APPENDIX 7.1 METHODOLOGY FOR ECOLOGICAL RISK ASSESSMENTS

Assessment Approach

1.1 Ecological Risk Assessment (ERA) consisted of the following phases:

- Problem Formulation
- COPC Identification and Selection of COC
- Exposure Characterization
- Ecological Effects Characterization
- Risk Characterization

1.2 The assessment approach for ERA was based on the approach suggested in the Study Brief, which is very similar to the assessment framework documented in Guidelines for Ecological Risk Assessment by USEPA (1998). The Guidelines consist of three phases: problem formulation, analysis phase (including evaluation data and models; characterization of exposure; characterization of ecological effects), risk characterization (including risk estimation; risk description).

Problem Formulation

1.3 The following tasks were accomplished in this phase:

- Establish objective of the assessment
- Establish scope of the assessment
- Establish focus of the assessment
- Construct Site Conceptual Model
- Define assessment endpoint(s)

1.4 The objective, scope and focus of the risk assessments have been discussed in **Section 7** of the EIA report.

Site Conceptual Model

1.5 The SCMs adopted in the risk assessments were presented graphically in **Figures 7.1 to 7.2**. As seen in the figures, there are 3 types of exposure pathway in terms of completeness and significance, namely "exposure pathway complete and significant", "exposure pathway complete, but insignificant or significance unknown" and "exposure pathway incomplete". For the exposure pathway "complete and significant", it means that contaminants can be up-taken by receptors through that pathway and the amount of uptake can be considerable to contribute to the risk level. This type of exposure pathway was considered in the risk assessment.

1.6 For the exposure pathway "complete, but insignificant or significance unknown", it means that contaminants can be up-taken by receptors through that pathway but the amount of uptake is not sufficiently large to affect the risk level or the amount of uptake through that pathway is uncertain for determining the risk level. This type of exposure pathway was not considered in the risk assessment. For the "incomplete exposure pathway", it means that the contaminants cannot be up-taken by the receptor through that pathway because there is no complete route for the contaminants to reach the receptor. This type of exposure pathway was not considered in the risk assessment.

1.7 The SCMs were presented in text as shown in **Tables 1** to **2**.

Table 1 SCM for Ecological Risk Assessment – Aquatic Life

Contaminant Source:	Effluent from the outfall of SCISTW
Receptor:	Aquatic life
Complete and Significant Exposure Media and Pathway:	• Direct contact of seawater • Gill uptake of seawater

Table 2 SCM for Ecological Risk Assessment – Marine Mammals

Contaminant Source:	Effluent from the outfall of SCISTW
Receptor:	Marine Mammals (dolphin/porpoise)
Complete and Significant Exposure Media and Pathway:	• Ingestion of seawater • Consumption of contaminated food

1.8 Direct contact (i.e. dermal exposure) with seawater was considered as a complete but insignificant pathway for marine mammals which have lungs, and therefore avoid the osmotic problem that occurs from saltwater. This is different from fish, which have gills that are relatively permeable to water. In addition, to obtain an osmotic balance with the surrounding saltwater, marine mammals must excrete water rather than take it in through dermal absorption to maintain an osmotic balance (Schmidt-Neilsen (1990) as in SSDS EIA (1998)). Therefore, the dermal exposure pathway was considered to be a "complete but insignificant pathway".

Assessment Endpoint

1.9 The assessment endpoint for the ERA – Aquatic Life is defined as protection of aquatic life at population level from chronic exposure to contaminants produced in disinfection process from SCISTW. The measurement endpoint for the ERA – Aquatic Life is the surface water concentration for a particular COC that is unlikely to produce adverse effects to any aquatic organisms over long-term chemical exposure.

1.10 The assessment endpoint for the ERA – Marine Mammals is defined as protection of marine mammals from chronic exposure of contaminants produced in disinfection process via the ingestion of diluted effluent from SCISTW and the dietary ingestion of food over a relatively long period of time. The measurement endpoint for the ERA – Marine Mammals is the dose chemical doses that are unlikely to produce adverse effects to dolphins or porpoises over long-term chemical exposure.

Identification of COPC and Selection of COC

Identification of COPC

1.11 A total number of 35 chemicals were identified as COPCs in the risk assessments. The COPCs included 9 chlorination by-products (CBPs) regulated by USEPA National Primary Drinking Water Standards; 25 priority pollutants[1] (which may contain potential CBPs) regulated by the USA National Pollutant Discharge Elimination System (NPDES)[2]; and total residual chlorine (as disinfectant residue). The list of COPCs was presented in **Table 3**.

[1] The 25 pollutants are regulated in NPDES due to their presence in industrial effluent but not their possible generation in chlorination process. However, a conservative approach is adopted to study all these regulated chlorinated organic substances, which are documented as potential CBPs, in US drinking water and wastewater discharge.

[2] The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into water of the United States. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters.

Table 3 List of Contaminants of Potential Concern

CBPs regulated by USEPA National Primary Drinking Water Standards	Priority Pollutants listed in NPDES Permit Application Testing Requirements (40 CFR 122, Appendix D, Tables II to V), which may contain CBPs	Disinfectant Residue
Chloroform	Methylene chloride	Total residual chloride
Bromodichloromethane	Carbon tetrachloride	
Dibromochloromethane	Chlorobenzene	
Bromoform	1,1-dichloroethane	
Chloroacetic acid	1,2-dichloroethane	
Bromoacetic acid	1,1-dichloroethylene	
Dibromoacetic acid	1,2-dichloropropane	
Dichloroacetic acid	Tetrachloroethylene	
Trichloroacetic acid	1,1,1-trichloroethane	
	1,1,2-trichloroethane	
	Trichloroethylene	
	2-chlorophenol	
	2,4-dichlorophenol	
	p-chloro-m-cresol	
	Pentachlorophenol	
	2,4,6-trichlorophenol	
	Bis(2-chloroethoxy)methane	
	1,4-dichlorobenzene	
	Hexachlorobenzene	
	Hexachlorocyclopentadiene	
	Hexachloroethane	
	1,2,4-trichlorobenzene	
	Alpha-benzene hexachloride	
	Beta-benzene hexachloride	
	Gamma-benzene hexachloride	

1.12 Unlike other conventional human health/ecological risk assessments for air pollution source (e.g. incinerator) and contaminated land/groundwater, a look-up table of contaminants/list of possible COPC for CBPs risk assessment in effluent was not identified from local and overseas authorities. Moreover, according to the review of local and overseas practice, list of "regulated CBPs in sewage effluent" was not identified.

1.13 Hence, a conservative approach was adopted in this Study to include all the regulated CBPs in drinking water plus the 25 priority pollutants (may contain potential CBPs) regulated by NPDES as COPCs, although these pollutants are not regulated due to the concern of generation during chlorination process.

1.14 The NPDES practice was adopted because it contains the most comprehensive list of regulated pollutants for effluent discharge, based on the review of practice in the USA, the United Kingdom, Australia, Canada, China and Hong Kong. Moreover, the purpose of NPDES is to ensure the US National Water Quality Criteria are complied by regulating pollutant concentrations in effluent discharge directly to surface water, in order to protect the human health and aquatic life.

1.15 Therefore, the 35 COPCs identified for the risk assessment include all documented potential CBPs/disinfectant residue which are regulated due to their potential to cause impact to human health and/or ecological resources. The list of identified COPCs (which the COCs for risk calculation were selected from the list) was considered sufficiently comprehensive to assess the potential risk to human health/ecological resources due to chronic exposure to the contaminants produced in the disinfection process in the effluent discharges.

1.16 The dechlorination agent - sodium bisulphite was not considered to pose an ecological risk issue but a physical stress related to water quality impact arising from dissolved oxygen uptake. Hence, chemical species (sodium, bisulphite, sulphite and sulphate) associated with sodium bisulphite were not identified as the COPCs in ERA.

Selection of COC

1.17 The concentrations of the identified COPCs in chlorinated/dechlorinated (C/D) CEPT effluent from SCISTW (for assessment scenarios 1 to 4), secondary treated effluent from Shatin/Tai Po Sewage Treatment Works (for assessment scenario 5) and ambient seawater (2 sampling locations) were determined by chemical analysis works. The COC selection and determination of COC effluent concentrations for risk assessments were based on the chemical analysis results and the following rules.

Rules of COC Selection

Rule A – COPCs without relevant toxicity values, standards or criteria were not selected as COCs for risk assessments.

Rule B - COPCs detected in the C/D effluent were selected as COCs for risk assessment. The highest value from the replicates of analysis was chosen as the effluent concentrations to use in the risk assessment calculations.

Rule C – Non-detected COPCs with detection limit (for C/D effluent samples) exceeds the Concentration of Interest[3] (COI) were selected as COCs. For these COCs, effluent concentrations used in the risk assessments are one-half of the detection limit, which is a standard approach accepted by USEPA.

Rule D – COPCs with concentration in C/D effluent lower than the ambient seawater concentration were not selected as COCs.

Rules of COC Ambient Seawater Concentration Determination

Rule E – The highest COC concentrations found in the replicates of ambient seawater analysis were used to represent the background concentrations in the risk assessment calculations.

Rule F – For COCs that were not detected in the ambient seawater samples, the background concentration was set as zero.

1.18 Based on the chemical analysis results and above rules, COCs were selected for the risk assessments for Scenarios 1 to 4 and Scenario 5 and presented in **Tables 4** and **5** respectively.

[3] The COIs for human health were the standards for drinking/tap water while the COIs for ecological resources were based on the water quality criteria or toxicity reference value derived in this study. The list of COIs are presented in Annex A.

Table 4 Results of COCs Selection for Scenarios 1 to 4

	Selected as COC for				
COPC	**ERA – Aquatic Life**	**ERA – Marine Mammals**	**Max. Conc. in C/D CEPT Effluent (µg/L)**	**Max. Conc. in Ambient Seawater (µg/L)**	**Note**
Total residual chloride	Yes	Yes	100	0	
Chloroform	Yes	Yes	7	0	
Bromodichloromethane			<5	0	
Dibromochloromethane			<5	0	
Bromoform			<5	0	
Chloroacetic acid	Yes	Yes	4	0	
Bromoacetic acid			<2	0	
Dibromoacetic acid	Yes	Yes	4	0	
Dichloroacetic acid	Yes	Yes	45.9	0	
Trichloroacetic acid	Yes	Yes	22	0	
Methylene chloride			<20	55	
Carbon tetrachloride			<0.5	0	
Chlorobenzene			<0.5	0	
1,1-dichloroethane			<0.5	0	A
1,2-dichloroethane			<0.5	0	
1,1-dichloroethylene			<0.5	0	
1,2-dichloropropane			<0.5	0	
Tetrachloroethylene	Yes	Yes	1.3	0	
1,1,1-trichloroethane			<0.5	0	
1,1,2-trichloroethane			<0.5	0	
Trichloroethylene	Yes	Yes	2	0	
2-chlorophenol			<0.5	0	
2,4-dichlorophenol			<0.5	0	
p-chloro-m-cresol			<0.5	0	
Pentachlorophenol			<2.5	0	
2,4,6-trichlorophenol	Yes	Yes	2	0	
Bis(2-chloroethoxy)methane			<0.5	0	
1,4-dichlorobenzene			<0.5	0	
Hexachlorobenzene	Yes	Yes	<0.5	0	B
Hexachlorocyclopentadiene			<2.5	0	
Hexachloroethane			<0.5	0	
1,2,4-trichlorobenzene			<0.5	0	
Alpha-benzene hexachloride			<0.5	0	
Beta-benzene hexachloride	Yes	Yes	<1	0	B
Gamma-benzene hexachloride	Yes	Yes	<1	0	B

Note: A) No available toxicity data for aquatic life
B) Detection limit exceeds the concentration of interest for aquatic life

Table 5 Results of COCs Selection for Scenario 5

	Selected as COC for				
COPC	**ERA – Aquatic Life**	**ERA – Marine Mammals**	**Max. Conc. in Secondary Treated Effluent (µg/L)**	**Max. Conc. in Ambient Seawater (µg/L)**	**Note**
Total residual chloride	Yes	Yes	<20	0	A
Chloroform			<5	0	
Bromodichloromethane			<5	0	
Dibromochloromethane	Yes	Yes	8	0	
Bromoform	Yes	Yes	49	0	
Chloroacetic acid			<2	0	
Bromoacetic acid			<2	0	
Dibromoacetic acid	Yes	Yes	10	0	
Dichloroacetic acid	Yes	Yes	3	0	
Trichloroacetic acid	Yes	Yes	7	0	
Methylene chloride			<20	55	
Carbon tetrachloride			<0.5	0	
Chlorobenzene			<0.5	0	
1,1-dichloroethane			<0.5	0	B
1,2-dichloroethane			<0.5	0	
1,1-dichloroethylene			<0.5	0	
1,2-dichloropropane			<0.5	0	
Tetrachloroethylene			<0.5	0	
1,1,1-trichloroethane			<0.5	0	
1,1,2-trichloroethane			<0.5	0	
Trichloroethylene			<0.5	0	
2-chlorophenol			<0.5	0	
2,4-dichlorophenol			<0.5	0	
p-chloro-m-cresol			<0.5	0	
Pentachlorophenol			<2.5	0	
2,4,6-trichlorophenol			<0.5	0	
Bis(2-chloroethoxy)methane			<0.5	0	
1,4-dichlorobenzene			<0.5	0	
Hexachlorobenzene	Yes	Yes	<0.5	0	A
Hexachlorocyclopentadiene			<2.5	0	
Hexachloroethane			<0.5	0	
1,2,4-trichlorobenzene			<0.5	0	
Alpha-benzene hexachloride			<0.5	0	
Beta-benzene hexachloride	Yes	Yes	<1	0	A
Gamma-benzene hexachloride	Yes	Yes	<1	0	A

Note: A) Detection limit exceeds the concentration of interest for aquatic life
B) No available toxicity data for aquatic life

Exposure Assessment

Ecological Risk Assessment – Aquatic Life

1.19 COC exposure by aquatic life was characterized as the COC concentrations in seawater. The COC concentrations in the seawater at the edge of the ZID and the edge of the mixing zone, which were determined by using dilution factors estimated in water quality modelling, were adopted as the COC exposure concentration by aquatic life.

1.20 The risk of individual COCs was characterized by hazard quotient which was composed of COC concentration at exposure point as numerator and the derived COC-specific toxicity reference value (TRV) as denominator (more details were presented below). Moreover, the averaging time of COC concentration used for hazard quotient calculation should match the averaging time of the TRV of the corresponding COC.

1.21 **Table 6** summarized the averaging time of different TRVs and the corresponding dilution factor for COC concentration calculation.

Table 6 Averaging Time of TRVs and Corresponding Dilution Factor

TRV Averaging Time	Dilution Factor at Edge of ZID	Dilution Factor at Edge of Mixing Zone
Daily	Minimum dilution factor in dry and wet season	Minimum dilution factor in dry and wet season
4-day	Minimum dilution factor in dry and wet season[a]	Minimum 4-day average dilution factor in dry and wet season
Annual	Annual weighted average dilution factor	Annual weighted average dilution factor
"To be complied at least 90% of occasions"	10 %tile dilution factor in dry and wet season[b]	10 %tile dilution factor in dry and wet season[b]
Seasonal[c]	The lower value of weight average dilution factor estimated for dry season and that of wet season	The lower value of weight average dilution factor estimated for dry season and that of wet season

Note: [a] Minimum dilution factor was adopted as a conservative estimate
[b] Dilution factor exceeded 90% of the time (i.e. 10% of values are below this value)
[c] For COC without water quality standard/criteria, which TRV was derived from toxicity data

Ecological Risk Assessment – Marine Mammals

1.22 This phase would comprise the following tasks:

- Water quality modelling
- Exposure setting characterization, which consists of the following tasks:
  - Characterize potential marine mammals receptors
  - Calculate the COC exposure

Water Quality Modelling

1.23 The water quality modelling has been conducted in this assignment and the results obtained were used for the risk assessment.

Exposure Setting Characterization

Potential Marine Mammals Receptors Characterization

1.24 The following parameters will be characterized for both dolphins and porpoises receptors:

- Contaminated water/seafood ingestion rate
- Proportion of dietary prey item (shellfish and fish) in diet
- Area use factor (the fraction of time for the receptor resides and feeds in the impacted area)
- Body weight

1.25 **Table 7** presented the parameter values of marine mammals receptors, which were adopted in Montgomery Watson (1998) "Strategic Sewage Disposal Scheme – Environmental Impact Assessment Study – Technical Note 4. Detailed Risk Assessment (Final Version).

Table 7 Parameter Values of Marine Mammals Receptors

Parameter	Value		Unit
	Dolphin	Porpoise	
Ingestion rate of food	0.065	0.075	kg food/kg body weight/d
Ingestion rate of water	12.5	12.5	ml water/kg body weight/d
Body Weight	225	55	kg
Area use factor	0.25	0.15	fraction
Fraction of dietary prey item in diet (fish/shellfish percent)	90/10	50/50	percent

COC Exposure Calculation

1.26 The COC exposure would be calculated by the following equation, which is adopted from SSDS/EIAS DRA (1998).

$$Dose_i = \{(IR_{food} \times BW \times C_{fish} \times FP_{fish} \times AUF) + (IR_{food} \times BW \times C_{shellfish} \times FP_{shellfish} \times AUF) + (IR_{water} \times BW \times C_{water} \times AUF)\} / BW$$

Equation 1

Where

$Dose_i$ = Daily Dose of COC *i* (mg/kg/day)
$C_{fish/shellfish}$ = COC concentration in fish/shellfish (mg/kg)
C_{water} = COC concentration in seawater (mg/L)
$IR_{food/water}$ = Ingestion rate of food or effluent (kg food/kg/day or L water/kg/day)
BW = Body weight of receptor (kg)
AUF = Area use factor (fraction)
$FP_{fish/shellfish}$ = Fraction of dietary prey item in diet (fraction)

1.27 The COC concentration in the prey item (fish and shellfish) of the marine mammals would be calculated by the following equation, which is adopted from USEPA (1999b).

$$C_{is} = C_{iw} \times BCF_i \times FCM_i$$

Equation 2

Where

C_{is} = contaminant *i* concentration in fish/shellfish (mg/kg)
C_{iw} = contaminant *i* concentration in seawater (mg/kg)
BCF_i = water-to-fish/water-to-invertebrate bioconcentration factor for contaminant *i* (L/kg)
FCM_i = food chain multiplier of contaminant *i* (unitless)

1.28 Annual average COC concentrations at the edge of the ZID estimated by the water quality modelling were used for exposure calculation.

1.29 Bioconcentration factor and food chain multiplier for COCs were presented in **Table 8**.

Table 8 Bioconcentration Factor and FCM

COC	Water-to-fish Bioconcentration Factor[a]	Trophic Level 4 FCM[b]	Water-to-aquatic invertebrates Bioconcentration Factor	Trophic Level 3 FCM[b]
Total residual chlorine	N/A	N/A	N/A	N/A
Bromoform	13.3	1.0	6.60[c]	1.0
Bromodichloromethane	8.26	1.0	3.68[c]	1.0
Chloroform	6.92	1.0	2.82[d]	1.0
Dibromochloromethane	10.4	1.0	4.79[c]	1.0
Chloroacetic acid	0.26	1.0	0.11[c]	1.0
Dibromoacetic acid	0.82	1.0	0.31[c]	1.0
Dichloroacetic acid	1.13	1.0	0.41[c]	1.0
Trichloroacetic acid	2.66	1.0	0.88[c]	1.0
Tetrachloroethylene	82.8	1.0	43.5[c]	1.1
2,4,6-trichlorophenol	56.1	1.0	76.6[c]	1.1
Hexachlorobenzene	2400	1.0	2595[d]	1.0
Beta-BHC	168	1.0	89.1[c]	1.2
Gamma-BHC	168	1.0	79.6[c]	1.2

N/A: Not Available
Note: [a] Also refer to Table 8.
[b] The FCMs were developed using K_{ow} values reported in USEPA (1995), as in USEPA (1999b).
[c] No recommended BCF value identified. Regression equation was used to calculate the BCF values (Southworth *et al.* (1978), as in USEPA (1999b)).
[d] Recommended BCF value in USEPA (1999b).

Ecological Effects Characterization (for ERA – Aquatic Life)

1.30 The ecological effects of COC exposure to aquatic life were characterized by comparing the COC concentrations in the seawater at the edge of the ZID and the edge of the mixing zone to the TRV for aquatic life. TRVs for COCs were derived from water quality criteria/standards for protection of aquatic life when available; for COCs without such criteria/standards, toxicity values obtained from the scientific literature were used to derive TRVs. Details on the TRV derivation process were presented in **Annex B**; derived TRVs for risk calculations were presented in **Table 9**.

Table 9 Derived TRVs for Aquatic Life

COC	TRV for ecological resources (µg/L)	Averaging Time
Total residual chloride	13 at edge of ZID, 8 at edge of mixing zone	Daily average
Chloroform	12	Annual average
Dibromochloromethane	34	Annual average
Bromoform	360	Annual average
Chloroacetic acid	32,000	Seasonal average
Bromoacetic acid	1,600	Seasonal average
Dibromoacetic acid	690	Seasonal average
Dichloroacetic acid	230	Seasonal average
Trichloroacetic acid	93,000	Seasonal average
Tetrachloroethylene	8.85	Annual average
Trichloroethylene	10	Annual average
2,4,6-trichlorophenol	12.1	Seasonal average
Hexachlorobenzene	0.03	Annual average
Beta-benzene hexachloride	0.046	Annual average
Gamma-benzene hexachloride	0.063	Annual average

Ecological Effects Characterization (for ERA – Marine Mammals)

1.31 The ecological effects of COC exposure to marine mammals were characterized by comparing the COC daily dose to the toxicity reference doses for the marine mammals, which were derived by reviewing the toxicological effects data from various scientific literature, database and guidelines. Details on the toxicity reference dose derivation process were presented in **Annex C**; derived toxicity reference dose for risk calculations were presented in **Table 10**.

Table 10 Derived Toxicity Reference Dose for Marine Mammals

COC	Toxicity Reference Dose Derived (mg/kg/d)
Bromoform	12.5
Chloroform	3.75
Dibromochloromethane	10.0
Dibromoacetic acid	0.025
Chloroacetic acid	0.1875
Dichloroacetic acid	0.095
Trichloroacetic acid	0.45
Total residual chlorine	1.875
Tetrachloroethylene	6.7
Trichloroethylene	13.7125
2,4,6-trichlorophenol	169.5
Hexachlorobenzene	0.3
Beta-BHC	0.1125
Gamma-BHC	1

Risk/Hazard Characterization

Ecological Risk Assessment – Aquatic Life

1.32 The risk associated with the COCs to the aquatic life were characterized by COC-specific hazard quotients (HQs) and hazard index (HI), estimated by the following equations:

HQ_i = Conc. of COC *i* in effluent or seawater / TRV for COC *i* Equation 3

Where
HQ_i = Hazard Quotient for exposure to identified COC_i

$HI = \Sigma HQ_i$ Equation 4

Where
HI = Hazard Index, total hazard attributable to exposure to all identified COCs

Ecological Risk Assessment – Marine Mammals

1.33 The risk associated with the COCs to the marine mammals were characterized by COC-specific hazard quotients (HQs) and hazard index (HI), estimated by the following equations:

HQ_i = Daily Dose of COC *i* / Toxicity Reference Dose for COC *i* Equation 5

$HI = \Sigma HQ_i$ Equation 6

Output of the Risk Assessment

Output of the ERA – Aquatic Life

1.34 The output of the ERA – Aquatic Life are listed as follows:

- The hazard quotient of exposure to individual identified COCs (contributed by both HATS effluent and "background" COC concentrations existing in ambient seawater) by aquatic life at the edge of ZID
- The hazard quotient of exposure to individual identified COCs (contributed by both HATS effluent and "background" COC concentrations existing in ambient seawater) by aquatic life at the edge of mixing zone
- The hazard index of exposure to all identified COCs (contributed by both HATS effluent and "background" COC concentrations existing in ambient seawater) by aquatic life at the edge of ZID
- The hazard index of exposure to all identified COCs (contributed by both HATS effluent and "background" COC concentrations existing in ambient seawater) by aquatic life at the edge of mixing zone

Output of ERA – Marine Mammals

1.35 The output of the ERA – Marine Mammals are listed as follows:

- Hazard quotient due to exposure of identified individual COCs (contributed by both HATS effluent and "background" COC concentrations existing in ambient seawater) by consumption of contaminated seawater and seafood
- Hazard index due to exposure of all identified COCs (contributed by both HATS effluent and "background" COC concentrations existing in ambient seawater) by consumption of contaminated seawater and seafood

References

For Ecological Risk Assessment – Aquatic Life

1. ANZECC (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality.
2. CCME (2005). Canadian Water Quality Guidelines for Protection of Aquatic Life
3. CDM (2002). Environmental and Engineering Feasibility Assessment Studies in Relation to the Way Forward of the Harbour Area Treatment Scheme – Proposed Water Quality Critieria.
4. CDM (2004). Environmental and Engineering Feasibility Assessment Studies in Relation to the Way Forward of the Harbour Area Treatment Scheme – Working Paper No. 8 Ecological and Human Health Risk Assessment (Final).
5. IPCS INCHEM. OECD Screening Information DataSet High Production Volume Chemicals. Available online: www.inchem.org/pages/sids.html.
6. Montgomery Watson (1998). Strategic Sewage Disposal Scheme – Environmental Impact Assessment Study – Technical Note 4. Detailed Risk Assessment (Final Version).
7. PRC National Guideline – Environmental Quality Standards for Surface Water (GB 3838-2002).
8. USEPA. ECOTOX Database. Available online: www.epa.gov/ecotox.
9. USEPA. Water Quality Standards – State, Tribal & Territorial Standards. Available online: www.epa.gov/waterscience/standards/states.
10. USEPA (1999b). Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities.
11. USEPA (2004). National Recommended Water Quality Criteria.
12. WRc Swindon (1999). Guidelines for Managing Water Quality Impacts within UK European Marine Sites.

For Ecological Risk Assessment – Marine Mammals

13. ATSDR (1997). Toxicological Profile for Chloroform.
14. ATSDR (1997). Toxicological Profile for Tetrachloroethylene.
15. ATSDR (1997). Toxicological Profile for Trichloroethylene.
16. ATSDR (1999). Toxicological Profile for Chlorophenols.
17. ATSDR (2002). Toxicological Profile for Hexachlorobenzene.
18. ATSDR (2003). Toxicological Profile for Bromoform and Dibromochloromethane.
19. ATSDR (2005). Toxicological Profile for Hexachlorocyclohexane.
20. CDM (2004). Environmental and Engineering Feasibility Assessment Studies in Relation to the Way Forward of the Harbour Area Treatment Scheme – Working Paper No. 8 Ecological and Human Health Risk Assessment (Final).
21. Montgomery Watson (1998). Strategic Sewage Disposal Scheme – Environmental Impact Assessment Study – Technical Note 4. Detailed Risk Assessment (Final Version).
22. NHMRC (2004). Australian Drinking Water Guidelines 2004.
23. Oak Ridge National Laboratory (1996). Toxicological Benchmarks for Wildlife: 1996 Revision
24. The Risk Assessment Information System. Available online: http://risk.lsd.ornl.gov/tox/tox_values.shtml.
25. USEPA (1998). Guidelines for Ecological Risk Assessment.
26. USEPA (1999b). Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities.
27. WHO (2000). International Programme on Chemical Safety – Environmental Health Criteria 216.
28. WHO (2004b). Guidelines for Drinking-water Quality (Third Ed.) – Volume 1.