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## Appendix J

## Investigation Reports on Action Level or Limit Level Non-compliance

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# INVESTIGATION REPORT ON

# ACTION AND LIMIT LEVEL NON-COMPLIANCE

# FOR

# CONTRACT NO. HY/2013/03

## Hong Kong Zhuhai Macao Bridge
## Hong Kong Boundary Crossing Facilities – Vehicle Clearance Plazas and Ancillary Buildings and Facilities

**Report No. Ref.: 0165-15-IR0004**

Prepared by: Mr. Vincent Lu

Reviewed by: Mr. Bong Yu

Certified by: _____ Date: 14/12/2017

Mr. Arthur Cheng
Environmental Team Leader

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## NON-COMPLIANCE INVESTIGATION REPORT No.: 0165-15-IR004

### 1. Project Details

Contract No.: HY/2013/03

Contract Title: Hong Kong Zhuhai Macao Bridge Hong Kong Boundary Crossing Facilities - Vehicle Clearance Plazas and Ancillary Buildings and Facilities

Project Proponent: Highways Department

Main Contractor: China Harbour Engineering Co. Ltd.

### 2. Details of Non-compliance

Notification of Action/Limit Level Exceedance (20170901DO_v1) was forwarded by the ET of Contract No. HY/2013/01 on 27 September 2017:

Monitoring Date: 1 September 2017

The Action and Limit Levels of dissolved oxygen (DO) at determined from baseline monitoring data are listed below:

| Monitoring Parameter | Action Level (mg/L) | Limit Level (mg/L) |
|---|---|---|
| Surface and Middle | 5.0 | 4.2 (except 5 mg/L for FCZ) |
| Bottom | 4.7 | 3.6 |

Measured Level: Mid-flood tide

| Parameter | Station | Depth | Measured at mid-ebb tide (mg/L) | Measured at mid-flood tide (mg/L) |
|---|---|---|---|---|
| DO | IS5 | Bottom | **4.4** | **4.4** |
| DO | IS10(N) | Bottom | **4.5** | **4.5** |
| DO | IS(Mf)11 | Bottom | **4.6** | **4.5** |
| DO | IS17 | Bottom | **4.5** | 5.2 |
| DO | SR5(N) | Bottom | **4.5** | 4.7 |

**Bold** means AL exceedance.

Monitoring was undertaken by the ET of Contract No. HY/2013/01 of HKBCF. The Notification of Action/Limit Level Exceedance (20170901DO_v1) provided by the ET of Contract No. HY/2013/01 of HKBCF is shown in **Appendix A**.

## 3. Investigation of Non-compliance

Summary of Investigation

As confirmed with Mr. Marko Chan, Environmental Officer, and operation team of Contract No. HY/2013/03, there was marine transportation on the date of exceedance. Regarding marine transportation, the vessels was sized to make sure adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash. Regarding marine-based works in Box Culvert B, the work undertaken in the current stage is the preparation work of precast installation which was suspended on the date of exceedance due to safety issues. But silt curtain was still maintained to enclose the work area of the outlet of the box culvert fully. All sea water flow into the work area of box culvert B will be treated by desilting facilities before discharge in accordance with the discharge license approved by EPD for Contract No. HY/2013/03. It was unlikely to consume any dissolved oxygen to cause the DO exceedances recorded at the concerned WQM stations during mid-flood and mid-ebb tide on 1 September 2017.

The location of the WQM station where exceedances were recorded and all relevant WQM stations are shown in **Figure 1** and the location of marine-based construction works are shown in **Figure 2**.

Investigation Results

The ET of Contract No. HY/2013/03 concluded that the captioned exceedance was not related to the construction site activities of the contract. Nevertheless, the Contractor had been reminded to comply with the requirements stipulated in the Environmental Mitigation Implementation Schedule (EMIS) of the EM&A Manual, in particular:

- Water Quality:
  W1-
  1. Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
  2. Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
  3. Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
  4. Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
  5. Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
  6. All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.

## 4. Follow up Status (Exceedance)

During weekly site audit on 31 August, 8 and 14 September 2017, ET confirmed the Contractor had provided workable and effective water quality mitigation measures.

## 5. Recommendation to the Contractor

The Contractor was reminded to continue to fully maintain all water quality mitigation measures.

## 6. Follow up Status (Overall)

The captioned exceedance was not related to the Contract and therefore, no additional follow-up action is needed. However, ET proposed recommendations to Contractor in particular to the following aspects when there are marine construction activities.

Water Quality:

- Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
- Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
- Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
- Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
- Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
- All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.

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**Figure 1**

**The Location of WQM Stations**


**LEGEND**

- IS — IMPACT STATIONS
- CS — CONTROL / FAR FIELD STATIONS
- SR — SENSITIVE RECEIVERS STATIONS

# FIGURE 4.1– LOCATION OF WATER QUALITY MONITORING STATIONS

## SETTING OUT SCHEDULE

| MONITORING STATIONS | CO-ORDINATES | |
|---|---|---|
| | EASTING | NORTHING |
| IS5 | 811579 | 817106 |
| IS(Mf)6 | 812101 | 817873 |
| IS7 | 812244 | 818777 |
| IS8 | 814251 | 818412 |
| IS(Mf)9 | 813273 | 818850 |
| IS10 | 812577 | 820670 |
| IS10(N) | 812942 | 820455 |
| IS(Mf)11 | 813562 | 820716 |
| IS(Mf)16 | 814328 | 819497 |
| IS17 | 814539 | 820391 |
| SR3 | 810525 | 816456 |
| SR4(N) | 814705 | 817859 |
| SR5 | 811489 | 820455 |
| SR5(N) | 812569 | 821475 |
| SR6 | 805837 | 821818 |
| SR7 | 814293 | 821431 |
| SR10A | 823741 | 823495 |
| SR10B(N) | 823683 | 820881 |
| CS(Mf)3 | 809989 | 821117 |
| CS(Mf)3(N) | 808814 | 822355 |
| CS(Mf)5 | 817990 | 821129 |
| CS4 | 810025 | 824004 |
| CS6 | 817028 | 823992 |
| CSA | 818103 | 823064 |

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## Figure 2

## The Locations of Marine Transportation and Marine-based Construction Works

810000 E

815000 E

820000 E

825000 N

820000 N

815000 N

TAP SHEK KOK

CASTLE PEAK BAY

TAI LAM CHUNG

THE BROTHERS

THE SITE SEE DRAWING NO.
60191048/C3/000/C00/1003

TUEN MUN-CHEK LAP KOK LINK
(TM-CLKL) (BY OTHERS)

Sand Blanket Filling Area
of Three Runway Project

RECLAMATION FOR THE TM-CLKL
SOUTHERN LANDFALL (BY OTHERS)

OTHER INFRASTRUCTURE AND
BUILDING WORKS OUTSIDE
SITH BOUNDARY (BY OTHERS)

HONG KONG LINK ROAD (HKLR)
(SEPARATE PROJECT) (BY OTHERS)

WORKS AREA 'WA4'
SEE DRAWING NO.
60191048/C3/000/C00/1052

WORKS AREA 'WA3'
SEE DRAWING NO.
60191048/C3/000/C00/1051

CHEK LAP KOK

TUNG CHUNG

LANTAU ISLAND

NORTH LANTAU HIGHWAY

N

## NOTES:

1. COORDINATES ARE RELATED TO HONG KONG METRIC GRID (1980).
2. DIMENSIONS ARE IN MILLIMETER AND CHAINAGE ARE IN METRES UNLESS OTHERWISE SHOWN.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 60191048/C3/000/C00/1051 TO 1053.

## LEGEND:

- SITE BOUNDARY
- WORKS AREA
- Location of Box Culvert B
- Silt Curtain

| REV. 修訂 | DESCRIPTION 內容摘要 | D.C. | P.C. CHECKED 復核 | DATE 日期 |
|---|---|---|---|---|
| - | TENDER DRAWING | BWCW | SCT | MAR.14 |

路政署 HIGHWAYS DEPARTMENT
港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

HONG KONG-ZHUHAI-MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- VEHICLE CLEARANCE PLAZAS AND
ANCILLARY BUILDINGS AND FACILITIES

# SITE LOCATION PLAN

AECOM
Rogers Stirk Harbour + Partners
BURO HAPPOLD ATKINS ADI
Aedas

DRG.NO. 圖紙編號 60191048/C3/000/C00/1000

| | | |
|---|---|---|
| DESIGNED BY 設計 BWCW | CONTRACT NO. 合約編號 HY/2013/03 | P. Dir. APPROVED 批准人 TKH |
| DRAWN BY 繪圖 WSY | STATUS 階段 | |
| SCALE 比例 A1 1 : 25000 | | |
| DIMENSIONS ARE IN 尺寸單位 METRES | © COPYRIGHT RESERVED 版 權 所 有 | |

Plot File by : 2014/3/26 WANGSY

p:\projects\60191048\drawing\contract\c3\1000\C3_000_C00_1000.dgn

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# Appendix A

## Notification of Limit Level Exceedance (20170901DO_v1)

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**

**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170901DO_v1

**Date of Notification:** 5 September 2017

**Works Inspected:** Data collected from water sampling works on 1 September 2017 and the results were issued on 4 September 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** Dissolved Oxygen (DO)/ ~~Suspended Solid (SS)/ Turbidity (TURB)~~

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| DO | IS5 | Bottom | Surface and Middle 5.0 Bottom 4.7 | Surface and Middle 4.2 (except 5 mg/L for FCZ) Bottom 3.6 | **4.4** | **4.4** |
| DO | IS10(N) | Bottom | | | **4.5** | **4.5** |
| DO | IS(Mf)11 | Bottom | | | **4.6** | **4.5** |
| DO | IS17 | Bottom | | | **4.5** | 5.2 |
| DO | SR5(N) | Bottom | | | **4.5** | 4.7 |

Notes:
AL means Action Level.
LL means Limit Level.
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.

Reviewed by : Keith Chau Title : ET Leader

Date : 27 September 2017

Copied to: Contractor and Engineer Representative

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# INVESTIGATION REPORT ON

# ACTION AND LIMIT LEVEL NON-COMPLIANCE

# FOR

# CONTRACT NO. HY/2013/03

## Hong Kong Zhuhai Macao Bridge
## Hong Kong Boundary Crossing Facilities – Vehicle Clearance Plazas and Ancillary Buildings and Facilities

**Report No. Ref.: 0165-15-IR0005**

Prepared by: Mr. Vincent Lu

Reviewed by: Mr. Bong Yu

Certified by: _____ Date: 14/12/2017

Mr. Arthur Cheng
Environmental Team Leader

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## NON-COMPLIANCE INVESTIGATION REPORT No.: 0165-15-IR005

### 1. Project Details

Contract No.: HY/2013/03

Contract Title: Hong Kong Zhuhai Macao Bridge Hong Kong Boundary Crossing Facilities - Vehicle Clearance Plazas and Ancillary Buildings and Facilities

Project Proponent: Highways Department

Main Contractor: China Harbour Engineering Co. Ltd.

### 2. Details of Non-compliance

Notification of Action/Limit Level Exceedance (20170906DO_TURB_v3 & 20170906SS_v1) were forwarded by the ET of Contract No. HY/2013/01 on 26 September 2017 and 21 September 2017 respectively:

Monitoring Date: 6 September 2017

The Action and Limit Levels of dissolved oxygen (DO), turbidity and suspended solid (SS) at determined from baseline monitoring data are listed below:

| Monitoring Parameter | Action Level (mg/L) | Limit Level (mg/L) |
|---|---|---|
| DO (Surface and Middle) | 5.0 | 4.2 (except 5 mg/L for FCZ) |
| DO (Bottom) | 4.7 | 3.6 |
| Depth-averaged turbidity | 27.5 and 120% (i.e. 17.6 for mid-ebb/18.7 for mid-flood) of upstream control station's turbidity at the same tide of the same day | 47.0 and 130% (i.e. 19.0 for mid-ebb/20.2 for mid-flood) of upstream control station's turbidity at the same tide of the same day |
| SS | 23.5 and 120% (i.e. 11.3 for mid-ebb /14.1 for mid-flood) of upstream control station's SS at the same tide of the same day | 34.4 and 130% (i.e. 12.3 for mid-ebb/15.3 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes |

| Parameter | Station | Depth | Measured at mid-ebb tide (mg/L) | Measured at mid-flood tide (mg/L) |
|---|---|---|---|---|
| DO | IS17 | Bottom | **4.6** | 4.9 |
| | SR6 | Surface & Middle | 5.7 | **4.8** |
| | SR10A | Surface & Middle | **4.9** | **4.6** |
| | | Bottom | 4.8 | **4.5** |
| | SR10B(N) | Surface & Middle | **4.8** | **4.6** |
| | | Bottom | 4.8 | **4.5** |
| Turbidity | IS(Mf)11 | Depth average | 14.6 NTU | **27.9 NTU** |
| SS | IS8 | Depth average | 8.1 | **26.4** |
| | SR4(N) | | 9.4 | **25.3** |
| | SR6 | | 6.2 | **23.6** |

Notes:
Bold means AL exceedances
Bold with underline means LL exceedances
Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4
Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA

Monitoring was undertaken by the ET of Contract No. HY/2013/01 of HKBCF. The Notification of Action/Limit Level Exceedance (20170906DO_TURB_v3 & 20170906SS_v1) provided by the ET of Contract No. HY/2013/01 of HKBCF are shown in **Appendix A**.

## 3. Investigation of Non-compliance

Summary of Investigation

As confirmed with Mr. Marko Chan, Environmental Officer, and operation team of Contract No. HY/2013/03, there was marine transportation on the date of exceedance. Regarding marine transportation, the vessels was sized to make sure adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash. For SS exceedance recorded at the WQM station IS8, SR4(N) and SR6, the concerned WQM stations where the exceedances were recorded were not close to the marine delivery route of Contract No. HY/2013/03, while there was no notification of exceedance received at the WQM stations closer to the marine delivery route, such as IS10(N). For turbidity exceedance recorded at the WQM station IS(Mf)11 closer to the marine delivery route, there was no turbidity exceedance recorded at WQM station IS10(N) which also close to the marine delivery route. Regarding marine-based works in Box Culvert B, the work undertaken at the date of exceedance was preparation work of precast installation which had a cofferdam to separate seawater and works area. Silt curtain was also maintained to enclose the work area of the outlet of the box culvert fully. All sea water flows into the work area of box culvert B will be treated by desilting facilities

before discharge in accordance with the discharge license approved by EPD for Contract No. HY/2013/03. It was unlikely to consume any dissolved oxygen or generate suspended solid to cause the DO, turbidity and SS exceedances recorded at the concerned WQM stations during mid-flood and mid-ebb tide on 6 September 2017. Besides, the concerned WQM stations where DO and SS exceedances recorded were far away from the works areas (i.e. box Culvert B), while there was only Action Level exceedance of turbidity but no notification of exceedance of DO and SS received at the WQM stations closer to the works areas, such as IS(Mf)11. Therefore, the exceedances on 6 September 2017 was considered not related to construction site activities of Contract No. HY/2013/03.

The location of the WQM stations where exceedances were recorded and all relevant WQM stations are shown in **Figure 1** and the locations of marine-based construction works are shown in **Figure 2**.

Investigation Results

The ET of Contract No. HY/2013/03 concluded that the captioned exceedance was not related to the construction site activities of the contract. Nevertheless, the Contractor had been reminded to comply with the requirements stipulated in the Environmental Mitigation Implementation Schedule (EMIS) of the EM&A Manual, in particular:

- Water Quality:
  W1-
  1. barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
  2. any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
  3. loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
  4. excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
  5. adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
  6. all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.

  W2-
  1. wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
  2. 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;

3. 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 each rainstorm;
4. rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;
5. measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;
6. open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms;
7. discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
8. surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

## 4. Follow up Status (Exceedance)

During weekly site audit on 25 and 31 August, 8 and 15 September 2017, ET confirmed the Contractor had provided workable and effective water quality mitigation measures.

## 5. Recommendation to the Contractor

The Contractor was reminded to continue to fully maintain all water quality mitigation measures.

## 6. Follow up Status (Overall)

The captioned exceedance was not related to the Contract and therefore, no additional follow-up action is needed. However, ET proposed recommendations to Contractor in particular to the following aspects when there are marine construction activities.

Water Quality:

- Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
- Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
- Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
- Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
- Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
- All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.

- wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
- 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 each rainstorm;
- 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;
- discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
- surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

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**Figure 1**

**The Location of WQM Stations**


**LEGEND**

- IS — IMPACT STATIONS
- CS — CONTROL / FAR FIELD STATIONS
- SR — SENSITIVE RECEIVERS STATIONS

# FIGURE 4.1– LOCATION OF WATER QUALITY MONITORING STATIONS

## SETTING OUT SCHEDULE

| MONITORING STATIONS | CO-ORDINATES | |
|---|---|---|
| | EASTING | NORTHING |
| IS5 | 811579 | 817106 |
| IS(Mf)6 | 812101 | 817873 |
| IS7 | 812244 | 818777 |
| IS8 | 814251 | 818412 |
| IS(Mf)9 | 813273 | 818850 |
| IS10 | 812577 | 820670 |
| IS10(N) | 812942 | 820455 |
| IS(Mf)11 | 813562 | 820716 |
| IS(Mf)16 | 814328 | 819497 |
| IS17 | 814539 | 820391 |
| SR3 | 810525 | 816456 |
| SR4(N) | 814705 | 817859 |
| SR5 | 811489 | 820455 |
| SR5(N) | 812569 | 821475 |
| SR6 | 805837 | 821818 |
| SR7 | 814293 | 821431 |
| SR10A | 823741 | 823495 |
| SR10B(N) | 823683 | 820881 |
| CS(Mf)3 | 809989 | 821117 |
| CS(Mf)3(N) | 808814 | 822355 |
| CS(Mf)5 | 817990 | 821129 |
| CS4 | 810025 | 824004 |
| CS6 | 817028 | 823992 |
| CSA | 818103 | 823064 |

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## Figure 2

## The Locations of Marine Transportation and Marine-based Construction Works

810000 E

815000 E

820000 E

825000 N

820000 N

815000 N

TAP SHEK KOK

CASTLE PEAK BAY

TAI LAM CHUNG

THE BROTHERS

THE SITE SEE DRAWING NO.
60191048/C3/000/C00/1003

TUEN MUN-CHEK LAP KOK LINK
(TM-CLKL) (BY OTHERS)

Sand Blanket Filling Area
of Three Runway Project

RECLAMATION FOR THE TM-CLKL
SOUTHERN LANDFALL (BY OTHERS)

OTHER INFRASTRUCTURE AND
BUILDING WORKS OUTSIDE
SITH BOUNDARY (BY OTHERS)

HONG KONG LINK ROAD (HKLR)
(SEPARATE PROJECT) (BY OTHERS)

WORKS AREA 'WA4'
SEE DRAWING NO.
60191048/C3/000/C00/1052

WORKS AREA 'WA3'
SEE DRAWING NO.
60191048/C3/000/C00/1051

CHEK LAP KOK

TUNG CHUNG

LANTAU ISLAND

NORTH LANTAU HIGHWAY

N

## NOTES:

1. COORDINATES ARE RELATED TO HONG KONG METRIC GRID (1980).
2. DIMENSIONS ARE IN MILLIMETER AND CHAINAGE ARE IN METRES UNLESS OTHERWISE SHOWN.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 60191048/C3/000/C00/1051 TO 1053.

## LEGEND:

- SITE BOUNDARY
- WORKS AREA
- Location of Box Culvert B
- Silt Curtain

| REV. 修訂 | DESCRIPTION 內容摘要 | D.C. | P.C. CHECKED 復核 | DATE 日期 |
|---|---|---|---|---|
| - | TENDER DRAWING | BWCW | SCT | MAR.14 |

路政署 HIGHWAYS DEPARTMENT
港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

HONG KONG-ZHUHAI-MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- VEHICLE CLEARANCE PLAZAS AND
ANCILLARY BUILDINGS AND FACILITIES

# SITE LOCATION PLAN

AECOM
Rogers Stirk Harbour + Partners
BURO HAPPOLD ATKINS ADI
Aedas

DRG.NO. 圖紙編號 60191048/C3/000/C00/1000

| | | |
|---|---|---|
| DESIGNED BY 設計 BWCW | CONTRACT NO. 合約編號 HY/2013/03 | P. Dir. APPROVED 批准人 TKH |
| DRAWN BY 繪圖 WSY | STATUS 階段 | |
| SCALE 比例 A1 1 : 25000 | | |
| DIMENSIONS ARE IN 尺寸單位 METRES | © COPYRIGHT RESERVED 版 權 所 有 | |

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# Appendix A

# Notification of Limit Level Exceedance

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**
**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170906DO_TURB_v3

**Date of Notification:** 11 September 2017

**Works Inspected:** Data collected from water sampling works on 6 September 2017 and the results were issued on 11 September 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** Dissolved Oxygen (DO)/ ~~Suspended Solid (SS)~~/ Turbidity (TURB)

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| DO | IS17 | Bottom | Surface and Middle 5.0 Bottom 4.7 | Surface and Middle 4.2 (except 5 mg/L for FCZ) Bottom 3.6 | **4.6** | 4.9 |
| | SR6 | Surface and Middle | | | 5.7 | **4.8** |
| | SR10A | Surface and Middle | | | ***4.9*** | ***4.6*** |
| | | Bottom | | | 4.8 | **4.5** |
| | SR10B(N) | Surface and Middle | | | ***4.8*** | ***4.6*** |
| | | Bottom | | | 4.8 | **4.5** |
| TURB | IS(Mf)11 | Depth Average | 27.5 and 120% (i.e. 17.6 for mid-ebb/18.7 for mid-flood) of upstream control station's turbidity at the same tide of the same day | 47.0 and 130% (i.e. 19.0 for mid-ebb/20.2 for mid-flood) of upstream control station's turbidity at the same tide of the same day | 14.6 | **27.9** |

Remarks:
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.
Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4
Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA

Reviewed by : Keith Chau Title : ET Leader

Date : 26 September 2017

Copied to : Contractor, Engineer Representative and IEC/ENPO

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**

**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170906SS_v1

**Date of Notification:** 19 September 2017

**Works Inspected:** Data collected from water sampling works on 6 September 2017 and the results were issued on 15 September 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** ~~Dissolved Oxygen (DO)/~~ Suspended Solid (SS)~~/ Turbidity (TURB)~~

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| SS | IS8 | Depth Average | 23.5 and 120% (i.e. 11.3 for mid-ebb/14.1 for mid-flood) of upstream control station's SS at the same tide of the same day | 34.4 and 130% (i.e. 12.3 for mid-ebb/15.3 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes | 8.1 | **26.4** |
| | SR4(N) | | | | 9.4 | **25.3** |
| | SR6 | | | | 6.2 | **23.6** |

Remarks:
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.

Reviewed by : Keith Chau Title : ET Leader

Date : 21 September 2017

Copied to : Contractor, Engineer Representative and IEC/ENPO

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# INVESTIGATION REPORT ON

# ACTION AND LIMIT LEVEL NON-COMPLIANCE

# FOR

# CONTRACT NO. HY/2013/03

## Hong Kong Zhuhai Macao Bridge
## Hong Kong Boundary Crossing Facilities – Vehicle Clearance Plazas and Ancillary Buildings and Facilities

**Report No. Ref.: 0165-15-IR006**

Prepared by: Mr. Vincent Lu

Reviewed by: Mr. Bong Yu

Certified by: _____ Date: 25/10/2017

Mr. Arthur Cheng
Environmental Team Leader

**MATERIALAB CONSULTANTS LIMITED**
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## NON-COMPLIANCE INVESTIGATION REPORT No.: 0165-15-IR006

### 1. Project Details

Contract No.: HY/2013/03

Contract Title: Hong Kong Zhuhai Macao Bridge Hong Kong Boundary Crossing Facilities - Vehicle Clearance Plazas and Ancillary Buildings and Facilities

Project Proponent: Highways Department

Main Contractor: China Harbour Engineering Co. Ltd.

### 2. Details of Non-compliance

Notification of Action/Limit Level Exceedance (20170908DO_TURB_v2) were forwarded by the ET of Contract No. HY/2013/01 on 26 September 2017. Notification of Action/Limit Level Exceedance (20170908SS) were forwarded by the ET of Contract No. HY/2013/01 on 21 September 2017:

Monitoring Date: 8 September 2017

The Action and Limit Levels of dissolved oxygen (DO), turbidity and suspended solid (SS) at determined from baseline monitoring data are listed below:

| Monitoring Parameter | Action Level (mg/L) | Limit Level (mg/L) |
|---|---|---|
| DO (Surface and Middle) | 5.0 | 4.2 (except 5 mg/L for FCZ) |
| DO (Bottom) | 4.7 | 3.6 |
| Depth-averaged turbidity* | 27.5 and 120% (i.e. 20.2 for mid-ebb/13.7 for mid-flood) of upstream control station's turbidity at the same tide of the same day | 47.0 and 130% (i.e. 21.9 for mid-ebb/14.9 for mid-flood) of upstream control station's turbidity at the same tide of the same day |
| SS | 23.5 and 120% (i.e. 20.4 for mid-ebb /10.5 for mid-flood) of upstream control station's SS at the same tide of the same day | 34.4 and 130% (i.e. 22.1 for mid-ebb/11.4 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes |

*: The unit for turbidity is nephelometric turbidity unit (NTU)

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| Parameter | Station | Depth | Measured at mid-ebb tide (mg/L) | Measured at mid-flood tide (mg/L) |
|---|---|---|---|---|
| DO | IS5 | Surface & Middle | 5.0 | **4.9** |
| | IS7 | Surface & Middle | **4.8** | 5.1 |
| | | Bottom | **4.6** | 5.2 |
| | IS8 | Surface & Middle | 5.0 | **4.9** |
| | IS(Mf)9 | Surface & Middle | 5.3 | **4.8** |
| | IS10(N) | Surface & Middle | **4.9** | **4.7** |
| | IS(Mf)11 | Surface & Middle | 5.0 | **4.7** |
| | | Bottom | 4.8 | **4.6** |
| | IS(Mf)16 | Surface & Middle | **4.6** | **4.9** |
| | | Bottom | **4.3** | 5.0 |
| | IS17 | Surface & Middle | **4.9** | **4.7** |
| | | Bottom | **4.3** | **4.5** |
| | SR3 | Surface & Middle | **4.7** | **4.9** |
| | SR4(N) | Surface & Middle | 5.2 | **4.9** |
| | SR5(N) | Surface & Middle | 5.0 | **4.8** |
| | SR6 | Surface & Middle | **4.9** | **4.9** |
| | SR7 | Surface & Middle | 5.1 | **4.9** |
| | SR10A | Surface & Middle | **4.9** | **4.3** |
| | | Bottom | 4.8 | **4.3** |
| | SR10B(N) | Surface & Middle | **4.8** | **4.7** |
| Turbidity* | IS5 | Depth average | **34.4** | 6.6 |
| | IS10(N) | | 25.2 | **31.6** |
| | IS(Mf)11 | | 17.8 | **29.0** |
| | SR6 | | 12.2 | **35.3** |
| SS | IS5 | Depth average | **28.4** | 8.7 |
| | IS10(N) | | 19.5 | **35.5** |
| | IS(Mf)11 | | 15.4 | **33.2** |

Notes:
Bold means AL exceedances
Bold with underline means LL exceedances
Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4
Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA
* The unit for turbidity is nephelometric turbidity unit (NTU)

Monitoring was undertaken by the ET of Contract No. HY/2013/01 of HKBCF. The Notification of Action/Limit Level Exceedance (20170908DO_TURB_v2 & 20170908SS) provided by the ET of Contract No. HY/2013/01 of HKBCF are shown in **Appendix A**.

## 3. Investigation of Non-compliance

Summary of Investigation

As confirmed with Mr. Marko Chan, Environmental Officer, and operation team of Contract No. HY/2013/03, there was no marine transportation on the date of exceedance. Regarding marine-based works in Box Culvert B, the work undertaken at the date of exceedance was preparation work of precast installation which had a cofferdam to separate seawater and works area. Silt curtain was also maintained to enclose the work area of the outlet of the box culvert fully. All sea water flows into the work area of box culvert B will be treated by desilting facilities before discharge in accordance with the discharge license approved by EPD for Contract No. HY/2013/03.Besides, no organic matter discharge from the works areas (i.e. box Culvert B) was observed. It was unlikely to consume any dissolved oxygen to cause DO exceedances recorded at the concerned WQM stations during mid-flood and mid-ebb tide on 8 September 2017.

For turbidity and SS exceedance recorded at the WQM station IS10(N) closer to the works area Box Culvert B, there was no turbidity and SS exceedance recorded at the same WQM station under similar work environment on 06 September 2017 and 11 September 2017. For turbidity and SS exceedance recorded at the WQM station IS(Mf)11 closer to the works area Box Culvert B, there was no turbidity and SS exceedance recorded at the same WQM station under similar work environment on 11 September 2017. For turbidity and SS exceedance recorded at the WQM station IS5 and SR6, the exceedance recorded at the concerned WQM station is far away from the marine works area of Contract No. HY/2013/03. It was unlikely that the works undertaken by Contract No. HY/2013/03 caused turbidity or SS exceedance recorded at the concerned WQM stations during mid-flood and mid-ebb tide on 8 September 2017.

The location of the WQM stations where exceedances were recorded and all relevant WQM stations are shown in **Figure 1** and the locations of marine-based construction works are shown in **Figure 2**.

Investigation Results

The ET of Contract No. HY/2013/03 concluded that the captioned exceedance was not related to the construction site activities of the contract. Nevertheless, the Contractor had been reminded to comply with the requirements stipulated in the Environmental Mitigation Implementation Schedule (EMIS) of the EM&A Manual, in particular:

- Water Quality:
  W1-
  1. barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
  2. any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;

3. loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
4. excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
5. adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
6. all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.

W2-

1. wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
2. 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;
3. 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 each rainstorm;
4. rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;
5. measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;
6. open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms;
7. discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
8. surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

## 4. Follow up Status (Exceedance)

During weekly site audit on 25 and 31 August, 8 and 15 September 2017, ET confirmed the Contractor had provided workable and effective water quality mitigation measures.

Photos showing the site situation of marine works in Box Culvert B which was taken during the site audit in mid-October are shown in **Appendix B**.

## 5. Recommendation to the Contractor

The Contractor was reminded to continue to fully maintain all water quality mitigation measures.

## 6. Follow up Status (Overall)

The captioned exceedance was not related to the Contract and therefore, no additional follow-up action is needed. However, ET proposed recommendations to Contractor in particular to the following aspects when there are marine construction activities.

Water Quality:

- Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
- Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
- Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
- Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
- Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
- All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.
- wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
- 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 each rainstorm;
- 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;
- discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
- surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

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**Figure 1**

**The Location of WQM Stations**


**LEGEND**

- IS — IMPACT STATIONS
- CS — CONTROL / FAR FIELD STATIONS
- SR — SENSITIVE RECEIVERS STATIONS

# FIGURE 4.1– LOCATION OF WATER QUALITY MONITORING STATIONS

## SETTING OUT SCHEDULE

| MONITORING STATIONS | CO-ORDINATES | |
|---|---|---|
| | EASTING | NORTHING |
| IS5 | 811579 | 817106 |
| IS(Mf)6 | 812101 | 817873 |
| IS7 | 812244 | 818777 |
| IS8 | 814251 | 818412 |
| IS(Mf)9 | 813273 | 818850 |
| IS10 | 812577 | 820670 |
| IS10(N) | 812942 | 820455 |
| IS(Mf)11 | 813562 | 820716 |
| IS(Mf)16 | 814328 | 819497 |
| IS17 | 814539 | 820391 |
| SR3 | 810525 | 816456 |
| SR4(N) | 814705 | 817859 |
| SR5 | 811489 | 820455 |
| SR5(N) | 812569 | 821475 |
| SR6 | 805837 | 821818 |
| SR7 | 814293 | 821431 |
| SR10A | 823741 | 823495 |
| SR10B(N) | 823683 | 820881 |
| CS(Mf)3 | 809989 | 821117 |
| CS(Mf)3(N) | 808814 | 822355 |
| CS(Mf)5 | 817990 | 821129 |
| CS4 | 810025 | 824004 |
| CS6 | 817028 | 823992 |
| CSA | 818103 | 823064 |

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## Figure 2

## The Locations of Marine Transportation and Marine-based Construction Works

810000 E

815000 E

820000 E

825000 N

820000 N

815000 N

TAP SHEK KOK

CASTLE PEAK BAY

TAI LAM CHUNG

THE BROTHERS

THE SITE SEE DRAWING NO.
60191048/C3/000/C00/1003

TUEN MUN-CHEK LAP KOK LINK
(TM-CLKL) (BY OTHERS)

Sand Blanket Filling Area
of Three Runway Project

RECLAMATION FOR THE TM-CLKL
SOUTHERN LANDFALL (BY OTHERS)

OTHER INFRASTRUCTURE AND
BUILDING WORKS OUTSIDE
SITH BOUNDARY (BY OTHERS)

HONG KONG LINK ROAD (HKLR)
(SEPARATE PROJECT) (BY OTHERS)

WORKS AREA 'WA4'
SEE DRAWING NO.
60191048/C3/000/C00/1052

WORKS AREA 'WA3'
SEE DRAWING NO.
60191048/C3/000/C00/1051

CHEK LAP KOK

TUNG CHUNG

LANTAU ISLAND

NORTH LANTAU HIGHWAY

N

## NOTES:

1. COORDINATES ARE RELATED TO HONG KONG METRIC GRID (1980).
2. DIMENSIONS ARE IN MILLIMETER AND CHAINAGE ARE IN METRES UNLESS OTHERWISE SHOWN.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 60191048/C3/000/C00/1051 TO 1053.

## LEGEND:

- SITE BOUNDARY
- WORKS AREA
- Location of Box Culvert B
- Silt Curtain

| REV. 修訂 | DESCRIPTION 內容摘要 | D.C. | P.C. CHECKED 復核 | DATE 日期 |
|---|---|---|---|---|
| - | TENDER DRAWING | BWCW | SCT | MAR.14 |

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HONG KONG-ZHUHAI-MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- VEHICLE CLEARANCE PLAZAS AND
ANCILLARY BUILDINGS AND FACILITIES

# SITE LOCATION PLAN

AECOM
Rogers Stirk Harbour + Partners
BURO HAPPOLD ATKINS ADI
Aedas

DRG.NO. 圖紙編號 60191048/C3/000/C00/1000

| | | |
|---|---|---|
| DESIGNED BY 設計 BWCW | CONTRACT NO. 合約編號 HY/2013/03 | P. Dir. APPROVED 批准人 TKH |
| DRAWN BY 繪圖 WSY | STATUS 階段 | |
| SCALE 比例 A1 1 : 25000 | | |
| DIMENSIONS ARE IN 尺寸單位 METRES | © COPYRIGHT RESERVED 版 權 所 有 | |

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# Appendix A

# Notification of Limit Level Exceedance

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**
**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170908DO_TURB_v2

**Date of Notification:** 13 September 2017

**Works Inspected:** Data collected from water sampling works on 8 September 2017 and the results were issued on 12 September 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** Dissolved Oxygen (DO)/ ~~Suspended Solid (SS)~~/ Turbidity (TURB)

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| DO | IS5 | Surface and Middle | Surface and Middle 5.0 Bottom 4.7 | Surface and Middle 4.2 (except 5 mg/L for FCZ) Bottom 3.6 | 5.0 | **4.9** |
| | IS7 | Surface and Middle | | | **4.8** | 5.1 |
| | | Bottom | | | **4.6** | 5.2 |
| | IS8 | Surface and Middle | | | 5.0 | **4.9** |
| | IS(Mf)9 | Surface and Middle | | | 5.3 | **4.8** |
| | IS10(N) | Surface and Middle | | | **4.9** | **4.7** |
| | IS(Mf)11 | Surface and Middle | | | 5.0 | **4.7** |
| | | Bottom | | | 4.8 | **4.6** |
| | IS(Mf)16 | Surface and Middle | | | **4.6** | **4.9** |
| | | Bottom | | | **4.3** | 5.0 |
| | IS17 | Surface and Middle | | | **4.9** | **4.7** |
| | | Bottom | | | **4.3** | **4.5** |
| | SR3 | Surface and Middle | | | **4.7** | **4.9** |
| | SR4(N) | Surface and Middle | | | 5.2 | **4.9** |
| | SR5(N) | Surface and Middle | | | 5.0 | **4.8** |
| | SR6 | Surface and Middle | | | **4.9** | **4.9** |
| | SR7 | Surface and Middle | | | 5.1 | **4.9** |
| | SR10A | Surface and Middle | | | **4.9** | **4.3** |
| | | Bottom | | | 4.8 | **4.3** |
| | SR10B(N) | Surface and Middle | | | **4.8** | **4.7** |
| TURB | IS5 | Depth Average | 27.5 and 120% (i.e. 20.2 for mid-ebb/13.7 for mid-flood) of upstream control station's turbidity at the same tide of the same day | 47.0 and 130% (i.e. 21.9 for mid-ebb/14.9 for mid-flood) of upstream control station's turbidity at the same tide of the same day | **34.4** | 6.6 |
| | IS10(N) | | | | 25.2 | **31.6** |
| | IS(Mf)11 | | | | 17.8 | **29.0** |
| | SR6 | | | | 12.2 | **35.3** |

Remarks:
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.
Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4
Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA

Reviewed by : Keith Chau Title : ET Leader

Date : 26 September 2017

Copied to : Contractor, Engineer Representative and IEC/ENPO

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**
**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170908SS

**Date of Notification:** 19 September 2017

**Works Inspected:** Data collected from water sampling works on 8 September 2017 and the results were issued on 18 September 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** ~~Dissolved Oxygen (DO)/~~ Suspended Solid (SS)~~/ Turbidity (TURB)~~

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| SS | IS5 | Depth Average | 23.5 and 120% (i.e. 20.4 for mid-ebb/10.5 for mid-flood) of upstream control station's SS at the same tide of the same day | 34.4 and 130% (i.e. 22.1 for mid-ebb/11.4 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes | **28.4** | 8.7 |
| | IS10(N) | | | | 19.5 | **35.5** |
| | IS(Mf)11 | | | | 15.4 | **33.2** |

Remarks:
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.

Reviewed by : Keith Chau Title : ET Leader

Date : 21 September 2017

Copied to : Contractor, Engineer Representative and IEC/ENPO

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## Appendix B

## Photo showing the site situation of marine works in Box Culvert B

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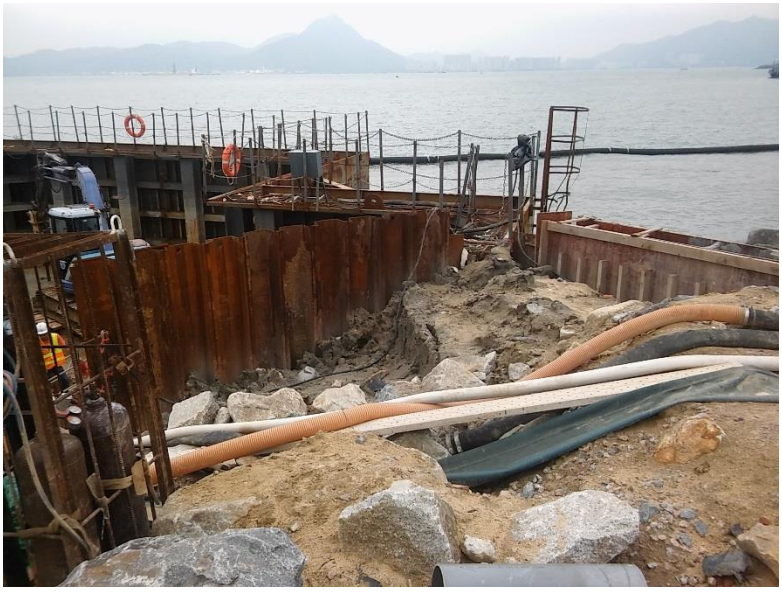

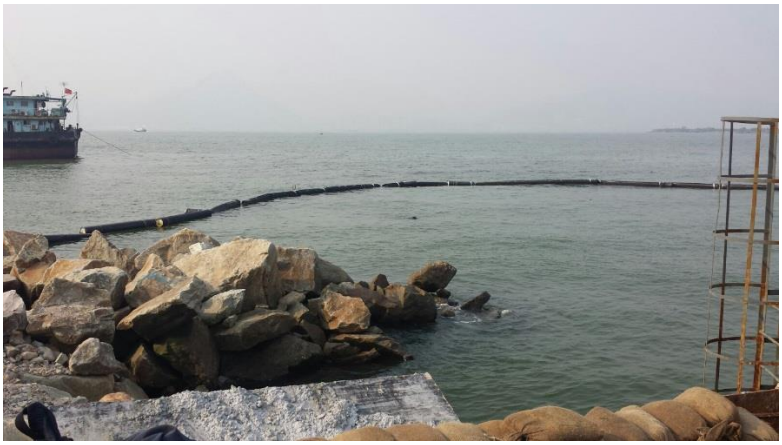

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# INVESTIGATION REPORT ON

# ACTION AND LIMIT LEVEL NON-COMPLIANCE

# FOR

# CONTRACT NO. HY/2013/03

## Hong Kong Zhuhai Macao Bridge
## Hong Kong Boundary Crossing Facilities – Vehicle Clearance Plazas and Ancillary Buildings and Facilities

**Report No. Ref.: 0165-15-IR0007**

Prepared by: Mr. Vincent Lu

Reviewed by: Mr. Bong Yu

Certified by: _____ Date: 14/12/2017

Mr. Arthur Cheng
Environmental Team Leader

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## NON-COMPLIANCE INVESTIGATION REPORT No.: 0165-15-IR007

### 1. Project Details

Contract No.: HY/2013/03

Contract Title: Hong Kong Zhuhai Macao Bridge Hong Kong Boundary Crossing Facilities - Vehicle Clearance Plazas and Ancillary Buildings and Facilities

Project Proponent: Highways Department

Main Contractor: China Harbour Engineering Co. Ltd.

### 2. Details of Non-compliance

Notification of Action/Limit Level Exceedance (20170911DO_v1) were forwarded by the ET of Contract No. HY/2013/01 on 27 September 2017:

Monitoring Date: 11 September 2017

The Action and Limit Levels of dissolved oxygen (DO), turbidity and suspended solid (SS) at determined from baseline monitoring data are listed below:

| Monitoring Parameter | Action Level (mg/L) | Limit Level (mg/L) |
|---|---|---|
| DO (Surface and Middle) | 5.0 | 4.2 (except 5 mg/L for FCZ) |
| DO (Bottom) | 4.7 | 3.6 |

| Parameter | Station | Depth | Measured at mid-ebb tide (mg/L) | Measured at mid-flood tide (mg/L) |
|---|---|---|---|---|
| DO | IS8 | Surface & Middle | 5.2 | **4.8** |
| | | Bottom | 5.0 | **4.6** |
| | IS(Mf)9 | Surface & Middle | 5.3 | **4.8** |
| | IS10(N) | Surface & Middle | **4.9** | **4.6** |
| | | Bottom | 4.8 | **4.4** |
| | IS(Mf)11 | Surface & Middle | **4.9** | **4.6** |
| | | Bottom | **4.6** | **4.5** |
| | IS(Mf)16 | Surface & Middle | 5.2 | **4.7** |
| | | Bottom | **4.3** | **4.6** |
| | IS17 | Surface & Middle | **4.8** | **4.5** |
| | | Bottom | **4.2** | **4.2** |
| | SR4(N) | Surface & Middle | 5.3 | **4.8** |
| | SR5(N) | Surface & Middle | **4.7** | **4.6** |
| | | Bottom | **4.6** | **4.6** |
| | SR6 | Surface & Middle | **4.7** | **4.7** |
| | | Bottom | 4.7 | **4.6** |
| | SR7 | Surface & Middle | **4.9** | **4.7** |

| | | | | |
|---|---|---|---|---|
| | | Bottom | 4.8 | 4.7 |
| | SR10A | Surface & Middle | 5.2 | **4.5** |
| | | Bottom | 5.1 | **4.1** |
| | SR10B(N) | Surface & Middle | **4.8** | **4.2** |
| | | Bottom | **4.6** | **4.0** |

Notes:
Bold means AL exceedances
Bold with underline means LL exceedances

Monitoring was undertaken by the ET of Contract No. HY/2013/01 of HKBCF. The Notification of Action/Limit Level Exceedance (20170911DO_v1) provided by the ET of Contract No. HY/2013/01 of HKBCF are shown in **Appendix A**.

## 3. Investigation of Non-compliance

Summary of Investigation

As confirmed with Mr. Marko Chan, Environmental Officer, and operation team of Contract No. HY/2013/03, there was marine transportation on the date of exceedance. Regarding marine transportation, the vessels was sized to make sure adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash. Regarding marine-based works in Box Culvert B, the work undertaken at the date of exceedance was preparation work of precast installation which had a cofferdam to separate seawater and works area. Silt curtain was also maintained to enclose the work area of the outlet of the box culvert fully. All sea water flows into the work area of box culvert B will be treated by desilting facilities before discharge in accordance with the discharge license approved by EPD for Contract No. HY/2013/03. It was unlikely to consume any dissolved oxygen to cause the DO exceedances recorded at the concerned WQM stations during mid-flood and mid-ebb tide on 11 September 2017. Besides, no organic matter discharge from the works areas (i.e. box Culvert B) was observed, while there was only Action Level exceedance of DO at the WQM stations closer to the works areas, such as IS(Mf)11. Therefore, the exceedances on 11 September 2017 was considered not related to construction site activities of Contract No. HY/2013/03.

The location of the WQM stations where exceedances were recorded and all relevant WQM stations are shown in **Figure 1** and the locations of marine-based construction works are shown in **Figure 2**.

Investigation Results

The ET of Contract No. HY/2013/03 concluded that the captioned exceedance was not related to the construction site activities of the contract. Nevertheless, the Contractor had been reminded to comply with the requirements stipulated in the Environmental Mitigation Implementation Schedule (EMIS) of the EM&A Manual, in particular:

Water Quality:

W1-

1. barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
2. any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
3. loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
4. excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
5. adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
6. all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.

W2-

1. wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
2. 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;
3. 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 each rainstorm;
4. rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;
5. measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;
6. open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms;
7. discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
8. surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

## 4. Follow up Status (Exceedance)

During weekly site audit on 25 and 31 August, 8 and 15 September 2017, ET confirmed the Contractor had provided workable and effective water quality mitigation measures.

Photos showing the site situation of marine works in Box Culvert B which was taken during the site audit in mid-October are shown in **Appendix B**.

## 5. Recommendation to the Contractor

The Contractor was reminded to continue to fully maintain all water quality mitigation measures.

## 6. Follow up Status (Overall)

The captioned exceedance was not related to the Contract and therefore, no additional follow-up action is needed. However, ET proposed recommendations to Contractor in particular to the following aspects when there are marine construction activities.

Water Quality:

- Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
- Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
- Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
- Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
- Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
- All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.
- wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
- 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 each rainstorm;
- 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;
- discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
- surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

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**Figure 1**

**The Location of WQM Stations**


**LEGEND**

- IS — IMPACT STATIONS
- CS — CONTROL / FAR FIELD STATIONS
- SR — SENSITIVE RECEIVERS STATIONS

# FIGURE 4.1– LOCATION OF WATER QUALITY MONITORING STATIONS

## SETTING OUT SCHEDULE

| MONITORING STATIONS | CO-ORDINATES | |
|---|---|---|
| | EASTING | NORTHING |
| IS5 | 811579 | 817106 |
| IS(Mf)6 | 812101 | 817873 |
| IS7 | 812244 | 818777 |
| IS8 | 814251 | 818412 |
| IS(Mf)9 | 813273 | 818850 |
| IS10 | 812577 | 820670 |
| IS10(N) | 812942 | 820455 |
| IS(Mf)11 | 813562 | 820716 |
| IS(Mf)16 | 814328 | 819497 |
| IS17 | 814539 | 820391 |
| SR3 | 810525 | 816456 |
| SR4(N) | 814705 | 817859 |
| SR5 | 811489 | 820455 |
| SR5(N) | 812569 | 821475 |
| SR6 | 805837 | 821818 |
| SR7 | 814293 | 821431 |
| SR10A | 823741 | 823495 |
| SR10B(N) | 823683 | 820881 |
| CS(Mf)3 | 809989 | 821117 |
| CS(Mf)3(N) | 808814 | 822355 |
| CS(Mf)5 | 817990 | 821129 |
| CS4 | 810025 | 824004 |
| CS6 | 817028 | 823992 |
| CSA | 818103 | 823064 |

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## Figure 2

## The Locations of Marine Transportation and Marine-based Construction Works

810000 E

815000 E

820000 E

825000 N

820000 N

815000 N

TAP SHEK KOK

CASTLE PEAK BAY

TAI LAM CHUNG

THE BROTHERS

THE SITE SEE DRAWING NO.
60191048/C3/000/C00/1003

TUEN MUN-CHEK LAP KOK LINK
(TM-CLKL) (BY OTHERS)

Sand Blanket Filling Area
of Three Runway Project

RECLAMATION FOR THE TM-CLKL
SOUTHERN LANDFALL (BY OTHERS)

OTHER INFRASTRUCTURE AND
BUILDING WORKS OUTSIDE
SITH BOUNDARY (BY OTHERS)

HONG KONG LINK ROAD (HKLR)
(SEPARATE PROJECT) (BY OTHERS)

WORKS AREA 'WA4'
SEE DRAWING NO.
60191048/C3/000/C00/1052

WORKS AREA 'WA3'
SEE DRAWING NO.
60191048/C3/000/C00/1051

CHEK LAP KOK

TUNG CHUNG

LANTAU ISLAND

NORTH LANTAU HIGHWAY

N

## NOTES:

1. COORDINATES ARE RELATED TO HONG KONG METRIC GRID (1980).
2. DIMENSIONS ARE IN MILLIMETER AND CHAINAGE ARE IN METRES UNLESS OTHERWISE SHOWN.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 60191048/C3/000/C00/1051 TO 1053.

## LEGEND:

- SITE BOUNDARY
- WORKS AREA
- Location of Box Culvert B
- Silt Curtain

| REV. 修訂 | DESCRIPTION 內容摘要 | D.C. | P.C. CHECKED 復核 | DATE 日期 |
|---|---|---|---|---|
| - | TENDER DRAWING | BWCW | SCT | MAR.14 |

路政署 HIGHWAYS DEPARTMENT
港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

HONG KONG-ZHUHAI-MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- VEHICLE CLEARANCE PLAZAS AND
ANCILLARY BUILDINGS AND FACILITIES

# SITE LOCATION PLAN

AECOM
Rogers Stirk Harbour + Partners
BURO HAPPOLD ATKINS ADI
Aedas

DRG.NO. 圖紙編號 60191048/C3/000/C00/1000

| | | |
|---|---|---|
| DESIGNED BY 設計 BWCW | CONTRACT NO. 合約編號 HY/2013/03 | P. Dir. APPROVED 批准人 TKH |
| DRAWN BY 繪圖 WSY | STATUS 階段 | |
| SCALE 比例 A1 1 : 25000 | | |
| DIMENSIONS ARE IN 尺寸單位 METRES | © COPYRIGHT RESERVED 版 權 所 有 | |

Plot File by : 2014/3/26 WANGSY

p:\projects\60191048\drawing\contract\c3\1000\C3_000_C00_1000.dgn

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# Appendix A

# Notification of Limit Level Exceedance

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**
**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170911DO_v1

**Date of Notification:** 15 September 2017

**Works Inspected:** Data collected from water sampling works on 11 September 2017 and the results were issued on 14 September 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** Dissolved Oxygen (DO)/ ~~Suspended Solid (SS)/ Turbidity (TURB)~~

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| DO | IS8 | Surface and Middle | Surface and Middle 5.0 Bottom 4.7 | Surface and Middle 4.2 (except 5 mg/L for FCZ) Bottom 3.6 | 5.2 | **4.8** |
| | | Bottom | | | 5.0 | **4.6** |
| | IS(Mf)9 | Surface and Middle | | | 5.3 | **4.8** |
| | IS10(N) | Surface and Middle | | | **4.9** | **4.6** |
| | | Bottom | | | 4.8 | **4.4** |
| | IS(Mf)11 | Surface and Middle | | | **4.9** | **4.6** |
| | | Bottom | | | **4.6** | **4.5** |
| | IS(Mf)16 | Surface and Middle | | | 5.2 | **4.7** |
| | | Bottom | | | **4.3** | **4.6** |
| | IS17 | Surface and Middle | | | **4.8** | **4.5** |
| | | Bottom | | | **4.2** | **4.2** |
| | SR4(N) | Surface and Middle | | | 5.3 | **4.8** |
| | SR5(N) | Surface and Middle | | | **4.7** | **4.6** |
| | | Bottom | | | **4.6** | **4.6** |
| | SR6 | Surface and Middle | | | **4.7** | **4.7** |
| | | Bottom | | | 4.7 | **4.6** |
| | SR7 | Surface and Middle | | | **4.9** | **4.7** |
| | | Bottom | | | 4.8 | 4.7 |
| | SR10A | Surface and Middle | | | 5.2 | **4.5** |
| | | Bottom | | | 5.1 | **4.1** |
| | SR10B(N) | Surface and Middle | | | **4.8** | **4.2** |
| | | Bottom | | | **4.6** | **4.0** |

Remarks:
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.

Reviewed by : Keith Chau Title : ET Leader

Date : 27 September 2017

Copied to : Contractor, Engineer Representative and IEC/ENPO

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## Appendix B

## Photo showing the site situation of marine works in Box Culvert B

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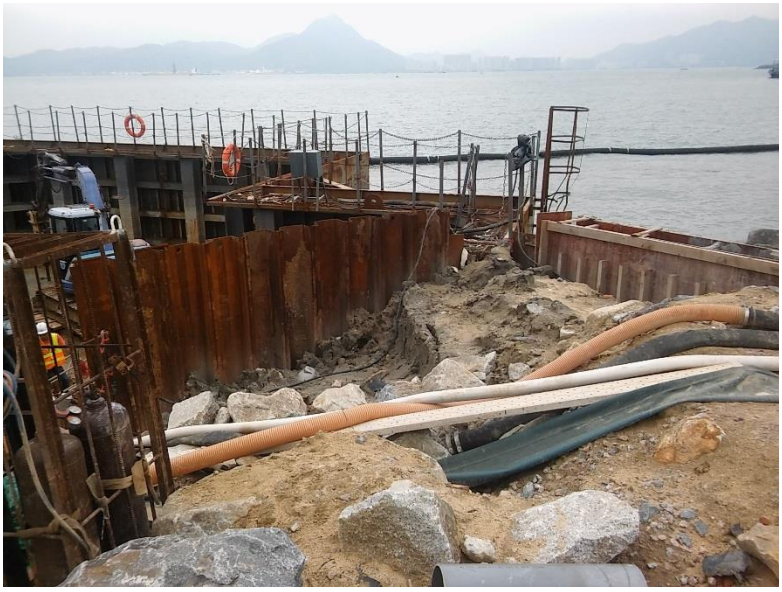

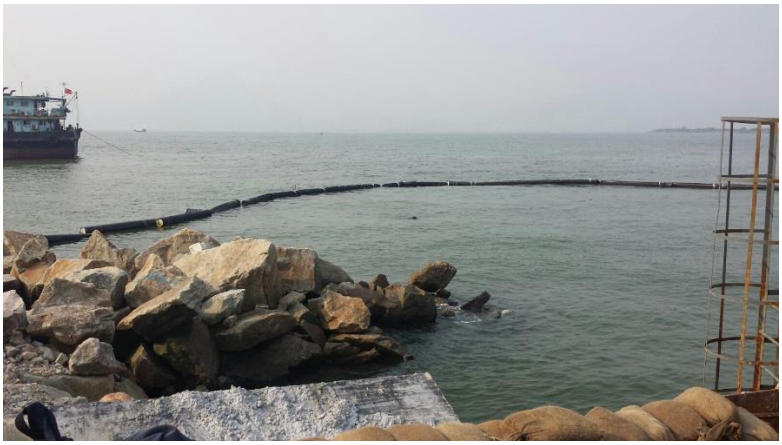

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# INVESTIGATION REPORT ON

# ACTION AND LIMIT LEVEL NON-COMPLIANCE

# FOR

# CONTRACT NO. HY/2013/03

## Hong Kong Zhuhai Macao Bridge
## Hong Kong Boundary Crossing Facilities – Vehicle Clearance Plazas and Ancillary Buildings and Facilities

**Report No. Ref.: 0165-15-IR0008**

Prepared by: Mr. Vincent Lu

Reviewed by: Mr. Bong Yu

Certified by: _____ Date: 14/12/2017

Mr. Arthur Cheng
Environmental Team Leader

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## NON-COMPLIANCE INVESTIGATION REPORT No.: 0165-15-IR008

### 1. Project Details

Contract No.: HY/2013/03

Contract Title: Hong Kong Zhuhai Macao Bridge Hong Kong Boundary Crossing Facilities - Vehicle Clearance Plazas and Ancillary Buildings and Facilities

Project Proponent: Highways Department

Main Contractor: China Harbour Engineering Co. Ltd.

### 2. Details of Non-compliance

Notification of Action/Limit Level Exceedance (20170913DO_v2) were forwarded by the ET of Contract No. HY/2013/01 on 4 October 2017:

Monitoring Date: 13 September 2017

The Action and Limit Levels of dissolved oxygen (DO), turbidity and suspended solid (SS) at determined from baseline monitoring data are listed below:

| Monitoring Parameter | Action Level (mg/L) | Limit Level (mg/L) |
|---|---|---|
| DO (Surface and Middle) | 5.0 | 4.2 (except 5 mg/L for FCZ) |
| DO (Bottom) | 4.7 | 3.6 |

| Parameter | Station | Depth | Measured at mid-ebb tide (mg/L) | Measured at mid-flood tide (mg/L) |
|---|---|---|---|---|
| DO | IS5 | Bottom | **4.1** | **4.1** |
| | IS(Mf)9 | Bottom | 6.5 | **4.2** |
| | IS10(N) | Surface & Middle | **4.7** | 5.0 |
| | IS(Mf)11 | Surface & Middle | 5.1 | **4.9** |
| | IS(Mf)16 | Bottom | **4.1** | **4.2** |
| | IS17 | Surface & Middle | 5.0 | **4.9** |
| | | Bottom | **3.8** | **4.1** |
| | SR5(N) | Surface & Middle | **4.8** | 5.5 |
| | SR10A | Surface & Middle | **4.9** | **4.4** |
| | | Bottom | 5.2 | **3.9** |
| | SR10B(N) | Surface & Middle | 5.2 | **4.4** |
| | | Bottom | 5.4 | **4.1** |

Notes:
Bold means AL exceedances
Bold with underline means LL exceedances

Monitoring was undertaken by the ET of Contract No. HY/2013/01 of HKBCF. The Notification of Action/Limit Level Exceedance (20170913DO_v2) provided by the ET of Contract No. HY/2013/01 of HKBCF are shown in **Appendix A**.

## 3. Investigation of Non-compliance

Summary of Investigation

As confirmed with Mr. Marko Chan, Environmental Officer, and operation team of Contract No. HY/2013/03, there was marine transportation on the date of exceedance. Regarding marine transportation, the vessels was sized to make sure adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash. Regarding marine-based works in Box Culvert B, the work undertaken at the date of exceedance was preparation work of precast installation which had a cofferdam to separate seawater and works area. Silt curtain was also maintained to enclose the work area of the outlet of the box culvert fully. All sea water flows into the work area of box culvert B will be treated by desilting facilities before discharge in accordance with the discharge license approved by EPD for Contract No. HY/2013/03. Besides, no organic matter discharge from the works areas (i.e. box Culvert B) was observed. It was unlikely to consume any dissolved oxygen to cause the DO exceedances recorded at the concerned WQM stations during mid-flood and mid-ebb tide on 13 September 2017.

The location of the WQM stations where exceedances were recorded and all relevant WQM stations are shown in **Figure 1** and the locations of marine-based construction works are shown in **Figure 2**.

Investigation Results

The ET of Contract No. HY/2013/03 concluded that the captioned exceedance was not related to the construction site activities of the contract. Nevertheless, the Contractor had been reminded to comply with the requirements stipulated in the Environmental Mitigation Implementation Schedule (EMIS) of the EM&A Manual, in particular:

- Water Quality:
  W1-
  1. barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
  2. any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
  3. loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
  4. excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
  5. adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and

6. all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.

W2-

1. wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
2. 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;
3. 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 each rainstorm;
4. rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;
5. measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;
6. open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms;
7. discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
8. surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

## 4. Follow up Status (Exceedance)

During weekly site audit on 25 and 31 August, 8 and 15 September 2017, ET confirmed the Contractor had provided workable and effective water quality mitigation measures.

Photos showing the site situation of marine works in Box Culvert B which was taken during the site audit in mid-October are shown in **Appendix B**.

## 5. Recommendation to the Contractor

The Contractor was reminded to continue to fully maintain all water quality mitigation measures.

## 6. Follow up Status (Overall)

The captioned exceedance was not related to the Contract and therefore, no additional follow-up action is needed. However, ET proposed recommendations to Contractor in particular to the following aspects when there are marine construction activities.

Water Quality:

- Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
- Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
- Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
- Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
- Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
- All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.
- wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
- 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 each rainstorm;
- 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;
- discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
- surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

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**Figure 1**

**The Location of WQM Stations**


**LEGEND**

- IS — IMPACT STATIONS
- CS — CONTROL / FAR FIELD STATIONS
- SR — SENSITIVE RECEIVERS STATIONS

# FIGURE 4.1– LOCATION OF WATER QUALITY MONITORING STATIONS

## SETTING OUT SCHEDULE

| MONITORING STATIONS | CO-ORDINATES | |
|---|---|---|
| | EASTING | NORTHING |
| IS5 | 811579 | 817106 |
| IS(Mf)6 | 812101 | 817873 |
| IS7 | 812244 | 818777 |
| IS8 | 814251 | 818412 |
| IS(Mf)9 | 813273 | 818850 |
| IS10 | 812577 | 820670 |
| IS10(N) | 812942 | 820455 |
| IS(Mf)11 | 813562 | 820716 |
| IS(Mf)16 | 814328 | 819497 |
| IS17 | 814539 | 820391 |
| SR3 | 810525 | 816456 |
| SR4(N) | 814705 | 817859 |
| SR5 | 811489 | 820455 |
| SR5(N) | 812569 | 821475 |
| SR6 | 805837 | 821818 |
| SR7 | 814293 | 821431 |
| SR10A | 823741 | 823495 |
| SR10B(N) | 823683 | 820881 |
| CS(Mf)3 | 809989 | 821117 |
| CS(Mf)3(N) | 808814 | 822355 |
| CS(Mf)5 | 817990 | 821129 |
| CS4 | 810025 | 824004 |
| CS6 | 817028 | 823992 |
| CSA | 818103 | 823064 |

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## Figure 2

## The Locations of Marine Transportation and Marine-based Construction Works

810000 E

815000 E

820000 E

825000 N

820000 N

815000 N

TAP SHEK KOK

CASTLE PEAK BAY

TAI LAM CHUNG

THE BROTHERS

THE SITE SEE DRAWING NO.
60191048/C3/000/C00/1003

TUEN MUN-CHEK LAP KOK LINK
(TM-CLKL) (BY OTHERS)

Sand Blanket Filling Area
of Three Runway Project

RECLAMATION FOR THE TM-CLKL
SOUTHERN LANDFALL (BY OTHERS)

OTHER INFRASTRUCTURE AND
BUILDING WORKS OUTSIDE
SITH BOUNDARY (BY OTHERS)

HONG KONG LINK ROAD (HKLR)
(SEPARATE PROJECT) (BY OTHERS)

WORKS AREA 'WA4'
SEE DRAWING NO.
60191048/C3/000/C00/1052

WORKS AREA 'WA3'
SEE DRAWING NO.
60191048/C3/000/C00/1051

CHEK LAP KOK

TUNG CHUNG

LANTAU ISLAND

NORTH LANTAU HIGHWAY

N

## NOTES:

1. COORDINATES ARE RELATED TO HONG KONG METRIC GRID (1980).
2. DIMENSIONS ARE IN MILLIMETER AND CHAINAGE ARE IN METRES UNLESS OTHERWISE SHOWN.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 60191048/C3/000/C00/1051 TO 1053.

## LEGEND:

- SITE BOUNDARY
- WORKS AREA
- Location of Box Culvert B
- Silt Curtain

| REV. 修訂 | DESCRIPTION 內容摘要 | D.C. | P.C. CHECKED 復核 | DATE 日期 |
|---|---|---|---|---|
| - | TENDER DRAWING | BWCW | SCT | MAR.14 |

路政署 HIGHWAYS DEPARTMENT
港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

HONG KONG-ZHUHAI-MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- VEHICLE CLEARANCE PLAZAS AND
ANCILLARY BUILDINGS AND FACILITIES

# SITE LOCATION PLAN

AECOM
Rogers Stirk Harbour + Partners
BURO HAPPOLD ATKINS ADI
Aedas

DRG.NO. 圖紙編號 60191048/C3/000/C00/1000

| | | |
|---|---|---|
| DESIGNED BY 設計 BWCW | CONTRACT NO. 合約編號 HY/2013/03 | P. Dir. APPROVED 批准人 TKH |
| DRAWN BY 繪圖 WSY | STATUS 階段 | |
| SCALE 比例 A1 1 : 25000 | | |
| DIMENSIONS ARE IN 尺寸單位 METRES | © COPYRIGHT RESERVED 版 權 所 有 | |

Plot File by : 2014/3/26 WANGSY

p:\projects\60191048\drawing\contract\c3\1000\C3_000_C00_1000.dgn

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# Appendix A

# Notification of Limit Level Exceedance

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**
**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170913DO_v2

**Date of Notification:** 19 September 2017

**Works Inspected:** Data collected from water sampling works on 13 September 2017 and the results were issued on 18 September 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** Dissolved Oxygen (DO)/ ~~Suspended Solid (SS)/ Turbidity (TURB)~~

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| DO | IS5 | Bottom | Surface and Middle 5.0 Bottom 4.7 | Surface and Middle 4.2 (except 5 mg/L for FCZ) Bottom 3.6 | **4.1** | **4.1** |
| | IS(Mf)9 | Bottom | | | 6.5 | **4.2** |
| | IS10(N) | Surface and Middle | | | **4.7** | 5.0 |
| | IS(Mf)11 | Surface and Middle | | | 5.1 | **4.9** |
| | IS(Mf)16 | Bottom | | | **4.1** | **4.2** |
| | IS17 | Surface and Middle | | | 5.0 | **4.9** |
| | | Bottom | | | **3.8** | **4.1** |
| | SR5(N) | Surface and Middle | | | **4.8** | 5.5 |
| | SR10A | Surface and Middle | | | **4.9** | **4.4** |
| | | Bottom | | | 5.2 | **3.9** |
| | SR10B(N) | Surface and Middle | | | 5.2 | **4.4** |
| | | Bottom | | | 5.4 | **4.1** |

Remarks:
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.

Reviewed by : Keith Chau Title : ET Leader

Date : 4 October 2017

Copied to : Contractor, Engineer Representative and IEC/ENPO

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## Appendix B

## Photo showing the site situation of marine works in Box Culvert B

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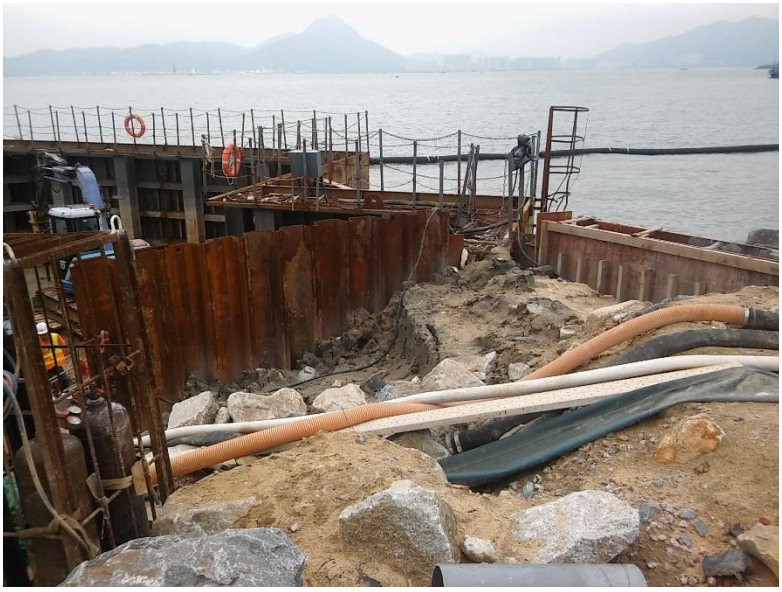

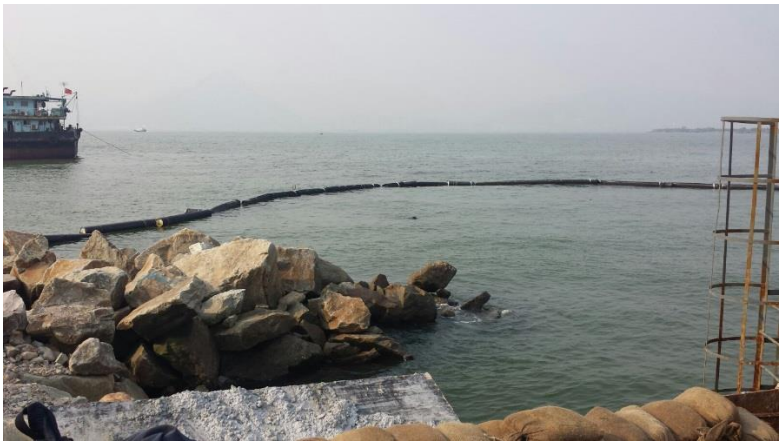

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# INVESTIGATION REPORT ON

# ACTION AND LIMIT LEVEL NON-COMPLIANCE

# FOR

# CONTRACT NO. HY/2013/03

## Hong Kong Zhuhai Macao Bridge
## Hong Kong Boundary Crossing Facilities – Vehicle Clearance Plazas and Ancillary Buildings and Facilities

**Report No. Ref.: 0165-15-IR0009**

Prepared by: Mr. Vincent Lu

Reviewed by: Mr. Bong Yu

Certified by: _____ Date: 14/12/2017

Mr. Arthur Cheng
Environmental Team Leader

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## NON-COMPLIANCE INVESTIGATION REPORT No.: 0165-15-IR009

### 1. Project Details

Contract No.: HY/2013/03

Contract Title: Hong Kong Zhuhai Macao Bridge Hong Kong Boundary Crossing Facilities - Vehicle Clearance Plazas and Ancillary Buildings and Facilities

Project Proponent: Highways Department

Main Contractor: China Harbour Engineering Co. Ltd.

### 2. Details of Non-compliance

Notification of Action/Limit Level Exceedance (20170915DO_TURB_v3) were forwarded by the ET of Contract No. HY/2013/01 on 27 September 2017:

Monitoring Date: 15 September 2017

The Action and Limit Levels of dissolved oxygen (DO), turbidity and suspended solid (SS) at determined from baseline monitoring data are listed below:

| Monitoring Parameter | Action Level (mg/L) | Limit Level (mg/L) |
|---|---|---|
| DO (Surface and Middle) | 5.0 | 4.2 (except 5 mg/L for FCZ) |
| DO (Bottom) | 4.7 | 3.6 |
| Depth-averaged turbidity | 27.5 and 120% (i.e. 19.6 for mid-ebb/15.4 for mid-flood) of upstream control station's turbidity at the same tide of the same day | 47.5 and 130% (i.e. 21.2 for mid-ebb/16.7 for mid-flood) of upstream control station's turbidity at the same tide of the same day |

| Parameter | Station | Depth | Measured at mid-ebb tide (mg/L) | Measured at mid-flood tide (mg/L) |
|---|---|---|---|---|
| DO | IS10(N) | Bottom | **4.2** | **4.5** |
| | IS(Mf)11 | Surface & Middle | **4.1** | **4.7** |
| | IS17 | Surface & Middle | **4.9** | 5.7 |
| | | Bottom | **3.9** | 4.7 |
| | SR6 | Surface & Middle | 5.5 | **4.8** |
| | | Bottom | 4.7 | **4.5** |
| | SR10A | Surface & Middle | 5.5 | **4.7** |
| | | Bottom | 5.4 | **3.9** |

| | | | | |
|---|---|---|---|---|
| | SR10B(N) | Surface & Middle | 5.4 | **<u>4.6</u>** |
| | | Bottom | 5.0 | **4.3** |
| Turbidity | IS8 | Depth average | 10.6 NTU | **<u>95.4 NTU*</u>** |

Notes:
Bold means AL exceedances
Bold with underline means LL exceedances
Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4
Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA
*The muddy water was observed due to 3 fast boats were moving around near the monitoring location during measurement period.

Monitoring was undertaken by the ET of Contract No. HY/2013/01 of HKBCF. The Notification of Action/Limit Level Exceedance (20170915DO_TURB_v3) provided by the ET of Contract No. HY/2013/01 of HKBCF are shown in **Appendix A**.

## 3. Investigation of Non-compliance

<u>Summary of Investigation</u>

As confirmed with Mr. Marko Chan, Environmental Officer, and operation team of Contract No. HY/2013/03, there was marine transportation on the date of exceedance. Regarding marine transportation, the vessels was sized to make sure adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash. For turbidity exceedance recorded at the WQM station IS8, the concerned WQM stations where the exceedances were recorded were not close to the marine delivery route of Contract No. HY/2013/03, while there was no notification of exceedance received at the WQM stations closer to the marine delivery route, such as IS(Mf)11. Regarding marine-based works in Box Culvert B, the work undertaken at the date of exceedance was preparation work of precast installation which had a cofferdam to separate seawater and works area. Silt curtain was also maintained to enclose the work area of the outlet of the box culvert fully. All sea water flows into the work area of box culvert B will be treated by desilting facilities before discharge in accordance with the discharge license approved by EPD for Contract No. HY/2013/03. Besides, no organic matter discharge from the works areas (i.e. box Culvert B) was observed. It was unlikely that the works undertaken by Contract No. HY/2013/03 consumed any dissolved oxygen to cause DO exceedances recorded at the concerned WQM stations during mid-flood and mid-ebb tide on 15 September 2017.

For turbidity exceedance, the exceedance recorded at the concerned WQM station (i.e. IS8) is far away from the marine works area of Contract No. HY/2013/03, while there was no notification of exceedance received at the WQM stations closer to the works areas, such as IS(Mf)11. Besides, fast boats moving around near the monitoring location during measurement period as mentioned in Notification of Action/Limit Level Exceedance may be one of the reason for turbidity exceedance.

It was unlikely that the works undertaken by Contract No. HY/2013/03 caused turbidity exceedance recorded at the concerned WQM stations during mid-flood tide on 15 September 2017.

The location of the WQM stations where exceedances were recorded and all relevant WQM stations are shown in **Figure 1** and the locations of marine-based construction works are shown in **Figure 2**.

Investigation Results

The ET of Contract No. HY/2013/03 concluded that the captioned exceedance was not related to the construction site activities of the contract. Nevertheless, the Contractor had been reminded to comply with the requirements stipulated in the Environmental Mitigation Implementation Schedule (EMIS) of the EM&A Manual, in particular:

- Water Quality:
  W1-
  1. barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
  2. any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
  3. loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
  4. excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
  5. adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
  6. all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.

  W2-
  1. wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
  2. 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;
  3. 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 each rainstorm;
  4. rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;
  5. measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;

6. open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms;
7. discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
8. surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

## 4. Follow up Status (Exceedance)

During weekly site audit on 8, 15 and 21 September 2017, ET confirmed the Contractor had provided workable and effective water quality mitigation measures.

Photos showing the site situation of marine works in Box Culvert B which was taken during the site audit in mid-October are shown in **Appendix B**.

## 5. Recommendation to the Contractor

The Contractor was reminded to continue to fully maintain all water quality mitigation measures.

## 6. Follow up Status (Overall)

The captioned exceedance was not related to the Contract and therefore, no additional follow-up action is needed. However, ET proposed recommendations to Contractor in particular to the following aspects when there are marine construction activities.

Water Quality:

- Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
- Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
- Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
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- discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
- surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

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**Figure 1**

**The Location of WQM Stations**


**LEGEND**

- IS — IMPACT STATIONS
- CS — CONTROL / FAR FIELD STATIONS
- SR — SENSITIVE RECEIVERS STATIONS

# FIGURE 4.1– LOCATION OF WATER QUALITY MONITORING STATIONS

## SETTING OUT SCHEDULE

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| IS(Mf)6 | 812101 | 817873 |
| IS7 | 812244 | 818777 |
| IS8 | 814251 | 818412 |
| IS(Mf)9 | 813273 | 818850 |
| IS10 | 812577 | 820670 |
| IS10(N) | 812942 | 820455 |
| IS(Mf)11 | 813562 | 820716 |
| IS(Mf)16 | 814328 | 819497 |
| IS17 | 814539 | 820391 |
| SR3 | 810525 | 816456 |
| SR4(N) | 814705 | 817859 |
| SR5 | 811489 | 820455 |
| SR5(N) | 812569 | 821475 |
| SR6 | 805837 | 821818 |
| SR7 | 814293 | 821431 |
| SR10A | 823741 | 823495 |
| SR10B(N) | 823683 | 820881 |
| CS(Mf)3 | 809989 | 821117 |
| CS(Mf)3(N) | 808814 | 822355 |
| CS(Mf)5 | 817990 | 821129 |
| CS4 | 810025 | 824004 |
| CS6 | 817028 | 823992 |
| CSA | 818103 | 823064 |

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Email : mcl@fugro.com

## Figure 2

## The Locations of Marine Transportation and Marine-based Construction Works

810000 E

815000 E

820000 E

825000 N

820000 N

815000 N

TAP SHEK KOK

CASTLE PEAK BAY

TAI LAM CHUNG

THE BROTHERS

THE SITE SEE DRAWING NO.
60191048/C3/000/C00/1003

TUEN MUN-CHEK LAP KOK LINK
(TM-CLKL) (BY OTHERS)

Sand Blanket Filling Area
of Three Runway Project

RECLAMATION FOR THE TM-CLKL
SOUTHERN LANDFALL (BY OTHERS)

OTHER INFRASTRUCTURE AND
BUILDING WORKS OUTSIDE
SITH BOUNDARY (BY OTHERS)

HONG KONG LINK ROAD (HKLR)
(SEPARATE PROJECT) (BY OTHERS)

WORKS AREA 'WA4'
SEE DRAWING NO.
60191048/C3/000/C00/1052

WORKS AREA 'WA3'
SEE DRAWING NO.
60191048/C3/000/C00/1051

CHEK LAP KOK

TUNG CHUNG

LANTAU ISLAND

NORTH LANTAU HIGHWAY

N

## NOTES:

1. COORDINATES ARE RELATED TO HONG KONG METRIC GRID (1980).
2. DIMENSIONS ARE IN MILLIMETER AND CHAINAGE ARE IN METRES UNLESS OTHERWISE SHOWN.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 60191048/C3/000/C00/1051 TO 1053.

## LEGEND:

- SITE BOUNDARY
- WORKS AREA
- Location of Box Culvert B
- Silt Curtain

| REV. 修訂 | DESCRIPTION 內容摘要 | D.C. | P.C. CHECKED 復核 | DATE 日期 |
|---|---|---|---|---|
| - | TENDER DRAWING | BWCW | SCT | MAR.14 |

路政署 HIGHWAYS DEPARTMENT
港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

HONG KONG-ZHUHAI-MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- VEHICLE CLEARANCE PLAZAS AND
ANCILLARY BUILDINGS AND FACILITIES

# SITE LOCATION PLAN

AECOM
Rogers Stirk Harbour + Partners
BURO HAPPOLD ATKINS ADI
Aedas

DRG.NO. 圖紙編號 60191048/C3/000/C00/1000

| | | |
|---|---|---|
| DESIGNED BY 設計 BWCW | CONTRACT NO. 合約編號 HY/2013/03 | P. Dir. APPROVED 批准人 TKH |
| DRAWN BY 繪圖 WSY | STATUS 階段 | |
| SCALE 比例 A1 1 : 25000 | | |
| DIMENSIONS ARE IN 尺寸單位 METRES | © COPYRIGHT RESERVED 版 權 所 有 | |

Plot File by : 2014/3/26 WANGSY

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# Appendix A

# Notification of Limit Level Exceedance

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**
**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170915DO_TURB_v3

**Date of Notification:** 21 September 2017

**Works Inspected:** Data collected from water sampling works on 15 September 2017 and the results were issued on 19 September 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** Dissolved Oxygen (DO)/ ~~Suspended Solid (SS)~~/ Turbidity (TURB)

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| DO | IS10(N) | Bottom | Surface and Middle 5.0 Bottom 4.7 | Surface and Middle 4.2 (except 5 mg/L for FCZ) Bottom 3.6 | **4.2** | **4.5** |
| | IS(Mf)11 | Surface and Middle | | | **4.1** | **4.7** |
| | IS17 | Surface and Middle | | | **4.9** | 5.7 |
| | | Bottom | | | **3.9** | 4.7 |
| | SR6 | Surface and Middle | | | 5.5 | **4.8** |
| | | Bottom | | | 4.7 | **4.5** |
| | SR10A | Surface and Middle | | | 5.5 | **4.7** |
| | | Bottom | | | 5.4 | **3.9** |
| | SR10B(N) | Surface and Middle | | | 5.4 | **4.6** |
| | | Bottom | | | 5.0 | **4.3** |
| TURB | IS8 | Depth Average | 27.5 and 120% (i.e. 19.6 for mid-ebb/15.4 for mid-flood) of upstream control station's turbidity at the same tide of the same day | 47.0 and 130% (i.e. 21.2 for mid-ebb/16.7 for mid-flood) of upstream control station's turbidity at the same tide of the same day | 10.6 | **95.4*** |

Remarks:
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.
Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4
Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA
*The muddy water was observed due to 3 fast boats were moving around near the monitoring location during measurement period.

Reviewed by : Keith Chau Title : ET Leader

Date : 27 September 2017

Copied to : Contractor, Engineer Representative and IEC/ENPO

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## Appendix B

## Photo showing the site situation of marine works in Box Culvert B

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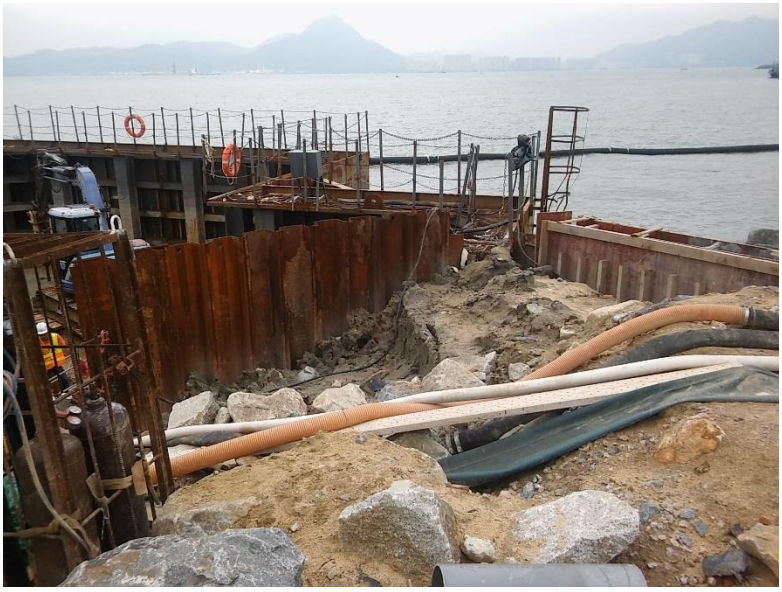
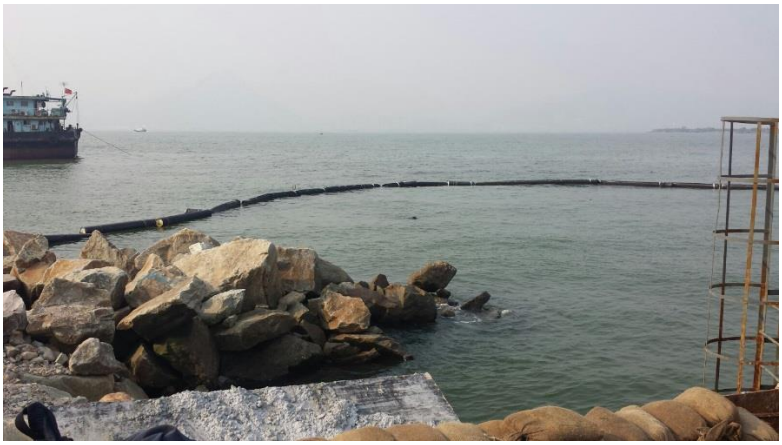
Fax : (852)-24508032
Email : mcl@fugro.com





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# INVESTIGATION REPORT ON

# ACTION AND LIMIT LEVEL NON-COMPLIANCE

# FOR

# CONTRACT NO. HY/2013/03

## Hong Kong Zhuhai Macao Bridge
## Hong Kong Boundary Crossing Facilities – Vehicle Clearance Plazas and Ancillary Buildings and Facilities

**Report No. Ref.: 0165-15-IR0010**

Prepared by: Mr. Vincent Lu

Reviewed by: Mr. Bong Yu

Certified by: _____ Date: 14/12/2017

Mr. Arthur Cheng
Environmental Team Leader

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## NON-COMPLIANCE INVESTIGATION REPORT No.: 0165-15-IR0010

### 1. Project Details

Contract No.: HY/2013/03

Contract Title: Hong Kong Zhuhai Macao Bridge Hong Kong Boundary Crossing Facilities - Vehicle Clearance Plazas and Ancillary Buildings and Facilities

Project Proponent: Highways Department

Main Contractor: China Harbour Engineering Co. Ltd.

### 2. Details of Non-compliance

Notification of Action/Limit Level Exceedance (20170918DO & 20170918SS) were forwarded by the ET of Contract No. HY/2013/01 on 21 September 2017 & 27 September 2017:

Monitoring Date: 18 September 2017

The Action and Limit Levels of dissolved oxygen (DO) and suspended solid (SS) at determined from baseline monitoring data are listed below:

| Monitoring Parameter | Action Level (mg/L) | Limit Level (mg/L) |
|---|---|---|
| DO (Surface and Middle) | 5.0 | 4.2 (except 5 mg/L for FCZ) |
| DO (Bottom) | 4.7 | 3.6 |
| Depth-averaged Suspended Solid | 23.5 and 120% (i.e. 9.9 for mid-ebb/13.4 for mid-flood) of upstream control station's SS at the same tide of the same day | 34.4 and 130% (i.e. 10.8 for mid-ebb/14.5 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes |

| Parameter | Station | Depth | Measured at mid-ebb tide (mg/L) | Measured at mid-flood tide (mg/L) |
|---|---|---|---|---|
| DO | IS5 | Bottom | **4.5** | 5.8 |
| | IS10(N) | Bottom | **4.6** | 5.0 |
| | IS(Mf)11 | Bottom | **4.6** | 5.0 |
| | IS(Mf)16 | Bottom | **4.4** | 5.0 |
| | SR6 | Surface & Middle | **4.7** | **4.4** |
| | | Bottom | **4.5** | **4.3** |
| | SR10A | Surface & Middle | 5.5 | **4.7** |
| | SR10B(N) | Surface & Middle | 5.4 | **4.9** |
| SS | IS8 | Depth average | 6.3 | **25.0** |

Notes:
Bold means AL exceedances

Bold with underline means LL exceedances
Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4
Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA

Monitoring was undertaken by the ET of Contract No. HY/2013/01 of HKBCF. The Notification of Action/Limit Level Exceedance (20170918DO & 20170918SS) provided by the ET of Contract No. HY/2013/01 of HKBCF are shown in **Appendix A**.

## 3. Investigation of Non-compliance

Summary of Investigation

As confirmed with Mr. Marko Chan, Environmental Officer, and operation team of Contract No. HY/2013/03, there was marine transportation on the date of exceedance. Regarding marine transportation, the vessels was sized to make sure adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash. For SS exceedance recorded at the WQM station IS8, the concerned WQM stations where the exceedances were recorded were not close to the marine delivery route of Contract No. HY/2013/03, while there was no notification of exceedance received at the WQM stations closer to the marine delivery route, such as IS(Mf)11. Regarding marine-based works in Box Culvert B, the work undertaken at the date of exceedance was preparation work of precast installation which had a cofferdam to separate seawater and works area. Silt curtain was also maintained to enclose the work area of the outlet of the box culvert fully. All sea water flows into the work area of box culvert B will be treated by desilting facilities before discharge in accordance with the discharge license approved by EPD for Contract No. HY/2013/03. Besides, no organic matter discharge from the works areas (i.e. box Culvert B) was observed. It was unlikely to consume any dissolved oxygen to cause the DO exceedances recorded at the concerned WQM stations during mid-flood and mid-ebb tide on 18 September 2017.

For SS exceedance, the exceedance recorded at the concerned WQM station (i.e. IS8) is far away from the marine works area of Contract No. HY/2013/03, while there was no notification of exceedance received at the WQM stations closer to the works areas, such as IS(Mf)11. It was unlikely that the works undertaken by Contract No. HY/2013/03 caused SS exceedance recorded at the concerned WQM station during mid-flood tide on 18 September 2017.

The location of the WQM stations where exceedances were recorded and all relevant WQM stations are shown in **Figure 1** and the locations of marine-based construction works are shown in **Figure 2**.

Investigation Results

The ET of Contract No. HY/2013/03 concluded that the captioned exceedance was not related to the construction site activities of the contract. Nevertheless, the Contractor had been reminded to comply with the requirements stipulated in the

Environmental Mitigation Implementation Schedule (EMIS) of the EM&A Manual, in particular:

- Water Quality:
  W1-
  1. barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
  2. any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
  3. loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
  4. excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
  5. adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
  6. all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.

  W2-
  1. wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
  2. 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;
  3. 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 each rainstorm;
  4. rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;
  5. measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;
  6. open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms;
  7. discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
  8. surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

## 4. Follow up Status (Exceedance)

During weekly site audit on 8, 15 and 21 September 2017, ET confirmed the Contractor had provided workable and effective water quality mitigation measures.

Photos showing the site situation of marine works in Box Culvert B which was taken during the site audit in mid-October are shown in **Appendix B**.

## 5. Recommendation to the Contractor

The Contractor was reminded to continue to fully maintain all water quality mitigation measures.

## 6. Follow up Status (Overall)

The captioned exceedance was not related to the Contract and therefore, no additional follow-up action is needed. However, ET proposed recommendations to Contractor in particular to the following aspects when there are marine construction activities.

Water Quality:

- Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
- Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
- Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
- Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
- Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
- All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.
- wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
- 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 each rainstorm;
- 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;

- discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
- surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

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## Figure 1

## The Location of WQM Stations


**LEGEND**

- IS — IMPACT STATIONS
- CS — CONTROL / FAR FIELD STATIONS
- SR — SENSITIVE RECEIVERS STATIONS

# FIGURE 4.1– LOCATION OF WATER QUALITY MONITORING STATIONS

## SETTING OUT SCHEDULE

| MONITORING STATIONS | CO-ORDINATES | |
|---|---|---|
| | EASTING | NORTHING |
| IS5 | 811579 | 817106 |
| IS(Mf)6 | 812101 | 817873 |
| IS7 | 812244 | 818777 |
| IS8 | 814251 | 818412 |
| IS(Mf)9 | 813273 | 818850 |
| IS10 | 812577 | 820670 |
| IS10(N) | 812942 | 820455 |
| IS(Mf)11 | 813562 | 820716 |
| IS(Mf)16 | 814328 | 819497 |
| IS17 | 814539 | 820391 |
| SR3 | 810525 | 816456 |
| SR4(N) | 814705 | 817859 |
| SR5 | 811489 | 820455 |
| SR5(N) | 812569 | 821475 |
| SR6 | 805837 | 821818 |
| SR7 | 814293 | 821431 |
| SR10A | 823741 | 823495 |
| SR10B(N) | 823683 | 820881 |
| CS(Mf)3 | 809989 | 821117 |
| CS(Mf)3(N) | 808814 | 822355 |
| CS(Mf)5 | 817990 | 821129 |
| CS4 | 810025 | 824004 |
| CS6 | 817028 | 823992 |
| CSA | 818103 | 823064 |

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## Figure 2

## The Locations of Marine Transportation and Marine-based Construction Works

810000 E

815000 E

820000 E

825000 N

820000 N

815000 N

TAP SHEK KOK

CASTLE PEAK BAY

TAI LAM CHUNG

THE BROTHERS

THE SITE SEE DRAWING NO.
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TUEN MUN-CHEK LAP KOK LINK
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Sand Blanket Filling Area
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RECLAMATION FOR THE TM-CLKL
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WORKS AREA 'WA4'
SEE DRAWING NO.
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WORKS AREA 'WA3'
SEE DRAWING NO.
60191048/C3/000/C00/1051

CHEK LAP KOK

TUNG CHUNG

LANTAU ISLAND

NORTH LANTAU HIGHWAY

N

## NOTES:

1. COORDINATES ARE RELATED TO HONG KONG METRIC GRID (1980).
2. DIMENSIONS ARE IN MILLIMETER AND CHAINAGE ARE IN METRES UNLESS OTHERWISE SHOWN.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 60191048/C3/000/C00/1051 TO 1053.

## LEGEND:

- SITE BOUNDARY
- WORKS AREA
- Location of Box Culvert B
- Silt Curtain

| REV. 修訂 | DESCRIPTION 內容摘要 | D.C. | P.C. CHECKED 復核 | DATE 日期 |
|---|---|---|---|---|
| - | TENDER DRAWING | BWCW | SCT | MAR.14 |

路政署 HIGHWAYS DEPARTMENT
港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

HONG KONG-ZHUHAI-MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- VEHICLE CLEARANCE PLAZAS AND
ANCILLARY BUILDINGS AND FACILITIES

# SITE LOCATION PLAN

AECOM
Rogers Stirk Harbour + Partners
BURO HAPPOLD ATKINS ADI
Aedas

DRG.NO. 圖紙編號 60191048/C3/000/C00/1000

| | | |
|---|---|---|
| DESIGNED BY 設計 BWCW | CONTRACT NO. 合約編號 HY/2013/03 | P. Dir. APPROVED 批准人 TKH |
| DRAWN BY 繪圖 WSY | STATUS 階段 | |
| SCALE 比例 A1 1 : 25000 | | |
| DIMENSIONS ARE IN 尺寸單位 METRES | © COPYRIGHT RESERVED 版 權 所 有 | |

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# Appendix A

# Notification of Limit Level Exceedance

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**
**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170918SS

**Date of Notification:** 27 September 2017

**Works Inspected:** Data collected from water sampling works on 18 September 2017 and the results were issued on 27 September 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** ~~Dissolved Oxygen (DO)/~~ Suspended Solid (SS)~~/ Turbidity (TURB)~~

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| SS | IS8 | Depth Average | 23.5 and 120% (i.e. 9.9 for mid-ebb/13.4 for mid-flood) of upstream control station's SS at the same tide of the same day | 34.4 and 130% (i.e. 10.8 for mid-ebb/14.5 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes | 6.3 | **25.0** |

Remarks:
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.
Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4
Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA

Reviewed by : Keith Chau Title : ET Leader

Date : 27 September 2017

Copied to : Contractor, Engineer Representative and IEC/ENPO

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**
**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170918DO

**Date of Notification:** 21 September 2017

**Works Inspected:** Data collected from water sampling works on 18 September 2017 and the results were issued on 21 September 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** Dissolved Oxygen (DO)/ ~~Suspended Solid (SS)/ Turbidity (TURB)~~

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| DO | IS5 | Bottom | Surface and Middle 5.0 Bottom 4.7 | Surface and Middle 4.2 (except 5 mg/L for FCZ) Bottom 3.6 | **4.5** | 5.8 |
| | IS10(N) | Bottom | | | **4.6** | 5.0 |
| | IS(Mf)11 | Bottom | | | **4.6** | 5.0 |
| | IS(Mf)16 | Bottom | | | **4.4** | 5.0 |
| | SR6 | Surface and Middle | | | **4.7** | **4.4** |
| | | Bottom | | | **4.5** | **4.3** |
| | SR10A | Surface and Middle | | | 5.5 | **4.7** |
| | SR10B(N) | Surface and Middle | | | 5.4 | **4.9** |

Remarks:
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.

Reviewed by : Keith Chau Title : ET Leader

Date : 21 September 2017

Copied to : Contractor, Engineer Representative and IEC/ENPO

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## Appendix B

## Photo showing the site situation of marine works in Box Culvert B

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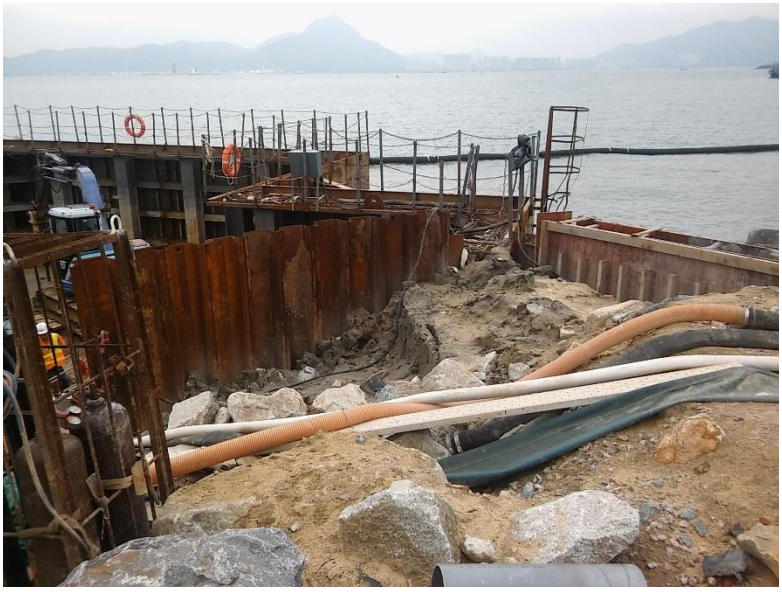

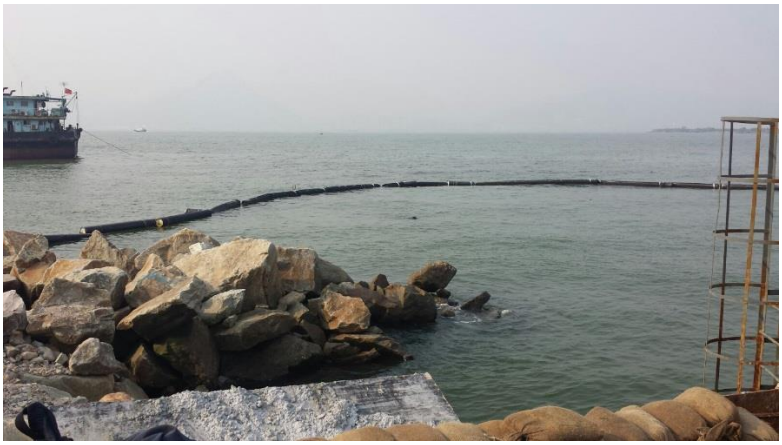

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# INVESTIGATION REPORT ON

# ACTION AND LIMIT LEVEL NON-COMPLIANCE

# FOR

# CONTRACT NO. HY/2013/03

## Hong Kong Zhuhai Macao Bridge
## Hong Kong Boundary Crossing Facilities – Vehicle Clearance Plazas and Ancillary Buildings and Facilities

**Report No. Ref.: 0165-15-IR0011**

Prepared by: Mr. Vincent Lu

Reviewed by: Mr. Bong Yu

Certified by: _____ Date: 14/12/2017

Mr. Arthur Cheng
Environmental Team Leader

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## NON-COMPLIANCE INVESTIGATION REPORT No.: 0165-15-IR0011

### 1. Project Details

Contract No.: HY/2013/03

Contract Title: Hong Kong Zhuhai Macao Bridge Hong Kong Boundary Crossing Facilities - Vehicle Clearance Plazas and Ancillary Buildings and Facilities

Project Proponent: Highways Department

Main Contractor: China Harbour Engineering Co. Ltd.

### 2. Details of Non-compliance

Notification of Action/Limit Level Exceedance (20170920DO) was forwarded by the ET of Contract No. HY/2013/01 on 27 September 2017. Notification of Action/Limit Level Exceedance (20170920SS) was forwarded by the ET of Contract No. HY/2013/01 on 06 October 2017:

Monitoring Date: 20 September 2017

The Action and Limit Levels of dissolved oxygen (DO) at determined from baseline monitoring data are listed below:

| Monitoring Parameter | Action Level (mg/L) | Limit Level (mg/L) |
|---|---|---|
| DO (Surface and Middle) | 5.0 | 4.2 (except 5 mg/L for FCZ) |
| DO (Bottom) | 4.7 | 3.6 |
| SS | 23.5 and 120% (i.e. 20.4 for mid-ebb /10.5 for mid-flood) of upstream control station's SS at the same tide of the same day | 34.4 and 130% (i.e. 22.1 for mid-ebb/11.4 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes |

| Parameter | Station | Depth | Measured at mid-ebb tide (mg/L) | Measured at mid-flood tide (mg/L) |
|---|---|---|---|---|
| DO | SR6 | Surface & Middle | 5.1 | **4.5** |
| | | Bottom | 5.0 | **4.6** |
| | SR10A | Surface & Middle | 5.0 | **4.5** |
| | | Bottom | 4.7 | **4.5** |
| | SR10B(N) | Surface & Middle | 5.0 | **4.5** |
| SS | SR6 | Depth average | 10.4 | **25.4** |

Notes:
Bold means AL exceedances
Bold with underline means LL exceedances
Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4
Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA

Monitoring was undertaken by the ET of Contract No. HY/2013/01 of HKBCF. The Notification of Action/Limit Level Exceedance (20170920DO) provided by the ET of Contract No. HY/2013/01 of HKBCF are shown in **Appendix A**.

## 3. Investigation of Non-compliance

Summary of Investigation

As confirmed with Mr. Marko Chan, Environmental Officer, and operation team of Contract No. HY/2013/03, there was marine transportation on the date of exceedance. Regarding marine transportation, the vessels was sized to make sure adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash. For turbidity exceedance recorded at the WQM station SR6, the concerned WQM stations where the exceedances were recorded were not close to the marine delivery route of Contract No. HY/2013/03, while there was no notification of exceedance received at the WQM stations closer to the marine delivery route, such as IS(Mf)11. Regarding marine-based works in Box Culvert B, the work undertaken at the date of exceedance was preparation work of precast installation which had a cofferdam to separate seawater and works area. Silt curtain was also maintained to enclose the work area of the outlet of the box culvert fully. All sea water flows into the work area of box culvert B will be treated by desilting facilities before discharge in accordance with the discharge license approved by EPD for Contract No. HY/2013/03. In addition, the exceedances recorded at the concerned WQM stations (i.e. SR6, SR10A and SR10B(N)) are far away from the marine works area of Contract No. HY/2013/03, while there was no notification of exceedance received at the WQM stations closer to the works areas, such as IS(Mf)11. It was unlikely to consume any dissolved oxygen to cause the DO exceedances recorded at the concerned WQM stations during mid-flood tide on 20 September 2017.

The location of the WQM stations where exceedances were recorded and all relevant WQM stations are shown in **Figure 1** and the locations of marine-based construction works are shown in **Figure 2**.

Investigation Results

The ET of Contract No. HY/2013/03 concluded that the captioned exceedance was not related to the construction site activities of the contract. Nevertheless, the Contractor had been reminded to comply with the requirements stipulated in the Environmental Mitigation Implementation Schedule (EMIS) of the EM&A Manual, in particular:

- Water Quality:
  W1-
  1. barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
  2. any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
  3. loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
  4. excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
  5. adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
  6. all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.

  W2-
  1. wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
  2. 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;
  3. 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 each rainstorm;
  4. rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;
  5. measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;
  6. open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms;
  7. discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
  8. surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

## 4. Follow up Status (Exceedance)

During weekly site audit on 25 and 31 August, 8, 15 and 21 September 2017, ET confirmed the Contractor had provided workable and effective water quality mitigation measures.

Photos showing the site situation of marine works in Box Culvert B which was taken during the site audit in mid-October are shown in **Appendix B**.

## 5. Recommendation to the Contractor

The Contractor was reminded to continue to fully maintain all water quality mitigation measures.

## 6. Follow up Status (Overall)

The captioned exceedance was not related to the Contract and therefore, no additional follow-up action is needed. However, ET proposed recommendations to Contractor in particular to the following aspects when there are marine construction activities.

Water Quality:

- Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
- Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
- Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
- Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
- Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
- All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.
- wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
- 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 each rainstorm;
- 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;
- discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;

- surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

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**Figure 1**

**The Location of WQM Stations**


**LEGEND**

- IS — IMPACT STATIONS
- CS — CONTROL / FAR FIELD STATIONS
- SR — SENSITIVE RECEIVERS STATIONS

# FIGURE 4.1– LOCATION OF WATER QUALITY MONITORING STATIONS

## SETTING OUT SCHEDULE

| MONITORING STATIONS | CO-ORDINATES | |
|---|---|---|
| | EASTING | NORTHING |
| IS5 | 811579 | 817106 |
| IS(Mf)6 | 812101 | 817873 |
| IS7 | 812244 | 818777 |
| IS8 | 814251 | 818412 |
| IS(Mf)9 | 813273 | 818850 |
| IS10 | 812577 | 820670 |
| IS10(N) | 812942 | 820455 |
| IS(Mf)11 | 813562 | 820716 |
| IS(Mf)16 | 814328 | 819497 |
| IS17 | 814539 | 820391 |
| SR3 | 810525 | 816456 |
| SR4(N) | 814705 | 817859 |
| SR5 | 811489 | 820455 |
| SR5(N) | 812569 | 821475 |
| SR6 | 805837 | 821818 |
| SR7 | 814293 | 821431 |
| SR10A | 823741 | 823495 |
| SR10B(N) | 823683 | 820881 |
| CS(Mf)3 | 809989 | 821117 |
| CS(Mf)3(N) | 808814 | 822355 |
| CS(Mf)5 | 817990 | 821129 |
| CS4 | 810025 | 824004 |
| CS6 | 817028 | 823992 |
| CSA | 818103 | 823064 |

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## Figure 2

## The Locations of Marine Transportation and Marine-based Construction Works

810000 E

815000 E

820000 E

825000 N

820000 N

815000 N

TAP SHEK KOK

CASTLE PEAK BAY

TAI LAM CHUNG

THE BROTHERS

THE SITE SEE DRAWING NO.
60191048/C3/000/C00/1003

TUEN MUN-CHEK LAP KOK LINK
(TM-CLKL) (BY OTHERS)

Sand Blanket Filling Area
of Three Runway Project

RECLAMATION FOR THE TM-CLKL
SOUTHERN LANDFALL (BY OTHERS)

OTHER INFRASTRUCTURE AND
BUILDING WORKS OUTSIDE
SITH BOUNDARY (BY OTHERS)

HONG KONG LINK ROAD (HKLR)
(SEPARATE PROJECT) (BY OTHERS)

WORKS AREA 'WA4'
SEE DRAWING NO.
60191048/C3/000/C00/1052

WORKS AREA 'WA3'
SEE DRAWING NO.
60191048/C3/000/C00/1051

CHEK LAP KOK

TUNG CHUNG

LANTAU ISLAND

NORTH LANTAU HIGHWAY

N

## NOTES:

1. COORDINATES ARE RELATED TO HONG KONG METRIC GRID (1980).
2. DIMENSIONS ARE IN MILLIMETER AND CHAINAGE ARE IN METRES UNLESS OTHERWISE SHOWN.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 60191048/C3/000/C00/1051 TO 1053.

## LEGEND:

- SITE BOUNDARY
- WORKS AREA
- Location of Box Culvert B
- Silt Curtain

| REV. 修訂 | DESCRIPTION 內容摘要 | D.C. | P.C. CHECKED 復核 | DATE 日期 |
|---|---|---|---|---|
| - | TENDER DRAWING | BWCW | SCT | MAR.14 |

路政署 HIGHWAYS DEPARTMENT
港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

HONG KONG-ZHUHAI-MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- VEHICLE CLEARANCE PLAZAS AND
ANCILLARY BUILDINGS AND FACILITIES

# SITE LOCATION PLAN

AECOM
Rogers Stirk Harbour + Partners
BURO HAPPOLD ATKINS ADI
Aedas

DRG.NO. 圖紙編號 60191048/C3/000/C00/1000

| | | |
|---|---|---|
| DESIGNED BY 設計 BWCW | CONTRACT NO. 合約編號 HY/2013/03 | P. Dir. APPROVED 批准人 TKH |
| DRAWN BY 繪圖 WSY | STATUS 階段 | |
| SCALE 比例 A1 1 : 25000 | | |
| DIMENSIONS ARE IN 尺寸單位 METRES | © COPYRIGHT RESERVED 版 權 所 有 | |

Plot File by : 2014/3/26 WANGSY

p:\projects\60191048\drawing\contract\c3\1000\C3_000_C00_1000.dgn

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# Appendix A

# Notification of Limit Level Exceedance

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**

**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170920DO

**Date of Notification:** 25 September 2017

**Works Inspected:** Data collected from water sampling works on 20 September 2017 and the results were issued on 23 September 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** Dissolved Oxygen (DO)/ ~~Suspended Solid (SS)/ Turbidity (TURB)~~

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| DO | SR6 | Surface and Middle | Surface and Middle 5.0 Bottom 4.7 | Surface and Middle 4.2 (except 5 mg/L for FCZ) Bottom 3.6 | 5.1 | **4.5** |
| | | Bottom | | | 5.0 | **4.6** |
| | SR10A | Surface and Middle | | | 5.0 | **4.5** |
| | | Bottom | | | 4.7 | **4.5** |
| | SR10B(N) | Surface and Middle | | | 5.0 | **4.5** |

Remarks:
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.

Reviewed by : Keith Chau Title : ET Leader

Date : 25 September 2017

Copied to : Contractor, Engineer Representative and IEC/ENPO

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**
**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170920SS

**Date of Notification:** 6 October 2017

**Works Inspected:** Data collected from water sampling works on 20 September 2017 and the results were issued on 29 September 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** ~~Dissolved Oxygen (DO)/~~ Suspended Solid (SS)~~/ Turbidity (TURB)~~

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| SS | SR6 | Depth Average | 23.5 and 120% (i.e. 16.7 for mid-ebb/19.0 for mid-flood) of upstream control station's SS at the same tide of the same day | 34.4 and 130% (i.e. 18.1 for mid-ebb/20.6 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes | 10.4 | **25.4** |

Remarks:
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.
Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4
Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA

Reviewed by : Keith Chau Title : ET Leader

Date : 6 October 2017

Copied to : Contractor, Engineer Representative and IEC/ENPO

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## Appendix B

## Photo showing the site situation of marine works in Box Culvert B

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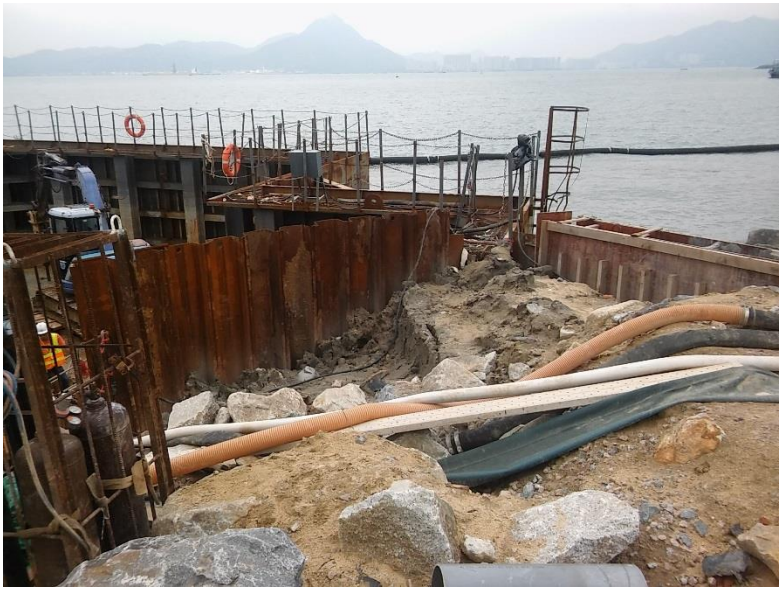

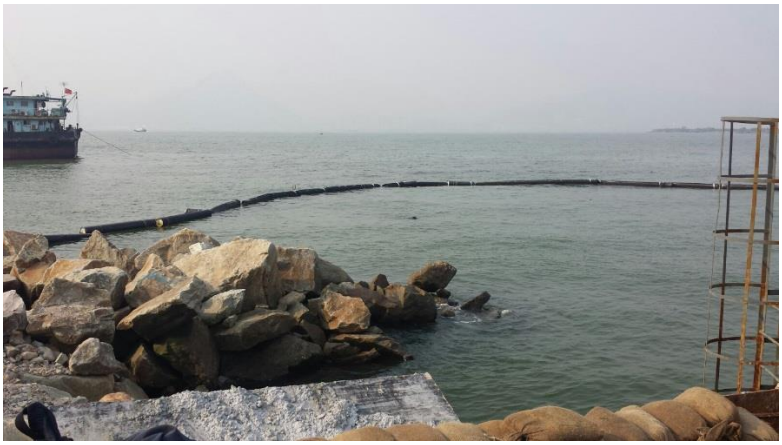

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# INVESTIGATION REPORT ON

# ACTION AND LIMIT LEVEL NON-COMPLIANCE

# FOR

# CONTRACT NO. HY/2013/03

## Hong Kong Zhuhai Macao Bridge
## Hong Kong Boundary Crossing Facilities – Vehicle Clearance Plazas and Ancillary Buildings and Facilities

**Report No. Ref.: 0165-15-IR0012**

Prepared by: Mr. Vincent Lu

Reviewed by: Mr. Bong Yu

Certified by: _____ Date: 14/12/2017

Mr. Arthur Cheng
Environmental Team Leader

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## NON-COMPLIANCE INVESTIGATION REPORT No.: 0165-15-IR0012

### 1. Project Details

Contract No.: HY/2013/03

Contract Title: Hong Kong Zhuhai Macao Bridge Hong Kong Boundary Crossing Facilities - Vehicle Clearance Plazas and Ancillary Buildings and Facilities

Project Proponent: Highways Department

Main Contractor: China Harbour Engineering Co. Ltd.

### 2. Details of Non-compliance

Notification of Action/Limit Level Exceedance (20170922DO) was forwarded by the ET of Contract No. HY/2013/01 on 27 September 2017:

Monitoring Date: 22 September 2017

The Action and Limit Levels of dissolved oxygen (DO) at determined from baseline monitoring data are listed below:

| Monitoring Parameter | Action Level (mg/L) | Limit Level (mg/L) |
|---|---|---|
| DO (Surface and Middle) | 5.0 | 4.2 (except 5 mg/L for FCZ) |
| DO (Bottom) | 4.7 | 3.6 |

| Parameter | Station | Depth | Measured at mid-ebb tide (mg/L) | Measured at mid-flood tide (mg/L) |
|---|---|---|---|---|
| DO | IS8 | Surface & Middle | 5.2 | **4.8** |
| | IS(Mf)9 | Surface & Middle | 5.3 | **4.9** |
| | IS10(N) | Surface & Middle | **4.8** | **4.8** |
| | | Bottom | **4.6** | 4.8 |
| | IS(Mf)11 | Surface & Middle | **4.7** | **4.9** |
| | IS(Mf)16 | Surface & Middle | 5.1 | **4.8** |
| | IS17 | Surface & Middle | 5.0 | **4.8** |
| | SR3 | Surface & Middle | **4.9** | 5.0 |
| | SR4(N) | Surface & Middle | 5.2 | **4.8** |

| | | | | |
|---|---|---|---|---|
| | SR5(N) | Surface & Middle | **4.9** | **4.8** |
| | SR6 | Surface & Middle | **4.8** | **4.8** |
| | SR7 | Surface & Middle | 5.0 | **4.8** |
| | SR10A | Surface & Middle | **4.9** | **4.7** |
| | SR10B(N) | Surface & Middle | **4.8** | **4.6** |
| | | Bottom | 4.9 | **4.5** |

Notes:
Bold means AL exceedances
Bold with underline means LL exceedances

Monitoring was undertaken by the ET of Contract No. HY/2013/01 of HKBCF. The Notification of Action/Limit Level Exceedance (20170922DO) provided by the ET of Contract No. HY/2013/01 of HKBCF are shown in **Appendix A**.

## 3. Investigation of Non-compliance

Summary of Investigation

As confirmed with Mr. Marko Chan, Environmental Officer, and operation team of Contract No. HY/2013/03, there was marine transportation on the date of exceedance. Regarding marine transportation, the vessels was sized to make sure adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash. Regarding marine-based works in Box Culvert B, the work undertaken at the date of exceedance was preparation work of precast installation which had a cofferdam to separate seawater and works area. Silt curtain was also maintained to enclose the work area of the outlet of the box culvert fully. All sea water flows into the work area of box culvert B will be treated by desilting facilities before discharge in accordance with the discharge license approved by EPD for Contract No. HY/2013/03. Besides, no organic matter discharge from the works areas (i.e. box Culvert B) was observed. It was unlikely to consume any dissolved oxygen to cause the DO exceedances recorded at the concerned WQM stations during mid-flood tide on 22 September 2017.

The location of the WQM stations where exceedances were recorded and all relevant WQM stations are shown in **Figure 1** and the locations of marine-based construction works are shown in **Figure 2**.

Investigation Results

The ET of Contract No. HY/2013/03 concluded that the captioned exceedance was not related to the construction site activities of the contract. Nevertheless, the Contractor had been reminded to comply with the requirements stipulated in the

Environmental Mitigation Implementation Schedule (EMIS) of the EM&A Manual, in particular:

- Water Quality:
  W1-
  1. barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
  2. any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
  3. loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
  4. excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
  5. adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
  6. all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.

  W2-
  1. wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
  2. 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;
  3. 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 each rainstorm;
  4. rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;
  5. measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;
  6. open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms;
  7. discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
  8. surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

## 4. Follow up Status (Exceedance)

During weekly site audit on 8, 15, 21 and 25 September 2017, ET confirmed the Contractor had provided workable and effective water quality mitigation measures.

Photos showing the site situation of marine works in Box Culvert B which was taken during the site audit in mid-October are shown in **Appendix B**.

## 5. Recommendation to the Contractor

The Contractor was reminded to continue to fully maintain all water quality mitigation measures.

## 6. Follow up Status (Overall)

The captioned exceedance was not related to the Contract and therefore, no additional follow-up action is needed. However, ET proposed recommendations to Contractor in particular to the following aspects when there are marine construction activities.

Water Quality:

- Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
- Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
- Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
- Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
- Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
- All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.
- wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
- 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 each rainstorm;
- 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;

- discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
- surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

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**Figure 1**

**The Location of WQM Stations**


**LEGEND**

- IS — IMPACT STATIONS
- CS — CONTROL / FAR FIELD STATIONS
- SR — SENSITIVE RECEIVERS STATIONS

# FIGURE 4.1– LOCATION OF WATER QUALITY MONITORING STATIONS

## SETTING OUT SCHEDULE

| MONITORING STATIONS | CO-ORDINATES | |
|---|---|---|
| | EASTING | NORTHING |
| IS5 | 811579 | 817106 |
| IS(Mf)6 | 812101 | 817873 |
| IS7 | 812244 | 818777 |
| IS8 | 814251 | 818412 |
| IS(Mf)9 | 813273 | 818850 |
| IS10 | 812577 | 820670 |
| IS10(N) | 812942 | 820455 |
| IS(Mf)11 | 813562 | 820716 |
| IS(Mf)16 | 814328 | 819497 |
| IS17 | 814539 | 820391 |
| SR3 | 810525 | 816456 |
| SR4(N) | 814705 | 817859 |
| SR5 | 811489 | 820455 |
| SR5(N) | 812569 | 821475 |
| SR6 | 805837 | 821818 |
| SR7 | 814293 | 821431 |
| SR10A | 823741 | 823495 |
| SR10B(N) | 823683 | 820881 |
| CS(Mf)3 | 809989 | 821117 |
| CS(Mf)3(N) | 808814 | 822355 |
| CS(Mf)5 | 817990 | 821129 |
| CS4 | 810025 | 824004 |
| CS6 | 817028 | 823992 |
| CSA | 818103 | 823064 |

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## Figure 2

## The Locations of Marine Transportation and Marine-based Construction Works

810000 E

815000 E

820000 E

825000 N

820000 N

815000 N

TAP SHEK KOK

CASTLE PEAK BAY

TAI LAM CHUNG

THE BROTHERS

THE SITE SEE DRAWING NO.
60191048/C3/000/C00/1003

TUEN MUN-CHEK LAP KOK LINK
(TM-CLKL) (BY OTHERS)

Sand Blanket Filling Area
of Three Runway Project

RECLAMATION FOR THE TM-CLKL
SOUTHERN LANDFALL (BY OTHERS)

OTHER INFRASTRUCTURE AND
BUILDING WORKS OUTSIDE
SITH BOUNDARY (BY OTHERS)

HONG KONG LINK ROAD (HKLR)
(SEPARATE PROJECT) (BY OTHERS)

WORKS AREA 'WA4'
SEE DRAWING NO.
60191048/C3/000/C00/1052

WORKS AREA 'WA3'
SEE DRAWING NO.
60191048/C3/000/C00/1051

CHEK LAP KOK

TUNG CHUNG

LANTAU ISLAND

NORTH LANTAU HIGHWAY

N

## NOTES:

1. COORDINATES ARE RELATED TO HONG KONG METRIC GRID (1980).
2. DIMENSIONS ARE IN MILLIMETER AND CHAINAGE ARE IN METRES UNLESS OTHERWISE SHOWN.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 60191048/C3/000/C00/1051 TO 1053.

## LEGEND:

- SITE BOUNDARY
- WORKS AREA
- Location of Box Culvert B
- Silt Curtain

| REV. 修訂 | DESCRIPTION 內容摘要 | D.C. | P.C. CHECKED 復核 | DATE 日期 |
|---|---|---|---|---|
| - | TENDER DRAWING | BWCW | SCT | MAR.14 |

路政署 HIGHWAYS DEPARTMENT
港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

HONG KONG-ZHUHAI-MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- VEHICLE CLEARANCE PLAZAS AND
ANCILLARY BUILDINGS AND FACILITIES

# SITE LOCATION PLAN

AECOM
Rogers Stirk Harbour + Partners
BURO HAPPOLD ATKINS ADI
Aedas

DRG.NO. 圖紙編號 60191048/C3/000/C00/1000

| | | |
|---|---|---|
| DESIGNED BY 設計 BWCW | CONTRACT NO. 合約編號 HY/2013/03 | P. Dir. APPROVED 批准人 TKH |
| DRAWN BY 繪圖 WSY | STATUS 階段 | |
| SCALE 比例 A1 1 : 25000 | | |
| DIMENSIONS ARE IN 尺寸單位 METRES | © COPYRIGHT RESERVED 版 權 所 有 | |

Plot File by : 2014/3/26 WANGSY

p:\projects\60191048\drawing\contract\c3\1000\C3_000_C00_1000.dgn

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# Appendix A

# Notification of Limit Level Exceedance

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**

**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170922DO

**Date of Notification:** 27 September 2017

**Works Inspected:** Data collected from water sampling works on 22 September 2017 and the results were issued on 26 September 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** Dissolved Oxygen (DO)/ ~~Suspended Solid (SS)/ Turbidity (TURB)~~

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| DO | IS8 | Surface and Middle | Surface and Middle 5.0 Bottom 4.7 | Surface and Middle 4.2 (except 5 mg/L for FCZ) Bottom 3.6 | 5.2 | **4.8** |
| | IS(Mf)9 | Surface and Middle | | | 5.3 | **4.9** |
| | IS10(N) | Surface and Middle | | | **4.8** | **4.8** |
| | | Bottom | | | **4.6** | 4.8 |
| | IS(Mf)11 | Surface and Middle | | | **4.7** | **4.9** |
| | IS(Mf)16 | Surface and Middle | | | 5.1 | **4.8** |
| | IS17 | Surface and Middle | | | 5.0 | **4.8** |
| | SR3 | Surface and Middle | | | **4.9** | 5.0 |
| | SR4(N) | Surface and Middle | | | 5.2 | **4.8** |
| | SR5(N) | Surface and Middle | | | **4.9** | **4.8** |
| | SR6 | Surface and Middle | | | **4.8** | **4.8** |
| | SR7 | Surface and Middle | | | 5.0 | **4.8** |
| | SR10A | Surface and Middle | | | **4.9** | **4.7** |
| | SR10B(N) | Surface and Middle | | | **4.8** | **4.6** |
| | | Bottom | | | 4.9 | **4.5** |

Remarks:
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.

Reviewed by : Keith Chau Title : ET Leader

Date : 27 September 2017

Copied to : Contractor, Engineer Representative and IEC/ENPO

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## Appendix B

## Photo showing the site situation of marine works in Box Culvert B

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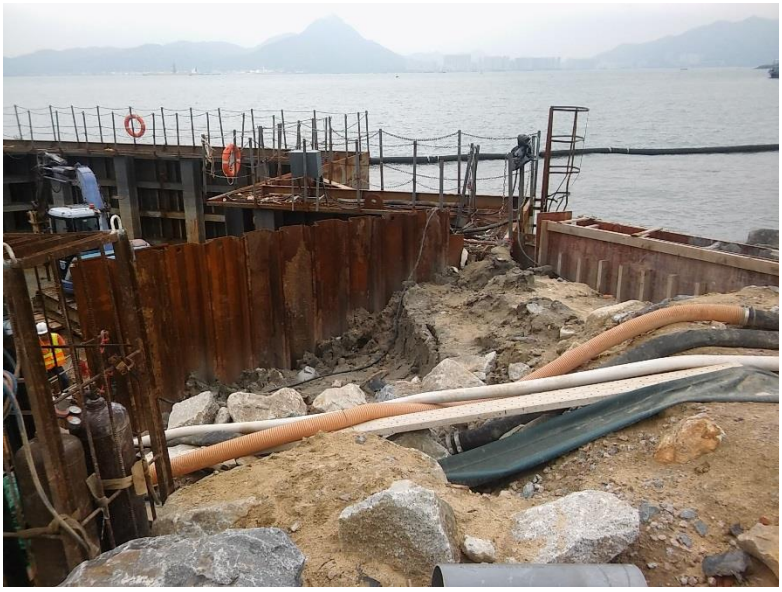

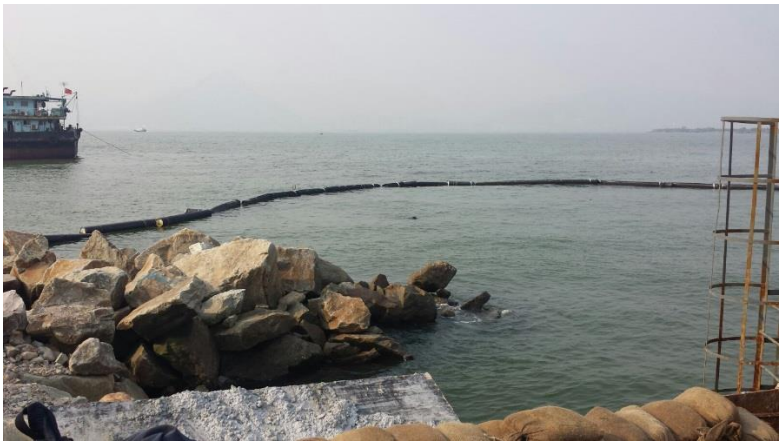

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# INVESTIGATION REPORT ON

# ACTION AND LIMIT LEVEL NON-COMPLIANCE

# FOR

# CONTRACT NO. HY/2013/03

## Hong Kong Zhuhai Macao Bridge
## Hong Kong Boundary Crossing Facilities – Vehicle Clearance Plazas and Ancillary Buildings and Facilities

**Report No. Ref.: 0165-15-IR0013**

Prepared by: Mr. Vincent Lu

Reviewed by: Mr. Bong Yu

Certified by: _____ Date: 14/12/2017

Mr. Arthur Cheng
Environmental Team Leader

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## NON-COMPLIANCE INVESTIGATION REPORT No.: 0165-15-IR0013

### 1. Project Details

Contract No.: HY/2013/03

Contract Title: Hong Kong Zhuhai Macao Bridge Hong Kong Boundary Crossing Facilities - Vehicle Clearance Plazas and Ancillary Buildings and Facilities

Project Proponent: Highways Department

Main Contractor: China Harbour Engineering Co. Ltd.

### 2. Details of Non-compliance

Notification of Action/Limit Level Exceedance (20170925DO) was forwarded by the ET of Contract No. HY/2013/01 on 4 October 2017. Notification of Action/Limit Level Exceedance (20170925SS) was forwarded by the ET of Contract No. HY/2013/01 on 9 October 2017:

Monitoring Date: 25 September 2017

The Action and Limit Levels of dissolved oxygen (DO) at determined from baseline monitoring data are listed below:

| Monitoring Parameter | Action Level (mg/L) | Limit Level (mg/L) |
|---|---|---|
| DO (Surface and Middle) | 5.0 | 4.2 (except 5 mg/L for FCZ) |
| DO (Bottom) | 4.7 | 3.6 |
| SS | 23.5 and 120% (i.e. 7.3 for mid-ebb /9.1 for mid-flood) of upstream control station's SS at the same tide of the same day | 34.4 and 130% (i.e. 7.9 for mid-ebb/9.8 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes |

| Parameter | Station | Depth | Measured at mid-ebb tide (mg/L) | Measured at mid-flood tide (mg/L) |
|---|---|---|---|---|
| DO | SR10B(N) | Surface & Middle | 5.1 | **<u>4.7</u>** |
| | | Bottom | 5.0 | **4.6** |
| SS | IS8 | Depth average | 11.3 | **30.4** |

Notes:
Bold means AL exceedances
Bold with underline means LL exceedances
Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4
Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA

Monitoring was undertaken by the ET of Contract No. HY/2013/01 of HKBCF. The Notification of Action/Limit Level Exceedance (20170925DO) & (20170925SS) provided by the ET of Contract No. HY/2013/01 of HKBCF are shown in **Appendix A**.

## 3. Investigation of Non-compliance

Summary of Investigation

As confirmed with Mr. Marko Chan, Environmental Officer, and operation team of Contract No. HY/2013/03, there was marine transportation on the date of exceedance. Regarding marine transportation, the vessels was sized to make sure adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash. For SS exceedance recorded at the WQM station IS8, the concerned WQM stations where the exceedances were recorded were not close to the marine delivery route of Contract No. HY/2013/03, while there was no notification of exceedance received at the WQM stations closer to the marine delivery route, such as IS(Mf)11. Regarding marine-based works in Box Culvert B, the work undertaken at the date of exceedance was preparation work of precast installation which had a cofferdam to separate seawater and works area. Silt curtain was also maintained to enclose the work area of the outlet of the box culvert fully. All sea water flows into the work area of box culvert B will be treated by desilting facilities before discharge in accordance with the discharge license approved by EPD for Contract No. HY/2013/03. In addition, the concerned WQM station where exceedances were recorded (i.e. SR10B(N)) was far away from the marine works area of Contract No. HY/2013/03, while there was no notification of exceedance received at the WQM stations closer to the works areas, such as IS(Mf)11. It was unlikely to consume any dissolved oxygen to cause the DO exceedances recorded at the concerned WQM stations during mid-flood and mid-ebb tide on 25 September 2017.

For SS exceedance, the exceedance recorded at the concerned WQM station (i.e. IS8) is far away from the marine works area of Contract No. HY/2013/03, while there was no notification of exceedance received at the WQM stations closer to the works areas, such as IS(Mf)11. It was unlikely that the works undertaken by Contract No. HY/2013/03 caused SS exceedance recorded at the concerned WQM station during mid-flood tide on 25 September 2017.

The location of the WQM stations where exceedances were recorded and all relevant WQM stations are shown in **Figure 1** and the locations of marine-based construction works are shown in **Figure 2**.

Investigation Results

The ET of Contract No. HY/2013/03 concluded that the captioned exceedance was not related to the construction site activities of the contract. Nevertheless, the Contractor had been reminded to comply with the requirements stipulated in the Environmental Mitigation Implementation Schedule (EMIS) of the EM&A Manual, in particular:

- Water Quality:
  W1-
  1. barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
  2. any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
  3. loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
  4. excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
  5. adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
  6. all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.

  W2-
  1. wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
  2. 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;
  3. 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 each rainstorm;
  4. rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;
  5. measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;
  6. open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms;
  7. discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
  8. surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

## 4. Follow up Status (Exceedance)

During weekly site audit on 8, 15, 21 and 25 September 2017, ET confirmed the Contractor had provided workable and effective water quality mitigation measures.

Photos showing the site situation of marine works in Box Culvert B which was taken during the site audit in mid-October are shown in **Appendix B**.

## 5. Recommendation to the Contractor

The Contractor was reminded to continue to fully maintain all water quality mitigation measures.

## 6. Follow up Status (Overall)

The captioned exceedance was not related to the Contract and therefore, no additional follow-up action is needed. However, ET proposed recommendations to Contractor in particular to the following aspects when there are marine construction activities.

Water Quality:

- Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
- Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
- Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
- Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
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- All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.
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- 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 each rainstorm;
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- measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;
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- surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

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**Figure 1**

**The Location of WQM Stations**


**LEGEND**

- IS — IMPACT STATIONS
- CS — CONTROL / FAR FIELD STATIONS
- SR — SENSITIVE RECEIVERS STATIONS

# FIGURE 4.1– LOCATION OF WATER QUALITY MONITORING STATIONS

## SETTING OUT SCHEDULE

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|---|---|---|
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| IS(Mf)9 | 813273 | 818850 |
| IS10 | 812577 | 820670 |
| IS10(N) | 812942 | 820455 |
| IS(Mf)11 | 813562 | 820716 |
| IS(Mf)16 | 814328 | 819497 |
| IS17 | 814539 | 820391 |
| SR3 | 810525 | 816456 |
| SR4(N) | 814705 | 817859 |
| SR5 | 811489 | 820455 |
| SR5(N) | 812569 | 821475 |
| SR6 | 805837 | 821818 |
| SR7 | 814293 | 821431 |
| SR10A | 823741 | 823495 |
| SR10B(N) | 823683 | 820881 |
| CS(Mf)3 | 809989 | 821117 |
| CS(Mf)3(N) | 808814 | 822355 |
| CS(Mf)5 | 817990 | 821129 |
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## Figure 2

## The Locations of Marine Transportation and Marine-based Construction Works

810000 E

815000 E

820000 E

825000 N

820000 N

815000 N

TAP SHEK KOK

CASTLE PEAK BAY

TAI LAM CHUNG

THE BROTHERS

THE SITE SEE DRAWING NO.
60191048/C3/000/C00/1003

TUEN MUN-CHEK LAP KOK LINK
(TM-CLKL) (BY OTHERS)

Sand Blanket Filling Area
of Three Runway Project

RECLAMATION FOR THE TM-CLKL
SOUTHERN LANDFALL (BY OTHERS)

OTHER INFRASTRUCTURE AND
BUILDING WORKS OUTSIDE
SITH BOUNDARY (BY OTHERS)

HONG KONG LINK ROAD (HKLR)
(SEPARATE PROJECT) (BY OTHERS)

WORKS AREA 'WA4'
SEE DRAWING NO.
60191048/C3/000/C00/1052

WORKS AREA 'WA3'
SEE DRAWING NO.
60191048/C3/000/C00/1051

CHEK LAP KOK

TUNG CHUNG

LANTAU ISLAND

NORTH LANTAU HIGHWAY

N

## NOTES:

1. COORDINATES ARE RELATED TO HONG KONG METRIC GRID (1980).
2. DIMENSIONS ARE IN MILLIMETER AND CHAINAGE ARE IN METRES UNLESS OTHERWISE SHOWN.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 60191048/C3/000/C00/1051 TO 1053.

## LEGEND:

- SITE BOUNDARY
- WORKS AREA
- Location of Box Culvert B
- Silt Curtain

| REV. 修訂 | DESCRIPTION 內容摘要 | D.C. | P.C. CHECKED 復核 | DATE 日期 |
|---|---|---|---|---|
| - | TENDER DRAWING | BWCW | SCT | MAR.14 |

路政署 HIGHWAYS DEPARTMENT
港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

HONG KONG-ZHUHAI-MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- VEHICLE CLEARANCE PLAZAS AND
ANCILLARY BUILDINGS AND FACILITIES

# SITE LOCATION PLAN

AECOM
Rogers Stirk Harbour + Partners
BURO HAPPOLD ATKINS ADI
Aedas

DRG.NO. 圖紙編號 60191048/C3/000/C00/1000

| | | |
|---|---|---|
| DESIGNED BY 設計 BWCW | CONTRACT NO. 合約編號 HY/2013/03 | P. Dir. APPROVED 批准人 TKH |
| DRAWN BY 繪圖 WSY | STATUS 階段 | |
| SCALE 比例 A1 1 : 25000 | | |
| DIMENSIONS ARE IN 尺寸單位 METRES | © COPYRIGHT RESERVED 版 權 所 有 | |

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# Appendix A

# Notification of Limit Level Exceedance

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**

**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170925DO

**Date of Notification:** 3 October 2017

**Works Inspected:** Data collected from water sampling works on 25 September 2017 and the results were issued on 29 September 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** Dissolved Oxygen (DO)/ ~~Suspended Solid (SS)/ Turbidity (TURB)~~

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| DO | SR10B(N) | Surface and Middle | Surface and Middle 5.0 Bottom 4.7 | Surface and Middle 4.2 (except 5 mg/L for FCZ) Bottom 3.6 | 5.1 | **<u>4.7</u>** |
| | | Bottom | | | 5.0 | **4.6** |

Remarks:
**Bold** means AL exceedances.
**<u>Bold with underline</u>** means LL exceedances.

Reviewed by : Keith Chau Title : ET Leader

Date : 3 October 2017

Copied to : Contractor, Engineer Representative and IEC/ENPO

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**

**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170925SS

**Date of Notification:** 9 October 2017

**Works Inspected:** Data collected from water sampling works on 25 September 2017 and the results were issued on 6 October 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** ~~Dissolved Oxygen (DO)~~/ Suspended Solid (SS)~~/ Turbidity (TURB)~~

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| SS | IS8 | Depth Average | 23.5 and 120% (i.e. 7.3 for mid-ebb/9.1 for mid-flood) of upstream control station's SS at the same tide of the same day | 34.4 and 130% (i.e. 7.9 for mid-ebb/9.8 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes | 11.3 | **30.4** |

Remarks:
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.
Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4
Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA

Reviewed by : Keith Chau Title : ET Leader

Date : 9 October 2017

Copied to : Contractor, Engineer Representative and IEC/ENPO

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## Appendix B

## Photo showing the site situation of marine works in Box Culvert B

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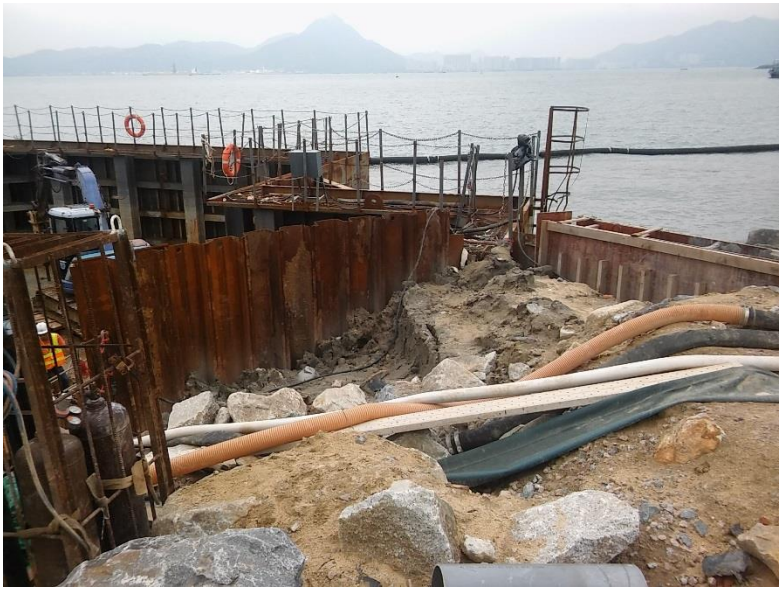

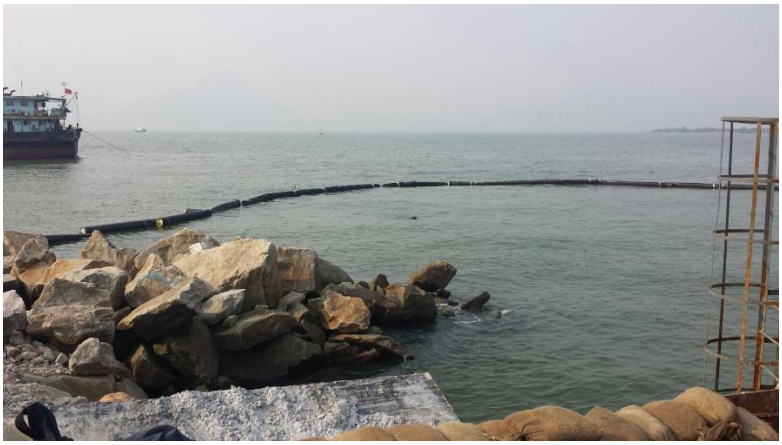

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# INVESTIGATION REPORT ON

# ACTION AND LIMIT LEVEL NON-COMPLIANCE

# FOR

# CONTRACT NO. HY/2013/03

## Hong Kong Zhuhai Macao Bridge
## Hong Kong Boundary Crossing Facilities – Vehicle Clearance Plazas and Ancillary Buildings and Facilities

**Report No. Ref.: 0165-15-IR0014**

Prepared by: Mr. Vincent Lu

Reviewed by: Mr. Bong Yu

Certified by: _____ Date: 14/12/2017

Mr. Arthur Cheng
Environmental Team Leader

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## NON-COMPLIANCE INVESTIGATION REPORT No.: 0165-15-IR014

### 1. Project Details

Contract No.: HY/2013/03

Contract Title: Hong Kong Zhuhai Macao Bridge Hong Kong Boundary Crossing Facilities - Vehicle Clearance Plazas and Ancillary Buildings and Facilities

Project Proponent: Highways Department

Main Contractor: China Harbour Engineering Co. Ltd.

### 2. Details of Non-compliance

Notification of Action/Limit Level Exceedance (20170927_DO_NOE_v1) were forwarded by the ET of Contract No. HY/2013/01 on 4 October 2017:

Monitoring Date: 27 September 2017

The Action and Limit Levels of dissolved oxygen (DO) at determined from baseline monitoring data are listed below:

| Monitoring Parameter | Action Level (mg/L) | Limit Level (mg/L) |
|---|---|---|
| DO (Surface and Middle) | 5.0 | 4.2 (except 5 mg/L for FCZ) |
| DO (Bottom) | 4.7 | 3.6 |

| Parameter | Station | Depth | Measured at mid-ebb tide (mg/L) | Measured at mid-flood tide (mg/L) |
|---|---|---|---|---|
| DO | IS10(N) | Bottom | **4.6** | 5.0 |
| | IS17 | Bottom | **4.6** | 4.8 |
| | SR5(N) | Bottom | **4.6** | 5.0 |
| | SR10A | Bottom | 5.3 | **4.6** |
| | SR10B(N) | Surface & Middle | 5.0 | **4.7** |
| | | Bottom | **4.4** | **4.4** |

Notes:
Bold means AL exceedances
Bold with underline means LL exceedances

Monitoring was undertaken by the ET of Contract No. HY/2013/01 of HKBCF. The Notification of Action/Limit Level Exceedance (20170927_DO_NOE_v1) provided by the ET of Contract No. HY/2013/01 of HKBCF are shown in **Appendix A**.

## 3. Investigation of Non-compliance

Summary of Investigation

As confirmed with Mr. Marko Chan, Environmental Officer, and operation team of Contract No. HY/2013/03, there was marine transportation on the date of exceedance. Regarding marine transportation, the vessels was sized to make sure adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash. Regarding marine-based works in Box Culvert B, the work undertaken at the date of exceedance was preparation work of precast installation which had a cofferdam to separate seawater and works area. Silt curtain was also maintained to enclose the work area of the outlet of the box culvert fully. All sea water flows into the work area of box culvert B will be treated by desilting facilities before discharge in accordance with the discharge license approved by EPD for Contract No. HY/2013/03. In addition, the concerned WQM stations where the exceedances were recorded were far away from the marine works area of Contract No. HY/2013/03, while there was no notification of exceedance received at the WQM stations closer to the works areas, such as IS(Mf)11. It was unlikely to consume any dissolved oxygen to cause the DO exceedances recorded at the concerned WQM stations during mid-flood tide on 27 September 2017.

The location of the WQM stations where exceedances were recorded and all relevant WQM stations are shown in **Figure 1** and the locations of marine-based construction works are shown in **Figure 2**.

Investigation Results

The ET of Contract No. HY/2013/03 concluded that the captioned exceedance was not related to the construction site activities of the contract. Nevertheless, the Contractor had been reminded to comply with the requirements stipulated in the Environmental Mitigation Implementation Schedule (EMIS) of the EM&A Manual, in particular:

- Water Quality:
  W1-
  1. barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
  2. any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
  3. loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
  4. excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
  5. adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
  6. all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that

undue turbidity is not generated by turbulence from vessel movement or propeller wash.

W2-

1. wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
2. 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;
3. 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 each rainstorm;
4. rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;
5. measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;
6. open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms;
7. discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
8. surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

## 4. Follow up Status (Exceedance)

During weekly site audit on 15, 21, 25 September 2017 and 6 October 2017, ET confirmed the Contractor had provided workable and effective water quality mitigation measures.

Photos showing the site situation of marine works in Box Culvert B which was taken during the site audit in mid-October are shown in **Appendix B**.

## 5. Recommendation to the Contractor

The Contractor was reminded to continue to fully maintain all water quality mitigation measures.

## 6. Follow up Status (Overall)

The captioned exceedance was not related to the Contract and therefore, no additional follow-up action is needed. However, ET proposed recommendations to Contractor in particular to the following aspects when there are marine construction activities.

Water Quality:

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- Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
- Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
- Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
- Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
- Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
- All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.
- wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
- 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 each rainstorm;
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- 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;
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**Figure 1**

**The Location of WQM Stations**


**LEGEND**

- IS — IMPACT STATIONS
- CS — CONTROL / FAR FIELD STATIONS
- SR — SENSITIVE RECEIVERS STATIONS

# FIGURE 4.1– LOCATION OF WATER QUALITY MONITORING STATIONS

## SETTING OUT SCHEDULE

| MONITORING STATIONS | CO-ORDINATES | |
|---|---|---|
| | EASTING | NORTHING |
| IS5 | 811579 | 817106 |
| IS(Mf)6 | 812101 | 817873 |
| IS7 | 812244 | 818777 |
| IS8 | 814251 | 818412 |
| IS(Mf)9 | 813273 | 818850 |
| IS10 | 812577 | 820670 |
| IS10(N) | 812942 | 820455 |
| IS(Mf)11 | 813562 | 820716 |
| IS(Mf)16 | 814328 | 819497 |
| IS17 | 814539 | 820391 |
| SR3 | 810525 | 816456 |
| SR4(N) | 814705 | 817859 |
| SR5 | 811489 | 820455 |
| SR5(N) | 812569 | 821475 |
| SR6 | 805837 | 821818 |
| SR7 | 814293 | 821431 |
| SR10A | 823741 | 823495 |
| SR10B(N) | 823683 | 820881 |
| CS(Mf)3 | 809989 | 821117 |
| CS(Mf)3(N) | 808814 | 822355 |
| CS(Mf)5 | 817990 | 821129 |
| CS4 | 810025 | 824004 |
| CS6 | 817028 | 823992 |
| CSA | 818103 | 823064 |

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## Figure 2

## The Locations of Marine Transportation and Marine-based Construction Works

810000 E

815000 E

820000 E

825000 N

820000 N

815000 N

TAP SHEK KOK

CASTLE PEAK BAY

TAI LAM CHUNG

THE BROTHERS

THE SITE SEE DRAWING NO.
60191048/C3/000/C00/1003

TUEN MUN-CHEK LAP KOK LINK
(TM-CLKL) (BY OTHERS)

Sand Blanket Filling Area
of Three Runway Project

RECLAMATION FOR THE TM-CLKL
SOUTHERN LANDFALL (BY OTHERS)

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CHEK LAP KOK

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NORTH LANTAU HIGHWAY

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## NOTES:

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## LEGEND:

- SITE BOUNDARY
- WORKS AREA
- Location of Box Culvert B
- Silt Curtain

| REV. 修訂 | DESCRIPTION 內容摘要 | D.C. | P.C. CHECKED 復核 | DATE 日期 |
|---|---|---|---|---|
| - | TENDER DRAWING | BWCW | SCT | MAR.14 |

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港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

HONG KONG-ZHUHAI-MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- VEHICLE CLEARANCE PLAZAS AND
ANCILLARY BUILDINGS AND FACILITIES

# SITE LOCATION PLAN

AECOM
Rogers Stirk Harbour + Partners
BURO HAPPOLD ATKINS ADI
Aedas

DRG.NO. 圖紙編號 60191048/C3/000/C00/1000

| | | |
|---|---|---|
| DESIGNED BY 設計 BWCW | CONTRACT NO. 合約編號 HY/2013/03 | P. Dir. APPROVED 批准人 TKH |
| DRAWN BY 繪圖 WSY | STATUS 階段 | |
| SCALE 比例 A1 1 : 25000 | | |
| DIMENSIONS ARE IN 尺寸單位 METRES | © COPYRIGHT RESERVED 版 權 所 有 | |

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# Appendix A

# Notification of Limit Level Exceedance

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**
**Notifications of Environmental Quality Limits Exceedances** **Notification No.: 20170927_DO_NOE_v1**

**Date of Notification:** 4 October 2017

**Works Inspected:** Data collected from water sampling works on 27 September 2017 and the results were issued on 3 October 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** Dissolved Oxygen (DO)/ ~~Suspended Solid (SS)/ Turbidity (TURB)~~

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| DO | IS10(N) | Bottom | Surface and Middle 5.0 Bottom 4.7 | Surface and Middle 4.2 (except 5 mg/L for FCZ) Bottom 3.6 | **4.6** | 5.0 |
| DO | IS17 | Bottom | | | **4.6** | 4.8 |
| DO | SR5(N) | Bottom | | | **4.6** | 5.0 |
| DO | SR10A | Bottom | | | 5.3 | **4.6** |
| DO | SR10B(N) | Surface and Middle | | | 5.0 | **4.7** |
| DO | SR10B(N) | Bottom | | | **4.4** | **4.4** |

Remarks:
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.
Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4
Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA

Reviewed by : Keith Chau Title : ET Leader

Date : 04-Oct-17

Copied to : Contractor, Engineer Representative and IEC/ENPO

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# Appendix B

## Photo showing the site situation of marine works in Box Culvert B

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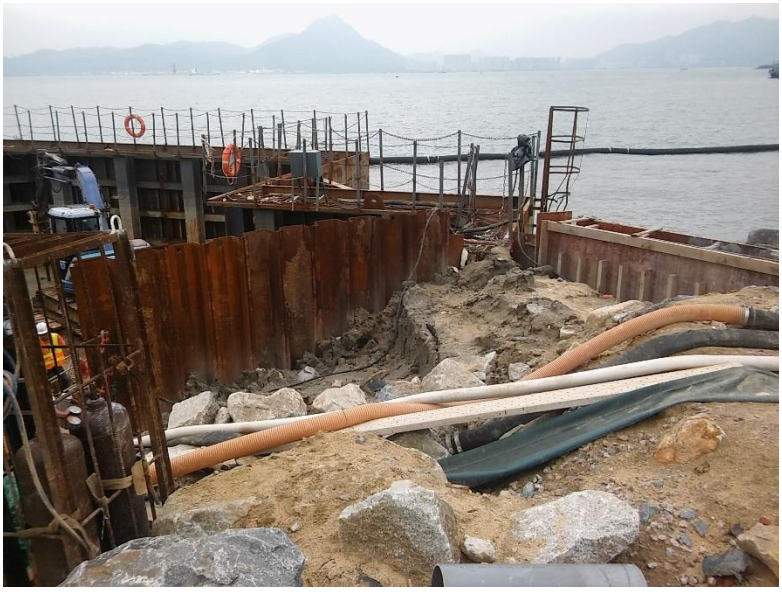

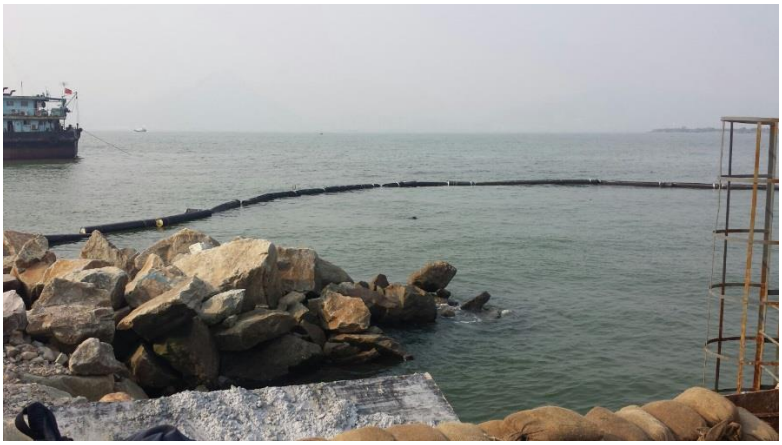

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# INVESTIGATION REPORT ON

# ACTION AND LIMIT LEVEL NON-COMPLIANCE

# FOR

# CONTRACT NO. HY/2013/03

## Hong Kong Zhuhai Macao Bridge
## Hong Kong Boundary Crossing Facilities – Vehicle Clearance Plazas and Ancillary Buildings and Facilities

**Report No. Ref.: 0165-15-IR0015**

Prepared by: Mr. Vincent Lu

Reviewed by: Mr. Bong Yu

Certified by: _____ Date: 14/12/2017

Mr. Arthur Cheng
Environmental Team Leader

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## NON-COMPLIANCE INVESTIGATION REPORT No.: 0165-15-IR015

### 1. Project Details

Contract No.: HY/2013/03

Contract Title: Hong Kong Zhuhai Macao Bridge Hong Kong Boundary Crossing Facilities - Vehicle Clearance Plazas and Ancillary Buildings and Facilities

Project Proponent: Highways Department

Main Contractor: China Harbour Engineering Co. Ltd.

### 2. Details of Non-compliance

Notification of Action/Limit Level Exceedance (20170929DO) were forwarded by the ET of Contract No. HY/2013/01 on 9 October 2017:

Monitoring Date: 29 September 2017

The Action and Limit Levels of dissolved oxygen (DO) at determined from baseline monitoring data are listed below:

| Monitoring Parameter | Action Level (mg/L) | Limit Level (mg/L) |
|---|---|---|
| DO (Surface and Middle) | 5.0 | 4.2 (except 5 mg/L for FCZ) |
| DO (Bottom) | 4.7 | 3.6 |

| Parameter | Station | Depth | Measured at mid-ebb tide (mg/L) | Measured at mid-flood tide (mg/L) |
|---|---|---|---|---|
| DO | IS5 | Bottom | 4.8 | **4.4** |
| | IS7 | Bottom | **4.3** | 15.0 |
| | IS8 | Bottom | **4.4** | 5.7 |
| | IS10(N) | Surface & Middle | **4.8** | 6.2 |
| | | Bottom | **4.2** | **4.2** |
| | IS(Mf)11 | Bottom | **4.6** | **4.1** |
| | IS(Mf)16 | Bottom | **4.4** | 5.5 |
| | IS17 | Bottom | 4.7 | **4.2** |
| | SR5(N) | Bottom | **4.3** | **4.2** |
| | SR10B(N) | Bottom | **4.5** | 5.0 |

Notes:
Bold means AL exceedances
Bold with underline means LL exceedances
Red tide was observed by ET for Contract No. HY/2013/01 near WQM stations, SR3, IS5, IS(Mf)6, IS7 and IS(Mf)16, during mid-flood tide on 29 September 2017

Monitoring was undertaken by the ET of Contract No. HY/2013/01 of HKBCF. The Notification of Action/Limit Level Exceedance (20170927_DO_NOE_v1) provided by the ET of Contract No. HY/2013/01 of HKBCF are shown in **Appendix A**.

## 3. Investigation of Non-compliance

Summary of Investigation

As confirmed with Mr. Marko Chan, Environmental Officer, and operation team of Contract No. HY/2013/03, there was marine transportation on the date of exceedance. Regarding marine transportation, the vessels was sized to make sure adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash. Regarding marine-based works in Box Culvert B, the work undertaken at the date of exceedance was preparation work of precast installation which had a cofferdam to separate seawater and works area. Silt curtain was also maintained to enclose the work area of the outlet of the box culvert fully. All sea water flows into the work area of box culvert B will be treated by desilting facilities before discharge in accordance with the discharge license approved by EPD for Contract No. HY/2013/03. It was unlikely to consume any dissolved oxygen to cause the DO exceedances recorded at the concerned WQM stations during mid-flood tide on 29 September 2017.

The location of the WQM stations where exceedances were recorded and all relevant WQM stations are shown in **Figure 1** and the locations of marine-based construction works are shown in **Figure 2**.

Investigation Results

The ET of Contract No. HY/2013/03 concluded that the captioned exceedance was not related to the construction site activities of the contract. Nevertheless, the Contractor had been reminded to comply with the requirements stipulated in the Environmental Mitigation Implementation Schedule (EMIS) of the EM&A Manual, in particular:

- Water Quality:
  W1-
  1. barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
  2. any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
  3. loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
  4. excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
  5. adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
  6. all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that

undue turbidity is not generated by turbulence from vessel movement or propeller wash.

W2-

1. wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
2. 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;
3. 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 each rainstorm;
4. rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;
5. measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;
6. open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms;
7. discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
8. surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

## 4. Follow up Status (Exceedance)

During weekly site audit on 15, 21, 25 September 2017 and 6 October 2017, ET confirmed the Contractor had provided workable and effective water quality mitigation measures.

Photos showing the site situation of marine works in Box Culvert B which was taken during the site audit in mid-October are shown in **Appendix B**.

## 5. Recommendation to the Contractor

The Contractor was reminded to continue to fully maintain all water quality mitigation measures.

## 6. Follow up Status (Overall)

The captioned exceedance was not related to the Contract and therefore, no additional follow-up action is needed. However, ET proposed recommendations to Contractor in particular to the following aspects when there are marine construction activities.

Water Quality:

- Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;

- Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
- Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation;
- Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved;
- Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; and
- All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.
- wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
- 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 each rainstorm;
- 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;
- discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
- surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

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**Figure 1**

**The Location of WQM Stations**


**LEGEND**

- IS — IMPACT STATIONS
- CS — CONTROL / FAR FIELD STATIONS
- SR — SENSITIVE RECEIVERS STATIONS

# FIGURE 4.1– LOCATION OF WATER QUALITY MONITORING STATIONS

## SETTING OUT SCHEDULE

| MONITORING STATIONS | CO-ORDINATES | |
|---|---|---|
| | EASTING | NORTHING |
| IS5 | 811579 | 817106 |
| IS(Mf)6 | 812101 | 817873 |
| IS7 | 812244 | 818777 |
| IS8 | 814251 | 818412 |
| IS(Mf)9 | 813273 | 818850 |
| IS10 | 812577 | 820670 |
| IS10(N) | 812942 | 820455 |
| IS(Mf)11 | 813562 | 820716 |
| IS(Mf)16 | 814328 | 819497 |
| IS17 | 814539 | 820391 |
| SR3 | 810525 | 816456 |
| SR4(N) | 814705 | 817859 |
| SR5 | 811489 | 820455 |
| SR5(N) | 812569 | 821475 |
| SR6 | 805837 | 821818 |
| SR7 | 814293 | 821431 |
| SR10A | 823741 | 823495 |
| SR10B(N) | 823683 | 820881 |
| CS(Mf)3 | 809989 | 821117 |
| CS(Mf)3(N) | 808814 | 822355 |
| CS(Mf)5 | 817990 | 821129 |
| CS4 | 810025 | 824004 |
| CS6 | 817028 | 823992 |
| CSA | 818103 | 823064 |

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## Figure 2

## The Locations of Marine Transportation and Marine-based Construction Works

810000 E

815000 E

820000 E

825000 N

820000 N

815000 N

TAP SHEK KOK

CASTLE PEAK BAY

TAI LAM CHUNG

THE BROTHERS

THE SITE SEE DRAWING NO.
60191048/C3/000/C00/1003

TUEN MUN-CHEK LAP KOK LINK
(TM-CLKL) (BY OTHERS)

Sand Blanket Filling Area
of Three Runway Project

RECLAMATION FOR THE TM-CLKL
SOUTHERN LANDFALL (BY OTHERS)

OTHER INFRASTRUCTURE AND
BUILDING WORKS OUTSIDE
SITH BOUNDARY (BY OTHERS)

HONG KONG LINK ROAD (HKLR)
(SEPARATE PROJECT) (BY OTHERS)

WORKS AREA 'WA4'
SEE DRAWING NO.
60191048/C3/000/C00/1052

WORKS AREA 'WA3'
SEE DRAWING NO.
60191048/C3/000/C00/1051

CHEK LAP KOK

TUNG CHUNG

LANTAU ISLAND

NORTH LANTAU HIGHWAY

N

## NOTES:

1. COORDINATES ARE RELATED TO HONG KONG METRIC GRID (1980).
2. DIMENSIONS ARE IN MILLIMETER AND CHAINAGE ARE IN METRES UNLESS OTHERWISE SHOWN.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 60191048/C3/000/C00/1051 TO 1053.

## LEGEND:

- SITE BOUNDARY
- WORKS AREA
- Location of Box Culvert B
- Silt Curtain

| REV. 修訂 | DESCRIPTION 內容摘要 | D.C. | P.C. CHECKED 復核 | DATE 日期 |
|---|---|---|---|---|
| - | TENDER DRAWING | BWCW | SCT | MAR.14 |

路政署 HIGHWAYS DEPARTMENT
港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

HONG KONG-ZHUHAI-MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- VEHICLE CLEARANCE PLAZAS AND
ANCILLARY BUILDINGS AND FACILITIES

# SITE LOCATION PLAN

AECOM
Rogers Stirk Harbour + Partners
BURO HAPPOLD ATKINS ADI
Aedas

DRG.NO. 圖紙編號 60191048/C3/000/C00/1000

| | | |
|---|---|---|
| DESIGNED BY 設計 BWCW | CONTRACT NO. 合約編號 HY/2013/03 | P. Dir. APPROVED 批准人 TKH |
| DRAWN BY 繪圖 WSY | STATUS 階段 | |
| SCALE 比例 A1 1 : 25000 | | |
| DIMENSIONS ARE IN 尺寸單位 METRES | © COPYRIGHT RESERVED 版 權 所 有 | |

Plot File by : 2014/3/26 WANGSY

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# Appendix A

# Notification of Limit Level Exceedance

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**Contract No. HY/2013/01 -**
**Hong Kong- Zhuhai- Macao Bridge**
**Hong Kong Boundary Crossing Facilities – Passenger Clearance Building**
**Notifications of Environmental Quality Limits Exceedances** Notification No.: 20170929DO

**Date of Notification:** 9 October 2017

**Works Inspected:** Data collected from water sampling works on 29 September 2017 and the results were issued on 6 October 2017

**Monitoring Location:** Water Quality Monitoring Station

**Parameter:** Dissolved Oxygen (DO)/ ~~Suspended Solid (SS)/ Turbidity (TURB)~~

**Action & Limit Level (AL & LL) / Measured Level:**

| PARAM | STATION | DEPTH | AL (mg/L) | LL (mg/L) | MEASURED AT MID-EBB TIDE (mg/L) | MEASURED AT MID-FLOOD TIDE (mg/L) |
|---|---|---|---|---|---|---|
| DO | IS5 | Bottom | Surface and Middle 5.0 Bottom 4.7 | Surface and Middle 4.2 (except 5 mg/L for FCZ) Bottom 3.6 | 4.8 | **4.4** |
| | IS7 | Bottom | | | **4.3** | 15.0 |
| | IS8 | Bottom | | | **4.4** | 5.7 |
| | IS10(N) | Surface and Middle | | | **4.8** | 6.2 |
| | | Bottom | | | **4.2** | **4.2** |
| | IS(Mf)11 | Bottom | | | **4.6** | **4.1** |
| | IS(Mf)16 | Bottom | | | **4.4** | 5.5 |
| | IS17 | Bottom | | | 4.7 | **4.2** |
| | SR5(N) | Bottom | | | **4.3** | **4.2** |
| | SR10B(N) | Bottom | | | **4.5** | 5.0 |

Remarks:
**Bold** means AL exceedances.
**Bold with underline** means LL exceedances.

Reviewed by : Keith Chau Title : ET Leader

Date : 9 October 2017

Copied to : Contractor, Engineer Representative and IEC/ENPO

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## Appendix B

## Photo showing the site situation of marine works in Box Culvert B

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