WAVE-CURRENT INTERACTION

North-Northwest Wave Scenarios for Assessing **4 million cy placement** within Shallow Water ODMDS – Compared to 1997 Baseline Condition

Change in Wave Height

Wave Amplification

Changes in Wave Breaking

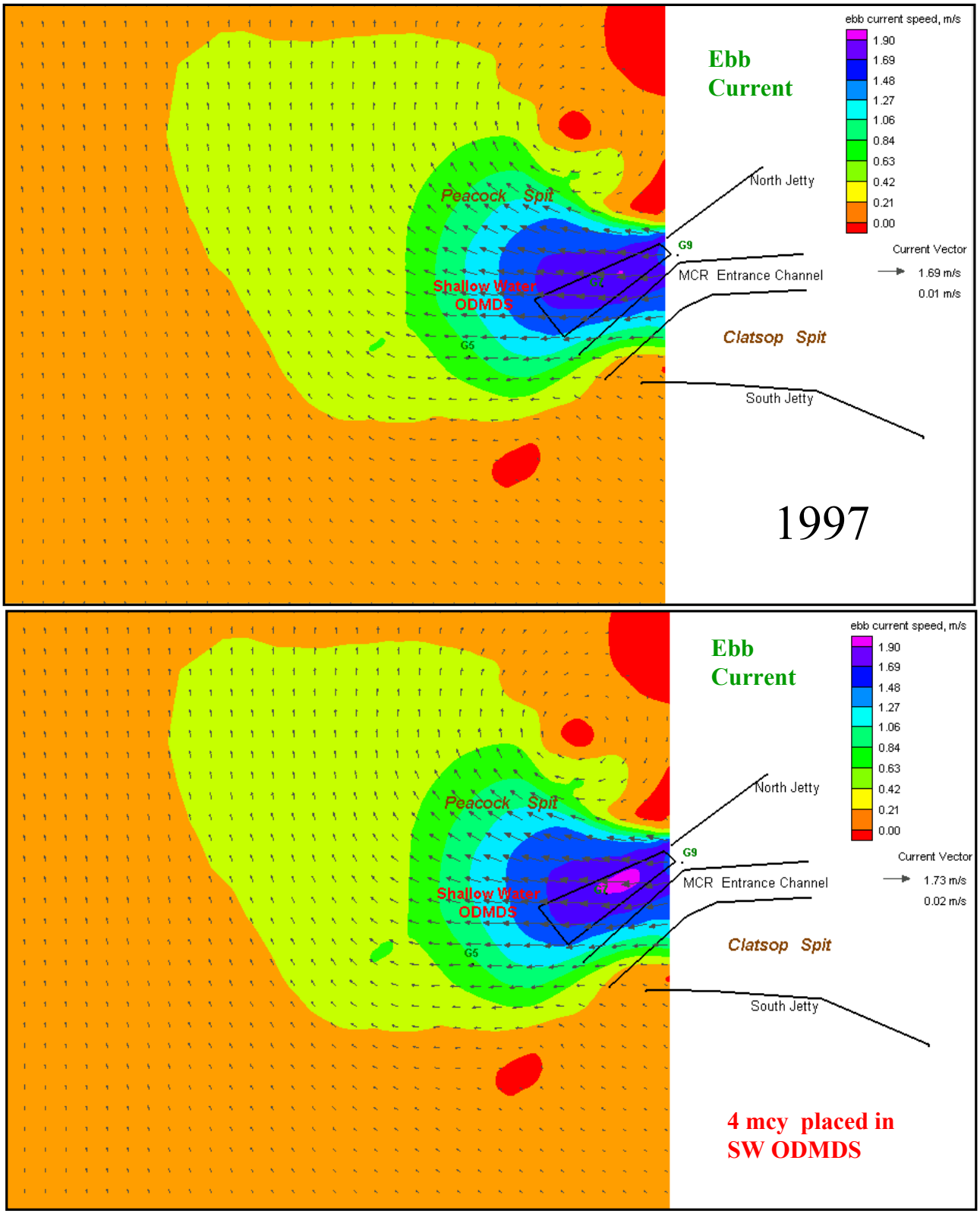


Figure C1. Distribution of depth-averaged current at MCR during peak ebb flow for summer spring tide. Top graphic is based on the 1997 bathymetry, bottom graphic is for 4 MCY placed within SWS. Maximum current in SWS is given on right side of each figure. Data generated using a depth-averaged hydrodynamic model (ADCIRC).

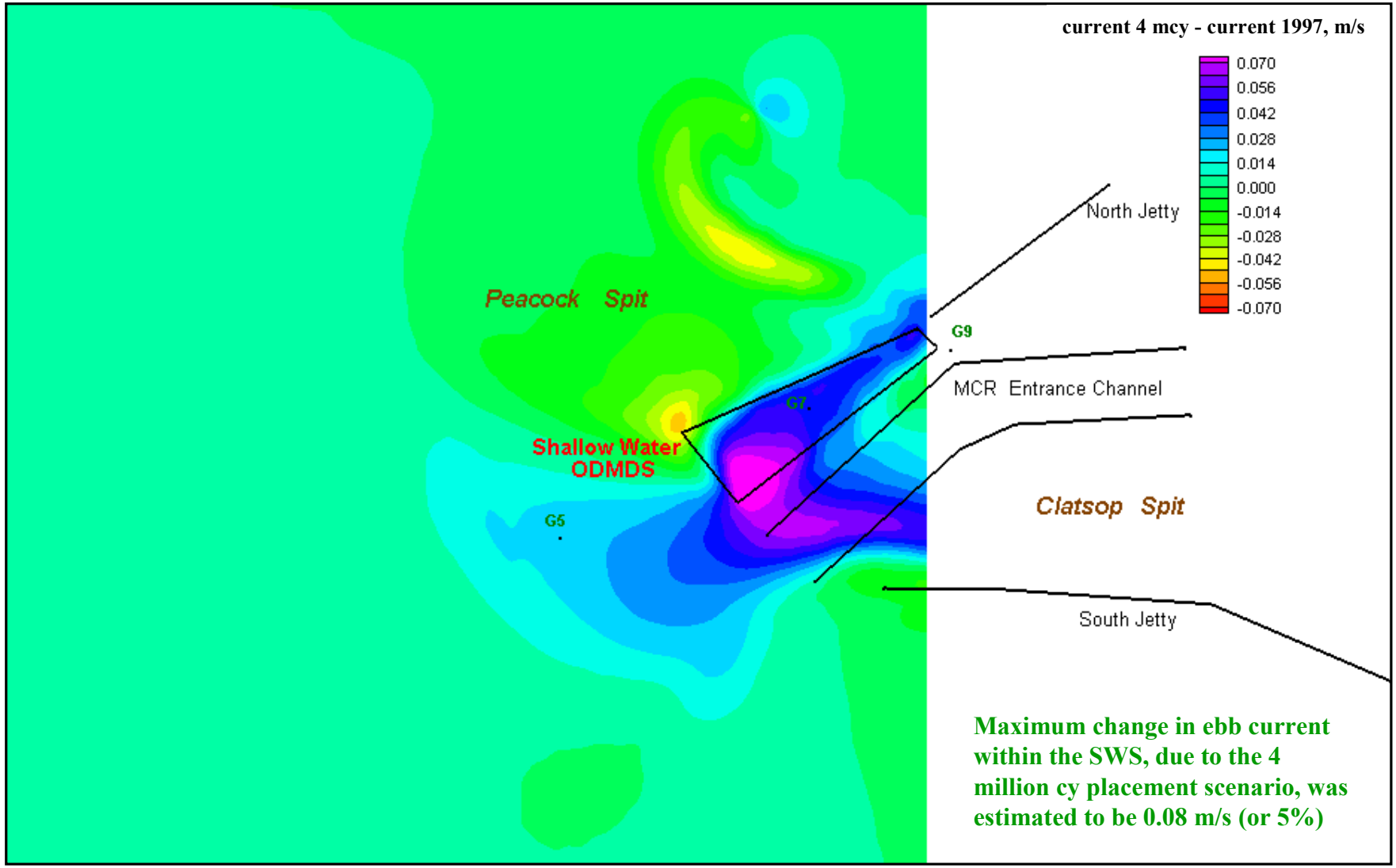
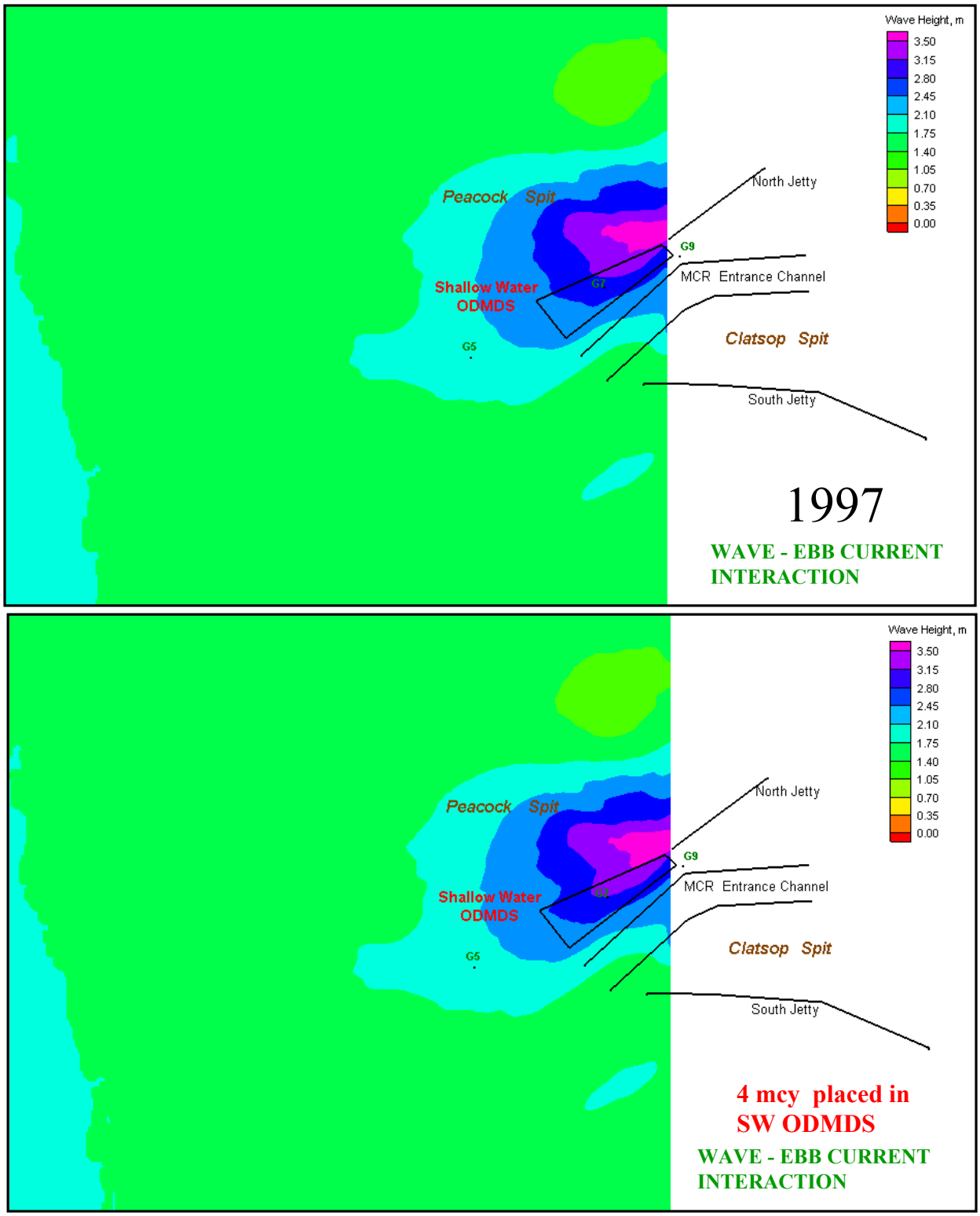


Figure C2 . Estimated change in ebb current at MCR due to bathymetry change within the SWS, for the 1997 condition vs. 4 million cy placement scenario. Change in ebb current was calculated as "4 million cy placement current - 1997 current". A value of 0.08 means that the change in ebb current due to 4 million cy placement scenario was estimated to be 0.08 m/s greater than in 1997.



Offshore wave conditions (figure S6) for Summer Swell: Ht = 1.79 m, Tp=11.0 sec, Dir =275 deg, Wind=5.9 m/s @ 329 deg

Figure C3. STWAVE model simulation of nearshore wave height at MCR with ebb current, for the prescribed offshore wave condition. Top graphic is for 1997 bathymetry, bottom graphic is for 4 MCY placed within SWS.

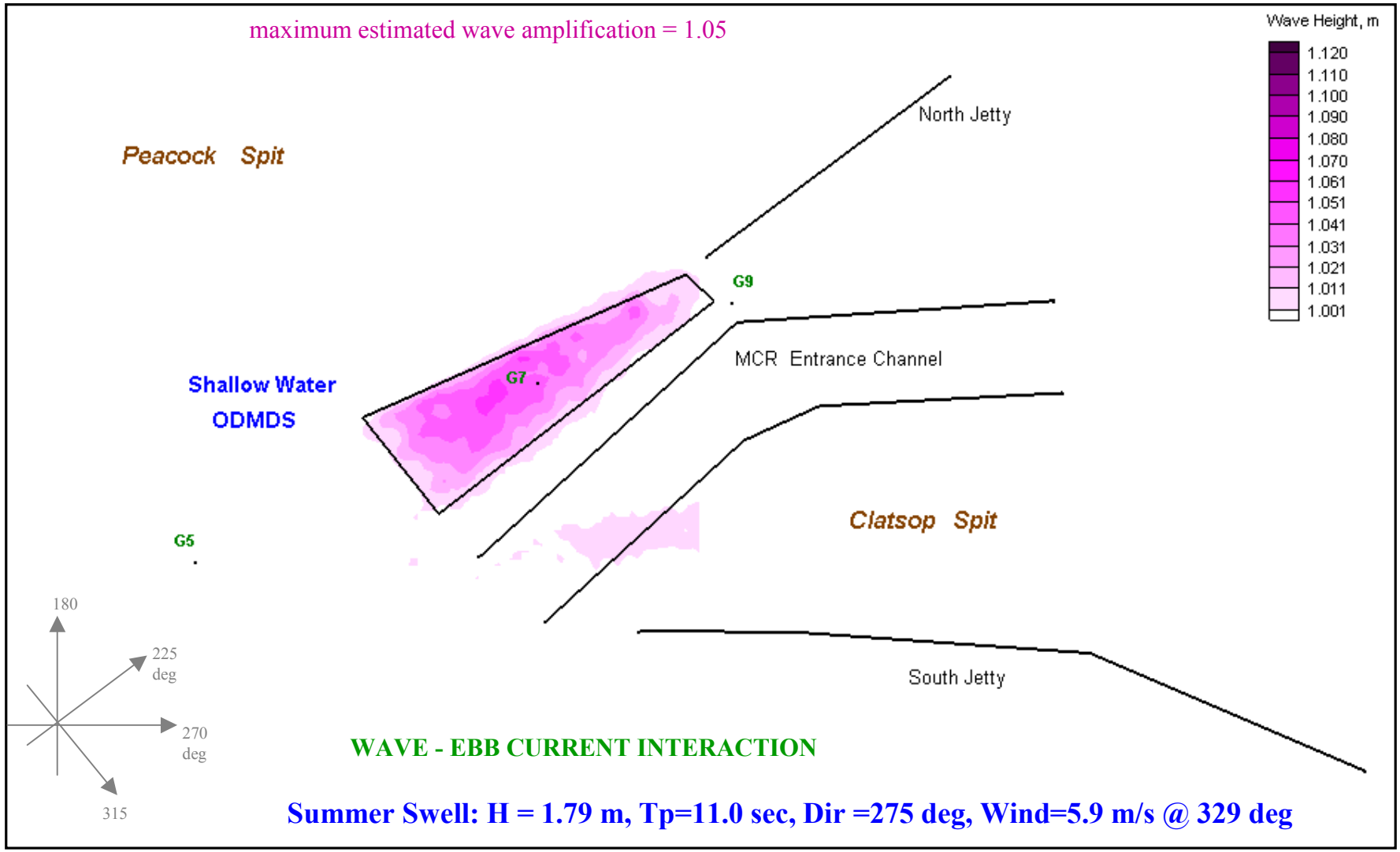
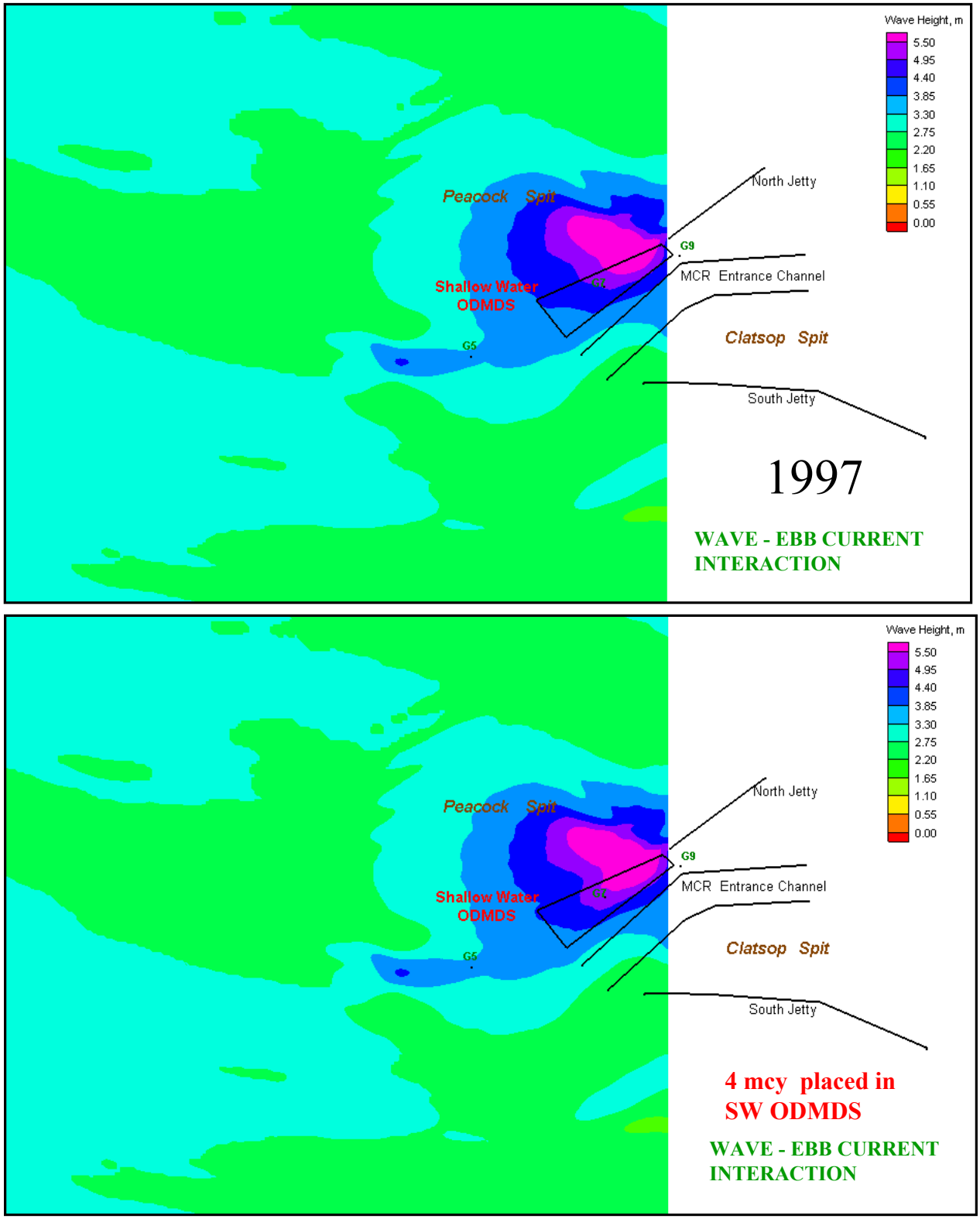


Figure C4 . Estimated wave amplification at MCR due to bathymetry & ebb current change resulting from 4 MCY of dredged material being placed within SWS as compared to 1997 baseline condition, for the prescribed offshore wave condition. Wave amplification was calculated as "4 million cy placement wave height / 1997 wave height"; only values greater than 1.0 are shown. A value of 1.2 means that waves for the 4 million cy placement scenario were estimated to be 20% greater than in 1997.



Offshore wave conditions (figure S7) for Winter Swell: Ht = 2.85 m, Tp=16.7 sec, Dir =280 deg, Wind=4.8 m/s @ 158 deg

Figure C5 . STWAVE model simulation of nearshore wave height at MCR with ebb current, for the prescribed offshore wave condition. Top graphic is for 1997 bathymetry, bottom graphic is for 4 MCY placed within SWS.

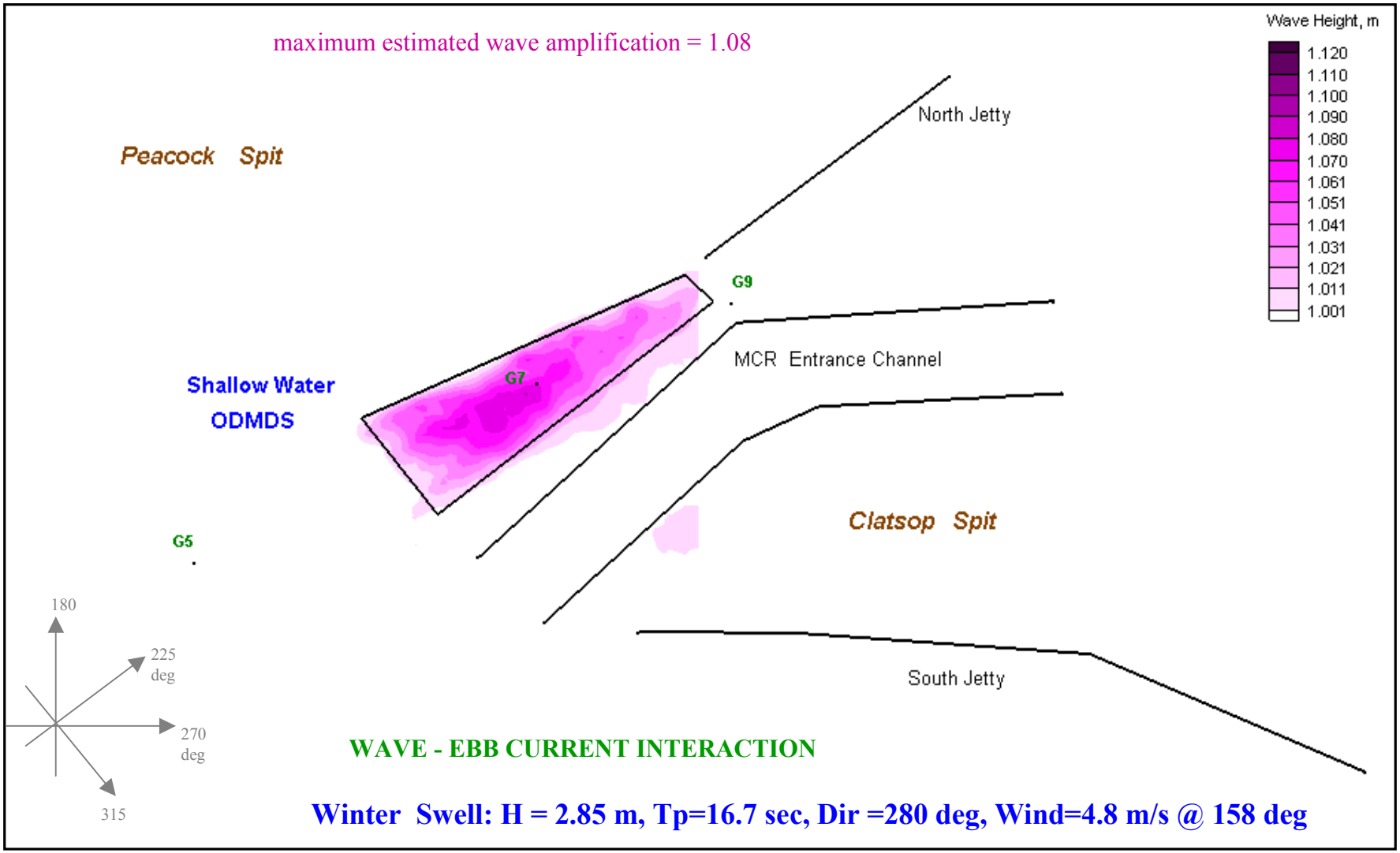
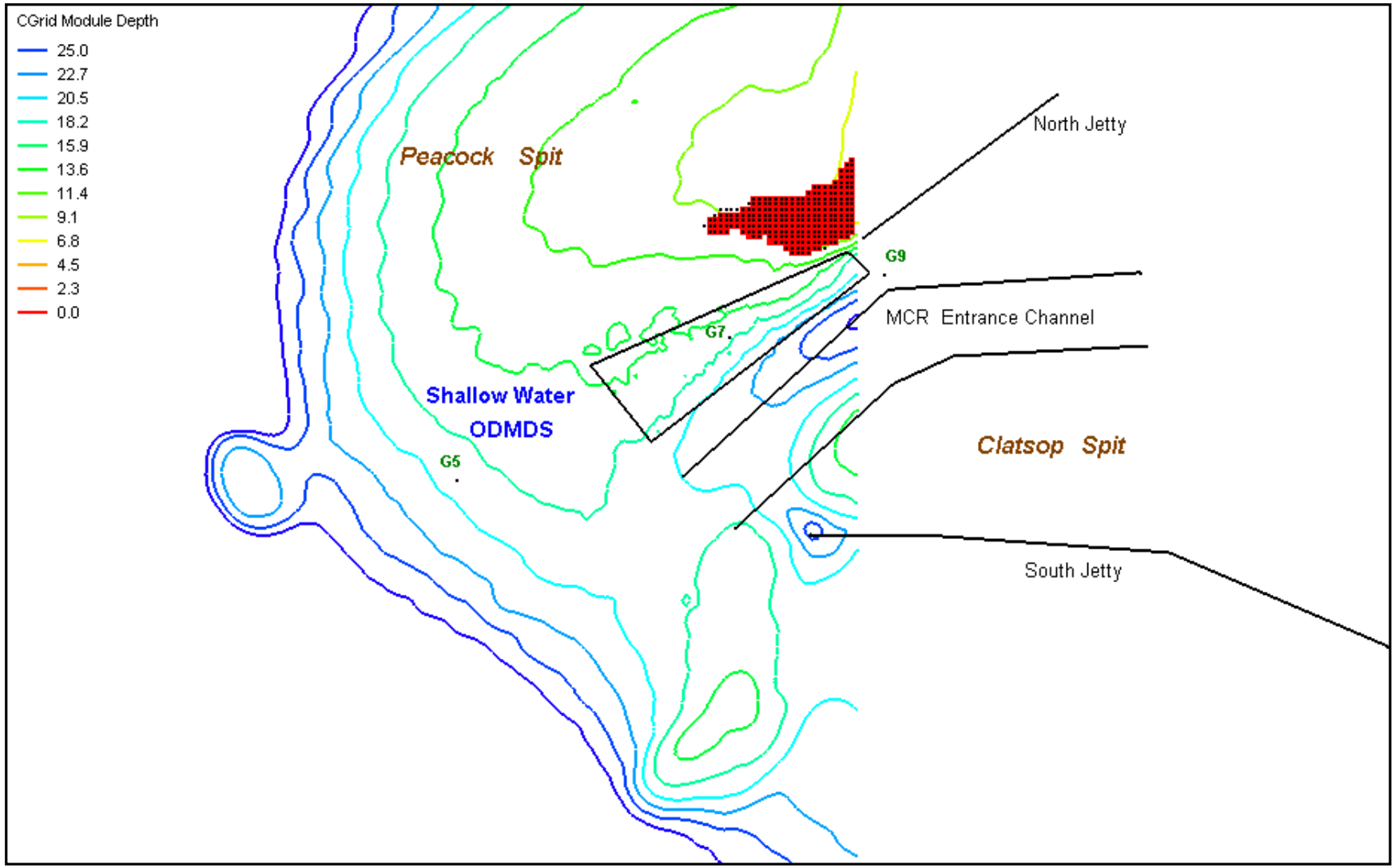
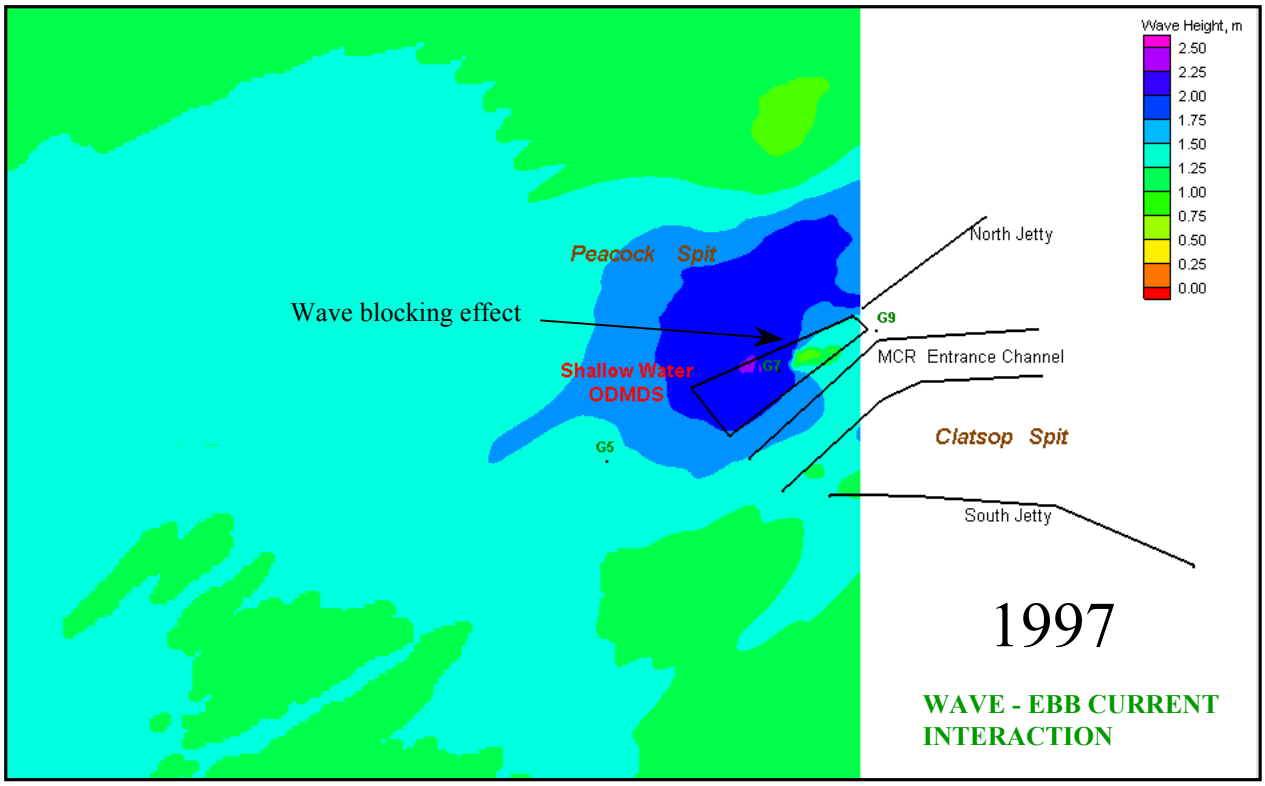


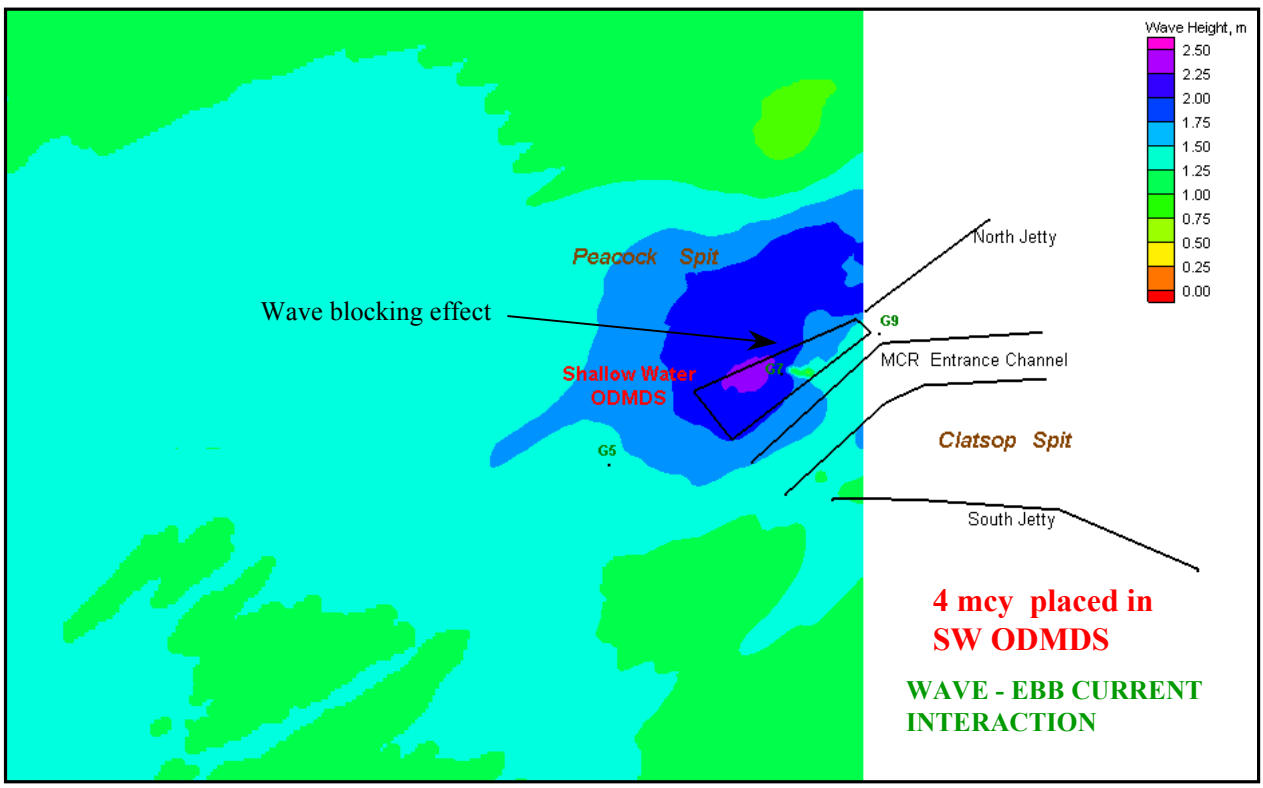
Figure C6 . Estimated wave amplification at MCR due to bathymetry & ebb current change resulting from 4 MCY of dredged material being placed within SWS as compared to 1997 baseline condition, for the prescribed offshore wave condition. Wave amplification was calculated as "4 million cy placement wave height / 1997 wave height"; only values greater than 1.0 are shown. A value of 1.2 means that waves for the 4 million cy placement scenario were estimated to be 20% greater than in 1997.



Winter Swell: Avg. wave height = 2.85 m, peak wave period=16.7 sec, Avg. wave direction = W (280 deg), Wind=4.8 m/s @ SE (158 deg)

Figure C7. Estimated wave breaking location for 1997 (shown in black markers) and for 4 MCY palced in SWS (shown in red markers), based on the prescribed offshore wave condition. Bathymetry is shown for 1997+4 MCY placed in SWS; depth contour values are limited to 25 meters for clarity.





Offshore wave conditions (figure S8) for Summer Swell: Ht = 1.29 m, Tp=16.7 sec, Dir =225 deg, Wind=5.4 m/s @ 316 deg

Figure C8. STWAVE model simulation of nearshore wave height at MCR with ebb current, for the prescribed offshore wave condition. Top graphic is for 1997 bathymetry, bottom graphic is for 4 MCY placed within SWS.

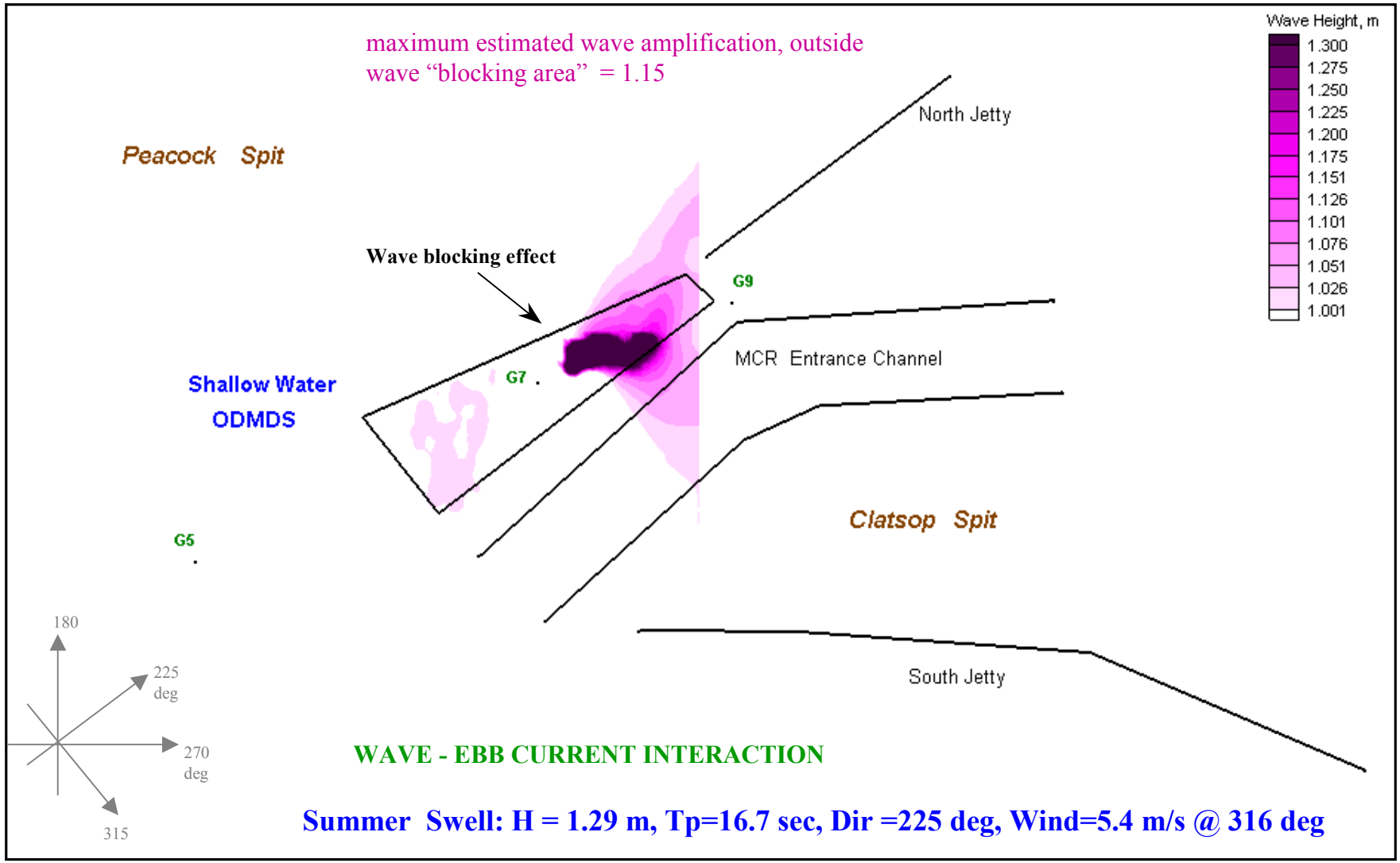
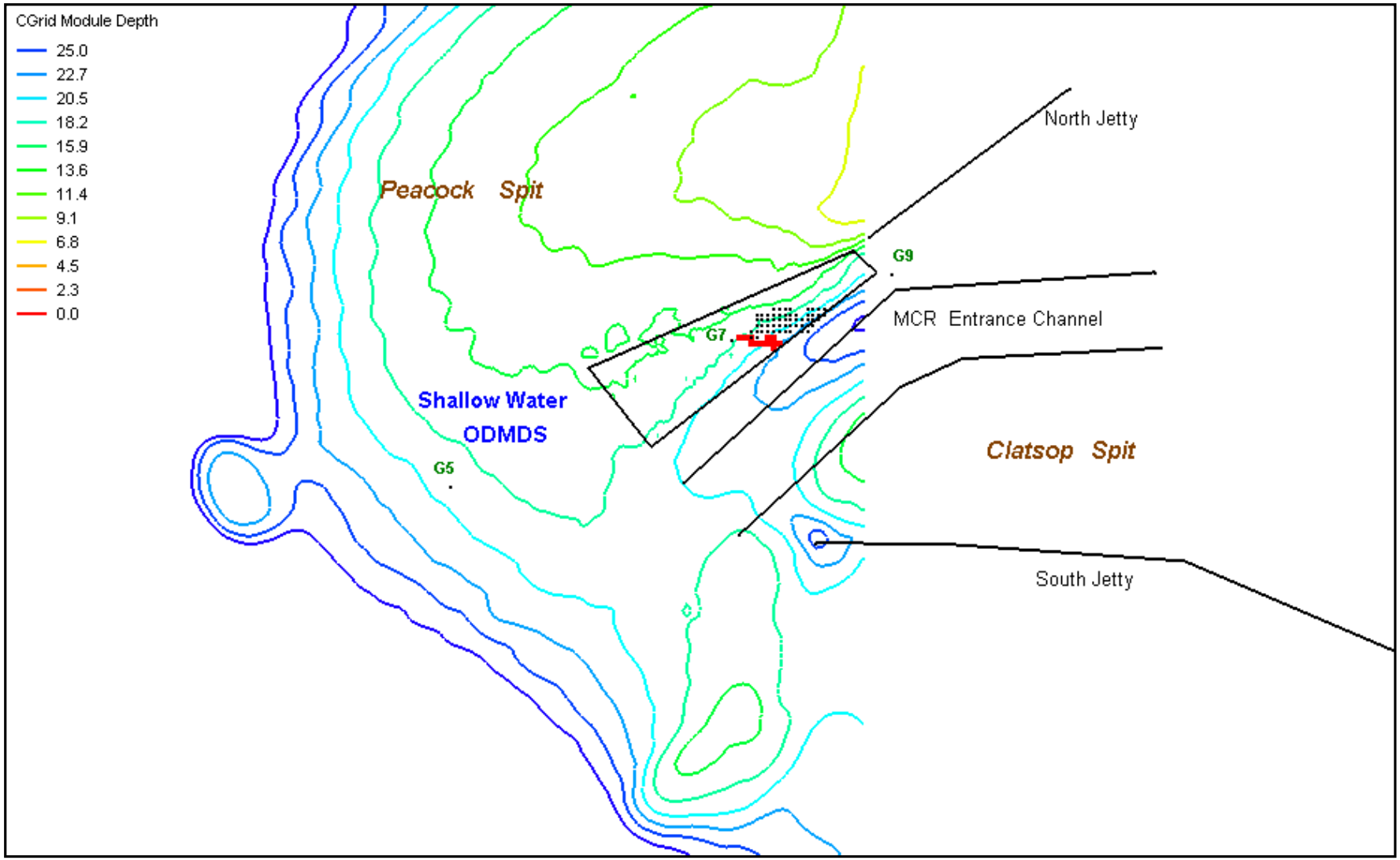
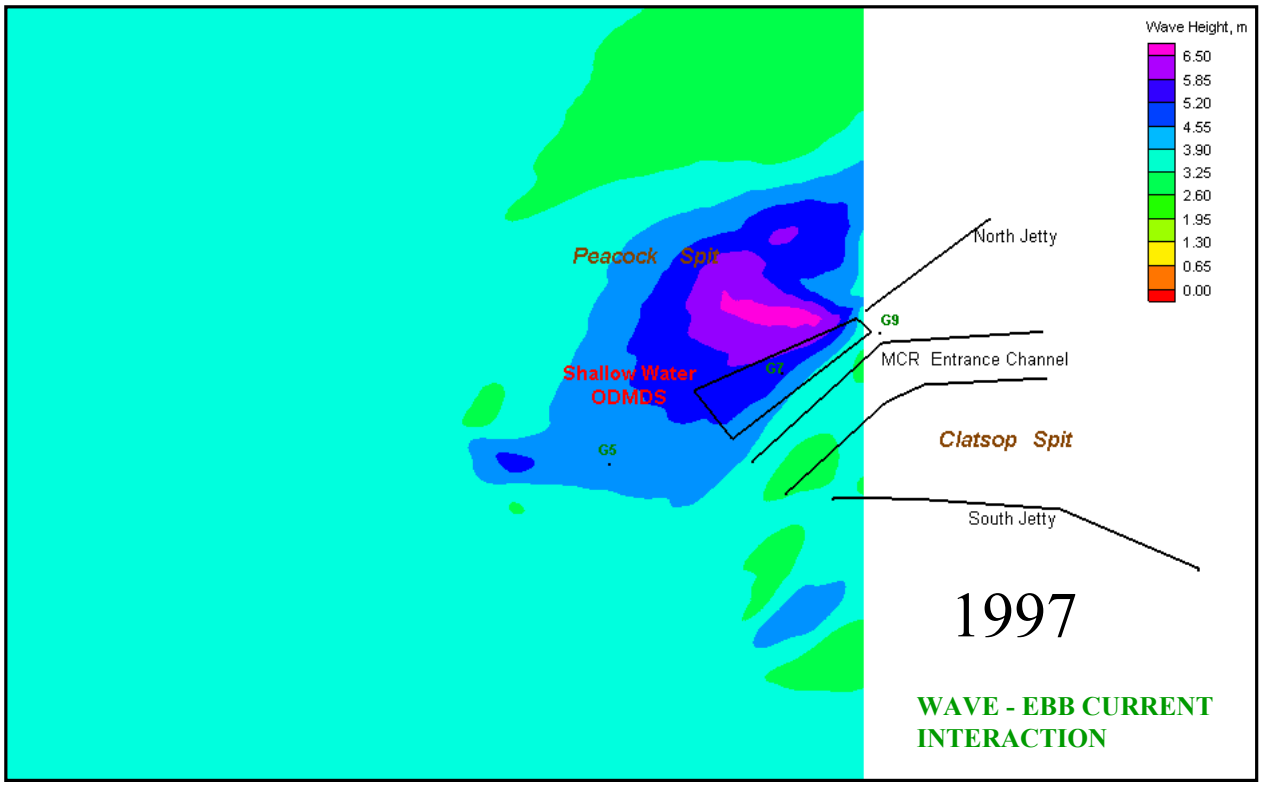


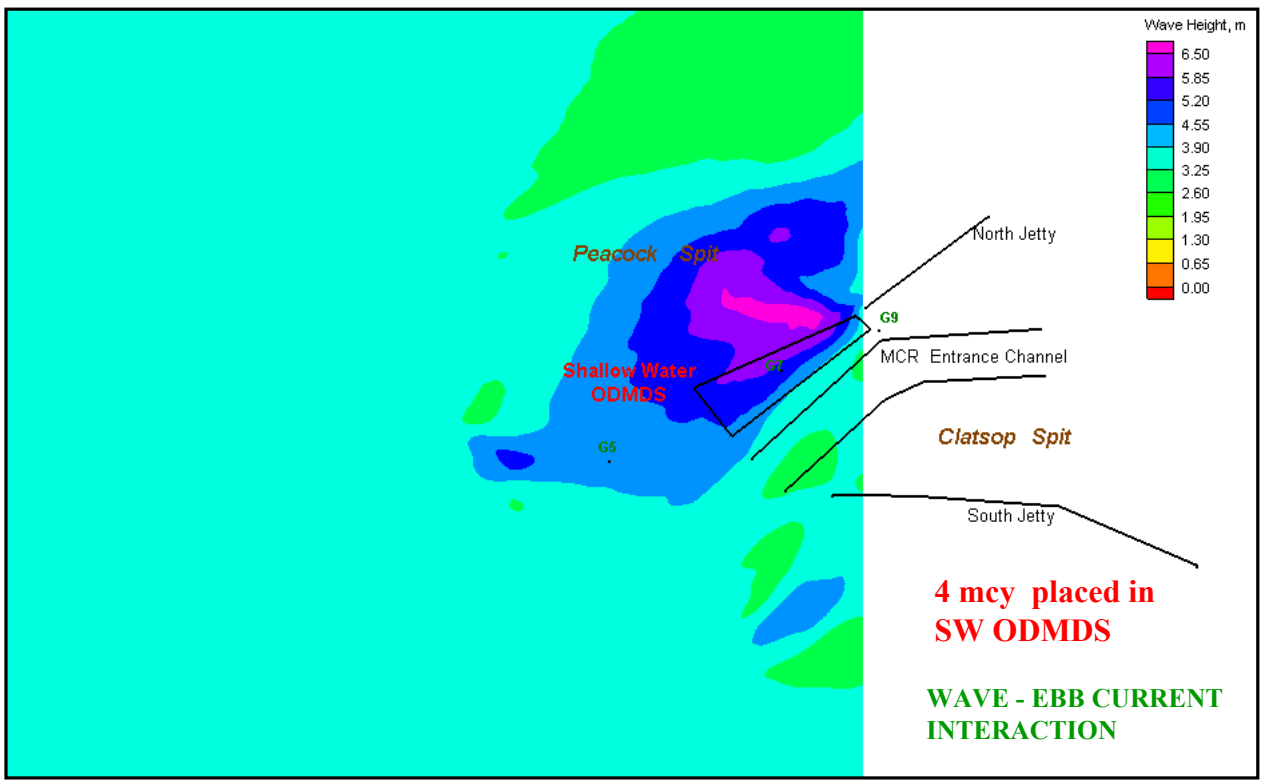
Figure C9 . Estimated wave amplification at MCR due to bathymetry & ebb current change resulting from 4 MCY of dredged material being placed within SWS as compared to 1997 baseline condition, for the prescribed offshore wave condition. Wave amplification was calculated as "4 million cy placement wave height / 1997 wave height"; only values greater than 1.0 are shown. A value of 1.2 means that waves for the 4 million cy placement scenario were estimated to be 20% greater than in 1997.



Summer Swell: Avg. wave height = 1.29 m, peak wave period =16.7 sec, Avg. wave direction = sW (225 deg), Wind=5.4 m/s @ NW (316 deg)

Figure C10. Estimated wave breaking location for 1997 (shown in black markers) and for 4 MCY palced in SWS (shown in red markers), based on the prescribed offshore wave condition. Bathymetry is shown for 1997+4 MCY placed in SWS; depth contour values are limited to 25 meters for clarity. Breaking is due to a wave blocking effect for short period waves.





Offshore wave conditions (figure S9) for Winter Swell: Ht = 3.75 m, Tp=16.7 sec, Dir =275 deg, Wind=6.9 m/s @ 108 deg

Figure C11. STWAVE model simulation of nearshore wave height at MCR with ebb current, for the prescribed offshore wave condition. Top graphic is for 1997 bathymetry, bottom graphic is for 4 MCY placed within SWS.

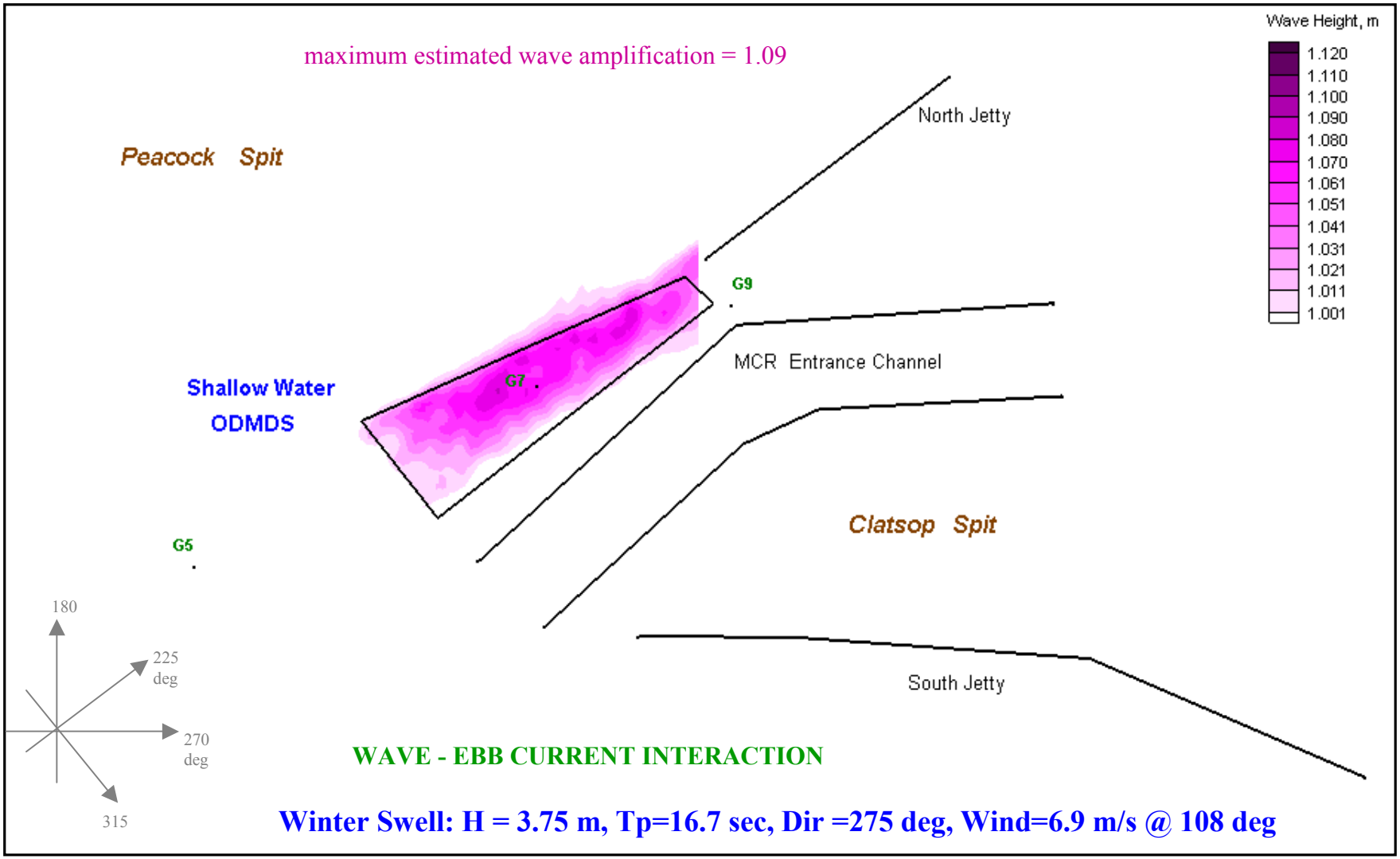
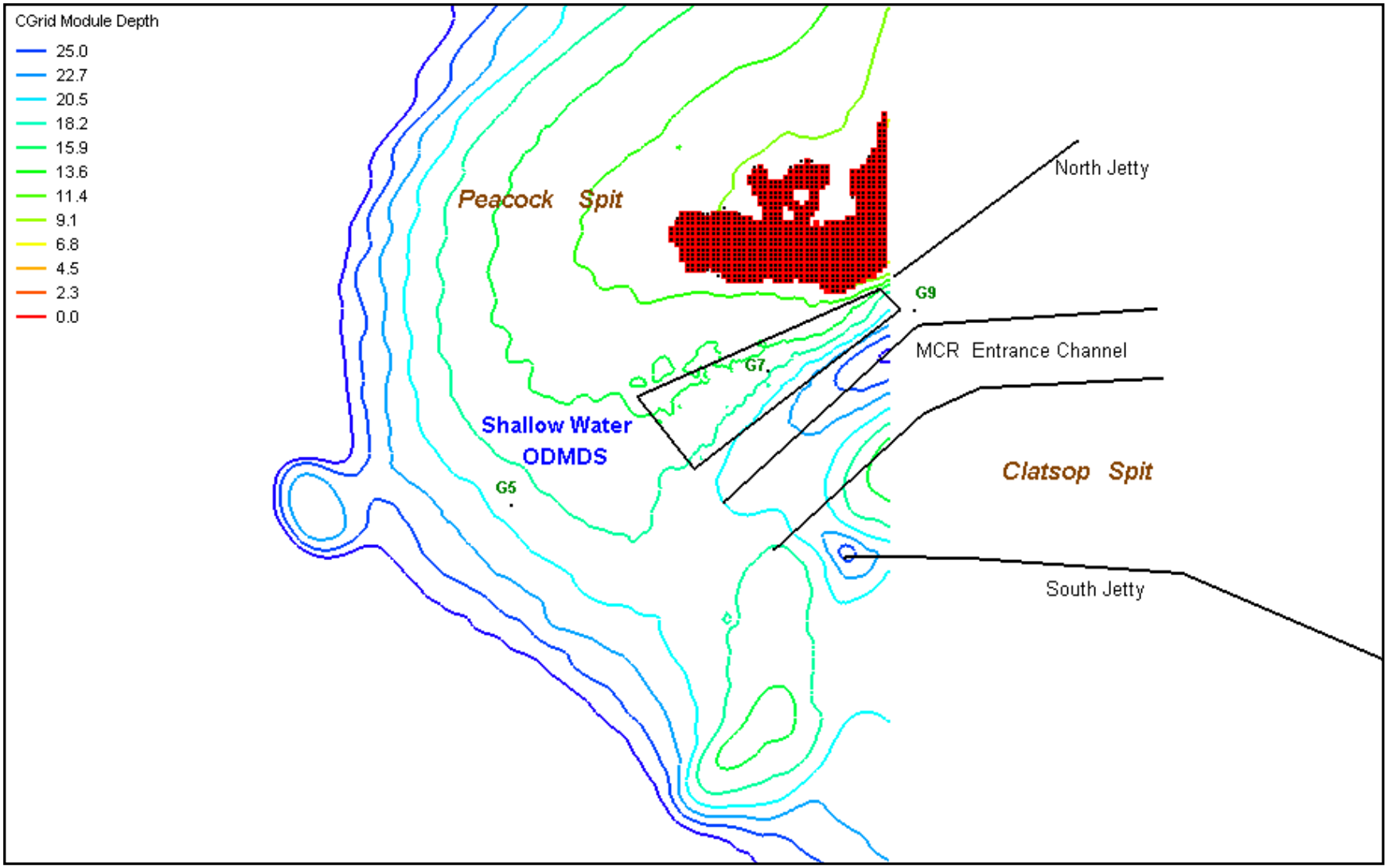
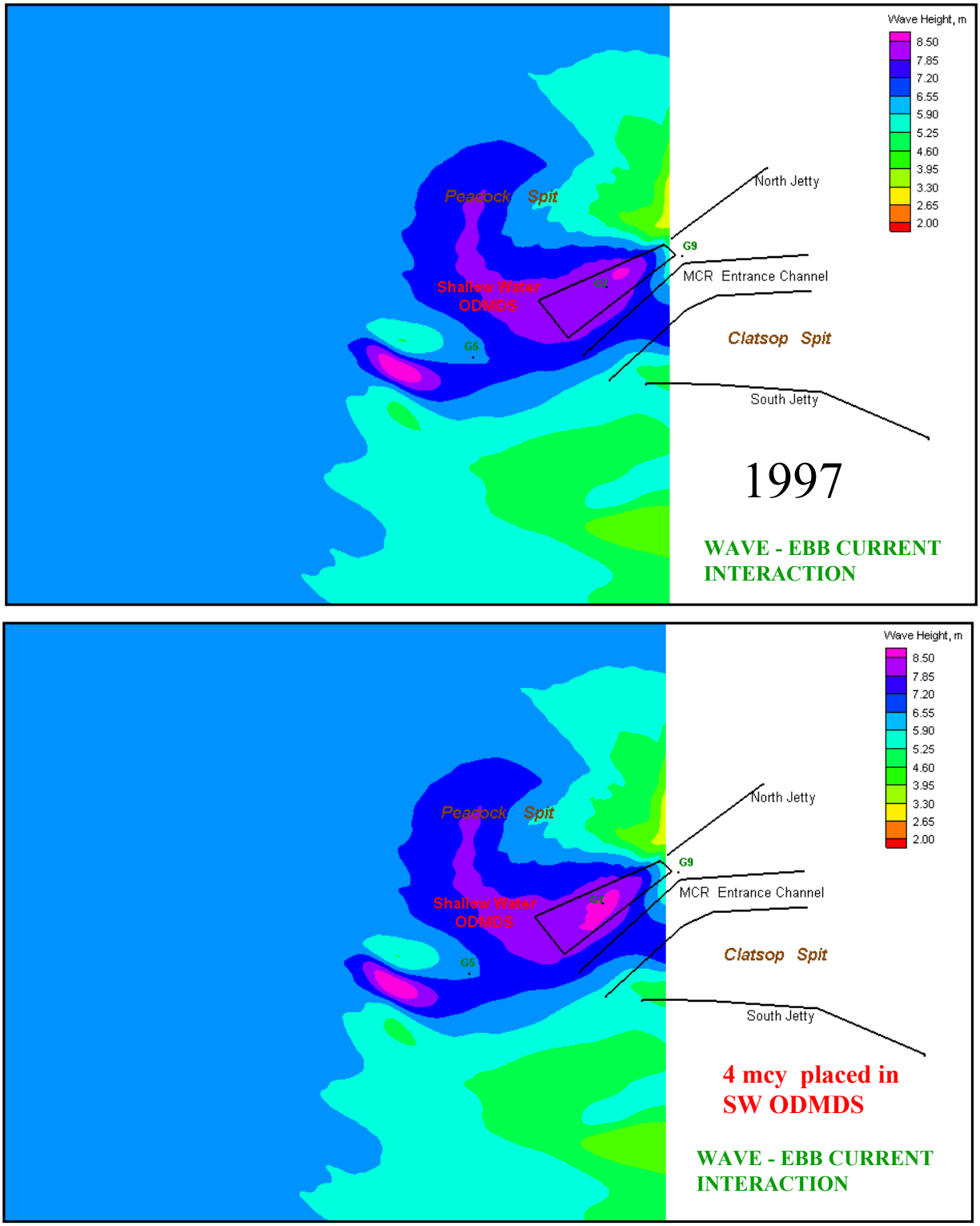


Figure C12. Estimated wave amplification at MCR due to bathymetry & ebb current change resulting from 4 MCY of dredged material being placed within SWS as compared to 1997 baseline condition, for the prescribed offshore wave condition. Wave amplification was calculated as "4 million cy placement wave height / 1997 wave height"; only values greater than 1.0 are shown. A value of 1.2 means that waves for the 4 million cy placement scenario were estimated to be 20% greater than in 1997.



Winter Swell: Avg. wave height= 3.75 m, peak wave period =16.7 sec, Avg. wave direction =W (275 deg), Wind=6.9 m/s @ E (108 deg)

Figure C13. Estimated wave breaking location for 1997 (shown in black markers) and for 4 MCY palced in SWS (shown in red markers), based on the prescribed offshore wave condition. Bathymetry is shown for 1997+4 MCY placed in SWS; depth contour values are limited to 25 meters for clarity.



Offshore wave conditions (figure S10) for Winter Storm: Ht = 6.55 m, Tp=14.0 sec, Dir =310 deg, Wind=10.4 m/s @ 294 deg

Figure C14. STWAVE model simulation of nearshore wave height at MCR with ebb current, for the prescribed offshore wave condition. Top graphic is for 1997 bathymetry, bottom graphic is for 4 MCY placed within SWS.

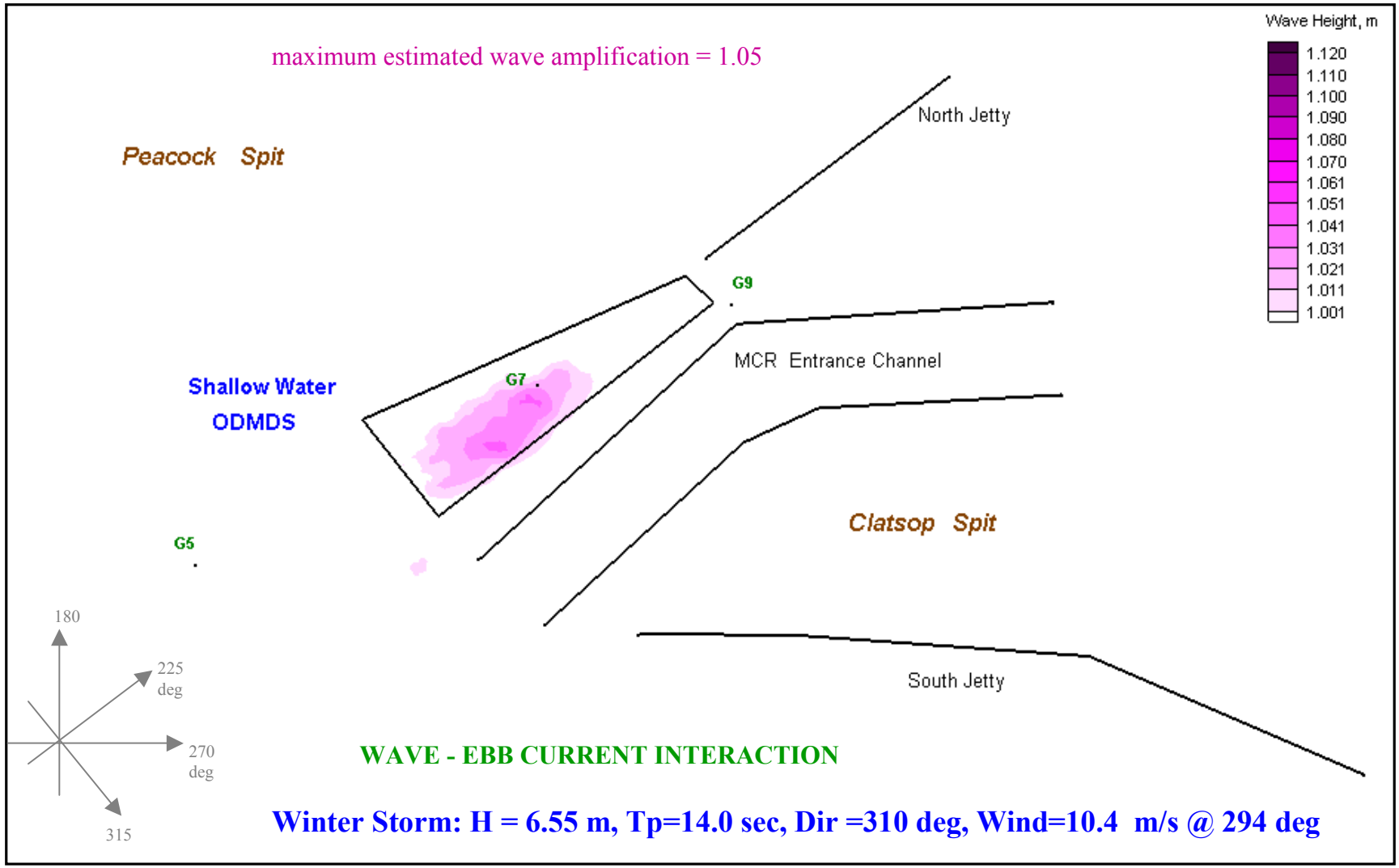
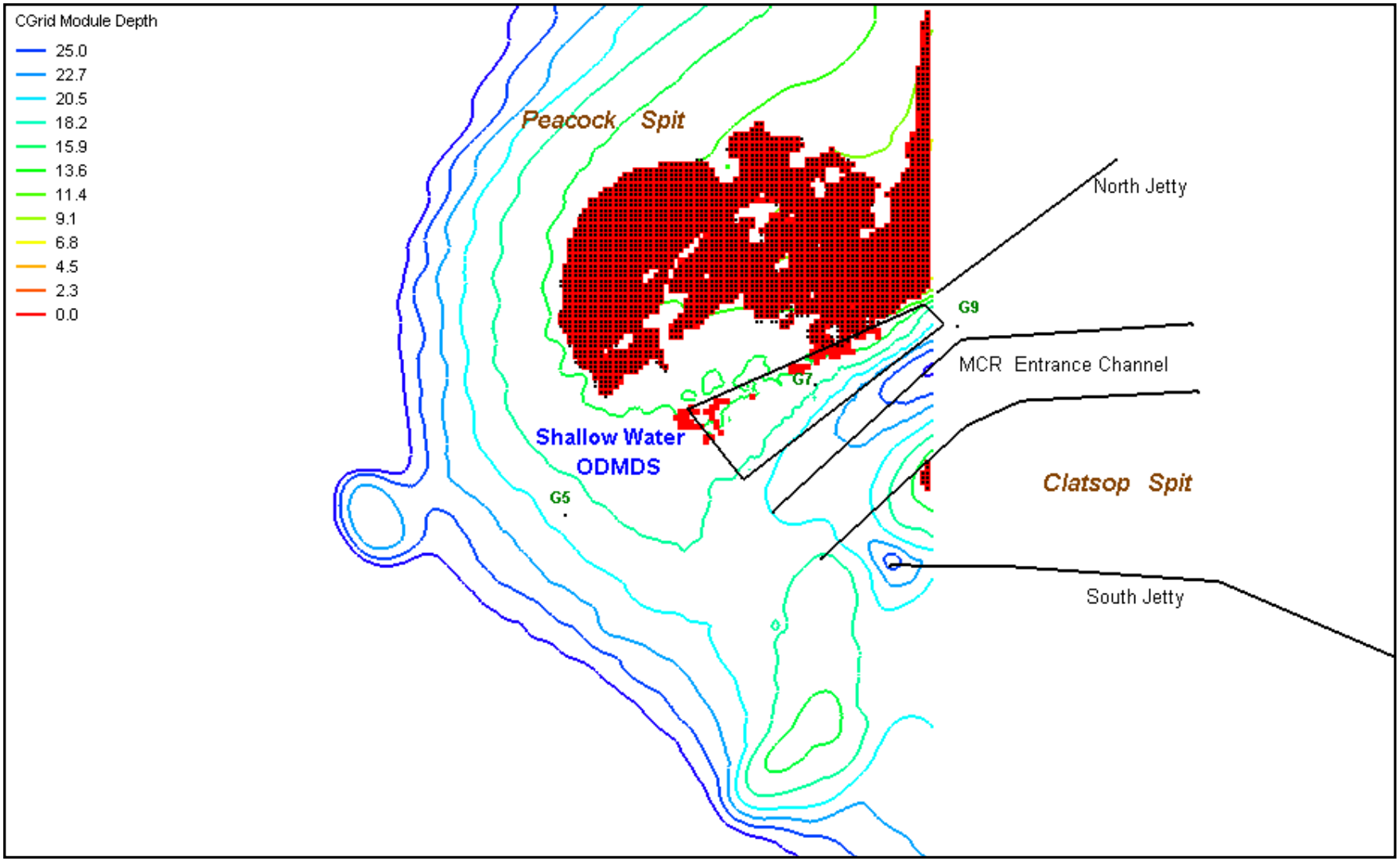
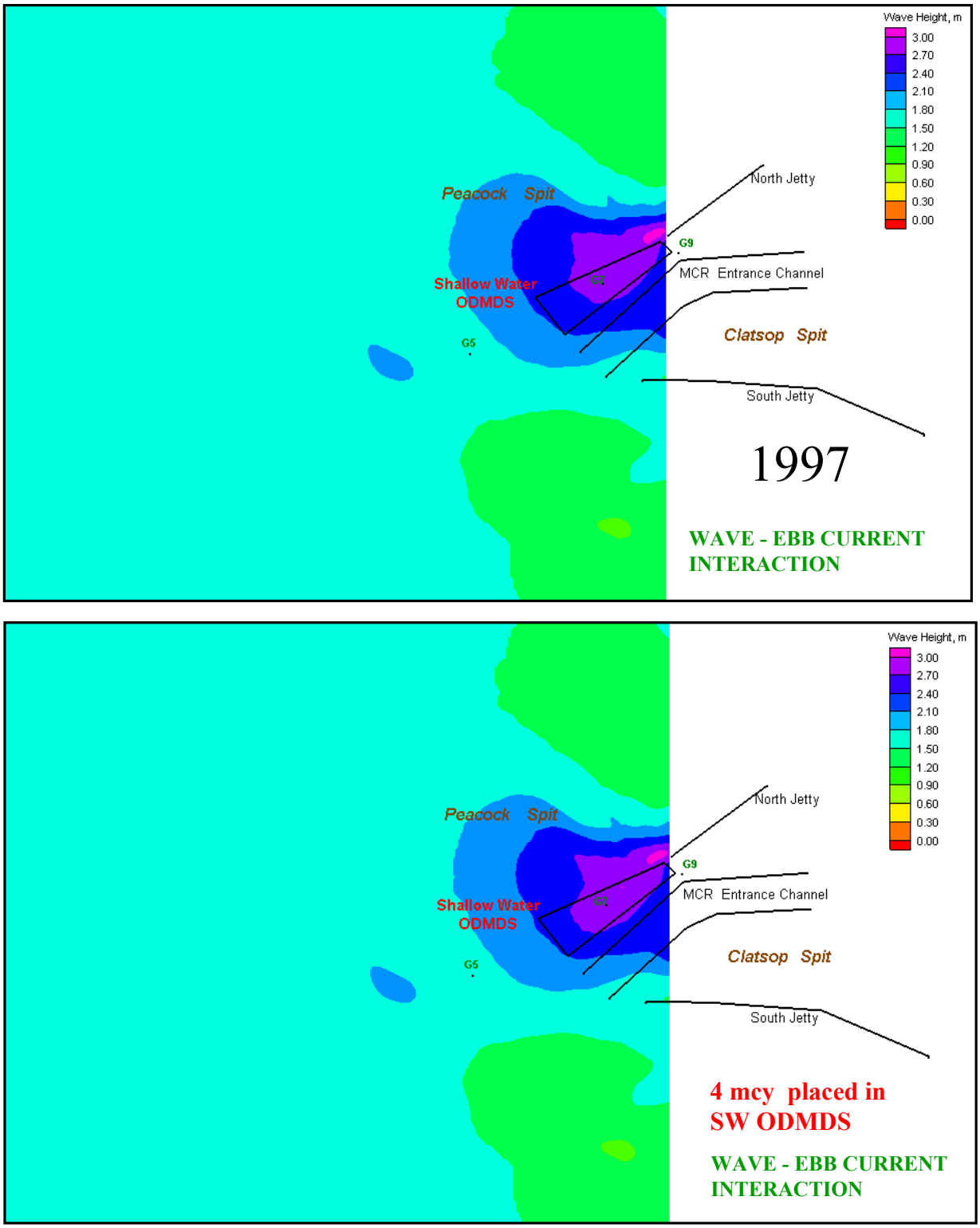


Figure C15. Estimated wave amplification at MCR due to bathymetry & ebb current change resulting from 4 MCY of dredged material being placed within SWS as compared to 1997 baseline condition, for the prescribed offshore wave condition. Wave amplification was calculated as "4 million cy placement wave height / 1997 wave height"; only values greater than 1.0 are shown. A value of 1.2 means that waves for the 4 million cy placement scenario were estimated to be 20% greater than in 1997.



Winter Storm: Avg. wave height = 6.55 m, peak wave period =14.0 sec, Avg. wave direction = NW (310 deg), Wind=10.4 m/s @ NW (294 deg)

Figure C16. Estimated wave breaking location for 1997 (shown in black markers) and for 4 MCY palced in SWS (shown in red markers), based on the prescribed offshore wave condition. Bathymetry is shown for 1997+4 MCY placed in SWS; depth contour values are limited to 25 meters for clarity.



Offshore wave conditions (figure S11) for <u>Summer Swell</u>: Ht = 1.77 m, Tp=8.3 sec, Dir =305 deg, Wind=2.1 m/s @ 334 deg

Figure C17. STWAVE model simulation of nearshore wave height at MCR with ebb current, for the prescribed offshore wave condition. Top graphic is for 1997 bathymetry, bottom graphic is for 4 MCY placed within SWS.

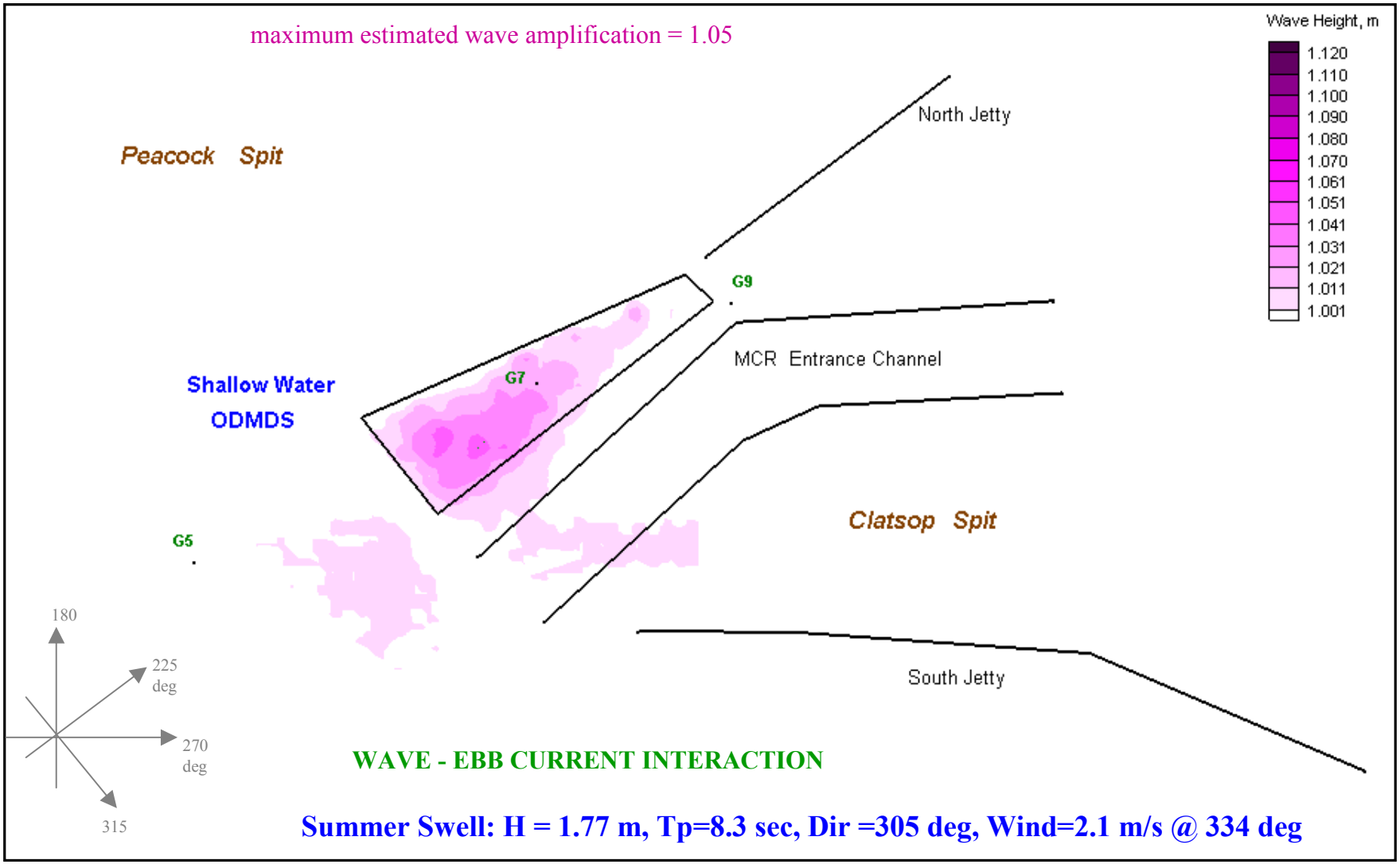


Figure C18. Estimated wave amplification at MCR due to bathymetry & ebb current change resulting from 4 MCY of dredged material being placed within SWS as compared to 1997 baseline condition, for the prescribed offshore wave condition. Wave amplification was calculated as "4 million cy placement wave height / 1997 wave height"; only values greater than 1.0 are shown. A value of 1.2 means that waves for the 4 million cy placement scenario were estimated to be 20% greater than in 1997.