

Ramboll Hong Kong Limited 21st Floor, BEA Harbour View Centre 56 Gloucester Road Wan Chai, Hong Kong

Attn:

Mr. Ray Yan - Independent Environmental Checker

Our Reference TC/GC/al/T355861/02/ 02/L123

3/F International Trade Tower (formerly Mapletree Bay Point) 348 Kwun Tong Road Kowloon Hong Kong

T +852 2828 5757 F +852 2827 1823 mottmac.hk Contract No. HY/2013/04 Hong Kong-Zhuhai-Macao Bridge (HZMB) Hong Kong Boundary Crossing Facilities – Infrastructure Works Stage II (Southern Portion)

Quarterly EM&A Report for October 2018 to November 2018

25 June 2019

By Email

Dear Sir,

In accordance with Section 16.4 of the updated EM&A Manual for Hong Kong Boundary Crossing Facilities (Version 1.0) covering the captioned contract, we are pleased to submit the certified Quarterly EM&A Report for October 2018 to November 2018 for your verification.

Yours faithfully
For MOTT MACDONALD HONG KONG LIMITED

Gary Chow

Environmental Team Leader

Encl.

CC.

AECOM – Mr. Peter Lee (By Email)
China State Construction Engineering (Hong Kong) Ltd. – Mr. Xavier Lam / Mr. Ng
Ka Po (By Email)



Ref.: HYDHZMBEEM00\_0\_7480L.19.doc

27 June 2019

By Fax (3468 2076) and By Post

AECOM Asia Co. Ltd. The PRE's Office 550 Cheung Tung Road, Lantau, Hong Kong

Attention: Mr. Peter Lee

Dear Sir,

Re: Agreement No. CE 48/2011 (EP)

**Environmental Project Office for the** 

HZMB Hong Kong Link Road, HZMB Hong Kong Boundary Crossing Facilities, and Tuen Mun-Chek Lap Kok Link – Investigation

Contract No. HY/2013/04 - HZMB HKBCF - Infrastructure Works Stage II (Southern Portion)

**Quarterly EM&A Report for October 2018 to November 2018** 

Reference is made to the Environmental Team's submission of the Quarterly Environmental Monitoring & Audit Report for October 2018 to November 2018 certified by the ET Leader (ET's ref.: "TC/GC/al/T355861/02/02/L123" dated 25 June 2019) and provided to us via e-mail on 25 June 2019.

We are pleased to inform you that we have no adverse comment on the captioned Quarterly EM&A Report for October 2018 to November 2018.

Thank you very much for your attention and please feel free to contact the undersigned should you require further information.

Yours faithfully, For and on behalf of Ramboll Hong Kong Limited

Ray Yan

Independent Environmental Checker

c.c. HyD Mr. Cheng Pan (By Fax: 3188 6614) HyD Mr. Harry Louie (By Fax: 3188 6614)

MMHK Mr. Gary Chow (By Fax: 2827 1823) CSCE Mr. Jason Chung (By Fax: 2459 4336)

Internal: DY, YH, DF, HW, ENPO Site



Contract No. HY/2013/04 HZMB HKBCF – Infrastructure Works Stage II (Southern Portion)

Quarterly EM&A Report for October 2018 to November 2018

June 2019

 $Mott\ MacDonald\ |\ Contract\ No.\ HY/2013/04\ HZMB\ HKBCF-Infrastructure\ Works\ Stage\ II\ (Southern\ Portion)$ 

#### Information class: Standard

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### **Executive summary**

This Quarterly Environmental Monitoring and Audit (EM&A) Report is prepared for Contract No. HY/2013/04 "Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Infrastructure Works Stage II (Southern Portion)" (hereafter referred to as "the Contract") for the Highways Department of Hong Kong Special Administrative Region (HKSAR). The Contract was awarded to China State Construction Engineering (Hong Kong) Limited (hereafter referred to as "the Contractor") and Mott MacDonald Hong Kong Limited (MMHK) was appointed as the Environmental Team (ET) by the Contractor.

The Contract is part of the "Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities" (HZMB HKBCF) Project which is a "Designated Project" under Schedule 2 of the Environmental Impact Assessment (EIA) Ordinance (Cap. 499) and for which an EIA Report (Register No. AEIAR-145/2009) was prepared and approved. The current Environmental Permit (EP) for HKBCF, namely No. EP-353/2009/K, was issued on 11 April 2016. These documents are available through the EIA Ordinance Register. Commencement of the Contract took place on 13 March 2015 and the construction works commenced on 13 July 2015.

Mott MacDonald Hong Kong Limited has been appointed by the Contractor to implement the Environmental Monitoring & Audit (EM&A) programme for the Contract in accordance with the Updated EM&A Manual for HKBCF (Version 1.0) and will be providing environmental team services for the Contract. This is the 14<sup>th</sup> Quarterly EM&A Report for the Contract which summarises findings of the EM&A works for air quality, noise, water quality and waste management for October to November 2018 and the impact dolphin monitoring data and analyses for September to November 2018 (which together form the "reporting period") in order to tally with the project dolphin monitoring quarterly review period.

#### **Environmental Monitoring and Audit Progress**

The EM&A programme was undertaken in accordance with the Updated EM&A Manual for HKBCF (Version 1.0).

The remaining air quality, noise, water quality and dolphin monitoring works under Contract No. HY/2013/01 "HZMB HKBCF – Passenger Clearance Building" were suspended from 1 October 2018. The ET of Contract No. HY/2013/04 is required and continues the full implementation of environmental monitoring commencing on 1 October 2018.

Air quality monitoring stations AMS2, AMS3C and AMS7B are covered by this Contract. It should be noted that the air quality monitoring station AMS6 is covered by Contract No. HY/2011/03 "Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road (HZMB HKLR) – Section between Scenic Hill and HKBCF". If the impact air quality monitoring at AMS6 is no longer covered under Contract No. HY/2011/03, it is required to continue such monitoring at AMS6 as part of EM&A programme However, this is subject to ENPO's final decision on which ET should carry out the monitoring work at these stations.

Noise monitoring stations NMS2 and NMS3C, water quality monitoring works and dolphin monitoring works under HZMB HKBCF are covered by this Contract.

A summary of monitoring and audit activities conducted in the reporting period is listed below:

1-hour Total Suspended Particulates (TSP) monitoring: 23 sessions

24-hour TSP monitoring: 17 sessions
Noise monitoring: 10 sessions
Impact water quality monitoring: 25 sessions

Impact dolphin monitoring:
 6 surveys conducted

Joint Environmental site inspection: 9 sessions

#### **Breaches of Action and Limit Levels**

Summary of Action and Limit Level exceedance of 1-hr TSP level and 24-hr TSP level at AMS6 shall be referred to the monthly EM&A report prepared by Contract No. HY/2011/03.

A summary of environmental exceedances for the reporting period as recorded by the Environmental Team of this Contract are listed below:

<b>Environmental Monitoring</b>	Parameters	<b>Action Level</b>	<b>Limit Level</b>
Air Quality	1-hour TSP	-	-
	24-hour TSP	-	-
Noise	Leq (30 min)	-	-
Water Quality	Suspended Solids (SS)	6	-
	Turbidity	1	-
	Dissolved Oxygen (DO)	-	-
Dolphin Monitoring	Quarterly analysis	-	1

The ET of this Contract conducted investigations into the exceedances of impact water quality monitoring and impact dolphin monitoring, and the findings are presented in this report.

Furthermore, impact dolphin monitoring results at all transects during September 2018 are reported in the monthly EM&A Reports for Contract No. HY/2013/01, while impact dolphin monitoring results at all transects during October 2018 and November 2018 are reported in the monthly EM&A Reports for this Contract.

#### **Complaint Log**

There was one new complaint received in relation to the environmental impact during the reporting period.

Log No.	Environmental Complaint Ref. No.	Date of Complaint Receipt	Description
010	ENPO-C0139	3 October 2018	Air Quality

The complaint referred to a large amount of dust generated due to lack of water spraying on dirt road at HKBCF Island site. As informed by EPD, the location under complaint was near the exit/entrance of Contract No. HY/2013/04 as advised by the complainant.

The complaint was investigated by the ET of this Contract and the findings are also presented in this report.

#### **Notifications of Summons and Successful Prosecutions**

There were no notifications of summons or prosecutions received during this reporting period.

#### **Reporting Changes**

The remaining air quality, noise, water quality and dolphin monitoring works under Contract No. HY/2013/01 "HZMB HKBCF – Passenger Clearance Building" were suspended from 1 October

2018. The ET of Contract No. HY/2013/04 is required and continues the full implementation of environmental monitoring commencing on 1 October 2018.

It should be noted that the air quality monitoring station AMS6 is covered by Contract No. HY/2011/03 "Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road (HZMB HKLR) – Section between Scenic Hill and HKBCF".

A proposal by ET to temporarily suspend the water quality monitoring under the EM&A programme during a scheduled period of no marine works under HZMB HKBCF was verified by IEC on 26 October 2018 and approved by EPD on 21 November 2018. Subsequently, the water quality monitoring programme was temporarily suspended by ET after completion of water quality monitoring on 26 November 2018.

### 1 Introduction

#### 1.1 Basic Project Information

This Quarterly Environmental Monitoring and Audit (EM&A) Report is prepared for Contract No. HY/2013/04 "Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Infrastructure Works Stage II (Southern Portion)" (hereafter referred to as "the Contract") for the Highways Department of Hong Kong Special Administrative Region (HKSAR). The Contract was awarded to China State Construction Engineering (Hong Kong) Limited (hereafter referred to as "the Contractor") and Mott MacDonald Hong Kong Limited (MMHK) was appointed as the Environmental Team (ET) by the Contractor.

The Contract is part of the "Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities" (HZMB HKBCF) Project which is a "Designated Project" under Schedule 2 of the Environmental Impact Assessment (EIA) Ordinance (Cap. 499) and for which an EIA Report (Register No. AEIAR-145/2009) was prepared and approved. The current Environmental Permit (EP) for HKBCF, namely No. EP-353/2009/K, was issued on 11 April 2016. These documents are available through the EIA Ordinance Register. Commencement of the Contract took place on 13 March 2015 and the construction works commenced on 13 July 2015. The works areas of the contract are shown in **Appendix A**.

This is the 14<sup>th</sup> Quarterly EM&A Report for the Contract which summarises findings of the EM&A works for air quality, noise, water quality and waste management for October to November 2018 and the impact dolphin monitoring data and analyses for September to November 2018 (which together form the "reporting period") in order to tally with the project dolphin monitoring quarterly review period.

#### 1.2 Project Organisation

The organisation chart and lines of communication with respect to the on-site environmental management structure together with the contact information of the key personnel are shown in **Appendix B**. The key personnel contact names and numbers are summarized in **Table 1.1**.

**Table 1.1: Contact Information of Key Personnel** 

Party	Position	Name	Telephone	Fax
Engineer or Engineer's Representative (AECOM Asia Co. Ltd.)	Chief Resident Engineer	Alfred Cheng	3958 7471	3468 2076
Environmental Project Office /	Environmental Project Office Leader	Y H Hui	3465 2888	3465 2899
Independent Environmental Checker (Ramboll Hong Kong Limited)	Independent Environmental Checker	Raymond Dai	3465 2888	3465 2899
	Environmental Site Supervisor	Ray Yan	5181 8165	3465 2899
Contractor	Site Agent	Jason Chung	9127 8369	2459 4336
(China State Construction Engineering (Hong Kong)	Environmental Officer	Xavier Lam	9493 2944	2459 4336
Limited)		Desmond Ho (until 20 Oct 2018)	6351 3811	2459 4336
,	_	K P Ng (from 22 Oct 2018)	9626 9961	2459 4336

Party	Position	Name	Telephone	Fax
Environmental Team (Mott MacDonald Hong Kong Limited)	Environmental Team Leader	Gary Chow	2828 5874	2827 1823
24-hour Complaint Hotline	-	-	5236 7111	-

#### 1.3 Construction Programme

The Construction Works Programme of the Project is provided in **Appendix C**.

#### 1.4 Construction Works undertaken during the Reporting Period

A summary of the construction activities undertaken during this reporting period is shown below:

- Erection of sign gantries
- Erection of precast segments
- Erection of precast bridge structures
- Construction of parapets for bridge structures
- Construction of Abutment A1601 and associated retaining walls
- Construction of Retaining Wall RW16N and RW16S
- Construction of Bridge D16 in-situ deck
- Construction of utilities cross-over frame under Bridge D9c
- Backfilling walls and formation of fill slopes and road embankment
- Drainage works and watermains laying
- Roadworks and road furniture
- Maintenance of TTA associated with the commissioning of HKBCF and TM-CLKL-SC
- No marine-based segment delivery (all segments stored at segment storage yard on HKBCF island site)
- No generation of excavated marine sediment

During this reporting period, temporary soft landscaping works were conducted and marine-based outfall works had not commenced.

## 2 EM&A Requirements

#### 2.1 Summary of EM&A Requirements

The EM&A programme was undertaken in accordance with the Updated EM&A Manual for HKBCF (Version 1.0).

For this reporting period, the remaining air quality, noise, water quality and dolphin monitoring works under Contract No. HY/2013/01 "HZMB HKBCF – Passenger Clearance Building" were suspended from 1 October 2018. The ET of Contract No. HY/2013/04 is required and continues the full implementation of environmental monitoring commencing on 1 October 2018.

Air quality monitoring at stations AMS2, AMS3C and AMS7B, and noise monitoring at station NMS2 and NMS3C, are covered by this Contract. It should be noted that the air quality monitoring station AMS6 is covered by Contract No. HY/2011/03 "Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road (HZMB HKLR) – Section between Scenic Hill and HKBCF". If the impact air quality monitoring at AMS6 is no longer covered under Contract No. HY/2011/03, it is required to continue such monitoring at AMS6 as part of EM&A programme However, this is subject to ENPO's final decision on which ET should carry out the monitoring work at these stations.

A summary of air and noise monitoring locations are presented in **Table 2.1**. The location of air quality and noise monitoring stations are shown as in **Figure 2.1** and **Figure 2.2**, respectively.

**Table 2.1: Construction Dust and Noise Monitoring Locations** 

<b>Environmental Monitoring</b>	Identification No.	Location Description
Air Quality	AMS2 <sup>(3)</sup>	Tung Chung Development Pier
	AMS3C	Ying Tung Estate Market Rooftop
	AMS6 <sup>(1)</sup>	Dragonair / CNAC (Group) Building
	AMS7B <sup>(3)</sup>	3RS Site Offices
Noise	NMS2 <sup>(3)</sup>	Seaview Crescent
	NMS3C <sup>(2)</sup>	Ying Tung Estate Refuse Collection Point

Remarks

- (1) The ET of this Contract should conduct impact air quality monitoring at station AMS6 listed in the table as part of EM&A programme according to latest notification from ENPO when the monitoring station(s) is/are no longer covered by another ET of the HZMB project.
- (2) The Action and Limit Levels for schools will be applied for this alternative monitoring location.
- (3) Monitoring works at this location by the ET of this Contract commenced on 1 October 2018.

The water quality monitoring works for HZMB HKBCF under the approved EM&A Manual for the reporting period are covered by this Contract. A total of twenty-one stations (nine Impact Stations, seven Sensitive Receiver Stations and five Control/Far Field Stations) are covered by the current EM&A programme.

**Table 2.2** and **Figure 2.3** show the locations of water quality monitoring stations.

**Table 2.2: Impact Water Quality Monitoring Stations** 

Station	Description	East	North
IS5	Impact Station (Close to HKBCF construction site)	811579	817106

Station	Description	East	North
IS(Mf)6	Impact Station (Close to HKBCF construction site)	812101	817873
IS7	Impact Station (Close to HKBCF construction site)	812244	818777
IS8	Impact Station (Close to HKBCF construction site)	814251	818412
IS(Mf)9	Impact Station (Close to HKBCF construction site)	813273	818850
IS10(N)	Impact Station (Close to HKBCF construction site)	812942	820881
IS(Mf)11	Impact Station (Close to HKBCF construction site)	813562	820716
IS(Mf)16	Impact Station (Close to HKBCF construction site)	814328	819497
IS17	Impact Station (Close to HKBCF construction site)	814539	820391
SR3(N)	Sensitive receivers (San Tau SSSI)	810689	816591
SR4(N)	Sensitive receivers (Tai Ho)	814705	817859
SR5(N)	Sensitive receivers (Artificial Reef in NE Airport)	812569	821475
SR6	Sensitive receivers (Sha Chau and Lung Kwu Chau Marine Park)	805837	821818
SR7	Sensitive receivers (Tai Mo Do)	814293	821431
SR10A(N)	Sensitive receivers (Ma Wan FCZ) 1	823644	823484
SR10B(N2)	Sensitive receivers (Ma Wan FCZ) 2	823689	823159
CS(Mf)3(N)	Control Station	808814	822355
CS(Mf)5	Control Station	817990	821129
CS4	Control Station	810025	824004
CS6	Control Station	817028	823992
CSA	Control Station	818103	823064

The dolphin monitoring works for the Contract are covered by Contract No. HY/2011/03 "Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road (HZMB HKLR) – Section between Scenic Hill and HKBCF" with the reporting of reporting results presented by the ET of Contract No. HY/2013/04. The dolphin monitoring should adopt line-transect vessel survey method. The survey follows pre-set and fixed transect lines in the two areas defined by AFCD as: Northeast Lantau survey area; and Northwest Lantau survey area.

**Table 2.3** shows the co-ordinates for the transect lines and layout map.

The revised layout map showing the transect lines have been provided by AFCD and are shown in **Figure 2.4**.

Table 2.3: Impact Dolphin Monitoring Line Transect Co-ordinates (Provided by AFCD)

Transect	HK Grid System		Long Lat i	in WGS84
	X	Υ	Long	Lat
1#	804671	815456	113.870287	22.277678
	804671	831404	113.869975	22.421696
2*^	805476	820800	113.877995	22.325951
	805476	826654	113.877882	22.378815
3^	806464	821150	114.030267	22.196697
	806464	822911	114.047344	22.196712
4^	807518	821500	114.033651	22.206219
	807518	829230	114.108618	22.206267
5^	808504	821850	114.037037	22.215126
	808504	828602	114.102523	22.215169
6^	809490	822150	114.039938	22.224033
	809490	825352	114.070995	22.224056

Transect	HK Grid	System	Long Lat	in WGS84
7*^	810499	822000	114.038474	22.233143
	810499	824613	114.063820	22.233163
8#	811508	821123	113.936539	22.328966
	811508	824254	113.936486	22.357241
9#	812516	821303	113.946320	22.330606
	812516	824254	113.946279	22.357255
10*	813525	820827	113.956112	22.326321
	813525	824657	113.956066	22.360908
11#	814556	818853	113.966155	22.304858
	814556	820992	113.966125	22.327820
12	815542	818807	113.975726	22.308109
	815542	824882	113.975647	22.362962
13	816506	819480	113.985072	22.314192
	816506	824859	113.985005	22.362771
14	817537	820220	113.995070	22.320883
	817537	824613	113.995018	22.360556
15	818568	820735	114.005071	22.325550
	818568	824433	114.005030	22.358947
16	819532	821420	114.014420	22.331747
	819532	824209	114.014390	22.356933
17	820451	822125	114.023333	22.338117
	820451	823671	114.023317	22.352084
18	821504	822371	114.033556	22.340353
	821504	823761	114.033544	22.352903
19	822513	823268	114.043340	22.348458
	822513	824321	114.043331	22.357971
20	823477	823402	114.052695	22.349680
	823477	824613	114.052686	22.360610
21	805476	827081	113.877878	22.382668
	805476	830562	113.877811	22.414103
22	806464	824033	113.887520	22.355164
	806464	829598	113.887416	22.405423
23	814559	821739	113.966142	22.334574
	814559	824768	113.966101	22.361920
24^	805476	815900	113.979368	22.187721
	805476	819100	114.010398	22.187756

#### Remarks:

- (a) \* Due to the presence of deployed silt curtain systems at the site boundaries of the Contract, some of the transect lines shown in Figure 2.4 could not be fully surveyed during the regular survey. Transect 10 is reduced from 6.4km to approximately 3.6km in length due to the HKBCF construction site. Therefore the total transect length for both NEL and NWL combined is reduced to approximately 108km.
- (b) # Coordinates for transect lines 1, 2, 7, 8, 9 and 11 have been updated in respect to the Proposal for Alteration of Transect Line for Dolphin Monitoring approved by EPD on 19 August 2015.
- (c) ^ The change of transect lines 2, 3, 4, 5, 6 and 7 and new transect line 24 were justified and verified by the ET Leader for Contract No. HY/2010/02 and the IEC respectively on 24 March 2017 and it was approved by EPD on 12 May 2017.

#### 2.2 Monitoring Requirements

The monitoring requirements, monitoring equipment, monitoring parameters, frequency and duration, monitoring methodology, monitoring schedule, meteorological information are detailed in the monthly EM&A reports prepared for this Contract and Contract No. HY/2011/03.

#### 2.3 Action and Limit Levels

The Action and Limit Levels for 1-hr TSP and 24-hr TSP are provided in **Table 2.4** and **Table 2.5** respectively.

Table 2.4: Action and Limit Levels for 1-hour TSP

Monitoring Station	Action Level, μg/m³	Limit Level, μg/m³
AMS2 – Tung Chung Development Pier	374	500
AMS3C – Ying Tung Estate Market Rooftop	368	500
AMS6 - Dragonair / CNAC (Group) Building (HKIA)	360	500
AMS7B – 3RS Site Offices	370	500

Table 2.5: Action and Limit Levels for 24-hour TSP

Monitoring Station	Action Level, μg/m <sup>3</sup>	Limit Level, μg/m³
AMS2 – Tung Chung Development Pier	176	260
AMS3C – Ying Tung Estate Market Rooftop	167	260
AMS6 – Dragonair / CNAC (Group) Building (HKIA)	173	260
AMS7B – 3RS Site Offices	183	260

If exceedance(s) at these stations is/are recorded by the ET of the Contract or referred by the other ET under the HZMB project to the Contract, the ET of the Contract will carry out an investigation and findings will be reported in the quarterly EM&A report.

The Action and Limit Levels for construction noise are defined in **Table 2.6**.

Table 2.6: Action and Limit Level for Construction Noise

Monitori	ng Station	Time Period	Action Level	Limit Level
NMS2	07:00 – 19:00 hours on		When one documented complaint is received	70 dB(A)
NMS3C		normal weekdays	when one documented complaint is received	70/65 dB(A)*
Remark:	k: Limit Level for schools will be applied for NMS3C. Day time noise Limit Level of 70 dB(A) applies to			pplies to

education institutions, while 65 dB(A) applies during the school examination period.

If exceedance(s) at these stations is/are recorded by the ET of the Contract or referred by the other ET under the HZMB project to the Contract, the ET of the Contract will carry out an investigation and findings will be reported in the quarterly EM&A Report.

The Action and Limit Levels for water quality are provided in **Table 2.7**.

Table 2.7: Action and Limit Levels for Water Quality

Action	Limit
Surface and Middle	Surface and Middle
5.0	4.2 (except 5 mg/L for FCZ)
Bottom	Bottom
4.7	3.6
	Surface and Middle 5.0 Bottom

Parameters	Action	Limit
SS in mg L <sup>-1</sup> (depth-averaged) at all monitoring stations and control stations	23.5 and 120% of upstream control station's SS at the same tide of the same day*	34.4 and 130% of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes*
Turbidity in NTU (depth-averaged)	27.5 and 120% of upstream control station's turbidity at the same tide of the same day*	47.0 and 130% of upstream control station's

#### Remarks:

 Reference is made to EPD approval of adjustment of water quality assessment criteria issued and became effective on 18 February 2013.

#### Notes:

- 1. "depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.
- 2. For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
- 3. For turbidity, SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
- 4. All the figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered as necessary.
- The 1%-ile of baseline data for dissolved oxygen (surface and middle) and dissolved oxygen (bottom) are 4.2 mg/L and 3.6 mg/L respectively.

If exceedance(s) at these stations is/are recorded by the ET of the Contract or referred by the other ET under the HZMB project to the Contract, the ET of the Contract will carry out an investigation and findings will be reported in the monthly EM&A Report.

The Action and Limit Levels for Chinese White Dolphin Monitoring are provided in **Table 2.8** and **Table 2.9**, respectively.

Table 2.8: Action and Limit Levels for Chinese White Dolphin Monitoring - Approach to Define Action Level (AL) and Limit Level (LL)

	North Lantau Social Cluster		
	NEL	NWL	
Action Level	(STG < 70% of baseline) & (ANI < 70% of baseline)	(STG < 70% of baseline) & (ANI < 70% of baseline)	
Limit Level	,	[(STG < 40% of baseline) & (ANI < 40% of baseline)] AND [(STG < 40% of baseline) & (ANI < 40% of baseline)]	

Table 2.9: Derived Value of Action Level (AL) and Limit Level (LL) for Chinese White Dolphin Monitoring

	North Lantau	North Lantau Social Cluster		
	NEL	NWL		
Action Level	(STG < 4.2) & (ANI < 15.5)	(STG < 6.9) & (ANI < 31.3)		
Limit Level	[(STG < 2.4) & (ANI <8.9)] AN	D [ (STG < 3.9) & (ANI < 17.9)]		

If exceedance(s) at these survey transect(s) is/are recorded by the ET of the Contract or referred by the other ET under the HZMB project to the Contract, the ET of the Contract will carry out an investigation and findings will be reported in the monthly EM&A Report.

#### 2.4 Event and Action Plans

The event and action plans for air quality, noise, water quality and dolphin monitoring are provided in **Appendix D**.

#### 2.5 Mitigation Measures

Environmental mitigation measures for the contract were recommended in the approved EIA Report. **Appendix E** lists the recommended mitigation measures and the implementation status.

## 3 Environmental Monitoring and Audit

#### 3.1 Air Quality Monitoring Results

The monitoring results for AMS2, AMS3C and AMS7B are reported in the monthly EM&A Report prepared for this Contract.

The monitoring results for AMS6 are reported in the monthly EM&A Reports prepared for Contract No. HY/2011/03.

Summary of Action and Limit Level exceedance of 1-hr TSP level and 24-hr TSP level at AMS6 is reported in the monthly EM&A Reports (for October and November 2018) prepared by Contract No. HY/2011/03.

There was no Action and Limit Level exceedance of 1-hr TSP level and 24-hr TSP level recorded at station AMS2, AMS3C and AMS7B by the Environmental Team of this Contract during the reporting period.

#### 3.2 Noise Monitoring Results

The monitoring results for NMS2 and NMS3C are reported in the monthly EM&A Reports (for October and November 2018) prepared for this Contract.

No noise exceedances were recorded at stations NMS2 and NMS3C by the ET of this Contract during the reporting period.

#### 3.3 Water Quality Monitoring Results

The monitoring results for the twenty-one monitoring stations are reported in the monthly EM&A Report (for October and November 2018) prepared for this Contract.

During the reporting period, a total of seven exceedances of water quality (consisting of 6 Action Level exceedances of suspended solids and one Action Level exceedance of turbidity) were recorded by the Environmental Team of this Contract during October and November 2018. Following investigations, it was concluded that the exceedances were not related to the HZMB HKBCF project. The detailed investigation results of these exceedances recorded are presented in **Appendix K**.

Water quality exceedances recorded during the reporting period are summarised in Table 3.1.

Table 3.1: Summary of Water Quality Exceedances during Reporting Period

Date	Parameter (Units)	Station	Depth	Exceedance Recorded during Mid-ebb Tide	Exceedance Recorded during Mid-flood Tide
10 Oct 2018	SS	SR6	Depth Average	-	Action Level
24 Oct 2018	TURB	IS(Mf)6	Depth Average	Action Level	-
23 Nov 2018	SS	IS10(N)	Depth Average	-	Action Level
23 Nov 2018	SS	IS(Mf)11	Depth Average	-	Action Level
23 Nov 2018	SS	SR7	Depth Average	-	Action Level
26 Nov 2018	SS	SR10A(N)	Depth Average	-	Action Level

Date	Parameter (Units)	Station	Depth	Exceedance Recorded during Mid-ebb Tide	Exceedance Recorded during Mid-flood Tide
26 Nov 2018	SS	SR10B(N2)	Depth Average	-	Action Level

#### 3.4 Dolphin Monitoring Results

In accordance with the updated EM&A Manual, pre-set and fixed transect line vessel based dolphin survey was required in two AFCD designated areas (Northeast Lantau (NEL) and Northwest Lantau (NWL) survey areas). The impact dolphin monitoring at each survey area should be conducted twice per month.

The impact dolphin monitoring conducted is vessel-based and combines line-transect and photo-ID methodology, which have adopted similar survey methodologies as that adopted during baseline monitoring to facilitate comparisons between data sets.

The layout map of impact dolphin monitoring has been provided by AFCD and is shown in Figure 1 of **Appendix J**.

The effort summary and sighting details during the reporting period are shown in the **Appendix J**. A summary of key findings of the dolphin surveys completed during the reporting period is shown below in **Table 3.2**:

Table 3.2: Summary of Key Dolphin Survey Findings in the Reporting Period

Parameter		Findings		
Number of Impact Surveys Completed^		6		
	nce Travelled under On-Effort Condition	795 km		
Number of S	ightings	6 sightings (all sightings were recorded during "on effort" search)		
Number of de	olphin individual sighted	14 individuals		
Dolphin Encounter Rate#		NEL: 0.00 NWL: 1.5 ± 2.25		
Dolphin Group Size		Average of NEL: 0 Average of NWL: $2.3 \pm 1.03$ (n = 6) Varied from 1 – 4 individuals		
Most frequer	nt dolphin sighting area	NWL, in waters around Lung Kwu Chau		
Remarks: ^	Completion of line transect survey.	urvey of NEL and NWL survey area once was counted as one complete		
#	Dolphin Encounter Rate =	Sum of 1 <sup>st</sup> , 2 <sup>nd</sup> & 3 <sup>rd</sup> month's total sighting  Sum of 1 <sup>st</sup> , 2 <sup>nd</sup> & 3 <sup>rd</sup> month's total effort  X 100 km		
(encounter rates are calculate		ed using on effort sightings made under favourable conditions only.)		

<sup>.</sup> Event and Action Plan for Impact Dolphin Monitoring was triggered. For details of investigation, please refer to **Appendix K**.

Table 3.3: Summary of STG and ANI encounter rates in the Reporting Period

	NEL	NWL	Level Exceeded
STG*	0.0	1.5 ± 2.25	Limit
ANI**	0.0	$3.0 \pm 3.89$	Limit

Remarks: \* Quarterly Average Encounter Rate of Number of Dolphin Sightings (STG) presents averaged encounter rates of the three monitored months in terms of groups per 100km per survey event.

(Average of (total number of Individual/total effort) of 1st and 2nd

Quarterly Average Encounter Rate of Number of Dolphin Sightings (STG) presents averaged encounter Remarks: \* rates of the three monitored months in terms of groups per 100km per survey event. completed survey# of 1st month + Average of (total number of Individual/total effort) of 1st and 2nd completed survey of 2nd month + Average of (total number of Individual/total effort) of 1st and 2nd STG Encounter rate = X 100km completed survey# of 3rd month) Quarterly Average Encounter Rate of Total Number of Dolphins (ANI) presents averaged encounter rates of the three monitored months in terms of individuals per 100km per survey event. (Average of (total number of Individual/total effort) of 1st and 2nd completed survey# of 1st month+ Average of (total number of Individual/total effort) of 1st and 2nd completed survey# of 2nd month + Average of (total number of Individual/total effort) of 1st and 2nd completed survey<sup>#</sup> of 3<sup>rd</sup> month) ANI Encounter rate = X 100 km

Details of the comparison and analysis methodology and their findings and discussions are annexed in **Appendix J**.

#### 3.5 Implementation of Environmental Measures

In response to the site audit findings, the Contractor carried out corrective actions. Details of site audit findings and the corrective actions during the reporting period are presented in **Appendix F**.

A summary of the Implementation Schedule of Environmental Mitigation Measures (EMIS) is presented in **Appendix E**. Most of the necessary mitigation measures were implemented properly.

Implementation status of the Regular Marine Travel Route Plan (RMTRP) including checking of Contractor's marine traffic records by ER, ETL and IEC/ENPO would be conducted in the event of Contract-related marine traffic taking place during the reporting period.

According to the Contractor of HY/2013/04, all marine-based segment deliveries were completed in January 2018 and no marine-based works were conducted under the contract during the reporting period.

Implementation status of the Dolphin Watching Plan (DWP) was checked by ET. Training of marine mammal observer (MMO) was given to relevant staff and relevant records were kept properly. Silt curtains were provided at each box culvert for marine works areas in accordance with the approved Dolphin Watching Plan. The silt curtains were inspected regularly by ET and Contractor and the implementation was found to be in working order.

#### 3.6 Advice on the Solid and Liquid Waste Management Status

The Contractor registered as a chemical waste producer for the Contract. Sufficient numbers of receptacles were available for general refuse collection and sorting. As a practical means, the disposal operation is managed by a single HKBCF contractor who is also responsible for applying dumping permit and its subsequent extension applications from EPD. Contract No. HY/2013/03 has been assigned to coordinate and arrange for disposal of extracted marine sediment from this Contract.

There was no generation of excavated sediment for treatment during this reporting period. Any treatment of excavated marine sediment will be conducted using cement solidification / stabilization (Cement S/S) techniques and the treated sediment will be reused onsite for either backfilling or landscaping (e.g. berm material).

The summary of waste flow table is detailed in **Appendix G**.

The Contractor was reminded that chemical waste containers should be properly treated and stored temporarily in designated chemical waste storage area on site in accordance with the Code of Practice on the Packing, Labelling and Storage of Chemical Waste.

#### 3.6.1 Disposal of Marine Sediment Extracted from Bored Piling Works

#### 3.6.1.1 Background

After the acceptance of the review of the approved Sediment Quality Report (SQR) for this Project under EPD letter dated 19 August 2015, an approval to dispose the marine sediment extracted from bored piling for this Project was then approved under memo from Secretary, Marine Fill Committee of CEDD dated 20 August 2015 for the disposal of marine sediment extracted from bored piling works. The disposal sites allocated to this Project are the Mud Pit CMP2 of the Confined Marine Sediment Disposal Facility to the South of The Brothers (or at the East of Sha Chau). As advised by CEDD in the memo dated 19 February 2016, from 00:00 on 22 March 2016 onward, the disposal space at CMP2 of the South of The Brothers is closed and all disposal of contaminated sediment is to be carried out at CMP Vd to the East of Sha Chau (ESC).

As Contract No. HY/2013/01 has commenced treatment of the extracted marine sediment, treatment will continue and the treated marine sediment will be re-used within the HKBCF Island. On the other hand, Contract Nos. HY/2013/02, HY/2013/03 and HY/2013/04 have not commenced the treatment of extracted marine sediment. Therefore the marine sediment extracted from these three Contracts will be disposed to the allocated disposal sites directly without treatment. As a practical means, the disposal operation is managed by one contractor who is also responsible for applying dumping permit and its subsequent extension applications from EPD. Contract No. HY/2013/03 has been assigned to coordinate and arrange for disposal of extracted marine sediment from all three Contracts.

The SQR was further reviewed in mid-2016. EPD has no comment to extend the validity of the SQR to August 2017 under letter dated 18 August 2016.

Based on the actual piling operation, the estimated quantity of marine sediment to be extracted has been revised from 85,000 m³ to 126,000 m³ (bulk volume). EPD has no comments on the request as in the letter dated 20 October 2016. The Secretary of Marine Fill Committee, CEDD approved the increasing quantity in the memo dated 10 November 2016.

During the course of reviewing the SQR, it was noted that the contamination level of the marine sediment extracted from the inner part of the HKBCF Island was not identified during the previous sampling and testing. As requested by EPD, sampling and testing are required. The Sediment Sampling and Testing Proposal (SSTP) for the inner area of the HKBCF Island was approved by EPD on 2 June 2016.

As in the agreed SSTP for the inner area of the HKBCF Island, samples were taken from the seventeen batches of stockpiled marine sediments and from five boreholes each in one of the five sampling grids. After conducting chemical tests on samples, six batches of stockpiled samples under Contract No. HY/2013/03 and all eight batches of stockpiled samples under Contract No. HY/20013/04 are classified as Category L sediment. The Secretary of Marine Fill Committee of CEDD allocated disposal sites under memo dated 24 October 2016 and dated 22 November 2016 for disposal of a total of 9,500 m³ in-situ volume of Category L sediment (using a bulk factor of 1.3). The Category L sediment was disposed in December 2016.

One sample from the batch of stockpiled marine sediment under Contract No. HY/2013/03 and samples from all five sampling grids had contamination levels exceeding the Lower Chemical Exceedance Levels (LCEL) and biological screenings were carried out. All samples passed the biological screenings and are classified as Category Mp sediment and to be disposed off site using Type II confined marine disposal method the same method used for marine sediment extracted from other part of the HKBCF Island.

#### 3.6.1.2 Dumping Arrangements

The barge for disposal of marine sediment will morn at the temporary loading and unloading at the east shore of the HKBCF Island, which has been being used by reclamation contractor (Contract No. HY/2010/02) for reclamation activities. In terms of safety consideration, each dumping date will be allocated to one Contract. The quantity of marine sediment disposed on the date is from one Contract.

During dumping, each Contractor is responsible for transporting the marine sediment from his site area to the barge. The estimated quantity of marine sediment in each truck is confirmed by Resident Site Staff of each Contract. The trip tickets for transportation and disposal of marine sediment are collected and checked. Contract No. HY/2013/03 as the dumping permit holder is responsible for reporting to EPD the quantity disposed of as the condition stipulated in the dumping permit.

#### 3.6.1.3 Reporting

AECOM has confirmed that the disposal of excavated marine sediments to allocated dumping site via Contract No. HY/2013/03 has been completed with the last batch disposal on 30 August 2017. The total quantities disposed are presented in the following table (**Table 3.4**):

Table 3.4: Summary of Marine Sediment disposed to Dumping Site via Contract No. HY/2013/03

Month	/Year	ear Type of Sediment and Quant	
		Cat. L (in Type I)	
	Total =	3,570	39,814
Note:	For monthly breakdown of thes	se quantities, please refer to the waste fl	ow table in Appendix G.

#### 3.7 Environmental Licences and Permits

The valid environmental licences and permits during the reporting period are summarized in **Appendix H**.

# 4 Summary of Exceedances, Complaints, Notification of Summons and Successful Prosecution

#### 4.1 Summary of Exceedance of the Environmental Quality Performance Limit

Summary of Action and Limit Level exceedance of 1-hr TSP level and 24-hr TSP level at AMS6 is reported in the monthly EM&A Reports (for October and November 2018) prepared by Contract No. HY/2011/03.

There was no Action and Limit Level exceedance of 1-hr TSP level and 24-hr TSP level recorded at stations AMS2, AMS3C and AMS7B by the Environmental Team of this Contract the reporting period.

There was no Action and Limit Level exceedance for noise recorded at station NMS2 and station NMS3C by the Environmental Team of this Contract during the reporting period.

During the reporting period, a total of seven exceedances of water quality (consisting of 6 Action Level exceedances of suspended solids and one Action Level exceedance of turbidity) were recorded by the Environmental Team of this Contract during October and November 2018. Following investigations, it was concluded that the exceedances were not related to the HZMB HKBCF project.

Furthermore, Limit Level exceedance of impact dolphin monitoring during September to November 2018 was recorded by the Environmental Team of this Contract.

Impact dolphin monitoring results at all transects during September 2018 are reported in the monthly EM&A Reports for Contract No. HY/2013/01. Impact dolphin monitoring results at all transects during October 2018 and November 2018 are reported in the monthly EM&A Reports for this Contract.

## 4.2 Summary of Complaints, Notification of Summons and Successful Prosecution

There was one complaint received in relation to the environmental impact during the reporting period and investigated by the ET of the Contract. The summary of environmental complaints is presented in **Table 4.1**. The details of cumulative statistics of Environmental Complaints are provided in **Appendix H**.

#### Table 4.1: Summary of Environmental Complaints for the Reporting Period

Log No.	<b>Environmental Complaint Ref. No.</b>	Date of Complaint Receipt	Description
010	ENPO-C0139	3 October 2018	Air Quality

#### **Environmental Complaint Ref. No. ENPO-C0139**

The complaint referred to a large amount of dust generated due to lack of water spraying on dirt road at HKBCF Island site. As informed by EPD, the location under complaint was near the exit/entrance of Contract No. HY/2013/04 as advised by the complainant.

The relevant mitigation measures for access roads for the HZMB BCF Island site, as required in the EMIS and statutory requirements in the Air Pollution Control (Construction Dust)
Regulations and other applicable environmental legislation, are consolidated as follows:

- Immediately before leaving a construction site, every vehicle shall be washed to remove any
  dusty materials from its body and wheels and to ensure that no earth, mud or debris is
  deposited by them on roads.
- Vehicle washing facilities with high pressure water jet should be provided at every
  discernible or designated vehicle exit point. The area where vehicle washing takes place
  and the road section between the washing facilities and the exit point should be paved with
  concrete, bituminous materials or hardcores.
- Every main haul road shall be paved with concrete, bituminous materials, hardcores or metal
  plates, and kept clear of dusty materials, or sprayed with water or a dust suppression
  chemical so as to maintain the entire road surface wet.
- The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials.
- The Contractor should undertake proper watering on all exposed spoil (with at least 8 times per day) throughout the construction phase.

The Contractor's site watering record for 2 and 3 October 2018 as checked by ET was normal with watering provided 8 times per day.

As informed by the Contractor of HY/2013/04, water spray was provided by water truck for the HY/2013/04 site on the morning of 3 October 2018.

During ET's regular weekly site inspection on 3 October 2018 (between 14:00 and 15:00), a site observation regarding air quality was made, namely dust emission was observed along haul road near bridge D12 area; the Contractor was reminded to provide water spraying to ensure wet surface. Other haul roads within HY/2013/04 site were found to have been provided with water spray.

The vehicular entrance of and the wheel wash facility at the vehicular exit of HY/2013/04 site boundary were also inspected and found to be operating normally with no fugitive dust observed.

The Contractor's site watering plan (annotated with locations of the abovementioned photos) and wheel wash facility are presented in Attachments 3 and 4 respectively of the investigation report.

#### **Notifications of Summons and Successful Prosecutions**

Statistics on notifications of summons and successful prosecutions are summarized in **Appendix I**.

## 5 Comments, Recommendations and Conclusions

#### 5.1 Comments

According to the environmental site inspections undertaken during the reporting period, the following recommendations were provided:

- The Contractor was reminded to reinstate the silt curtains.
- The Contractor was reminded to clear the C&D waste as soon as possible.
- The Contractor was reminded to sort the C&D waste and clear the general refuse as soon as possible.
- The Contractor was reminded to provide water spraying on the haul road regularly to keep the road surface wet.
- The Contractor was reminded to clearly sign and designate the C&D waste collection area.
- The Contractor was reminded to clear the loose general refuse as soon as possible.
- The Contractor was reminded to provide drip tray for chemical containers.
- The Contractor was reminded to ensure that all vehicles exited the site area via the wheel wash area.
- The Contractor was reminded to provide the required labels for chemical containers.
- The Contractor was reminded to provide a new NRMM label for the generator.
- The Contractor was reminded to properly designate the temporary storage area for construction materials.

A summary of the Implementation Schedule of Environmental Mitigation Measures (EMIS) is presented in **Appendix E**. Most of the necessary mitigation measures were implemented properly.

#### 5.2 Recommendations

With implementation of the recommended environmental mitigation measures, the contract's environmental impacts were considered environmentally acceptable. The weekly environmental site inspections ensured that all the environmental mitigation measures recommended were effectively implemented.

The recommended environmental mitigation measures, as included in the EM&A programme, effectively minimize the potential environmental impacts from the contract. Also, the EM&A programme effectively monitored the environmental impacts from the construction activities and ensured the proper implementation of mitigation measures. No particular recommendation was advised for the improvement of the programme.

#### 5.3 Conclusions

#### General

Commencement of the Contract took place on 13 March 2015 and the construction works of the Contract commenced on 13 July 2015. This is the 14<sup>th</sup> Quarterly EM&A Report for the Contract which summaries findings of the EM&A works from 1 October 2018 to 30 November 2018, as well as the EM&A works for dolphin monitoring from 1 September 2018 to 30 November 2018 (which together form the "reporting period") in order to tally with the project dolphin monitoring quarterly review period.

#### **Breaches of Action and Limit Levels**

#### Air Quality

There was no Action and Limit Level exceedance of 1-hr TSP level and 24-hr TSP level recorded at stations AMS2, AMS3C and AMS7B by the Environmental Team of this Contract during the reporting period.

Summary of Action and Limit Level exceedance of 1-hr TSP level and 24-hr TSP level at AMS6 shall be referred to the monthly EM&A Reports (for October and November 2018) prepared by Contract No. HY/2011/03.

#### Noise

There was no Action and Limit Level exceedance for noise recorded at stations NMS2 and NMS3C by the Environmental Team of this Contract during the reporting period.

#### Water Quality

During the reporting period, a total of seven exceedances of water quality (consisting of 6 Action Level exceedances of suspended solids and one Action Level exceedance of turbidity) were recorded by the Environmental Team of this Contract during October and November 2018. Following investigations, it was concluded that the exceedances were not related to the HZMB HKBCF project.

#### Chinese White Dolphin

Limit Level exceedance of impact dolphin monitoring was recorded by the Environmental Team of this Contract for the period of September 2018 to November 2018.

Impact dolphin monitoring results at all transects during September 2018 are reported in the monthly EM&A Reports for Contract No. HY/2013/01, while impact dolphin monitoring results at all transects during October 2018 and November 2018 are reported in the monthly EM&A Reports for this Contract.

#### **Environmental Site Inspections**

Environmental site inspection was carried out on 3, 10, 18, 22 and 31 October and 7, 14, 19 and 28 November 2018. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site inspections.

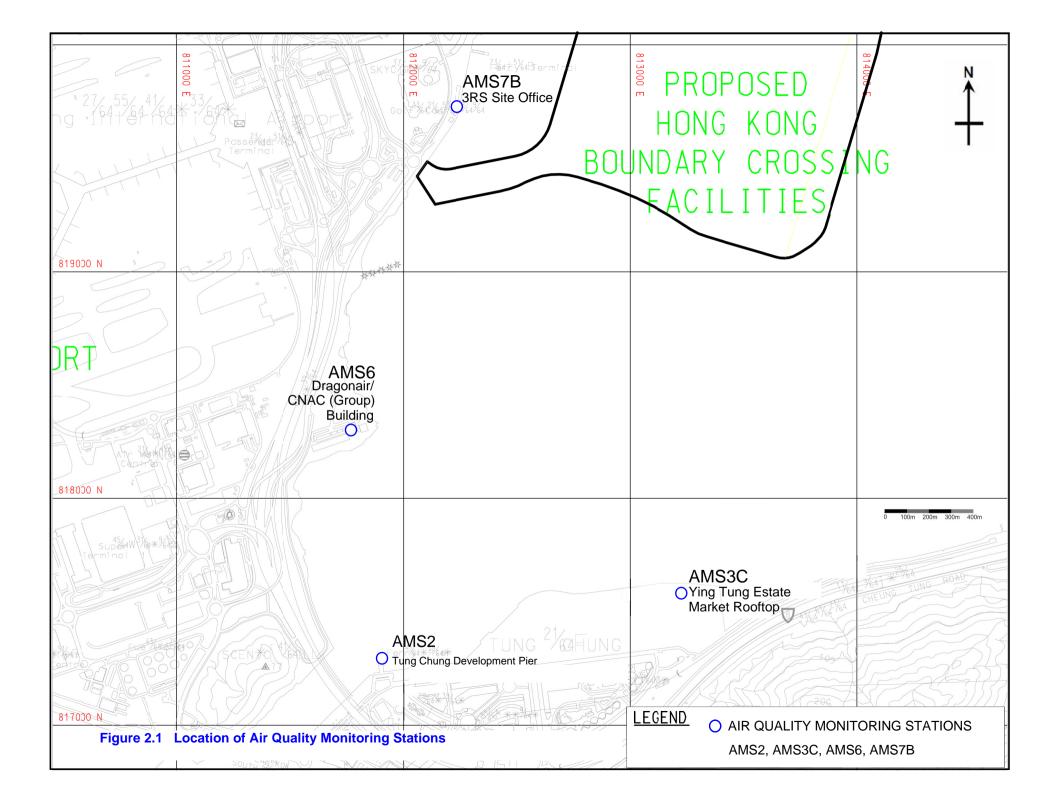
#### **Complaints**

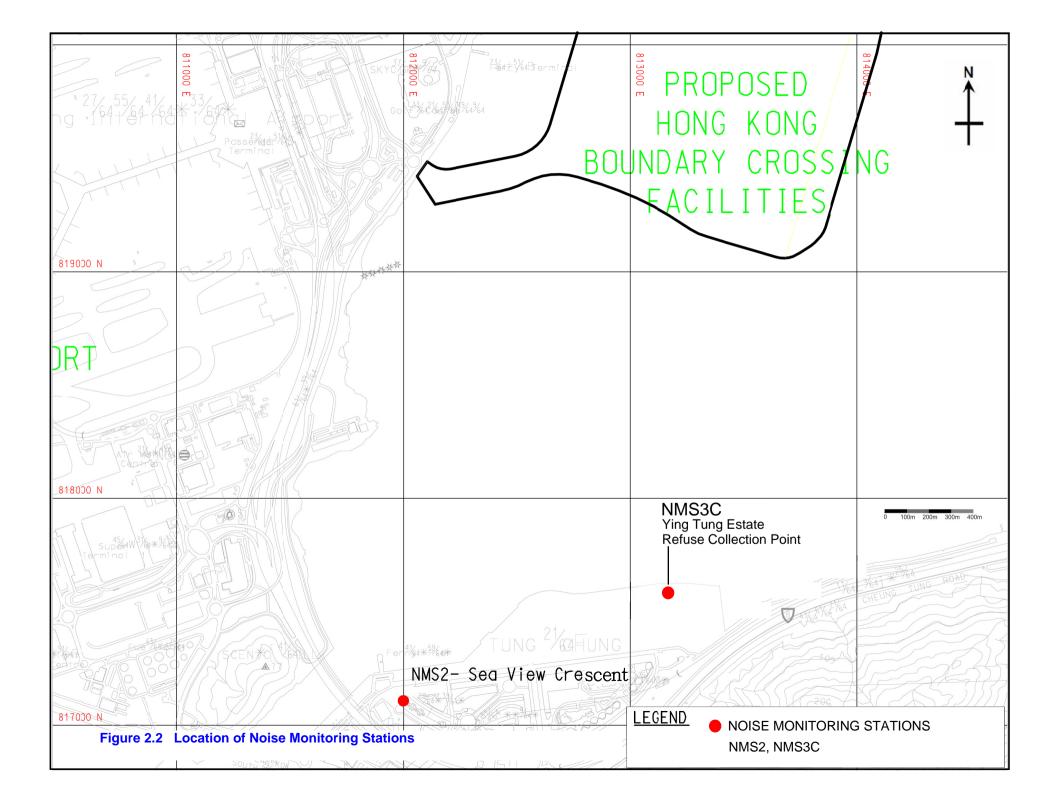
There was one new complaint received in relation to the environmental impact during the reporting period. The complaint referred to a large amount of dust generated due to lack of water spraying on dirt road at HKBCF Island site. As informed by EPD, the location under complaint was near the exit/entrance of Contract No. HY/2013/04 as advised by the complainant. The complaint was investigated by the ET of this Contract.

#### **Notifications of Summons and Successful Prosecutions**

There were no notifications of summons or prosecutions received during the reporting period.

## **Figures**







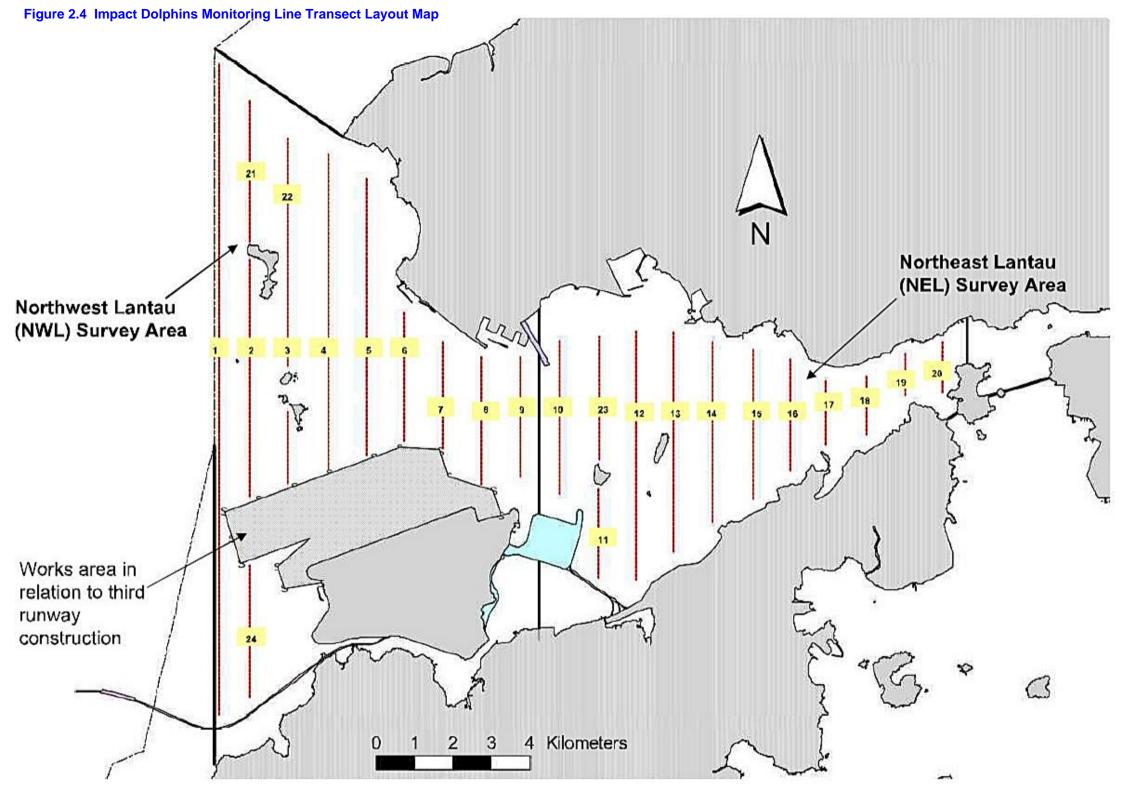
Station	East	North
IS5	811579	817106
IS(Mf)6	812101	817873
IS7	812244	818777
IS8	814251	818412
IS(Mf)9	813273	818850
IS10(N)	812942	820881
IS(Mf)11	813562	820716
IS(Mf)16	814328	819497
IS17	814539	820391
SR3(N)	810689	816591
SR4(N)	814705	817859
SR5(N)	812569	821475
SR6	805837	821818
SR7	814293	821431
SR10A(N)	823644	823484
SR10B(N2)	823689	823159
CS(Mf)3(N)	808814	822355
CS(Mf)5	817990	821129
CS4	810025	824004
CS6	817028	823992
CSA	818103	823064

## FIGURE 2.3 — LOCATION OF WATER QUALITY MONITORING STATIONS

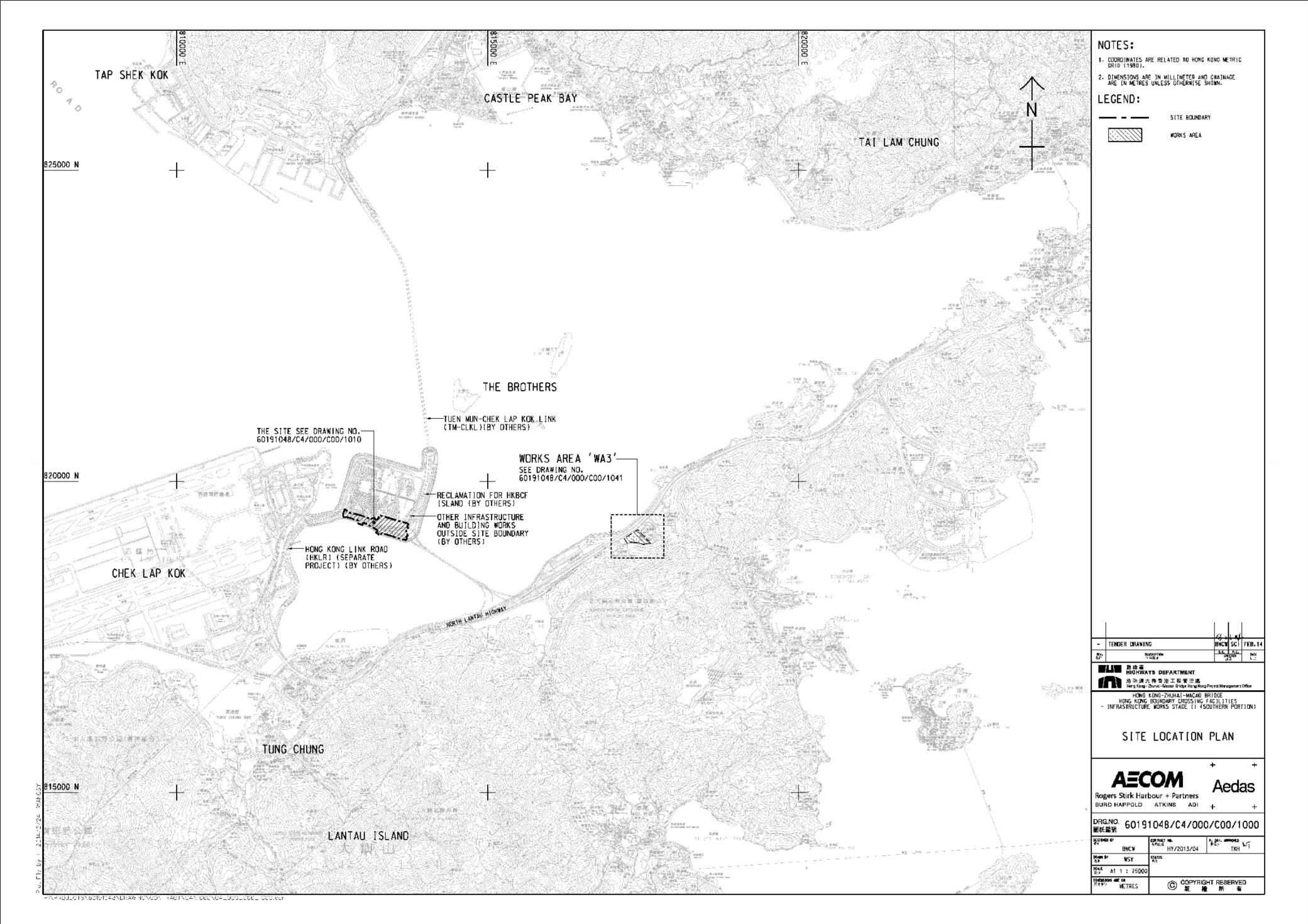


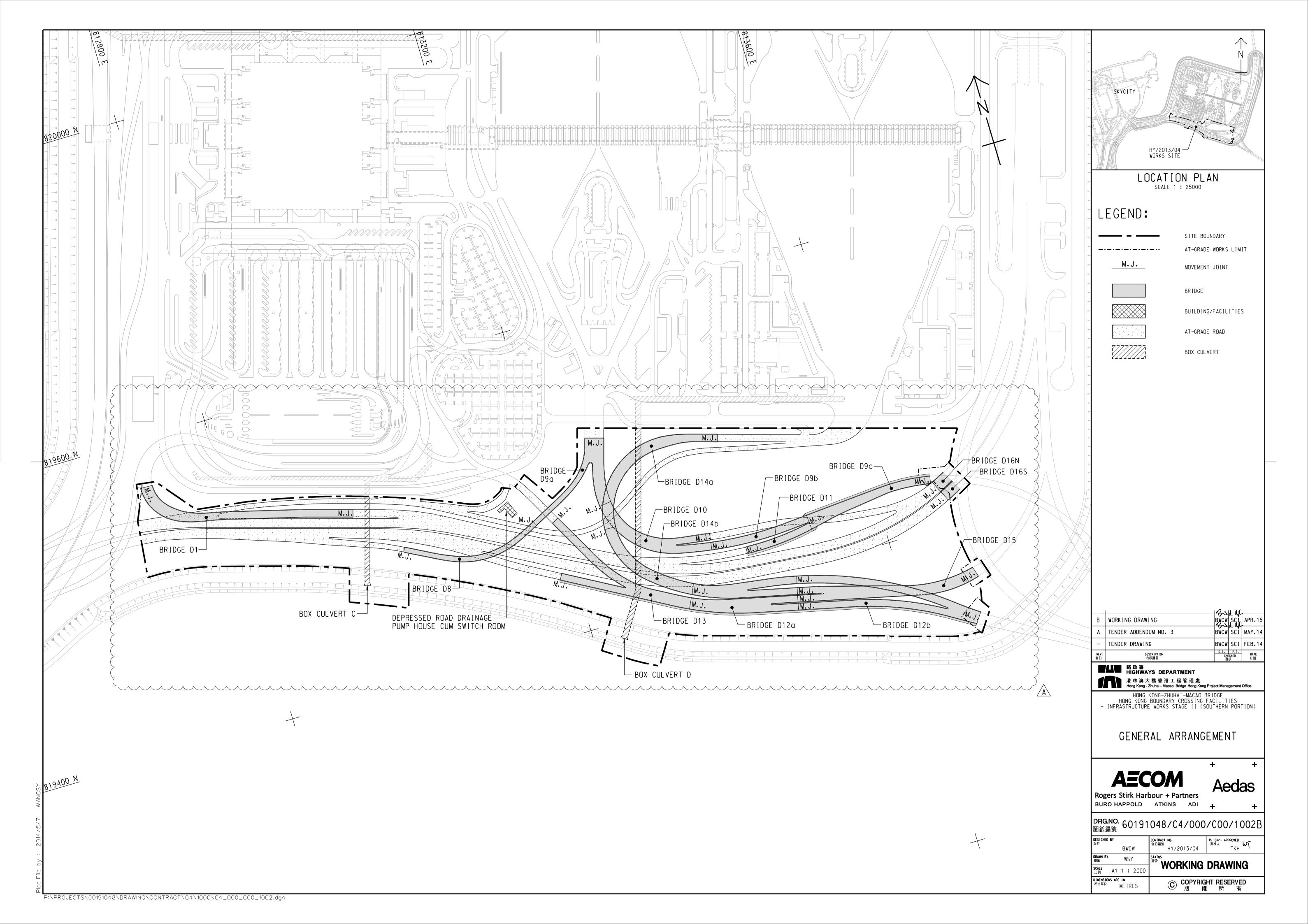
CONTROL / FAR FIELD STATIONS

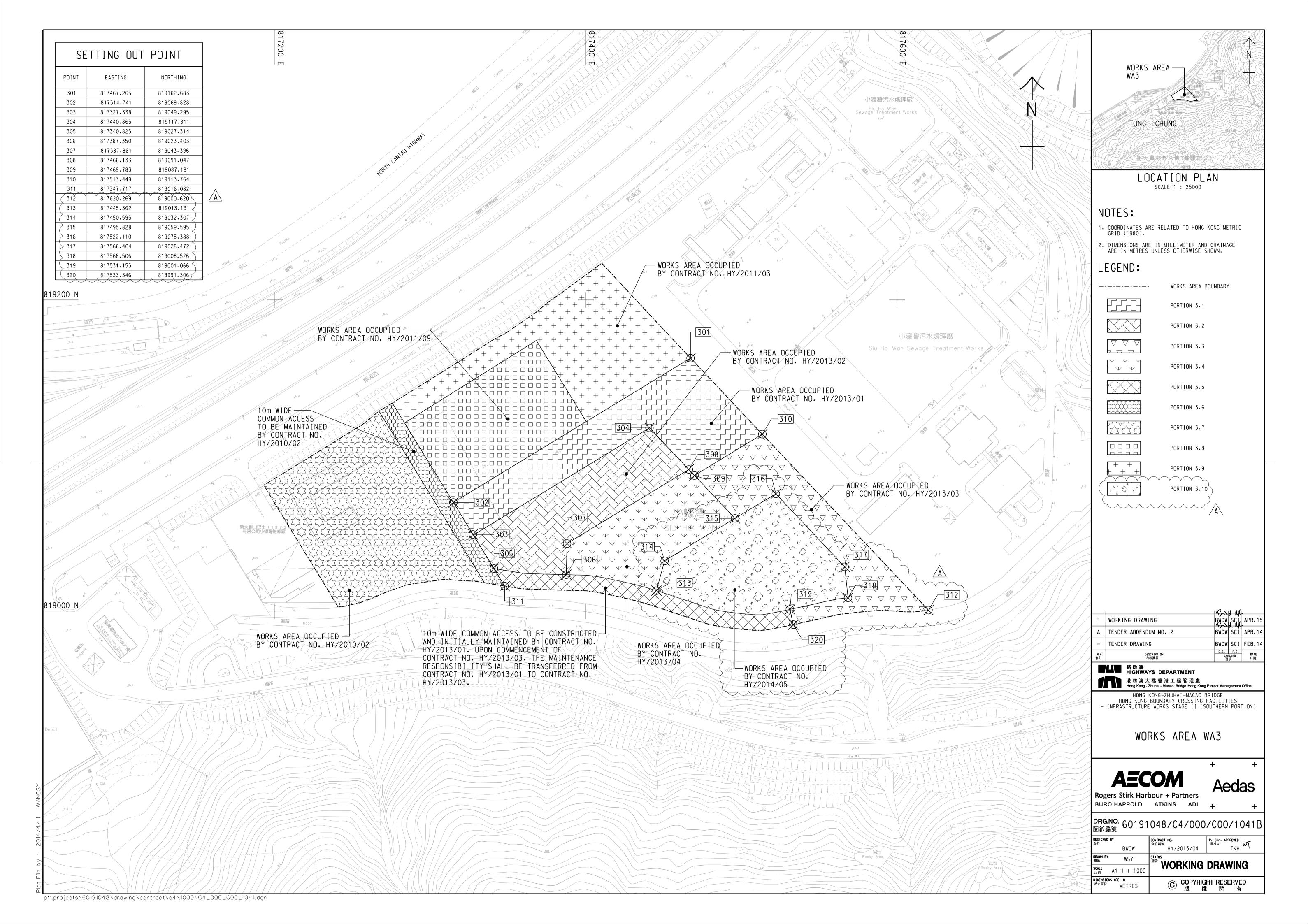
SENSITIVE RECEIVERS STATIONS



## **Appendix A. Location of Works Areas**

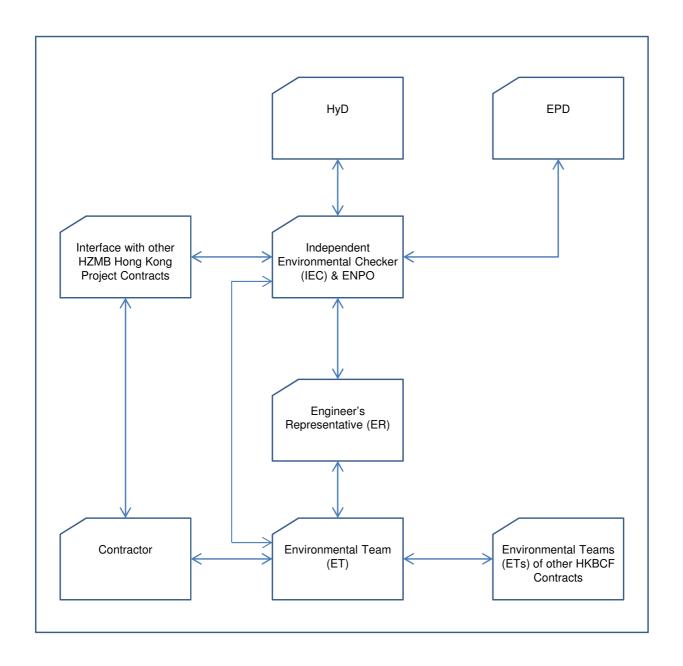






## **Appendix B. Project Organization for Environmental Works**

#### **Project Organisation for Environmental Works**



## **Appendix C. Construction Programme**

| A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D Essential Works Updates - Tier 1 - 26 C **Contract Key Dates** CON KD 0005 Letter of Acceptance (LOA) etter of Acceptance (LOA) CON.KD.0010 ent Date Commencement Date CON.KD.0020 Completion of the whole of the Works (1520) 11-May-19, Completion of the whole of the Works (1520) Possession Dates CON.PD.1010 Site Possession of Portion A1 (61) - 8 sion of Portion A1 (61) CON.PD.1020 Site Possession of Portion A2 (61) Site Poss sion of Portion A2 (61) CON.PD.1050 Site Possession of Portion A5 (61) Site Possession of Portion Site Possession of Portion A6 (61) on of Portion A6 (61) CON.PD.1060 CON PD 1070 e Possession of Portion B1-5 (92) Site Possession of Portion B1-5 (92) CON.PD.1080 sion of Portioh B2 (123) Site Possession of Portion B2 (123) Site Possession of Portion B5 (123) CON.PD.1130 Site Possession of Portion B5 (123) CON.PD.1140 Site Possession of Portion C1 (184) 06-Oct-16 Site Pos CON.PD.1150 Site Possession of Portion C2 (184) Site Possession of Port Site Pos sion of Portion D1 (183) CON.PD.1160 Site Possession of Portion D1 (183) CON.PD.1180 Site Possession of Portion D3 (183) Site Po sion of Portion D3 (183) CON.PD.1190 Site Possession of Portion A1 (61) - 2 Site Possession of Portion A1 (61) CON.PD.1200 Site Possession of Portion A1 (61) - 5 Site Passessian of Partian A1 (61) - 5 CON.PD.1210 Site Possession of Portion A1 (61) Site Possession of Portion A1 (61) - 1 ssion of Portion C1; -1 (184) CON.PD.1220 Site Possession of Portion C1 -1 (184) CON.PD.1230 Site Possession of Portion C1 -2 (184) session of Portion C1 -2 (184) CON.PD.1240 Site Possession of Portion B1 -1 (92) Site Possession of Portion B1 -1 (92) CON.PD.1250 Site Possession of Portion B1 -2 (92) Site Possession of Portion B1 +2 (92) CON.PD.1260 Site Possession of Portion A1 (61) - 7 ion of Porti<mark>o</mark>n A1 (61) - 7 ossession of Portion B1-3 (92) CON.PD.1270 Site Possession of Portion B1-3 (92) CON PD 1280 Site Possession of Portion B1-4 (92) Site Possession of Portion B1-4 (92) Site Possession of Portion C1 -3 (184) ite Possession of Portion C1 -3 (184) CON.PD.1290 CON.PD.1030 Site Access of Portion A3 (476) 06-Oct-16 Site Access of Portion A3 (476) -16 🔷 Site Access of Portion A4 (627) CON.PD.1040 Site Access of Portion A4 (627) CON.PD.1090 Site Access of Portion B3 (476) 06-Oct-16 Site Access of Portion B3 (476) CON.PD.1100 Site Access of Portion B4 (627) -16 🔷 Site Access of Portion B4 (627) Site Access of Portion D2 (488) CON.PD.1170 Site Access of Portion D2 (488) Contractual Key Dates - Stage / Section CON.FOT.KD01 KD01 - Achievement of Stage 1A (525) 06-Oct-16, KD01 - Achi ◆ 22-Dec-16, KD02 - Achievement of Stage 1B (650) CON.FOT.KD02 KD02 - Achievement of Stage 1B (650) CON.FOT.KD03 KD03 - Achievement of Stage 2 (525) 06-Oct-16, KD03 - Achieve ment of Stage 2 (525) 06-Oct-16, KD04 - Achievement of Stage 3 (465) CON.FOT.KD04 KD04 - Achievement of Stage 3 (465) ◆ 17-Nov-16, KD05 - Achievement of Stage 4 (615) CON.FOT.KD05 KD05 - Achievement of Stage 4 (615) ◆ 17-Nov-16, KD06 - Achievement of Stage 5 CON.FOT.KD06 KD06 - Achievement of Stage 5 (615) 6-Oct-16, KD07 - Achiev nent of Stage 6 (270) CON.FOT.KD07 KD07 - Achievement of Stage 6 (270) CON.FOT.KD08 KD08 - Completion of Section I of the Works ◆ 16-May-17, KD08 - Completion of Section I of the Works (795) ◆ 24-May-17, KD09 CON.FOT.KD09 KD09 - Completion of Section II of the Works ◆ 24-May-17, KD10 - Completion of Section III of the Works (803) CON.FOT.KD10 KD10 - Completion of Section III of the Works 06-Oct-16, KD11 - Completion of Section IV of the Works (565) CON.FOT.KD11 KD11 - Completion of Section IV of the Works 24-May-17, KD12 - Completion of Section V of the Works (803) CON.FOT.KD12 KD12 - Completion of Section V of the Works 06-Oct-16, KD13 - Completion of Section VI of the Works (465) CON.FOT.KD13 KD13 - Completion of Section VI of the Works CON.FOT.KD14 KD14 - Completion of Section VII of the Works (1155) ♦ 11-May-18, KD14 - Co tion of Section VII of the Works (1155 ♦ 16 May-17, KD15 - Completion of Section VIIIA of the Works (795 CON.FOT.KD15 KD15 - Completion of Section VIIIA of the Works (795) ◆ 11-May-18, KD16 - Completion of Section VIIIB of the Works (1155) CON.FOT.KD16 KD16 - Completion of Section VIIIB of the Works (1155) CON.FOT.KD17 KD17 - Achievement of Stage 7 (718) ♦ 28-Feb-17, KD17 - Achievement of Stage 7 (718) ◆ 16-May-17, KD17A - Completion of Section VIIIC of the Works (795) CON.FOT.KD17A KD17A - Completion of Section VIIIC of the Works (795) KD18 - Completion of Section VIIID of the Works (1155) CON.FOT.KD18 ◆ 11-May-18, KD18 - Co etion of Section VIIID of the Works (1155) etion of \$ection IXA of the Works (1160) ♦ 16-May-18, KD19 - Comp KD19 - Completion of Section IXA of the Works CON.FOT.KD19 ♠ 11-May-19, KD20 - Completion of Section IXB of the Works (1520) CON.FOT.KD20 KD20 - Completion of Section IXB of the Works (1520) Contractual Handover Dates to Employer ♦ 13-Jun-17, Handover of Portion A1 (KD8+28 days) CON.HD.1190 Handover of Portion A1 (KD8+28 days) CON.HD.1200 Handover of Portion A2 (KD8+28 days) 13-Jun-17, Handover of Portion A2 (KD8+28 days) ♦ 21-Jun-17, Handover of Portion A3 (KD9+28 days) CON.HD.1210 Handover of Portion A3 (KD9+28 days) CON.HD.1220 21-Jun-17, Handover of Portion A4 (KD10+28 days) Handover of Portion A4 (KD10+28 days) Handover of Portion A5 (KD13+0 days) CON.HD.1240 r of Portion A5 (KD13+0 days) HY/2013/04 - Detailed Works Programme **\** Current Milestone

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D	etailed vvorks Programme (IVVP)	Rev. 04	
Date	Revision	Chec	Approved
09-Sep-15	Detailed Works Programme	WN/WC	ET
17-Oct-15	Detailed Works Programme	WN/WC	ET
29-Oct-15	Detailed Works Programme	WN/WC	ET
25-Nov-15	Detailed Works Programme	WN/WC	ET

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Print Date: 14-Dec-16 09:46 Page: 2 / 23 CON.HD.1250 Handover of Portion A6 (KD14+28 days) CON.HD.1260 Handover of Portion B1 (KD8+28 days) of Portion B1 (KD8+28 days) Handover of Portion B2 (KD8+28 days) ♦ 13-Jun-17, Handover of Portion B2 (KD8+28 davs) CON.HD.1270 of Portion B3 (KD11+28 days) CON.HD.1280 Handover of Portion B3 (KD11+28 days) CON.HD.1290 Handover of Portion B4 (KD12+28 days) 21-Jun-17, Handover of Portion B4 (KD12+28 days) CON.HD.1300 Handover of Portion B5 (KD14+28days) ♦ 08-Jun-18. Had B5 (KD14+28days CON.HD.1310 Handover of Portion C1 (KD8+28 days) ♦ 13-Jun 17 Handover of Portion C1 (KD8+28 days) CON.HD.1320 Handover of Portion C2 (KD13+0 days) 06-Oct-16, Hand f Portion C2 (KD13+0 days CON.HD.1330 Handover of Portion D1 (KD8+28 days) of Portion D1: (KD8+28 days) CON.HD.1340 🔷 13-Jun-17, Handov er of Portion D2 (KD8+28 days) Handover of Portion D2 (KD8+28 days) 13-Jun-17, Handov CON.HD.1350 Handover of Portion D3 (KD8+28 days) er of Portion D3 (KD8+28 days) Contractor Planned Completion: Key Dat ◆ 19-Jun-18, KD01 - Achievement of Stage 1A (525) CON.SC.KD01 KD01 - Achievement of Stage 1A (525) nent of \$tage 1B (650) KD02 - Achievement of Stage 1B (650) CON.SC.KD02 03-May-18, KD02 - Achie CON.SC.KD03 KD03 - Achievement of Stage 2 (525) 19-Jun-18, KD03 - Achievement of Stage 2 (525) ♦ 12-Jun-17, KD04 - Achie CON.SC.KD04 KD04 - Achievement of Stage 3 (465) nt of Stage 3 (465) CON.SC.KD05 KD05 - Achievement of Stage 4 (615) ◆ 20-Aug-18, KD05 -CON.SC.KD06 03-Aug-17, KD06 - Achievement of Stage 5 (615) KD06 - Achievement of Stage 5 (615) CON.SC.KD07 KD07 - Achievement of Stage 6 (270) nent of Stage 6 (270) ♦ 04-Jul-18, KD08 tion of Section I of the Works (795 CON.SC.KD08 KD08 - Completion of Section I of the Works CON.SC.KD09 21-Aug-18, KD09 - Completion of Section II of the Works (803) KD09 - Completion of Section II of the Works (803) CON.SC.KD10 KD10 - Completion of Section III of the Works 21-Aug-18, KD10 - Completion of Section III of the Works (803) CON.SC.KD11 10-Apr 18, KD11 - Completion of Section (V of the Works (565) KD11 - Completion of Section IV of the Works (565)◆ 21-Aug-18, KD12 - Completion of Section V of the Works (803) CON.SC.KD12 KD12 - Completion of Section V of the Works KD13 - Completion of Section VI of the Works CON.SC.KD13 🔷 29-Jun-17, KD13 tion of Section VI of the Works (465) ♦ 28-Aug-19, KD14 - Comp CON.SC.KD14 KD14 - Completion of Section VII of the Works CON SC KD15 KD15 - Completion of Section VIIIA of the 03-Aug-18, KD15 - Completion of Section VIIIA of the Works (795) Works (795) 28-Aug-19, KD16 - Completion of Section VIIIB of the CON.SC.KD16 KD16 - Completion of Section VIIIB of the Works (1155) O3-Jul-18, KD17 - Achievement of Stage 7 (718) CON.SC.KD17 KD17 - Achievement of Stage 7 (718) KD17A - Completion of Section VIIIC of the Works (795) CON.SC.KD17A d3-Aug-18, KDI 7A - Completion of Section VII IC of the Works (795) CON.SC.KD18 KD18 - Completion of Section VIIID of the 28-Aug-19, KD18 - Completion of Section VIIID of the Works (1155) CON.SC.KD19 KD19 - Completion of Section IXA of the Works 0/3-Aug-19, KD19 - Completion of Section IXA of the World CON.SC.KD20 KD20 - Completion of Section IXB of the Works ♦ 27-Aug-20, KD20 (1520)Preliminaries and General Requiremer Insurance CON.PR.1010 Arrange and Secure Professional Indemnity Insurances and submit copy to Engineer **Initial Works Programme** CON.PR.1020.10 Prepare & Submit Initial Works Programme (IWP) Enginéer's Approval CON.PR.1020.20 Engineer's Approval **Provisional Programme for Piling Works** CON.PR.1030.10 Prepare Detailed Piling Schedule (refer to IWP) repare Detailed Piling S CON.PR.1030.20 Engineer's Approval Engineer's Approval 3 Months Rolling Programme Prepare 3 Months Rolling Progra CON.PR.1040.10 Prepare 3 Months Rolling Programme CON.PR.1040.20 Engineer's Approval Engineer's Appro **Detailed Works Programme** CON.PR.1050.10 Prepare Detailed Works Programme (DWP) Prepare Detailed Works Programme (DWP) Engineer's Approval CON.PR.1050.20 Engineer's Approval Safety & Health CON.PR.1060.10 Draft Safety Plan Draft Safety Plan Finalized Safety Plan CON.PR.1060.20 Finalized Safety Plan **Environmental Management Plan** CON.PR.1080.10 Draft Envirionmental Management Plan Draft Envirionm Finalized EMP CON.PR.1080.20 Finalized EMP **Sub-Contractor Management Plan** CON.PR.1080.50 Draft Subcontractor Management Plan Engineer's Approval CON.PR.1080.60 Engineer's Approval **Temporary Facilities** ession / Access to W CON.PR.0130 Site Possession / Access to Works Area WA3 CON.PR.0140 Survey / Setting Out Survey / Setting Out CON.PR.0150.10 Site Formation / Site Clearing Site Formation / Site Clearing CON.PR.0160 Contractor's Site Office 💄 ¢ontractor's Site Øffice CON.PR.0170 External Works - Paving, Drainage and Fencing External Works: - Paving, Drainage and Fencing **Contractors Design & Procurement Bridge Bearings** 

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A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D Detailed Design / Shop Drawings and Materials PROC.MA.1610 PROC.MA.1615 Engineer's Review / Approval Engineer's Review / Approva PROC.MA.1650 Production / Manufacturing / Facbrication Production / Manufacturing / Facbrid 6 ♦ Materials Delivery (first delivery) PROC.MA.1670 Materials Delivery (first delivery) **Precast Concrete - Segments** PROC.MA.1760 Moulds Detailed Design Preparation / Engineer's Review / Appr PROC.MA.1765 Engineer's Review / Approval Mould Fabri PROC.MA.1770 Mould Fabrication Cast Prototype / Ir PROC.MA.1780 Cast Prototype / Inspection and Approval ection and Approva PROC.MA.2570 Production of Precast Segments 14-Nov-16 ♦ Materials Delivery (First Delivery) PROC.MA.2590 Materials Delivery (First Delivery) Segment Fabrication and Post Pouring Segment Fabrication Type A Segment Fabrication for Bridge D1 (96 nos) tion for Bridge D1 (96 nos) Segment Fabrication Type C1 Fab.TC1.0010 Segment Fabrication for Bridge D12b (91-106) 16 nos. Segment Fabrication for Bridge D12b (91-106) 16 nos Fab.TC1.0020 rication for Bridge D9c (1-3) 3 nos. Segment Fabrication for Bridge D9c (1-3) 3 nt Fabrication for Bridge D14a (1-30) 30 nos Fab.TC1.0030 Segment Fabrication for Bridge D14a (1-30) 30 Fab.TC1.0040 Segment Fabrication for Bridge D12a (66-80) Segment Fabrication for Bridge D12a (66-80) 15 nds Segment Fabrication for Bridge D14b (14-27) 14 nos. Fab.TC1.0050 Segment Fabrication for Bridge D14b (14-27) Segment Fabrication for Bridge D14c (1-15) 15 nos. Fab.TC1.0060 Segment Fabrication for Bridge D14c (1-15) 1 Fab.TC1.0080 Segment Fabrication for Bridge D9c (4-14) 11 abrication for Bridge D9c (4-14) 11 nos Segment Fabrication for Bridge D15 (48-64) 17 nos. Fab.TC2.00060 | Segment Fabrication for Bridge D15 (48-64) 1 Segment Fabrication for Bridge D15 (31-47) 17 nos Fab.TC3.0060 Segment Fabrication for Bridge D15 (31-47) 1 Segment Fabrication for Bridge D13 (103-129) 27 nos. Fab.TC4.0030 ment Fabridation for Bridge D13 (103-129) 27 nos egment Fabrication for Bridge D14c (46-60) 15 nos Fab.TC4.0060 Segment Fabrication for Bridge D14c (46-60) 15 nos. Segment Fabrication Type C2 Segment Fabrication for Bridge D15 (1-15) 15 nos Fab.TC1.0070 Segment Fabrication for Bridge D15 (1-15) 15 Fab.TC2.00010 Segment Fabrication for Bridge D12b Segment Fabrication for Bridge D12b (112-127) 16 nos. (112-127) 16 nos. Fab.TC2.00020 Segment Fabrication for Bridge D14a (31-59) 29 nos. Segment Fabrication for Bridge D14a (31-59) 29 nos nt Fabrication for Bridge D9c (29-42) 14 nos Fab.TC2.00030 | Segment Fabrication for Bridge D9c (29-42) 14 Fab.TC2.00040 Segment Fabrication for Bridge D12a (48-65) \$egment Fabrication for Bridge D12a (48-65) 18 nos. Fab.TC2.00050 Segment Fabrication for Bridge D14c (16-30) 15 nos. Segment Fabrication for Bridge 014c (16-30) 15 nos. Segment Fabrication for Bridge D12b (4/4-8/4, 1/07-111) 46 nos Fab.TC3.0010 Segment Fabrication for Bridge D12b (44-84, 107-111) 46 nos. Segment Fabrication for Bridge D14c (31-45) 15 nos. Fab.TC3.0050 Segment Fabrication for Bridge D14¢ (31-45) 15 nos. Segment Fabrication for Bridge D15 (65-78) 14 no Fab.TC4.0070 Segment Fabrication for Bridge D15 (65-78) 1 Segment Fabrication Type C3 Fab.TC3.0020 Segment Fabrication for Bridge D9c (15-28) 14 nt Fabrication for Bridge D9c (15-28) 14 nos Segment Fabrication for Bridge D13 (43-70 & 100-102) 31 nos Fab.TC3.0030 Segment Fabrication for Bridge D13 (43-70 & 100-102) 31 nos. Fab.TC3.0040 Segment Fabrication for Bridge D14b (28-49) Segment Fabrication for Bridge D14b (28-49) 22 nos. Fab.TC4.0010 Segment Fabrication for Bridge D12b (1-43,85-90) 49 nos. nent Fabrication for Bridge D12b (1-43,85-90) 49 no abrication for Bridge D14a (60-75) 16 nos Fab.TC4.0020 Segment Fabrication for Bridge D14a (60-75) Segment Fabrication for Bridge D12a (81-95) 15 nos. Fab.TC4.0040 Segment Fabrication for Bridge 🛭 12a (81-95) 15 nos Segment Fabrication for Bridge D14b (1-13) 13 nos Fab.TC4.0050 Segment Fabrication for Bridge D14b (1-13) 13 Segment Fabrication Type D2 ment Fabrication for Bridge D9a (75-86 & nt Fabrication for Bridge D9a (75-86 & 92-104) 25 r Segment Fabrication for Bridge D13 (33-46) 14 nos. Fab.T1.0040 Segment Fabrication for Bridge D13 (33-46) 14 Segment Fabrication for Bridge D9a (1-15) 15 nos. ent Fabrication for Bridge D9a (1-15) 15 nos. Fab.T1.0050 Fab.T2.0010 Segment Fabrication for Bridge D9a (32-46) 15 ment Fabrication for Bridge D9a (32-46) 15 nos brication for Bridge D9b (1-15) 15 nos Fab.T2.0030 Segment Fabrication for Bridge D9b (1-15) 15 Fab.T2.0040 Segment Fabrication for Bridge D10 (33-47) 14 Segment Fabrication for Bridge D10 (33-47) 14 nos. Segment Fabrication for Bridge D13 (29-41) 13 nos. Fab.T2.0050 Segment Fabrication for Bridge D13 (29-41) 13 ment Fabrication for Bridge D9a (47-57, 70-74) 16 nos; Fab.T3.0030 Segment Fabrication for Bridge D9a (47-57, 70-74) 16 nos. Segment Fabrication for Bridge D10 (68-88 & 27-32) 27 nos. Fab.T3.0040 Segment Fabrication for Bridge D10 (68-88 & 27-32) 27 nos Segment Fabrication for Bridge D15 (1-14) 14 no Segment Fabrication for Bridge D15 (1-14) 14 Fab.T3.0070 Segment Fabrication for Bridge D10 (61-67 & 89-95) 14 nos. Fab.T4.0020 Segment Fabrication for Bridge D10 (61-67 & 89-95) 14 nos. Fab.T4.0040 Segment Fabrication for Bridge D8 (48-62) 15 Segment Fabrication for Bridge D8 (48-62) 15 nos Segment Fabrication for Bridge D13 (78-98) 21 nos Fab.T4.0050 Segment Fabrication for Bridge D13 (78-98) 21 Fab.T4.0060 Segment Fabrication for Bridge D10 (96-109) 14 nos. Segment Fabrication for Bridge D10 (96-109) 14 nos. Segment Fabrication Type D3 Fab.T1.0010 Segment Fabrication for Bridge D11 (17-31) 15 nos. Segment Fabrication for Bridge D11 (17-31) 15 nos egment Fabrication for Bridge D10 (1-26) 26 nos. Fab.T1.0030 Segment Fabrication for Bridge D10 (1-26) 26 Fab.T1.0060 Segment Fabrication for Bridge D8 (1-16) 16 abrication for Bridge D8 (1-16) 16 nos. Segment Fabrication for Bridge D12a (1-16) 16 nos. Segment Fabrication for Bridge D12a (1-16) 14 nos Fab.T1.0070 Fab.T2.0020 nt Fabrication for Bridge D11 (1-16) 16 no Segment Fabrication for Bridge D11 (1-16) 16 Segment Fabrication for Bridge D8 (17-31) 15 Segment Fabrication for Bridge D8 (17-31) 15 nos. Fab.T2.0060

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3 Nos Pier Segment for Bridge D13 - 4 Nos Fab.T3.00130 Pier Segment for Bridge D13 - 4 Nos ier Segment for Bridge D14b - 4 Fab.T3.00140 Pier Segment for Bridge D14b - 4 Nos Pier Segment for Bridge D12a - 4 Nos Fab.T3.00150 Pier Segment for Bridge D12a - 4 Nos Fab.T3.00160 Pier Segment for Bridge D14c - 4 Nos ■ Pier Segment for Bridge D14c - 4 Nos Pier Segment for Bridge D12b - 4 Nos Fab.T3.00170 Pier Segment for Bridge D12b - 4 Nos Pier Segment for Bridge D15 - 4 Nos Fab.T3.00180 Pier Segment for Bridge D15 - 4 Nos Fab.T3.00260 Pier Segment for Bridge D15 - 4 Nos Pler Segment for Bridge D15 - 4 Nos Fab.T3.0090 Pier Segment for Bridge D14a - 6 Nos Segment for Bridge D14a - 6 Nos Pier Segment - Type D- 1 Fab.T2.0070 Segment Fabrication for Bridge D12a (18-31) Fab.T3.00100 Pier Seament for Bridge D9b - 4 Nos Pier Segment for Bridge D9b - 4 Nos Pier Segment for Bridge D9a - 5 Nos Fab.T3.00190 Pier Segment for Bridge D9a - 5 Nos Pier Segment for Bridge D11 - 3 Nos Fab.T3.00200 Pier Segment for Bridge D11 - 3 Nos Fab.T3.00210 Pier Segment for Bridge D10 - 5 Nos Pier Segment for Bridge D10 - 5 No Fab.T3.00220 Pier Segment for Bridge D8 - 5 Nos Pier Segment for Bridge D8 - 5 No Pier Segment for Bridge D13 - 6 Nos Fab.T3.00230 Pier Segment for Bridge D13 - 6 Nos Fab.T3.00240 Pier Segment for Bridge D12a - 4 Nos Pier Segment for Bridge D12a + 4 Nos ■ Pier Segment for Bridge D15 - 1 Nos Pier Segment for Bridge D15 - 1 Nos Fab.T3.00250 Fab.T3.00280 Pier Segment for Bridge D10 - 5 Nos Pier Segment for Bridge D10 - 5 Nbs Fab.T3.00290 Pier Segment for Bridge D9a - 5 Nos Pier Segment for Bridge D9a - 5 Nos Segment Fabrication for Bridge D12a (33-46) 14 no Segment Fabrication for Bridge D12a (33-46) Fab.T3.0060 &M Works and Building Services for Pu Detailed Design and Material/ Equipment Submisison & Statutory Approval (FSD/EMSD) PROC.SC.1285 Engineer's Review / Approval PROC.SC.1287 Engineer's Review / Approval PROC.SC.1290 Procurement and Manufacturing of Materials nt and Manufacturing of Material PROC.SC.1300 Materials Delivery (first delivery) 29-Jun-17 • Materials Delivery (first delivery) Draft Operation and Maintenance (O&M) Manual PROC.SC.1310 Draft Operation and Maintenance (O&M) PROC.SC.1320 Engineer's Review on Draft O&M Manual Engineer's Review on Draft O&M Manual Draft Testing and Commissioning (T&C) Procedure PROC.SC.1330 Draft Testing and Commissioning (T&C) Final T&C Procedure PROC.SC.1340 Final T&C Procedure Engineer's Review on Draft T&C Procedure PROC.SC.1350 Engineer's Review on Draft T&C Procedure Engineer's Approval on Final T&C Procedure PROC.SC.1360 Engineer's Approval on Final T&C Procedure PROC.SC.2840 Final O&M Manual with as-fitted drawings Final O&M Manual with as-fitted drawings PROC.SC.2850 Engineer's Approval on Final O&M Manual with teel Structures for Sign Gantry / High N PROC.MA.1990 Detailed Design / Material Submission Detailed Design / Material Subr Engineer's Review / Approval PROC.MA.1995 Engineer's Review / Approval PROC.MA.2010 Manufacture of Steel Structures of Steel Structures PROC.MA.2020 Material Delivery (first delivery) 15-Sep-17 : ♦ Material Delivery (first delivery Roads and Bridge Lighting PROC.MA.2840 Lighting Arrangement Detailed Design / Material Submission and Approval (within 12 Lighting Arrangement Detailed Design / Material Submission and Approval (within 12 weeks) Engineer's Review / Approval PROC.MA.2845 Engineer's Review / Approval Manufacture of Road and Bridge Lighting PROC.MA.2850 Manufacture of Road and Bridge Lighting rv (first delivery) PROC.MA.2860 Material Delivery (first delivery) 27-Sep-17 🔷 Material Delive The Engineer confirm Landscape Works/ Irrigation Work (31 Dec 2015) PROC.SC.1178 The Engineer confirm Landscape Works/ 06-Oct-16 Irrigation Work (31 Dec 2015) PROC.SC.1180 Detailed Design / Material Submission Detailed Design / Material Submis Engineer's Review / Approval PROC.SC.1185 Engineer's Review / Approval PROC.SC.1190 Procurement and Shipment of Irrigation Materials/Equipment Soft Landscaping PROC.SC.2760 Propose Nursery for Landscape Materials Propose Nursery for Landscape Materials Joint Inspection and Engineer's appro PROC.SC.2780 Joint Inspection and Engineer's approval PROC.SC.2790 Landscape Materials Growing 02-Aug-17 A Materials Delivery (first delivery) PROC.SC.2810 Materials Delivery (first delivery) Construction / Installation Initial Works / Site Establishment & Mai

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| A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D **Mobilisation and Site Establishment** CONS.A1.0100 Site Possession / Access to Portion A1, A2, A5 CONS.A1.0110 Mobilisation, Site Clearing and Site Set-up oilisation, Site Clearing and Site Set-up CONS.A1.0120 Install Temporary Facilities / Hygiene Facilities Gates and Haul Road Construction (as per Dwg CONS.A1.1010 Site Possession / Access to Portion A1 Survey/ Setting Out CONS.A1.1020 Survey/ Setting Out CONS.A1.1030 | Construct Gate 1 at Haul Road Construct Gate 1 at Haul Road CONS.B1.1010 Site Possession / Access to Portion B1 06-Oct-16 Site Possession / Access to Portion B1 Mobilisation, Site Survey and Setting Out CONS.B1.1020 Mobilisation, Site Survey and Setting Out CONS.B1.1030 Construct Gate 3 and Temporary Haul Road Construct Gate 3 and Temporary Haul Road CONS.B2.1010 Site Possession / Access to Portion B2 & B5 ession / Access to Portion B2 & B5 Site Survey / \$etting out CONS.B2.1020 Site Survey / Setting out CONS.B2.1030 Construct Temporary Haul Road Construct Temporary Haul Road Preliminary Bored Pile with Additional Instrum CONS.A1.0180 | Commence Preliminary Bored Pile at Abutmer CONS.A1.0190 Mobilise Plant & Set-up Support ■ Mobilise Plant & Set-up Support CONS.A1.0195.1 Predrilling to Preliminary Bored Pile (D11) Predrilling to Preliminary Bored Pile (D11) CONS.A1.0195.2 GI Report and Verification / Agreement to GI Report and Verification / Agreement to F unding Level CONS.A1.0200 Preliminary Bored Piling with Additional Instrumentation at Abutment A1101 (1 no. Pile Curing CONS.A1.0210 Pile Curing CONS.A1.0220 Pile Load Testing & Submit Report Pile Load Testing & Submit Repor Replacement Preliminary Bored Pile and Load CONS.A1.0195.6 GI Report and Verification / Agreement to GI Report and Verification! Agreement to Founding Level CONS.A1.0195.7 Engineer's Representative confirmed the replacement bored pile at Pier P908-P1 Engineer's Representative confirmed the replace ement bored pile at Pier P908-P1 Commence Replacement Preliminary Bored Pile at Abutment A1004 CONS.A1.0280 Commence Replacement Preliminary Bored Pile at Abutment A1004 CONS.A1.0290 Mobilise Plant & Set-up Support ■ Mobilise Plant & Set-up Support Replacement Preliminary Bored Pil CONS.A1.0300 Replacement Preliminary Bored Piling - Pier Pile Curing CONS.A1.0310 Pile Curing CONS.A1.0320 Pile Load Testing & Submit Report Pile Load Testing & Submit Preliminary Bored Pile and Load Testing at Abı CONS.C1.0400 Commence Preliminary Bored Pile at Abutmer A106 06-Oct-16 Commence Préliminary Bored Pile at Abutment A106 CONS.C1.0410 Mobilise Plant & Set-up Support Mobilise Plant & Set-up Support Predrilling to Preliminary Bored Pile (D1) CONS.C1.0415.1 Predrilling to Preliminary Bored Pile (D1) CONS.C1.0415.2 GI Report and Verification / Agreement to Founding Level GI Report and Verification / Agreement to Founding Level Preliminary Bored Piling - Abutment A106 (1 no. 2000mm dia x 52m CONS.C1.0420 Preliminary Bored Piling - Abutment A106 (1 no. 2000mm dia x 52m) Pile Curing CONS.C1.0430 Pile Curing CONS.C1.0440 Pile Load Testing and Submit Report Pile Load Testing and Submit Report **Prelimnary Driven H Piles and Load Testing** CONS.A1.4360 Test Pile approved, commence permanent driven h-pile 15-Oct-16 Test Pile approved, commence permanent driven select Preliminary Test Pile (Driven H Pile) CONS.C1.0510 Engineer select Preliminary Test Pile (Driven H e Plant & Set-up Support CONS.C1.0520 | Mobilise Plant & Set-up Support CONS.C1.0530.1 Pre-drilling (2 nos) (Sign Gantry - Preliminary Pile) Pre-drilling (2 nos) (Sign Gantry - Preliminary Pile) CONS.C1.0530.2 GI Report and Verification / Agreement to Founding Level Preliminary Driven H Pile (2 nos) CONS.C1.0540 Preliminary Driven H Pile (2 nos) Pile Load Testing and Submit Report CONS.C1.0550 Pile Load Testing and Submit Report Preliminary Pre-Bored H-Pile and Load Testing CONS.A1.0195.3 Predrilling to Preliminary Pre-Bored H-Pile - 1 Predrilling to Preliminary Pre-Bored H-Pile - 1 no ent ta Founding L CONS.A1.0195.4 GI Report and Verification / Agreement to Founding Level GI Report and Verification / Agree Engineer select Preliminary Test Pile (Pre-Bored H-Pile) CONS.A1.0230 Engineer select Preliminary Test Pile (Pre-Bored H-Pile) Mobilise Plant & Set-up Support CONS.A1.0240 | Mobilise Plant & Set-up Support Preliminary Pre-Bored H-Piling - 1 no. CONS.A1.0250 Preliminary Pre-Bored H-Piling - 1 no. ile Load Testing & Submit Report CONS.A1.0270 Pile Load Testing & Submit Report **Treatment for Bored Piling Excavated Materials** Set-up Stockpile for Excavated Marine Mud CONS.EX.1010 Set-up Stockpile for Excavated Marine Mud Pilot Test for Marine Mud Treatmen CONS.EX.1020 Pilot Test for Marine Mud Treatment CONS.EX.1030 Solidification / Stabilisation / Approval Method Solidification / Stabilisation Set-up Treatment Facilities and Storage Yard CONS.EX.1040 Set-up Treatment Facilities and Storage Yard CONS.EX.1050 Full Scale Solidification / Stabilization Treatment and Verification Testing Full Scale Solidification CONS.EX.1060 Decommissioning of Treatment Facilities Site Set Up at Portion C1 CONS.C1.1010 Site Possession / Access to Portion C1 and C2 06-Oct-16 Site Possession / Access to Portion C1 and C2 06-Oct-16 Site Possession / Access to Portion D1 and D3 CONS.C1.1020 Site Possession / Access to Portion D1 and D3 Site Set-Up CONS.C1.1030 Site Set-Up Pump House cum Switch Room CONS.C1.5110 Commence Pump House Cum Switch Room mmence Pump House Cum Switch Room (2B+ GF) (2B+ GF)

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| A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D CONS.C1.5120 Mobilisation / Survey/ Setting Out CONS.C1.5125 Cofferdam - Sheet Piling Install Dewatering Wells + Pump Test CONS.C1.5130 Install Dewatering Wells + Pump Test ELS Works to Formation level (Base CONS.C1.5140 ELS Works to Formation level (Basement 2) Blinding, Waterproofing and Base Slab CONS.C1.5150 Blinding, Waterproofing and Base Slab Construct Walls and Slab to Upper Ba CONS.C1.5160 Construct Walls and Slab to Upper Basement CONS.C1.5170 Construct Walls and Slab to Ground Level CONS.C1.5200 Construct Walls and Roof Slab Construct Walls and Roof Slab ABWF & Building Service Works to Pump Hous / Switch Room ABWF & Building Service Works to Pump House / Switch CONS.C1.5205 vement of \$tage 5 (KD6) / Interfac ♦ 03-Aug-17, Achie CONS.C1.5210 Achievement of Stage 5 (KD6) / Interface with Pump House/ Switch Rm - Allow Access to 03-Aug-17, Pump House/Switch Rm - Allow Access to Contract HY/2013/03 CONS.C1.5215 Contract HY/2013/03 CONS.C1.5225 MEP installation for Pump House/Switch Room Testing and Commissioning and Statutory Permits / Certification by FSD / BD CONS.C1.5235 Testing and Commissioning and Statutory Permits / Certification by FSD / BD ABWF Works and External Works CONS.C1.5245 ABWF Works and External Works E&M Equipment Installation CONS.C1.5255 E&M Equipment Installation **Box Culvert D - Cost Savings Design Contractors Design** AD.A1.0001 Approval in Principle for Cost Savings Design 06-Oct-16 Approval in Principle for Cost Savings Design Detailed Design / Shop Drawings and AD.A1.0100 Detailed Design / Shop Drawings and Material AD.A1.0110 Engineer's Review / Approval Engineer's Review / Approva **Preliminary Driven Pile and Load Test** AD.A1.0470.30 Predrilling (1 nos) (Box Culvert D) Predrilling (1 nos) (Box Culvert D) GI Report and Verification / Agreement to Founding Level AD.A1.0470.40 GI Report and Verification / Agreement to Engineer advise Test Pile/ Preliminary Driven Pile at Box Culvert D Engineer advise AD.A1.0510 Test Pile/ Preliminary Driven H Pile at Box ( Mobilize Plant & Set-up Support AD.A1.0520 Mobilize Plant & Set-up Support AD.A1.0530 Preliminary Driven H Pile (2 nos) Preliminary Driven H Pile (2 nos) Pile Load Testing and Submit Report AD.A1.0540 Box Culvert D - 15 Bays drilling at Portion A1 (30 nos) (Box Culvert D) AD.A1.1055.30 Predrilling at Portion A1 (30 nos) (Box Culvert ■ GI Report and Verification / Agree AD.A1.1055.40 GI Report and Verification / Agreement to Founding Level AD.A1.1095.30 Box Culvert - Base Slab, Wall & Top Slab - Part Box Culvert - Base Slab, Wall & Top Slab - Part 1 (8 bays) AD.A1.1095.40 Box Culvert - Base Slab, Wall & Top Slab - Part Box Culvert - Base Slab, Wall & Top \$lab - Part 2 (7 bays) 2 (7 bays) Access to Portion A1 (Interface with Contract 03) 06-Oct-16 Access to Portion A1 (Interface with Contract AD.A1.1110 AD.A1.1120 Box Culvert D - Driven H-Pile Works ox Culvert D - Driven H-Pile Works AD.A1.1130 Install Dewatering Wells + Pump Test + Open Cut Excavation to formation ■ Backfill / Reinstate and Conhect UU and Road Works SOL101 AD.A1.1150 Backfill / Reinstate and Connect UU and Road Works SOL101 and SOL102 AD.A1.1160 Survey / Setting Out Survey / Setting Out AD.A1.1170 Pile Testing Mobilization and AD.A1.1180 Mobilization and Plant Set Up int Set Up Pile Trimming and Pile Caps (30 nos ) Pile Trimming and Pile Caps (30 nos.) AD.A1.2250 Box Culvert D - 3 Bays and Outfall AD.B1.1180.30 Predrilling (6 nos) (Box Culvert D along Seawall redrilling (6 nos) (Box Culvert D along Seawall Are AD.B1.1180.40 GI Report and Verification / Agreement to Founding Level Pile Trimming and Construction of Pile Caps AD.B1.2235 Pile Trimming and Construction of Pile Caps AD.B1.2250 Remove Piling Platform ve Piling Platform AD.B1.2260 Install Seawall Block & Rockfill near Seawall AD.B1.2270 General Fill General Fill AD.B1.2280 ELS Works ( 2 levels of Strut) ELS Works (2 levels of \$trut) Box Culvert D - Driven H Pile with Steel Plate AD.B1.2330 AD.B1.2350 Backfill, Remove Seawall Blocks & Reinstate Backfill, Remove Seawall Blocks & Reinstate Rock Armpur AD.B1.2360 ♦ 02-Mar-18, Complete Box Culvert D - based on CSD Complete Box Culvert D - based on CSD Construct Box Culvert Outfall & Connect Drainage AD.B1.2370 Construct Box Culvert Outfall & Connect Drainage Divert/Shift Haul Road ( on top of completed box culvert) AD.B1.2380 Divert/Shift Haul Road (lon to of completed box culvert) Sheet Piling Works AD.B1.2390 Install Dewatering Wells and Carry Out Pumping Test Install Dewatering Wells and Carry Out Pumping Test AD.B1.2400 AD.B1.2410 Commence Works on Box Culvert Outfall MDN Application for Marine Plants CONS.OF.1010 Prepare Documents for Statutory Submission to Marine Department MD Vetting, Site Inspection and Approva CONS.OF.1020 MD Vetting, Site Inspection and Approval 02-Dec-16. Marine Department Issues Permit / Cd CONS.OF.1030 Marine Department Issues Permit / Consent **Box Culvert C (Portion C1) Preliminary Driven Piles and Load Testing** CONS.C1.0450 Commence Preliminary Driven H Pile at Box Culvert C 06-Oct-16 Commence Preliminary Driven HiPile at Box Culvert C Mobilise Plant & Set-up Support CONS.C1.0460 Mobilise Plant & Set-up Support CONS.C1.0470. Predrilling (4 nos) (Box Culvert C) Predrilling (# nos) (Box Culvert C)

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CONS.C1.0470. GI Report and Verification / Agreement to Founding Level CONS.C1.0480 Preliminary Driven H Pile (4 nos) Preliminary Driven H Pile (4 nos) CONS.C1.0500 Pile Load Testing and Submit Report Pile Load Testing and Submit Report Box Culvert C - Bay 4-8 CONS.C1.1040 Commence Box Culvert C at Portion C1 05-Nov-Commence Box Culvert C at Portion C1 CONS.C1.1045 Survey / Setting Out Survey / Setting Out CONS.C1.1055. Predrilling (56 nos) (Box Culvert C) Predrilling (56 nos) (Box Culvert C) CONS.C1.1055. GI Report and Verification / Agreement to GIReport and Verification / Agreement to Founding Level CONS.C1.1060 Driven H Piling Works (56 nos x 6 days per Pile Driven H Piling Works (56 nos x 6 days per Pile / 3 rigs) CONS.C1.1070 Excavate and Install Dewatering Wells+ Pump Excavate and Install Dewatering Wells+ Pump Test Test CONS.C1.1090 Pile Trimming and Construction of Pile Caps Pile Trimming and Construction of Pile Caps CONS.C1.1100 Construct Box Culvert & Drainage Connection Construct Box Culvert & Drainage (5 bays) Backfill CONS.C1.1110 Backfill Box Culvert C - Bay 1-3 and Outfall CONS.C1.1120 Divert / Shift Haul Road to North Divert / Shift Haul Road to North Remove Rock Armour CONS.C1.1150 Remove Rock Armour CONS.C1.1160 Construct Piling Plaform Construct Piling Plaform CONS.C1.1170. Predrilling (36 nos) (Box culvert area in C1, Predrilling (36 nos) (Box culvert area in C1, along the GI Report and Verification / Agreement to Founding Leve CONS.C1.1170. GI Report and Verification / Agreement to Piling Driving Works - Driven H-Pile (36 nos) CONS.C1.1180 Piling Driving Works - Driven H-Pile (36 nos) 27-Feb-17. ♦ Commence Box Culvert C Outfall CONS.C1.8480 Commence Box Culvert C Outfall Divert /Shift Haul Road to North CONS.C1.8485 Divert /Shift Haul Road to North (on top of completed box culvert) CONS.C1.8490 Remove Piling Platform Remove Piling Platform CONS.C1.8500 Seawall Block Installation near Seawall Seawall Block Installation CONS.C1.8510 General Fill General Fill Sheet Piling CONS.C1.8530 Sheet Piling CONS.C1.8540 Dewatering Wells + Pump Test Dewatering Wells + Pump Test CONS.C1.8550 ELS Works (2 layers of Strut) ELS Works (2 layers of Strut) CONS.C1.8560 Pile Trimming and Construction of Pile Caps (9 Pile Trimming and Construction of Pile Caps (9:Pile CONS.C1.8570 Construct Box Culvert + Outfall & Drainage Connection (38m or 3 bays) Construct Box Culvert + Outfall & Drainage Connection (38m or 3 bays) CONS.C1.8580 Backfill & Remove Sea Wall Blocks and Backfill & Remove Sea Wall Blocks and Reinstate Rock Armour CONS.C1.8590 | Complete Box Culvert C ◆ 28-Feb-18, Complete Box Cully **Bridge Works** Bridge D1 in Portion C1, D1 and D3 (Interface CONS.C1.1130 Access to Portion C1, D1 & D3 06-Oct-16 Access to Portion C1, D1 & D3 CONS.C1.1140 Survey / Setting Out Survey / Setting Out Pier Columns (P508) CONS.C1.2100 Pier Columns (P508) CONS.C1.2200 Pier Head (P508) Pier Head (P508) CONS.C1.2200.1 Predrilling (17 nos) (D1) CONS.C1.2200.2 GI Report and Verification / Agreement to GI Report and /erification / Agreement to Founding Level Founding Level CONS.C1.2210 D1 Bored Piling (18 nos. 1800-2000mm dia x 52m) ( 2 nos + 0.8m Rock Socket ) D1 Bared Piling (18 nos, 1800-2000m Pile Testing CONS.C1.2215 Pile Testing Pile Trimming CONS.C1.2220 Pile Trimming CONS.C1.2225.3 Bearing Installation, Final Inspection and ♦ 17-May-17, Achievement of KD4 (465) CONS.C1.2226 Achievement of KD4 (465) CONS.C1.2230 Construct Abutment A106 Construct Aboutm CONS.C1.2250 Bridge D1 - Erect Precast Segments + Bridge D1 Erect Precast Segments + Stitching + Stressing (6 spans) Stitching + Stressing (6 spans) D1 Bridge Ancillary Parapet/TCS\$, Railing, MJ, Drainage & Bridge Lighting CONS.C1.2260 D1 Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage & Bridge Lighting CONS.C1.2265 D1 Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages D1 Bridge Aricillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signa D1 Final Asphalt Paving + Road Mark CONS.C1.2270 D1 Final Asphalt Paving + Road Markings ♦ 02-Jan-18, Completion of Bridge D1 CONS.C1.2280 Completion of Bridge D1 Pier Columns (P101) CONS.C1.2299 Pier Columns (P101) Pier Columns (P102) CONS.C1.8850 Pier Columns (P102) CONS.C1.8860 Pier Columns (P103) Pier Columns (P103) Pier Columns (P104) CONS.C1.8870 Pier Columns (P104) Pier Columns (P105) CONS.C1.8880 Pier Columns (P105) CONS.C1.8950 Pile Cap (P103) Pile Cap (P103) Pile Cap (P104) CONS.C1.8960 Pile Cap (P104) CONS.C1.8970 Pile Cap (P105) Pile Cap (P105) Pile Cap (P101) CONS.C1.8980 Pile Cap (P101) Pile Cap (A106) CONS.C1.8990 Pile Cap (A106) CONS.C1.9000 Pile Cap (P508) Pile Cap (P508) CONS.C1.9010 Pile Cap (P102) Ple Cap (P102) CONS.C1.9020 Pier Head & Bearing (P101) Pier Head & Bearing (P101) Pier Head & Bearing (P102) CONS.C1.9030 Pier Head & Bearing (P102) Pier Head & Bearing (P103) CONS.C1.9040 Pier Head & Bearing (P103)

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1 A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J CONS.C1.9050 Pier Head & Bearing (P104) Pier Head & Bearing (P105) CONS.C1.9060 Pier Head & Bearing (P105) RW1 (51m / 4 bays) CONS.C2.3140 Commence RW1 Retaining Wall Survey / Setting Out CONS.C2.3150 Survey / Setting Out CONS.C2.3160 Excavate to formation level (open cut / slope) Excavate to formation level (ppen cut / slope) Cast Base & Wall Stem 4 bays (ribbed finish to 1m CONS.C2.3170 Cast Base & Wall Stem 4 bays (ribbed finish to 1m below F.G.L) Backfill to final ground level and Reinstate Roa CONS.C2.3180 Backfill to final ground level and Reinstate CONS.C2.3250 Install Railing for RW1 and RW1a Install Railing for RW1 and RW1a RW1a (176m / 11 bays) CONS.C2.3200 Commence RW1a Retaining Wall Commence RW1a Retaining Wal CONS.C2.3210 Survey / Setting Out ■ Survey / Setting Out Excavate to formation level (open cut / slope) - Bay 4 to Bay 11 CONS.C2.3220 Excavate to formation level (open cut / slope) Bay 4 to Bay 11 CONS.C2.3230 Cast Base & Wall Stem (ribbed finish to 1m below F.G.L) - Bay 4 to Bay 11 Cast Base & Wall Stem (ribbled finish to 1m below F.G.L) - Bay 4 to Bay 11 CONS.C2.3240 Backfill to final ground level and Reinstate Backfill to final ground level and Reinstate Roads - Bay 4 to Bay 1 Roads - Bay 4 to Bay 11 Excavate to formation level (open cut / slope) - Bay 1 to Bay : CONS.C2.3370 Excavate to formation level (open cut / slope) Bay 1 to Bay 3 CONS.C2.3380 Cast Base & Wall Stem (ribbed finish to 1m below F.G.L) - Bay 1 to Bay 3 Cast Base & Wall Stem (ribbed finish to 1m below F.G.L) - Bay 1 to Bay 3 CONS.C2.3390 Backfill to final ground level and Reinstate Roads - Bay 1 to Bay 3 Bridge D8 CONS.C1.2285 Site Possession / Access to Portion C1 CONS.C1.2288 Survey / Setting Out Survey / Setting Out CONS.C1.2290.1 Predrilling (10 nos) (D8) Predrilling (10 nos) (D8) CONS.C1.2290.2 GI Report and Verification / Agreement to GI Report and Verification / Agreement to Founding Leve Founding Level D8 Bored Piling (10 nos.2000mm dia x.52m) CONS.C1.2300 D8 Bored Piling (10 nos.2000mm dia x 52m) CONS.C1.2305 Pile Testing Pile Testing Pile Trimming CONS.C1.2310 Pile Trimming Construct Abutment A801 CONS.C1.2320 Construct Abutment A801 CONS.C1.2322 Pier Columns (P805) Pier Columns (P805) Bridge D8:- Erect Precast Segments + Stitching + Stressing (4 CONS.C1.2340 Bridge D8 - Erect Precast Segments + CONS.C1.2350 D8 Bridge Ancillary - Parapet/TCSS, Railing, MJ Drainage & Bridge Lighting D8 Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage & Bridge Lighting D8 Bridge Ancillary - Parapet + Railing, Mi, Drainage, Bridge Lighting, Signages CONS.C1.2355 D8 Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages ■ D8 Final Asphalt Paving + Road Markings CONS.C1.2360 D8 Final Asphalt Paving + Road Markings O2-Nov-17, Completion of Bridge D8 CONS.C1.2370 Completion of Bridge D8 CONS.C1.8820 Pier Columns (P804) CONS.C1.8830 Pier Columns (P803) Pier Columns (P803) CONS.C1.8900 Pile Cap (A801) Pile Cap (A801) Pile Cap (P805) CONS.C1.8910 Pile Cap (P805) CONS.C1.8920 Pile Cap (P804) Pile Cap (P804) CONS.C1.8930 Pile Cap (P802) CONS.C1.9070 Pier Head & Bearing (P805) Pier Head & Bearing (P805) CONS.C1.9080 Pier Head & Bearing (P804) Pier Head & Bearing (P804) Pier Head & Bearing (P803) CONS.C1.9090 Pier Head & Bearing (P803) Pier Columns (P802) CONS.C2.3420 Pier Columns (P802) CONS.C2.3460 Pile Cap (P803) Pier Head & Bearing (P802) CONS.C2.3490 Pier Head & Bearing (P802) RW8 (35m / 3 bays) 08-Aug-17 ♦ Commence RW8 Retaining Wall CONS.C2.3320 Commence RW8 Retaining Wall ■ Survey / Setting Out CONS.C2.3330 Survey / Setting Out CONS.C2.3340 Excavate to formation level (open cut / slope) Excavate to formation level (open cut / slope) CONS.C2.3350 Cast Base & Wall Stem 3 bays (ribbed finish to 1m below F.G.L) Backfill to final ground level & Reinstate Road CONS.C2.3360 Backfill to final ground level & Reinstate Road Bridge D9a in Portion A1 & A5 06-Oct-16 Site Possession / Access to Portion A1 & A5 (61 days) CONS.A5.2010 Site Possession / Access to Portion A1 & A5 (61 days) CONS.A5.2015 Suvey / Setting out Suvey / Setting out Predrilling - Portion A1 & A5 (12 nos) (09a) CONS.A5.2020.1 Predrilling - Portion A1 & A5 (12 nos) (D9a) ■ GI Report and Verification / Agreem CONS.A5.2020.2 GI Report and Verification / Agreement to to Founding Level Founding Level CONS.A5.2030 D9a Bored Piling (12 nos.1800-2200mm dia x 47m) Pilling (12 nos 1800-2200mm dia x 47m) D9a Bor CONS.A5.2035 Pile Testing CONS.A5.2040 Pile Trimming Bridge D9a - Erect Pr CONS.A5.2065 Bridge D9a - Erect Precast Segments + Stitching + Stressing (4 spans) D9a Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage, Bridge Lighting, & Sign Gantry CONS.A5.2070 D9a Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage, Bridge Lighting, & Sign Gantry CONS.A5.2080 D9a Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages D9a Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages CONS.A5.2090 Pier Columns (P905 & P907) Pier Columns (P905 & P907) Pier Columns (P904 & P906) CONS.A5.2110 Pier Columns (P904 & P906) CONS.A5.2140 Pile Caps (P904) Pile Caps (P904) Pile Caps (P905) CONS.A5.2150 Pile Caps (P905)

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| A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D CONS.A5.2160 Pier Head & Bearing (P905 & P907) Pier Head & Bearing (P904 & P906) CONS.A5.2180 Pier Head & Bearing (P904 & P906) Bridge D9a in Portion C1 & C2 cess to Portion C1 & C2 (184 days) CONS.C2.3010 Site Possession / Access to Portion C1 & C2 (184 days) CONS.C2.3015 Survey / Setting Out Survey / Setting Out CONS.C2.3020. Predrilling - Portion C1 & C2 (8 nos) (D9a) Predrilling + Portion C1 & C2 (8 nos) (D CONS.C2.3020. GI Report and Verification / Agreement to GI Report and Verification / Agree Founding Level D9a in Portion C1 & C2 Bored Piling (8 nos.1800-2200mm dia x 47m) CONS.C2.3030 D9a in Portion C1 & C2 Bored Piling (8 nos.1800-2200mm dia x 47m) CONS.C2.3035 Pile Testing CONS.C2.3040 Pile Trimming CONS.C2.3070 Construct Abutment A901 Construct Abutment A901 CONS.C2.3080 Bridge D9a (C1 & C2) - Erect Precast Bridge D9a (C1 & C2) - Erect P D9a (C1 & C2) Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage, Bridge Lighting, & Sign Gantry CONS.C2.3085 D9a (C1 & C2) Bridge Ancillary - Parapet/TCSS Railing, MJ, Drainage, Bridge Lighting, & Sign CONS.C2.3095 Completion of Works in Section VI (KD13) ◆ 14-Jun-17, Completion of Works in Section VI (KD13) CONS.C2.3100 Bridge D9a (C1 & C2) - Erect Precast Bridge D9a (C1 & C2) - Erect Precast Segments + Stitching Segments + Stitching + Stressing (1 span) iD9a Bridge Ancillary | Parapiet/TCSS, Railing, MJ, Drainage, Bridge Lighting, & Sign Gantry CONS.C2.3110 D9a Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage, Bridge Lighting, & Sign Gantry CONS.C2.3115 D9a Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages D9a Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signage CONS.C2.3120 D9a Final Asphalt Paving + Road Markings ■ D9a Final Asphalt Paving + Road Markings ♦ 28-Jul-17, Completion of Bridge D9a CONS.C2.3130 Completion of Bridge D9a CONS.C2.3400 Pier Columns (P902) Pier Columns (P902) Pier Calumns (P903) CONS.C2.3410 Pier Columns (P903) CONS.C2.3440 Pile Caps (P902) Pile Caps (P902) CONS.C2.3450 Pile Caps (P903) Pile Caps (P903) CONS.C2.3470 Pier Head & Bearing (P902) Pier Head & Bearing (P902) CONS.C2.3480 Pier Head & Bearing (P903) Pier Head & Bearing (P903) CONS.C2.3560 Pile Caps (A901) Pile Caps (A901) Bridge D9b CONS.A1.1105 Access to Portion A1 ccess to Portion A CONS.A1.1108 Survey / Setting Out Survey / Setting Out CONS.A1.1110.1 Predrilling (8 nos incl. 4 nos for P910) (D9b) drilling (8 nos incl. 4 nos for P910 CONS.A1.1110.2 GI Report and Verification / Agreement to GI Report and Verification / Agreement to Founding Leve Founding Level D9b Bored Piling (8 nos. 2000mm dia x 49m) including 4 for P910 CONS.A1.1120 D9b Bored Piling (8 nos. 2000mm dia x 49m) including 4 for P910 CONS.A1.1125 Pile Testing CONS.A1.1130 Pile Trimming CONS.A1.1160 Bridge D9b - Erect Precast Segments + Stitching + Stressing (3 spans) Bridge D9b - Erect Precast Segments + Stitching + \$tressing (3 spans) CONS.A1.1170 D9b Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage & Bridge Lighting D9b Bridge Ancillary - Parapet/TC\$S, Railing, MJ Drainage & Bridge Lighting D9b Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signage CONS.A1.1175 D9b Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages CONS.A1.1180 D9b Final Asphalt Paving + Road Markings Þ9b Final Asphalt Paying + Road Markings ♦ 11-Aug-17, Bridge D9b complete CONS.A1.1190 Bridge D9b complete CONS.A1.8750 Pier Columns (P908) Pier Columns (P908) CONS.A1.8760 Pier Columns (P909) Pier Columns (P909) Pler Columns (P910) - A (Portal) CONS.A1.8770 Pier Columns (P910) - A (Portal) Per Columns (P910) B (Portal) CONS.A1.8780 Pier Columns (P910) - B (Portal) CONS.A1.9230 Pile Caps (P908) CONS.A1.9240 Pile Caps (P909) Pilė Caps (P909) CONS.A1.9250 Pile Caps (P910 - A) Pile Cap (P910 - A) CONS.A1.9260 Pile Caps (P910 - B) CONS.A1.9270 Pier Head & Bearing (P908) Pier Head & Bearing (P908) CONS.A1.9280 Pier Head & Bearing (P909) Pier Head & Bearing (P909) Bridge D9c CONS.A1.1192 Site Possession / Access to Portion A1 & A2 06-Oct-16 Site Possession / Access to Portion A1 & A2 CONS.A1.1194 Survey / Setting Out Survey / Setting Out CONS.A1.1200.1 Predrilling (8 nos) (D9c) Predrilling (8 nos) (D9c) CONS.A1.1200.2 GI Report and Verification / Agreement to Founding Level CONS.A1.1210 D9c Bored Piling (8 nos. 2000mm dia x 62m) CONS.A1.1215 Pile Testing CONS.A1.1220 Pile Trimming Construct Deck (Cast in Situ) (1 span, P910 to P911) CONS.A1.1240 Bridge D9c - Construct Deck (Cast in Situ) (1 Bridge D9c span, P910 to P911) CONS.A1.1250 Bridge D9c - Erect Precast Segments Pier P911 to Pier P913 + Stitching + Stressing (2 spans) Bridge D9¢ - Erect Precast Segments Pier P911 to Pier P913 + Stitching D9c Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage & Bridge Lighting CONS.A1.1260 D9c Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage & Bridge Lighting CONS.A1.1270 D9c Bridge Ancillary - Parapet + Railing, MJ, 💻 ;D9¢ Bridgė Aricillary į Parapet + Railing, MJ, Drainage, Bridge Lighting; Sigr Drainage, Bridge Lighting, Signages CONS.A1.8790 Pier Columns (P913) Pier Columns (P913) CONS.A1.8800 Pier Columns (P912) Pier Columns (P912) CONS.A1.8810 Pier Columns (P911) Pier Columns (P911) CONS.A1.9190 Pile Cap (P913) CONS.A1.9200 Pile Cap (P912) ap (P912)

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Erect Precast Segments + Bridge D10 - Erect Precast Segments + Stitching + Stressing (8 spans Stitching + Stressing (8 spans) CONS.A1.1350 D10 Bridge Ancillary - Parapet/TCSS, Railing, D10 Bridge Ancillary - Parapet/TCSS, Ralling, MJ, Drainage, Bridge Lighting, & Sign Gantry MJ, Drainage, Bridge Lighting, & Sign Gantry CONS.A1.1355 D10 Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages D10 Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, \$ignage D10 Final Asphalt Paving + Road Markings CONS.A1.1360 D10 Final Asphalt Paving + Road Markings ◆ 18-Oct-17, Bridge D10 complete CONS.A1.1370 Bridge D10 complete Pier Columns (P1003) CONS.A1.8830 Pier Columns (P1003) Pier Columns (P1002 & P1006) CONS.A1.8840 Pier Columns (P1002 & P1006) CONS.A1.8850 Pier Columns (P1008) Pier Columns (P1008) Pier Columns (P1001 & P1 CONS.A1.8860 Pier Columns (P1001 & P1005) Pier Columns (P1007) CONS.A1.8870 Pier Columns (P1007) CONS.A1.9110 Pile Caps (P1008) Pile Caps (P1008) Pile Caps (P1003) CONS.A1.9120 Pile Caps (P1003) CONS.A1.9130 Pile Caps (P1007) Pilė Caps (P1007) le Caps (P1002) CONS.A1.9140 Pile Caps (P1002) Pile Caps (P1001) CONS.A1.9160 Pile Caps (P1001) CONS.A1.9350 Pier Head & Bearing (P1003) Fier Head & Bearing (P1003) Pier Head & Bearing (P1007) CONS.A1.9360 Pier Head & Bearing (P1007) Pier Head & Bearing (P1008) CONS.A1.9370 Pier Head & Bearing (P1008) CONS.A1.9380 Pier Head & Bearing (P1002 & P1006) Pier Head & Bearing (P1002 & P1006) ■ Pier Head & Bearing (P1001 & 1005) CONS.A1.9400 Pier Head & Bearing (P1001 & 1005) Bridge D11 CONS.A1.1375 Site Possession / Access to Portion A1 (61d) Survey / Setting Out CONS.A1.1378 Survey / Setting Out CONS.A1.1380.1 Predrilling (3 nos) (D11) Predrilling (3 nos) (D11) GI Report and Verification / Agreem CONS.A1.1380.2 GI Report and Verification / Agreement to nt to Founding Leve D11 Bored Piling (3 nos. 2000mm dia x 65) (52m for abutment CONS.A1.1390 D11 Bored Piling (3 nos. 2000mm dia x 65) (52m for abutment) CONS.A1.1395 Pile Testing Pile Te CONS.A1.1400 Pile Trimming CONS.A1.1405 Abutment A1101 nt A1101 CONS.A1.1430 Bridge D11 - Erect Precast Segments + Bridge D11 - Erect Precast Segments + Stitching + Stressing (2 spans) CONS.A1.1440 D11 Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage, Bridge Lighting, & Sign Gantry D11 Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage, Bridge Lighting, & Sign Gantry CONS.A1.1445 D11 Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages D11 Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages Road Markings D11 Final Asphalt Paving CONS.A1.1450 D11 Final Asphalt Paving + Road Markings CONS.A1.1460 Bridge D11 complete CONS.A1.8900 Pier Columns (P1102) Pler Columns (P1102) Pile Caps (P1102) CONS.A1.9070 Pile Caps (P1102) CONS.A1.9080 Pile Caps (A1101) Pile Caps (A1101) CONS.A1.9420 Pier Head & Bearing (P1102) Pier Head & Bearing (P1102) RW11 (42m / 3 bays) CONS.A1.3320 Commence RW11 Retaining Wall (42m / 3 bays) 13-May-17 ♦ Commence RW11 Retaining Wall (42m / 3 bays) Survey / Setting Out CONS.A1.3330 Survey / Setting Out CONS.A1.3340 Excavate to formation level (open cut / slope) Excavate to formation level (open cut / slope) CONS.A1.3350 Cast Base & Wall Stem 3 bays (ribbed finish to 1m below F.G.L) Cast Base & Wall Stem 3 bays (ribbed finish to 1m below Backfill to final ground level CONS.A1.3360 Backfill to final ground level

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Bridge D12a CONS.B1.1835 Site Possession / Access to Portion B1 Site Survey and Setting Out CONS.B1.1837 Site Survey and Setting Out CONS.B1.1840.1 Predrilling (17 nos) (D12a) Predrilling (17 nos) (D12a) GI Report and Verification / Agreement to Founding Leve CONS.B1.1840.2 GI Report and Verification / Agreement to Founding Level CONS.B1.1850 D12a Bored Piling (17 nos. 2000mm dia x 60m + 1.0m Rock Socket) D12a Bored Piling (17 nos, 2000mm dia x 60m + 1,0m Rock \$ocket) CONS.B1.1855 Pile Testing Pile Trimming CONS.B1.1860 Pile Trimming CONS.B1.1890 Bridge D12a - Erect Precast Segments + Stitching + Stressing (6 spans) Bridge D12a - Erect Precast Segr nents + Stitching + Stressing (6 spans) D12a Bridge Ancillary - Parapet/TCSS, Railing, M.), Drainage, Bridge Lighting, & Sig CONS.B1.1900 D12a Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage, Bridge Lighting, & Sign Gantry CONS.B1.1905 D12a Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages D12a Bridge Ancillary CONS.B1.1910 D12a Final Asphalt Paving + Road Markings aving + Road Markings O4-Jul-18, Bridge D12a complete CONS.B1.1920 Bridge D12a complete Pier Columns (P1201 & P1204) CONS.B1.2020 Pier Columns (P1201 & P1204) CONS.B1.2040 Pier Columns (P1202 & P1205) Pier Columns (P1202 & P1205) Pier Columns (P1203 & P1414) CONS.B1.2050 Pier Columns (P1203 & P1414) CONS.B1.2070 Pier Columns (P1206) Pier Columns (P1206) Pile Caps (P1206) CONS.B1.2440 Pile Caps (P1206) CONS.B1.2450 Pile Caps (P1201) Pile: Caps (P1201): CONS.B1.2460 Pile Caps (P1202) Pile Caps (P1202) CONS.B1.2470 Pile Caps (P1203) Pile Caps (P1203) CONS.B1.2480 Pier Head & Bearing (P1201 & P1204) Pier Head & Bearing (P1201 & P1204) Pier Head & Bearing (P1202 & P1205) CONS.B1.2500 Pier Head & Bearing (P1202 & P1205) CONS.B1.2520 Pier Head & Bearing (P1203 & P1414) Pier Head & Bearing (P1203 & P1414) Pier Head & Bearing (P1206) CONS.B1.2530 Pier Head & Bearing (P1206) Bridge D12b CONS.B2.2015 Site Possession / Access to Portion B2 & B5 06-Oct-16 Site Possession / Access to Portion B2 & B5 CONS.B2.2018 Site Survey / Setting out Site Survey / Setting ou Predrilling (18 nds) (D12b) CONS.B2.2020.1 Predrilling (18 nos) (D12b) CONS.B2.2020.2 GI Report and Verification / Agreement to Founding Level GI Report and Verification / Agree D12b Bored Piling (18 nos. 2000mm da x 64m + 3.3m Rock Socket) CONS.B2.2030 D12b Bored Piling (18 nos. 2000mm dia x 64m 3.3m Rock Socket) CONS.B2.2035 Pile Testing Pile Testing Pile Trimming CONS.B2.2040 Pile Trimming D12b - Erect Precast Segments + Stitching + Stressing (4 spans) CONS.B2.2070 Bridge D12b - Erect Precast Segments + Stitching + Stressing (4 spans) ■ D12b Bridge Ancillary - Farapet/TCSS, Ralling, MJ, Drainage, Bridge Lighting, & Sign Gantry CONS.B2.2080 D12b Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage, Bridge Lighting, & Sign Gantry CONS.B2.2085 D12b Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages D12b Bridge Ancillary - Parapet + Railing MJ, Drainage Bridge Lighting, \$ignage Final Paving, Road CONS.B2.2090 Final Paving, Road Markings and Signages Markings and \$ignages CONS.B2.2100 Pier Columns (P1211) Pier Columns (P1211) CONS.B2.2110 Pier Columns (P1212) Pier Columns (P1214) CONS.B2.2120 Pier Columns (P1214) CONS.B2.2130 Pier Columns (P1213) - A (Portal) Pier Columns (P1213) - A (Porta Pier Columns (P1210) CONS.B2.2140 Pier Columns (P1210) CONS.B2.2150 Pier Columns (P1213) - B (Portal) Pier Columns (P1213) - B (Porta Pier Columns (P1208) CONS.B2.2160 Pier Columns (P1208) Pier Columns (P1209) CONS.B2.2170 Pier Columns (P1209) CONS.B2.2190 Pile Caps (P1211) Pile Caps (P1211) Pile Caps (P1212) CONS.B2.2200 Pile Caps (P1212) Pile Caps (P1213 - A) CONS.B2.2210 Pile Caps (P1213 - A) CONS.B2.2220 Pile Caps (P1213 - B) Pile Caps (P1213 - B) Pile Caps (P1214) CONS.B2.2230 Pile Caps (P1214) CONS.B2.2240 Pile Caps (P1207) Pile Caps (P1207) CONS.B2.2250 Pile Caps (P1208) Pile Caps (P1208) Pile Caps (P1209) CONS.B2.2260 Pile Caps (P1209) CONS.B2.2270 Pile Caps (P1210) Pile Caps (P1210) Pier Columns (P1207) CONS.B2.2280 Pier Columns (P1207) CONS.B2.2290 Pier Head & Bearing (P1211) Pier Head & Bearing (P1211) CONS.B2.2300 Pier Head & Bearing (P1214) Pier Head & Bearing (P1214) ■ Pier Head & Bearing (P1212) CONS.B2.2320 Pier Head & Bearing (P1212) CONS.B2.2340 Pier Head & Bearing (P1207) Pier Head & Bearing (P1207) Pier Head & Bearing (F CONS.B2.2350 Pier Head & Bearing (P1210) CONS.B2.2360 Pier Head & Bearing (P1208) Pier Head & Bearing (P1208) CONS.B2.2370 Pier Head & Bearing (P1209) Pier Head & Bearing (P1209 CONS.B2.2380 Bridge D12b - Erect Precast Segments + Stitching + Stressing (4 spans) Bridge D12b - Frect Preca Bridge D12b (cast in-situ) in Portion B3 (Inter CONS.B3.2110 Site Possession/Access to Portion B3 CONS.B3.2120 Survey / Setting Out Survey / Setting Out

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CONS.B3.2130 Bridge D12b (Portion B3) - Construct Deck (cast-in-situ) Pier P1210/P1214 interface with CONS.B3.2140 D12b Bridge Ancillary - Parapet/TCSS, Railing, TCSS, Railing, NJ, Drainage, Bridge Lighting, & Sign Gantry MJ, Drainage, Bridge Lighting, & Sign Gantry D 2b Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages CONS.B3.2145 D12b Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages CONS.B3.2150 D12b Final Paving, Road Markings and Signages 10-Apr-18, Completion of Section IV (KD11) Works within Portion \$3 including Bridge D12b CONS.B3.2160 | Completion of Section IV (KD11) Works within Portion B3 including Bridge D12b Bridge D13 in Portion B1 and Portion C1 CONS.B1.1925 Site Possession / Access to Portion B1 CONS.B1.1926 Site Possession / Access to Portion C1 06-Oct-16 Site Possession / Access to Portion C CONS.B1.1928 Site Survey / Setting out Portion B1 Site Survey / Setting out Portion B1 CONS.B1.1929 Site Survey / Setting out Portion C1 Site Survey / \$etting out Portion C1 CONS.B1.1930.1 Predrilling (15 nos) in Portion B1 (D13) Predrilling (15 nos) in Portion B1 (D13) GI Report and Verifica CONS.B1.1930.2 GI Report and Verification / Agreement to Founding Level - B1 Predrilling (6 nos) in Portion C1 (D13) CONS.B1.1932.1 Predrilling (6 nos) in Portion C1 (D13) CONS.B1.1932.2 GI Report and Verification / Agreement to Founding Level - C1 ■ GI:Report and Verification / Agreen nt to Founding D13 Bored Piling (15 nos 1800-2000mm dia x 52m) 4nos + 0.8m Rock Socket CONS.B1.1940 D13 Bored Piling (15 nos. 1800-2000mm dia x 52m) 4nos + 0.8m Rock Socket - Portion B1 Pile Testing B1 CONS.B1.1942 Pile Testing B1 CONS.B1.1946 D13 Bored Piling (6 nos. 1800-2000mm dia x 47m-52m) - Portion C1 D13 Bored Plling (6 nos. 1800-2000mm dia x 47m CONS.B1.1948 Pile Testing C1 CONS.B1.1950 Pile Trimming - Portion B1 Pile Trimming - Portion B1 Pile Trimming - Portion C1 CONS.B1.1952 Pile Trimming - Portion C1 CONS.B1.1960 Construct Abutment A1301 + A1307 - Portion Construct Abutment A1301 + A1307 - Portion C1 CONS.B1.1980 Bridge D13 - Erect Precast Segments + Stitching + Stressing (9 spans) g + Stressing (9 span Bridge D13 - Erect Precast Segments + Stitcl CONS.B1.1990 D13 Bridge Ancillary - Parapet/TCSS, Railing, D13 Bridge Ancillary - Parapet/TCSS, Railing, NU, Drainage, Bridge Lighting, & Sign Gantry MJ, Drainage, Bridge Lighting, & Sign Gantry D13; Bridge, Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages CONS.B1.1995 D13 Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting, Signages D13 Final Asphalt Paving, Road Markings & \$ignages CONS.B1.2000 D13 Final Asphalt Paving, Road Markings & Signages 24-Feb-18, Completion of Bridge D13 CONS.B1.2010 Completion of Bridge D13 CONS.B1.2190 Pier Columns (P1303) Pler Columns (P1303) Pier Columns (P1308) CONS.B1.2200 Pier Columns (P1308) CONS.B1.2210 Pier Columns (P1311 & P1306) Pier Calumns (P1311; & P1306) CONS.B1.2220 Pier Columns (P1310 & P1305) Pier Columns (P1310 & P130) Pier Columns (P1309 & P1304) CONS.B1.2230 Pier Columns (P1309 & P1304) CONS.B1.2330 Pile Caps (P1311) Pile Caps (P1311) CONS.B1.2340 Pier Columns (P1302) Pier Columns (P1302) Pile Caps (P1310) CONS.B1.2350 Pile Caps (P1310) CONS.B1.2360 Pile Caps (P1309) Pile Caps (P1309) CONS.B1.2370 Pile Caps (A1307) Pile Caps (A1307) Pile Caps (A1301) CONS.B1.2380 Pile Caps (A1301) CONS.B1.2390 Pile Caps (P1308) Pile Caps (P1308) CONS.B1.2400 Pile Caps (P1303) Pile Caps (P1303) Pile Caps (P1302) CONS.B1.2410 Pile Caps (P1302) CONS.B1.2560 Pier Head & Bearing (P1311 & P1306) ■ Pier Head & Bearing (P1311 & P1306) Pier Head & Bearing (P1310 & P1305) CONS.B1.2580 Pier Head & Bearing (P1310 & P1305) CONS.B1.2600 Pier Head & Bearing (P1309 & P1304) Pier Head & Bearing (P1309 & P1304) Pier Head & Bearing (P130 CONS.B1.2610 Pier Head & Bearing (P1303) Pier Head & Bearing (P1308) CONS.B1.2620 Pier Head & Bearing (P1308) CONS.B1.2630 Pier Head & Bearing (P1302) Pier Head & Bearing (P1302) RW13 (40m / 3 bays) nence RW13 Retaining Wall CONS.C2.3260 Commence RW13 Retaining Wall 11-Oct-17 🔷 Comn CONS.C2.3270 Survey / Setting Out I Survey / Setting Out CONS.C2.3280 Excavate to formation level (open cut / slope) CONS.C2.3290 Cast Base & Wall Stem 3 bays (ribbed finish to 1m below F.G.L) Cast Base & Wall Stem 3 bays (ribbed finish to 1m below F.G.L) CONS.C2.3300 Backfill to final ground level and Reinstate Backfill to final ground level and Reinstate Bridge D14a CONS.A1.1464 Commence Bridge D14a / Portion A1 06-Oct-16 nce Bridge D14a / Portion A1 Survey / Setting Out CONS.A1.1466 Survey / Setting Out CONS.A1.1470.1 Predrilling (12 nos) (D14a) Predrilling (12 nos) (D14a) CONS.A1.1470.2 GI Report and Verification / Agreement to Founding Level ■ G Report and Verification / Agr D14a Bored CONS.A1.1480 D14a Bored Piling (12 nos. 2000mm dia x 62m) 47m for Abutment Piling (12 nos. 2000mm dia x 62m) 47m for Abutment CONS.A1.1485 Pile Testing CONS.A1.1490 Pile Trimming CONS.A1.1515 Construct Abutment A1401 Construct Abutment A1401 CONS.A1.1520 Bridge D14a - Erect Precast Segments + Stitching + Stressing (5 spans) Bridge D14a - Erect Precast Segn CONS.A1.1530 D14a Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting & Signages Parapet + Ralling, MJ, Drainage, Bridge D14a Bridge Ancillary CONS.A1.1540 D14a Final Asphalt Paving + Road Markings D14a Final Asphalt Paving + Road Markings ♦ 09-Jun-17, Bridge D14a co CONS.A1.1550 Bridge D14a complete CONS.A1.8940 Pier Columns (P1402) Columns (P1402)

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CONS.A1.8950 Pier Columns (P1403) Pier Columns (P1404) CONS.A1.8960 Pier Columns (P1404) Pier Columns (P1405) CONS.A1.8970 Pier Columns (P1405) CONS.A1.8980 Pier Columns (P1406) Pier Columns (P1406 CONS.A1.9000 Pile Caps (A1401) Pile Caps (A1401) CONS.A1.9010 Pile Caps (P1402) Pile Caps (P1402) Pile Caps (P1403) CONS.A1.9020 Pile Caps (P1403) Pile Caps (P1404) CONS.A1.9030 Pile Caps (P1404) CONS.A1.9040 Pile Caps (P1405) Pile Caps (P1405) Pile Caps (P1406) CONS.A1.9050 Pile Caps (P1406) CONS.A1.9440 Pier Head & Bearing (P1402) Pier Head & Bearing (P1402) CONS.A1.9450 Pier Head & Bearing (P1403) Pier Head & Bearing (P1404) CONS.A1.9460 Pier Head & Bearing (P1404) CONS.A1.9470 Pier Head & Bearing (P1405) Pier Head & Bearing (P1405) Pier Head & Bearing (P1406) CONS.A1.9480 Pier Head & Bearing (P1406) RW14A (29m / 2 bays) CONS.A1.3380 Commence RW14a Retaining Wall (29m / 2 25-Jul-17 • Comr nce RW14a Retaining Wall (29m / 2 bays) Survey / Setting Out CONS.A1.3390 Survey / Setting Out Excavate to formation level (open cut / slope) CONS.A1.3400 Excavate to formation level (open cut / slope) CONS.A1.3410 Cast Base & Wall Stem 2 bays (ribbed finish to Cast Base & Wall Stem 2 bays (ribbed finish to 1 m 1m below F.G.L) CONS.A1.3420 Backfill to final ground level Backfill to final ground level Bridge D14b in Portion A1 and Portion B1 CONS.B1.1654 Access to Portion B1 Access to Portion B1 CONS.B1.1656 Survey / Setting Out Survey / Setting Out CONS.B1.1660.1 Predrilling (6 nos) (D14b) Predrilling (6 nos) (D14b) GI Report and Verification / Agreement to Founding Level CONS.B1.1660.2 GI Report and Verification / Agreement to Founding Level CONS.B1.1670 D14b Bored Piling (6 nos. 2000-2200mm dia x 62m) (2nos +2.3m Rock Socket) D14b Bored Piling (6 nos. 2000-2200mm dia x 62m) (2nos +2.3m Rock Socket) Pile Testing / Coring Test for Socket Bored Pile CONS.B1.1675 Pile Testing / Coring Test for Socket Bored Pile Pile Trimming CONS.B1.1680 Pile Trimming CONS.B1.1710 Bridge D14b - Erect Precast Segments + Stitching + Stressing (3 spans) CONS.B1.1720 D14b Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting & Signages D14b Bridge Ancillary - Parapet + Railing, MJ Drainage, Bridge Lighting & Signages D14b Final Asphalt Paving + Road Markings CONS.B1.1730 D14b Final Asphalt Paving + Road Markings ♦ 26-Sep-17, Bridge D14b complete CONS.B1.1740 Bridge D14b complete Pier Columns (P1407) CONS.B1.2090 Pier Columns (P1407) CONS.B1.2100 Pier Columns (P1408) Pier Columns (P1408) CONS.B1.2110 Pier Columns (P1409) Pier Columns (P1409) Pile Caps (P1407) CONS.B1.2290 Pile Caps (P1407) Pile Caps (P1408) CONS.B1.2300 Pile Caps (P1408) Pile Caps (P1409) CONS.B1.2310 Pile Caps (P1409) CONS.B1.2640 Pier Head & Bearing (P1407) Pier Head & Bearing (P1407) CONS.B1.2650 Pier Head & Bearing (P1408) Pier Head & Bearing (P1408) Pier Head & Bearing (P1409) CONS.B1.2660 Pier Head & Bearing (P1409) Bridge D14c CONS.B1.1744 Site Possession / Access to Portion B1 Survey / Setting Out CONS.B1.1746 Survey / Setting Out CONS.B1.1750.1 Predrilling (11 nos) (D14c) redrilling (11 nos) (D14c) CONS.B1.1750.2 GI Report and Verification / Agreement to GI Report and Verification / Agreement to Founding Level D) 4c Bored Pilling (11 nos; 2000-2200mm dia x 67m + 2.3m (Rock Socket) CONS.B1.1760 D14c Bored Piling (11 nos. 2000-2200mm dia x 67m + 2.3m Rock Socket) Pile Testing CONS.B1.1765 Pile Testing CONS.B1.1770 Pile Trimming CONS.B1.1795 Bridge D14c - Construct Deck (cast in-situ) Pier P1409 to P1410 Bridge D14c - Construct Deck (cast in-situ); Pier P1409 to P1410 Bridge D14c - Erect Precast Segments + Stitching + Stressing (4 spans) CONS.B1.1800 Bridge D14c - Erect Precast Segments + CONS.B1.1810 D14c Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting & Signages D14c Bridge Ancillary - Parapet + Railing, MJ, Drainage, Bridge Lighting & Signages CONS.B1.1820 D14c Final Asphalt Paving + Road Markings D14c Final Asphalt Paving + Road Marking ♦ 14-Dec-17, Bridge D14c complete CONS.B1.1830 Bridge D14c complete CONS.B1.2120 Pier Columns (P1410) Pier Columns (P1410) CONS.B1.2130 Pier Columns (P1411 & P1413) Pier Columns (P1411 & P1413) Pier Columns (P1412) CONS.B1.2140 Pier Columns (P1412) CONS.B1.2250 Pile Caps (P1410) Pile Caps (P1410) CONS.B1.2260 Pile Caps (P1411) Pile Caps (P1411) CONS.B1.2270 Pile Caps (P1412) Pile Caps (P1412) CONS.B1.2670 Pier Head & Bearing (P1410) Pier Head & Bearing (P1410) CONS.B1.2680 Pier Head & Bearing (P1411 & P1413) Pier Head & Bearing (P1411 & P1413) Pier Head & Bearing (P1412): CONS.B1.2690 Pier Head & Bearing (P1412) Bridge D15 Site Possession/Access to Partion B5 CONS.B5.2104 Site Possession/Access to Portion B5 06-Oct-16

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| A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D CONS.B5.2106 Survey/ Site Setting Out edrilling (11 nos) (D15) CONS.B5.2110.1 Predrilling (11 nos) (D15) CONS.B5.2110.2 GI Report and Verification / Agreement to GI Report and Verification / Agreement to Founding Level D15 Bored Piling (11 nos. 2000mm dia x 65m CONS.B5.2120 D15 Bored Piling (11 nos. 2000mm dia x 65m 3.3m Rock Socket) CONS.B5.2125 Pile Testing Pile Testing CONS.B5.2130 Pile Trimming Pile Trimmino CONS.B5.2150 Bridge D15 - Construct Deck (cast in-situ) Pier P1501/P1502-1503 CONS.B5.2160 Bridge D15 - Erect Precast Segments + Bridge D15 - Erect Precast Segments Stitching + Stressing (2 spans Stitching + Stressing (2 spans) CONS.B5.2170 D15 Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage, Bridge Lighting, & Sign Gantry :D15 Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage, Bridge Ligh CONS.B5.2180 D15 Final Asphalt Paving, Road Markings and p15 Final Asphalt Paving, Road Markings and Signages Signages CONS.B5.2190 Pier Columns (P1501 & P1502) Pier Columns (P1501 & P1502) Pier Columns (P1503) CONS.B5.2210 Pier Columns (P1503) Pier Columns (P1504) CONS.B5.2220 Pier Columns (P1504) CONS.B5.2230 Pier Columns (P1505) Pier Columns (P1505) CONS.B5.2250 Pile Caps (P1501 & P1502) Pile Caps (P1501 & P1502) Pile Caps (P1503) CONS.B5.2260 Pile Caps (P1503) CONS.B5.2270 Pile Caps (P1504) Plle Caps (P1504) CONS.B5.2280 Pile Caps (P1505) Pile Caps (P1505) CONS.B5.2290 Pier Head & Bearing (P1501) Pier Head & Bearing (P1501) Pier Head & Bearing (P1503) CONS.B5.2310 Pier Head & Bearing (P1503) Pier Head & Bearing (P1504) CONS.B5.2320 Pier Head & Bearing (P1504) CONS.B5.2330 Pier Head & Bearing (P1505) Pier Head & Bearing (P1505) CONS.B5.2340 Bridge D15 - Erect Precast Segments + Bridge D15 - Erect Precast Segments + \$titching + Stressing (2 spans) Stitching + Stressing (2 spans) Bridge D15 in Portion B4 (Interface with Cont CONS.B4.2170 Site Possession/Access to Portion B4 ■ Survey / \$ite Setting Out CONS.B4.2180 Survey / Site Setting Out CONS.B4.2190 Bridge D15 - Erect Precast Segments on Falseworks at Portion B4 Interface (1 spa ■ Bridge D15 - Erect Precast Segments on Falseworks at Portion B4 Interface (1 span) orks at Portion B4 Interface (1 span) - Parapet/T¢SS, Railing, M.), Drainage, Bridge Lighting, & Sign G CONS.B4.2200 D15 Bridge Ancillary - Parapet/TCSS, Railing, MJ, Drainage, Bridge Lighting, & Sign Gantry D15 Final Asphalt Paving, Road Markings and Signages CONS.B4.2210 D15 Final Asphalt Paving, Road Markings and CONS.B4.2220 Inspection and Handover CONS.B4.2230 Completion of Section V (KD12) Works within Portion B4 including Bridge D15 mpletion of Section V (KD12) Works within Portion B4 including Bridge D15 ♦ 18-Aug-18, Co Bridge D16S and D16N and Abutment A1601 in CONS.A4.2230 Commence Works for Abutment A1601 06-Oct-16 ce Works for Abutment A1601 Survey / Site \$etting Out CONS.A4.2240 Survey / Site Setting Out CONS.A4.2250.1 Predrilling (2 nos) (D16) - BH 03 & BH 04 at Portion A6 Predrilling (2 nos) (D16) - BH 03 & BH 04 at Portion A6 CONS.A4.2250.2 GI Report and Verification / Agreement to Founding Level to BH 03 and BH 04 Predrilling (2 nos):(D16) + BH 01 & BH 02 at Portion A3 CONS.A4.2250.3 Predrilling (2 nos) (D16) - BH 01 & BH 02 at CONS.A4.2250.4 GI Report and Verification / Agreement to Founding Level to BH 01 and BH 02 CONS.A4.2260 D16S Bored Piling (2 nos x 1800mm dia) D16S Boried Piling (2 nos x 1800mm dia) CONS.A4.2265 Pile Testing - BH 03 & BH 04 Pile Testing - BH 03 & BH 04 Construct Abutment A1601 CONS.A4.2280 | Construct Abutment A1601 016N Bored Piling (2 nos x 1800mm dia) CONS.A4.2340 D16N Bored Piling (2 nos x 1800mm dia) CONS.A4.2350 Pile Testing - BH 01 & BH 02 Pile Testing - BH 01 & BH 02 CONS.A4.2360 Pile Trimming + Pile Caps Bridge D16S and D16N in Portion A4 CONS.A4.2285 Site Possession / Site Access to Portion A4 20-Mar 17 Site Po sion / Site Access Construct Deck (cast in-stu) CONS.A4.2290 Bridge D16S & D16N - Construct Deck (cast D16N & D16S Bridge Ancillary - Parapet, MJ, Drainage, Bridge Lighting, †CSS & Signage CONS.A4,2300 D16N & D16S Bridge Ancillary - Parapet, MJ Drainage, Bridge Lighting, TCSS & Signages CONS.A4.2310 D16 Final Asphalt Paving, Road Markings and D16 Final Asphalt Paving, Road Markings and Signages Signages CONS.A4.2320 Inspection and Handover of Bridge D16 Handover of Bridge D16 CONS.A4.2330 Completion of Bridge D16N and D16S 21-Aug-18, Completion of Bridge D16N and D16S RW16S (15m / 1 bay) in Portion A6 13-Feb-17 ♦ Commence RW16s Retaining Wall (29m / 2 bays) CONS.A1.3500 Commence RW16s Retaining Wall (29m / 2 bays) Survey / Setting Out CONS.A1.3510 Survey / Setting Out Excavate to formation level (open cut / slope) CONS.A1.3520 Excavate to formation level (open cut / slope) CONS.A1.3530 Cast Base & Wall Stem 1 bay (ribbed finish to 1m below F.G.L) Cast Base & Wall Stem 1 bay (ribbed finish to 1m below F.G.L) CONS.A1.3540 Install U/G Utilities - TCSS, ELV & LV Ducting & Draw Pits Install U/G Utilities - TCSS, ELV & LV Ducting & Draw Pits CONS.A1.3550 Backfill to final ground level Backfill to final ground level RW16N (15m / 1 bay) in Portion A6 ence RW16n Retaining Wall (29m / 2 bays) CONS.A1.3440 Commence RW16n Retaining Wall (29m / 2 bays) CONS.A1.3450 Survey / Setting Out : Survey / Setting Out: CONS.A1.3460 Excavate to formation level (open cut / slope) Excavate to formation level (open cut / slope) CONS.A1.3470 Cast Base & Wall Stem 1 bay (ribbed finish to 1m below F.G.L) Cast Base & Wall Stem 1 bay (ribbed finish to 1m below F.G.L) Install U/G Utilities - TCSS, FLV & LV Ducting CONS.A1.3480 Install U/G Utilities - TCSS, ELV & LV Ducting Backfill to final ground leve CONS.A1.3490 Backfill to final ground level **Depressed Road RC Structure** 

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Predrilling (12 nos) (DS303) CONS.A1.4380. GI Report and Verification / Agreement to Founding Level GI Report and Verification / Agreement to Fo CONS.A1.4390 Piling Works - Driven H Pile (12 nos) ing Works - Driven H Pile (12 nos) CONS.A1.4410 Excavation, Pile Trimming + Cast Pile Caps (3 Excavation, Pile Trimming + Cast Pile Caps (3 nos) CONS.A1.4420 Backfill Foundation ■ Backfill Foundation Sign Gantry Footing at Grade in Portion C1 & P DS302 (610mm dia. Prebored H Pile) CONS.D1.3380 Commence Foundation / Footing for Sign 06-Oct-16 🔷 Commence Foundation / Footing for Sign Gantry Gantry Mobilisation/Survey/Setting Out CONS.D1.3390 | Mobilisation/ Survey / Setting Out CONS.D1.3400. Predrilling for Prebored H Pile (8 nos) (DS302) Predrilling for Prebored H Pile (8 nos) (DS302) CONS.D1.3400. GI Report and Verification / Agreement to GI Report and Verification / Agr Founding Level CONS.D1.3410 Pre-bored Socket H-Pile (8 nos) Pre-bored Socket H-Pile (8 nds) CONS.D1.3420 Pile Testing Pile Testing Excavation, Pile Trimming + Pile Caps ( 2 nos) CONS.D1.3430 Excavation, Pile Trimming + Pile Caps ( 2 nos) CONS.D1.3440 Backfill Foundation Backfill Foundation GT408 (Driven H Pile) Predrilling (8 nos) (GT408) CONS.C1.4030. Predrilling (8 nos) (GT408) CONS.C1.4030. GI Report and Verification / Agreement to Founding Level GI Report and Verification / Agreement to Founding Level Piling Works - Driven H Pile (8 nos) CONS.C1.4040 Piling Works - Driven H Pile (8 nos) CONS.C1.4060 Excavation, Pile Trimming + Cast Pile Caps ( 2 nos) Excavation, Pile Trimming + Cast Pile Caps (2 nos) CONS.C1.4070 Backfill Foundation Backfill Foundation DS44 (Driven H Pile) CONS.C1.4100. Predrilling (8 nos) (DS44) Predrilling (8 nos) (DS44) GI Report and Verification / Agreement to Founding Level CONS.C1.4100. GI Report and Verification / Agreement to Founding Level ing Works - Driven H Pile (8 nos) CONS.C1.4110 Piling Works - Driven H Pile (8 nos) CONS.C1.4130 Excavation, Pile Trimming + Cast Pile Caps ( 2 Excavation, Pile Trimming + Cast Pile Caps (2 nos) Backfill Foundation CONS.C1.4140 Backfill Foundation DS261 (Driven H Pile) Predrilling (8 nos) (D\$261) CONS.C1.4170. Predrilling (8 nos) (DS261) ■ GI Report and Verification / Agreement to Founding Level CONS.C1.4170. GI Report and Verification / Agreement to Founding Level Piling Works - Driven H Pile (8 nos) CONS.C1.4180 Piling Works - Driven H Pile (8 nos) Excavation, Pile Trimming + Cast Rile Caps (2 nos) CONS.C1.4200 Excavation, Pile Trimming + Cast Pile Caps ( 2 nos) ■ Backfill Foundation CONS.C1.4210 Backfill Foundation ADS301 (Driven H Pile) Predrilling (12 nos) (ADS301) CONS.C1.4240. Predrilling (12 nos) (ADS301) GI Report and Verification / Agreement to Founding Level CONS.C1.4240. GI Report and Verification / Agreement to Founding Level Pillng Works - Driven H Pile (12 nos) CONS.C1.4250 Piling Works - Driven H Pile (12 nos) CONS.C1.4270 Excavation, Pile Trimming + Cast Pile Caps ( 3 nos) Excavation, Pile Trimming + Cast Pile Caps (3 nos) CONS.C1.4280 Backfill Foundation Backfill Foundation FADS303 (Driven H Pile) Predrilling (8 nos) (FADS303) CONS.C1.4310. Predrilling (8 nos) (FADS303) CONS.C1.4310. GI Report and Verification / Agreement to Founding Level GI Report and Verification / Agre Piling Works - Driven H Pile (8 nos) CONS.C1.4320 Piling Works - Driven H Pile (8 nos) CONS.C1.4340 Excavation, Pile Trimming + Cast Pile Caps ( 2 nos) Excavation, Pile Trimming + Cast Pile Caps ( ■ Backfill Foundation CONS.C1.4350 Backfill Foundation **Erection of Sign Gantry and High Mast for TCS!** CONS.C1.4360 Erection of Sign Gantry & High Mast Structure and Associated Conduits for TCSS Works and Associated Conduits for TCSS Works Drainage and U/G Utilities CONS.RW.2300 Handover area to CLP for HV Cable Laying and Install HV Cable Ducting on Ca CONS.RW.3870 Excavate and Install HV Cable Ducting on Carriageway (West of Pump House - Portion : Excavate and Install HV Cable Ducting on Carriageway (East of Pump House - Portion: A and C) CONS.RW.3880 Excavate and Install HV Cable Ducting on Carriageway (East of Pump House - Portion A

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CONS.RW.3890 Excavate and Install HV Cable Ducting on Carriageway (East of Pump House - Portion B CONS.RW.3900 Excavate and Install HV Cable Ducting on Carriageway (West of Pump House - Portion Drainage and U/G Utilities (West of Pump Hou Drainage & UU Road SOL 101 / 105 (Phase 1) **Drainage System** CONS.RW.22 Survey/ Road Setting Out Survey/ Road Setting Out CONS.RW.228 Road Formation to Sub-grade (Cut & Fill) Road Formation to Sub-grade (Cut & Fill) CONS.RW.22 Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + **Installation of Underground Utilities** CONS.RW.23 Excavate and Install Fresh WM / Valves & Excavate and Install Fresh WM / Valves & fittings; + Testing; Cleaning & Flushing and Interface Co fittings + Testing, Cleaning & Flushing and CONS.RW.23 Excavate and Install Common Telecom Ducting and Telecom Ducting by Others elecom Ducting by Other Excavate and Install ELV/ LV Ducting and Pillar Box for CONS.RW.23 Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS Road SOL 101 / 105 (Phase 2) **Drainage System** CONS.RW.34 Survey/ Road Setting Out Survey/ Road Setting Out CONS.RW.34 Road Formation to Sub-grade (Cut & Fill) Road Formation to Sub-grade (Cut & Fill) CONS.RW.34( Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + **Installation of Underground Utilities** CONS.RW.34( Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Excavate and Install Fresh WM / Valves & fittings + To ng, Cleaning & Flushing a Excavate and Install Common Telecom Ducting and Telecom Ducting by Others CONS.RW.34 Excavate and Install Common Telecom Ducting and Telecom Ducting by Others CONS.RW.34 Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS Excavate and Install ELV/ LV Ducting and Pillar Box for Road SOL 102 /106 /111 and the neigboring la **Drainage System** Survey/ Road Setting Out CONS.RW.24 Survey/ Road Setting Out Road Formation to Sub-grade (Cut & Fill) CONS.RW.242 Road Formation to Sub-grade (Cut & Fill) CONS.RW.24 Excavate to invert level and install Drainage Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) System (Drain Pipes & Catchpit/Manholes) + **Installation of Underground Utilities** Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Connection CONS.RW.29 Excavate and Install Fresh WM / Valves & Excavate and Install Common Telecom Ducting and Telecom Ducting; by Others fittings + Testing, Cleaning & Flushing and CONS.RW.29 Excavate and Install Common Telecom Ducting and Telecom Ducting by Others Excavate and Install ELV/ LV Ducting and Pillar Box for TC\$S CONS.RW.29( Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS Road SOL 102 /106 /111 and the neigboring la **Drainage System** Survey/ Road Setting Out CONS.RW.34 Survey/ Road Setting Out CONS.RW.34 Road Formation to Sub-grade (Cut & Fill) Road Formation to Sub-grade (Cut & Fill) CONS.RW.34 Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + nd install Drainage System (Drain Pipes Installation of Underground Utilities CONS.RW.35( Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flush Excavate and Install Common Telecom Ducting and Telecom Ducting by Others CONS.RW.35 Excavate and Install Common Telecom Ducting and Telecom Ducting by Others Excavate and Install ELV/ LV Ducting and Pillar Box for TC\$S CONS.RW.352 Excavate and Install ELV/ LV Ducting and Pilla Box for TCSS Road SOL 104 (Phase 1) **Drainage System** CONS.RW.24 Survey/ Road Setting Out ■ Survey/ Road Setting Out CONS.RW.24 Road Formation to Sub-grade (Cut & Fill) Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + Testing & Interface Connection CONS.RW.24( Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + Installation of Underground Utilities CONS.RW.24 Excavate and Install Fresh WM / Valves & Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Connection fittings + Testing, Cleaning & Flushing and Excavate and Install Flush WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Connection (1 line) CONS.RW.24{ Excavate and Install Flush WM / Valves & fittings + Testing, Cleaning & Flushing and CONS.RW.24 Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS Excavate and Install ELV/LV Ducting and Pillar Box for TCSS Road SOL 104 (Phase 2) **Drainage System** Survey/ Road Setting Out CONS.RW.35¢ Survey/ Road Setting Out Road Formation to Sub-grade (Cut & Fill): CONS.RW.35 Road Formation to Sub-grade (Cut & Fill) CONS.RW.35{ Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + Installation of Underground Utilities CONS.RW.351 Excavate and Install Fresh WM / Valves & Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Connection (3 lines) fittings + Testing, Cleaning & Flushing and CONS.RW.35 Excavate and Install Flush WM / Valves & fittings + Testing, Cleaning & Flushing and Excavate and Install Flush WM / Valves & fittings + Testing, Cla Excavate and Install ELV/LV Ducting and Pillar Box for TCSS CONS.RW.35! Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS Undergound Utilties (ELV, Fresh WM & Teleco Work in Portion D1 and D2 Sewage Rising main at Portion D1 16-May-17 Commence Works on Rising Main CONS.RM.101 Commence Works on Rising Main ■ Site Survey / Setting Out Sewerage Alignment CONS.RM.102 Site Survey / Setting Out Sewerage Alignmen CONS.RM.103 Excavate to Invert Level & Install 2 Sewage Rising Main DN100 CHC & CHD Excavate to Invert Level & Install 2 Sewage Rising Main DN100 CHC & CHD Construct Thrust Block CONS.RM.104 Construct Thrust Block Gravity Flow Testing CONS.RM.105 Gravity Flow Testing

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Print Date: 14-Dec-16 09:47 Page: 17 / 23 CONS.RM.106 Backfill Telecom Crossing at Portion D2 and D1 Excavate and Install Common Telecom Ducting and Telecom Ducting by Telecom Com CONS.RW.28( Excavate and Install Common Telecom Ducting and Telecom Ducting by Telecom Companies Backfill and reinstate ground CONS.RW.282 Backfill and reinstate ground Drainage and U/G Utilities (East of Pump Hous Drainage & UU Road SOL 101 / 109 / 114 (Phase 1) **Drainage System** Survey/ Road Setting Out CONS.RE.101 Survey/ Road Setting Out CONS.RE.102 Road Formation to Sub-grade (Cut & Fill) Road Formation to Sub-grade (Cut & Fill) CONS.RE.103 Excavate to invert level and install Drainage Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + Testing Interface Connection System (Drain Pipes & Catchpit/Manholes) + **Installation of Underground Utilities** CONS.RE.106 Excavate and Install Fresh WM / Valves & Excavate and Install Fresh WM / Valves & fittings: + Testing, Cleaning & Flushing and Interface Connection fittings + Testing, Cleaning & Flushing and CONS.RE.107 Excavate and Install Common Telecom Ducting and Telecom Ducting by Others and Install Common Telecom Ducting a Telecom Ducting by Others Excavate and Install ELV/ LV Ducting and Pillar Box for TCS\$ and Road Lighting CONS.RE.108 Excavate and Install ELV/ LV Ducting and Pilla Box for TCSS and Road Lighting Road SOL 101 / 109 / 114 (Phase 2) **Drainage System** CONS.RE.420 Road Formation to Sub-grade (Cut & Fill) Road Formation to Sub-grade (Cut & Fill) CONS.RE.421 Excavate to invert level and install Drainage Excavate to invert level and install [ inage System (Drain Pipes & Catchpit/ System (Drain Pipes & Catchpit/Manholes) + Survey/ Road Setting Out CONS.RE.422 Survey/ Road Setting Out **Installation of Underground Utilities** CONS.RE.423 Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Excavate and Install Common Telecom Ducting and Telecom Ducting by Others CONS.RE.424 Excavate and Install Common Telecom Ductin and Telecom Ducting by Others CONS.RE.425 Excavate and Install ELV/ LV Ducting and Pillar Excavate and Install ELV/ LV Ducting and Pillar Bdx for TCSS and Road Lighting Box for TCSS and Road Lighting Road SOL 102 and the area outside the carriage **Drainage System** CONS.RE.197 Survey/ Road Setting Out Survey/ Road Setting Out CONS.RE.198 Road Formation to Sub-grade (Cut & Fill) Road Formation to Sub-grade (Cut & Fill) CONS.RE.199 Excavate to invert level and install Drainage Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + Testing & Interface Connection System (Drain Pipes & Catchpit/Manholes) + Installation of Underground Utilities CONS.RE.289 Excavate and Install Fresh WM / Valves & l; Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Interi fittings + Testing, Cleaning & Flushing and Excavate and Install Common Telecom Ducting and Telecom Ducting by Others CONS.RE.290 Excavate and Install Common Telecom Ductin and Telecom Ducting by Others CONS.RE.291 Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS and Road Lighting Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS and Road Lighting Road SOL 102 and the area outside the carriage **Drainage System** CONS.RE.426 Survey/ Road Setting Out Road Formation to Sub-grade (Cut & Fill) CONS.RE.427 Road Formation to Sub-grade (Cut & Fill) CONS.RE.428 Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + Excavate to invert level and install Dr em (Drain Pipes & Catchpit/Manholes) + Testing & Interface Connecti **Installation of Underground Utilities** CONS.RE.429 Excavate and Install Fresh WM / Valves & Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Con fittings + Testing, Cleaning & Flushing and CONS.RE.430 Excavate and Install Common Telecom Ducting and Telecom Ducting by Others Telecom Ducting and Telecom Ducting by Others CONS.RE.431 Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS and Road Lighting Road SOL 107 / 113 (Phase 1) **Drainage System** CONS.RE.200 Survey/ Road Setting Out Survey/ Road Setting Out CONS.RE.201 Road Formation to Sub-grade (Cut & Fill) Road Formation to Sub-grade (Cut & Fill) CONS.RE.202 Excavate to invert level and install Drainage Excavate to invert level and install Drainage System (Drain Pipe System (Drain Pipes & Catchpit/Manholes) + **Installation of Underground Utilities** CONS.RE.204 Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Excavate and Install Fresh WM / Valves & fittings + Testing Cleaning & Flushing and Interface Connection (3 lines) CONS.RE.205 Excavate and Install Fresh WM / Valves & Excavate and Install Fresh WIM / Valves & fittings + Testing, Cleaning & Flushing and Interface Cor fittings + Testing, Cleaning & Flushing and CONS.RE.206 Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS Excavate and Install ELV/LV Ducting and Pillar Box for TOSS Road SOL 107 / 113 (Phase 2) **Drainage System** CONS.RE.432 Survey/ Road Setting Out CONS.RE.433 Road Formation to Sub-grade (Cut & Fill) Road Formation to Sub-grade (Cut & Fill) CONS.RE.434 Excavate to invert level and install Drainage Excavate to invert level and install Drainage System (Drain I System (Drain Pipes & Catchpit/Manholes) + Installation of Underground Utilities CONS.RE.435 Excavate and Install Fresh WM / Valves & Excavate and Install Fresh WM / Valves & fittings; + Testing, Cleaning & Flushing and Interface Connection (3 lines) Excavate and Install Fresh:WM / Valves & fittings +: Testing, Cleaning & Flushing and Interface Connection (1 line) fittings + Testing, Cleaning & Flushing and CONS.RE.436 Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and and Install ELV/LV Ducting and Pillar Box for TCSS CONS.RE.437 Excavate and Install ELV/ LV Ducting and Pilla Box for TCSS Road SOL 108 / 106 & SOL 110 Adjacent to Road SOL 108 / 106, Abutment A90 CONS.RE.207 Excavate and Install Common Telecom Ducting Common Telecom Ducting and Telecom and Telecom Ducting by Others + Backfilling CONS.RE.216 Road Formation to subgrade + Drainage Road Formation to subgrade + 'Drainage System' CONS.RE.219 Install TCSS/LV/ELV Ducting ■ Install TC\$S/LV/ELV Ducting Portion A1 and A2 - Sub-Base Area

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Page: 18 / 23 Print Date: 14-Dec-16 09:47 CONS.A1.4430 Demobilisation of Temporary Facilities on Site CONS.A1.4440 Site Survey / Site Clearing Area to Formation Level CONS.A1.4450 Area to Formation Level CONS.A1.4460 Sub-Base Material Topping (Area 29,963 m2 : 100mm thk Subbase) Sub-Base Material Topping (Area 29,963 m2 x 100r Area 3 (in Portion A6) **Drainage System** ■ Survey/ Road Setting Out CONS.RE.4660 Survey/ Road Setting Out Road Formation to Sub-grade (Cut & Fill) CONS.RE.4670 Road Formation to Sub-grade (Cut & Fill) CONS.RE.4680 Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + ■ Excavate to invert leve and install Drainage System (Drain Pipe Installation of Underground Utilities CONS.RE.4690 Excavate and Install ELV/ LV Ducting and Pilla Excavate and Install ELV/, LV Ducting and Pillar Box for TCSS Box for TCSS Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Connec CONS.RE.4700 Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flyshing and Interface Connection CONS.RE.4710 Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Area 1 (West of Pump House) (Portion C1) **Road Works** Road SOL 101 / 105 (Phase 1) Kerbing and Footings for Railing, Fencing, Sign CONS.RW.30( Excavate and Construct Footings for Road and Construct Footings for Road Lightings / Railing / Fencing and Signage Lightings / Railing / Fencing and Signages oad Formation to Sub-base CONS.RW.30' Road Formation to Sub-base CONS.RW.301 Construct Precast Road Kerbings Construct Precast Road Kerbings Road Works to Road Base and Base Course CONS.RW.30 Road Formation to Road Base CONS.RW.304 Road Formation to Base Course Road Formation to Base Course Installation of Railing and Fencing + Road Ligh Install Road Railing and Fencing CONS.RW.30! Install Road Railing and Fencing CONS.RW.30( Install Road Lighting and Signages Install Road Lighting and Signages **Final Paving and Road Markings** CONS.RW.29 Cleaning and Rectification Works ☐ Cleaning and Rectification Work CONS.RW.298 Final Road Paving (Wearing Course) Final Road Paving (Wearing C Road Markings and Road Sig CONS.RW.299 Road Markings and Road Signages Road SOL 101 / 105 (Phase 2) Kerbing and Footings for Railing, Fencing, Sign Road Formation to Sub-bas CONS.RW.36; Road Formation to Sub-base Construct Precast Road Kerbings CONS.RW.36 Construct Precast Road Kerbings Road Works to Road Base and Base Course CONS.RW.36! Road Formation to Road Base Road Formation to Road Base Road Formation to Base Course CONS.RW.36¢ Road Formation to Base Course Installation of Railing and Fencing + Road Ligh CONS.RW.36 Install Road Railing and Fencing Install Road Railing and Fencing CONS.RW.36 Install Road Lighting and Signages Install Road Lighting and \$igna **Final Paving and Road Markings** CONS.RW.35 Cleaning and Rectification Works Cleaning and Rectification Work Final Road Paving (Wearing C CONS.RW.36( Final Road Paving (Wearing Course) Road Markings and Road Sigha CONS.RW.36 Road Markings and Road Signages Road SOL 102 /106 /111 (Phase 1) Kerbing and Footings for Railing, Fencing, Sign and Construct Footings for Road Lightings / Railing / Fencing and Signage CONS.RW.32 Excavate and Construct Footings for Road Lightings / Railing / Fencing and Signages Road Formation to Sub-base CONS.RW.328 Road Formation to Sub-base CONS.RW.32 Construct Precast Road Kerbings Road Works to Road Base and Base Course CONS.RW.32 Road Formation to Road Base Road Formation to Base Course CONS.RW.32: Road Formation to Base Course Installation of Railing and Fencing + Road Ligh CONS.RW.32 Install Road Railing and Fencing nstall Road Railing and Fehcing CONS.RW.32 Install Road Lighting and Signages Install Road Lighting and Signage Final Paving and Road Markings CONS.RW.32 Final Road Paving (Wearing Course) Final Road Paving (Wearing Course) CONS.RW.32 Road Markings and Road Signages Road SOL 102 /106 /111 (Phase 2) Kerbing and Footings for Railing, Fencing, Sign CONS.RW.37 Excavate and Construct Footings for Road Lightings / Railing / Fencing and Signages / Railing / Fencing and Signages CONS.RW.37( Road Formation to Sub-base CONS.RW.37 Construct Precast Road Kerbings Construct Precast Road Kerbings Road Works to Road Base and Base Course CONS.RW.36 Road Formation to Road Base Road Formation to Road Base

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Page: 19 / 23 Print Date: 14-Dec-16 09:47 CONS.RW.37( Road Formation to Base Course Installation of Railing and Fencing + Road Ligh Install Road Railing and Fencing CONS.RW.37 Install Road Railing and Fencing CONS.RW.37. Install Road Lighting and Signages Install Road Lighting and Signages **Final Paving and Road Markings** Final Road Paving (Wearing Course) CONS.RW.37 Final Road Paving (Wearing Course) Road Markings and Road Signages CONS.RW.37 Road Markings and Road Signages Road SOL 104 (Phase 1) Kerbing and Footings for Railing, Fencing, Sign CONS.RW.332 Excavate and Construct Footings for Road Excavate and Construct Footings for Road Lightings Lightings / Railing / Fencing and Signages CONS.RW.33: Road Formation to Sub-base Road Formation to Sub-base CONS.RW.33 Construct Precast Road Kerbings Road Works to Road Base and Base Course CONS.RW.33 Road Formation to Road Base Road Formation to Road Base Road Formation to Base Course CONS.RW.33¢ Road Formation to Base Course Installation of Railing and Fencing + Road Ligh Install Road Railing and Fencing CONS.RW.33 Install Road Railing and Fencing CONS.RW.338 Install Road Lighting and Signages nstall Road Lighting and Signag **Final Paving and Road Markings** Final Road Paving (Wearing Course) CONS.RW.33( Final Road Paving (Wearing Course) CONS.RW.33 Road Markings and Road Signages Road Markings and Road Signages Road SOL 104 (Phase 2) Kerbing and Footings for Railing, Fencing, Sign CONS.RW.38( Excavate and Construct Footings for Road Excavate and Construct Footings for Road Lightings Lightings / Railing / Fencing and Signages CONS.RW.38 Road Formation to Sub-base Road Formation to Sub-base Construct Precast Road Kerbings CONS.RW.38: Construct Precast Road Kerbings Road Works to Road Base and Base Course CONS.RW.38 Road Formation to Road Base Road Formation to Base Course CONS.RW.38 Road Formation to Base Course Installation of Railing and Fencing + Road Ligh Install Road Railing and Fencing CONS.RW.38! Install Road Railing and Fencing CONS.RW.38 Install Road Lighting and Signages Install Road Lighting and Signages **Final Paving and Road Markings** CONS.RW.378 Final Road Paving (Wearing Course) inal Road Paving (Wearing Course) CONS.RW.37 Road Markings and Road Signages ■ Road Markings and Road Signages Area 2 (East of Pump House Portion C1, A1, A2 **Road Works** Road SOL 101 / 109 / 114 (Phase 1) Kerbing and Footings for Railing, Fencing, Sign CONS.RE.384 Excavate and Construct Footings for Road Lightings / Railing / Fencing and Signages Excavate and Construct Footings for Road Lightings / Railing / Fencing and Sign CONS.RE.385 Road Formation to Sub-base Road Formation to Sub-base Construct Precast Road Kerbings CONS.RE.386 Construct Precast Road Kerbings Road Works to Road Base and Base Course CONS.RE.372 Road Formation to Road Base Road Formation to Base Course CONS.RE.373 Road Formation to Base Course Installation of Railing and Fencing + Road Ligh ■ Install Road Railing and Fencing CONS.RE.374 Install Road Railing and Fencing ■ Install Road Lighting and Signag CONS.RE.375 Install Road Lighting and Signages Road SOL 101 / 109 / 114 (Phase 2) Kerbing and Footings for Railing, Fencing, Sigr CONS.RE.442 Excavate and Construct Footings for Road Lightings / Railing / Fencing and Signages Excavate and Construct Footings for Road Lightings / Railing / Fencing and Signages CONS.RE.443 Road Formation to Sub-base Road Formation to Sub-base CONS.RE.444 Construct Precast Road Kerbings Construct Precast Road Kerbing Road Works to Road Base and Base Course CONS.RE.438 Road Formation to Road Base CONS.RE.439 Road Formation to Base Course Road Formation to Base ( Installation of Railing and Fencing + Road Ligh CONS.RE.440 Install Road Railing and Fencing Install Road Railing and Fencing CONS.RE.441 Install Road Lighting and Signages Install Road Lighting Road SOL 102 (Phase 1) Kerbing and Footings for Railing, Fencing, Sign CONS.RE.415 Excavate and Construct Footings for Road Lightings / Railing / Fencing and Signages nd Construct Footings for Road Lightings / Railing / Fencing and Signages CONS.RE.416 Construct Precast Road Kerbings Construct Precast Road Kerbings CONS.RE.417 Road Formation to Sub-base ad Formation to Sub-base Road Works to Road Base and Base Course CONS.RE.410 Road Formation to Road Base Road Formation to Road Base

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+ Bearings BRG.ES.1030 Bridges in Portion A & B - Decking / Segments Erection + Stitching Decking / Segments Erection BRG.ES.1040 Bridges in Portion A & B - Parapet + Ancillary n Portion A & B - Parapet Works Bridges in Portion C & D ridges in Portion C & D - Bored Piling BRG.ES.2010 Bridges in Portion C & D - Bored Piling + Pilecaps BRG.ES.2020 Bridges in Portion C & D - Column, Pier Head + Bridges in Portion € & D - Column, Pier Head + Bearings Bearings

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### **Appendix D. Event and Action Plan**

#### **Event/Action Plan for Air Quality Monitoring**

EVENT	ACTION				
	ET	IEC	ER	CONTRACTOR	
ACTION LEVEL					
1. Exceedance for one sample	Identify source, investigate the causes of exceedance and propose remedial measures;     Inform IEC and ER;     Repeat measurement to confirm finding;     Increase monitoring frequency to daily.	<ol> <li>Check monitoring data submitted by ET;</li> <li>Check Contractor's working method.</li> </ol>	Notify Contractor.	Rectify any unacceptable practice;     Amend working methods if appropriate.	
Exceedance for two or more consecutive samples	<ol> <li>Identify source;</li> <li>Inform IEC and ER;</li> <li>Advise the ER on the effectiveness of the proposed remedial measures;</li> <li>Repeat measurement s to confirm findings;</li> <li>Increase monitoring frequency to daily;</li> <li>Discuss with IEC and Contractor on remedial actions required;</li> <li>If exceedance continues, arrange meeting with IEC and ER;</li> <li>If exceedance stops, cease additional monitoring.</li> </ol>	<ol> <li>Check monitoring data submitted by ET;</li> <li>Check Contractor's working method;</li> <li>Discuss with ET and Contractor on possible remedial measures;</li> <li>Advise the ER on the effectiveness of the proposed remedial measures;</li> <li>Supervise Implementation of remedial measures.</li> </ol>	<ol> <li>Confirm receipt of notification of failure in writing;</li> <li>Notify Contractor;</li> <li>Ensure remedial measures properly implemented.</li> </ol>	1. Submit proposals for remedial to ER within 3 working days of notification; 2. Implement the agreed proposals; 3. Amend proposal if appropriate.	

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
1. Exceedance for one sample	1. Identify source, investigate the causes of exceedance and propose remedial measures;  2. Inform ER, Contractor and EPD;  3. Repeat measurement to confirm finding;  4. Increase monitoring frequency to daily;  5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER 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 the ER on the effectiveness of the proposed remedial measures; 5. Supervise implementation of remedial measures.	Confirm receipt of notification of failure in writing;     Notify Contractor;     Ensure remedial measures properly implemented.	<ol> <li>Take immediate action to avoid further exceedance;</li> <li>Submit proposals for remedial actions to IEC within 3 working days of notification;</li> <li>Implement the agreed proposals;</li> <li>Amend proposal if appropriate.</li> </ol>
2. Exceedance for two or more consecutive samples	<ol> <li>Notify IEC, ER,         Contractor and EPD;</li> <li>Identify source;</li> <li>Repeat measurement         to confirm findings;</li> <li>Increase monitoring         frequency to daily;</li> <li>Carry out analysis of         Contractor's working         procedures to         determine possible         mitigation to be         implemented;</li> <li>Arrange meeting with         IEC and ER to         discuss the remedial         actions to be taken;</li> <li>Assess effectiveness         of Contractor's         remedial actions and         keep IEC, EPD and         ER informed of the         results;</li> <li>If exceedance stops,         cease additional         monitoring.</li> </ol>	<ol> <li>Discuss amongst ER, ET, and Contractoron the potential remedial actions;</li> <li>Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly;</li> <li>Supervise the implementation of remedial measures.</li> </ol>	<ol> <li>Confirmreceipt of notification of failure in writing;</li> <li>Notify Contractor;</li> <li>In consultation with the IEC, agree with the Contractor on the remedial measures to be implemented;</li> <li>Ensure remedial measures properly implemented;</li> <li>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.</li> </ol>	<ol> <li>Take immediate action to avoid further exceedance;</li> <li>Submit proposals for remedial actions to IEC within 3 working days of notification;</li> <li>Implement the agreed proposals;</li> <li>Resubmit proposals if problem still not under control;</li> <li>Stop the relevant portion of works as determined by the ER until the exceedance is abated.</li> </ol>

#### **Event / Action Plan for Construction Noise Monitoring**

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Action Level	Contractor; 2. Identify source,		notification of failure in writing; 2. Notify Contractor;	1. Submit noise mitigation proposals to IEC; 2. Implement noise mitigation proposals.
Limit Level	and Contractor;  2. Identify source;  3. Repeat measurements to confirm findings;  4. Increase monitoring frequency;  5. Carry out analysis of Contractor's working procedures to	<ol> <li>Discuss amongst ER, ET, and Contractor on the potential remedial actions;</li> <li>Review Contractors remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly;</li> <li>Supervise the implementation of remedial measures.</li> </ol>	to propose remedial measures for the analysed noise problem; 4. Ensure remedial measures properly implemented; 5. If exceedance continues, consider what portion of the work is responsible	<ol> <li>Take immediate action to avoid further exceedance;</li> <li>Submit proposals for remedial actions to IEC within 3 working days of notification;</li> <li>Implement the agreed proposals;</li> <li>Resubmit proposals if problem still not under control;</li> <li>Stop the relevant portion of works as determined by the ER until the exceedance is abated.</li> </ol>

#### **Event / Action Plan for Water Quality Monitoring**

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Action level being exceeded by one sampling day	<ol> <li>Repeat in situ measurement to confirm findings;</li> <li>Identify source(s) of impact;</li> <li>Inform IEC, contractor and ER;</li> <li>Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>Discuss mitigation measures with IEC, ER and Contractor;</li> <li>Ensure mitigation measures are implemented;</li> <li>Repeat measurement on next day of exceedance to confirm findings.</li> </ol>	<ol> <li>Check monitoring data submitted by ET and Contractor's working methods;</li> <li>Discuss with ET and Contractor on possible remedial actions;</li> <li>Review the proposed mitigation measures submitted by Contractor and advise the ER accordingly;</li> <li>Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol> <li>Confirm receipt of notification of noncompliance in writing;</li> <li>Discuss with IEC on the proposed mitigation measures;</li> <li>Make agreement on mitigation measures to be implemented;</li> <li>Ensure mitigation measures are properly implemented.</li> </ol>	<ol> <li>Inform the ER and confirm notification of the non-compliance in writing;</li> <li>Rectify unacceptable practice;</li> <li>Check all plant and equipment and consider changes of working methods;</li> <li>Discuss with ET and IEC on possible remedial actions and propose mitigation measures to IEC and ER;</li> <li>Implement the agreed mitigation measures.</li> <li>Amend working methods if appropriate.</li> </ol>
Action level being exceeded by two or more consecutive sampling days	<ol> <li>Repeat in situ measurement to confirm findings;</li> <li>Identify source(s) of impact;</li> <li>Inform IEC, Contractor and ER;</li> <li>Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>Discuss mitigation measures with IEC, ER and Contractor;</li> <li>Ensure mitigation measures are implemented;</li> <li>Increase the monitoring frequency to daily until no exceedance of Action level;</li> <li>Repeat measurement on next day of exceedance to confirm findings.</li> </ol>	<ol> <li>Check monitoring data submitted by ET and Contractor's working method;</li> <li>Discuss with ET and Contractor on possible remedial actions;</li> <li>Review the proposed mitigation measures submitted by Contractor and advise the ER accordingly;</li> <li>Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol> <li>Confirm receipt of notification of noncompliance in writing;</li> <li>Discuss with IEC on the proposed mitigation measures;</li> <li>Make agreement on mitigation measures to be implemented;</li> <li>Ensure mitigation measures are properly implemented;</li> <li>Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol> <li>Inform the Engineer and confirm notification of the non-compliance in writing;</li> <li>Rectify unacceptable practice;</li> <li>Check all plant and equipment and consider changes of working methods;</li> <li>Discuss with ET and IEC on possible remedial actions and propose mitigation measures to IEC and ER within 3 working days of notification;</li> <li>Implement the agreed mitigation measures;</li> <li>Amend working methods if appropriate.</li> </ol>

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Limit level being exceeded by one sampling day	<ol> <li>Repeat in-situ measurement to confirm findings;</li> <li>Identify source(s) of impact;</li> <li>Inform IEC, Contractor, ER and EPD;</li> <li>Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>Discuss mitigation measures with IEC, ER and Contractor;</li> <li>Ensure mitigation measures are implemented;</li> <li>Increase the monitoring frequency to daily until no exceedance of Limit level.</li> </ol>	mitigation measures submitted by Contractor and advise	proposed mitigation measures; 3. Request Contractor to critically review the working methods; 4. Ensure mitigation	<ol> <li>Inform the ER and confirm notification of the non-compliance in writing;</li> <li>Rectify unacceptable practice;</li> <li>Check all plant and equipment and consider changes of working methods;</li> <li>Submit proposal of mitigation measures to ER within 3 working days of notification and discuss with ET, IEC and ER;</li> <li>Implement the agreed mitigation measures;</li> <li>Amend working methods if appropriate.</li> </ol>
Limit level being exceeded by two or more consecutive sampling days	<ol> <li>Repeat <i>in-situ</i> measurement to confirm findings;</li> <li>Identify source(s) of impact;</li> <li>Inform IEC, contractor, ER and EPD;</li> <li>Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>Discuss mitigation measures with IEC, ER and Contractor;</li> <li>Ensure mitigation measures are implemented;</li> <li>Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days.</li> </ol>	Contractor's mitigation measures whenever necessary to assure their effectiveness and advise the ER accordingly.	<ol> <li>Confirm receipt of notification of failure in writing;</li> <li>Discuss with IEC, ET and Contractor on the proposed mitigation measures;</li> <li>Request Contractor to critically review the working methods;</li> <li>Make agreement on the mitigation measures to be implemented;</li> <li>Ensure mitigation measures are properly implemented;</li> <li>Assess the effectiveness of the implemented mitigation measures;</li> <li>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>	avoid further exceedance; 3. Rectify unacceptable

**Event / Action Plan for Dolphin Monitoring** 

EVENT EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Action Level	<ol> <li>Repeat statistical data analysis to confirm findings;</li> <li>Review all available and relevant data, including raw data and statistical analysis results of other parameters covered in the EM&amp;A, to ascertain if differences are as a result of natural variation or previously observed seasonal differences;</li> <li>Identify source(s) of impact;</li> <li>Inform the IEC, ER/SOR and Contractor;</li> <li>Check monitoring data.</li> <li>Review to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary.</li> </ol>	<ol> <li>Check monitoring data submitted by ET and Contractor;</li> <li>Discuss monitoring results and finding with the ET and the Contractor.</li> </ol>	1. Discuss monitoring with the IEC and any other measures proposed by the ET; 2. If ER/SOR is satisfied with the proposal of any other measures, ER/SOR to signify the agreement in writing on the measures to be implemented.	

EVENT	ACTION				
	ET	IEC	ER	CONTRACTOR	
Limit Level	<ol> <li>Repeat statistical data analysis to confirm findings;</li> <li>Review all available and relevant data, including raw data and statistical analysis results of other parameters covered in the EM&amp;A, to ascertain if differences are as a result of natural variation or previously observed seasonal differences;</li> <li>Identify source(s) of impact;</li> <li>Inform the IEC, ER/SOR and Contractor of findings;</li> <li>Check monitoring data;</li> <li>Repeat review to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary.</li> <li>If ET proves that the source of impact is caused by any of the construction activity by the works contract, ET to arrange a meeting to discuss with IEC, ER/SOR and Contractor the necessity of additional dolphin monitoring and/or any other potential mitigation measures (e.g., consider to modify the perimeter silt curtain or consider to control/temporarily stop relevant construction activity etc.) and submit to IEC a proposal of additional dolphin monitoring and/or mitigation measures where necessary.</li> </ol>	Contractor the necessity of additional dolphin monitoring and any other potential mitigation measures.  4. Review proposals for additional monitoring and any other mitigation measures submitted by ET and Contractor and advise ER/SOR of the results and findings accordingly.  5. Supervise / Audit the implementation of additional monitoring and/or any other mitigation measures and advise ER/SOR the results and findings accordingly.	additional dolphin monitoring and/or any other mitigation measures submitted by ET and Contractor and verified by IEC, ER/SOR to signify the agreement in writing on such	<ol> <li>Inform the ER/SOR and confirm notification of the non-compliance in writing;</li> <li>Attend the meeting to discuss with ET, IEC and ER/SOR the necessity of additional dolphin monitoring and any other potential mitigation measures.</li> <li>Jointly submit with ET to IEC a proposal of additional dolphin monitoring and/or any other mitigation measures when necessary.</li> <li>Implement the agreed additional dolphin monitoring and/or any other mitigation measures.</li> </ol>	

# **Appendix E. Implementation Schedule for Environmental Mitigation Measures (EMIS)**

#### Appendix E – Implementation Schedule of Environmental Mitigation Measures (EMIS)

EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Location of the measures	Implementation Status
Air Quality	у			
S5.5.6.1	A1	The Contractor shall follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation	All construction sites	V
S5.5.6.2	A2	2) Proper watering of exposed spoil should be undertaken throughout the construction phase:	All construction sites	V
		<ul> <li>Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading;</li> </ul>		
		<ul> <li>Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads;</li> </ul>		
		• A stockpile of dusty material should not be extend beyond the pedestrian barriers, fencing or traffic cones;		
		<ul> <li>The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle;</li> </ul>		
		<ul> <li>Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores;</li> </ul>		
\$5.5.6.2	A2	When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided as far as practicable along the site boundary with provision for public crossing. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period;	All construction sites	V
		• The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials;		
		<ul> <li>Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously;</li> </ul>		
		<ul> <li>Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet;</li> </ul>		
		<ul> <li>Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding;</li> </ul>		
		Any skip hoist for material transport should be totally enclosed by impervious sheeting;		
		• Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides		
\$5.5.6.2	A2	Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed;	All construction sites	V
		<ul> <li>Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and</li> </ul>		
		<ul> <li>Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.</li> </ul>		
35.5.6.3	A3	3) The Contractor should undertake proper watering on all exposed spoil (with at least 8 times per day) throughout the construction phase.	All construction sites	V
S5.5.6.4	A4	Engineer to incorporate the controlled measures into the Particular Specification (PS) for the civil work. The PS should also draw the Contractor's attention to the relevant latest Practice Notes issued by EPD.	All construction sites	V
65.5.6.4	A5	5) Implement regular dust monitoring under EM&A programme during the construction stage.	Selected representative dust monitoring station	V (covered by Contract No. HY/2013/04 (AMS2 AMS3C, AMS7B) & HY/2011/03 (AMS6
S5.5.7.1	A6	The following mitigation measures should be adopted to prevent fugitive dust	Selected	N/A

EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Location of the measures	Implementation Status
		emissions for concrete batching plant:     Loading, unloading, handling, transfer or storage of any dusty materials should be carried out in totally enclosed system;	representative dust monitoring station	
		<ul> <li>All dust-laden air or waste gas generated by the process operations should be properly extracted and vented to fabric filtering system to meet the emission limits for TSP;</li> </ul>		
		Vents for all silos and cement/pulverised fuel ash (PFA) weighing scale should be fitted with fabric filtering system;      The materials which may generate sitherns dusty emissions should be wetted by		
		<ul> <li>The materials which may generate airborne dusty emissions should be wetted by water spray system;</li> <li>All receiving hoppers should be enclosed on three sides up to 3m above unloading</li> </ul>		
		point;		
		All conveyor transfer points should be totally enclosed;  All conveyor and south reads within the promises about the powed and wetted; and		
		<ul> <li>All access and route roads within the premises should be paved and wetted; and</li> <li>Vehicle cleaning facilities should be provided and used by all concrete trucks before leaving the premises to wash off any dust on the wheels and/or body.</li> </ul>		
S5.5.2.7	A7	The following mitigation measures should be adopted to prevent fugitive dust emissions at barging point:	All construction sites	N/A
		All road surface within the barging facilities will be paved;      Dust analysis will be provided for the leading rooms.		
		<ul> <li>Dust enclosures will be provided for the loading ramp;</li> <li>Vehicles will be required to pass through designated wheels wash facilities; and</li> </ul>		
		Continuous water spray at the loading points.		
Construct	tion Noise (/	Air borne)		
S6.4.10	N1	Use of good site practices to limit noise emissions by considering the following:	All construction sites	V
		only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme;		
		• machines and plant (such as trucks, cranes) that may be in intermittent use should		
		be shut down between work periods or should be throttled down to a minimum;  • plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs;		
		• silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works;		
		<ul> <li>mobile plant should be sited as far away from NSRs as possible and practicable;</li> <li>material stockpiles, mobile container site officer and other structures should be</li> </ul>		
		effectively utilised, where practicable, to screen noise from on-site construction activities.		
S6.4.11	N2	<ol> <li>Install temporary hoarding located on the site boundaries between noisy construction activities and NSRs. The conditions of the hoardings shall be properly maintained throughout the construction period.</li> </ol>	All construction sites	V
S6.4.12	N3	3) Install movable noise barriers (typically density @ 14kg/m²), acoustic mat or full enclosure close to noisy plants including air compressor, generators, saw.	For plant items listed in Appendix 6D of the EIA report at all construction sites	V
S6.4.13	N4	4) Select "Quiet plants" which comply with the BS 5228 Part 1 or TM standards.	For plant items listed in Appendix 6D of the EIA report at all construction sites	V
S6.4.14	N5	5) Sequencing operation of construction plants where practicable.	All construction sites where practicable	V
	N6	6) Implement a noise monitoring under EM&A programme.	Selected representative noise monitoring station	V (covered by Contract No. HY/2013/04)
Sediment				
S7.3	S1	The requirements as recommended in ETWB TC(W) 34/2002 Management of Dredged/Excavated Sediment shall be included in the Particular Specification as appropriate.	All construction sites	V
Waste Ma	nagement (	Construction Noise)		
S8.3.8	WM1	Construction and Demolition Material	All construction sites	V
		The following mitigation measures should be implemented in handling the waste:  • Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement;  • Compare the parties:		
		Carry out on-site sorting;		

EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Location of the measures	Implementation Status
		Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate;     Adopt 'Selective Demolition' technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose,		
		where possible; Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and verified; and Implement an enhanced Waste Management Plan similar to ETWB TC(W) No.		
		19/2005 – "Environmental Management on Construction Sites" to encourage on-site sorting of C&D materials and to minimize their generation during the course of construction.		
		<ul> <li>In addition, disposal of the C&amp;D materials onto any sensitive locations such as agricultural lands, etc. should be avoided. The Contractor shall propose the final disposal sites to the Project Proponent and get its approval before implementation.</li> </ul>		
S8.3.9-	WM2	C&D Waste	All construction sites	V
S8.3.11		• Standard formwork or pre-fabrication should be used as far as practicable in order to minimise the arising of C&D materials. The use of more durable formwork or plastic facing for the construction works should be considered. Use of wooden hoardings should not be used, as in other projects. Metal hoarding should be used to enhance the possibility of recycling. The purchasing of construction materials will be carefully planned in order to avoid over ordering and wastage.		
		• The Contractor should recycle as much of the C&D materials as possible on-site. Public fill and C&D waste should be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different areas of the sites should be considered for such segregation and storage.		
S8.2.12-	WM3	Chemical Waste	All construction sites	V
S8.3.15		<ul> <li>Chemical waste that is produced, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, should be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.</li> </ul>		
		• Containers used for the storage of chemical wastes should be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; have a capacity of less than 450 liters unless the specification has been approved by the EPD; and display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the regulation.		
		• The storage area for chemical wastes should be clearly labelled and used solely for the storage of chemical waste; enclosed on at least 3 sides; have an impermeable floor and bunding of sufficient capacity to accommodate 110% of the volume of the largest container or 20 % of the total volume of waste stored in that area, whichever is the greatest; have adequate ventilation; covered to prevent rainfall entering; and arranged so that incompatible materials are adequately separated.		
		<ul> <li>Disposal of chemical waste should be via a licensed waste collector; be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Centre which also offers a chemical waste collection service and can supply the necessary storage containers; or be to a reuser of the waste, under approval from the EPD.</li> </ul>		
S8.3.16	WM4	Sewage	All construction sites	V
		Adequate numbers of portable toilets should be provided for the workers. The portable toilets should be maintained in a state, which will not deter the workers from utilizing these portable toilets. Night soil should be collected by licensed collectors regularly.		
S8.3.17	WM5	General Refuse  • General refuse generated on-site should be stored in enclosed bins or compaction units separately from construction and chemical wastes.	All construction sites	V
		• A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law.		
		<ul> <li>Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated and made easily accessible. Separate labelled bins for their deposit should be provided if feasible.</li> </ul>		
		<ul> <li>Office wastes can be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme should be considered by the Contractor. In addition, waste separation facilities for paper, aluminium cans, plastic bottles etc., should be provided.</li> </ul>		
		• Training should be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including reduction, reuse and recycling of		

EIA Ref.	EM&A	Recommended	Mitigation	Measures
	Log Ref.			

Location of the measures

Implementation **Status** 

wastes.

#### Water Quality (Construction Phase)

#### S9.11.1.1 W1

Mitigation during the marine works to reduce impacts to within acceptable levels have Marine works been recommended and will comprise a series of measures that restrict the method and sequencing of dredging/backfilling, as well as protection measures. Details of the measures are provided below.

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- Floating type perimeter silt curtains shall be around the HKBCF site before the commencement of marine works.
- · Silt curtain shall be fully maintained throughout the works.

#### S9.11.1.7 W2

General construction activities on land should also be governed by standard good working practice. Specific measures to be written into the works contracts should include:

Land-based works areas

- wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
- sewage effluent and discharges from on-site kitchen facilities shall be directed to Government sewer in accordance with the requirements of the W PCO or collected for disposal offsite. The use of soakaways shall be avoided;
- storm drainage shall be directed to storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels, earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks:
- silt removal facilities, channels and manholes shall be maintained and any deposited silt and grit shall be removed regularly, including specifically at the onset of and after
- temporary access roads should be surfaced with crushed stone or gravel;
- rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;
- measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;
- open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms;
- manholes (including any newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers:
- · discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
- all vehicles and plant should be cleaned before they leave the construction site to ensure that no earth, mud or debris is deposited by them on roads. A wheel washing bay should be provided at every site exit;
- · wheel wash overflow shall be directed to silt removal facilities before being discharged to the storm drain;
- the section of construction road between the wheel washing bay and the public road should be surfaced with crushed stone or coarse gravel;
- · wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall be screened to remove large objects;
- vehicle and plant servicing areas, vehicle wash bays and lubrication facilities shall be located under roofed areas. The drainage in these covered areas shall be connected to foul sewers via a petrol interceptor in accordance with the requirements of the W PCO or collected for off site disposal;
- the Contractors shall prepare an oil / chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately;
- · waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance:
- all fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas. The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank; and
- surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Location of the measures	Implementation Status
Ecology (	Constructio	n Phase)		
S10.7	E2	<ul> <li>Install silt curtain during the construction.</li> <li>Limit dredging and works fronts.</li> <li>Good site practices.</li> <li>Site runoff control.</li> </ul>	Marine works and Land-based works areas	V
S10.7	E4	Watering to reduce dust generation; prevention of siltation of freshwater habitats; S runoff should be desilted, to reduce the potential for suspended sediments, organic and other contaminants to enter streams and standing freshwater		V
S10.7	E5	Good site practices, including strictly following the permitted works hours, using quieter machines where practicable, and avoiding excessive lightings during night time	Land-based works areas	V
S10.7	E6	Dolphin Exclusion Zone;     Dolphin watching plan	Marine works	V
S10.7	E7	Decouple compressors and other equipment on working vessels     Avoidance of percussive piling	Marine works	V
S10.7	E8	<ul> <li>Control vessel speed</li> <li>Skipper training</li> <li>Predefined and regular routes for working vessels; avoid Brother Islands.</li> </ul>	Marine Traffic	V
S10.10	E9	Dolphin vessel monitoring	North Lantau and West Lantau	V (covered by Contract No. HY/2013/04)
Fisheries				
S11.7	F4	Maritime Oil Spill Response Plan (MOSRP);     Contingency plan.	HKBCF	V
Landscap	e & Visual (l	Detailed Design Phase)		
		<ul> <li>Roadside planting and planting along the edge of the HKBCF Island is proposed;</li> <li>Transplanting of mature trees in good health and amenity value where appropriate and reinstatement of areas disturbed during construction by compensatory hydroseeding and planting;</li> <li>Protection measures for the trees to be retained during construction activities;</li> <li>Optimizing the sizes and spacing of the bridge columns; Fine-tuning the location of the bridge columns to avoid visually-sensitive locations;</li> <li>Maximizing new tree, shrub and other vegetation planting to compensate tree felled and vegetation removed;</li> <li>Providing planting area around peripheral of HKBCF for tree planting screening effect;</li> <li>Providing salt-tolerant native trees along the planter strip at affected seawall and newly reclaimed coastline;</li> <li>For HKBCF, providing aesthetic architectural design on the related buildings (e.g. similar materials for PCB building facade to Airport buildings, roof planting and subtle materials for other facilities buildings and so on), and the related infrastructure (e.g. parapet planting and transparent cover for elevated footbridges) to provide harmonious atmosphere of the HKBCF; and</li> <li>Fine-tuning the sizes of the structural members to minimize the bulkiness of buildings and adjustment of building arrangement to minimise disturbance to surrounding vegetation in the HKBCF.</li> </ul>		
Landscap	e & Visual (	Construction Phase)		
S14.3.3.3	LV2	Mitigate both Landscape and Visual Impacts G1. Grass-hydroseed bare soil surface and stock pile areas.	HKBCF	N/A
		G2. Add planting strip and automatic irrigation system if appropriate at some portions of bridge footbridge to screen bridge and traffic.  G3. Not applicable as this is for HKLR.  G4. For HKBCF, providing aesthetic architectural design on the related buildings (e.g. similar materials for PCB building facade to Airport buildings, roof planting and subtle materials for other facilities buildings and so on), and the related infrastructure (e.g. parapet planting and transparent cover for elevated footbridges) to provide harmonious atmosphere of the HKBCF  G5. Vegetation reinstatement and upgrading to disturbed areas  G6. Maximizing new tree shrub and other vegetation planting to compensate tree felled and vegetation removed  G7. Providing planting area around peripheral of HKBCF for tree planting screening		

EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Location of the measures	Implementation Status
		effect;		
		G8. Plant salt-tolerant native and shrubs etc along the planter strip at affected seawall.		
		G9. Reserve of loose natural granite rocks for re-use. Provide new coastline to adopt "natural-look" by means of using armour rocks in the form of natural rock materials and planting strip area accommodating screen buffer to enhance "natural-look" of the new coastline.		
S14.3.3.3	LV3	Mitigate Visual Impacts		N/A
		V1. Minimize time for construction activities during construction period.		
		V2. Provide screen hoarding at the portion of the project site / works areas / storage areas near VSRs who have close low-level views to the Project during HKBCF construction.		
EM&A				
S15.2.2	EM1	An Independent Environmental Checker needs to be employed as per the EM&A Manual.	All construction sites	V
S15.5 -	EM2	1) An Environmental Team needs to be employed as per the EM&A Manual.	All construction sites	V
S15.6		2) Prepare a systematic Environmental Management Plan to ensure effective implementation of the mitigation measures.		
		<ol> <li>An environmental impact monitoring needs to be implementing by the Environmental Team to ensure all the requirements given in the EM&amp;A Manual are fully complied with.</li> </ol>		
Legend:	V = implen	nented; x = not implemented; N/A = not applicable		

# **Appendix F. Site Audit Findings and Corrective Actions**

### Appendix F - Site Audit Findings and Corrective Actions

Site Inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control mitigation measures for the project. During the reporting period, site inspections were carried out on 3, 10, 18, 22 and 31 October and 7, 14, 19 and 28 November 2018.

Particular observations during the site inspections are described below.

### 17 September 2018

a. The silt curtains at Box Culvert C and D were disconnected from the coastal shoreline. The Contractor was reminded to reinstate the silt curtains. Subsequently, the silt curtain at Box Culvert D was fixed on 10 October 2018 and the silt curtain at Box Culvert C was removed on 28 November 2018. The observation was closed on 28 November 2018.

### 26 September 2018

a. C&D waste stockpiles were observed at P1211 and next to RW11. Subsequently, the stockpiles have been cleared. The observation was closed on 3 October 2018.

#### **3 October 2018**

- a. Accumulation of C&D waste and general refuses were observed near Bridge D12 area. Subsequently, the C&D waste and general refuses were cleared. The observation was closed on 10 October 2018.
- b. Dust emission was observed along haul road near Bridge D12 area. Subsequently, the water spraying was provided along haul road. The observation was closed on 10 October 2018.

### 10 October 2018

a. A C&D waste collection area without clear signage and designation were observed near Bridge D12 area. Subsequently, the C&D waste collection area was relocated no further accumulation of C&D waste near Bridge D12 area was observed. The observation was closed on 18 October 2018.

### 18 October 2018

- a. Loose general refuse was observed near P1211 area. Subsequently, the general refuse was cleared. The observation was closed on 22 October 2018.
- b. Chemical containers with no drip tray was observed near P1404 area. Subsequently, the chemical container was removed from site. The observation was closed on 22 October 2018.
- c. Vehicles were observed leaving the site without wheel wash near P1404 area. Subsequently, safety signage was posted at the site entrance and prominent area to prevent any improper exit. The observation was closed on 22 October 2018.

### 22 October 2018

a. Accumulation of general refuse was observed underneath Bridge D9a and on Bridge D15. Subsequently, the general refuse has been removed. The observation was closed on 31 October 2018.

#### 31 October 2018

a. Accumulation of general refuse was observed near P911 area. Subsequently, The general refuse near P911 area was cleared. The observation was closed on 7 November 2018.

#### 7 November 2018

a. Chemical containers without labelling was observed near P913 area. Subsequently, labellings were provided for the chemical containers. The observation was closed on 14 November 2018.

### **14 November 2018**

a. Accumulation of general refuse was observed near P909 area. Subsequently, the general refuse was cleared. The observation was closed on 19 November 2018.

### 19 November 2018

- a. Discolour NRMM label affixed onto the generator was observed. Subsequently, the new NRMM label with appropriate colour was provided. The observation was closed on 28 November 2018.
- b. Fugitive dust was observed when vehicles passing by the haul road opposite to P1212. Subsequently, water spraying on haul road was provided. The observation was closed on 28 November 2018.
- c. Accumulation of construction materials at Bridge D12 was observed. Subsequently, removal of construction materials was in progress and temporary fencing was provided to designate the area for temporary storage. The observation was closed on 28 November 2018.

#### 28 November 2018

a. A chemical container without drip tray was observed on Bridge D15. The Contractor was reminded to provide drip tray for the chemical container. Follow-up action for the outstanding observation will be inspected during the upcoming site inspections and reported in the coming reporting period.

# **Appendix G. Waste Flow Table**

Name of Department: Highways Department

Contract No.: HY/2013/04

# **Monthly Summary Waste Flow Table for 2018**

	Actual Quantities of Inert C&D Materials Generated Monthly					Actual Quantities of C&D Wastes Generated Monthly					
Month	Total Quantity Generated	Hard Rock and Large Broken Concrete	Reused in the Contract	Transported to other Projects (Note 2)	Disposed as Public Fill	Imported Fill	Metals	Paper/ cardboard packaging	Plastics (Note 1)	Chemical Waste	Others, e.g. general refuse
	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m³)	(in '000m <sup>3</sup> )	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000m <sup>3</sup> )
Jan	0	0	0	0	0	0	0	0	0	0	0.1293
Feb	0	0	0	0	0	0	0	0	0	0.2	0.1397
Mar	0	0	0	0	0	0	0	0	0	0	0.1346
Apr	0	0	0	0	0	0	0	0	0	0	0.2334
May	0	0	0	0	0	0	0	0	0	0	0.1748
Jun	0	0	0	0	0	0	0	0	0	0	0.2044
Sub-total	0.000	0	0	0.000	0	0	0	0	0	0.2	1.0162
Jul	0	0	0	0	0	0	0	0	0	0	0.2036
Aug	0	0	0	0	0	0	0	0	0	0	0.2856
Sep	0	0	0	0	0	0	0	0	0	0	0.2044
Oct	0	0	0	0	0	0	0	0	0	0	0.2183
Nov	5.324	0	0	0	5.324	0	0	0	0	0	0.1643
Dec											
Total	5.324	0	0	0.000	5.3239	0	0	0	0	0.2	2.0924

Note:

<sup>(1)</sup> Plastics refer to plastic bottles / containers, plastic sheets / foam from packaging material

<sup>(2) &</sup>quot;Other Projects" refers to HKBCF Contract No. HY/2013/03

Name of Department: Highways Department

Contract No.: HY/2013/04

# **Monthly Summary of Excavated Marine Sediment for 2018**

Month	a. Estimated Volume of Excavated Marine Sediment Generated	b. Estimate Volume of Accumulated Excavated Marine Sediment Treated	c. Reused in the Contract	d. Estimated Volume of Excavated Marine Sediment Transported to Other Projects (Note 1)	e. Estimated Volume of Treated Excavated Marine Sediment Stored on Site (Unused)
	(in m³)	(in m³)	(in m³)	(in m³)	(in m³)
Jan	0	0	0	0	0
Feb	0	0	0	0	0
Mar	0	0	0	0	0
Apr	0	0	0	0	0
May	0	0	0	0	0
Jun	0	0	0	0	0
Sub-total	0	0	0	0	0
Jul	0	0	0	0	0
Aug	0	0	0	0	0
Sep	0	0	0	0	0
Oct	0	0	0	0	0
Nov	0	0	0	0	0
Dec					
Total	0	0	0	0	0

Note:

<sup>(1) &</sup>quot;Other Projects" refers to HKBCF Contract No. HY/2013/03. The disposal of excavated marine sediments to allocated dumping site via Contract No. HY/2013/03 has been completed with the last batch disposal on 30 August 2017.

# **Appendix H. Environmental Licenses and Permits**

# **Environmental Licences and Permits**

Item No.	Type of Permit / Licence	Reference No.	Application Date	Valid from	Valid until	Remark
1	Environmental Permit under EIAO	EP-353/2009/K	24 Mar 2016	11 Apr 2016	N/A	Issued
2	Further Environmental Permit under EIAO	FEP-01/353/2009/K	29 Nov 2018	N/A	N/A	Application under consideration by EPD during reporting period
3	Construction Dust Notification (HKBCF Southern Portion)	387156	26 Mar 2015	1 Apr 2015	N/A	Notified
4	Construction Waste Disposal Account	7022038	16 Mar 2015	1 Apr 2015	N/A	Account approved
5	Registration as a Chemical Waste Producer (HKBCF Southern Portion)	Waste Producer Number (WPN): 5213-951-C3952-01	27 Mar 2015	27 Apr 2015	N/A	Registration completed
6	Discharge Licence under WPCO (Works Area WA3)	WT00022316-2015	1 Jun 2015	14 Aug 2015	31 Aug 2020	Issued
7	Discharge Licence under WPCO (HKBCF Works Area)	WT00028782-2017	25 May 2017	19 Jul 2017	31 Jul 2022	Issued
8	Construction Noise Permit	GW-RS0293-18	23 Mar 2018	1 May 2018	31 Oct 2018	Expired during reporting period
9	Construction Noise Permit	GW-RS0974-18	10 Oct 2018	31 Oct 2018	29 Mar 2019	Issued

# Appendix I. Statistics on Environmental Complaints, Notification of Summons and Successful Prosecutions

# Statistics on Environmental Complaints, Notifications of Summons and Successful Prosecutions

Reporting Period	Complaints	Notifications of Summons	Successful Prosecutions
This reporting period	1	0	0
From commencement date of construction to end of reporting month	11	0	0

# **Appendix J. Impact Dolphin Monitoring Survey Findings and Analysis**



# 香港鯨豚研究計劃

# CONTRACT NO. HY/2013/04

# Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Infrastructure Works Stage II (Southern Portion) Dolphin Monitoring

Quarterly Progress Report (September-November 2018)

Submitted to Mott MacDonald Hong Kong Limited & China State Construction Engineering (Hong Kong) Limited

Submitted by Samuel K.Y. Hung, Ph.D. Hong Kong Cetacean Research Project

10 April 2019

### 1. Introduction

- 1.1. For the Hong Kong-Zhuhai-Macao Bridge (HZMB) Hong Kong Boundary Crossing Facilities (HKBCF), the construction of the Infrastructure Works Stage II (Southern Portion) requires the contractor (i.e. China State Construction Engineering (Hong Kong) Limited) and the associated Environmental Team, Mott MacDonald Hong Kong Limited to implement the Environmental Monitoring and Audit (EM&A) programme.
- 1.2. According to the HKBCF EM&A Manual, monthly line-transect vessel surveys for Chinese White Dolphins should be conducted to cover the Northwest (NWL) and Northeast Lantau (NEL) survey areas, which should be the same as in AFCD annual marine mammal monitoring programme. However, as such construction-phase monitoring surveys have been undertaken by the HKLR03 project in the same areas (i.e. NWL and NEL), a combined monitoring approach is recommended by the Highways Department, that the HKBCF EM&A project should utilize the monitoring data collected by HKLR03 project to avoid any redundancy in monitoring effort.
- 1.3. In October 2018, the Director of Hong Kong Cetacean Research Project (HKCRP), Dr. Samuel Hung, has been appointed by the ET as the dolphin specialist for the HKBCF EM&A project. He is responsible for the dolphin monitoring study, including the



collection and collation of dolphin monitoring data from the HKLR03 project to examine any potential impacts of HKBCF constructions works on the dolphins. From the monitoring results, any changes in dolphin occurrence within the study area will be reviewed for possible causes, and appropriate actions and additional mitigation measures will be recommended as necessary.

1.4. The present quarterly progress report of this HKBCF construction-phase dolphin monitoring programme is submitted to the ET and the contractor, summarizing the result of the survey findings during the quarterly period of September to November 2018. Notably, for the present quarter, monitoring data collected in September 2018 through another HKBCF-Passenger Clearance Building (or HKBCF-PCB) Contract No. HY/2013/01 as well as in October-November 2018 through HKLR03 Contract No. HY/2011/03 were reviewed and utilized for various analyses. Moreover, the monitoring data from previous years obtained under the HKLR03 Contract are also referenced and compared to the present quarterly monitoring data from the HKBCF-PCB/HKLR03 combined dataset. All these previous monitoring data was collected by the same HKCRP survey team, to ensure 100% consistency in monitoring methodology including vessel survey method as well as various analyses. On the contrary, the previous monitoring data collected under HZMB HKBCF-Reclamation Works contract (Contract No. HY/2010/02) was from a different survey team that have adopted different survey methodology (e.g. two observers and one data recorder under HKBCF-Reclamation Works contract, as compared to one primary observer and one data recorder adopted by HKCRP team in the past 20+ years). Therefore, we cannot ensure that such monitoring data from that contract can be directly comparable to the HKBCF-PCB/HKLR03 monitoring data, and would rather use the previous HZMB monitoring data collected by HKCRP team instead for direct comparison with the present quarterly findings.

# 2. Monitoring Methodology

- 2.1. Vessel-based Line-transect Survey
- 2.1.1. According to the requirement of the updated EM&A manual, dolphin monitoring programme should cover all transect lines in NEL and NWL survey areas (see Figure 1) twice per month throughout the entire construction period. The co-ordinates of all transect lines are shown in Table 1.

Table 1 Co-ordinates of transect lines

Line No. Easting Northing	Line No.	Easting Northing
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1	Start Point	804671	815456	13	Start Point	816506	819480
1	End Point	804671	831404	13	End Point	816506	824859
2	Start Point	805476	820800	14	Start Point	817537	820220
2	End Point	805476	826654	14	End Point	817537	824613
3	Start Point	806464	821150	15	Start Point	818568	820735
3	End Point	806464	822911	15	End Point	818568	824433
4	Start Point	807518	821500	16	Start Point	819532	821420
4	End Point	807518	829230	16	End Point	819532	824209
5	Start Point	808504	821850	17	Start Point	820451	822125
5	End Point	808504	828602	17	End Point	820451	823671
6	Start Point	809490	822150	18	Start Point	821504	822371
6	End Point	809490	825352	18	End Point	821504	823761
7	Start Point	810499	822000	19	Start Point	822513	823268
7	End Point	810499	824613	19	End Point	822513	824321
8	Start Point	811508	821123	20	Start Point	823477	823402
8	End Point	811508	824254	20	End Point	823477	824613
9	Start Point	812516	821303	21	Start Point	805476	827081
9	End Point	812516	824254	21	End Point	805476	830562
10	Start Point	813525	821176	22	Start Point	806464	824033
10	End Point	813525	824657	22	End Point	806464	829598
11	Start Point	814556	818853	23	Start Point	814559	821739
11	End Point	814556	820992	23	End Point	814559	824768
12	Start Point	815542	818807	24	Start Point	805476	815900
12	End Point	815542	824882	24	End Point	805476	819100

2.1.2. The HKCRP survey team used standard line-transect methods (Buckland et al. 2001) to conduct the systematic vessel surveys, and followed the same technique of data collection that has been adopted over the last 22 years of marine mammal monitoring surveys in Hong Kong (see Hung 2018). For each monitoring vessel survey, a 15-m inboard vessel with an open upper deck (about 4.5 m above water surface) was used to make



observations from the flying bridge area.

- 2.1.3. Two experienced observers (a data recorder and a primary observer) made up the on-effort survey team, and the survey vessel transited different transect lines at a constant speed of 13-15 km per hour. The data recorder searched with unaided eyes and filled out the datasheets, while the primary observer searched for dolphins continuously through 7 x 50 marine binoculars. Both observers searched the sea ahead of the vessel, between 270° and 90° (in relation to the bow, which is defined as 0°). At least one additional experienced observers were available on the boat to work in shift (i.e. rotate every 30 minutes) in order to minimize fatigue of the survey team members. All observers were experienced in small cetacean survey techniques and identifying local cetacean species.
- 2.1.4. During on-effort survey periods, the survey team recorded effort data including time, position (latitude and longitude), weather conditions (Beaufort sea state and visibility), and distance traveled in each series (a continuous period of search effort) with the assistance of a handheld GPS (e.g. *Garmin eTrex Legend*). Data including time, position and vessel speed were also automatically and continuously logged by handheld GPS throughout the entire survey for subsequent review.
- 2.1.5. When dolphins were sighted, the survey team would end the survey effort, and immediately record the initial sighting distance and angle of the dolphin group from the survey vessel, as well as the sighting time and position. Then the research vessel was diverted from its course to approach the animals for species identification, group size estimation, assessment of group composition, and behavioural observations. The perpendicular distance (PSD) of the dolphin group to the transect line was later calculated from the initial sighting distance and angle.
- 2.1.6. Survey effort being conducted along the parallel transect lines that were perpendicular to the coastlines (as indicated in Figure 1) was labeled as "primary" survey effort, while the survey effort conducted along the connecting lines between parallel lines was labeled as "secondary" survey effort. According to HKCRP long-term dolphin monitoring data, encounter rates of Chinese white dolphins deduced from effort and sighting data collected along primary and secondary lines were similar in NEL and NWL survey areas. Therefore, both primary and secondary survey effort were presented as on-effort survey effort in this report.

### 2.2. Photo-identification Work

2.2.1. When a group of Chinese White Dolphins were sighted during the line-transect survey, the survey team would end effort and approach the group slowly from the side and behind



to take photographs of them. Every attempt was made to photograph every dolphin in the group, and even photograph both sides of the dolphins, since the colouration and markings on both sides may not be symmetrical.

- 2.2.2. One to two professional digital cameras (e.g. *Canon* EOS 7D model), each equipped with long telephoto lenses (100-400 mm zoom), were available on board for researchers to take sharp, close-up photographs of dolphins as they surfaced. The images were shot at the highest available resolution and stored on Compact Flash memory cards for downloading onto a computer.
- 2.2.3. All digital images taken in the field were first examined, and those containing potentially identifiable individuals were sorted out. These photographs would then be examined in greater detail, and were carefully compared to the existing Chinese White Dolphin photo-identification catalogue maintained by HKCRP since 1995. Chinese White Dolphins can be identified by their natural markings, such as nicks, cuts, scars and deformities on their dorsal fin and body, and their unique spotting patterns were also used as secondary identifying features (Jefferson 2000).
- 2.2.4. All photographs of each individual were then compiled and arranged in chronological order, with data including the date and location first identified (initial sighting), re-sightings, associated dolphins, distinctive features, and age classes entered into a computer database.

### 2.3. Data analysis

- 2.3.1. Distribution Analysis The line-transect survey data was integrated with the Geographic Information System (GIS) in order to visualize and interpret different spatial and temporal patterns of dolphin distribution using sighting positions. Location data of dolphin groups were plotted on map layers of Hong Kong using a desktop GIS (ArcView<sup>©</sup> 3.1) to examine their distribution patterns in details. The dataset was also stratified into different subsets to examine distribution patterns of dolphin groups with different categories of group sizes, young calves and activities.
- 2.3.2. Encounter rate analysis Encounter rates of Chinese White Dolphins (number of on-effort sightings per 100 km of survey effort, and total number of dolphins sighted on-effort per 100 km of survey effort) were calculated in NEL and NWL survey areas in relation to the amount of survey effort conducted during each month of monitoring survey. Dolphin encounter rates were calculated in two ways for comparisons with the HZMB baseline monitoring results as well as to AFCD long-term marine mammal monitoring results.



- 2.3.3. Firstly, for the comparison with the HZMB baseline monitoring results, the encounter rates were calculated using primary survey effort alone, and only data collected under Beaufort 3 or below condition would be used for encounter rate analysis. The average encounter rate of sightings (STG) and average encounter rate of dolphins (ANI) were deduced based on the encounter rates from six events during the present quarter (i.e. six sets of line-transect surveys in North Lantau), which was also compared with the one deduced from the six events during the baseline period (i.e. six sets of line-transect surveys in North Lantau).
- 2.3.4. Secondly, the encounter rates were calculated using both primary and secondary survey effort collected under Beaufort 3 or below condition as in AFCD long-term monitoring study. The encounter rate of sightings and dolphins were deduced by dividing the total number of on-effort sightings (STG) and total number of dolphins (ANI) by the amount of survey effort for the present quarterly period.
- 2.3.5. Quantitative grid analysis on habitat use To conduct quantitative grid analysis of habitat use, positions of on-effort sightings of Chinese White Dolphins collected during the quarterly impact phase monitoring period were plotted onto 1-km² grids among NWL and NEL survey areas on GIS. Sighting densities (number of on-effort sightings per km²) and dolphin densities (total number of dolphins from on-effort sightings per km²) were then calculated for each 1 km by 1 km grid with the aid of GIS.
- 2.3.6. Sighting density grids and dolphin density grids were then further normalized with the amount of survey effort conducted within each grid. The total amount of survey effort spent on each grid was calculated by examining the survey coverage on each line-transect survey to determine how many times the grid was surveyed during the study period. For example, when the survey boat traversed through a specific grid 50 times, 50 units of survey effort were counted for that grid. With the amount of survey effort calculated for each grid, the sighting density and dolphin density of each grid were then normalized (i.e. divided by the unit of survey effort).
- 2.3.7. The newly-derived unit for sighting density was termed SPSE, representing the number of on-effort sightings per 100 units of survey effort. In addition, the derived unit for actual dolphin density was termed DPSE, representing the number of dolphins per 100 units of survey effort. Among the 1-km² grids that were partially covered by land, the percentage of sea area was calculated using GIS tools, and their SPSE and DPSE values were adjusted accordingly. The following formulae were used to estimate SPSE and DPSE in each 1-km² grid within the study area:



SPSE =  $((S / E) \times 100) / SA\%$ DPSE =  $((D / E) \times 100) / SA\%$ 

where S = total number of on-effort sightings

D = total number of dolphins from on-effort sightings

E = total number of units of survey effort

SA% = percentage of sea area

2.3.8. Behavioural analysis – When dolphins were sighted during vessel surveys, their behaviour was observed. Different activities were categorized (i.e. feeding, milling/resting, traveling, socializing) and recorded on sighting datasheets. This data was then input into a separate database with sighting information, which can be used to determine the distribution of behavioural data with a desktop GIS. Distribution of sightings of dolphins engaged in different activities and behaviours would then be plotted on GIS and carefully examined to identify important areas for different activities of the dolphins.

2.3.9. Ranging pattern analysis – Location data of individual dolphins that occurred during the 3-month impact phase monitoring period were obtained from the dolphin sighting database and photo-identification catalogue. To deduce home ranges for individual dolphins using the fixed kernel methods, the program Animal Movement Analyst Extension, was loaded as an extension with ArcView® 3.1 along with another extension Spatial Analyst 2.0. Using the fixed kernel method, the program calculated kernel density estimates based on all sighting positions, and provided an active interface to display kernel density plots. The kernel estimator then calculated and displayed the overall ranging area at 95% UD level.

# 3. Monitoring Results

- 3.1. Summary of survey effort and dolphin sightings
- 3.1.1. A total of six sets of systematic line-transect vessel surveys were conducted for the HKBCF-PCB and HKLR03 contracts during the period of September to November 2018, to cover all transect lines in NWL and NEL survey areas twice per month. From these surveys, 795.4 km of total survey effort was collected, and 94.4% of such effort was conducted under favourable weather conditions (i.e. Beaufort Sea State 3 or below with good visibility). Among the NEL and NWL survey areas, 293.3 km and 502.1 km of survey effort were collected respectively.



- 3.1.2. Moreover, 574.9 km of survey effort was conducted on primary lines, while another 220.5 km of survey effort was conducted on secondary lines. As mentioned in the methodology section, survey effort conducted on primary and secondary lines were all considered as on-effort survey data. A summary table of the survey effort for the three-month period is shown in Appendix I.
- 3.1.3. From September to November 2018, only six groups of 14 Chinese White Dolphins were sighted from the combined dataset of HKBCF-PCB/HKLR03, and the summary table of dolphin sightings is shown in Appendix II. All six groups were sighted during on-effort search, and five of the six on-effort sightings were made on primary lines. All dolphin groups were only sighted in NWL, with none being sighted in NEL at all during the three-month monitoring period.

### 3.2. Distribution

- 3.2.1. Distribution of the six dolphin groups being sighted during the September-November 2018 monitoring surveys is shown in Figure 1. These six sightings were all concentrated at the northwestern portion of the North Lantau region, mostly in waters around Lung Kwu Chau. On the contrary, no dolphin was sighted at all in the central, eastern and southwestern portions of the North Lantau region (Figure 1). All six groups were also sighted very far away from the HKBCF and HKLR03 reclamation sites, as well as the bridge alignments of HKLR09 and Tuen Mun-Chek Lap Kok Link (TMCLKL).
- 3.2.2. A comparison of dolphin distribution between the present impact phase period (September-November 2018) and the baseline monitoring period (September-November 2011) revealed considerable differences. For example, in NEL dolphin was not found during the survey in the present quarter but in the baseline survey they were frequently found in the same study area, including the waters near Shum Shui Kok and in the vicinity of the HKBCF reclamation site (Figure 1). Furthermore, dolphins were infrequently sighted in NWL waters and mainly at the northwestern end of the survey area during the present three-month period. This was in stark contrast with their frequent occurrences throughout the entire NWL survey area during the baseline period (Figure 1).

### 3.3. Encounter rate

3.3.1. The encounter rates of Chinese White Dolphins were deduced from the survey effort and on-effort sighting data from the primary transect lines under favourable conditions (Beaufort 3 or below) for each set of the surveys in NEL and NWL during the present three-month impact monitoring period, and are shown in Table 2. The average encounter rates deduced from the six sets of surveys were also compared with the ones



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deduced from the baseline monitoring period (September-November 2011) (Table 3).

Table 2. Dolphin encounter rates (sightings per 100 km of survey effort) during September-November 2018

SURVEY AREA	DOLPHIN MONITORING DATES	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)  Primary Lines Only	Encounter rate (ANI)  (no. of dolphins from all  on-effort sightings per 100  km of survey effort)  Primary Lines Only	
	Set 1 (10 & 14 Sep 2018)	0.0	0.0	
	Set 2 (19 & 24 Sep 2018)	0.0	0.0	
Northeast	Set 3 (4 & 11 Oct 2018)	0.0	0.0	
Lantau	Set 4 (16 & 18 Oct 2018)	0.0	0.0	
	Set 5 (1 & 6 Nov 2018)	0.0	0.0	
	Set 6 (8 & 13 Nov 2018)	0.0	0.0	
	Set 1 (10 & 14 Sep 2018)	1.7	5.0	
	Set 2 (19 & 24 Sep 2018)	0.0	0.0	
Northwest	Set 3 (4 & 11 Oct 2018)	0.0	0.0	
Lantau	Set 4 (16 & 18 Oct 2018)	1.6	3.3	
	Set 5 (1 & 6 Nov 2018)	5.8	9.7	
	Set 6 (8 & 13 Nov 2018)	0.0	0.0	

3.3.2. To facilitate another comparison with the AFCD long-term monitoring data, the encounter rates were also calculated for the present quarter using both primary and secondary survey effort. Such encounter rates of sightings (STG) and dolphins (ANI) in NEL were both nil, while the ones the in NWL were 1.3 sightings and 3.0 dolphins per 100 km of survey effort respectively for this quarter.



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Table 3. Comparison of average dolphin encounter rates from impact monitoring period (September-November 2018) and baseline monitoring period (September-November 2011) (Note: encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions;  $\pm$  denotes the standard deviation of the average encounter rates)

	Encounter r	rate (STG)	Encounter rate (ANI)		
	(no. of on-effort dolphin sightings per 100		(no. of dolphins from all on-effort sightings		
	km of survey effort)		per 100 km of survey effort)		
	September –	r – September – September –		September –	
	November 2018	November 2011	November 2018	November 2011	
Northeast Lantau	0.00	6.0 ± 5.05	0.0	22.2 ± 26.81	
Northwest Lantau	1.5 ± 2.25	9.9 ± 5.85	3.0 ± 3.89	44.7 ± 29.85	

3.3.3. For the present three-month impact monitoring period, the average dolphin encounter rates (both STG and ANI) in NEL were both zero with no on-effort sighting being made. Such extremely low occurrence of dolphins in NEL has also been consistently recorded during the same autumn quarters throughout the HZMB monitoring period (Table 4).

Table 4. Comparison of average dolphin encounter rates in Northeast Lantau survey area from the same autumn quarters of HKLR03 and HKBCF impact monitoring periods and baseline monitoring period (September-November 2011) (Note: encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions;  $\pm$  denotes the standard deviation of the average encounter rates)

	Encounter rate	Encounter rate (ANI)	
	(STG)	(no. of dolphins from all	
	(no. of on-effort dolphin	on-effort sightings per	
	sightings per 100 km of	100 km of survey effort)	
	survey effort)		
September-November 2011 (Baseline)	6.0 ± 5.05	22.2 ± 26.81	
September-November 2013 (HKLR03 Impact*)	1.0 ± 1.59	$3.8 \pm 6.49$	
September-November 2014 (HKLR03 Impact*)	0.0	0.0	
September-November 2015 (HKLR03 Impact*)	0.0	0.0	
September-November 2016 (HKLR03 Impact*)	0.0	0.0	
September-November 2017 (HKLR03 Impact*)	0.0	0.0	
September-November 2018 (HKBCF Impact)	0.0	0.0	

<sup>\*</sup> As explained in Section 1.4, the previous monitoring data from Contract No. HY/2011/03 (i.e. HKLR03) were adopted for comparison with the baseline and present impact monitoring period



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3.3.4. On the other hand, the average dolphin encounter rates (STG and ANI) in NWL during the present impact phase monitoring period were only small fractions of the ones recorded during the three-month baseline period (with reductions of 84.8% and 93.3% respectively), indicating a dramatic decline in dolphin usage of this survey area during the present impact phase period (Table 5).

Table 5. Comparison of average dolphin encounter rates in Northwest Lantau survey area from all autumn quarters of HKLR03 and HKBCF impact monitoring periods and baseline monitoring period (September-November 2011) (Note: encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions;  $\pm$  denotes the standard deviation of the average encounter rates)

	Encounter rate (STG)	Encounter rate (ANI)	
	(no. of on-effort dolphin	(no. of dolphins from all	
	sightings per 100 km of	on-effort sightings per 100	
	survey effort)	km of survey effort)	
September-November 2011 (Baseline)	9.9 ± 5.85	44.7 ± 29.85	
September-November 2013 (HKLR03 Impact*)	8.0 ± 1.10	32.5 ± 26.51	
September-November 2014 (HKLR03 Impact*)	5.1 ± 4.40	20.5 ± 15.10	
September-November 2015 (HKLR03 Impact*)	3.9 ± 1.57	21.1 ± 17.19	
September-November 2016 (HKLR03 Impact*)	2.9 ± 1.98	10.9 ± 10.98	
September-November 2017 (HKLR03 Impact*)	3.1 ± 1.91	10.4 ± 9.66	
September-November 2018 (HKBCF Impact)	1.5 ± 2.25	3.0 ± 3.89	

<sup>\*</sup> As explained in Section 1.4, the previous monitoring data from Contract No. HY/2011/03 (i.e. HKLR03) were adopted for comparison with the baseline and present impact monitoring period

- 3.3.5. Both dolphin encounter rates in NWL in autumn 2018 were the lowest among all autumn quarters during the HZMB monitoring period, and apparently there has been a steady decline in dolphin occurrence in the past several years to reach to the lowest point in 2018 (Table 5). This is a very worrying trend as the dolphin occurrence should have recovered somewhat since the HKBCF reclamation works, which incurred permanent habitat loss, have been completed a few years ago and the remaining marine construction activities for the HKBCF are also nearly completed.
- 3.3.6. A two-way ANOVA with repeated measures and unequal sample size was conducted to examine whether there were any significant differences in the average encounter rates between the baseline and impact monitoring periods. The two variables that were examined included the two periods (baseline and impact phases) and two locations (NEL and NWL).



- 3.3.7. For the comparison between the baseline period and the present quarter, the p-values for the differences in average dolphin encounter rates of STG and ANI were 0.0029 and 0.0146 respectively. If the alpha value is set at 0.05, significant differences were detected between the baseline and present quarter in both the average dolphin encounter rates of STG and ANI.
- 3.3.8. Both distribution patterns and encounter rates of Chinese White Dolphins indicated that their usage have been dramatically reduced in both NEL and NWL survey areas during the present quarterly period, and such low occurrence of dolphins has been consistently documented in recent years of HZMB dolphin monitoring. Such significant decline in dolphin occurrence should raise serious concern, as the timing of the decline coincided well with the construction schedule of the HZMB related project as suggested by Hung (2018). Moreover, it is apparent that there has been no sign of recovery in dolphin usage, even with most of the marine works associated with the HZMB construction being completed. Continuous dolphin monitoring would be critical to examine whether the downward trend would continue, stabilize or revert in upcoming quarters.

## 3.4. Group size

3.4.1. From September to November 2018, the group sizes of Chinese White Dolphins ranged from one to four individuals per group in North Lantau region. The average dolphin group sizes from the present three-month period were compared with the ones deduced from the baseline period in September to November 2011, as shown in Table 6.

Table 6. Comparison of average dolphin group sizes from impact monitoring period (September-November 2018) and baseline monitoring period (September-November 2011) (Note: ± denotes the standard deviation of average group size)

	Average Dolphin Group Size			
	September – November 2018	September – November 2011		
Overall	2.3 ± 1.03 (n = 6)	3.7 ± 3.13 (n = 66)		
Northeast Lantau		3.2 ± 2.16 (n = 17)		
Northwest Lantau	2.3 ± 1.03 (n = 6)	3.9 ± 3.40 (n = 49)		

- 3.4.2. During the present quarter, the average dolphin group size in NWL was much lower than the one recorded during the baseline period. However, it should also be noted that the sample size in the present quarter (six groups) was much smaller than the 66 groups sighted during the baseline period (Table 6).
- 3.4.3. All six dolphin groups were composed of small groups with 1-4 animals only (Appendix



- II). This is in contrary to the baseline period when the larger groups (at least with five animals) were frequently sighted and evenly distributed in NWL, with a few also sighted in NEL waters.
- 3.5. Habitat use
- 3.5.1. During the present quarter, the quantitative grid analysis revealed that only six grids recorded dolphin occurrence, with just one grid adjacent to Lung Kwu Chau recorded higher dolphin density (Figures 2a and 2b). However, it should be emphasized that the amount of survey effort collected in each grid during the three-month period was fairly low (6-12 units of survey effort for most grids), and therefore the habitat use pattern derived from the three-month dataset should be treated with caution. A more complete picture of dolphin habitat use pattern should be examined when more survey effort for each grid will be collected throughout the impact phase monitoring programme.
- 3.5.2. When compared with the habitat use patterns during the baseline period, dolphin usage in NEL and NWL has drastically diminished in both areas during the present impact monitoring period (Figure 3). During the baseline period, many grids between Siu Mo To and Shum Shui Kok in NEL recorded moderately high to high dolphin densities, but the dolphins have completely disappeared from this area during the present impact phase period (Figure 3).
- 3.5.3. Moreover, the dolphin density patterns were also very different in NWL between the baseline and impact phase monitoring periods, with high usage throughout the area during the baseline period, while only two grids located adjacent to Lung Kwu Chau recoded moderate to high dolphin densities during the present impact phase period (Figure 3).
- 3.6. Mother-calf pairs
- 3.6.1. No mother-calf pair was sighted at all among the six dolphin groups during the present quarterly period. This was in stark contrast to the regular occurrence of young calves with their mothers in North Lantau waters during the baseline period, which should be of a serious concern.
- 3.7. Activities and associations with fishing boats
- 3.7.1. Only one of the six groups was engaged in both feeding and socializing activities during the present quarterly period, which was located to the north of Lung Kwu Chau (Figure 4). On the other hand, none of the groups was engaged in traveling or milling/resting activity.
- 3.7.2. When compared to the baseline period, distribution of various dolphin activities during the present quarterly period was drastically different with very rare occurrence of such



activities (Figure 4).

- 3.7.3. It should also be noted that none of the dolphin groups sighted during the present quarter was associated with any operating fishing vessels.
- 3.8. Summary of photo-identification works
- 3.8.1. Over 800 digital photographs of Chinese White Dolphins were taken from September to November 2018 for the photo-identification work during the HKBCF/HKLR03 surveys. A total of eight individuals were identified and sighted 12 times altogether (see summary table in Appendix III and photographs of identified individuals in Appendix IV). Re-sightings of individual dolphins were only made in NWL, while none was re-sighted in NEL during the quarterly period.
- 3.8.2. Five of the eight individuals were re-sighted only once, while the other three individuals (NL136, NL261 and NL328) were re-sighted twice or thrice during the quarterly period (Appendix III). Notably, none of these individuals sighted in NWL survey area during the HKBCF/HKLR03 monitoring surveys were also sighted in West Lantau waters during the HKLR09 monitoring surveys during the same quarterly period.
- 3.9. Individual range use
- 3.9.1. Ranging patterns of the eight individuals identified during the three-month study period were determined by fixed kernel method, and are shown in Appendix V.
- 3.9.2. While all eight individuals were sighted only in NWL waters in the present quarter, none of them occurred in NEL waters (Appendix V), which is in stark contrast to the extensive movements of many individual dolphins between NEL and NWL survey areas during the baseline period as well as in the earlier impact monitoring quarters. Moreover, none of the individuals has extended their range use to WL waters, even though such movements between North and West Lantau waters were quite common in the past several years.
- 3.9.4. Individual range use and movements should be continuously examined in the upcoming quarters, to determine whether there has been any consistent shifts of individual home ranges from North Lantau to West or Southwest Lantau, or vice versa.

### 4. Conclusion

4.1. During the present quarter of dolphin monitoring, no adverse impact from the activities of this construction project on Chinese White Dolphins was noticeable from general



observations.

- 4.2. Although dolphins seldom occurred in the area of HKBCF construction in the past and during the baseline monitoring period, it is apparent that dolphin usage has been dramatically reduced in North Lantau waters in recent years, and many individuals have shifted away from this once-important habitat for the dolphins.
- 4.3. It is critical to continuously monitor the dolphin usage in North Lantau region in the upcoming quarters, to determine whether the dolphins are continuously affected by the various construction activities in relation to the HZMB-related works, and whether there is any sign of recovery when the construction works have been completed.

### 5. References

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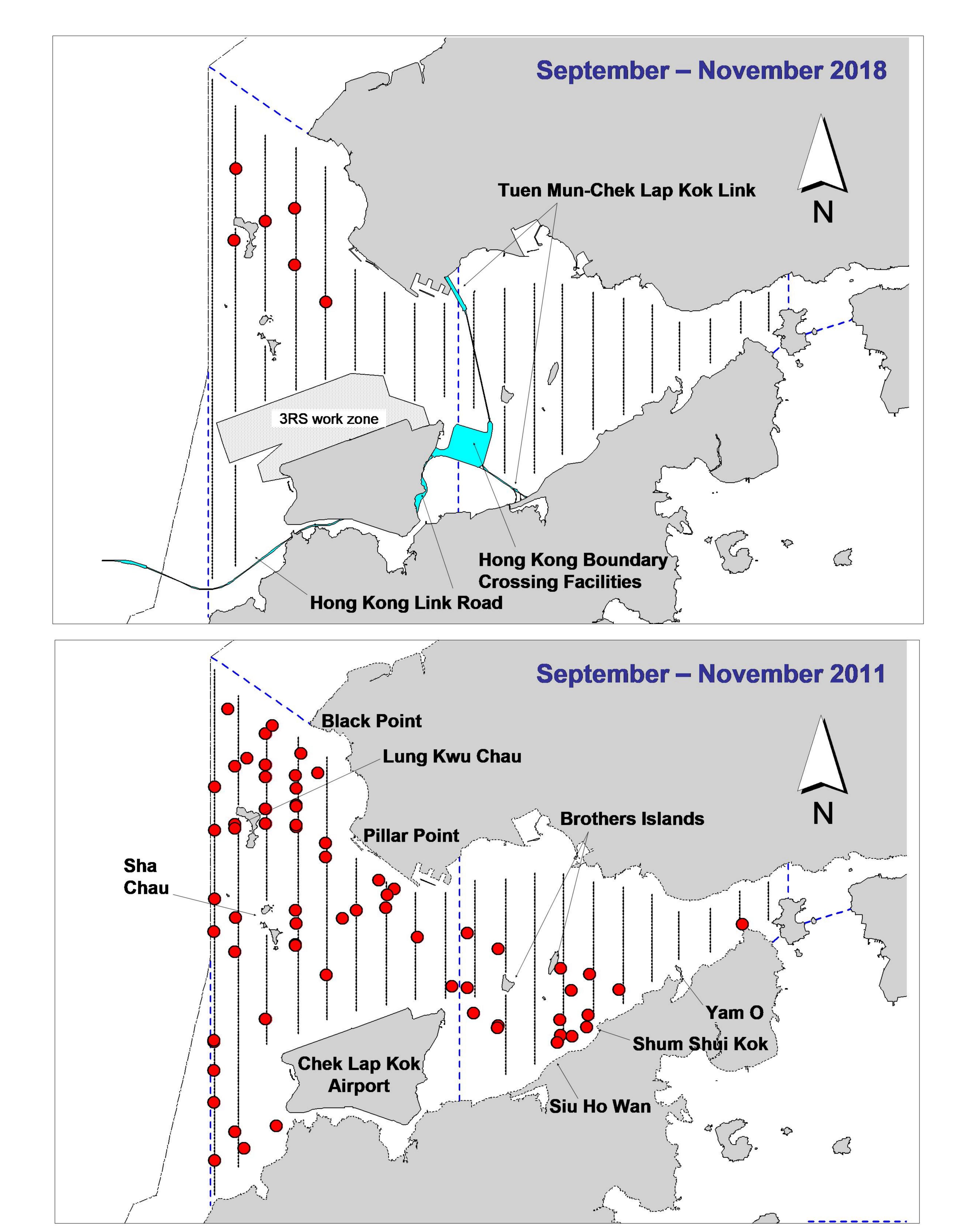


Figure 1. Distribution of Chinese white dolphin sighting in Northwest and Northeast Lantau during the present impact phase (top) and baseline monitoring surveys (bottom)

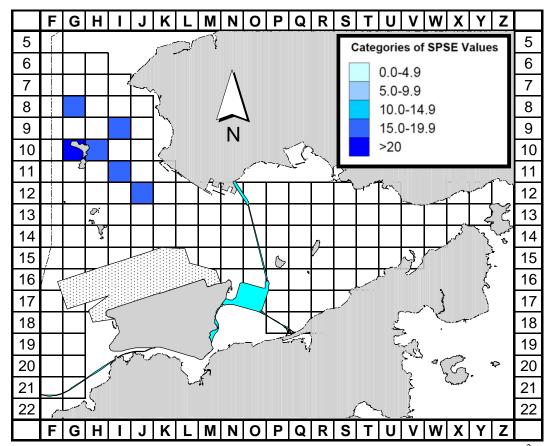


Figure 2a. Sighting density of Chinese white dolphins with corrected survey effort per km<sup>2</sup> in Northeast and Northwest Lantau survey areas, using data collected during the present impact monitoring period monitoring period (Sep-Nov 18) (SPSE = no. of on-effort sightings per 100 units of survey effort)

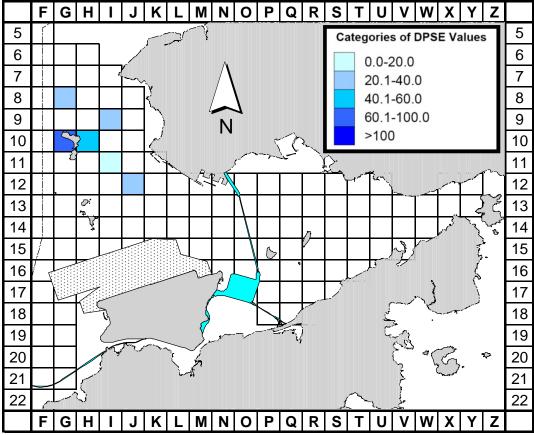


Figure 2b. Density of Chinese white dolphins with corrected survey effort per km<sup>2</sup> in Northeast and Northwest Lantau survey areas, using data collected during the present impact monitoring period (Sep-Nov 18) (DPSE = no. of dolphins per 100 units of survey effort)

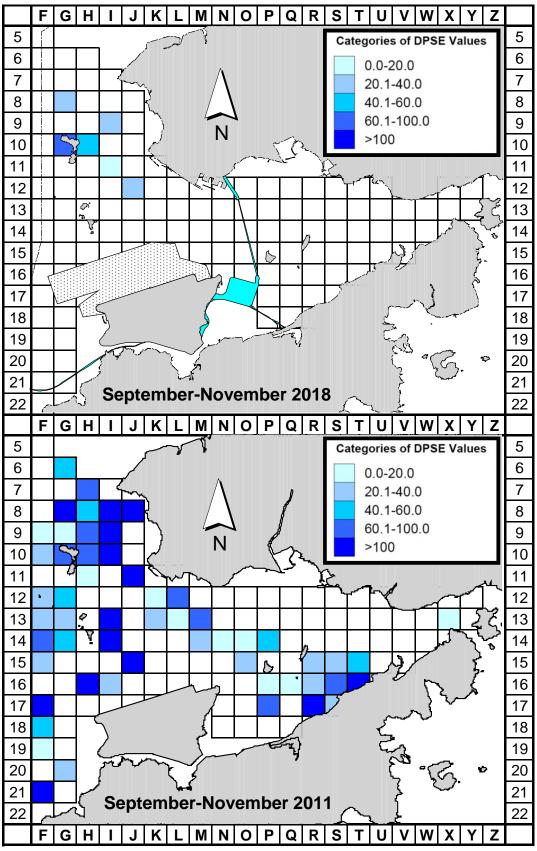


Figure 3. Comparison of density of Chinese white dolphins with corrected survey effort per km<sup>2</sup> in Northwest and Northeast Lantau survey area between the present impact monitoring period (September-November 2018) and baseline monitoring period (September-November 2011) (DPSE = no. of dolphins per 100 units of survey effort)

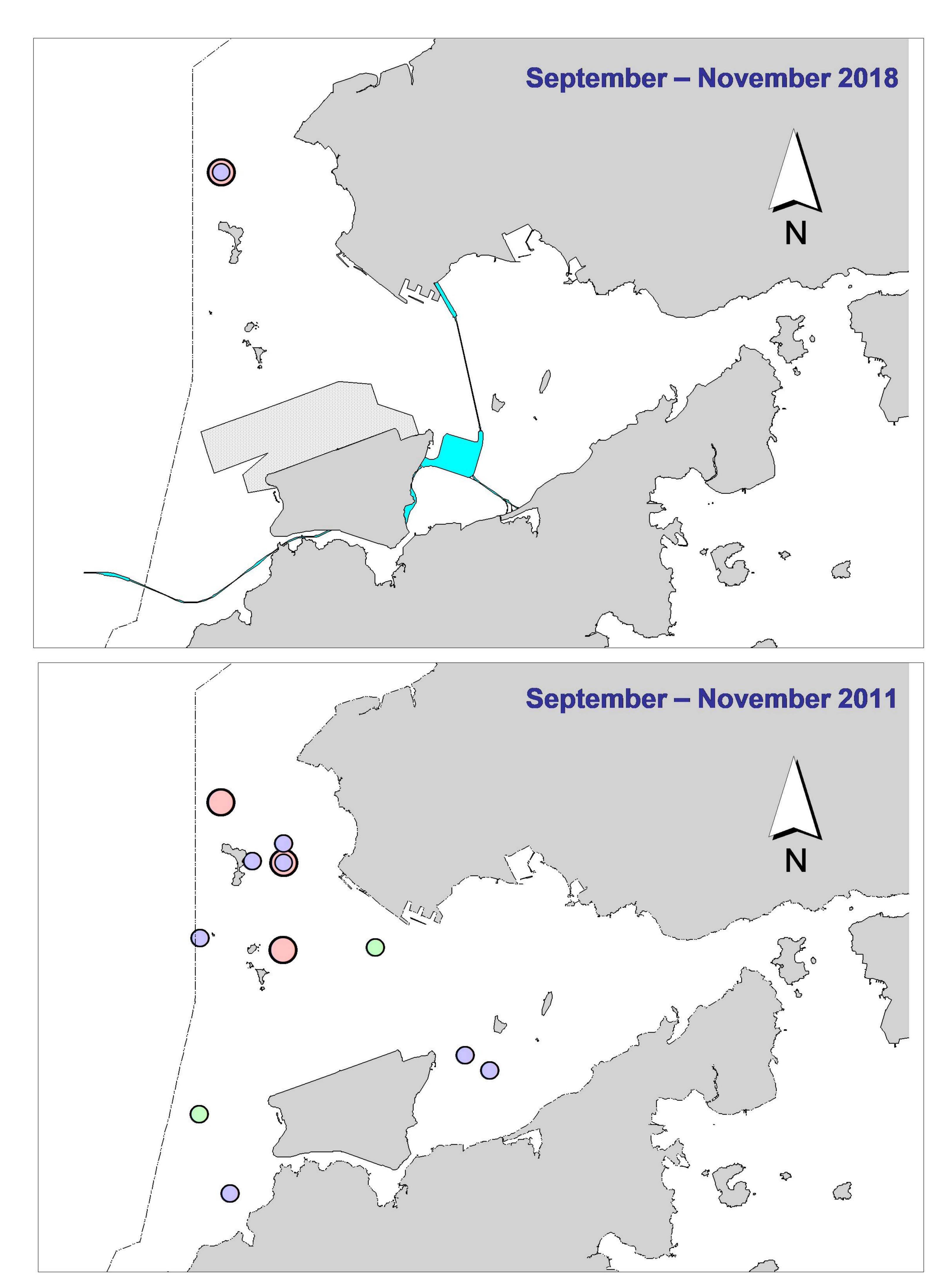


Figure 4. Distribution of Chinese white dolphins engaged in feeding (purple dots), socializing (pink dots) and traveling (green dots) activities during the present impact phase (top) and baseline monitoring surveys (bottom)

# Appendix I. HKBCF/HKLR03 Survey Effort Database in Sep-Nov 2018

(Abbreviations: BEAU = Beaufort Sea State; P = Primary Line Effort; S = Secondary Line Effort)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
10-Sep-18	NW LANTAU	1	7.01	AUTUMN	STANDARD36826	HKBCF	Р
10-Sep-18	NW LANTAU	2	28.97	AUTUMN	STANDARD36826	HKBCF	Р
10-Sep-18	NW LANTAU	1	3.50	AUTUMN	STANDARD36826	HKBCF	S
10-Sep-18	NW LANTAU	2	9.92	AUTUMN	STANDARD36826	HKBCF	S
10-Sep-18	NE LANTAU	1	5.90	AUTUMN	STANDARD36826	HKBCF	Р
10-Sep-18	NE LANTAU	2	30.19	AUTUMN	STANDARD36826	HKBCF	Р
10-Sep-18	NE LANTAU	1	1.59	AUTUMN	STANDARD36826	HKBCF	S
10-Sep-18	NE LANTAU	2	12.32	AUTUMN	STANDARD36826	HKBCF	S
14-Sep-18	NW LANTAU	1	2.60	AUTUMN	STANDARD138716	HKBCF	Р
14-Sep-18	NW LANTAU	2	21.43	AUTUMN	STANDARD138716	HKBCF	Р
14-Sep-18	NW LANTAU	2	11.97	AUTUMN	STANDARD138716	HKBCF	S
19-Sep-18	NW LANTAU	2	31.78	AUTUMN	STANDARD36826	HKBCF	Р
19-Sep-18	NW LANTAU	2	9.82	AUTUMN	STANDARD36826	HKBCF	S
19-Sep-18	NW LANTAU	3	1.20	AUTUMN	STANDARD36826	HKBCF	S
24-Sep-18	NW LANTAU	1	3.00	AUTUMN	STANDARD36826	HKBCF	P
24-Sep-18	NW LANTAU	2	19.49	AUTUMN	STANDARD36826	HKBCF	P
24-Sep-18	NW LANTAU	3	2.90	AUTUMN	STANDARD36826	HKBCF	P
24-Sep-18	NW LANTAU	2	10.71	AUTUMN	STANDARD36826	HKBCF	s S
24-Sep-18	NE LANTAU	2	24.22	AUTUMN	STANDARD36826	HKBCF	P
24-Sep-18	NE LANTAU	3	12.02	AUTUMN	STANDARD36826	HKBCF	P
24-Sep-18	NE LANTAU	2	10.06	AUTUMN	STANDARD36826	HKBCF	S
24-Sep-18	NE LANTAU	3	1.20	AUTUMN	STANDARD36826	HKBCF	S
4-Oct-18	NW LANTAU	2	19.20	AUTUMN	STANDARD36826	HKLR	P
4-Oct-18	NW LANTAU	3	12.68	AUTUMN	STANDARD36826	HKLR	P
4-Oct-18	NW LANTAU	4	0.62	AUTUMN	STANDARD36826	HKLR	P
4-Oct-18	NW LANTAU	2	6.10	AUTUMN	STANDARD36826	HKLR	S
4-Oct-18	NW LANTAU	3	5.60	AUTUMN	STANDARD36826	HKLR	S
4-Oct-18	NE LANTAU	2	19.33	AUTUMN	STANDARD36826	HKLR	P
4-Oct-18	NE LANTAU	3	15.44	AUTUMN	STANDARD36826	HKLR	P
4-Oct-18	NE LANTAU	2	8.06	AUTUMN	STANDARD36826	HKLR	S
4-Oct-18	NE LANTAU	3	5.07	AUTUMN	STANDARD36826	HKLR	S
11-Oct-18	NW LANTAU	2	15.31	AUTUMN	STANDARD36826	HKLR	P
11-Oct-18	NW LANTAU	3	12.41	AUTUMN	STANDARD36826	HKLR	P
11-Oct-18	NW LANTAU	2	4.07	AUTUMN	STANDARD36826	HKLR	S
11-Oct-18	NW LANTAU	3	9.41	AUTUMN	STANDARD36826	HKLR	S
16-Oct-18	NW LANTAU	2	23.58	AUTUMN	STANDARD36826	HKLR	P
16-Oct-18	NW LANTAU	3	5.15	AUTUMN	STANDARD36826	HKLR	P
16-Oct-18	NW LANTAU	2	10.36	AUTUMN	STANDARD36826	HKLR	S
16-Oct-18	NW LANTAU	3	2.11	AUTUMN	STANDARD36826	HKLR	S
18-Oct-18	NW LANTAU	2	32 <i>.4</i> 5	AUTUMN	STANDARD36826	HKLR	P
18-Oct-18	NW LANTAU	2	11.05	AUTUMN	STANDARD36826	HKLR	S
18-Oct-18	NE LANTAU	2	34.26	AUTUMN	STANDARD36826	HKLR	Р
18-Oct-18	NE LANTAU	3	2.27	AUTUMN	STANDARD36826	HKLR	P
18-Oct-18	NE LANTAU	2	11.07	AUTUMN	STANDARD36826	HKLR	S
1-Nov-18	NE LANTAU	2	10.78	AUTUMN	STANDARD36826	HKLR	P
1-Nov-18	NE LANTAU	3	19.78	AUTUMN	STANDARD36826	HKLR	P
1-Nov-18	NE LANTAU	4	6.85	AUTUMN	STANDARD36826	HKLR	P
1-Nov-18	NE LANTAU	2	4.88	AUTUMN	STANDARD36826	HKLR	S
1-Nov-18	NE LANTAU	3	7.41	AUTUMN	STANDARD36826	HKLR	S
6-Nov-18	NW LANTAU	2	32.12	AUTUMN	STANDARD36826	HKLR	P
6-Nov-18	NW LANTAU	3	19.50	AUTUMN	STANDARD36826	HKLR	Р

Appendix I. (cont'd)

(Abbreviations: BEAU = Beaufort Sea State; P = Primary Line Effort; S = Secondary Line Effort)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
6-Nov-18	NW LANTAU	4	6.80	AUTUMN	STANDARD36826	HKLR	Р
6-Nov-18	NW LANTAU	2	17.37	AUTUMN	STANDARD36826	HKLR	S
6-Nov-18	NW LANTAU	3	7.91	AUTUMN	STANDARD36826	HKLR	S
6-Nov-18	NW LANTAU	4	2.70	AUTUMN	STANDARD36826	HKLR	S
8-Nov-18	NW LANTAU	3	9.12	AUTUMN	STANDARD36826	HKLR	Р
8-Nov-18	NW LANTAU	4	16. <i>4</i> 2	AUTUMN	STANDARD36826	HKLR	Р
8-Nov-18	NW LANTAU	5	1.50	AUTUMN	STANDARD36826	HKLR	Р
8-Nov-18	NW LANTAU	3	5.80	AUTUMN	STANDARD36826	HKLR	S
8-Nov-18	NW LANTAU	4	5.75	AUTUMN	STANDARD36826	HKLR	S
8-Nov-18	NW LANTAU	5	1.40	AUTUMN	STANDARD36826	HKLR	S
8-Nov-18	NE LANTAU	2	21.83	AUTUMN	STANDARD36826	HKLR	Р
8-Nov-18	NE LANTAU	3	13.92	AUTUMN	STANDARD36826	HKLR	Р
8-Nov-18	NE LANTAU	4	1.30	AUTUMN	STANDARD36826	HKLR	Р
8-Nov-18	NE LANTAU	2	7.10	AUTUMN	STANDARD36826	HKLR	S
8-Nov-18	NE LANTAU	3	5.64	AUTUMN	STANDARD36826	HKLR	S
8-Nov-18	NE LANTAU	4	0.81	AUTUMN	STANDARD36826	HKLR	S
13-Nov-18	NW LANTAU	2	18.07	AUTUMN	STANDARD36826	HKLR	Р
13-Nov-18	NW LANTAU	3	14.72	AUTUMN	STANDARD36826	HKLR	P
13-Nov-18	NW LANTAU	2	6.80	AUTUMN	STANDARD36826	HKLR	S
13-Nov-18	NW LANTAU	3	1.71	AUTUMN	STANDARD36826	HKLR	S

#### Appendix II. HKBCF/HKLR03 Chinese White Dolphin Sighting Database in September-November 2018

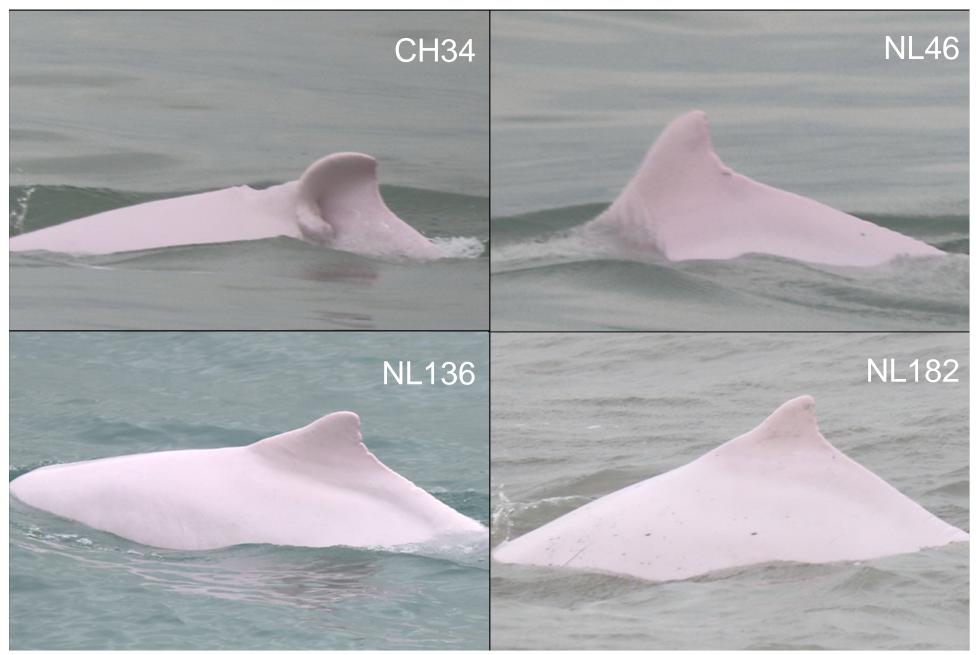
(Abberviations: STG# = Sighting Number; HRD SZ = Dolphin Herd Size; BEAU = Beaufort Sea State; PSD = Perpendicular Distance; BOAT ASSOC. = Fishing Boat Association; P/S: Sighting Made on Primary/Secondary Lines)

DATE	STG#	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
10-Sep-18	1	1143	3	NW LANTAU	1	195	ON	HKBCF	826872	806456	AUTUMN	NONE	Р
11-Oct-18	1	1222	4	NW LANTAU	3	362	ON	HKLR	826265	805415	AUTUMN	NONE	S
18-Oct-18	1	1232	2	NW LANTAU	2	145	ON	HKLR	824310	808501	AUTUMN	NONE	P
6-Nov-18	1	1107	1	NW LANTAU	2	364	ON	HKLR	825486	807443	AUTUMN	NONE	Р
6-Nov-18	2	1119	2	NW LANTAU	2	221	ON	HKLR	827280	807456	AUTUMN	NONE	Р
6-Nov-18	3	1202	2	NW LANTAU	2	84	ON	HKLR	828546	805451	AUTUMN	NONE	Р

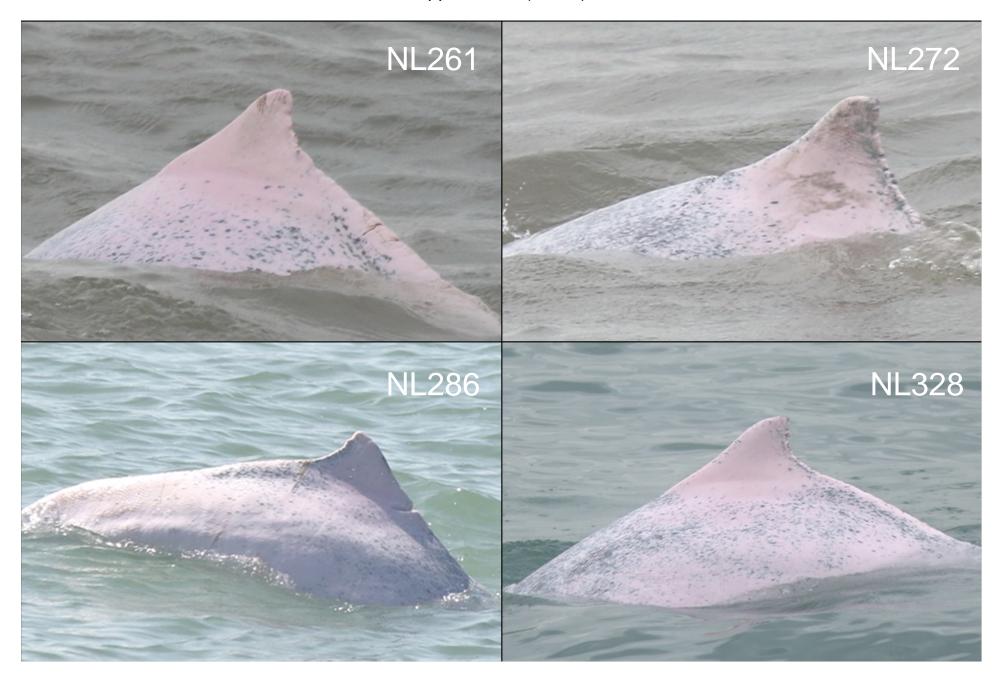
## Appendix III. Individual dolphins identified during HKBCF/HKLR03 monitoring surveys in September-November 2018

ID#	DATE	STG#	TYPE	AREA
CH34	10/09/18	1	HKBCF	NW LANTAU
NL46	10/09/18	1	HKBCF	NW LANTAU
NL136	10/09/18	1	HKBCF	NW LANTAU
	11/10/18	1	HKLR	NW LANTAU
	18/10/18	1	HKLR	NW LANTAU
NL182	11/10/18	1	HKLR	NW LANTAU
NL261	11/10/18	1	HKLR	NW LANTAU
	06/11/18	3	HKLR	NW LANTAU
NL272	11/10/18	1	HKLR	NW LANTAU
NL286	06/11/18	2	HKLR	NW LANTAU
NL328	18/10/18	1	HKLR	NW LANTAU
	06/11/18	3	HKLR	NW LANTAU

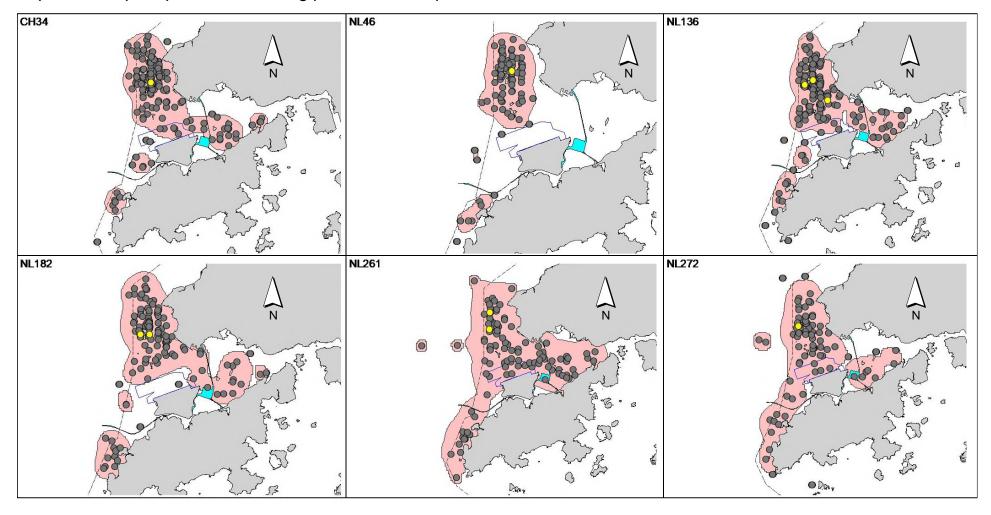
Appendix IV. Eight individual dolphins that were identified during September to November 2018 under the present impact phase monitoring surveys



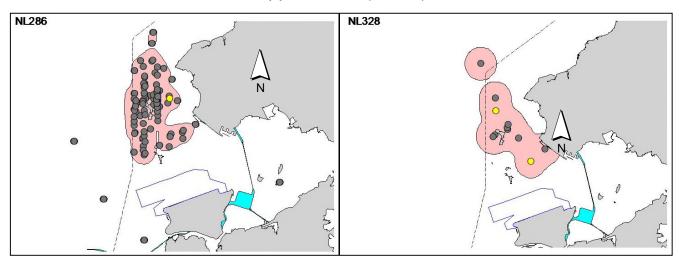
## Appendix IV. (cont'd)



Appendix V. Ranging patterns (95% kernel ranges) of eight individual dolphins that were sighted during the present impact phase monitoring period from September to November 2018



Appendix V. (cont'd)





Contract	Contract No. HY/2013/04 HZMB HKBCF – Infrastructure Works Stage II (Southern Portion)										
Ref. No.		E093									
Date		10 October 2018									
Time (hh:mm)					See	below					
Monitoring Location					S	R6					
Parameter		Water Quality – Suspended Solids (in mg/L)									
Action Level					See	below					
Limit Level					See	below					
Measured Level	Action &	Limit Le	vel (AL & LL) /	Measured L	evel:						
ivicasarea Lever	Param.	Unit	Station	Depth	Action Level	Limit Level	Measurement at Mid-Ebb Tide	Measurement at Mid-Flood Tide			
	SS Samplir	mg/L	SR6	Depth Averaged	23.5 and 120% (i.e. 14.9 for mid-flood) of upstream control station's SS at the same tide of the same day	34.4 and 130% (i.e. 16.2 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes	17.4	29.4			
Possible reason for Action or Limit Level Non- compliance	Bold wii Upstrea Upstrea On 1 durin As comarinater waste disch There Conti As coof	no n	trol stations ctober id-flood No. HY med w ansport uary 20 er gene was co /accum e, it is c No. HY med w itract /accum	is LL excees of mid-ets of mid-ets of mid-flo 2018, d tide.  7/2013, ith the action a 2018. Norated follected in the concluder on cluder the RSS No. in the conclusion in the conclusion in the RSS No. in the conclusion in the conclusion in the RSS No. in the conclusion in t	b tide: CS(Mf)3(N) and CS4 bod tide: CS(Mf)5, CS6 and C1 no. AL exceed  /01 RSS and ET of and no marine-ba o site runoff with a	Contract No. H' used works perform the Contract is site which potential site which potential stered collector area was observed ances were not were completed to onfirmed that at active work	Y/2013/01, to ormed under et site was contained. No orgoved on 10 Contained to the on 10 Septemanor organs	here were no the Contract observed. All ained organic ganic matter october 2018. e Contract. ober 2017. ET anic matter the date of			

#### Contract No. HY/2013/03

During weekly site audit on 4 and 11 October 2018, ET of Contract No. HY/2013/03 confirmed the Contractor had provided workable and effective water quality mitigation measures. There was no marine transportation on the date of exceedance. As confirmed with the Environmental Officer and operation team of this Contract, no organic matter discharge/accumulation at active works areas was observed on the date of exceedance. The marine-based works in Box Culvert B were completed. The ET of Contract No. HY/2013/03 concluded that the captioned exceedance was not related to the construction site activities of the Contract.

#### Contract No. HY/2013/04

According to the Contractor of HY/2013/04, all marine-based segment deliveries were completed in January 2018 and no marine-based works were conducted under the contract on 10 October 2018. Furthermore, there was no visible observation of any discharge or accumulation of organic matter at the active works areas within HY/2013/04 site area on 10 October 2018.

HY/2013/04 site shoreline interfacing with open waters was inspected during ET's regular weekly site inspection on 10 October 2018 (between 14:40 and 14:50). It was observed that the silt curtain at Box Culvert D was installed properly, however the silt curtain at Box Culvert C was not reinstated. The Contractor was reminded to reinstate the silt curtain at Box Culvert C as soon as possible. There were no other observations in relation to the same shoreline.

It was concluded that the exceedance was not due to HY/2013/04.

#### Contract No. HY/2014/05

This Contract did not involve any marine transportation or marine-based works. No site runoff within the Contract site was observed. Therefore, it is concluded that the exceedance was not related to the Contract.

## Actions taken / to be taken

#### Contract No. HY/2013/01

Although the exceedance was considered not due to HY/2013/01, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.

#### Contract No. HY/2013/02

Although the exceedance was considered not due to HY/2013/02, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.

#### Contract No. HY/2013/03

During weekly site audit on 4 and 11 October 2018, ET of Contract No. HY/2013/03 confirmed that the Contractor had provided workable and effective water quality mitigation measures.

#### Contract No. HY/2013/04

Actions were taken under Event and Action Plan (EAP):

- 1. In situ measurement was repeated to confirm findings;
- After considering the above-mentioned investigation results, it appears that it was unlikely that the exceedance was attributed to active construction activities of this Contract;
- 3. IEC, Contractor and ER were informed via email;
- Monitoring data, all plant, equipment and Contractor's working methods were checked;

		5. Since it is considered that the exceedance was unlikely to be contract related, as such, Actions 5-7 under the EAP are not considered applicable.
		However, the Contractor was also reminded to implement environmental mitigation measures in accordance with Environmental Mitigation Implementation Schedule.
		Contract No. HY/2014/05
		Although the exceedance was considered not due to HY/2014/05, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.
Remarks	*	ET of HY/2013/04 notified the exceedance as follows:
		• 24 October 2018 (Notification No. 20181010_NOE_r0)
		• 14 November 2018 (Notification No. 20181010_NOE_r1)

(Location Plan – please refer below)

Prepared by:

Gary Chow

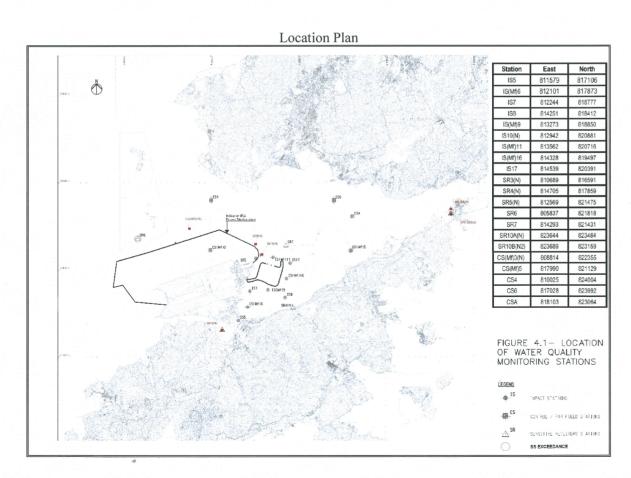
Designation:

Environmental Team Leader (Contract No. HY/2013/04)

Signature:

Date:

14 November 2018





Contract	Н	Contract No. HY/2013/04 HZMB HKBCF – Infrastructure Works Stage II (Southern Portion)									
Ref. No.		E094									
Date		24 October 2018									
Time (hh:mm)				See l	oelow						
Monitoring Location				IS(1	Mf)6						
Parameter				Water Quality – T	Turbidity (in NT	U)					
Action Level				See l	oelow						
Limit Level				See t	oelow						
Measured Level	Action & Limit L	evel (AL & LL) /	Measured I	evel:							
ivicasured Lever	Param. Unit TURB NTU Sampling Time:	Station IS(Mf)6	Depth Depth Averaged	Action Level 27.5 and 120% (i.e. 11.7 for mid-ebb) of upstream control station's turbidity at the same tide of the same day	Limit Level 47.0 and 130% (i.e. 12.7 for mid-ebb) of upstream control station's turbidity at the same tide of the same day	Measurement at Mid-Ebb Tide 29.6	Measurement at Mid-Flood Tide 7.2				
Possible reason for Action or Limit Level Non- compliance	Upstream cor On 24 C recorded Contract As confirmarine to after Jan wasteward matter discharge Therefore Contract As confirmation ET of C accumula	13:11	Is LL exceed of mid-etc. of mid-fle 2018, mid-etc. which is the ation a 2018. Norated to a 2018 on cluding the strength of the ation and the strength of the s	bb tide: CS(Mf)3(N) and CS4 bod tide: CS(Mf)5, CS6 and C 1 no. AL exceed bb tide.  /01  RSS and ET of C and no marine-ba to site runoff with from construction d by the regin n at active works led that the exceed	Contract No. HY sed works perform the Contract site which pote stered collectory area was observationates were not the completed area was observationally were completed area that no oworks areas on	Y/2013/01, the content of the conten	here were no the Contract observed. All nined organic ganic matter october 2018. e Contract. tember 2017. er discharge/ exceedance.				

#### Contract No. HY/2013/03

During weekly site audits on 18 and 25 October 2018, ET of Contract No. HY/2013/03 confirmed the Contractor had provided workable and effective water quality mitigation measures. There was no marine transportation on the date of exceedance. As confirmed with the Environmental Officer and operation team of this Contract, no organic matter discharge/accumulation at active works areas was observed on the date of exceedance. The marine-based works in Box Culvert B were completed. The ET of Contract No. HY/2013/03 concluded that the captioned exceedance was not related to the construction site activities of the Contract.

#### Contract No. HY/2013/04

According to the Contractor of HY/2013/04, all marine-based segment deliveries were completed in January 2018 and no marine-based works were conducted under the contract on 24 October 2018. Furthermore, there was no visible observation of any discharge or accumulation of organic matter at the active works areas within HY/2013/04 site area on 24 October 2018.

HY/2013/04 site shoreline interfacing with open waters was inspected during ET's regular weekly site inspections on 22 October 2018 (between 14:25 and 14:45) and 31 October 2018 (between 14:55 and 15:15). At both site inspections, it was observed that the silt curtain at Box Culvert D was installed properly, however the silt curtain at Box Culvert C was not reinstated. The Contractor was reminded to reinstate the silt curtain at Box Culvert C as soon as possible. There were no other observations in relation to the same shoreline.

It was concluded that the exceedance was not due to HY/2013/04.

#### Contract No. HY/2014/05

This Contract did not involve any marine transportation or marine-based works. No site runoff within the Contract site was observed. Therefore, it is concluded that the exceedance was not related to the Contract.

## taken

#### Actions taken / to be | Contract No. HY/2013/01

Although the exceedance was considered not due to HY/2013/01, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.

#### Contract No. HY/2013/02

Although the exceedance was considered not due to HY/2013/02, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.

#### Contract No. HY/2013/03

During weekly site audits on 18 and 25 October 2018, ET of Contract No. HY/2013/03 confirmed that the Contractor had provided workable and effective water quality mitigation measures.

#### Contract No. HY/2013/04

Actions were taken under Event and Action Plan (EAP):

- 1. In situ measurement was repeated to confirm findings;
- 2. After considering the above-mentioned investigation results, it appears that it was unlikely that the exceedance was attributed to active construction activities of this Contract;
- 3. IEC, Contractor and ER were informed via email;
- 4. Monitoring data, all plant, equipment and Contractor's working methods were

	checked;
	5. Since it is considered that the exceedance was unlikely to be contract related as such, Actions 5-7 under the EAP are not considered applicable.
	However, the Contractor was also reminded to implement environmenta mitigation measures in accordance with Environmental Mitigation Implementation Schedule.  Contract No. HY/2014/05
	Although the exceedance was considered not due to HY/2014/05, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.
Remarks	ET of HY/2013/04 notified the exceedance as follows:
	• 25 October 2018 (Notification No. 20181024_NOE_r0)
	• 20 November 2018 (Notification No. 20181024_NOE_r1)

(Location Plan – please refer below)

Prepared by:

Gary Chow

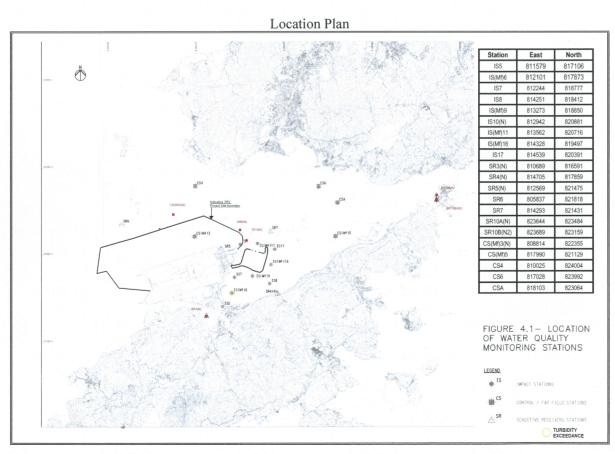
Designation:

Environmental Team Leader (Contract No. HY/2013/04)

Signature:

Date:

20 November 2018





Contract		Contract No. HY/2013/04 HZMB HKBCF – Infrastructure Works Stage II (Southern Portion)									
Ref. No.		E095									
Date		23 November 2018									
Time (hh:mm)					See	below					
Monitoring Location					IS(10)N, IS	6(Mf)11, SR7					
Parameter				Wate	er Quality – Susp	ended Solids (in	mg/L)				
Action Level					See	below					
Limit Level					See	below					
Measured Level	Action &	Limit Le	vel (AL & LL	) / Measured L	evel:						
ivieasured Lever	Param.	Unit	Station	Depth	Action Level	Limit Level	Measurement at Mid-Ebb Tide	Measurement at Mid-Flood Tide			
	SS	mg/L	IS10(N)	Depth Average	23.5 and 120% (i.e. 15.4 for mid-flood) of upstream control station's SS at the same tide of the same day	34.4 and 130% (i.e. 16.7 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes	10.6	25.8			
	SS	mg/L	IS(Mf)11	Depth Average	23.5 and 120% (i.e. 15.4 for mid-flood) of upstream control station's SS at the same tide of the same day	34.4 and 130% (i.e. 16.7 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes	9.5	27.8			
	SS	mg/L	SR7	Depth Average	23.5 and 120% (i.e. 15.4 for mid-flood) of upstream control station's SS at the same tide of the same day	34.4 and 130% (i.e. 16.7 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes	7.0	25.0			
	Sampling										
	IS5	1	Mid-Ebb	Mid-Flood							
	IS(Mf)	16	13:29 13:20	16:46 16:54							
	IS7		13:14	17:01							
	IS8 IS(Mf)	19	12:55 13:05	17:15 17:08							
	IS10(N		12:10	17:41							
	IS(Mf)		12:02 12:28	17:47 17:33							
	IS17		12:22	17:39							
	SR3(N		13:36	16:43							
	SR4(N SR5(N		12:48 12:15	17:20 17:35							
	SR6		13:10	16:42							
	SR7 SR10A(	N)	11:51 11:07	17:56 18:36							
	SR10B(I		11:19	18:40							
	Remarks: Bold means AL exceedance										
				ice ins LL exceed	dance						
	Upstrea	n cont	rol statior	ns of mid-eb	b tide: CS(Mf)3(N) and CS4	204					
Dogaible massam far					od tide: CS(Mf)5, CS6 and C		mandad arti	do of otations			
					8, 3 no. AL exc SR7 were record			us at stations			
Level Non-				Y/2013/		-6 4					
compliance					RSS and ET of	Contract No. H	Y/2013/01. 1	there were no			
					and no marine-ba						



after January 2018. No site runoff within the Contract site was observed. All wastewater generated from construction site which potentially contained organic matter was collected by the registered collector. No organic matter discharge/accumulation at active works area was observed on the date of exceedance. Therefore, it is concluded that the exceedances were not related to the Contract.

#### Contract No. HY/2013/02

As confirmed with RSS, marine works were completed on 10 September 2017. ET of Contract No. HY/2013/02 confirmed that no organic matter discharge/ accumulation was observed at active works areas on the date of exceedance. Therefore, it is concluded that the exceedances were not related to the Contract.

#### Contract No. HY/2013/03

As confirmed with RSS, there were no marine-based works performed under the contract after October 2018. ET of Contract No. HY/2013/03 confirmed that no organic matter discharge/accumulation was observed at the works areas on the date of exceedance. Therefore, it is concluded that the exceedances were not related to the Contract.

#### Contract No. HY/2013/04

According to the Contractor of HY/2013/04, all marine-based segment deliveries were completed in January 2018 and no marine-based works were conducted under the contract on 23 November 2018. Furthermore, there was no visible observation of any discharge or accumulation of organic matter at the active works areas within HY/2013/04 site area on 23 November 2018.

HY/2013/04 site shoreline interfacing with open waters was inspected during ET's regular weekly site inspections on 19 November 2018 (between 14:50 and 15:00) and 28 November 2018 (between 14:20 and 15:00). On 19 November 2018, it was observed that the silt curtain at Box Culvert D was installed properly, however the silt curtain at Box Culvert C was not reinstated. The Contractor was reminded to reinstate the silt curtain at Box Culvert C as soon as possible. Subsequently, the silt curtain at Box Culvert C was removed and the observation was closed on 28 November 2018. There were no other observations (including the appearance of the open waters) in relation to the same shoreline on 19 and 28 November 2018.

It was concluded that the exceedances were not due to HY/2013/04.

#### Contract No. HY/2014/05

This Contract did not involve any marine transportation or marine-based works. No site runoff within the Contract site was observed. Therefore, it is concluded that the exceedances were not related to the Contract.

## taken

#### Actions taken / to be Contract No. HY/2013/01

Although the exceedances were considered not due to HY/2013/01, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.

#### Contract No. HY/2013/02

Although the exceedances were considered not due to HY/2013/02, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.

#### Contract No. HY/2013/03

Although the exceedances were considered not due to HY/2013/03, the Contractor is reminded to implement all necessary water quality mitigation

	measures identified in the EM&A Manual.
	Contract No. HY/2013/04
	Actions were taken under Event and Action Plan (EAP):
	1. In situ measurement was repeated to confirm findings;
	2. After considering the above-mentioned investigation results, it appears that it was unlikely that the exceedance was attributed to active construction activities of this Contract;
	3. IEC, Contractor and ER were informed via email;
	4. Monitoring data, all plant, equipment and Contractor's working methods were checked;
	5. Since it is considered that the exceedance was unlikely to be contract related, as such, Actions 5-7 under the EAP are not considered applicable.
	However, the Contractor was also reminded to implement environmenta mitigation measures in accordance with Environmental Mitigation Implementation Schedule.
	Contract No. HY/2014/05
142 A201 A201 A201 A201 A201 A201 A201 A20	Although the exceedances were considered not due to HY/2014/05, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.
Remarks	ET of HY/2013/04 notified the exceedances as follows:

(Location Plan – please refer below)

5 December 2018 (Notification No. 20181123\_NOE\_r0) 6 December 2018 (Notification No. 20181123\_NOE\_r1)

Prepared by:

Gary Chow

Designation:

Environmental Team Leader (Contract No. HY/2013/04)

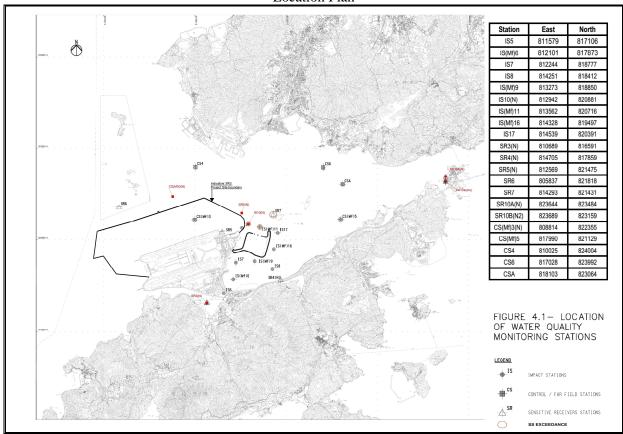
Signature:

Date:

21 December 2018



#### Location Plan





Contract						. HY/2013/04					
		HZMB HKBCF – Infrastructure Works Stage II (Southern Portion)									
Ref. No.		E096									
Date		26 November 2018									
Time (hh:mm)		See below									
Monitoring Location		SR10A(N), SR10B(N2)									
Parameter				Wat	er Quality – Susp	ended Solids (in	mg/L)				
Action Level					See	below					
Limit Level					See	below					
Measured Level	Action &	Limit Le	vel (AL & LL) /	Measured I	evel:		Measurement at	Measurement at			
	Param.	Unit	Station	Depth	Action Level	Limit Level	Mid-Ebb Tide	Mid-Flood Tide			
	SS	mg/L	SR10A(N)	Depth Average	23.5 and 120% (i.e. 16.8 for mid-flood) of upstream control station's SS at the same tide of the same day	34.4 and 130% (i.e. 18.2 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes	9.6	24.7			
	SS	mg/L	SR10B(N2)	Depth Average	23.5 and 120% (i.e. 16.8 for mid-flood) of upstream control station's SS at the same tide of the same day	34.4 and 130% (i.e. 18.2 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes	10.5	23.7			
Possible reason for Action or Limit Level Non- compliance	Bold wir Upstrea Upstrea On 2 SR10 Contr As co	(N)	ovember ovember ovember ovember ovember over over over over over over over ov	s LL excee of mid-ek of mid-flo er 201 R10B Z/2013, ith the ation a	bb tide: CS(Mf)3(N) and CS4 bod tide: CS(Mf)5, CS6 and C 8, 2 no. AL exc (N2) were recorded  RSS and ET of and no marine-ba	eedances of sus ed during mid-flo Contract No. H' used works perfo	ood tide. Y/2013/01, t ormed under	here were no the Contract			
	after waste matte disch	Januewater varge er varge edane	uary 20 er gene vas co /accum ce. The	018. N rated to ollected ulation	o site runoff with from construction do by the region at active work, it is concluded	thin the Contract a site which pote stered collector ks area was o	et site was of entially contains. No orgonial bserved on	observed. All ained organic ganic matter the date of			

#### Contract No. HY/2013/02

As confirmed with RSS, marine works were completed on 10 September 2017. ET of Contract No. HY/2013/02 confirmed that no organic matter discharge/ accumulation was observed at active works areas on the date of exceedance. Therefore, it is concluded that the exceedances were not related to the Contract.

#### Contract No. HY/2013/03

As confirmed with RSS, there were no marine-based works performed under the contract after October 2018. ET of Contract No. HY/2013/03 confirmed that no organic matter discharge/accumulation was observed at the works areas on the date of exceedance. Therefore, it is concluded that the exceedances were not related to the Contract.

#### Contract No. HY/2013/04

According to the Contractor of HY/2013/04, all marine-based segment deliveries were completed in January 2018 and no marine-based works were conducted under the contract on 26 November 2018. Furthermore, there was no visible observation of any discharge or accumulation of organic matter at the active works areas within HY/2013/04 site area on 26 November 2018.

HY/2013/04 site shoreline interfacing with open waters was inspected during ET's regular weekly site inspections on 19 November 2018 (between 14:50 and 15:00) and 28 November 2018 (between 14:20 and 15:00). On 19 November 2018, it was observed that the silt curtain at Box Culvert D was installed properly, however the silt curtain at Box Culvert C was not reinstated. The Contractor was reminded to reinstate the silt curtain at Box Culvert C as soon as possible. Subsequently, the silt curtain at Box Culvert C was removed and the observation was closed on 28 November 2018. There were no other observations (including the appearance of the open waters) in relation to the same shoreline on 19 and 28 November 2018.

It was concluded that the exceedances were not due to HY/2013/04.

#### Contract No. HY/2014/05

This Contract did not involve any marine transportation or marine-based works. No site runoff within the Contract site was observed. Therefore, it is concluded that the exceedances were not related to the Contract.

## taken

#### Actions taken / to be Contract No. HY/2013/01

Although the exceedances were considered not due to HY/2013/01, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.

#### Contract No. HY/2013/02

Although the exceedances were considered not due to HY/2013/02, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.

#### Contract No. HY/2013/03

Although the exceedances were considered not due to HY/2013/03, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.

#### Contract No. HY/2013/04

Actions were taken under Event and Action Plan (EAP):

- 1. In situ measurement was repeated to confirm findings;
- 2. After considering the above-mentioned investigation results, it appears that it

	was unlikely that the exceedance was attributed to active construction activities of this Contract;
	3. IEC, Contractor and ER were informed via email;
28	4. Monitoring data, all plant, equipment and Contractor's working methods were checked;
	5. Since it is considered that the exceedance was unlikely to be contract related, as such, Actions 5-7 under the EAP are not considered applicable.
	However, the Contractor was also reminded to implement environmental mitigation measures in accordance with Environmental Mitigation Implementation Schedule.
	Contract No. HY/2014/05
	Although the exceedances were considered not due to HY/2014/05, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.
Remarks	ET of HY/2013/04 notified the exceedances as follows:
	• 6 December 2018 (Notification No. 20181126_NOE_r0 & 20181126_NOE_r1)

(Location Plan – please refer below)

Prepared by:

Gary Chow

Designation:

Environmental Team Leader (Contract No. HY/2013/04)

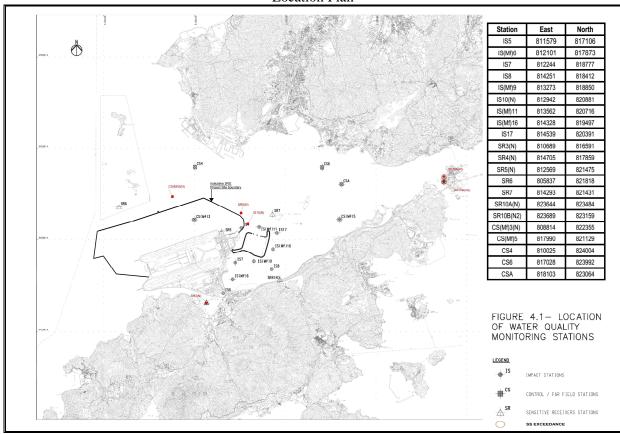
Signature:

Date:

21 December 2018



#### Location Plan



Contract	Contract No. HY/2013/04 HZMP HKPCE Infrastructure Works Stage II (Southern Portion)											
	HZMB HKBCF – Infrastructure Works Stage II (Southern Portion)											
Ref. No.	E100											
Date	Se	September – November 2018 (referred to as the "reporting period")										
Time (hh:mm)		N/A										
Monitoring Location		Northeast Lantau (NEL) & Northwest Lantau (NWL)										
Parameter		Ecology – Chinese White Dolphin (CWD)										
Action Level		The Action and Limit Levels of CWD monitoring extracted from the enhanced										
Limit Level	Event		or CWD Monitoring (2013) are reproduced		EPD on 7 May							
Measured Level		Action & Limit Levels (AL		Monitoring Results:								
21100000100 20 101		North Lant Action Level (AL)	tau Social Cluster Limit Level (LL)	for the Mo	nitoring Period							
	NEL	STG < 4.2 & ANI < 15.5	NEL: (STG < 2.4 & ANI < 8.9)	<u>STG = 0</u> 8	& <u>ANI = 0</u>							
	NWL	STG < 6.9 & ANI < 31.3	and NWL: (STG < 3.9 & ANI < 17.9)		& <u>ANI = 3.0 ± 3.89</u>							
Action or Limit	4. Bold means AL exceedance 5. Bold with underline means LL exceedance  (a) Causes of Exceedance  • During CWD monitoring in the reporting period, no adverse impact from											
Level Non- compliance	th g • A a: v	ne activities of HZ eneral observation after review of all nalyses of other ariation is detected	ZMB HKBCF projects. available and relevant parameters included in key environment.	t on dolphin want data, including in the EM& al parameters.	as noticeable from g the raw data and A, no significant							
	<ul> <li>As confirmed with Engineer's Representative, there were no matransportation and no marine-based works performed under Contract I HY/2013/01, HY/2013/02 and HY/2013/03 in September–Novem 2018.</li> </ul>											
	Se W N	<ul> <li>Also, according to the Contractor of HY/2013/04, all marine-based segment deliveries were completed in January 2018 and no marine-based works were conducted under the contract in September–November 2018.</li> <li>Moreover, the localised silt curtain at Box Culvert C under HY/2013/04 were removed on 17 November 2018.</li> </ul>										
	neasures were being upheld. Dolphin Watching Plan . HY/2013/01 and HY/2013/04 were implemented it ber 2018. There was no failure or reduction of dolphin neasures.											
	C	ontributing factor ontribution of imp	that the HZMB cors affecting the dolp pacts due to individual from the other activation	hins. It was al al HZMB contra	so concluded the acts and processes							

## taken

#### Actions taken / to be (b) Action required under the action plan

Please refer to the corresponding Event and Action Plan

#### (c) Action taken under the action plan

#### 1) Statistical data analysis has been repeated to confirm findings

It is noted that monitoring data collected in September 2018 through HZMB HKBCF Contract No. HY/2013/01 and in October and November 2018 through HZMB HLKR Contract No. HY/2011/03.

A two-way ANOVA with repeated measures and unequal sample size was conducted to examine whether there were any significant differences in the average encounter rates between the baseline and impact monitoring periods. The two variables that were examined included the two periods (baseline and impact phases) and two locations (NEL and NWL).

For the comparison between the baseline period and the present quarter, the pvalues for the differences in average dolphin encounter rates of STG and ANI were 0.0029 and 0.0146 respectively. If the alpha value is set at 0.05, significant differences were detected between the baseline and present quarter in both the average dolphin encounter rates of STG and ANI.

#### 2) All available and relevant data, including raw data and statistical analysis results of other parameters covered in the EM&A have been reviewed

The AFCD monitoring data during September to November 2018 has been reviewed by the dolphin specialist. During the same quarter, no dolphin was sighted from 172.60 km of survey effort on primary lines in NEL, while nine groups of 22 dolphins were sighted from 216.88 km of survey effort on primary lines in NWL. This review has confirmed that the low occurrence of dolphins reported by the monitoring surveys in autumn 2018 in NEL and NWL survey area is accurate.

Furthermore, for water quality monitoring during this reporting period, the following exceedances were recorded and investigated:

- During September 2018, 184 exceedances of water quality (consisting of 153 Action Level and 29 Limit Level exceedances of dissolved oxygen and two Action Level exceedances of suspended solids) were recorded. Following investigations, it was concluded that the exceedances were not related to the HZMB HKBCF project.
- During October 2018, two exceedances of water quality (consisting of one Action Level exceedance of suspended solids and one Action Level exceedance of turbidity) were recorded. Following investigations, it was concluded that the exceedances were not related to the HZMB HKBCF project.
- During November 2018, five exceedances of water quality (all Action Level exceedances of suspended solids) were recorded. Following investigations, it was concluded that the exceedances were not related to the HZMB HKBCF project.

#### 3) Identification of source of impact was carried out

During this reporting period of dolphin monitoring, no adverse impact on dolphin from the works activities of HZMB HKBCF project was noticeable from general observations. Nevertheless, dolphin mitigation measures were being upheld and the Dolphin Watching Plan was implemented from the start of the works of the Project.

It is also noted that another ongoing project has expanded extensively in scale and now occupies considerable areas of NWL; it has prevented the successful completion of some of the transect lines and is in addition to the existing pressures the dolphins faced in the Lantau habitat before the HZMB development started (e.g. boat traffic, habitat degradation, pollution, competition with fisheries). The same project has already been noted as influencing a large part of NWL, which dolphins seem to have entirely vacated. Investigation reports into previous dolphin monitoring exceedances prepared by the ET for Contract No. HY/2010/02 had concluded that there were ongoing construction works, both Project related and not, which were known to impact dolphins. While no adverse impact was observed from HZMB HKBCF activities on dolphins during this reporting period, the long-term impacts of these works cannot be assessed although expanding the scope of monitoring areas will provide better data on impacts outside the NEL and NWL zones.

#### 4) The IEC, ER and Contractor have been informed of findings

ET of HY/2013/04 notified the exceedance as follows:

- 18 April 2019 (Notification No. 201809-201811D NOE)
- 20 May 2019 (Notification No. 201809-201811D\_NOE\_r1)

#### 5) Monitoring data have been checked

See Point (2) above.

#### 6) Repeated review to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary

Site inspection of the silt curtain integrity was conducted during weekly site inspection. The appropriate mitigation monitoring was in place depending on site activities (i.e., Dolphin Exclusion Zone (DEZ)/Dolphin Watching Plan (DWP) for silt curtain deployment and all other Project activities, respectively).

After investigation, there was no evidence that indicated that the reduced number of dolphins in NWL and NEL was related solely to Project works. It was also concluded that the contribution of impacts due to the HZMB works as a whole (or individual contracts) cannot be quantified nor separate from the other stress factors.

#### (d) ET's conclusions and recommendations for mitigation

Current mitigation measures for CWD were implemented fully, and the Contractor was reminded to consistently implement existing mitigation measures.

Investigation reports into previous dolphin monitoring exceedances prepared by the ET for Contract No. HY/2010/02 have noted that the current monitoring works

	under the EM&A programmes have already provided a high level of monitoring effort, that additional monitoring in the monitoring areas was not considered necessary, and that existing data can be reviewed and alternative analytical methods can be explored to determine any new insight to the dolphin distribution pattern.
	(e) Contractor's actions to implement the mitigation
	<ul> <li>Although this exceedance was considered not solely caused by HZME HKBCF Project, the Contractor is reminded to fully implement all relevant mitigation measures identified in the EM&amp;A Manual.</li> <li>It was recommended that the marine works of HZMB projects should be accelerated and completed as soon as possible so as to reduce the overal duration of impacts and allow the dolphin population to recover as early as possible.</li> </ul>
Remarks	

(Location Plan – please refer below)

Prepared by:

Gary Chow

Designation:

Environmental Team Leader (Contract No. HY/2013/04)

Signature:

(MAS)

Date:

19 June 2019

