Summary of Model Setup and Inputs

1. Model Parameters for Sediment Release

The setup of the model to simulate the sediment plume including the characteristics of the sediments in terms of settling velocity and other parameters are detailed in **Table C.1**.

Table C.1: Summary of proposed parameters for sediment plume model using Delft3D-PART

Sediment Plume Model Parameters	Assumed Values
Settling velocity	0.5 mm/s
Critical shear stress for deposition	0.2 N/m^2
Critical shear stress for erosion	0.3 N/m^2
Vertical Dispersion (Wet Season)	0.00001 m^2/s
Vertical Dispersion (Dry Season)	0.005 m^2/s
Horizontal Dispersion coefficient a	1
Horizontal Dispersion coefficient b	0.001
Manning's n	0.02 m

Source:
1. Water Supplies Department, EIA Report (ref. EIA-131/2007) for Laying of Western Cross Harbour Main and Associated Land Mains from West Kowloon to Sai Ying Pun
2. Highways Department, EIA Report (ref. EIA-173/2009) for Hong Kong - Zhuhai - Macao Bridge Hong Kong Boundary Crossing Facilities

A summary of the plant types and sediment loss rates input into the model are shown in **Table C.2** and **Table C.3**.

Table C.2: Summary of Sediment Loss Rates for 3RS Project

Worst Case Scenario	Scenario Date	Bathymetry to be Used in Hydraulic Model	Working Areas	Work Type	Plant Type	Number of Plant	Production Rate/unit (m^3/s)	Cycle Time (s)	Production Rate/unit (kg/s)[1]	Material Fines Content (%)	Sediment Loss Rate/unit (%)	Sediment Loss Rate (kg/s)	Cycles /Day	Total Daily Productivity (m3/d)	Total Daily Sediment Losses (kg/d)
A	Q1-Q3 2016	Baseline	A1-01	Sand Blanket	TSHD	1	0.278	13,320	510.1	10%	5%	2.55	3	11,109	101,924
			A1-03	Sand Blanket	TSHD	3	0.278	13,320	510.1	10%	5%	2.55	2	22,218	203,848
			A1-04	Sand Blanket	TSHD	3	0.278	13,320	510.1	10%	5%	2.55	1	11,109	101,924
			A1-07	Sand Blanket	TSHD	2	0.278	13,320	510.1	10%	5%	2.55	1	7,406	67,949
			A1-08A	Sand Blanket	TSHD	1	0.278	13,320	510.1	10%	5%	2.55	2	7,406	67,949
			A1-08B	Sand Blanket	TSHD	1	0.278	13,320	510.1	10%	5%	2.55	1	3,703	33,975
			A2-03B*	Sand Blanket	TSHD	1	0.278	32,400	510.1	10%	5%	2.55	1	9,007	82,641
			A2-04*	Sand Blanket	TSHD	1	0.278	32,400	510.1	10%	5%	2.55	1	9,007	82,641
			A2-06*	Sand Blanket	TSHD	1	0.278	32,400	510.1	10%	5%	2.55	1	9,007	82,641
			A2-07A*	Sand Blanket	TSHD	1	0.278	32,400	510.1	10%	5%	2.55	1	9,007	82,641
			A2-07B*	Sand Blanket	TSHD	1	0.278	32,400	510.1	10%	5%	2.55	1	9,007	82,641
			A2-08	Sand Blanket	TSHD	1	0.278	13,320	510.1	10%	5%	2.55	1	3,703	33,975
			A2-09	Sand Blanket	TSHD	1	0.278	13,320	510.1	10%	5%	2.55	1	3,703	33,975
			A1-03	Ground Improvement	DCM Barge	1	0.115	120	211.0	10%	5%	1.06	30	414	3,798
			A1-07	Ground Improvement	DCM Barge	1	0.115	120	211.0	10%	5%	1.06	30	414	3,798
			A1-08A	Ground Improvement	DCM Barge	3	0.115	120	211.0	10%	5%	1.06	30	1,242	11,395
B	Q4 2016 - Q3 2017	Baseline (with modification for construction areas with completed 2m sand blanket)	A2-02B*	Sand Blanket	TSHD	1	0.278	32,400	510.1	10%	5%	2.55	1	9,007	82,641
			A1-05	Ground Improvement	DCM Barge	7	0.115	120	211.0	10%	5%	1.06	30	2,898	26,589
			A1-05	Ground Improvement	DCM Barge	7	0.115	120	211.0	10%	5%	1.06	40	3,864	35,452
			A1-06	Ground Improvement	DCM Barge	3	0.115	120	211.0	10%	5%	1.06	30	1,242	11,395
			A1-06	Ground Improvement	DCM Barge	3	0.115	120	211.0	10%	5%	1.06	40	1,656	15,194
			A1-07	Ground Improvement	DCM Barge	4	0.115	120	211.0	10%	5%	1.06	30	1,656	15,194
			A2-02B	Ground Improvement	DCM Barge	4	0.115	120	211.0	10%	5%	1.06	60	3,312	30,388
			A1-07	Ground Improvement	DCM Barge	4	0.115	120	211.0	10%	5%	1.06	60	3,312	30,388
			A2-05A	Ground Improvement	DCM Barge	4	0.115	120	211.0	10%	5%	1.06	60	3,312	30,388
			A3-01A[#]	Ground Improvement	DCM Barge	2	0.056	120	102.8	10%	5%	0.51	60	806	7,399
			A3-02A[#]	Ground Improvement	DCM Barge	8	0.056	120	102.8	10%	5%	0.51	60	3,226	29,595
			A1-01	Sand Filling	TSHD	4	0.833	4,440	1,528.6	20%	5%	15.29	2	29,588	542,943
			A1-02	Sand Filling	TSHD	2	0.833	4,440	1,528.6	20%	5%	15.29	2	14,794	271,471
			A1-03	Sand Filling	TSHD	5	0.833	4,440	1,528.6	20%	5%	15.29	1	18,493	339,339
			A1-04	Sand Filling	TSHD	5	0.833	4,440	1,528.6	20%	5%	15.29	1	18,493	339,339
			A1-07	Sand Filling	TSHD	2	0.833	4,440	1,528.6	20%	5%	15.29	2	14,794	271,471
			A1-08A	Sand Filling	TSHD	2	0.833	4,440	1,528.6	20%	5%	15.29	2	14,794	271,471
			A1-08B	Sand Filling	TSHD	1	0.833	4,440	1,528.6	20%	5%	15.29	3	11,096	203,604
			A1-09	Sand Filling	TSHD	2	0.833	4,440	1,528.6	20%	5%	15.29	1	7,397	135,736
			A2-03B*	Sand Filling	TSHD	1	0.833	10,800	1,528.6	20%	5%	15.29	2	17,993	330,168
			A2-05B*	Sand Filling	TSHD	1	0.833	10,800	1,528.6	20%	5%	15.29	2	17,993	330,168
			A2-06*	Sand Filling	TSHD	1	0.833	10,800	1,528.6	20%	5%	15.29	2	17,993	330,168
			A2-07A*	Sand Filling	TSHD	1	0.833	10,800	1,528.6	20%	5%	15.29	1	8,996	165,084
			A2-07B*	Sand Filling	TSHD	1	0.833	10,800	1,528.6	20%	5%	15.29	1	8,996	165,084
			A2-08	Sand Filling	TSHD	1	0.833	4,440	1,528.6	20%	5%	15.29	1	3,699	67,868
			A2-09	Sand Filling	TSHD	1	0.833	4,440	1,528.6	20%	5%	15.29	2	7,397	135,736
			A3-01A*	Sand Filling	TSHD	1	0.833	10,800	1,528.6	20%	5%	15.29	1	8,996	165,084
C	Q2 2015 - Q2 2016	Baseline	I	Water Jetting	Jetter Machine	1	0.03125	36,000	28.125	NA	10%	2.813	1	1,125	101,250
			II	Dredging	Grab Dredger	1	0.00833	36,000	Sediment release per grab = 20 kg/m^3			0.167	1	300	6,000

Table C.3: Summary of Sediment Loss Rates for Concurrent Projects

Concurrent Projects	Bathymetry to be Used in Hydraulic Model	Working Areas	Work Type	Plant Type	Number of Plant	Production Rate/unit	Cycle Time (s)	Production Rate/unit (kg/s)	Material Fines Content (%)	Sediment Loss Rate/unit (%)	Sediment Loss Rate (kg/s)	Cycles/ Day	Total Daily Productivity (m3/d)	Total Daily Sediment Losses (kg/d)
HKBCF	Same as project scenario being modelled	Portion C2	Filling (Public Fill)	Hopper Barge	2	1,200 m^3/event	14,400	NA	25%	5%	0.371	4	9,000	42,750
		Portion C2	Filling (Sand Fill)	Hopper Barge	1	1,000 m^3/event	2,700	NA	5%	5%	0.311	21	21,000	17,640
HKLR		Portion C	Dredging for Piling	Grab Dredger	35	24 m^3/day	57,600	Loss rate per grab = 1 kg/m^3			0.0004	1	840	836
MDF		Pit 1	Capping	Barge	1	650 m^3/event	instantaneous	NA	NA	NA	14,625	41	26,700	599,625
		Pit Vb	Filling	Barge	1	650 m^3/event	instantaneous	NA	NA	NA	14,625	41	26,700	599,625
LLP		Area 1B	Dredging	Grab Dredger	2	4,900 m^3/day	43,200	Loss rate per grab = 17 kg/m^3			0.578	1	9,800	49,939
		Area 1B	Filling	Pelican Barge	1	800 m^3/hr	43,200	373.33	10%	10%	2.053	1	9,600	88,704
		Area 1C	Dredging	Grab Dredger	2	4,900 m^3/day	43,200	Loss rate per grab = 17 kg/m^3			0.578	1	9,800	49,939
		Area 1C	Filling	Pelican Barge	1	800 m^3/hr	43,200	373.33	10%	10%	2.053	1	9,600	88,704
KTCB		Z2C3	Dredging	Grab Dredger	1	2,750 m^3/day (dry season) 4,000 m^3/day (wet season)	72,000	Sediment release per grab = 20 kg/m^3			0.99 (dry season) 1.44 (wet season)	1	2,750 (dry season) 4,000 (wet season)	71,280 (dry season) 103,680 (wet season)
		Z8	Dredging	Grab Dredger	1	4,000 m^3/day	72,000	Sediment release per grab = 20 kg/m^3			1.44	1	4,000	103,680
		Z12	Dredging	Grab Dredger	1	4,000 m^3/day	72,000	Sediment release per grab = 20 kg/m^3			1.44	1	4,000	103,680
Tonggu Channel Maintenance Dredging		Zone I	Dredging (flood tide only)	TSHD	1	125 m^3/min	2,100	Sediment release = 7 kg/m^3			14.6	1	4,375	30,660
		Zone II	Dredging (ebb tide only)	TSHD	1	125 m^3/min	2,100	Sediment release = 7 kg/m^3			14.6	2	8,750	61,320
		Zone III	Dredging	TSHD	1	104 m^3/min	3,600	Sediment release = 7 kg/m^3 (first 55 mins) 15 kg/m^3 (last 5 mins)			12.1 (first 55 mins) 26.0 (last 5 mins)	2	6,240	95,460
Tai O STW		Submarine Outfall	Dredging	Grab Dredger	1	500 m^3/day	28,800	Sediment release per grab = 20 kg/m^3			0.35	1	500	10,000

Note:

1. Density of sand is assumed to be 1,835 kg/m^3

* Assumes sand deployment from a 9,000 m^3 capacity TSHD. Other works areas assume sand deployed from a 3,700 m^3 TSHD.

DCM associated with Stage 3 works area

2. Model Parameters for Residual Chlorine and Biocide Release

The setup of the operation phase PART model to simulate the residual chlorine and biocide are detailed in **Table C.4**.

Table C.4: Summary of proposed parameters for residual chlorine and biocide level model using Delft3D-PART

Sediment Plume Model Parameters	Assumed Values	
	Chlorine	Biocide
T90 Factor	8,289 s	N/A
1st Order Decay Rate	24 /day	0 /day
Settling Velocity	0 mm/s	0 mm/s
Vertical Dispersion (Wet Season)	0.00001 m^2/s	0.00001 m^2/s
Vertical Dispersion (Dry Season)	0.005 m^2/s	0.005 m^2/s

A summary of chlorine and biocide release rates adopted in the model is shown in **Table C.5** and **Table C.6**.

Table C.5: Summary of chlorine release rates

Scenario	Discharge Point	Flow Rate (L/s)	Concentration (mg/L)	Frequency / Duration	Total Daily Release (kg/d)
Year 2026 With Project	Existing stormwater outfall No.7	7,070	0.5	24 hrs/day continuous	305
	Existing stormwater outfall No.8	5,368	0.5	24 hrs/day continuous	232
	New stormwater outfall No.14	7,400	0.5	24 hrs/day continuous	320

Table C.6: Summary of biocide release rates

Scenario	Discharge Point	Flow Rate (L/s)	Concentration (mg/L)	Cycles	Total Release (kg)
Pre-run Year 2026 With Project	Existing stormwater outfall No.7	7,070	2.0	24 hrs/day continuous	1,222 / day
	Existing stormwater outfall No.8	5,368	2.0	24 hrs/day continuous	928 / day
	New stormwater outfall No.14	7,400	2.0	24 hrs/day continuous	1,279 / day
Year 2026 With Project	Existing stormwater outfall No.7	7,070	2.0	1 hr/week	51 / week
	Existing stormwater outfall No.8	5,368	2.0	1 hr/week	39 / week
	New stormwater outfall No.14	7,400	2.0	1 hr/week	53 / week

3. Model Runs

Based on the model scenarios specified in **Section 8.6** of the EIA report, a summary of the model runs are shown in **Table C.7**.

Table C.7: Summary of Model Runs

Model ID	Name and Model Year	Description	Model Outputs	Remarks
FLOW MODELS				
B1	Baseline Model (2012)	Simulation of existing flow conditions using the original Western Harbour Model (WHM) grid	Water level, temperature, salinity, current velocity for near-field, mid-field and far-field locations, and discharge through major navigation channels and sections	Cooling water discharges from power stations included
B2	Baseline Model (2012) – refined grid for verification	Simulation of existing flow conditions using the WHM but with a refined grid in the vicinity of the project area to provide a higher resolution; this refined model will be verified by comparing with the original WHM	Water level, temperature, salinity, current velocity for near-field, mid-field and far-field locations, and discharge through major navigation channels and sections; all plots to be compared to B1 model	Successive model runs to ensure spin-up period is sufficient and the model is stabilised; cooling water discharges from power stations included
B3	Baseline Model (2012) – refined model without Project	Verified model from B2; this model will be the basis for updating to suit the use of different scenarios (prior to completion of the project)	NA	Basic setup only – no real model run
B4	Baseline Model (2012) – refined model with Project	Verified model from B2; this model will be the basis for updating to suit the use of the operation phase 'with project' scenario	NA	Basic setup only – no real model run
C1	Flow Model for Construction Phase (2016)	Model setup (based on B3) for simulation of construction phase water quality impact associated with the project and concurrent projects in 2016	Communication files for P1	Updated with changes in bathymetry and land boundaries due to concurrent projects, and incorporating the physical conditions of worst case scenario A
C2	Flow Model for Construction Phase (2017)	Model setup (based on B3) for simulation of construction phase water quality impact associated with the project and concurrent projects in 2017	Communication files for P2	Updated with changes in bathymetry and land boundaries due to concurrent projects, and incorporating the physical conditions of worst case scenario B
O1	Flow Model for Operation Phase (2026) – without Project	Model setup (based on B3) for simulation of operation phase water quality impact with future flow conditions and completion of concurrent projects, in the absence of the 3rd runway project. This will become the basis for	Tidal flow characteristics (water level, temperature, salinity, current velocity and discharge); all plots to be compared to B2 model	Updated with changes in discharge, bathymetry and land boundaries due to completed concurrent projects in 2026 (excluding the project)

Model ID	Name and Model Year	Description	Model Outputs	Remarks
		evaluation against O2	Communication files for W1	
O2	Flow Model for Operation Phase (2026) – with Project	Model setup (based on B4) for simulation of operation phase water quality impact with future flow conditions and completion of concurrent projects, with the 3rd runway project in place. This will be compared against O1 to derive the contribution from the project.	Tidal flow characteristics (water level, temperature, salinity, current velocity and discharge); all plots to be compared to B2 and O1model Communication files for W2	Updated with changes in discharge, bathymetry and land boundaries due to completed concurrent projects in 2026 (including the project)
PART MODELS				
P1	Sediment Plume Model for Construction Phase (2016)	Simulation of sediment plume dispersion using flow model outputs from C1 and sediment loss associated with this project and concurrent projects	Suspended solids (SS) levels and deposition rates at WSRs and observation points	Other water quality parameters to be interpreted from SS elevations
P2	Sediment Plume Model for Construction Phase (2017)	Simulation of sediment plume dispersion using flow model outputs from C2 and sediment loss associated with this project and concurrent projects	Suspended solids (SS) levels and deposition rates at WSRs and observation points	Other water quality parameters to be interpreted from SS elevations
P3	Dilution Model for Construction Phase (2016)	Simulation of dilution rate based on a unit discharge of a conservative tracer using flow model outputs from C1	Tracer concentration at WSRs and observation points	Use to estimate contaminant concentrations due to release of pore water from ground improvement works
P4	Residual Chlorine / Biocide Model for Operation Phase (2026)	Simulation of residual chlorine and biocide from spent cooling discharge using flow model outputs from O2	Residual chlorine and biocide levels at WSRs and observation points	
WAQ MODELS				
W1	Water Quality Model for Operation Phase (2026) – without Project	Simulation of water quality using flow model outputs from O1 and contribution from the pollution loading inventory for 2026 (excluding the project). This will become the basis for evaluation against W2	Water quality parameters including temperature, salinity, DO, BOD, SS, TIN, NH_3 (unionised), *E.coli*, and sedimentation at WSRs and observation points	Other water quality parameters such as Ortho Phosphate, Dissolved Silica, Copper and Inorganic Matter to be incorporated into the model as processes only
W2	Water Quality Model for Operation Phase (2026) – with Project	Simulation of water quality using flow model outputs from O2 and contribution from the pollution loading inventory for 2026 (including the project). This will be compared against W1 to derive the contribution from the project.	Water quality parameters including temperature, salinity, DO, BOD, SS, TIN, NH_3 (unionised), *E.coli*, and sedimentation at WSRs and observation points; all plots to be compared to W1 model	Other water quality parameters such as Ortho Phosphate, Dissolved Silica, Copper and Inorganic Matter to be incorporated into the model as processes only