Environmental benefits and dis-benefits of feasible alternative construction methods, sequence of works and staged implementation

Phasing	Project Component	Feasible Alternative Construction Methods, Sequence of Works and Staged Implementation	Environmental Benefits	Environmental Dis-benefits
Advance Works	Fishpond Compensation / Establishment of Ecological Area (DP1)	Compensation prior to major construction works	• Maintain the ecological value at any stage of the project	• N/A
	Land de-contamination	Solidification / Stabilization Ex-situ immobilization technique treating contaminated soil by mixing soil with binding agents, e.g. cement so as to physically bind contaminants into stable mass.	• Applicable to clean-up inorganic contaminants such as heavy metals. • Solidification/stabilization are used on certain contaminated sites in Hong Kong and successfully demonstrated treatment method for inorganic contaminated soil, e.g. decontamination works at the Cheoy Lee Shipyard at Penny's Bay, reclamation works at North Tsing Yi Shipyard site and few isolated sites identified in the Deep Bay Link project.	• The effectiveness reduces with the presence of organic contaminants • Large boulders may hinder the mixing process. Soil sorting is necessary prior to the treatment taken place.
		Soil Washing An Ex-situ soil separation method primarily based on mineral processing techniques. A water-based process for scrubbing soils ex-situ to remove contaminants.	• Applicable to clean inorganic contaminants such as heavy metals from coarse-grained soils.	• Effectiveness of treatment dependent on soil coarseness. Fine soil particles may require addition of polymer for removal of contaminant by the washing fluid. • Complex waste mixtures make formulating washing fluid difficult. • Further treatment and disposal

Phasing	Project Component	Feasible Alternative Construction Methods, Sequence of Works and Staged Implementation	Environmental Benefits	Environmental Dis-benefits
				for residuals required.
		Electrokinetic Separation This In-situ method uses electrochemical and electrokinetic processes to desorb and remove metals and polar organics from soil. Low intensity direct current is applied to the soil to mobilize the charged species.	• Applicable to treat soil with low permeability and heavily contaminated with metals.	• Effectiveness dependent on moisture content of soil and decreases with moisture content less than 10%. • Require further treatment for removal of desorbed contaminants and thus increase cost of remediation. • Variability of electrical conductivity in soil may be induced by presence of anomalies such as large gravels and insulating material. This may reduce treatment effectiveness.
		Excavation and Landfill Disposal Ex-situ method whereby contaminants are removed by excavation of the contaminated soil and direct disposal to landfill	• Most simple and quickest way to dispose of large volume of contaminated soil • Contamination is removed definitely • Higher certainty of success • Wide experience in Hong Kong • Applicable to all waste or mixture that meet land disposal restriction treatment standards. • Common practice for shallow, highly-contaminated soils.	• Pre-treatment may be required for contaminated soil to meet landfill disposal criteria • Landfill space limited and valuable. • Indirect costs to the landfill management on monitoring and maintenance. • Potential long-term liabilities to landfill • Need large volume of clean backfill materials • No access to the working site until completion of backfilling • Least desirable management

Phasing	Project Component	Feasible Alternative Construction Methods, Sequence of Works and Staged Implementation	Environmental Benefits	Environmental Dis-benefits
				option.
Phase 1 Infrastructures	Site formations works	Marine access (barging or conveyor belt) from Deep Bay and Shenzhen River for material transportation	• Less disturbance to local villages	• Dredging on Shenzhen River is required for barging facilities • Increase marine traffic in Deep Bay • Extension in construction period due to additional dredging works
		Land-based access from Sai Kwo Road and Lok Ma Chau Road	• No dredging required in Shenzhen River • Less disturbance to Deep Bay waters	• Air and noise nuisance to local village alongside Lok Ma Chau Road
	Western Connection Road including the connections between LMC Road and Fanling/San Tin Highway (DP2) / Direct Link to Lok Ma Chau Station (DP3) / Drainage System under Internal Transport Networks (DP4) / District Cooling System (Western) / Sewage Treatment Works (DP5)	Use of explosives/blasting, percussive piling.	• N/A	• Induce higher risk, higher noise problem
		Use of traditional powered mechanical equipment	• Shorter construction period	• Induce higher noise problem
		Use of quiet powered mechanical equipment	• Less construction noise emission	• N/A
	Bio-remediation [2-1]	Ex situ treatment	• N/A	• Large extension of dredging works required in Shenzhen River • Large quantity of sediment disposal required
		In-situ treatment by calcium nitrate	• High AVS removal efficiency and long lasting • Less secondary contaminant emission	• N/A

Phasing	Project Component	Feasible Alternative Construction Methods, Sequence of Works and Staged Implementation	Environmental Benefits	Environmental Dis-benefits
		In-situ treatment by calcium oxides	• High AVS removal efficiency	• Higher secondary contaminant emission
		In-situ treatment by hydrogen peroxides	• High AVS removal efficiency	• Higher secondary contaminant emission
		In-situ treatment by potassium permanganate	• High AVS removal efficiency	• Higher secondary contaminant emission
Phase 1 Buildings	Construction and operation of Phase 1 Buildings / Construction and operation of fire station cum ambulance depot	Use of traditional powered mechanical equipment	• Shorter construction period	• Induce higher noise problem
		Use of quiet powered mechanical equipment	• Less construction noise emission	• N/A
Phase 2 Infrastructures	District Cooling System (Eastern) / Flushing Water Service Reservoir (DP7) / Provision of boundary crossing facilities	Use of traditional powered mechanical equipment	• Shorter construction period	• Induce higher noise problem
		Use of quiet powered mechanical equipment	• Less construction noise emission	• N/A
	Eastern Connection Road (DP6)	Use of traditional powered mechanical equipment, blasting, percussive piling, etc.	• Shorter construction period	• Induce higher noise problem
		Use of quiet powered mechanical equipment	• Less construction noise emission	• N/A
		During underpass construction, provide river diversion to the Meander and use cut and cover method with diaphragm walls to separate the water and works area.	• Shorter construction period	• Induce significant ecological impact to otter habitats.
		During underpass construction, flow contraction of will be divided into two batches (half year per each batch) and all the works will be conducted in dry season (October to March) in order to avoid and minimize the impact to	• Less water disturbance • Less ecological impact to otter habitats	• N/A

Phasing	Project Component	Feasible Alternative Construction Methods, Sequence of Works and Staged Implementation	Environmental Benefits	Environmental Dis-benefits
		flow regimes. 50% (around 30m) of the width of the Meander (total width around 60m) will be occupied by the erected cofferdams or diaphragm walls.		
Phase 2 Buildings (Full operation)	Construction and operation of Phase 2 Buildings	Use of traditional powered mechanical equipment	• Shorter construction period	• Induce higher noise problem
		Use of quiet powered mechanical equipment	• Less construction noise emission	• N/A

Highlighted item refers to the preferred option and details to be discussed in Section 2.6 of EIA.