The implications of the dispersal of the sediment plumes expected as a result of the dredging works were assessed using the computational models SEDPLUME-RW which comprise a suite of post processing packages to the hydrodynamic models. The programs were developed at HR Wallingford and are designed to compute the dispersion of suspended silts/fine sands released by dredging related activities.

The sediment dispersal models are capable of accurately simulating the advection, dispersion, settling, deposition and re-erosion of sediments typically encountered during capital and maintenance dredging operations. A detailed description of the models and their implementation are presented in Appendix B.

A series of SEDPLUME-RW simulation runs were completed in order to determine the distribution of sediments in suspension during various stages of the dredging operations. The resulting sediment plumes when the dredger is working in the middle of the navigable channel are presented in Figures 5.38 to 5.41. Contours of 25 mg/l (Guideline value for salmonid fish, see Chapter 8.0) and 50 mg/l have been plotted to illustrate the concentrations of suspended solids making up the sediment plumes. These values do not include background levels which are discussed in paragraph 5.49. The results show that elevated levels of suspended solids will become quickly dispersed due to the dilution and settlement. A curtain of elevated suspended solids across the navigable channel will therefore not occur allowing the free passage of migrating salmon. High suspended solids loadings in the order of 400 mg/l are only expected immediately downstream of the dredger itself (circa 50 m).
Further plume simulation results are presented in Figures 5.42 to 5.45 which show the resulting sediment plumes when the dredger is working at the edge of the navigable channel in close proximity to a tidal opening to the polders. In this case, a limited volume of sediment is expected to enter the polders during the last 3 hours of the flood Spring tide at concentrations less than 50 mg/l. Less material will enter the polders during Neap tides. Again high suspended solids loadings are only expected immediately downstream of the dredger itself (circa 50 m).

The background suspended solids loading within the Boyne Estuary is regularly monitored by the Environmental Protection Agency. The results of the routine monitoring programme for the period 1994 to 1995 are presented in Table 5.4. The location of the sampling points are also presented in Figure 5.46. The results show that suspended solids are often recorded above 25 mg/l and can reach levels in excess of 150 mg/l in the vicinity of Mornington during storm conditions. It is also worth noting that regular maintenance dredging of the navigable channel takes place at present which uses a grab to remove sediments. This type of dredge is expected to result in a much greater percentage loss of material, albeit at a lesser scale. Present maintenance dredging removes around 20,000 - 30,000 m³/year of sediment from the navigable channel to a licensed offshore disposal site.

References


## Table 5.4 Background Suspended Solids Loading (mg/l)

(Recorded by EPA Regional Inspectorate, Monaghan)

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Drogheda Harbour Study
Predicted Sediment Plume at Mid-Ebb
Due to Dredging in Centre of Channel
Tidal times relate to HW at the Bar

Figure 5.38
Drogheda Harbour Study
Predicted Sediment Plume at Low-Water
Due to Dredging in Centre of Channel
Tidal times relate to HW at the Bar

Figure 5.39
Drogheda Harbour Study
Predicted Sediment Plume at Mid-Flood
Due to Dredging in Centre of Channel
Tidal times relate to HW at the Bar

Figure 5.40
Drogheda Harbour Study

Predicted Sediment Plume at High-Water
Due to Dredging in Centre of Channel
Tidal times relate to HW at the Bar
Drogheda Harbour Study
Predicted Sediment Plume at Mid-Ebb
Due to Dredging at Edge of Channel
Tidal times relate to HW at the Bar

Figure 5.42
Drogheda Harbour Study
Predicted Sediment Plume at Low-Water
Due to Dredging at Edge of Channel
Tidal times relate to HW at the Bar

Figure 5.43
Drogheda Harbour Study
Predicted Sediment Plume at Mid-Flood
Due to Dredging at Edge of Channel
Tidal times relate to HW at the Bar

Figure 5.44
Drogheda Harbour Study
Predicted Sediment Plume at High-Water
Due to Dredging at Edge of Channel
Tidal times relate to HW at the Bar

Figure 5.45