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MEMORANDUM

ATTN: Andrew Baker	**CC:** Kate McManus, Mark Bailey
COMPANY: Water Corporation	**FROM:** Spencer Shute
PROJECT NO.: 442	**DATE:** 12 October 2006
SUBJECT: ALKIMOS BPPH LOSS ASSESSMENT	

Dear Andrew/Kate,

As requested in your email of 6th October 2006 we hereby provide a written assessment of the plan for a 3.7 km Alkimos ocean outfall at Alkimos, with respect to the EPA's Guidance Statement 29 for Benthic Primary Producer Habitat (BPPH) Protection.

At the time of release of the Public Environmental Review (PER) document (November 2006) the exact details on the construction methodology for the ocean outlet had not been determined. In the PER, habitat losses for two alternative outlet options (outlet lengths of 2.0 and 3.5 km, respectively) were estimated on the basis of an assumed 10 m disturbance swathe (PER Section 4.1.7.2).

We received from you yesterday a digital dataset which provide detailed information on the agreed outlet construction method and the exact alignment and length of the outlet. This information enables us to more specifically estimate the losses of BPPH due to the construction of the outlet (as requested by the EPA Service Unit in their letter to the Water Corporation dated 26th May 2006).

As noted in the PER, the area offshore of Alkimos is classified by the BPPH Guidance Statement as a high protection area (category B), in which a cumulative loss of ≤1% of the historic BPPH would be required to meet the EPA objective (EPA 2004).

Direct Losses

The proposed pipeline route crosses a number of vegetated habitats including *Amphibolis* spp. beds and algae-dominated reef. Over its entire 3.7 km length, the pipeline route crosses approximately 1.4 km of sand habitat and 2.3 km of vegetated habitat (Figure 1). During construction a ≤ 10 m wide swathe of seabed along the pipeline route will be cleared and the piping laid on the seabed surface (information provided by the Water Corporation, August 2006). In three sections, trenching will be required prior to laying the pipeline and the trenched material will then be side-cast (Figure 1). Trenching/side casting will disturb habitats along each section to a maximum width of 49.5 m (information provided by Water Corporation yesterday). In areas where the loss of seagrasses can be reduced by side casting to one side of the trench only, this will be carried out. Following placement of the pipe, backfilling will occur along the trenched sections to anchor the pipe in place. In light of the nominated alignment and construction methods, the direct losses of each habitat type are given in Table 1.

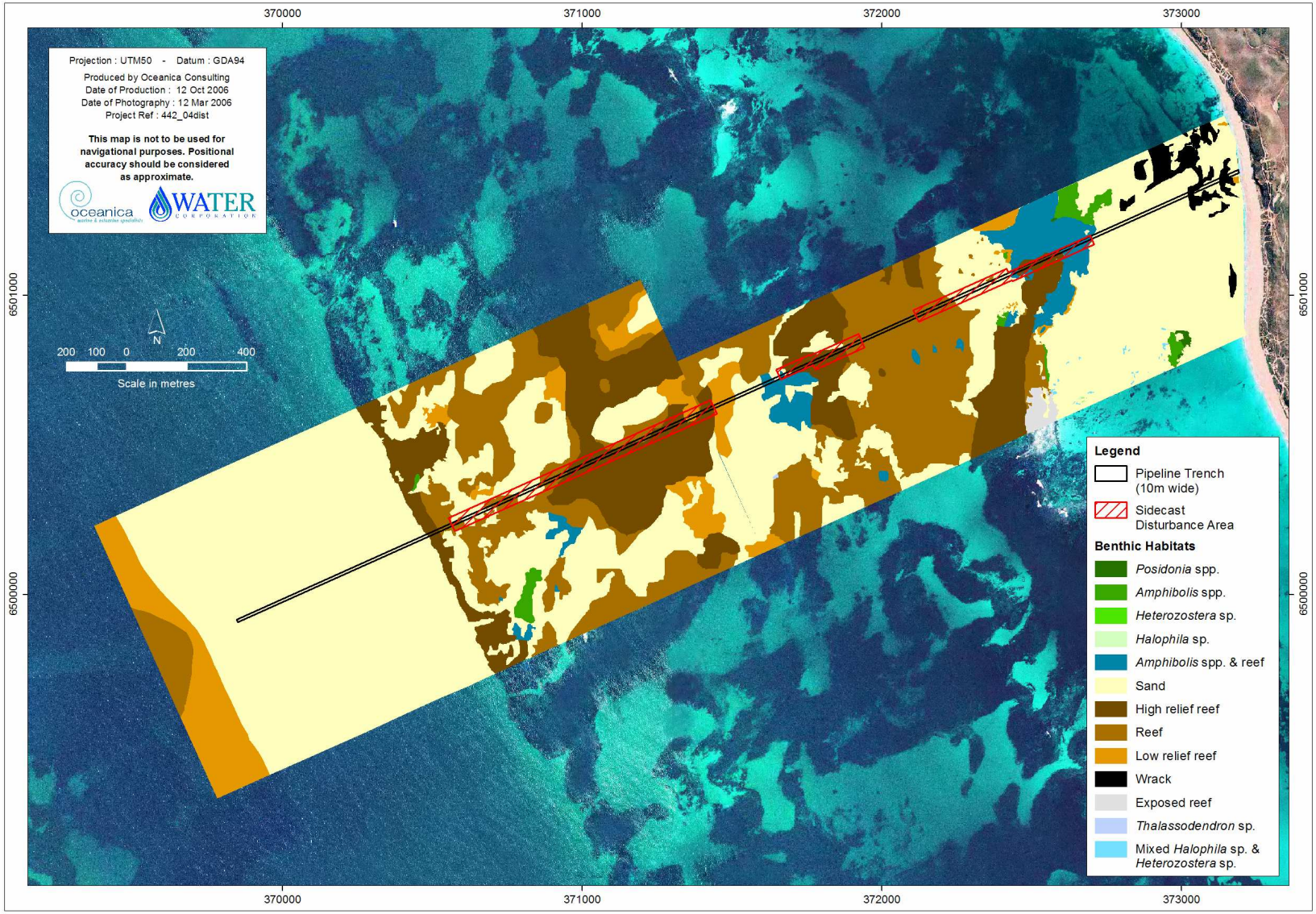

Figure 1 – Benthic habitats along the proposed Alkimos ocean outlet pipeline route

Table 1 Direct loss of BPPH due to construction of the proposed Alkimos ocean outlet

Habitat Type*	Habitat Loss (ha)			
	Clearing (10 m swathe)	Trenching/side casting	Sub-total (ha)	% loss (within groundtruthed area-332 ha)
Amphibolis spp. & reef	0.048	0.460	0.51	5.02
High relief reef	0.040	3.381	3.42	7.43
Low relief reef	0.078	0.198	0.28	1.38
Reef	0.248	2.445	2.693	4.16
TOTAL			**6.898**	

Notes: Details of each habitat type given in PER (Water Corporation 2005).

The majority of habitat losses due to the clearing of a 10 m wide swathe along the pipeline route will occur to 'reef' habitat (Table 1), whereas the greatest losses due to trenching/side casting will occur to 'high relief reef' habitat.

A total of 6.898 ha of BPPH are likely to be lost/damaged due to construction of the outlet. This equates to a loss of approximately 0.34% of BPPH within the 50 km^2 management unit (assuming 41% of management unit is vegetated—see Section 4.1.7.1 of PER).

Back-filling with rock and the presence of the pipe will form habitat for recolonisation and will counter some of the loss of hard substrate. It is anticipated that the recolonising faunal and algal communities would be similar to those already found in the area.

Indirect Losses

The construction of the pipeline is proposed to occur over two summer/autumn periods, for four to five months in each year (2008–2009). In addition to the direct loss/damage of benthic habitats, indirect losses associated with the generation of turbidity may occur.

During the sediment survey component of the Alkimos Marine Studies Programme (Oceanica 2005a), the sand habitats within 3.5 km of the shoreline in the Alkimos area were generally found to be dominated by medium to coarse sands and exhibited zero fines (silt and clay fraction). The exception was sediment at one site approximately 3 km offshore, 1.4 km north of the proposed pipeline route, which was dominated by fine sands (Oceanica 2005a). During the benthic habitat mapping component of the Alkimos Marine Studies Programme, the sediment type collected within infaunal cores adjacent to the proposed pipeline route was also described. Again the majority of sites were dominated by medium/coarse sands, although the sediment at two inshore sites (approximately 0.7 km offshore) and one offshore site (approximately 3 km offshore) was described as medium/fine clean sand (Oceanica 2005b).

On the basis of this sediment sampling, turbidity caused during the trenching and back-filling of sand habitats is likely to be minimal and short-lived (medium sands (250–500 µm) settle at over 0.05 m/s while coarse sands (500–1,000 µm) settle at over 0.2 m/s). Although some smothering by settling sand is likely to occur immediately adjacent to the pipeline route during trenching and back-filling, the local flora and fauna is likely to be relatively tolerant to some degree of smothering (given the rough conditions occurring naturally at the site during the summer sea breeze and winter storms, sand is likely to be resuspended regularly and deposited on reef areas).

The amount of turbidity caused by trenching through the limestone reef features is largely dependent upon the type of dredging equipment used, which is in turn dependent upon the hardness of the rock and types of equipment available. During the Port of Geraldton dredging program the use of a large cutter-suction dredge, which directly filled hopper barges, was estimated to produce approximately 1,781 tonnes/day of fines

(< 100 µm) (GEMS 2003). It is anticipated that the use of blasting, followed by back-hoe dredging to side-cast the rock material, would result in significantly less fines being produced. However, we understand that the most appropriate construction methodology to be used at Alkimos will not be determined till the geotechnical works have been completed.

The majority of the reef habitats present along the pipeline route are algae dominated, with *Amphibolis* spp. limited to discrete areas approximately 750 m and 1,750 m offshore, and small patches of *Posidonia* spp. seagrasses present inshore (Oceanica 2005b). Even given marked turbidity/smothering impacts, the algal assemblages are likely to recover rapidly (1–2 years). Therefore, worst-case longer term indirect impacts are likely to be limited to impacts on the seagrasses *Amphibolis* spp. and *Posidonia* spp. adjacent to the pipeline route where reef is being trenched. Even significant losses of seagrass/algae in such areas (for example total loss within 100 m of the pipeline) would only cause the loss of approximately 10 ha (2.5%) of vegetated habitats within the 9.7 km^2 mapping area and 0.5% of vegetated habitats within the 50 km^2 management unit (assuming 41% of management unit is vegetated—see Section 4.1.7.1 of PER).

Full potential extent of BPPH losses
As discussed above, direct losses are likely to be well within the cumulative loss threshold. Indirect losses due to turbidity are more difficult to estimate without knowing the trenching method to be used. This information will become available following on-site geotechnical works.

As discussed within the PER (Water Corporation 2005), adverse effects from the discharge of treated wastewater on the adjacent seagrass and macroalgal communities is considered unlikely in the light of other studies from Ocean Reef (see PER Section 4.1.7.2).

It is anticipated that the overall losses/damage to BPPH due to direct (construction) and indirect (operation) impacts of the proposed ocean outlet are unlikely to exceed the 1% threshold level.

References
EPA 2004. Guidance for the Assessment of Environmental Factors. Benthic Primary Producer Habitat Protection for Western Australia's Marine Environment. No. 29.

Global Environmental Modelling Systems 2003. Geraldton Port Redevelopment – Further Dredge Plume Turbidity Modelling. Report No. 13/03.

Oceanica 2005a. Alkimos Marine Studies Programme: Sediment Survey. Prepared for Water Corporation of Western Australia. May 2005. Report No. 439/1.

Oceanica 2005b. Alkimos Marine Studies Programme: Benthic Habitat Mapping and Infauna Survey. Prepared for Water Corporation of Western Australia. July 2005. Report No. 438/1.

Water Corporation 2005. Alkimos Wastewater Treatment Plant – Public Environmental Review. November 2005.

Regards,

Spencer Shute
Coastal Ecologist