Appendix 4 – Proactive turbidity reduction measures – Best Environmental Practice Techniques.

Best Environmental Practice (BEP) Techniques were established within the DSDMP to proactively reduce environmental impacts from the Pluto LNG Project dredging program. Table 1 identified each BEP and demonstrates compliance.

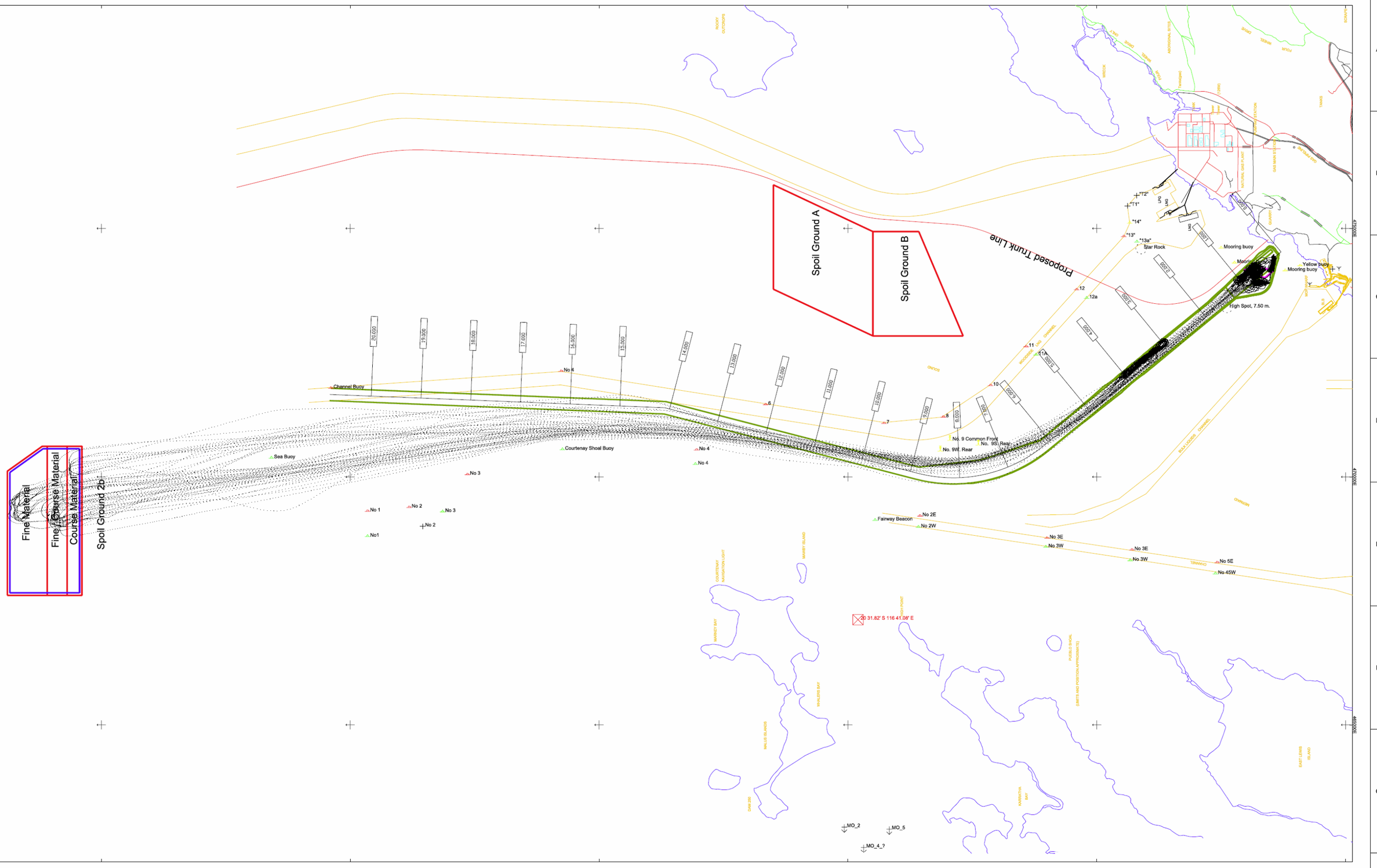
Table 1: Best Environmental Practice Water Quality Mangement Measures.

Ref No.	BEP Method	Application of BEP to Dredging and Disposal Works	Effectiveness of BEP technique / Beneficial Outcome	Monitoring and Reporting	Timing	Compliance Statement & Evidence	Relevant Appendix 4 Figures
BEP#01	Justify depth and width of channels during design	- Modeling & simulation of the proposed navigation channel conducted during design stage; - Varying depth turning basin to minimise dredging required	Minimises amount of dredging and disposal work required, thereby reducing the extent and duration of any impacts	Final Design Drawings	Completed during design phase with further improvements being investigated	Finalised during EIA and prior to DSDMP development. Refer to DSDMP.	N/A
BEP#02	Use of tidal range to assist entry of deep draught vessels	- Design of navigation channel includes the use of tides for departure of laden vessels	Minimises the amount of dredging and disposal work required, thereby reducing the extent and duration of any impacts	Final Design Drawings	Completed during design phase	Finalised during EIA and prior to DSDMP development. Maximised within safety constraints. Refer to DSDMP.	N/A
BEP#03	Coordinate dredging operations to satisfy multiple planning requirements	- Reuse of dredge spoil from Spoil Ground 2B for trunkline stabilisation thereby reducing need for sourcing material from undisturbed areas	Minimises the impact footprint of the works	Final Design Drawing	During trunkline post-lay works	Option of utilising material from 2B has been included in the design, although material for stabilisation is likely to be sourced primarily from onshore quarries and the existing TSEP sand borrow ground (previously disturbed) as outlined in the DSDMP. Trunkline construction has not commenced.	N/A
BEP#04	Minimise the use of temporary spoil sites	- Re-handling minimised; - All side casting and re-handling will be carried out within dredging footprint	Minimises the impact footprint of the works	Hydrographic surveys	During side-casting operations	Spoil re-handling works were carried out in two locations during Phase 1. These were i) calcarenite areas within the approach channel; and ii) the jetty exclusion zone and turning basin. Both occurred within the approved dredging footprint. Refer to Figures 1 and 2 for an example of a weekly track plot for rehandling works in the jetty exclusion zone, turning basin, and entrance channel. The track plots demonstrate that rehandling occurred within the approved design footprint.	Figure 1 Figure 2 Figure 3
BEP#05	Optimise location of disposal ground	- Numerical modeling and environmental surveys completed during design and planning stage	Ensures optimal location of the spoil disposal grounds	Final Planning	Undertaken during design phase	Finalised during EIA/DSDMP development. Refer to Appendix L of the DSDMP.	N/A
BEP#06	Utilise rapid and latest survey equipment technology	- Use of Multi beam hydrographic survey system.	Allows effective management of operations to reduce extent and duration of impact	Contract Documents, Contractors method statements	During all survey activities	A Simrad 3002 Multi Beam Echo Sounder was used for all survey work. Regular bathymetric surveys were completed during Phase 1 for operational purposes (i.e. to ensure that design depth was reached, and to confirm volumes). Weekly surveys were compiled and provided to the DEMG for review. Refer to Figure 4 for an example of a bathymetric survey at the loading site. Refer to Figure 5 for an example of a bathymetric survey at the dump site.	Figure 4 Figure 5
BEP#07	Utilise on-line visualisation of updated bathymetric charts including topographic data, coastlines, disposal areas, dredge position, dredge head /cutter head position, tidal information	- Modern, fully equipped dredging vessels which include these features as standard to be utilised; - Daily survey updates to be provided to the vessel; - Real time tide information will be made available.	Allows effective management of operations to minimise impact	Contractor method statements	During all dredging and disposal activities with all dredging vessels	Real time on-line visualisation of updated bathymetric charts including topographic data, coastlines, disposal areas, dredge position, dredge head /cutter head position and tidal information were employed at all times on the trailer dredger Cornelis Zanen and cutter dredger Phoenix. The presence and function of these systems was verified in a pre-start audit by Woodside personnel. General photographs showing the operation of this equipment on the bridge of the Coza TSHD are provided in Figure 6.	Figure 6
BEP#08	Visualisation/ evaluation of dredged tracks/profiles/zones	- Regular track plots to be provided by contractor and analysed to ensure optimum methods are used so that no dredging outside the required area occurs	Allows effective management of operations to minimise impact	Vessel track plots	During all dredging and disposal activities with all dredging vessels	Regular bathymetric, cross sections and trailer dredger track plots were provided by the contractor from every survey undertaken and analysed by the Woodside Resident Dredging Engineer to ensure optimum methods were used so that no dredging outside the required area occurs. Refer to Figures 1, 2, and 14 for example track plots. Weekly track plots for the entire dredging program are available if required.	Figure 1 Figure 2 Figure 14
BEP#09	Online measurement of: - mixture velocity; - mixture concentration; - vessel heading, speed; - dredge production.	- Modern, fully equipped dredging vessels which include these features as standard will be utilised.	Improves operational efficiency leading to increased production and decreasing the duration of dredging	Vessel specification	During all dredging and disposal activities with all dredging vessels	Modern, fully equipped dredgers that include all of these features as standard were deployed during Phase 1. The presence and function of these systems was verified in pre-start audits by Woodside personnel. General photographs showing the operation of this equipment on the bridge of the Coza TSHD are provided in Figures 7-9.	Figure 7 Figure 8 Figure 9
BEP#10	Use of submerged diffuser to place spoil low in water column to reduce velocity of mixture	- Diffuser to be used when CSD side casting via a pipeline	Ensure material is released as close as possible to the seabed, leading to less solids entering the water column and significantly lower settlement times	Contractors Method Statement	During all CSD side casting activities	Sidecasting via pipeline was required on one occasion during Phase 1 when the CSD 'Phoenix' was cutting in the JEZ and casting behind for rocovery by the 'Cornelis Zanen'. During this period, a diffuser was used in order to deposit cut material as close to the bottom as possible, thus reducing the dispersion potential and extent of the plume. A photograph of the diffuser in operation is provided in Attachment 10.	Figure 10
BEP#11	Adjustable anti-turbidity overflow shaft	- Anti-turbidity valve in overflow shaft to be utilised on TSHD	Lowers the intensity, duration and spatial extent of the turbidity plume	Vessel specification	During all TSHD dredging activities	TSHD 'Cornelis Zanen' is fitted with an anti-turbidity valve in the hopper overflow. The anti-turbidity valve was always used.	Figure 11
BEP#12	Submerged Dredge Pumps	- To be utilised on CSD; - No benefit for TSHD at required dredging depths	Improves operational efficiency leading to increased production and decreasing the duration of dredging	Vessel specifications	During all CSD dredging works	Cutter dredger Phoenix is built with a ladder pump. The pump cannot be bypassed.	N/A
BEP# 13	Establish optimum overflow time for the TSHD using loading diagrams	- Loading charts / data to be used by contractor to establish optimum overflow times; - Loading charts / data to be provided by contractor for analysis	Improve operational efficiency leading to increased production and decreasing the duration of dredging	Loading charts	Optimisation of the overflow process will be an ongoing process throughout the TSHD dredging activities. As the project proceeds, the data available from the monitoring programs will also be applied to the overflow optimisation process. In the event that conditions where overflow causes unacceptable impacts on benthic habitats are identified, overflow will be reduced or eliminated when dredging in similar condition during the remainder of the works.	TSHD 'Cornelis Zanen' was always loaded for optimal dredging efficiency during Phase 1. Whilst a loading chart was available, loading phase of dredge cycle optimisation provided by onboard, real time dredge management system. The system alerts the operator once the optimum load has been reached (i.e. the mass loaded plateaus), dredging ceases, and the dredge departs for the dump site.	Figure 12
BEP# 14	Minimal Overflow for bulk dredging of low density / high moisture content sediments by the TSHD	- Contractor to dredge with minimal overflow when bulk dredging low density/high moisture content sediments	Reduces introduction of sediments into water column	Loading charts	During all dredging of low density / high moisture content sediments by the TSHD. Also see BEP #13	Trailer dredger Cornelis Zanen was always loaded for optimal dredging efficiency. Loading phase of dredge cycle optimisation provided by onboard, real time dredge management system thereby minimising discharge of fine fractions from the hopper (Figure 12). A daily report for 22 November 2007 (first day of dredging) documenting the use of minimal/no overflow during dredging of fine silt is provided in Figure 13.	Figure 12 Figure 13

BEP#15	Minimise disturbance of sediments outside dredging footprint	- Sailing routes to and from the disposal grounds will be selected to minimise the impact of propeller wash (within constraints of DPA operations); - Existing shipping routes will be used where possible. Where this is not possible, routes will be chosen on the basis of water depths and the location of sensitive receivers; - Dredging vessels will be required to enter the navigation channel/turning basin dredging area via the navigation channel route and where practical, stay within the confines of the navigation channel / turning basin during dredging operations; - Short-cuts across shallow non footprint areas while sailing empty, will not be permitted. Entry into the proposed Dampier Archipelago Marine Park, other than for safety purposes, will not be permitted,	Limits the generation of turbidity via propeller wash thus lowering the extent, duration and spatial distribution of the turbidity plume	Track plots to be submitted to Woodside regularly	During all transiting activities with dredging vessels. Particular attention will be applied to sailing routes during dredging operations involved with the trunkline route near sensitive benthic habitats	TSHD 'Cornelis Zanen' always sailed to/from the Offshore Spoil Ground and dredging areas via the route of new Pluto shipping channel. Refer to Figure 1 for an example of a sailing track plot. Weekly track plots for the entire dredging program are available if required.	Figure 1
BEP#16	Minimise use of lean mixture bypass system on the TSHD	The use of the lean mixture by-pass system will be minimised by using experienced operators and where practical planned dredging tracks to minimise turning requirements.	Minimises the intensity and spatial extent of the sediment plume	Track plots	During all TSHD dredging activities	MYOB system (lean mixture overboard) was not used by Cornelis Zanen. Loading patterns were planned to make this unnecessary.	N/A
BEP#17	Minimise time when unconsolidated side cast material is available for re-suspension	- Any unconsolidated material that has been side casted by the CSD will be re dredged as soon as practically possible by the TSHD; - Regular hydrographic surveys will be undertaken to ensure all side casted material is removed efficiently	Limits duration of sediments available for re-suspension	Regular hydrographic surveys	During side casting operations by the CSD	Regular hydrographic surveys were undertaken to ensure all material side cast by cutter dredger was removed efficiently by the trailer dredger.	Figure 4
BEP#18	Avoid sediment losses during transport via the TSHD	- Sea-state to be monitored, lower fill levels to be utilised during extreme rough conditions; - Overflow levels to be set at highest level during transport; - Hopper door seals to be in good condition to avoid leaking	Limits the inadvertent loss of sediments during transport, thereby lowering the spatial extent of the plume	Visual inspection	During all sediment transport activities	Physical size and construction of TSHD 'Cornelis Zanen' made these provisions unneccesary. No sea state conditions existed that risked loss of dredged material from hopper over flow system or overboard from the hopper itself. Hopper door seals were regularly tested by pumping hopper out at the spoil ground followed by hopper inspections to identify leaking door seals.	N/A
BEP#19	Plan hopper dewatering activities	De-watering of the hopper will be confined to the following areas to avoid impacts on sensitive receptors. These areas include: - at the spoil disposal site; - within the dredging area; - the proposed Pluto LNG shipping channel; and - outside Mermaid Sound Note that no hopper dewatering activities are to take place near sensitive benthic habitats.	Minimise the generation of sediment plumes near sensitive receptors	Visual inspection	During all dredging activities by the TSHD.	The TSHD ' Cornelis Zanen' hopper was only pumped out whilst within the boundaries of the Offshore Spoil Ground (2B).	N/A
BEP#20	Ensure equipment correctly calibrated	Calibration before starting and regular calibration checks to be undertaken with respect to: - dredge survey systems; - hydrographic survey systems; - dredge hopper volume and load.	Improves operational efficiency leading to increased production and decreasing the duration of dredging	Calibration reports	Before commencing works and as required during works	Calibrations were carried out prior to commencement of work and verified by Woodside personnel. These calibrations are also necessary to ensure the accuracy/efficiency of the work from an operational perspective.	N/A
BEP#21	Monitoring of disposal operations	- Disposal activities will be monitored to ensure that no disposal of spoil occurs outside the designated disposal grounds; - DGPS Positioning system to be employed to ensure accurate positioning; - Contractor to ensure the hopper doors are completely closed prior to departure from the disposal ground	Minimises the impact footprint of the spoil disposal works	Track logs, visual inspections	Throughout Works	The dump position of each load was monitored and recorded. The Dredge Disposal Management Plan was used to plan the discharge point of each and every TSHD load. Refer to Figure 14 for an example of a weekly dumping track plot. The DGPS system was always used. Hopper doors were always closed before dredger egress from the Offshore Spoil Ground.	Figure 1 Figure 8 Figure 14
BEP#22	Strategic placement of material	Spoil disposal into Spoil Ground 2B will be planned to ensure that material suitable for reuse is kept separated from unsuitable material	Allows for reuse of material, minimising disturbance of any other source	Track plots	During all sediment disposal activities	Dredge Disposal Management Plan was used to plan the discharge point of each and every load. Offshore Spoil Ground 2B was divided into three sub-divisions (fine, medium, and coarse) and each hopper discharged according to the nature of the significant part of each load. Refer to Figure 14 for an example of weekly dumping track plots showing fine versus coarse material disposal. Dumping track plots for the entire dredging program are available if required.	Figure 14
BEP#23	Minimise Impact of Drilling and Blasting Activities	Where drilling and blasting is required, limit the instantaneous charge rate to 50kg pre delay and if impact observed or addition caution is required, lower the charge rate to 25kg per delay	Limits the impact of the drilling and blasting activities	Contractors Method Statement	As required	A single blast was undertaken during Phase 1 on the inner trunkline route. A MIC of 40kg was used and the verification process was carried out in consultation with the DEMG. Refer to Appendix 16 for DEMG advice.	N/A
BEP#24	Ensure optimum timing of works with respect to sea and meteorological conditions	Relocate the TSHD away from the turning basin during periods of flood tides combined with sustained westerly winds in excess of 15knots.	Lowers potential impact of sediment plume from turning basin works on fringing corals	Track plots	During times where flood tides combine with sustained westerly winds.	Dispersion of turbidity plume from dredging works in the Turning Basin and its approached continually monitored. TSHD 'Cornelis Zanen' was deployed to the entrance channel as appropriate to minimise the spread of turbidity to the north from the Turning Basin. Evidence of the adequacy of turbidity management measures in Zone A is provided in Appendix 8. Monitoring has shown no loss in coral cover within Zone A.	N/A
BEP#25	Minimise the abrasion path while crushing soft rock	Minimise transport distance during pumping of soft rock	Limits creation of rock flour	Contractors Method Statement	During all pumping activities with the CSD	Floating pipeline was only used with CSD when water depth limited trailer dredger operations in the Turning Basin area. The bulk of the crushing of calcareous materials was done with no pumping by CSD dredger at all (i.e. crush in situ with recovery by TSHD). When pipeline was required, a short length of approximately 300m was utilised. The CSD 'Phoenix' was found to generate minimal 'rock flour' due to its high power cutting action therefore large fragments of rock were fractured rather than a grinding action which is known to create a smaller particle size. This was discussed during DEMG meeting 4.	Figure 10
BEP#26	Strategic use of drag head water jets	The use of water jets from the drag head will only occur when dredging appropriate material.	Limits suspension of material due to jetting	Contractors Method Statement	During all dredging activities with the TSHD. Jets will usually not be used while dredging low density / high moisture content sediments.	Trailer dredger draghead jetting systems were only used when dredging the heavier materials.	N/A

Figure 1. BEP#04:
Refer to page 2 of this appendix.

Description:
Weekly track plot for week 6, 2008. The TSHD ‘Coza’ was rehandling material cut by the CSD ‘Phoenix’ in the turning basin and approach channel during this period (refer to Figure 3 for a daily report describing these activities). The track lines on this figure are plotted using DGPS (Differential Global Positioning System) data extracted directly from the ships log, which records continuously, therefore transit routes are also plotted. The areas of concentrated activity in the turning basin and entrance channel represent the locations where dredging was occurring (i.e. repeated passes over a location).



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Notes:

Mapping Grid GDA94-2007 (GRS80), Zone 50

Depth Datum ACDD - relationship to AHD at PWD BM A958 (located near tide gauge @ KBSB)
ACDD = RL 7.477m AHD = RL 4.709m

TITLE: Sailing-Track "Cornelis Zanen"

AREA: Working area Pluto Project

TYPE OF SURVEY: Logged Data, Week 06_2008

REV.	BY	DATE	DESCRIPTION	CKD.	APP.
0	KMRU	11/02/2008	Sailing-Track "Cornelis Zanen"		

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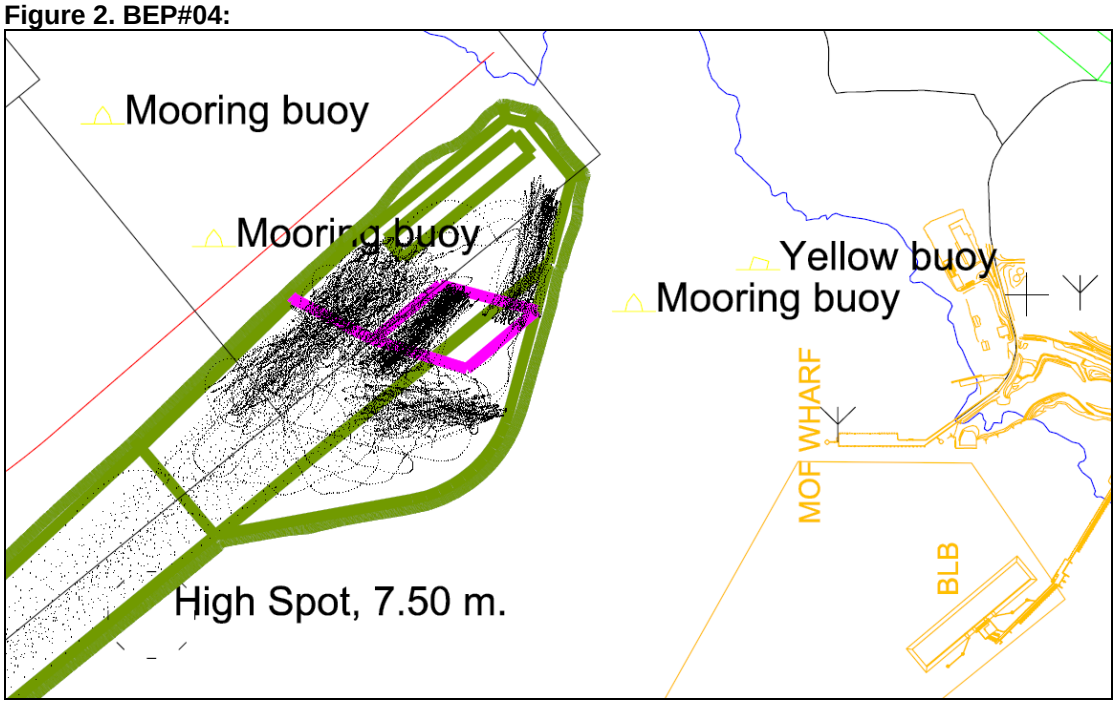
PLUTO LNG Project

DRAWING No: BKA-036-10038-PRO-190

SCALE:	DRAWN: KMRU	CHK'D:	APP'D:	APP'D:	REVISION
1: 35000	DATE: 11/02/2008	DATE:	DATE:	DATE:	00

Figure 2. BEP#04:



Description:
Extract from Figure 1 showing the detail of rehandling activities completed by the TSHD 'Cornelis Zanen' in the turning basin during week 6 of 2008 (refer to Figure 3 for a daily report describing these activities). The design boundaries are marked green in this figure.

Figure 3. BEP#04:
Refer to page 4 of this appendix.

Description:
Daily report for 6 February 2008 outlining activates undertaken during the periods depicted in Figures 1 and 2 of this attachment.

WOODSIDE
Pluto LNG Project

Onshore Engineering
Contract No. 0C00002337 – Dredging & Disposal
DREDGE REPS DAILY OBSERVATIONS REPORT

Baggerman Asso

Vessel: "Cornelis Zanen"

Name of the Rep: **Gary Edwards**
Day of Activities: **Wednesday 6th February 2008**

1. Dredging Operations

- No. Loads: 5
- Average cycle time: 4.3 hours approximately.
- Est. insitu quantity today: 24,383 m^3.
- Est. insitu quantity to date: 1,601,283 m^3
- Material: The hopper loads are crushed material from the basin
- Dredging area: Turning basin (crushed)
- Work method: Dredging to economic load with hopper overflowing.
- Delays: none

2. Spoil Dumping Operations

- Spoil Ground 2B (Offshore), southern section for crushed material.

3. Cetaceans & Turtle Sightings

Turtle	Dolphin	Whale	Manta Ray
-	-	-	-

4. Survey Operations

- Turning Basin.

5. Safety

- On board ship's safety meeting. BKA Safety Advisor Mr. Frank Kolosa delivered an interactive Step Back 5 x 5 talk.

6. Environmental Monitoring

- This is conducted by visually observing the dredging plume. The most concentrated plume is over the dredging area in the turning basin, caused primarily from the overflow and secondly from the propeller wash and crushing operations by Phoenix. The plume generally drifts in the direction of the current and dissipates after about 600m.
- At the disposal area the plume remains in the area where the load is released.

7. Weather & Seastate (Typical)

- Wind: NNW. Speed 6 to 14 kts.
- Visibility Rain & Cloudy in the morning 7 oktas clearing in the day.
- Sea/Swell: 0.5 m. to 1m, swell 0.5m approx.
- Temp: 31 degrees C (approximately).

8. Planned Activities

- Continue dredging crushed material from turning basin.

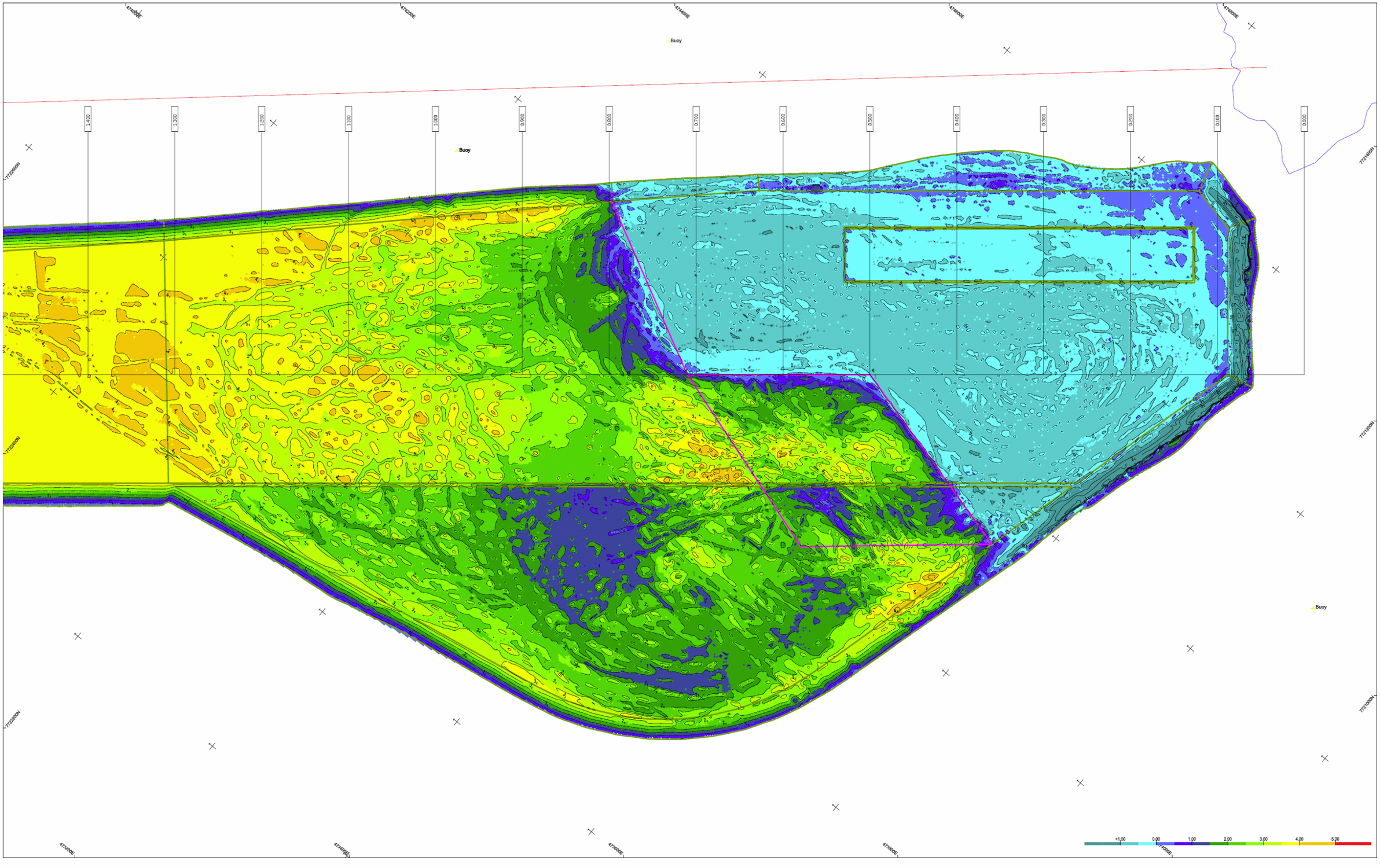
9. Other

- Hard spot in southern half of the channel between kp 3850 and kp4100. Shows up distinctively on the screen. Will require crushing.

Gary Edwards
Dredge Supervisor
6th February 2008

Figure 4. BEP#06:
Refer to page 6 of this appendix.

Description:
A bathymetric survey of the turning basin from week 15, 2008 (April) showing the Jetty Exclusion Zone near completion of Phase 1 CSD works. Light aqua indicates area that has been dredged to design depth, and orange indicates area that is 4 metres above design depth. The figure shows that cut material has been removed form the rehandling pit used during Phase 1.



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Notes:

Mapping Grid GDA94-2007 (GRS80), Zone 50

Depth Datum ACDD - relationship to AHD at PWD BM A958 (located near tide gauge @ KBSB)
ACDD = RL 7.477m AHD = RL 4.709m

TITLE:
Basin 1 of 5, Week 15

AREA:
Kp 0.000 -- 1.450

TYPE OF SURVEY:
Progress versus Theoretical, Shallowest Depth's

REV.	BY	DATE	DESCRIPTION	CKD.	APP.
	KMRU	14-04-2008	Progress week 15		

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PLUTO LNG Project

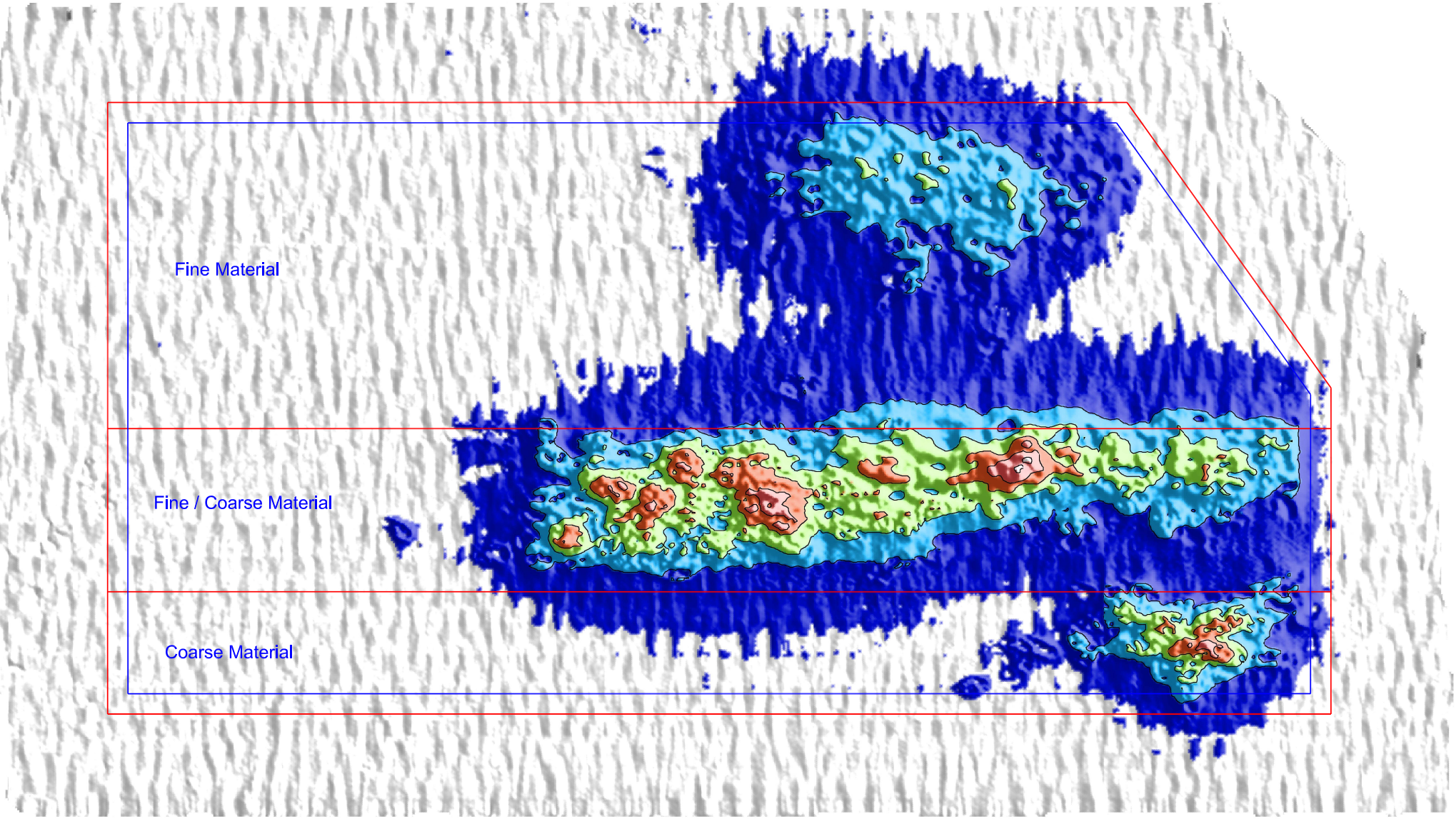
DRAWING No: BKA-036-10038-PRO-619

SCALE:	DRAWN: KMRU	CHK'D:	APP'D:	APP'D:	REVISION
1: 2000	DATE: 14-04-2008	DATE:	DATE:	DATE:	

Figure 5. BEP#06:
Refer to page 8 of this appendix.

Description:
A bathymetric survey of Spoil Ground 2B following completion of Phase 1 dredging works. The scale indicates depth of dumped material above pre-dredging survey levels.

Deep Water Spoil Ground 2B Post Phase1 Isopach



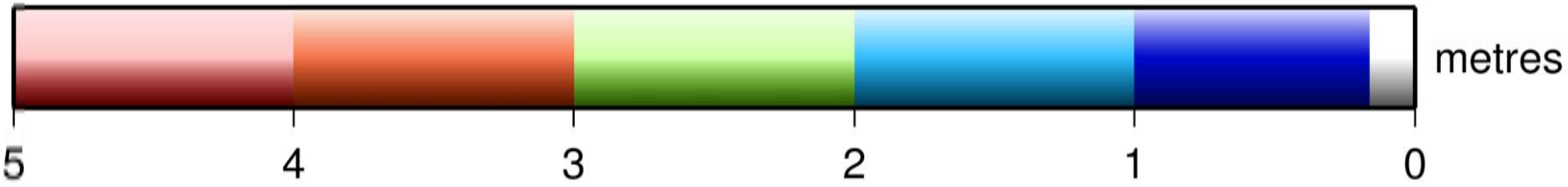
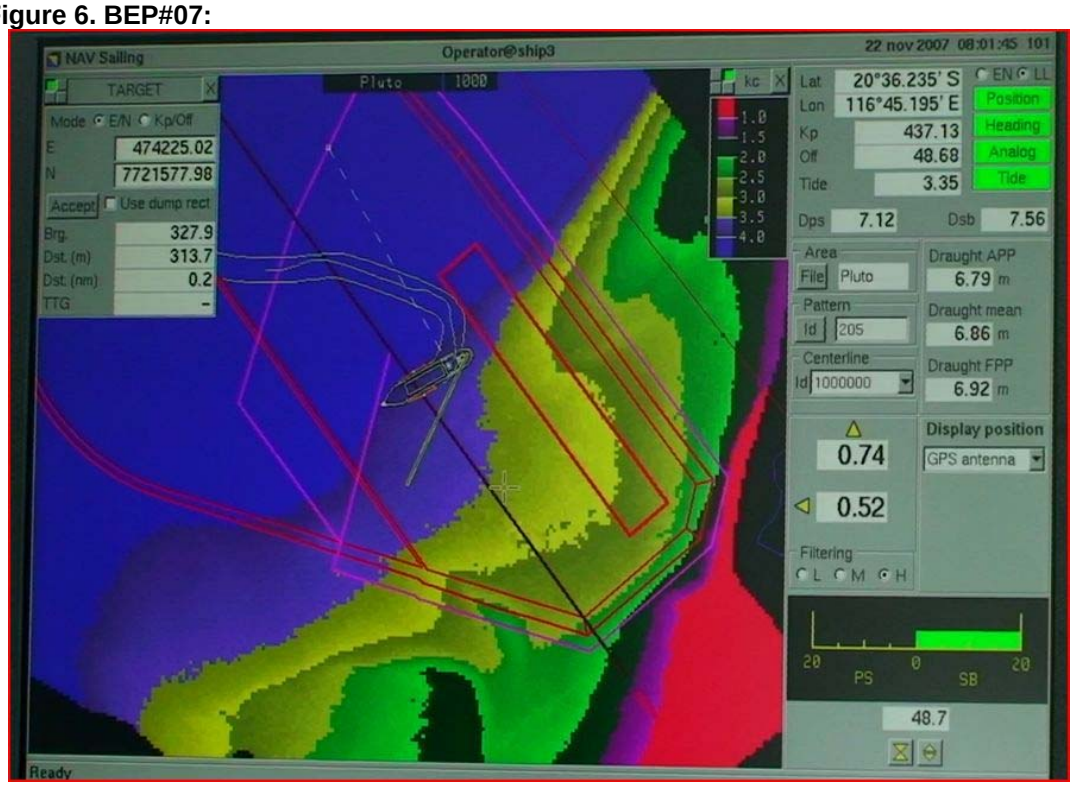
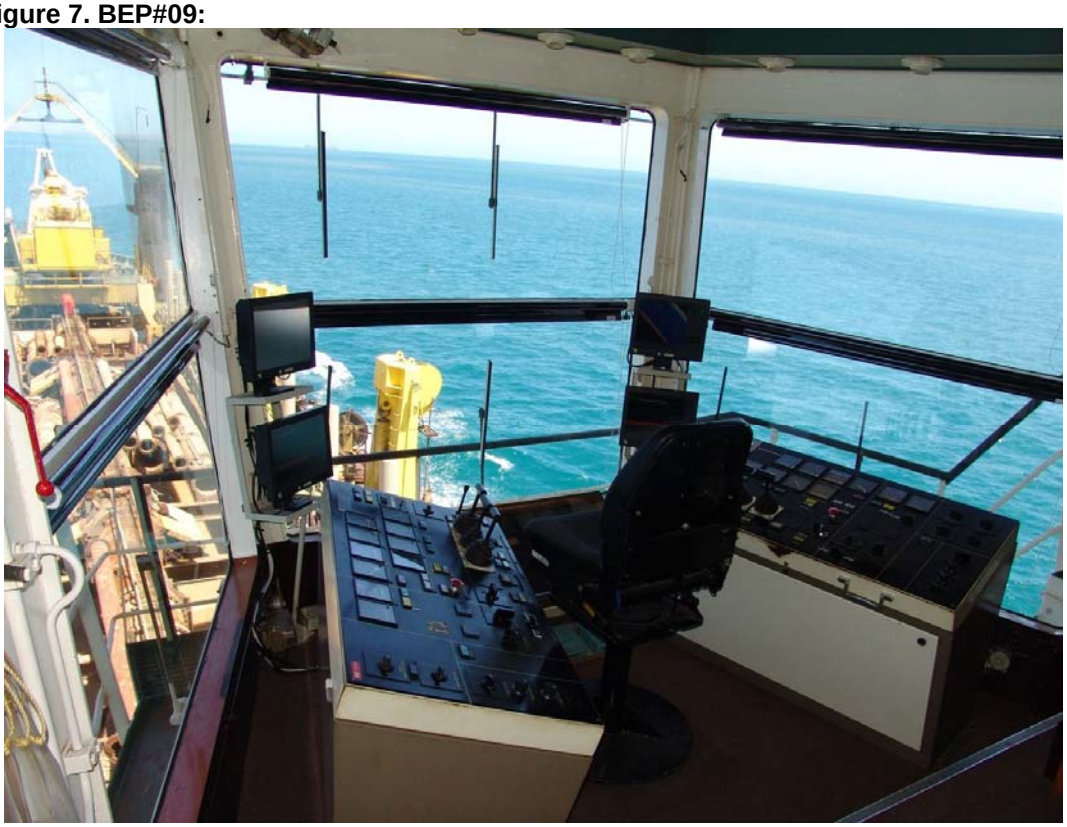


Figure 6. BEP#07:



Description:
Navigation/dredging screen onboard the 'Cornelis Zanen' during operation in the Jetty Exclusion Zone.

Figure 7. BEP#09:



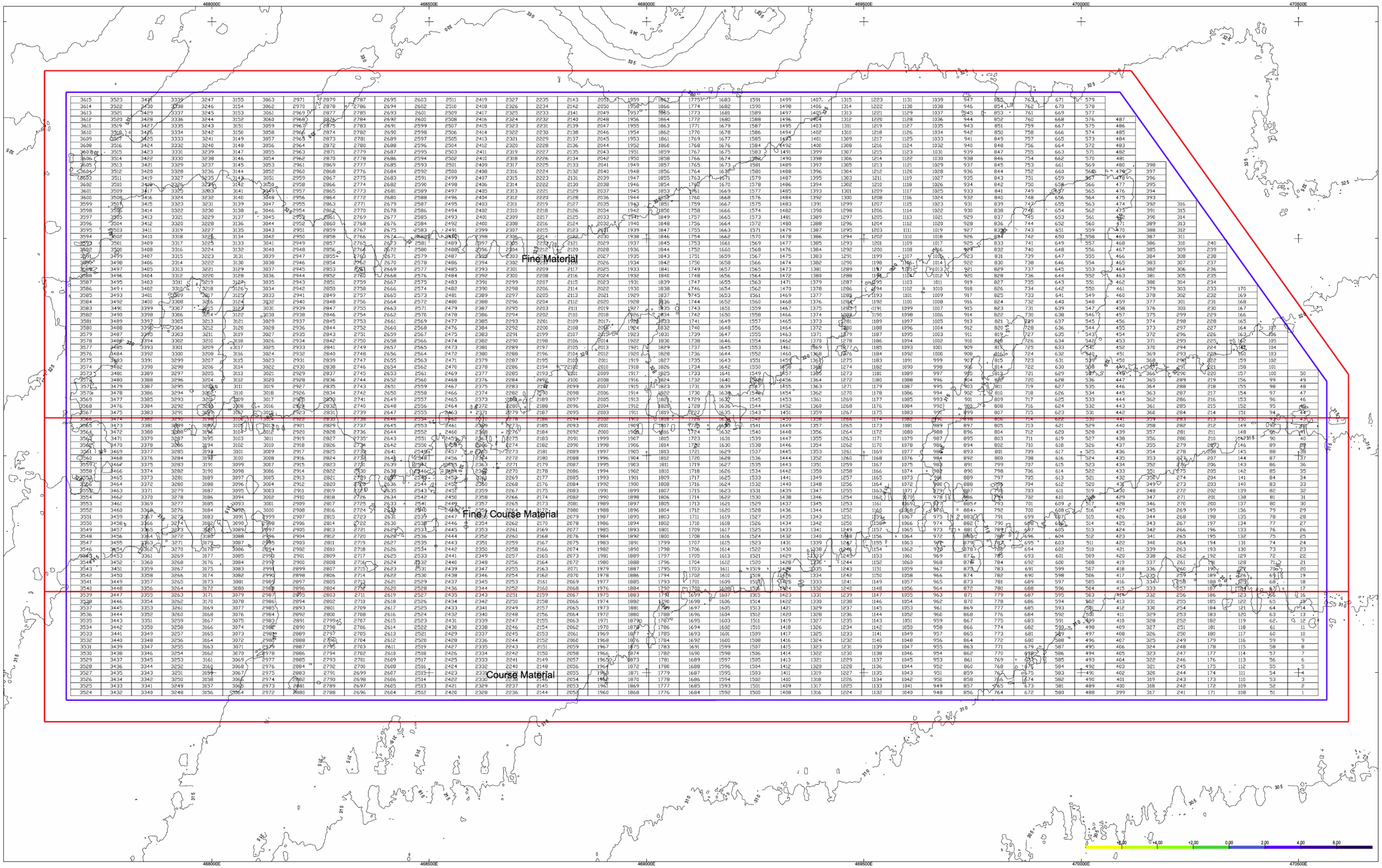
Description:
Drag head control onboard the Coza during sailing.

Figure 8. BEP#09:

Description:
Navigation/dredging screen onboard the 'Cornelis Zanen' during dumping of the 4th load into the North East corner of Spoil Ground 2B following commencement of Phase 1 dredging. The spoil ground is split into a total of approximately 3615 "dump boxes" to allow a dumping pattern to be planned. The "dump boxes" shown in this figure represent only those in the target area of the ground during this cycle.

Figure 9. BEP#09:
Refer to page 11 of this appendix.

Description:
Allocation of "dump boxes" within Spoil Ground 2B.



Notes:

Mapping Grid GDA94-2007 (GRS80), Zone 50

Depth Datum ACDD - relationship to AHD at PWD BM A958 (located near tide gauge @ KBSB)

ACDD = RL 7.477m AHD = RL 4.709m

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TITLE: Spoil Ground 2b, 1 of 4

AREA: Spoil Ground 2b

TYPE OF SURVEY: Dump Squares, Spoil Ground 2b

REV.	BY	DATE	DESCRIPTION	CKD.	APP.
0	RZEY	18-11-2007	Dump Squares, Spoil Ground 2b		

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PLUTO LNG Project

DRAWING No: BKA-036-10038-PRE-016

SCALE:	DRAWN: RZEY	CHK'D:	APP'D:	APP'D:	REVISION
1: 4000	DATE: 18/11/2007	DATE:	DATE:	DATE:	00

Figure 10. BEP#10:

Description:
CSD floating pipeline in use as the CSD ‘Phoenix’ operates in the turning basin. The pipeline was directed approximately 5 metres below the surface at this right angle junction, and relocated periodically to allow the TSHD ‘Cornelis Zanen’ to recover the spoil. A diffuser plate was fitted at the end of the pipeline (below the surface of the water) in order to reduce the velocity of the spoil/water mixture exiting the pipeline.

Figure 11. BEP#11:

Description:
Anti turbidity valve fitted in the hopper of the TSHD ‘Cornelis Zanen’.

Figure 12. BEP#13:

Description:
Real-time dredge management system with loading chart displayed. The vertical dashed line indicates the optimal load point where additional overflow time will not result in significantly improved load size. This photograph demonstrates that following the optimal loading point being reached, the 'Cornelis Zanen' has ceased dredging and departed for the spoil ground (status in the top right corner of the photograph is set to "sailing loaded").

Figure 13. BEP#14

Refer to page 15 of this attachment.

Description:
Daily Woodside Resident Engineers daily report onboard the 'Cornelis Zanen' at the commencement of Phase 1 dredging (22 November 2007). Note that limited to no overflow was being used until an increase in sand/gravel component was available in order to minimise the turbidity generated from ultra fines present on the surface.

Vessel: "Cornelis Zanen"

Name of the Rep: **Ron Hutchinson**
Day of Activities: **Thursday 22nd November 2007**

1. Dredging Operations
- No. Loads 5 between 7:50 am and 24:00 average cycle time approx 3.5 hours;
- Est. quantity (insitu) 16,500 m3;
- Vessel loading with post-overflow time of 0 to 5 minutes. Overflow time will increase as sand and gravel component increases;
- Material: silt, silty fine sand, occasional gravel;
- Dredging area Turning Basin Pit excavation.

2. Spoil Dumping Operations
- Spoil Ground 2B (Offshore) North East corner.

3. Cetaceans & Turtle Sightings
- Fauna watches maintained for 15 minutes arriving dredging areas and spoil grounds. For the initial load vessel circled twice prior to loading to disturb fauna on fauna on seafloor and nearby area;
- During the first load one small dolphin came from outside the area and transited the area at speed and came to within 10 to 20 m of the vessel;
- No turtle, whale or manta ray sightings.

4. Survey Operations
- None this period.

5. Safety
- Structural documentation in place;
- Work required to apply designated systems through the vessel particularly Permit to Work and individual risk assessments for various tasks;
- BKA requested to remove fabric slings from the vessel while on WBPL works;
- Smoking in engine room control cabin noted and request to stop issued;
- WBPL Marine Warranty Surveyor undertook a reinspection of Singapore NCRs.

6. Environmental Monitoring
- Turbidity plumes generally 200m by 200m hugging coast on flooding tide and decayed plumes evident 2 hours later in both dredging and spoil ground. Plumes from previous loads decayed during ebbing tides and not obvious after 2 hours;
- Plumes generation is from propeller action in shallow water.

7. Weather & Seastate (Typical)
- Wind: < 10 Knots from north east occasional 15-25 knots at spoil ground;
- Visibility: excellent;
- Swell: < 0.3minshore to < 1.5m at spoil ground;
- Temp: 40 degrees.

8. Planned Activities
- Excavation of Turning Basin Rehandling Pit and sediment removal.

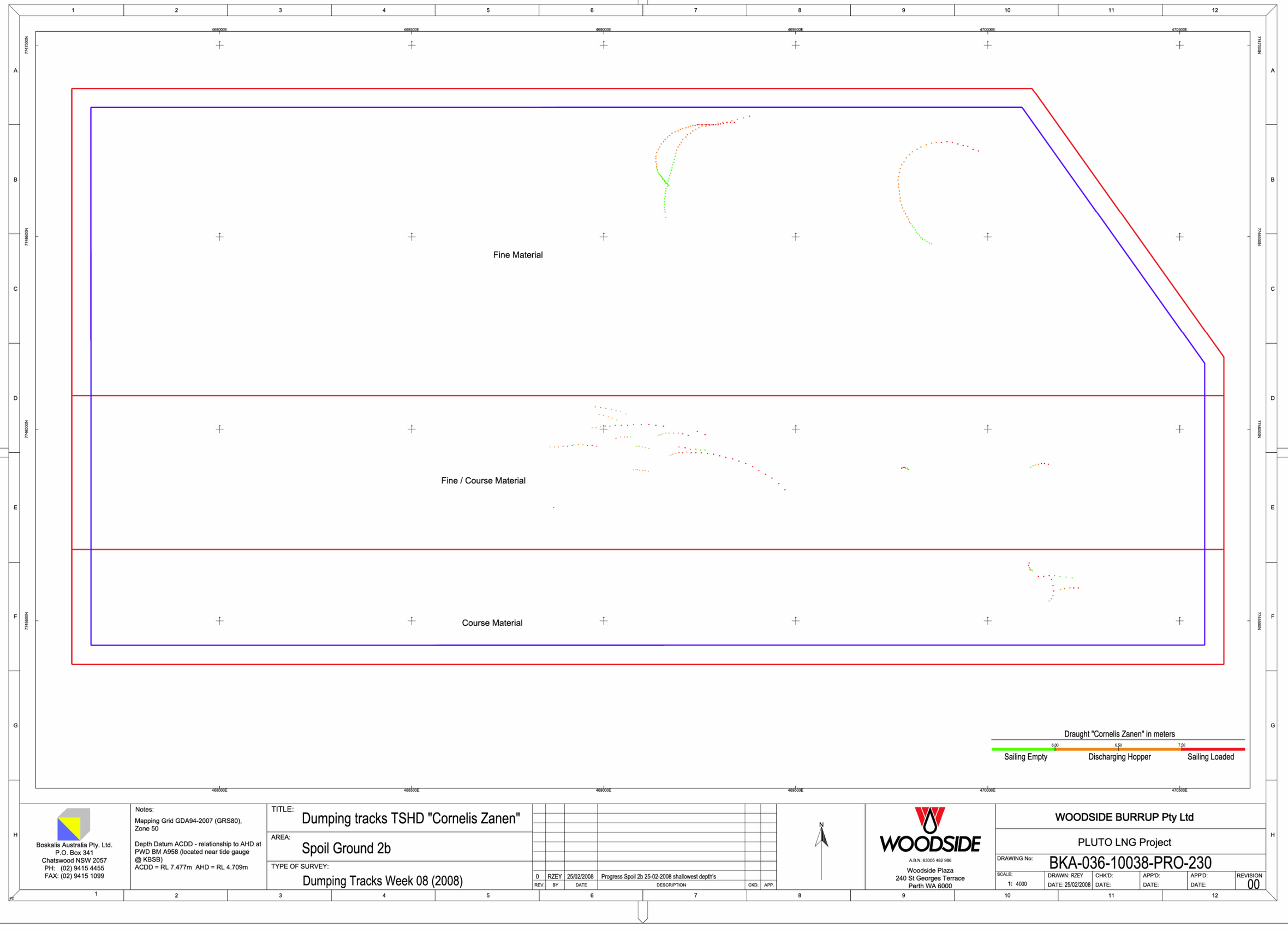
9. Other
- No matters to discuss.

Ron Hutchinson
23 November 2007

Figure 14. BEP#21

Refer to page 17 of this attachment.

Description:
Weekly dump plot showing the location of individual dump passes on Spoil Ground 2B. Note that individual loads have been dumped within the spoil ground boundary and into separate sections dependent on the nature of the material dredged.



Boskalis Australia Pty. Ltd.
P.O. Box 341
Chatswood NSW 2057
PH: (02) 9415 4455
FAX: (02) 9415 1099

Notes:

Mapping Grid GDA94-2007 (GRS80), Zone 50

Depth Datum ACDD - relationship to AHD at PWD BM A958 (located near tide gauge @ KBSB)
ACDD = RL 7.477m AHD = RL 4.709m

TITLE: Dumping tracks TSHD "Cornelis Zanen"

AREA: Spoil Ground 2b

TYPE OF SURVEY: Dumping Tracks Week 08 (2008)

REV.	BY	DATE	DESCRIPTION	CKD.	APP.
0	RZEY	25/02/2008	Progress Spoil 2b 25-02-2008 shallowest depth's		

N

WOODSIDE
A.B.N. 63005 482 986
Woodside Plaza
240 St Georges Terrace
Perth WA 6000

WOODSIDE BURRUP Pty Ltd

PLUTO LNG Project

DRAWING No: BKA-036-10038-PRO-230

SCALE:	DRAWN: RZEY	CHK'D:	APP'D:	APP'D:	REVISION
1: 4000	DATE: 25/02/2008	DATE:	DATE:	DATE:	00

Appendix 5 – Level 1 Criterion Exceedance Correspondence Register.

No Level 1 Coral Condition Management Trigger Criterion exceedances in Impact Criteria Zone C (L1C Criterion Exceedances) have been attributed to dredging related activities. No reactive turbidity management has therefore been required. Below lists all previously submitted L1C Criterion Exceedance compliance reports and related DEMG advice.

Subject	***Exceedance Number***	***Site***	***Reference Correspondence***		
			To	***From***	***Date(s) and/or WBPL Reference Number(s)***
Exceedance Reported to DEC	L1C-1	CRTS	DEC CEO	Woodside	PLU/GOV/00178; 15/01/2008
Exceedance Reported to DEC	L1C-2	ANGI	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-3	CONI	DEC CEO	Woodside	PLU/ GOV/00177; 2/01/2008
Exceedance Reported to DEC	L1C-4	COBN	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-5	ANG2	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-6	GIDI	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-7	HAM4	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-8	LANI	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-9	HAM4	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-10	CRTS	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-11	CRTS	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-12	HAM3	DEC CEO	Woodside	PLU/GOV/00189; 13/02/2008
Exceedance Reported to DEC	L1C-13	GIDI	DEC CEO	Woodside	PLU/GOV/00199; 7/03/2008
Exceedance Reported to DEC	L1C-14	HAM4	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-15	LANI	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-16	ANG2	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-17	ANG3	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-18	ANGI	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-19	NELS	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-20	CONI	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-21	ANG3	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-22	CRTS	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-23	GIDI	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-24	ANG3	DEC CEO	Woodside	PLU/GOV/00238; 2/05/2008
Exceedance Reported to DEC	L1C-25	ANG3	DEC CEO	Woodside	PLU/GOV/00247; 20/05/2008
Exceedance Reported to DEC	L1C-26	HAM3	DEC CEO	Woodside	PLU/GOV/00249; 26/05/2008
Exceedance Reported to DEC	L1C-27	ANG3	DEC CEO	Woodside	PLU/GOV/00254; 3/06/2008
Exceedance Reported to DEC	L1C-28	ANG3	DEC CEO	Woodside	PLU/GOV/00267;