to cetaceans due to vessel movements. Specific marine routes shall be specified by the Contractor prior to construction commencing.</li> </ul>	All areas north and west of Lantau Island during construction phase	Contractor	✓	✓			
<b>Marine Ecological Impact – Operation Phase</b>										
13.11.5.24 to 13.11.5.43	10.6.2.1	-	<b>Establishment of New Marine Protected Areas/Linking of Existing Marine Parks</b> <ul style="list-style-type: none"> <li>establishment of a new marine park matrix that would comprise a new marine protection area around HKIA, adding an area of 2,400 ha and also providing critical linkages between the SCLKCMP (an area of 1,200 ha) and the BMP (an area of 850 ha). Together, all three marine parks would make up 4,450 ha of CWD marine park area.</li> <li>A speed limit of 10 knots for all vessels to travel within the marine parks areas.</li> <li>A detailed study initiated and led by AAHK will be carried out during the construction phase to review relevant previous studies and collate</li> </ul>	Around the airport island / Operational Phase	AAHK	✓		✓		

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<p>available information on the ecological characters of the proposed area for marine park designation and review available survey data marine traffic and planned development projects in the vicinity. Based on the findings, ecological profiles of the proposed area for marine park designation would be established and the extent and location of the proposed marine park be determined.</p> <ul style="list-style-type: none"> <li>A management plan for the proposed marine park will be proposed in consultation with AFCD, covering information on the responsible departments for operation and management (O&amp;M) of the marine park, as well as the O&amp;M duties of each of the departments involved. The management plan will be submitted to Director of Environmental Protection (DEP) for approval before the commissioning of the 3RS project.</li> </ul>							
13.11.5.44 to 13.11.5.50	10.6	-	<p><b>SkyPier High Speed Ferries' Speed Restrictions and Route Diversions</b></p> <ul style="list-style-type: none"> <li>A speed limit of 15 knots for SkyPier HSFs operating to and from Zhuhai and Macau continue to divert north of SCLKCMP transiting through those areas with the relatively-high CWD densities.</li> <li>A speed limit of 10 knots for all vessels to travel within the marine parks areas.</li> </ul>	Around the airport island / Operational Phase	AAHK (outside Marine Park) AFCD (inside Marine Park)				✓	
13.11.5.51 to 13.11.5.52	10.6.2.1	-	<p><b>Operational Spill Response Plan</b></p> <ul style="list-style-type: none"> <li>Fuel pipelines and hydrant systems should be designed with adequate protection and pressure / leakage detection systems.</li> <li>A 'spill trap containment system' should be designed and provided at aircraft apron and stand areas.</li> <li>An emergency spill response plan should be in place to provide timely and effective response and remediation of spillage events.</li> <li>Spill response equipment should be available on site and regularly checked and maintained.</li> <li>Operation of the fuel supply and refuelling systems should be restricted to qualified and trained personnel with adequate knowledge of the spill response procedures in place.</li> </ul>	Operational Phase	AAHK				✓	

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<ul style="list-style-type: none"> <li>A penalty system should be set up to discourage poor practices associated with maintenance of aircraft, vehicle and refuelling systems by airport tenants and franchisees.</li> <li>Detailed records of all spillage events should be kept and maintained.</li> </ul>							
<b>Fisheries Impact – Construction Phase</b>										
14.9.1.2 to 14.9.1.5	-	-	<b>Minimisation of Land Formation Area</b> <ul style="list-style-type: none"> <li>Minimise the overall size of the land formation needed for the additional facilities to minimise the overall loss of habitat for fisheries resources.</li> </ul>	Land formation footprint / during detailed design phase to completion of construction	Design Engineer and Contractor	✓	✓	✓		
14.9.1.6	-	-	<b>Use of Construction Methods with Minimal Risk/Disturbance</b> <ul style="list-style-type: none"> <li>Use of non-dredge method for the main land formation and ancillary works including the diversion of the aviation fuel pipeline to the AFRF;</li> <li>Use of Deep Cement Mixing (DCM) method instead of conventional seabed dredging for the land formation works to reduce the risk of negative impacts through the elevation of suspended solids and contaminants on fisheries and the marine environment;</li> <li>Use of bored piling in short duration to form the new approach lights and marker beacons for the new runway; and</li> <li>Use of HDD method and water jetting methods for placement of undersea cables and pipelines to minimise the disturbance to fisheries resources.</li> </ul>	During construction phase at marine works area	Contractor		✓			
14.9.1.11	-		<b>Strict Enforcement of No-Dumping Policy</b> <ul style="list-style-type: none"> <li>A policy prohibiting dumping of wastes, chemicals, oil, trash, plastic, or any other substance that would potentially be harmful to dolphins and/or their habitat in the work area;</li> </ul>	All works area during the construction phase	Contractor		✓			

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
			<ul style="list-style-type: none"> <li>Mandatory educational programme of the no-dumping policy be made available to all construction site personnel for all project-related works;</li> <li>Fines for infractions should be implemented; and</li> <li>Unscheduled, on-site audits shall be implemented.</li> </ul>							
14.9.1.12	-		<b>Good Construction Site Practices</b> <ul style="list-style-type: none"> <li>Regular inspection of the integrity and effectiveness of all silt curtains and monitoring of effluents to ensure that any discharge meets effluent discharge guidelines.</li> <li>Keep the number of working or stationary vessels present on-site to the minimum anytime</li> <li>Unscheduled, on-site audits for all good site practice restrictions should be conducted, and fines or penalties sufficient to be an effective deterrent need to be levied against violators.</li> </ul>	All works area during the construction phase	Contractor			✓		
14.9.1.13 to 14.9.1.18	-		<b>Mitigation for Indirect Disturbance due to Deterioration of Water Quality</b> <ul style="list-style-type: none"> <li>Water quality mitigation measures during construction phases include consideration of alternative construction methods, deployment of silt curtain and good site practices.</li> <li>Alternative construction methods including use of non-dredge methods for ground improvement (e.g. Deep Cement Mixing (DCM), prefabricated vertical drains (PVD), sand compaction piles, steel cells, stone columns and vertical sand drains)</li> <li>Use of bored piling in short duration to form the new approach lights and marker beacons for the new runway;</li> <li>Use of HDD method and water jetting methods for placement of undersea cables and pipelines to minimise the disturbance to fisheries resources.</li> </ul>	All works area during the construction phase	Contractor			✓		
<b>Fisheries Impact – Operation Phase</b>										

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
14.9.1.19 to 14.9.1.30	11.2		<b>Compensation for the Loss of Fisheries Habitats (and Resources) and Fishing Ground</b> <ul style="list-style-type: none"> <li>Establishment of marine park at north, west and east of the proposed land formation footprint and HKIAAA extension.</li> <li>All these marine protected areas with regulation of fishing activities. The potential fisheries resources recovery due to the enhanced protection measures apply for Marine Park and the synergic effect of the connected marine protected areas will benefit to the adjacent fishing grounds.</li> </ul>	Operational Phase	AAHK	✓		✓		
<b>Landscape and Visual Impact – Construction Phase</b>										
Table 15.6	12.3	-	<b>CM1</b> - The construction area and contractor's temporary works areas should be minimised to avoid impacts on adjacent landscape.	All works areas for duration of works; Upon handover and completion of works.	Contractor		✓			
Table 15.6	12.3	-	<b>CM2</b> - Reduction of construction period to practical minimum.	All works areas for duration of works; Upon handover and completion of works.	Contractor		✓			
Table 15.6	12.3	-	<b>CM3</b> - Phasing of the construction stage to reduce visual impacts during the construction phase.	All works areas for duration of works; Upon handover and	Contractor		✓			

EIA Ref.	EM& A Ref.	EP Condi-tion	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
Table 15.6	12.3	-	<b>CM4</b> - Construction traffic (land and sea) including construction plants, construction vessels and barges should be kept to a practical minimum.	completion of works. All works areas for duration of works; Upon handover and completion of works.	Contractor		✓			
Table 15.6	12.3	-	<b>CM5</b> - Erection of decorative mesh screens or construction hoardings around works areas in visually unobtrusive colours.	All works areas for duration of works; Upon handover and completion of works. – may be disassembled in phases	Contractor		✓			
Table 15.6	12.3	-	<b>CM6</b> - Avoidance of excessive height and bulk of site buildings and structures.	New passenger concourse, terminal 2 expansion and other proposed airport related buildings and structures under the project;	Design Engineer	✓				



EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
				Upon handover and completion of works.						
Table 15.6	12.3	-	<b>CM7</b> - Control of night-time lighting by hooding all lights and through minimisation of night working periods.	All works areas for duration of works; Upon handover and completion of works. – may be disassembled in phases	Contractor		✓			
Table 15.6	12.3	-	<b>CM8</b> - All existing trees shall be carefully protected during construction. Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in contractor's works areas.	All existing trees to be retained; Upon handover and completion of works.	Contractor	✓	✓			
Table 15.6	12.3	-	<b>CM9</b> - Trees unavoidably affected by the works shall be transplanted where practical. A detailed Tree Transplanting Specification shall be provided in the Contract Specification, if applicable. Sufficient time for necessary tree root and crown preparation periods shall be allowed in the project programme.	All existing trees to be affected by the works; Upon handover and completion of works.	Contractor	✓	✓			
Table 15.6	12.3	-	<b>CM10</b> - Land formation works shall be followed with advanced hydroseeding around taxiways and runways as soon as practical.	All affected existing grass areas around	Contractor	✓	✓			

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
				runways and verges/Duration of works; Upon handover and completion of works.						
<b>Landscape and Visual Impact – Operation Phase</b>										
Table 15.7	12.3	-	<b>OM1</b> - Sensitive landscape design of reclamation edge by incorporating different angles of gradient and the use of a range of armour rock sizes placed randomly in a riprap approach for an irregular appearance. Planting of native coastal plants shall be incorporated.	New land formation edge; Completion of Design Stage.	Design Engineer	✓				
Table 15.7	12.3	-	<b>OM2</b> - All above ground structures, including, Vent Shafts, Emergency and Firemen's' Accesses etc. shall be, either fully integrated with the planned buildings, or sensitively designed in a manner that responds to the existing and planned urban context, and minimises potential adverse landscape and visual impacts.	All locations of above ground structures; Completion of Design Stage.	Design Engineer	✓				
Table 15.7	12.3	-	<b>OM3</b> - Sensitive design of buildings and structures in terms of scale, height and bulk (visual weight).	All locations of above ground structures; Completion of Design Stage.	Design Engineer	✓				
Table 15.7	12.3	-	<b>OM4</b> - Use appropriate building materials and colours in built structures to create cohesive visual mass	All locations of above ground structures; Completion of Design Stage.	Design Engineer	✓				

EIA Ref.	EM& A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
Table 15.7	12.3	-	<b>OM5</b> - Lighting units to be directional and minimise unnecessary light spill and glare.	All locations within the project site boundary; Completion of Design Stage.	Design Engineer	✓				
Table 15.7	12.3	-	<b>OM6</b> - Greening measures, including vertical greening, green roofs, road verge planting and peripheral screen planting shall be implemented.	All locations within the project site boundary where greening measures can be implemented as far as possible; Ongoing duration.	Contractor	✓		✓		
Table 15.7	12.3	-	<b>OM7</b> - Compensatory Tree Planting for all felled trees shall be provided to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Felling Application process under the relevant technical circulars.	All trees effected by the works; Upon handover and completion of works.	Contractor	✓	✓	✓		
Table 15.7	12.3	-	<b>OM8</b> - Streetscape (e.g. paving, signage, street furniture, lighting etc.) shall be sensitively designed in a manner that responds to the existing and planned urban context, and minimises potential adverse landscape and visual impacts.	All locations of streetscape treatment works; Completion of Design Stage.	Design Engineer	✓				

EIA Ref.	EM& A Ref.	EP Condi- tion	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage			Mitigation Measures Implemented ? ^	
						Des	C	O	Yes	No
Table 15.7	12.3	-	<b>OM9</b> - All streetscape areas and hard and soft landscape areas disturbed during construction shall be reinstated to equal or better quality (due to implementation of screen planting, road verge planting etc.), to the satisfaction of the relevant Government departments.	All locations of streetscape treatment works; Upon handover and completion of works.	Contractor		✓			
Table 15.7	12.3	-	<b>OM10</b> - Aesthetic improvement planting of viaduct structure through greening of structure to mitigate visual impact of viaduct form.	All locations of viaduct structures; Ongoing duration.	Design Engineer	✓	✓			
Table 15.7	12.3	-	<b>OM11</b> - Sensitive design of footbridges, noise barriers and enclosures with greening (screen planting/climbers/planters) and chromatic measures.	All locations of viaduct structures; Ongoing duration.	Design Engineer	✓				
<b>Cultural Heritage Impact – Construction Phase</b>										
Not applicable										
<b>Cultural Heritage Impact – Operation Phase</b>										
Not applicable										
<b>Health Impact – Aircraft Emissions</b>										
Not applicable										
<b>Health Impact – Aircraft Noise</b>										
Not applicable										

## Notes:

Des=Design; C=Construction; O=Operation

“ \* ” Environmental Team (ET) represents the ET specified in the Environmental Monitoring and Audit Manual.

“ ^ ” Checking of the implementation stage for each mitigation measure by ET during site inspection. Updated information on implementation status is provided in Environmental Mitigation Implementation Schedule for construction and operation phase presented in the EM&A Reports according to project progress.

“ — ” For items denoted as “ - ” provided under the columns of EM&A Ref. or EP Condition, environmental protection measures should be referred to the relevant paragraph(s) / table(s) in the approved EIA Report.

“ # ” The arrangement of silt curtain has been modified. The details can be referred to Silt Curtain Deployment Plan.

## Appendix D. Sample Environmental Log-book

## Environmental Log-book Format

[illegible]

## Appendix E. Checklist of Key Assumptions Adopted in the EIA Report

**Table E.1: Checklist of Key Assumptions Adopted in the EIA Report**

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Stage		
					Des	C	O
Air Quality Impact – Construction Phase							
5.2.3.9	Ch 2	N/A	There will be no open storage of cement on the Deep Cement Mixing (DCM) barges or the supporting vessels.	Airport construction / Construction Period		✓	
Air Quality Impact – Operation Phase							
5.3.4.18	Ch 2	N/A	A decreasing trend in helicopter flights to an average of four flights per month.	Design and operation Period	✓		✓
5.3.4.26	Ch 2	N/A	The use of ultra-low sulfur diesel (0.005%) for airside Ground Service Equipment (GSE).	Design and operation Period	✓		✓
5.3.4.31	Ch 2	N/A	By 2031, all the non-GSE will likely be changed to Euro V standard.	Design and operation Period	✓		✓
5.3.4.31	Ch 2	N/A	By 2017 all salon vehicles on the airside will be electric (AAHK policy).	Airport operation / Operation Period			✓
5.3.4.37	Ch 2	N/A	From 2014, all aircraft parking at stand will be required to connect to the fixed ground power and the use of APU will be prohibited (AAHK policy).	Airport operation / Operation Period			✓
5.3.4.37	Ch 2	N/A	APU will be operated before the aircraft reach the gate (around 1 minute); and after the aircraft has left the gate, with the main engine not yet started (around 5 minutes).	Design and operation Period	✓		✓



EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Stage		
					Des	C	O
5.3.4.4 2	Ch 2	N/A	For Government Flying Services (GFS), aircraft replacements will take place by 2031 where ZLIN Z242L will be replaced by Diamond DA42NG with 2 x Austro Engine A300 and Jetstream 41 will be replaced by Bombardier Challenger 605 with General Electric CF 34-3B engines.	Design and operation Period	✓		✓
5.3.4.4 6	Ch 2	N/A	No expansion to the existing aviation fuel farm on the airport island is proposed.	Design and operation Period	✓		✓
App. 5.3.1-2	Ch 2	N/A	International Civil Aviation (ICAO) gradual tightening of NO <sub>x</sub> emissions standards and long-term objective for 2026 to be at 60% (+/- 5%) below the Committee on Aviation Environmental Protection (CAEP) stringency level of CAEP/6, which may be achieved with a gradual introduction of new aircrafts and new engine types.	Design and operation Period	✓		✓
<b>Hazard to Human Life – Construction Phase</b>							
Not applicable							
<b>Hazard to Human Life – Operation Phase</b>							
Not applicable							
<b>Noise Impact – Aircraft Noise</b>							
7.3.2	Ch 3	2.21	Aircraft departing to the northeast are required to adopt the noise abatement take-off procedures stipulated by ICAO so long as safe flight operations permit.	Airport operation / Operation Period			✓
7.3.2	Ch 3	2.21	All aircraft on approach to the HKIA from the northeast between 11:00 pm to 07:00 am are encouraged to adopt the Continuous Descent Approach (CDA).	Airport operation / Operation Period			✓
7.3.3	Ch 3	2.21	Putting the existing south runway on standby where possible at night between 2300 and 0659.	Airport operation / Operation Period			✓
7.3.3	Ch 3	2.21	Aircraft departing to the south are required to take the via West Lamma Channel route during east flow at night from 2300 to 0659, subject to acceptable operational and safety consideration.	Airport operation / Operation Period			✓
7.3.3	Ch 3	2.21	Preferential use of the new arrival Required Navigation Performance (RNP) Track 6 in the west flow direction (i.e., runway 25 direction), between 2300 and 0659 and by year 2030, instead of the existing straight-in tracks.	Airport operation / Operation Period			✓
7.3.3	Ch 3	2.21	Implementing a preferential runway use programme when wind conditions allow such that west flow is used when departures dominate while east flow is used when arrivals dominate during night-time.	Airport operation / Operation Period			✓

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Stage		
					Des	C	O
Noise Impact – Fixed Noise Sources							
7.4.7	Ch 3	N/A	All aircraft parking at frontal stand are required to connect to the fixed ground power and the use of APU is prohibited since 2014. APU will be operated before the aircraft reaches the gate (for around 1 min), and after the aircraft leaves the gate when the main engines has not been started yet (for around 5 min),	Within the Project site / During operation phase / Throughout operation phase			✓
7.9.2	3.2.1	N/A	Specification of the maximum permissible SWLs of the project’s fixed plants during daytime / evening and night-time should be followed.	Within the Project site / During operation phase / Throughout operation phase	✓		✓
Noise Impact – Construction Phase							
Not applicable							
Water Quality Impact – Construction Phase							
8.5.1.3	Ch 5	2.31	Use of non-dredge ground improvement methods for land formation for avoidance of SS and contaminants release.	Within construction site / Duration of the design and construction phase	✓	✓	
8.6.4.1	Ch 5	N/A	Only rockfill will be used in the construction of the seawall core for avoidance of SS release during seawall construction.	Within construction site / Duration of the design and construction phase	✓	✓	
8.6.4.1	Ch 5	N/A	Where steel cells are used as part of seawall core construction, sand fill will be deposited directly into the steel cell structures, which are isolated from the surrounding marine waters, hence no release of SS will arise from this activity.	Within construction site / Duration of the design and construction phase	✓	✓	
8.6.4.9 & 8.6.4.10	Ch 5	N/A	Fine content of sand (to be specified in the relevant works contracts) = 5 % to 10 %	Within construction site / Duration of the design and construction phase	✓	✓	
8.7.1.62	Ch 5	2.28	Use of horizontal directional drill (HDD) method for submarine aviation fuel pipelines diversion.	Within construction site / Duration of the design and construction phase	✓	✓	

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Stage		
					Des	C	O
8.7.1.65	Ch 5	N/A	Only welding works will be carried out on the floating platform, and bulk storage of chemicals is not required at the daylighting point at Sha Chau	Within construction site / Duration of the construction phase		✓	
8.7.1.65	Ch 5	N/A	No dewatering of pipe at Sha Chau	Within construction site / Duration of the construction phase		✓	
8.7.1.66	Ch 5	N/A	Provision of a small concrete bund wall around the high side of the pit, and a cover to prevent rain entry at the daylighting point at Sha Chau to prevent muddy runoff	Within construction site / Duration of the construction phase		✓	
8.7.1.68	Ch 5	N/A	Drilling is conducted via a closed-loop system at the launching point at airport island, and drilling fluid is reconditioned and reused	Within construction site / Duration of the construction phase		✓	
8.6.4	Ch 5	2.31	Use of water jetting method and closed grabs for field joint excavation for diversion of submarine 11 kV cables to minimise SS and contaminant release	Within construction site / Duration of the design and construction phase	✓	✓	
8.8.1.4	Ch 5	N/A	Connection works for outfalls to be undertaken during dry season.	Within construction site / Duration of the construction phase		✓	
<b>Water Quality Impact – Operation Phase</b>							
8.7.2.39	Ch 5	2.33	Connection of sewage to public sewerage system and transfer to the Siu Ho Wan Sewage Treatment Works (STW) for treatment.	During design and operation phase	✓		✓
8.7.2.43	Ch 5	2.33	Reuse of treated greywater to reduce sewage effluent and fresh water usage	During operation phase			✓
8.7.1.62	Ch 5	N/A	Placement of submarine aviation fuel pipelines under seabed rocks to avoid possible damage from marine vessels and fuel leakage	During design phase	✓		
8.6.3.3	Ch 5	N/A	Appropriate design of the land formation to avoid major changes in local and regional hydrodynamics	During design phase	✓		
8.8.2.4	Ch 5	N/A	Restrict operation of the fuel supply and refuelling systems to qualified and trained personnel	During operation phase			✓

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Stage		
					Des	C	O
Sewerage and Sewage Treatment Implication – Operation Phase							
Not applicable							
Waste Management Implication – Construction Phase							
10.5.1.1	Ch 6	2.31	The use of non-dredge methods for ground improvement will completely avoid bulk removal and disposal of any dredged materials.	Project Site Area / During design and construction phase	✓	✓	
Table 10.16	Ch 6	N/A	Most sloping seawall options can allow for the reuse of rock armour from the existing northern seawall to minimise waste generation.	Project Site Area / During design and construction phase	✓	✓	
10.4.1.36	Ch 6	N/A	All marine sediments to be generated from the foundation / piling / excavation works for constructing various tunnels, facilities, buildings and APM depot will be treated and reused on-site as backfilling materials, thus avoiding the need for disposal of the sediments.	Project Site Area / During design and construction phase	✓	✓	
Table 10.16	Ch 6	2.28	Use HDD method to construct the new pipeline will avoid dredging of seabed.	Project Site Area / During design and construction phase	✓	✓	
Table 10.16	Ch 6	2.31	Use of water jetting method to lay the new cable will avoid generation and disposal of any marine sediment.	Project Site Area / During design and construction phase	✓	✓	
Waste Management Implication – Operation Phase							
10.5.2.1	Ch 6	N/A	The initiatives currently implemented at the existing airport in segregating recyclable waste materials (such as cardboard, paper, metals, plastics, glass bottles, food waste, etc.) from general refuse for recycling should be extended to cover the expanded airport;	Project Site Area / Operation Phase			✓
10.4.1.66	Ch 6	N/A	The artificial seawall of the expanded airport island has been properly designed to achieve a shoreline without any sharp turns or abrupt indentation where floating refuse would easily be trapped or accumulated.	Project Site Area / Operation Phase			✓
Land Contamination – Construction Phase							
Not applicable							

EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Stage		
					Des	C	O
Terrestrial Ecological Impact – Construction Phase							
12.7.2.3 and 12.7.2.6	Ch 9	2.14	Avoidance of direct impact to egrettry – the daylighting location should be outside egrettry boundary	Project Site Area / During design and construction phase	✓	✓	
12.7.2.4 and 12.7.2.6	Ch 9	2.30	Construction activities at Sheung Sha Chau should avoid night-time and the ardeid's breeding season (April – July).	Project Site Area / During design and construction phase	✓	✓	
Marine Ecological Impact – Construction Phase							
13.8.2.5	Ch 10	N/A	Underwater percussive piling work will not be adopted for the project.	Project Site Area / During design and construction phase	✓	✓	
13.8.2.24	Ch 10	2.31	Non-dredge methods will be adopted for land formation which will substantially reduce the environmental impacts compared with the conventional dredging method.	Project Site Area / During design and construction phase	✓	✓	
13.8.2.48	Ch 10	N/A	The construction vessels will be travelled at slow speed, and will mostly be routed to travel from west and south around Lung Kwu Chau instead of through Urmston Road. The risk of vessel collision and chemical spillage will therefore be lowered.	Project Site Area / During construction phase		✓	
13.8.2.49	Ch 10	N/A	All vessels shall be sized with adequate clearance maintained between vessels and the seabed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.	Project Site Area / During construction phase		✓	
13.9.2.24	Ch 10	N/A	Backfilling activities for main land formation will be undertaken behind a 200 m advance of seawall to minimise the dispersion of fine materials.	Within construction site / Duration of the design and construction phase	✓	✓	
13.9.2.24	Ch 10	N/A	Seawalls will be constructed using rock fill and as only rockfill will be used in construction of the seawall core, the potential SS release during seawall construction is considered to be insignificant.	Within construction site / Duration of the design and construction phase	✓	✓	
13.9.2.29	Ch 10	N/A	The excavation rate for laying the new 11 kv submarine cables will be very slow, at only 300 m³/day, to avoid damaging the existing buried cable.	Within construction site / Duration of the design and construction phase	✓	✓	

				Location / Duration of measures	Implementation Stage		
EIA Ref.	EM&A Ref.	EP Condition	Environmental Protection Measures	Timing of completion of measures	Des	C	O
Marine Ecological Impact – Operation Phase							
13.8.3.2	Ch 10	N/A	The HKIAAA is restricted to vessel entry, and therefore will provide a limited disturbance environment for the establishment of intertidal and sub-tidal communities at the extended seawall.	Project Site Area / Operation Phase			✓
Fisheries Impact – Construction Phase							
Not applicable							
Landscape and Visual Impact – Construction Phase							
Not applicable							
Landscape and Visual Impact – Operation Phase							
Not applicable							
Cultural Heritage Impact – Construction Phase							
Not applicable							
Cultural Heritage Impact – Operation Phase							
Not applicable							
Health Impact – Aircraft Emissions							
Not applicable							
Health Impact – Aircraft Noise							
Not applicable							

Notes:

Des=Design; C=Construction; O=Operation

## Appendix F. Sample Template for Interim Notifications

### Sample template for the interim notifications of Environmental Quality Limits Exceedances

#### Incident Report on Action Level or Limit Level Non-compliance

Project	
Date	
Time	
Monitoring Location	
Parameter	
Action & Limit Levels	
Measured Level	
Possible reason for Action or Limit Level Non-compliance	
Actions taken / to be taken	
Remarks	

#### Location Plan

Prepared by:

Designation:

Signature:

Date:

