

**Table 4.1 Montego Freeport Harbour Dredging – HCSD - Potential impacts and corresponding impact mitigation measures.**

ACTIVITY	POTENTIAL IMPACTS	IMPACT MITIGATION MEASURES
Suction Cutter Dredging Works		
<u>Dredging</u>		
1. Digging and suction pumping		
1.1 Sediment removal	Loss of benthic habitat	1. Apply good control of cutter head, restrict digging to specified boundaries to minimise sediment dispersion.
	Modification of current & wave pattern	2. N/A
1.2 Sediment disturbance	Dispersion of suspended solids & turbidity	3. Apply good control of ladder swing speed and cutter head rotation speed to minimise sediment dispersion.
	Dispersion of contaminated sediments	4. N/A
	Degradation of pelagic habitat	5. Apply measures at #3 above to minimise sediment dispersion.
	Curtailed of fishing activity	6. Apply measures at #3 above to minimise sediment dispersion.
1.3 Presence/location of dredger	Increased ambient noise level	7. Advise local residents before commencement of dredging works. If practicable, restrict dredging to 7.00 – 17.00 hours when within 100m of shoreline
	Impaired visual aesthetics/landscape	8. N/A
	Impedance of ship traffic	9. Coordinate location of dredging activity with port managers to reduce shipping delays. Consider laying pipeline on seabed.
2. Slurry transport via pipeline	Impedance of ship traffic	10. As for #9 above, or place pipeline on seabed.
3. Slurry spillage from pipeline	Dispersion of suspended solids & turbidity	11. Regularly monitor pipeline joints. Immediately halt pumping in event of leak.
	Dispersion of contaminated sediments	12. As for #11 above.
<u>Sediment Disposal - Land</u>		
1. Construction of containment area		
1.1 Sourcing of earth materials	Induced illegal quarry operations	13. Obtain earth materials from licenced quarry operators only.
1.2 Transport of earth materials	Nuisance dusting and material spillage	14. Ensure proper covering of materials during transport.
	Increased traffic	15. Restrict materials transport to off-peak hours.
1.3 Construction works	Loss of existing terrestrial habitat	16. N/A
	Loss of alternative land-use	17. N/A
	Increased ambient noise	18. Restrict construction activities to 7.00 – 17.00 hours.
	Increased local employment	19. N/A

**Table 4.1 (cont'd) Montego Freeport Harbour Dredging – HCSD - Potential impacts and corresponding impact mitigation measures.**

ACTIVITY	POTENTIAL IMPACTS	IMPACT MITIGATION MEASURES
Suction Cutter Dredging Works		
2. Disposal operations		
2.1 Decanted water release	Increased inshore marine water turbidity	20. Construct double cell containment area with water box at discharge outlet. deploy silt screens around supernatant outlet.
2.2 Sediment containment	Opportunity for dredged material re-use	21. N/A
	Containment of contaminated sediments	22. N/A
	Avoidance of sea disposal issues	23. N/A
	Fugitive dust from dried fine materials	24. Plant salt tolerant vegetation over sediment pile. keep pile wetted until covered by vegetation. Plant <i>Leucaena</i> trees around perimeter as a windbreak.

**Table 4.2 Montego Freeport Harbour Dredging – TSHD - Potential impacts and corresponding impact mitigation measures.**

ACTIVITY	POTENTIAL IMPACTS	IMPACT MITIGATION MEASURES
Trailing Hopper Dredging Works		
<u>Dredging</u>		
1. Trailing and suction pumping		
1.1 Sediment removal	Loss of benthic habitat	1. Apply good control of drag head, restrict digging to specified boundaries to minimise sediment dispersal.
	Modification of current & wave pattern	2. N/A
1.2 Sediment disturbance	Dispersion of suspended solids & turbidity	3. N/A
	Dispersion of contaminated sediments	4. N/A
	Degradation of pelagic habitat	5. Apply measures at #3 above to minimise sediment dispersal.
	Curtailed of fishing activity	6. Apply measures at #3 above to minimise sediment dispersal.
1.3 Presence/location of dredger	Increased ambient noise level	7. Advise local residents before commencement of dredging works.If practicable, restrict dredging to 7.00 – 17.00 hours when within 100m of shoreline.
	Impaired visual aesthetics/landscape	8. N/A
	Impedance of ship traffic	9. Coordinate location of dredging activity with port managers to reduce shipping delays.
2. Overfilling and spillage of sediments	Dispersion of suspended solids & turbidity	10. Do not allow overfilling of hopper and resultant spillage.
<u>Sediment Disposal – Sea</u>		
1. Leakage of sediments during transport to disposal site	Increased turbidity over sensitive inshore habitats	11. Ensure that an electronic voyage record is available for review for every disposal trip made and random independent monitoring of voyages is carried out..
2. Deep sea sediment disposal	Sedimentation of deep-water benthic habitat	12. N/A
	Relocation of contaminated sediments	13. N/A
	Degradation of pelagic habitat	14. N/A
	Avoidance of land disposal issues	15. N/A
	Precluded re-use of sediment material	16. N/A

Table 5.1 Montego Freeport Harbour Dredging - Summary of Potential Environmental Impacts – Suction Cutter Dredging

ACTIVITY	POTENTIAL IMPACTS	DIRECTION		Impact Significance	Mitigation Possible	DURATION		LOCATION		MAGNITUDE			EXTENT	
		Positive	Negative			Long	Short	Direct	Indirect	Large	Small	Wide	Local	
<b>Dredging</b>														
<b>1. Digging and suction pumping</b>														
1.1 Sediment removal	Loss of benthic habitat		✓	Mod	No	✓		✓			✓			✓
	Modification of current & wave pattern		✓	Low	No	✓		✓			✓			✓
1.2 Sediment disturbance	Dispersion of suspended solids & turbidity		✓	High	Yes	✓		✓			✓			✓
	Dispersion of contaminated sediments		✓	Low	Yes	✓		✓			✓			✓
	Degradation of pelagic habitat		✓	Low	Yes	✓		✓			✓			✓
	Curtailment of fishing activity		✓	Low	Yes	✓		✓			✓			✓
1.3 Presence/location of dredger	Increased ambient noise level		✓	Mod	Yes	✓		✓			✓			✓
	Impaired visual aesthetics/landscape		✓	Low	No	✓		✓			✓			✓
	Impedance of ship traffic		✓	High	Yes	✓		✓			✓			✓
2. Slurry transport via pipeline	Impedance of ship traffic		✓	High	Yes	✓		✓			✓			✓
3. Slurry spillage from pipeline	Dispersion of suspended solids & turbidity		✓	Low	Yes	✓		✓			✓			✓
	Dispersion of contaminated sediments		✓	Low	Yes	✓		✓			✓			✓
<b>Sediment Disposal - Land</b>														
<b>1. Construction of containment area</b>														
1.1 Sourcing of earth materials	Induced illegal quarry operations		✓	Mod	Yes	✓			✓					✓
1.2 Transport of earth materials	Nuisance dusting and material spillage		✓	Low	Yes				✓					✓
	Increased traffic		✓	Mod	Yes				✓					✓
1.3 Construction works	Loss of existing terrestrial habitat		✓	Low	No	✓			✓					✓
	Loss of alternative land-use		✓	High	Yes	✓			✓					✓
	Increased ambient noises		✓	Low	Yes				✓					✓
	Increased local employment	✓		Mod	-				✓					✓
<b>2. Disposal operations</b>														
2.1 Decanted water release	Increased inshore marine water turbidity		✓	High	Yes				✓					✓
2.2 Sediment containment	Opportunity for dredged material re-use	✓		High	-				✓					✓
	Containment of contaminated sediments	✓		High	-				✓					✓
	Avoidance of sea disposal issues	✓		Mod	-				✓					✓
	Fugitive dust from dried fine materials		✓	Mod	Yes	✓			✓					✓

Table 5.2 Montego Freeport Harbour Dredging - Summary of Potential Environmental Impacts – Trailing Hopper Dredging

ACTIVITY	POTENTIAL IMPACTS	DIRECTION		Impact Significance	Mitigation Possible	DURATION		LOCATION		MAGNITUDE		EXTENT	
		Positive	Negative			Long	Short	Direct	Indirect	Large	Small	Wide	Local
<b>Dredging</b>													
1. Trailing and suction pumping			✓	Mod	No	✓							
1.1 Sediment removal	Loss of benthic habitat Modification of current & wave pattern		✓	Low	No	✓					✓		✓
1.2 Sediment disturbance	Dispersion of suspended solids & turbidity		✓	High	Yes	✓					✓		✓
	Dispersion of contaminated sediments		✓	Low	Yes	✓					✓		✓
	Degradation of pelagic habitat		✓	Low	Yes	✓					✓		✓
	Curtailment of fishing activity		✓	Low	Yes	✓					✓		✓
1.3 Presence/location of dredger	Increased ambient noise level		✓	Mod	Yes	✓					✓		✓
	Impaired visual aesthetics/landscape		✓	Low	No	✓					✓		✓
	Impedance of ship traffic		✓	Mod	Yes	✓					✓		✓
	Dispersion of suspended solids & turbidity		✓	High	Yes	✓					✓		✓
2. Overfilling and spillage of sediments													
<b>Sediment Disposal - Sea</b>													
1. Deliberate leakage of sediments during transport to disposal site	Increased turbidity over sensitive inshore habitats		✓	High	Yes	✓					✓		✓
	Sedimentation of deep-water benthic habitat		✓	Mod	No	✓					✓		✓
2. Deep sea sediment disposal	Relocation of contaminated sediments		✓	Low	No	✓					✓		✓
	Degradation of pelagic habitat		✓	Low	No	✓					✓		✓
	Avoidance of land disposal issues	✓		Mod	-	✓					✓		✓
	Precluded re-use of sediment material		✓	Mod	-	✓					✓		✓

**Table 7.1 Montego Freeport Harbour Dredging – HCSD - Potential impacts and corresponding impact mitigation measures.**

ACTIVITY	POTENTIAL IMPACTS	IMPACT MITIGATION MEASURES
<u>Dredging</u>		
1. Digging and suction pumping		
1.1 Sediment removal	Loss of benthic habitat	1. Apply good control of cutter head, restrict digging to specified boundaries to minimise sediment dispersion.
1.2 Sediment disturbance	Modification of current & wave pattern	2. N/A
1.3 Presence/location of dredger	Dispersion of suspended solids & turbidity	3. Apply good control of ladder swing speed and cutter head rotation speed to minimise sediment dispersion.
	Dispersion of contaminated sediments	4. N/A
	Degradation of pelagic habitat	5. Apply measures at #3 above to minimise sediment dispersion.
	Curtailment of fishing activity	6. Apply measures at #3 above to minimise sediment dispersion.
	Increased ambient noise level	7. Advise local residents before commencement of dredging works. If practicable, restrict dredging to 7.00 – 17.00 hours when within 100m of shoreline.
	Impaired visual aesthetics/landscape	8. N/A
	Impedance of ship traffic	9. Coordinate location of dredging activity with port managers to reduce shipping delays. Consider laying pipeline on seabed.
2. Slurry transport via pipeline	Impedance of ship traffic	10. As for #9 above, or place pipeline on seabed.
3. Slurry spillage from pipeline	Dispersion of suspended solids & turbidity	11. Regularly monitor pipeline joints. Immediately halt pumping in event of leak.
	Dispersion of contaminated sediments	12. As for #11 above.
<u>Sediment Disposal - Land</u>		
1. Construction of containment area		
1.1 Sourcing of earth materials	Induced illegal quarry operations	13. Obtain earth materials from licenced quarry operators only.
1.2 Transport of earth materials	Nuisance dusting and material spillage	14. Ensure proper covering of materials during transport.
	Increased traffic	15. Restrict materials transport to off-peak hours.
1.3 Construction works	Loss of existing terrestrial habitat	16. N/A
	Loss of alternative land-use	17. N/A
	Increased ambient noise	18. Restrict construction activities to 7.00 – 17.00 hours.
	Increased local employment	19. N/A

**Table 7.1 (cont'd) Montego Freeport Harbour Dredging – HCSD - Potential impacts and corresponding impact mitigation measures.**

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	Containment of contaminated sediments	22. N/A
	Avoidance of sea disposal issues	23. N/A
	Fugitive dust from dried fine materials	24. Plant salt tolerant vegetation over sediment pile, keep pile wetted until covered by vegetation. Plant <i>Leucaena</i> trees around perimeter as a windbreak.

**Table 7.2 Montego Freeport Harbour Dredging – TSHD - Potential impacts and corresponding impact mitigation measures.**

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<u>Dredging</u>		
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	Modification of current & wave pattern	2. N/A
	Dispersion of suspended solids & turbidity	3. N/A
	Dispersion of contaminated sediments	4. N/A
1.2 Sediment disturbance	Degradation of pelagic habitat	5. Apply measures at #3 above to minimise sediment dispersal.
	Curtailed of fishing activity	6. Apply measures at #3 above to minimise sediment dispersal.
1.3 Presence/location of dredger	Increased ambient noise level	7. Advise local residents before commencement of dredging works. If practicable, restrict dredging to 7.00 - 17.00 hours when within 100m of shoreline.
	Impaired visual aesthetics/landscape	8. N/A
	Impedance of ship traffic	9. Coordinate location of dredging activity with port managers to reduce shipping delays.
2. Overfilling and spillage of sediments	Dispersion of suspended solids & turbidity	10. Do not allow overfilling of hopper and resultant spillage.
<u>Sediment Disposal - Sea</u>		
1. Leakage of sediments during transport to disposal site	Increased turbidity over sensitive inshore habitats	11. Ensure that an electronic voyage record is available for review for every disposal trip made and random independent monitoring of voyages is carried out.
	Sedimentation of deep-water benthic habitat	12. N/A
2. Deep sea sediment disposal	Relocation of contaminated sediments	13. N/A
	Degradation of pelagic habitat	14. N/A
	Avoidance of land disposal issues	15. N/A
	Precluded re-use of sediment material	16. N/A