

## **Project Profile for Designated Project – San Tin Western Main Drainage Channel**

(Part of PWP Item No. 4112CD –  
Drainage Improvement in Northern New Territories – Package A)

### PROJECT INFORMATION

1. Project Title  
San Tin Western Main Drainage Channel
2. Purpose and Nature of Project  
The Project will help to alleviate flooding problems in San Tin.  
  
55CD “Drainage master plan study in the Northern New Territories” (DMP Study) has identified deficiencies in the existing drainage system and recommended drainage improvement works to tackle flooding problems. The DMP Study has recommended the construction of about 2.1 km long San Tin Western Main Drainage Channel to help alleviate the flooding problems in San Tin. If the drainage improvement works are not proceeded, high flood risk would persist during heavy rainstorm.
3. Name of Project Proponent  
Client Department : Drainage Services Department  
Works Department : Drainage Services Department
4. Location and Scale of Project  
The proposed location and scale of the drainage improvement works is shown on the attached Drawing no. DDN/112CD/0005 and Table 1.

Table 1: Scale of Proposed Drainage Works

Proposed Drainage Works	Estimated Overall Length (m)	Range of Estimated Channel Top Width
San Tin Western MDC – two alternative alignments	2100	30m – 38m

5. Number and Types of Designated Project to be Covered by this Project Profile  
 In accordance with Schedule 2 Part I, Item I.1 – Waterways and Drainage Works and Item Q.1, of the EIAO, San Tin Western Main Drainage Channel (San Tin Western MDC) is a designated project. The proposed San Tin Western MDC is within Wetland Buffer Area, partly within Wetland Conservation Area and, depending on the selected channel alignment, partly within the Ramsar Site.

6. Name and Telephone Number of Contact Person

#### OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

7. Planning and Implementation Programme  
 The planning, design and construction supervision will be undertaken in house by DSD and the construction works will be carried out by contractors. Details of the project programme are as follows:

Table 2: Project Programme

Items	Target Completion Date
Appointment of Consultants to conduct impact assessments and site investigations	Dec 2001
Finalization of design	Early 2005
Contract tendering and award	Oct 2005
Construction completion	Oct 2008

#### POSSIBLE IMPACTS ON THE ENVIRONMENT

8. There are two alternative alignments proposed for the San Tin Western MDC which both start at the same location under Castle Peak Road near Tsing Lung Tsuen. As shown in Drawing no. DDN/112CD/0005, Option 1 is the original alignment identified in the Territorial Land Drainage and Flood Control Strategy Study Phase II (TEL 2), which bends southward after running for approximately 1400m. Option 2 is an alternative alignment, which has different environmental and land implications. This alternative alignment bends further southward after running for approximately 600m.

9. The construction of the San Tin Western Main Drainage Channel will involve the following the main activities:
- Site clearance
  - Earthworks for forming channel bed and width, and channel bunds
  - Construction of concrete structures such as retaining walls, box culverts or other ancillary drainage structures
  - Road works
10. An Environmental Review (ER) was undertaken as part of the Drainage Master Plan Study in the Northern New Territories to review potential environmental impacts associated with the construction and operation of the proposed drainage improvement works. According to the ER, the possible environmental impacts in relation to the San Tin Western MDC are discussed as follows.

#### Potential Construction Impact

11. The environmental issues during the construction phase of the proposed drainage improvement works are identified based on all possible impacts on the environment as listed in Annexes 1 and 3 of the Technical Memorandum on EIA Process. The identified issues include noise, air quality, water quality, ecology, solid waste management and cultural heritage.

#### ***Construction Noise***

12. Noise will be generated from the powered mechanical equipment (PME) used for site clearance, earthworks, concreting and road works. The identified noise sensitive receivers in the vicinity of the proposed drainage channel are listed in the Table 3 and comprise village type developments.

Table 3: Identified Noise Sensitive Receivers

Proposed Channel	Sensitive Receiver	Approximate Distance (m)
San Tin Western MDC	San Tin Villages: <ul style="list-style-type: none"> <li>• Tsing Lung Tsuen</li> <li>• San Lung Tsuen</li> <li>• Lin Barn Tsuen</li> </ul> Shek Wu Wai	100 220 150 (500)* 300

\* Lin Barn Tsuen is situated 500m from the proposed Option 1 alignment for San Tin Western MDC

13. In accordance with the *Technical Memorandum on Environmental Impact Assessment Process*, the appropriate daytime (0700-1900) noise criteria during weekdays for construction work are 75 dB(A) for residential receivers, 70 dB(A) for schools during normal teaching periods and 65 dB(A) during examination periods.
14. The construction works for the San Tin Western MDC will include pond draining and river bed excavation/drainage. PME likely to be used include excavator, lorry, concrete mixer, compactor, water pump etc. for different construction activities. With reference to the *Technical Memorandum on Noise from Construction Work other than Percussive Piling*, the Sound Power Level (SWL) of the PME are typically in the range of 111 to 120 dB(A). In view of noise sensitive receivers being identified in the vicinity of the works, it is recommended that a detailed noise assessment be carried out to predict the construction noise levels at sensitive receivers during different construction activities. Based on the assessment findings, the need for further noise mitigation measures in addition to good site practices and noise management measures would be determined.
15. On comparison of the potential noise impacts which may arise from the two proposed options for the San Tin Western MDC, the only difference is that Option 1 is located further from the identified sensitive receiver of Lin Barn Tsuen. In terms of construction noise, therefore, Option 1 would affect one less sensitive receiver.

#### ***Air Quality***

16. Potential sources of air quality impacts would be dust emissions generated during construction activities and odour nuisance. Dust will be generated from site clearance, excavation and road works. In view of the high water content of spoil, it is considered that the dust impact would be localized and temporary. It is considered that potential air quality impacts from dust emissions can be kept within acceptable levels by undertaking good construction practices on-site. Recommended dust suppression measures are listed in paragraphs 41 and 42.
17. Odour nuisance may arise when excavated sediments or organic materials are lifted from stream beds, agricultural fields or drained fish ponds. The rural ponds

are not affected by agricultural wastes and therefore it is considered that the material within the ponds would not be particularly malodorous. However, cautionary measures should be adopted to minimize odour when handling excavated material from stream beds and agricultural fields, and during any stockpiling of these materials. A number of practical measures should be adopted on-site to minimize odour nuisance are recommended in paragraph 43.

18. On comparison of the two proposed options for the San Tin Western MDC, the only difference between the two proposed alignments is that Option 1 is located further from the identified sensitive receiver of Lin Barn Tsuen. In terms of air quality, therefore, Option 1 would affect one less sensitive receiver.

***Ecology***

19. The San Tin Western MDC will traverse through the designated Wetland Conservation Area and Wetland Buffer Area and even part of the Ramsar Site (depending on the alignment option adopted). Drawing no. DDN/112CD/0005 illustrates the boundary of these designated conservation areas in Inner Deep Bay. Both proposed alignments will result in the loss of active fish ponds and wetland habitats in the San Tin area.
20. A preliminary environmental assessment of the two proposed options for the Western MDC was included in the EIA study carried out for the Eastern Main Drainage Channel. Table 4 summarizes the findings of the preliminary assessment of potential ecological impacts from which a comparison of the two alignment options may be made.

Table 4: Summary of Potential Ecological Impacts Arising from San Tin Western MDC

Potential Ecological Impact	Option 1	Option 2
Mangrove loss	Minor loss	Approximately 1.5 ha
Stream (nullah) habitat loss	Approximately 1.05 ha	Approximately 1.25 ha
Fish pond loss	Approximately 15 ha	Approximately 13 ha
Ramsar Site	Outside, but adjacent (i.e. channel length of 400m)	Partially inside (i.e. 2.2 ha with channel length of 500m)
Wetland Conservation Area	Partially inside	Partially inside
Wetland Buffer Area	Entirely inside	Entirely inside

21. Based on this preliminary ecological assessment, the main difference between the two proposed alignments is that part of Option 2 lies within the Ramsar Site. Option 2 would also result in a greater loss of stream and mangrove habitat

although the loss of fish pond habitat is less than that estimated to result from Option 1.

22. As both the proposed alignments for the Western MDC lie within an area of high ecological value and sensitivity, a detailed ecological assessment would be required to evaluate the potential impacts of the two alignments in particular the waterfowl during the winter season. The ecological assessment should also include justifications of identifying and selecting two proposed options for the proposed San Tin Western MDC and take note of the zoning intention in computing the wetland compensation/restoration for the channel as depicted in paragraph 39.
23. The Mai Po Village Site of Special Scientific Interest (SSSI) is located behind Mai Po Village beside Castle Peak Road and covers an area of approximately 53 ha (Drawing No. DDN/112CD/0005). This is an important nesting place for many of the egrets and herons breeding in the Deep Bay area. The SSSI is located approximately 900m from the proposed alignment of the Western MDC. Significant impacts on the SSSI from construction activities for the Western MDC such as noise and dust are not anticipated due to the considerable distance.

#### ***Water Quality***

24. Potential sources of impact on water quality during the construction of the proposed San Tin Western MDC have been identified and include:
  - Construction runoff and drainage.
  - General construction activities e.g. debris, refuse and liquid spillage of any fuels stored on-site.
  - Sewage effluents from the construction workforce.
  - Disturbance to or loss of aquatic systems.
25. In addition, the construction of the Western MDC may result in siltation impacts to downstream water sensitive uses from increased concentrations of suspended solids. Sensitive receivers which may be impacted by deterioration in water quality include agricultural areas, active fishponds and downstream reaches of watercourses. Measures should therefore be taken to minimize sediment resuspension and sediment transport. The construction of the Western MDC will inevitably result in the infilling of fish ponds along the proposed channel alignment as well as the permanent loss of stream courses.
26. Proper site management practices will be required to minimize water pollution from site construction activities. It is also important that proper site practices be followed to prevent runoff and drainage water with high sediment loads from entering nearby streams and impacting downstream sensitive receivers. Recommended site practices and other mitigation measures are described in paragraphs 48 and 49. It is expected that a small volume of sewage effluent will

be generated by the construction workforce at the work site. Portable chemical toilets should therefore be provided at the construction site to handle the sewage effluent. With the implementation of the recommended mitigation measures to control the identified potential sources of water quality impacts, unacceptable impacts on water quality are not anticipated.

27. The potential water pollution impacts which may arise from the construction works for the two proposed options for the San Tin Western MDC are similar. On considering the potential disturbance or loss of aquatic systems, Option 1 would result in a slightly smaller loss of stream habitat although this option would result in the loss of a larger area of fish ponds compared to Option 2 (Table 4). In terms of water quality, therefore, there is no marked difference in the extent of potential impacts between the two proposed options.

***Solid Waste***

28. Site preparation work for the construction of the drainage channels will generate hard and soft spoil comprising vegetation, soil, rock and concrete, etc. Throughout the period of construction, the workforce engaged in construction will generate refuse, comprising food scraps, paper, empty containers, etc. The impact of these wastes on streams is expected to be minimal.
29. It is recommended that different types of wastes should be segregated, stored, transported and disposed of separately in accordance with EPD’s required procedures. Where possible, waste should be re-used on-site to minimize off-site disposal. Provided that the identified waste arisings are handled, transported and disposed of using approved methods and that the recommended good site practices are adhered to, adverse environmental impacts are not anticipated.
30. A key issue to the construction of the Western MDC is the disposal of excavated fish pond and stream bed sediment. An initial estimate from the preliminary channel design indicates that approximately 306,500 m<sup>3</sup> of excavated sediment/material would arise from both Option 1 and Option 2. An indication of the sediment quality may be made from the sediment sampling programme undertaken for the Territorial Land Drainage & Flood Control Strategy Study – Phase III Sedimentation Study (TEL-3). Under the TEL-3 study, four sediment core samples were taken in the vicinity of the proposed Western MDC. The results of the sediment quality analysis are presented in Table 5.

Table 5: Heavy Metal Content of Sediment in San Tin Area

Station	Depth (mm)	Cd	Cr	Cu	Hg	Ni	Pb	Zn	Class
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G2/D	0-250	1.7 <sup>(c)</sup>	22.5	334 <sup>(c)</sup>	0.2	24.1	216 <sup>(b)</sup>	1150 <sup>(c)</sup>	C
	250-500	0.4	23.5	49.3	0.1	16.1	66.5 <sup>(b)</sup>	245 <sup>(c)</sup>	C
	500-750	0.1	27.4	15	0.1	15.9	50.3	73	A
	750-990	0.1	18.9	10.9	0.1	9.5	58.2	47	A
G3/D	0-270	0.3	27.2	17.8	0.1	13.6	116 <sup>(c)</sup>	66	C
	270-540	0.1	25.6	15.2	0.1	12.7	56.1	59	A
	540-810	0.5	23.2	13.2	0.1	11.6	59.2	53	A
	801-1070	0.1	19.3	13.2	0.1	8.9	41	47	A
G5/D	0-250	0.5	49.7 <sup>(b)</sup>	129 <sup>(c)</sup>	0.1	24.2	81.6 <sup>(c)</sup>	294 <sup>(c)</sup>	C
	250-500	0.6	51 <sup>(b)</sup>	67.7 <sup>(c)</sup>	0.1	40.1 <sup>(c)</sup>	67.6 <sup>(b)</sup>	331 <sup>(c)</sup>	C
	500-760	0.2	28.9	26.2	0.1	18.6	52.7	111	A
G6/D	0-290	1.2 <sup>(b)</sup>	46.3	147 <sup>(c)</sup>	0.2	34.1 <sup>(b)</sup>	83 <sup>(c)</sup>	539 <sup>(c)</sup>	C
	290-580	0.2	35.5	33.2	0.1	17.1	58.2	137	A
	580-890	0.1	29.6	42.4	0.1	15.3	50.8	63	A

Notes:

- (a) All units for heavy metals are in mg/kg<sup>-1</sup> dry weight.  
(b) Denotes Class B – moderately contaminated material (EPD TC No. 1-1-92).  
(c) Denotes Class C – seriously contaminated material (EPD TC No. 1-1-92).

31. The results indicate that the sediments in the San Tin study area are generally contaminated with heavy metals (commonly with copper, lead and zinc), and that the contaminated sediment is generally limited to the top 0.5m. In order to accurately determine the volume of seriously contaminated sediment to be excavated and the extent of contamination, it is recommended that a detailed sediment quality investigation be carried out according to the Works Bureau Technical Circular No. 3/2000 prior to the commencement of the construction works. The sediment quality results will enable the determination of specific handling procedures and disposal requirements for the excavated material.
32. On comparison of the potential waste management implications associated with the construction of the two proposed options for the San Tin Western MDC, there is no marked difference between the two options.

### ***Cultural Heritage***

33. There are two declared monuments in San Tin; the Man Lun Fung Ancestral Hall and Tai Fu Tai. The nearer of these two sites, the Man Lun Fung Ancestral Hall, is located at a distance of approximately 420m from the proposed Western MDC. Therefore the construction works for the drainage channel will not result in any direct disturbance to these two cultural heritage sites. Any indirect impacts such as construction noise and dust are anticipated to be insignificant given the considerable separation distance.
34. On comparison of the two proposed options for the San Tin Western MDC, there is no marked difference between the two options in terms of potential impacts on cultural heritage.
35. The Antiquities and Monuments Office (AMO) of Leisure and Cultural Services Department have advised that the paddy fields and river terrace in the areas of San Tin are highly likely to be of archaeological potential, and that there are many



historical villages in the San Tin areas such as Shek Wu Wai. AMO have requested that a Heritage Impact Assessment (HIA) be conducted to identify all the known and unknown archaeological sites, historical buildings and structures which would be affected by the proposed drainage works, and to identify any mitigation requirements.

#### Potential Operation Impact

36. As the San Tin Western MDC falls within the Wetland Conservation Area and Wetland Buffer Area, it is prudent to ensure that the operation of the channel would not adversely affect the ecological function of the wetland, nor reduce the bird usage in the area. Therefore, a detailed ecological impact assessment should assess the potential operation impact of the San Tin Western MDC on the wetland and to ensure the impact is mitigated. In particular, the impact on bird usage such as desilting should be addressed and mitigated.
37. Other than the possible ecological impact, it is not expected that the operation of the proposed San Tin Western MDC will pose other adverse environmental impacts. However, desilting will be required to remove any silt, grit or rubbish deposited within the drainage channel. It is recommended that desilting of the drainage channel be carried out during the dry seasons whenever possible in order to minimize impacts of water quality from sediment suspension.

#### MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

38. The landuse of the San Tin area is designated under the draft San Tin OZP No. S/YL-ST/4 gazetted on 18<sup>th</sup> May 2001. The Western MDC alignment (i.e. proposed northern-most alignment) has been reserved in the OZP as Drainage Reserve. The surrounding landuses to the proposed San Tin Western MDC consist of Village, Residential, Green Belt, Conservation Area and Other Specified Uses annotated Comprehensive Development to include Wetland Restoration Area.
39. The San Tin Village area (V zone) comprises seven villages and to the west of this village zone is a R(D) area within which new houses in low rise style may be constructed. There is a green belt to the south-west of the R(D) area. An Other Specified Uses annotated Comprehensive Development to include Wetland Restoration Area (“OU(CDWRA)”) is located to north of the R(D). Both suggested alignments of San Tin Western MDC will encroach onto the “OU(CDWRA)” which is now occupied by some container parking/storage activities. The planning intention of “OU(CDWRA)” is to encourage the phasing out of sporadic open storage and port back-up uses, and to provide incentive for the restoration of degraded wetlands adjoining existing fish ponds. The northern San Tin area is predominantly fish ponds and is designated as Conservation Area within which developments are strictly controlled. It is aimed to retain the

existing natural characteristics of the Conservation Area so as to give additional protection to the Mai Po Nature Reserve from incompatible development.

40. Container lorry parking and container yards are located alongside the New Territories Circular Road in the southern part of the San Tin area. Some of these parking and storage areas actually impinge of the San Tin Village zone and the R(D) zone.

## ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED IN THE DESIGN

### *Air Quality*

41. General requirements for air pollution control as stated in the EPD's *Recommended Pollution Control Clauses for Construction Contracts* are listed below:
  - i) The Contractor shall observe and comply with the Air Pollution Control Ordinance and its subsidiary regulations, particularly the Air Pollution Control (Open Burning) Regulation and Air Pollution Control (Construction Dust) Regulation and Air Pollution Control (Smoke) Regulation.
  - ii) The Contractor shall undertake at all times to prevent dust nuisance and smoke as a result of his activities.
  - iii) The Contractor shall ensure that there will be adequate water supply/storage for dust suppression.
  - iv) The Contractor shall devise, arrange methods of working and carrying out the works in such a manner so as to minimize dust impacts on the surrounding environment, and shall provide experienced personnel with suitable training to ensure that these methods are implemented.
  - v) Before the commencement of any work, the Engineer may require the methods of working, plant, equipment and air pollution control system to be used on the site to be made available for inspection and approval to ensure that they are suitable for the project.

### *Dust*

42. The following good construction practices are recommended to be adopted on-site to minimize potential air quality impacts from dust emissions:
  - i) Use of regular watering (at least twice daily) to reduce dust emissions from exposed site surfaces, particularly during dry weather.
  - ii) Side enclosure and covering of any aggregate or dusty material stockpiles to reduce emissions. Where this is not practicable owing to frequent usage, watering shall be employed to aggregate fines.

- iii) Tarpaulin covering of all dusty vehicle loads transported to and from site locations.

#### *Odour*

43. The following site practices are recommended to minimize potential air quality impacts from odour nuisance:
- i) Any odorous excavated material shall be placed as far away from receivers as possible.
  - ii) Any stockpiles of odorous excavated material shall be covered with tarpaulin sheets.
  - iii) Any odorous stockpiled material shall be removed from site as soon as possible (within 3 days) to reduce the amount of time available for decomposition of organic matter.

#### *Noise*

44. The implementation of good site practices and nuisance avoidance measures will significantly reduce noise emissions from construction activities. General requirements for noise control as stated in the EPD's *Recommended Pollution Control Clauses for Construction Contracts* are listed below:
- i) The Contractor shall observe and comply with the Noise Control Ordinance and its subsidiary regulations.
  - ii) The Contractor shall ensure that all plant and equipment to be used on the Site are properly maintained in good operating condition and noisy construction activities shall be effectively sound-reduced by means of silencers, mufflers, acoustic linings or shields, acoustic sheds or screens or other means, to avoid disturbance to any nearby noise sensitive receivers.
  - iii) For carrying out any construction work other than percussive piling during the time period from 0700 to 1900 hours on any day not being a general holiday (including Sundays), the Contractor shall comply with the following requirements:
    - a) The noise level measured at 1m from the most affected external façade of the nearby noise sensitive receivers from the construction alone during any 30 minute period shall not exceed an equivalent sound level (Leq) of 75 dB(A).
    - b) The noise level measured at 1m from the affected external façade of the nearby schools from the construction works alone during any 30 minute period shall not exceed an equivalent sound level (Leg) of 70 dB(A) [65 dB(A) during school examination periods]. The Contractor shall liaise with the schools and/or the Examination Authority to ascertain the exact dates and times of all examination periods during the course of the contract.

- c) Should the limits stated in the above sub-clause (a) and (b) be exceeded, the construction shall stop and shall not re-commence until appropriate measures acceptable to the Engineer that are necessary for compliance have been implemented.
  - d) The Contractor shall adopt, where necessary, the use of Quiet Construction Equipment (QCE) and/or shall employ the quietest practicable working methods when carrying out demolition works, and/or road opening works during restricted hours.
  - e) Diesel hammers are not to be used for percussive piling works.
  - iv) Before the commencement of any work, the Engineer may require the methods of working, plant equipment and sound-reducing measures to be used on the Site to be made available for trial demonstration inspection and approval to ensure that they are suitable for the project.
  - v) The Contractor shall devise, arrange methods of working and carry out the Works in such a manner so as to minimize noise impacts on the surrounding environment, and shall provide experienced personnel with suitable training to ensure that these methods are implemented.
  - vi) Notwithstanding the requirements and limitations set out in Clause iii) above and subject to compliance with Clauses ii) and v) above, the Engineer may upon application in rewriting by the Contractor, allow the use of equipment and the carrying out of any construction activities for any duration provided that he is satisfied with the application which, in his opinion, is considered to be of absolute necessity and adequate noise insulation has been provided to the schools to be affected, or of emergency nature, and not in contravention with the Noise Control Ordinance in any respect.
  - vii) The Contractor shall, when necessary, apply for a construction noise permit in accordance with the Noise Control (General) Regulations prior to the commencement of the relevant part(s) of the works, display the permit as required and provide a copy to the Engineer.
  - viii) Measures that are to be taken to protect adjacent schools and other adjacent noise sensitive receivers, if necessary, shall include, but not be limited to, adequate noise barriers. The barriers shall be of substantial construction and designed to reduce transmission of noise. The barriers shall be surmounted with baffle designed to reduce transmission of noise. The barriers shall be designed to BS 5228(1984). The location and details of the barriers shall be submitted to the Engineer for approval before works commence adjacent to schools and other noise sensitive receivers.
45. The following site practices and measures shall be adopted for all construction activities involving the use of PME:
- i) All machines and plant that may be in intermittent use shall be shut down between work periods or be throttled down to a minimum.

- ii) Plant that is expected to emit noise strongly in one direction shall, where possible, be orientated so that the noise is directed away from nearby receivers.
  - iii) Mobile plant shall be sited as far away from receivers as possible.
  - iv) Material stockpiles and other structures shall be effectively utilised to screen noise from on-site construction activities.
46. These mitigation measures can be enforced by incorporating suitable conditions in the Contractor's construction contract in accordance with ProPECC Practice Notes PN 1/93 *Noise from Construction Activities – Statutory* and PN 2/93 *Noise from Construction Activities – Non-Statutory*.

### ***Water Quality***

47. The Contractor shall observe and comply with the Water Pollution Control Ordinance and its subsidiary regulations. The Contractor shall carry out the Works in such a manner as to minimize adverse impacts on the water quality during execution of the works. In particular he shall arrange his method of working to minimize the effects on the water quality within and outside the Site and on the transport routes.
48. Proper site management measures shall be implemented to control site runoff and drainage, and thereby prevent high sediment loadings from reaching downstream sections of the river and adjacent agricultural land. The Contractor shall follow the practices, and be responsible for the design, construction, operation and maintenance of all the mitigation measures as specified in ProPECC PN 1/94 "*Construction Site Drainage*". The design of the mitigation measures shall be submitted by the Contractor to the Engineer for approval. These mitigation measures shall include the following practices to minimize site surface runoff and the chance of erosion, and also to retain the reduce any suspended solids prior to discharge:
- i) Before commencing any site formation work, all sewer and drainage connections shall be sealed to prevent debris, soil, sand, etc. from entering public sewers/drains.
  - ii) Provision of perimeter channels to intercept storm-runoff from outside the site. These shall be constructed in advance of site formation works and earthworks.
  - iii) Temporary ditches such as channels, earth bunds or sand bag barriers shall be included to facilitate runoff discharge into the stormwater drain, via a sand/silt basin/trap.
  - iv) Works programmes shall be designed to minimise works areas at any one time, thus minimising exposed soil areas and reducing the potential for increased siltation and runoff.
  - v) Sand/silt removal facilities such as sand traps, silt traps and sediment basins shall be provided to remove the sand/silt particles from run-off.

These facilities shall be properly and regularly cleaned and maintained. These facilities shall be carefully planned to ensure that they would be installed at appropriate locations to capture all surface water generated on site.

- vi) Careful programming of the works to minimize excavation works during the rainy season.
  - vii) Temporary access roads shall be protected by crushed gravel and exposed slope surfaces shall be protected when rainstorms are likely.
  - viii) Open stockpiles of construction materials on-site shall be covered with tarpaulin or similar fabric during rainstorms to prevent erosion.
49. The use of containment structures and diversion channels is recommended wherever practicable to facilitate a dry or at least confined excavation within watercourses. By limiting or confining the works areas the extent of disturbance to the surrounding water bodies will be significantly reduced, and thus resulting impacts on water quality from sediment resuspension will be reduced. Furthermore, excavation works shall be carried out during periods of low flow (dry season) as far as possible to minimize impacts on downstream water quality and sensitive receivers.
50. Portable toilets shall be provided by the Contractor, where necessary, to handle sewage from the workforce. To prevent spillage of fuels and solvents to water courses, all fuel tanks and storage areas shall be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank.
51. The Contractor shall not discharge directly or indirectly or cause or permit or suffer to be discharged into any public sewer, stormwater drain, channel, stream-course or sea any trade effluent or foul or contaminated water or cooling or hot water without the prior written consent of the Engineer in consultation with the Director of Environmental Protection and Director of Water Supplies, who may as a condition of granting his consent require the Contractor to provide, operate and maintain at the Contractor's own expense to the satisfaction of the Engineer suitable works for the treatment and disposal of such trade effluent or foul or contaminated or cooling or hot water. [The design of such treatment works shall be submitted to the Engineer for approval not less than one month before the commencement of the relevant works.]
52. If any office, site canteen or toilet facilities is erected, foul water effluent shall be directed to a foul sewer or to a sewage treatment and disposal facility either directly or indirectly by means of pumping or other means approved by the Engineer.

### ***Solid Waste***

53. The Contractor shall observe and comply with the Waste Disposal Ordinance and its subsidiary regulations. Requirements with respect to waste minimization,

waste nuisance control and chemical waste control as stated in the EPD's *Recommended Pollution Control Clauses for Construction Contracts* are given below:

*Waste Minimization*

- i) The Contractor shall submit to the Engineer for approval a waste management plan with appropriate mitigation measures including the allocation of an area for waste segregation and shall ensure that the day-to-day site operations comply with the approved waste management plan.
  - ii) The Contractor shall minimize the generation of waste from his work. Avoidance and minimization of waste generation can be achieved through changing or improving design and practices, careful planning and good site management.
  - iii) The Contractor shall ensure that different types of wastes are segregated on-site and stored in different containers, skips or stockpiles to facilitate reuse/recycling of waste and, as the last resort, disposal at different outlets as appropriate.
  - iv) The reuse and recycling of waste shall be practiced as far as possible. The recycled materials shall include paper/cardboard, timber and metal etc.
  - v) The Contractor shall ensure that Construction and Demolition (C&D) materials are sorted into public fill (inert portion) and C&D waste (non-inert portion). The public fill which comprises soil, rock, concrete, brick, cement plaster/mortar, inert building debris, aggregates and asphalt shall be reused in earth filling or site formation works. The Contractor shall also implement other waste minimization measures, such as reusing of excavated material for backfilling, processing of material unsuitable for backfilling to suitable material, and using of recycled aggregate in pipe bedding. The C&D waste which comprises metal, timber, paper, glass, junk and general garbage shall be reused or recycled and, as the last resort, disposal of at landfills.
  - vi) The Contractor shall record the amount of wastes generated, recycled and disposed of (including the disposal sites).
  - vii) The Contractor shall use a trip ticket system for the disposal of C&D materials to any designated public filling facility and/or landfill.
  - viii) Training shall be provided for workers about the concepts of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling.
54. If off-site disposal of C&D waste to landfill is necessary, it must be ensured that its water content is less than 30%. To minimize off-site disposal of spoil, it is recommended that inert material be reused on-site for the construction of channel embankments if the material meets the engineering requirements.

#### *Waste Nuisance Control*

55. The Contractor shall not permit any sewage, waste water or effluent containing sand, cement, silt or any other suspended or dissolved material to flow from the Site onto any adjoining land or allow any waste matter, which cannot be reused, to be deposited anywhere within the Site or onto any adjoining land. He shall arrange removal of such matter from the site or any building erected or to be erected thereon in a proper manner to the satisfaction of the Engineer in consultation with the Director of Environmental Protection.

#### *Chemical Waste Control*

56. The Contractor shall observe and comply with the Waste Disposal (Chemical Waste)(General) Regulation.
57. The Contractor shall apply for registration as chemical waste producer under the Waste Disposal (Chemical Waste) (General) Regulation when chemical waste is produced. All chemical waste shall be properly stored, labeled, packaged and collected in accordance with the Regulation.

#### *Sediment Quality Investigation*

58. A sediment quality investigation is required to determine the level of contamination in the fish pond and stream bed sediment to be excavated for the construction of the San Tin Western MDC. Excavated sediment classified as seriously contaminated sediment (Class C) would require confined disposal at the East Sha Chau Contaminated Mud Pits. Stockpiling of Class C contaminated sediment shall not be permitted on-site. It is recommended that these sediments be transported off-site as soon as practical in water-tight trucks.

#### *Ecology*

59. The following mitigation measures are recommended to be implemented on site to alleviate potential ecological impacts associated with the proposed works and to minimize disturbance to the surrounding areas:
- i) Regular checking should be undertaken to ensure that the work site boundaries are not exceeded and that no damage occurs to surrounding areas.
  - ii) Open fires should be prohibited and prevented within the work site boundary during construction.
  - iii) Implementation of mitigation measures specified in ProPECC PN 1/94 to control site runoff and drainage at the work site during construction.
  - iv) Implementation of noise control measures at the construction site to reduce impacts of construction noise to wildlife habitats adjacent to works areas.



- v) Implementation of dust control measures at the construction site to minimize dust nuisance to adjacent wildlife habitats during construction activities.
60. Specific mitigation requirements to alleviate potential ecological impacts will be developed during detailed design, based on the findings of the detailed ecological assessment. As the proposed San Tin Western MDC alignment passes through the designated Wetland Buffer Area, Wetland Conservation Area and Ramsar Site (depending on the alignment option adopted), the ecological assessment should demonstrate that the drainage works would not result in a net loss in wetland function and negative disturbance impact. Wetland compensation is required for any works involving pond filling and mitigation measures against disturbance would be necessary. The EIA study should identify potential sites for wetland compensation and the proposed method of compensation. Appropriate environmental protection measures from the *Deep Bay Guidelines for Dredging, Reclamation and Drainage Works* should be recommended for implementation to ensure that the drainage works respect the environmental value and sensitivity of the area. In addition, the *Guidelines for Implementing the Policy on Off-site Ecological Mitigation Measures* (PELB TC 1/97, WBTC 4/94, dated 17 February 1997) should be followed.

#### POSSIBLE FURTHER POTENTIAL ENVIRONMENTAL IMPLICATIONS

61. The downstream end of San Tin Western MDC is close to the Inner Deep Bay. Tidal water intrusion from Inner Deep Bay might bring in pollution to MDC and a tidal barrier for San Tin Western MDC may be required, depending on the outcome of EIA study, to improve the water quality in the MDC. However, as the San Tin Western MDC is close to the Ramsar Site (or even encroach upon the Ramsar Site which depends on the selected alignment), the adverse environmental impacts due to the tidal barrier and its ancillary facilities, should also be considered. These impacts may include the ecological impact due to change of water regime arising from tidal barrier and forming land for a low flow pumping station ancillary to the tidal barrier, visual impact of the pumping station, and the noise impact from the operation of the low flow pumps and associated equipment. The detailed EIA study is required to assess the pros and cons of the use of tidal barrier with respect to environmental issues and address the necessity of a tidal barrier.

#### SUMMARY OF RECOMMENDED FURTHER DETAILED IMPACT ASSESSMENT

62. The environmental issues identified as key issues requiring detailed assessment in the EIA study of the San Tin Western MDC are summarized in Table 6:

Table 6: Designated Projects and Identified Detailed Assessment Studies

Drainage Channels	Reason for DP - Relevant clause under Schedule 2 Part I of EIAO	Recommended Mitigation Measures	Key Issues & Recommended Further Studies
San Tin Western MDC	Item I.1 – Waterways & Drainage Works & Item Q.1: within Wetland Conservation Area & Ramsar Site	<p>Ecological mitigation requirements to be developed based on findings of further study.</p> <p>In addition to the recommended pollution control clauses, the need for incorporating other mitigation requirements are subjected to findings of further studies.</p> <p>Subject to findings of HIA.</p> <p>Provision of tidal barrier subject to findings of its associated environmental impacts.</p>	<ul style="list-style-type: none"> <li>• Ecological impacts associated with construction and operation – detailed ecological assessment;</li> <li>• Pond/stream sediment contamination and associated waste management implications due to excavation works – detailed sediment quality investigation;</li> <li>• Construction noise impact during different construction activities – detailed noise assessment;</li> <li>• Heritage Impact Assessment requested by AMO; and</li> <li>• Environmental impacts associated with the provision and non-provision of tidal barrier.</li> </ul>

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深圳經濟特區  
SHENZHEN SPECIAL ECONOMIC ZONE

方案 1  
OPTION 1  
新田西排水幹渠  
包括保留地的原來路線  
SAN TIN WESTERN CHANNEL  
ORIGINAL ALIGNMENT WITH  
DRAINAGE RESERVE

方案 2  
OPTION 2  
新田西排水幹渠替代路線  
SAN TIN WESTERN CHANNEL  
ALTERNATIVE ALIGNMENT

圖例：  
LEGENDS :

- 濕地緩衝區界線  
BOUNDARY OF WETLAND  
BUFFER AREA
- 濕地自然保護區  
BOUNDARY OF WETLAND  
CONSERVATION AREA
- 新田西排水幹渠  
SAN TIN WESTERN MDC
- 拉姆薩爾濕地  
RAMSAR SITE
- 具特別科學價值的地點  
SSSI

PROVISIONAL  
SUBJECT TO AMENDMENT  
圖則名稱 drawing title

新界北雨水排放系統改善計劃 — A 部份  
DRAINAGE IMPROVEMENTS IN THE NORTHERN NEW TERRITORIES,  
PACKAGE A  
新田西排水幹渠路線 (兩個方案)  
- SAN TIN WESTERN CHANNEL ALIGNMENT (2 OPTIONS)

繪圖 drawn	SIGNED	W. H. KO	日期 date	21.05.01
核對 checked	SIGNED	S. C. LI	日期 date	23.05.01
批核 approved			日期 date	

部門 office  
排水工程處  
DRAINAGE PROJECTS DIVISION

圖則編號 drawing no.  
DDN/112CD/0005  
比例 scale  
N.T.S.

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