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MEMORANDUM

ATTN: Kate McManus	**CC:** Mark Bailey
COMPANY: Water Corporation	**FROM:** Spencer Shute
PROJECT NO.: 442	**DATE:** 2 August 2006
SUBJECT: Potential habitat losses associated with construction of Alkimos Ocean Outfall	

Dear Kate,

In response to the EPA's comments in relation to the Response to Submissions for the Alkimos Wastewater Treatment Plant, and your request for further information, I have revisited the habitat loss/damage calculations and have incorporated the construction information you provided.

Please find below discussion and explanation of the anticipated loss/damage of benthic primary producer habitat (BPPH) associated with construction of the Alkimos Wastewater Treatment Plant.

Direct losses of BPPH from construction

The proposed pipeline route crosses a number of vegetated habitats including *Amphibolis* spp. beds and algae-dominated reef. Over its entire 3.5 km length, the pipeline route crosses approximately 1.3 km of sand habitat and 2.3 km of vegetated habitat (Oceanica 2005a). During construction a 10 m wide swathe of seabed along the pipeline route will be cleared (information from Water Corporation, August 2006), with reef features trenched through, and the material side-cast. It has been assumed that side-casting will cause smothering of habitats up to 5 m either side of the cleared pipeline route. Following placement of the pipe, backfilling will occur to anchor the pipe in place (Water Corporation 2005).

This work would cause the loss of approximately 4.6 ha (0.046 km^2) of vegetated habitat (length of 2.3 km x width 0.02 km) and have a total footprint of 7.0 ha (0.07 km^2) (length of 3.6 km x width 0.02 km). This represents a loss of approximately 0.22% of the vegetated habitats present within the BPPH management unit (21 km^2) and the disturbance of 0.14% of the overall management unit. This falls well below the 1% cumulative loss threshold set out in the guidance statement (EPA 2004).

Back-filling through reef sections is likely to counter the loss of any hard substrate, with boulder or cobble reef features being formed over the pipeline, meaning that the area of hard substrate is increased. It is likely that the faunal and algal communities recolonising the trench region would be similar to those previously found in the area, although decolonisation by seagrass species is likely to be slower.

Indirect losses of BPPH from construction

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 and smothering by sediment during trenching and back-filling may also occur.

During the sediment survey component of the Alkimos Marine Studies Programme (Oceanica 2005b), 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 2005b). 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 2005a).

Therefore 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 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 likely 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, the most appropriate construction methodology cannot be determined prior to geotechnical works.

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 2005a). 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 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.

Full potential extent of BPPH losses

As discussed above, direct losses are likely to be relatively minor compared to the cumulative loss threshold, and dependent upon the trench width and side-casting methodology. Indirect losses are more difficult to estimate without knowing the dredging technology to be used. This information will become available following on-site geotechnical works. Given the limited distribution of seagrass species adjacent to the pipeline route, and the likely rapid recolonisation of algal assemblages on back-filled rock material, it is likely that overall losses of BPPH will fall well below the cumulative loss threshold (1%). Again the dredging technology will determine the physical characteristics of the rock material to be back-filled over the trench and the nature of the recolonising flora and fauna assemblages.

References

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

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

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

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

If you feel that more information is required, or that more assumptions regarding the dredge type and area of disturbance can be made, please do not hesitate to contact me.

Regards,

Spencer Shute
Coastal Ecologist