Kyleakin Pier – Request for clarification of issues relating to Chapter 18 of EIS.

Response to comments made by SNH email 28th December 2016

Comment 1

A 1 in 1 year event is the correct standard for general sediment transport simulations as 1 in 100 year events area extremely rare and of short duration. Changes in sediment transport tend to be important over longer periods of time thus the 1 in 1 year events are more appropriate than 1 in 100 year events. However for such items as structural or bank stability extreme events are more appropriate and 1 in 100 year events have been considered in the analysis of these items.

In particular Figure 7.2 and 7.3 show changes in bed levels for the existing regime and for the regime with the proposed pier extension development in place respectively. It will be noted that the changes in the sea bed levels in these diagrams are confined to the shallow water areas and locations where there are fine sediments on the sea bed in the lee of the pier. Most importantly Figure 7.4 shows the impact of the proposed pier development on the sediment transport regime where it will be seen that changes in the sea bed levels resulting from the proposed development do not occur anywhere near the flame shell beds.

Furthermore the bank stability analysis reported in Section 7.5 of Chapter 18 shows that bank would be stable during a 1 in 100 year storm with spring tides when the bank surface is covered with cobble sized material. Thus as the sea bed around the flame shell beds is composed of coarse and rocky material and the water depths are greater than at the banks, the sea bed adjoining the flame shell beds will be stable even under the 1 in 100 year storm conditions.

Thus since the proposed pier development will have no impact on the tidal, wave or bed sediments adjoining the flame shell beds the development will not alter the sediment transport regime around the flame shell beds.

Comment 2

The modelling of the sediment plumes and sediment deposition was undertaken for each dredging scenario over the full dredging period which ranged from 30 days to 78 days depending upon the type of dredging equipment used. In order to be conservative a Force 3 wind from the south was applied <u>over the entire dredging period</u>. Given the length of the dredging period it is likely that winds will actually come from a range of directions with variable strengths during the period thus we consider that the use of a F3 southerly wind over the entire period is appropriate and conservative.

Wind driven currents are primarily surface currents and thus only affect surface plumes. In stronger winds wave action tends to mix the surface layer with the overall water column and thus the sediment plume is more affected by the tidal currents than a surface current. Added to this is the fact that there is generally no overspill during the dredging operations planned for the development so surface plumes will not dominate the losses to the water column from the dredging operations. Thus the application of a Force 3 southerly wind over the entire dredging period is appropriate and conservative.

Comment 3

The so called inner and outer dredging areas are clearly shown in Figures 8.3 and 8.4 of the coastal processes chapter text. The areas have been chosen due to the different sea bed sediments in the two areas and the possible dredging methods that may be used in each area.

The dredging simulations have been undertaken for the dredging of both areas in each of the overall dredging scenario simulations. Thus no part of the dredging has been omitted from the simulations. Figures 8.6, 8.10 and 8.14 show examples of the typical dredging plumes at various stages of the tidal cycle to give the reader an idea of how the plumes move about under the influence of the tide. The plume for the “inner” area was selected as the bed sediment in the “inner” area include finer material than in the “outer” area making the plumes from the inner area more visible than those during the dredging of the outer area.

As noted in the text the plume concentrations in the area adjacent to the flame shell beds were less than 70 mg/l and only approached this concentration for a very short period during the dredging. Thus it is not surprising that the deposition diagrams show that deposition of sediments from the dredging on the flame shell bed areas are less than 1mm.

In one of the early drafts of the text for the coastal process chapter we included maximum SSC envelope plots for each of the dredging scenarios but these were excluded from the final version as we have found from previous experience that most non technical people reading the EIA find these plots extremely confusing. For the benefit of SNH we have set these out below together with the maximum bed thickness envelope for each of the dredging scenarios.

The maximum SSC envelop shows the area which is covered by the dredging plume as it moves back and forth with the tidal and wind driven currents over the full period of the dredging operations. The value of the SSC shown in the diagrams are the maximum value that occurs at each point in space at any time throughout the dredging operation even if it only occurs for a very short period of time.

In a similar manner the maximum bed level change envelop plot shows the maximum deposition depth of sediment over the area at any time during the dredging operation even if the material is temporally deposited during say the turn of the tide and is subsequently re-suspended by the increasing tidal flow. A comparison can be made between the maximum deposition depths plot and the deposition depth plot at the end of the simulation to see the areas where temporally deposited sediment has been re-suspended.

The maximum envelop plots for each dredging scenario are shown below: These diagrams may be compared with the mean SSC and the deposition depth at the end of the dredging simulations shown in Section 8 of Chapter 18 of the EIA for each Scenario as follows

Scenario 1 TSHD with dredging period of 75 days.	Figures 8.7 and 8.8
Scenario 2 TSHD and BHD with dredging period of 78 days.	Figures 8.11 and 8.12
Scenario 3 CSD with dredging period of 30 days.	Figures 8.15 and 8.16

Scenario 1 TSHD with dredging period of 75 days

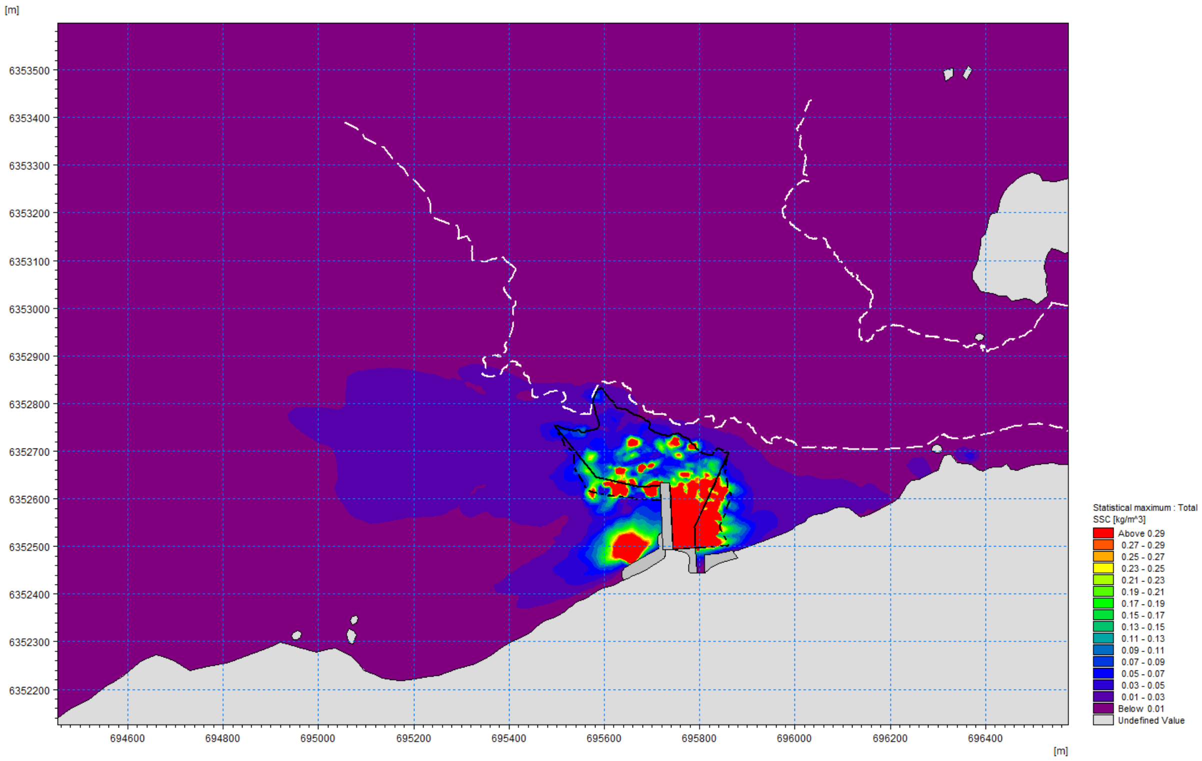

Figure C3.1: The maximum total SSC envelop created by the TSHD during the entire capital dredging programme.

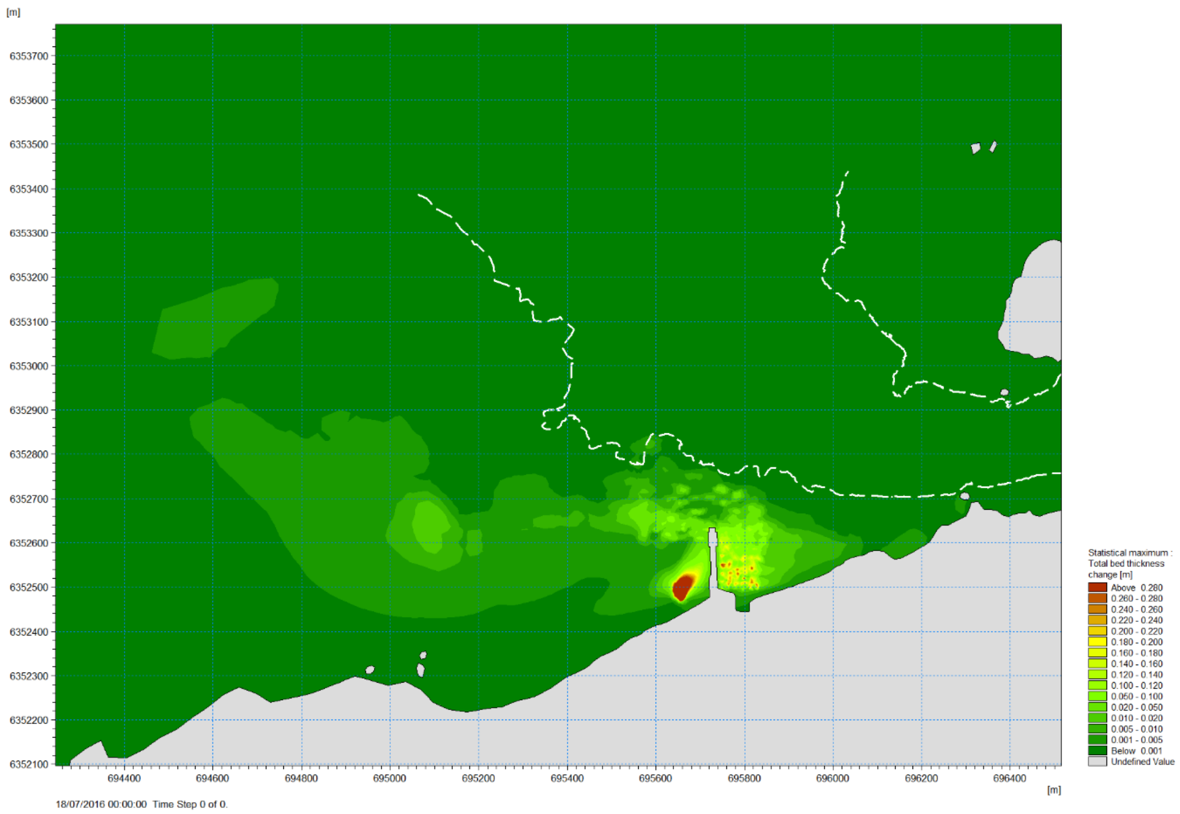

Figure C3.2: Maximum deposition depth envelop during the 75day TSHD dredging campaign.

Scenario 2 TSHD and BHD with dredging period of 78 days

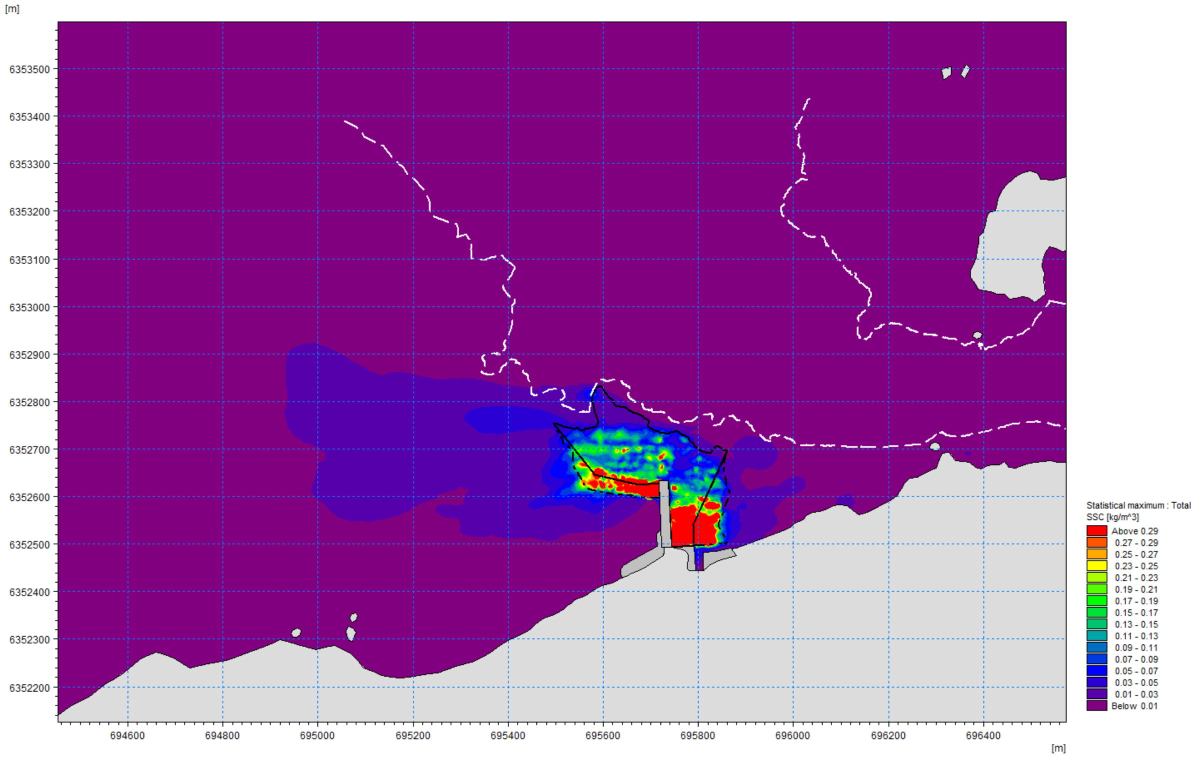

Figure C3.3: The maximum total SSC envelop created by the TSHD & BHD during the entire capital dredging programme.

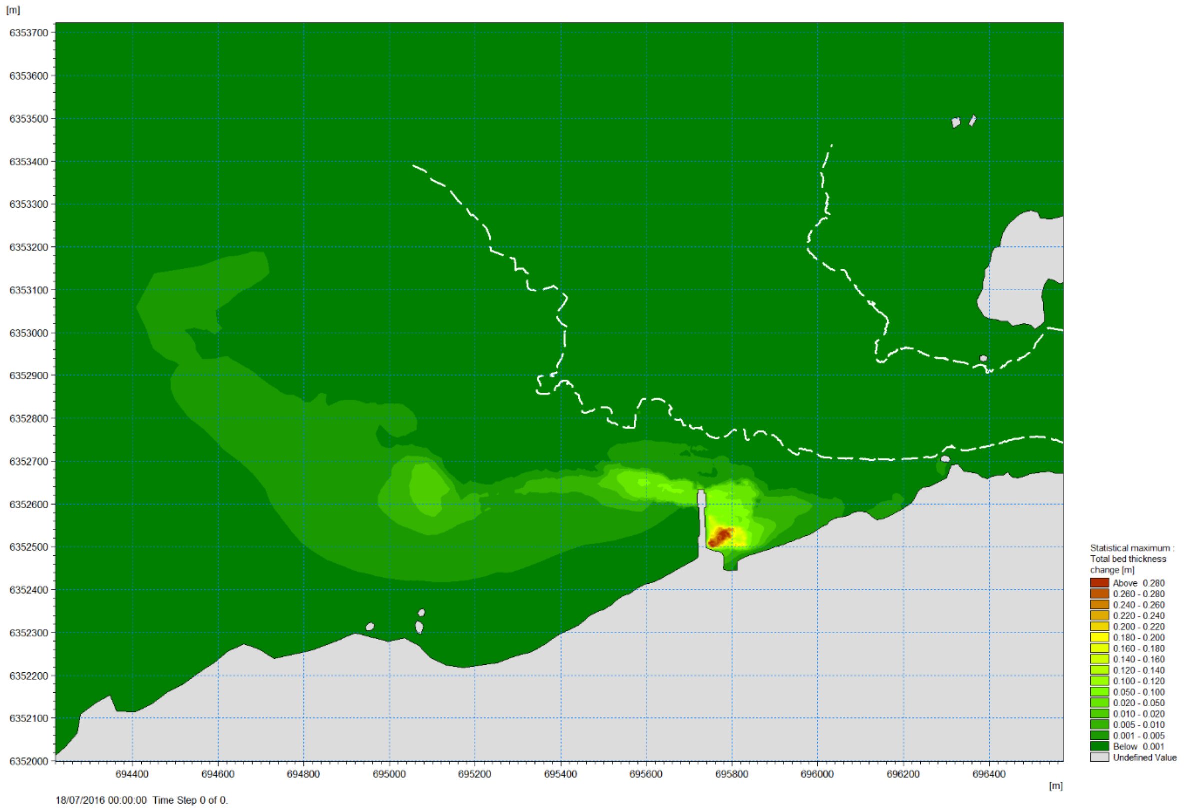

Figure C3.4: Maximum deposition depth envelop during the 78day TSHD & BHD dredging campaign.

Scenario 3 CSD with dredging period of 30 days

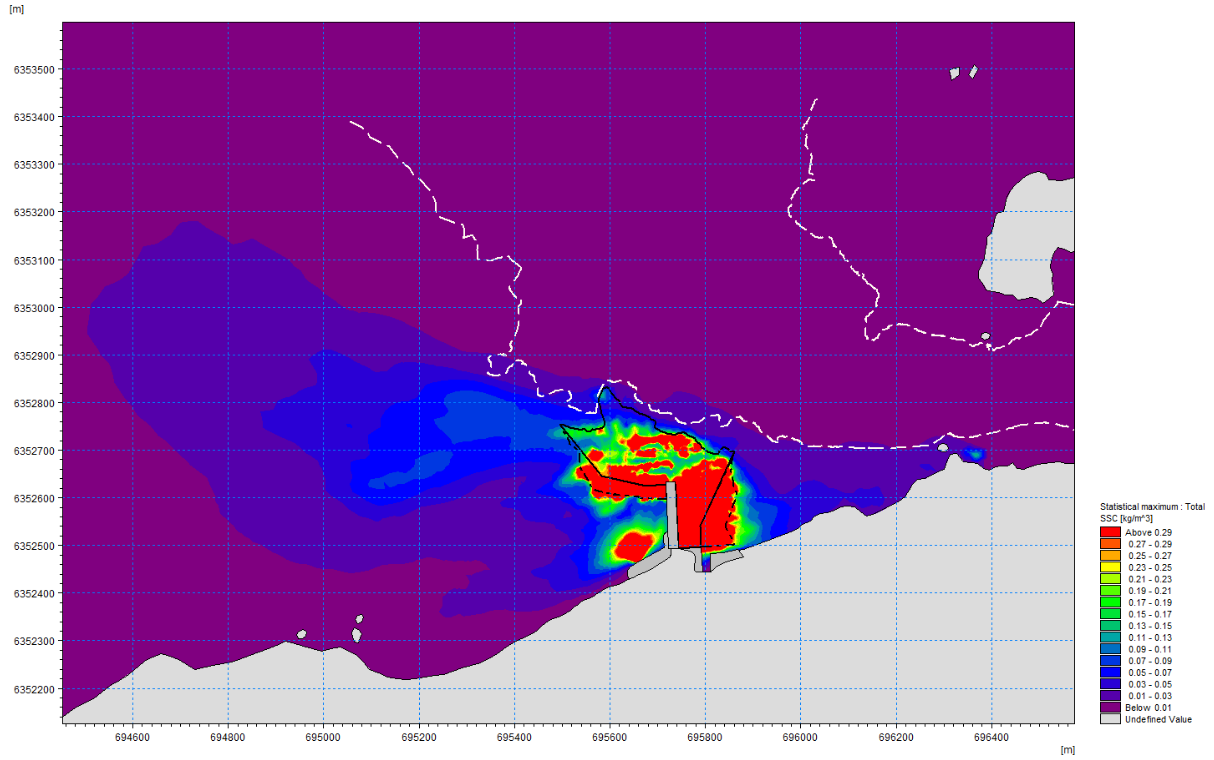

Figure C3.5: The maximum total SSC envelop created by the TSHD during the entire capital dredging programme.

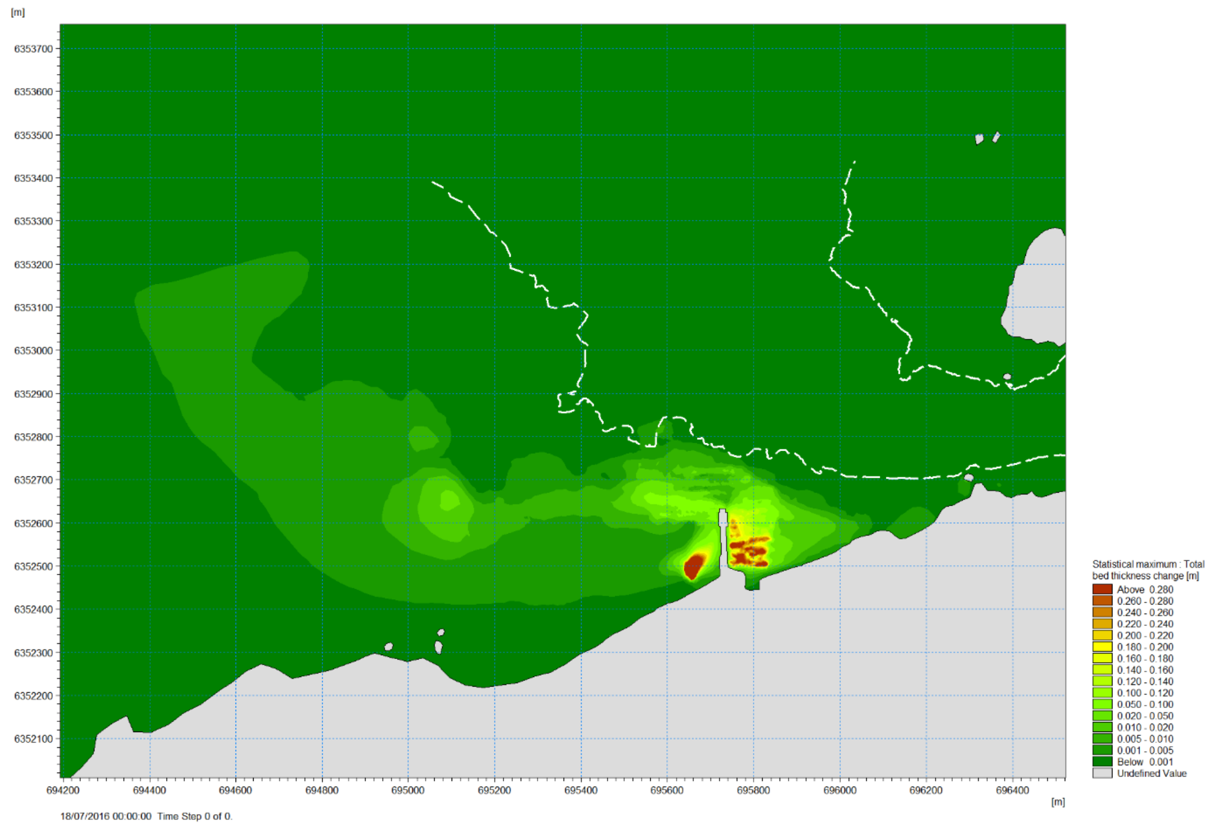

Figure C3.6: Maximum deposition depth envelop during the 30day CSD dredging campaign.

It will be seen from the diagrams above and the appropriate figures in Section 8 of Chapter 18 of the EIA that the maximum SSCs which occur over the flame shell beds are low and restricted to a very small part of the flame shell bed area and are of short duration. Similarly the maximum depth of deposition on this small part at the edge of the flame shell beds is very low being less than 2mm and again only occurs for a short time during the turn of the tide. Effectively the flame shell bed area is totally dispersive for the dredged plume material.

It should also be noted that subsequent to the completion of the dredging scenario modelling the decision was taken to reduce the extent of the dredging at the North West corner of the dredged area. This reduction in the area which projects close to the flame shell beds will further reduce the level of the SSC and the temporary deposition of material at the south western edge of the flame shell beds.