Hunter - Central Rivers CMA CATCHMENT MANAGEMENT AUTHORITY

Ms Yolande Stone
A/Executive Director
Major Projects Assessments
Department of Planning
GPO Box 39
SYDNEY NSW 2001

24th August 2006

Dear Ms Stone

Proposed Hexham Swamp Rehabilitation Project (MP No 05_0193)

I refer to your letter dated 13 July 2006 (received on 20 July 2006) and to the enclosed summaries of, and extracts from, submissions made during the exhibition of the above proposal.

I note that on 31 July 2006 the Authority sought and obtained from Ms Joanna Bakopanos of your department an extension of time in which to reply to those submissions.

The Authority's response to the issues raised in the submissions is enclosed with this letter.

Please note that the Authority's response addresses successively, without quoting, each dot-point under each heading in the Summary of Public Submissions for Hexham Swamp Rehabilitation Project, followed by each point of each separate submission supplied by your department.
The Authority received a further public submission by email from your office on 8th August 2006 and the HCRCMA has included its response within Submissions Report.

The Authority considers that its response to the submissions does not entail any substantial changes to the proposed project and therefore does not require a Preferred Project Report or a revised Statement of Commitments.
Please contact the writer if you have any questions regarding the Authority's response.

Yours sincerely

Brett Peterkin
For Glenn Evans
General Manager

Private Bag 2010 PATERSON NSW 2421 - 816 Tocal Road PATERSON
Tel: 02 4930 1030 - Fax: 02 4930 1013 - ABN: 50 602 455 909

HCRCMA Summary of pubic submissions responses

Mosquitoes

- If monitoring demonstrates an increase in mosquito numbers, then contingency measures will be applied, including restricting tidal inundation extents during large tides (king tides or even spring tides if considered warranted), and consideration given to the use of larvae control agents, in accordance with regional mosquito management strategy.
- Measures will be actioned to ensure there is no continuing substantial increase in mosquito numbers (see point above). HCRCMA valuer has indicated that comparable sales in similar situations, there is a negligible impact on property values.

Flooding

- Areas that have been developed in recent years (eg Maryland) are well above the flood level of the swamp. Predictive computer modelling has shown that the project will have a negligible impact on flooding beyond the Project Area.
- The project will not have any significant impact on flooding of any private properties. Proposed works (bunds, filling etc) are designed to protect private lands from saltwater inundation – not flooding. Areas within and around Hexham Swamp are naturally flood prone now, and will remain that way following implementation of the project. The project does not aim to flood proof private land or specifically improve drainage. Clearing of obstructions from private drainage lines would also potentially expose acid sulphate soils, which is to be avoided by this project.
- HCRCMA has held discussions with all landholders within the Project Area and is unaware of a request to have land filled to the level of the Pacific Highway by any landholders within the project area

Water quality

- Agree, in the long term
- Stormwater inputs are to be addressed through Council's Stormwater Management Program. This Project does not aim to specifically improve water quality, rather, it will be a consequence of the works and other CMA activities within the catchment.

Fish stocks

- Fish stocks will improve with better fish passage through the gates and improved juvenile habitat within the wetland. Initial discussions have been held with the Commercial Fishermen's Co-operative regarding commercial fishing within Hexham Swamp, however, any restriction on commercial or recreational fishing is the responsibility of DPI.

.

- Agreed

Wetland values

- Agreed
- No comment
- Agreed
- No comment
- The green corridor is an issue that has a more holistic agenda that this specific project. It should be addressed at a region-wide strategic level.

Flora and fauna

- Agreed
- Agreed
- Cattle grazing has provided some mechanism of vegetation control in the past. Removal of cattle since property purchase has resulted in rapid growth of some Phragmities areas. It is considered, however, that this control has only been required because of the change in hydrology and groundwater conditions (as a result of the installation of the floodgates).

Dredging

- The project does not aim to restore exactly the conditions prior to installation of the floodgates, but rather, aims to restore the bulk of habitat lost over the past 30 years. This is particularly true for Muck Eye Creek, where contemporary sediment has in filled the previous deep tributary channel. Shallow dredging of Muck Eye Creek, or any other waterway within the swamp, would introduce significant potential acid sulphate soil issues, which may compromise the benefits resulting from other aspects of the project.

Education

- Agreed
- No comment

Environmental Management

- An Environmental Management System is currently being prepared for the use of cattle grazing in the swamp as a component of a holistic management approach to better manage Phragmities prior to inundation.

Timing

- Agreed

Hunter Central Rivers Catchment Management Authority
Response to Public Submissions
Individual Responses

Response to Hunter Water Corporation

The HCRCMA met with Hunter Water Corporation on 4/8/06 to discuss its draft response to the issues raised in the Hunter Water Submission.

1, 2, 3

The HCRCMA convenes and coordinates the Project Committee which has been established since the inception of the project. Hunter Water Corporation has been represented on this committee since inception and is currently represented on the committee by Gary deRedder.

4, 5

The HCRCMA has previously advised HWC it is fully prepared to accept responsibility for the cost of any remedial action required to protect the Corporation's assets that is directly caused by the inundation.

6

Currently negotiating with HWC.

7

We understand the Hunter Water Board (Corporatisation) Act 1991 addresses this issue.

8

HCRCMA is currently negotiating with Hunter Water. This issue is proposed to be addressed in the easement for inundation.

9

HCRCMA is currently negotiating with Hunter Water. This issue is proposed to be addressed in the easement for inundation.

Response to City of Newcastle

HCRCMA telephoned NCC and offered to meet to discuss the issues raised and the proposed response.

2 (a) Bund Slope

The final profile of the bund in the vicinity of the guy anchor block will be subject to a more detailed ground survey as part of the detailed design component of the works. Preliminary survey carried out to date suggests that a steeper side slope (1 in 2) will be required on both sides of the bund; however, this will be confirmed as part of the detailed design. If a steeper side slope is only required on one side, then it is agreed that it should be located on the guy-anchor block side (not the creek side).

Minor Filling on properties at Shortland and Maryland

The HCRCMA does not support or endorse filling of wetland. However, negotiations with these landholders resulted in all avenues of possible solutions being exhausted, which left the HCRCMA with no other realistic, practical or commercially acceptable option but to agree to the minor filling. The proposed area to be filled at Marsden Street is less than 0.4ha (approximately 220m X 15m), whilst the proposed Maryland area is approximately 1500 square metres. It needs to be noted that the project area is approximately 1946ha and the proposed area of filling totals approximately 4800 square metres (approximately 0.5ha). It is considered that the very minor scope of filling would not diminish existing landscape values as the lands are currently used for grazing.

(c) Consultation on Staged Flood gate Opening

The HCRCMA is currently negotiating a Memorandum of Understanding with the Department of Natural Resources, owners of the floodgates. This will outline the process of how the flood gates will be operated. In consultation with the Project Committee, the HCRCMA will be responsible for the decision to progress or otherwise the opening of the floodgates. Results of monitoring undertaken in the swamp (which will be the prime mechanism for justifying the decisions) will be presented to the Project Committee. All Committee members, as representatives of a wide range of stakeholders including Council, will be afforded opportunity to comment on the monitoring results and make recommendations regarding on-going floodgate management. The CMA will consult with the Project Committee prior to making discretionary decisions regarding floodgate operations and other works.

The Project Committee will be the primary source of information dissemination and consultation and the main area for stakeholders to provide input into the project.

Odours

Decomposition of organic material may result in the generation of malodour. Decomposition by aerobic bacteria typically produce few odours compared to anaerobic bacteria. Anaerobic decomposition would generally be expected within the sediments of some deeper sections of the waterway. As these are underwater, malodour would only occur if the sediments are disturbed.

It is anticipated that the primary decomposition process would be via aerobic bacteria, which is a relatively rapid process. As such, decay resulting from initial saline inundation (and any odour associated with such) would be short-lasting. On-going mortality and decay of freshwater plants would be more limited, with associated odours considered to be of minor consequence.

Generation of odours from the swamp will be reduced by associated measures aimed at minimising the quantity of organic material subject to decomposition. These measures include opening of the gates in a staged manner to limit the extent of saltwater inundation by a single event, opening of the gates during winter when the freshwater plant biomass is at a minimum, and selective stock grazing of key areas immediately prior to staged opening of the gates.

Erosion

The computer model used to predict inundation extents is unsuitable to predict in-stream velocities, as the channels have been represented as one-dimensional elements (that is, a constant velocity throughout the channel cross-section). Areas of existing bank erosion and areas that are expected to be susceptible to erosion will be targeted for erosion monitoring. If monitoring manifests in these areas, then mitigation measures can be implemented.

It is considered that we are taking a pro-active approach by identifying key areas and including them in a monitoring program. We are also taking an adaptive management approach which means that contingency measures are planned based on monitoring outcomes. Pre-emptive bank stabilisation works is considered to be a potential waste of money unless there is a high degree of confidence that erosion will occur at those particular locations.

Response to Department of Natural Resources

CMA staff met with Department of Natural Resources (Bruce Coates) to discuss the project 31/7/06.

Operation and maintenance of Floodgates

The HCRCMA is currently negotiating a Memorandum of Understanding with the Department of Natural Resources as owners of the floodgates. This will outline the process of how the flood gates would be operated.

Former Shortland Waste Disposal Site

Newcastle City Council is responsible for the management and rehabilitation of the former Astra Street tip site. DEC has listed the site an Investigation Area under Section 60 of the Contaminated Lands Management Act 1997, in response to similar issues raised by DNR. Additional investigations have been carried out by NCC (refer NCC submission) and support the findings in the EA that state that a potential increase in groundwater level as a result of the project would potentially reduce the discharge of contaminated groundwater from the site to the wetland (as the groundwater table is higher at the site than in the surrounding wetland, i.e. reduced hydraulic gradient will reduce net discharge). Hydrogeological modelling is not considered warranted to quantify the change in hydraulic gradient, and has not been raised as an issue for consideration by NCC (the managers of the site).

Future management of the site will be subject to a NCC management plan, which will incorporate the provisions for elevated groundwater level and enhanced tidal flushing within Ironbark Creek commensurate with increased half tide level and tidal range.

Extensive groundwater and surface water monitoring of the site is currently undertaken by NCC, the outcomes from which have been incorporated into the EA where appropriate.

Where appropriate, the CMA will work closely with NCC to develop a Site Management Plan that is integrated with the CMA's Hexham Swamp Management Plan, and does not compromise the objectives of the Rehabilitation Project.

Sandgate cemetery

As outlined within the Environmental Assessment, changes to groundwater levels as a result of the project would be restricted to areas in the immediate vicinity of the main Ironbark Creek channels. Sandgate cemetery is approximately 1000 metres from Ironbark Creek, located on relatively high land (typically above RL 3m AHD).

It is considered that the project would have no impacts on groundwater levels within Sandgate cemetery. Rates of leachate from the cemetery into Hexham Swamp would be unaffected by opening of the floodgates.

Approved bores

The holder of licensed bore 20BL 135899 has been consulted regarding the project. An independent assessment of the bore has been carried out by RCA Australia and has concluded that there is little, if any, connectivity between the bore and the adjacent Ironbark Creek. Consequently, it was concluded that changes to the near surface ground water levels and changes to the chemistry of the creek waters would not impact on the conditions or quality of the licensed bore.

Acid sulphate soil issues

The acid sulphate soils potential has been recognised. Works are not proposed to disturb the soil. All bunds are to be constructed using clean imported material.

Response to Department of Environment and Conservation

Liaison between the CMA and Newcastle City Council regarding the rehabilitation of the former Astra Street landfill will be facilitated through Council's representative on the Hexham Swamp Project Committee. Newcastle Council has confirmed that the project will not exacerbate current impacts of the landfill on the environment.

The proposed monitoring program has been included in the Environmental Assessment. DEC comments on the monitoring program and reporting of the monitoring results back to DEC would be best facilitated through the Project Committee, which DEC has representation on.

Recommended Conditions of Approval

1 – 8

HCRCMA note these points

9

The proposed monitoring program has been included in the Environmental Assessment.

10

Reporting of monitoring will be via the Project Committee of which DEC is represented. DEC comments on the monitoring program and reporting of the monitoring results back to DEC would be best facilitated through the Project Committee.

11

HCRCMA notes this point

12

The Project Committee has been established of which DEC and NCC have been members since its inception. HCRCMA has purchased or is in the final stages of purchasing property and easements to inundate. Once completed HCRCMA will either own land, have an interest in land (i.e. easement to inundate) or have formal agreements in place with landowners who own land within the project area.

Response to The Wetlands Centre

HCRCMA has requested a meeting with TWC to discuss its response to the issues raised by TWC.

Reporting on Easement Arrangements

The letters referred in Environment Assessment Supplement (April 2006), Appendix B-1 are purely evidence that consultation has occurred with The Wetlands Centre for a number of years. This issue was discussed at a meeting of The Wetlands Centre and HCRCMA (15/6/06). The HCRCMA in no way views these two letters as evidence of having an agreement with the Wetlands Centre.

Consultation conducted with Shortland Wetlands Centre on the implications of the Hexham Project for Shortland Wetlands

The Wetlands Centre has been represented on the Project Committee since inception. HCRCMA met with TWC 15/6/06, and from this meeting HCRCMA offered to carry out further survey work for the options discussed. An on site meeting was held 29/6/06 with TWC and HCRCMA and surveyors to clarify areas/options to be surveyed. HCRCMA indicated it would be pleased to look at variations of the two options identified. The survey and plans identifying proposed works for both options discussed has been provided to The Wetlands Centre for further discussion. Please also note the timeline supplied by the Wetlands Centre indicates that consultation has been ongoing for a number of years.

The Wetlands Centre subsequently has supplied the HCRCMA with a third option for investigation. HCRCMA met with the Department of Planning 14/8/06 to discuss this option. It was indicated that should the third option be implemented a separate project approval would be required from that currently being assessed.

Low Level Recognition in EIS of the Classification of Shortland Wetlands

Discussions with The Wetlands Centre regarding the project span more than 5 years. At no stage during these discussions has The Wetlands Centre declared recent site-specific information that they consider would be useful to help describe the existing environment within the required Environmental Assessment. Regardless, works have been proposed to protect the existing environment from impacts resulting from opening of the floodgates. These works comprise raising of access tracks and associated culvert works, including installation of one-way flap gates to prevent saline backwater inundation.

Previous referral to DEH was based on the provision of works to prevent tidal inundation of the site. Consequently, the technical aspects on which the site has been included on the Ramsar listing will not be compromised by the proposal.

Response to ARTC

Since submission of the Environmental Assessment, additional ground survey and track details have been provided by ARTC. Along with a detailed site inspection with ARTC, this information has allowed for a greater understanding of ARTC's concerns. In return, the additional liaison has also resulted in a greater understanding of the project and its impacts by ARTC staff.

Access track drainage

ARTC raised concerns that any filling of the access track would inhibit free drainage from the ballast layer that a tops the railway embankment. Assessment of ground survey provided recently by ARTC suggests that filling of the track may only be required immediately adjacent to the Ironbark Creek channel. At this location, the ballast layer is significantly higher than the proposed track fill level, meaning that there would be no implications for drainage through the ballast.

Groundwater impacts

Groundwater levels in the immediate vicinity of Ironbark Creek will increase as a result of a net increase in water levels within the waterway. The mean tide level within Ironbark Creek following opening of the gates will increase to approximately 0.15m AHD. Groundwater levels adjacent to the creek will adjust to this elevated creek level condition. Impacts on groundwater levels would be restricted to those parts of the groundwater table that are lower than about RL 0.3m AHD. For existing groundwater levels in excess of about RL 0.3m AHD, the impacts of opening the floodgates would be minimal. Localised ponding of groundwater within the rail embankment would therefore not be affected by the proposal, as ponded levels would typically be higher than 0.3m AHD.

The offer to enter into more extensive discussions and undertake detailed hydrogeological modelling has been given to ARTC. ARTC is currently reviewing the need for further assessment following recent on-site discussions and more detailed understanding of the project and associated impacts. We are awaiting feedback from ARTC in this regard.

Response to Public Submission 1

Modifying the gates to reduce king tide incursion into the swamp will be carried out during the summer king tides only. It is considered that ponding of saltwater within the swamp during the summer king tides would introduce a significant opportunity for mosquito breeding habitat, which may have a potentially detrimental impact on the community despite potential benefits of reducing Phragmities more quickly.

Any cattle grazing of the swamp will be tightly managed under an Environmental Management System. Prior to the grazing occurring potential impacts of grazing will be identified and management actions will be put into place to manage these impacts. The Environmental Management System will be audited and reviewed annually to ensure any grazing is providing a positive contribution to the rehabilitation project. HCRCMA has invited DEC (National Parks) and Oceanwatch to assist in the preparation of the Environmental Management System.

Controlled grazing of the land will be undertaken for a limited period of time prior to the successive gate openings, which will occur immediately prior to winter king tides. Therefore, 'pugging' of the soil by the cattle will occur outside the main mosquito breeding period (Dec to Mar). It is considered that any 'pugged' soil will be largely recovered before the next mosquito season, assisted by periodic surface water flows (particularly areas subject to frequent tidal inundation) and rainfall infiltration. The limited time for cattle grazing would minimise opportunity for severe pugging and associated damage to soil structure.

Controlled grazing is included as a strategy to reduce the biomass of Phragmities prior to exposure to saltwater, and thus reducing the potential volume of organic detritus that would need to decay (and potentially causing water quality issues). Controlled grazing has been undertaken effectively and with minimal environmental damage by the Kooragang Wetlands Rehabilitation Project on Ash Island. The techniques established on Ash Island will be used by the HCRCMA in Hexham Swamp.

Muck-eye Creek has experienced significant sedimentation since the gates were installed. The CMA does not wish to pursue to physical removal bed sediments from within Muck Eye Creek, or any other waterways within the swamp, on the basis of potential acid sulphate soil issues (with associated cost implications for removal, disposal and environmental controls). It is considered that there would be no significant advantage to the project objectives should dredging be carried out in Muck Eye Creek, as the sedimentation within the creek would not be largely inhibiting tidal inundation of lands behind.

Response to Public Submission 2

1.

Excluding inundation of the land behind the bund does not result in the water needing to go elsewhere. Reduced inundation extents within the swamp will result in less water being drawn into the swamp from the Hunter River. The impacts of the Marsden Street bund have been fully investigated from a hydraulic perspective. There are no detrimental impacts elsewhere as a result of the inclusion of the bund in the project.

The HCRCMA sent a letter to all residents potentially impacted by the bund seeking their views. The majority of respondents indicated they were in favour of the bund. This, coupled with the environmental investigations results led the HCRCMA's proposal to construct the bund.

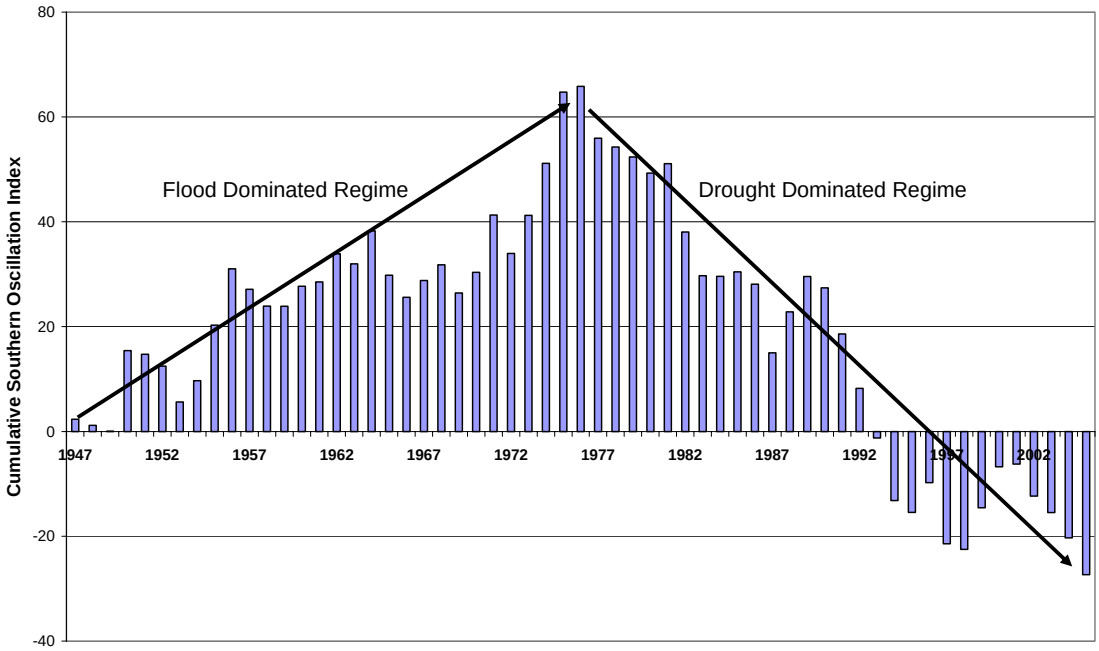
2.

The HCRCMA has been open and up front with all landowners and has fully complied with its statutory obligations of disclosure in regards to the land acquisition process.

Modelling that is contained with the environmental studies has taken into account the catchment changes.

3.

Prior to the construction of the floodgates, the east coast of Australia experienced a period of extended wet weather (was in a flood-dominated climate regime). Since the 1970s, there has been comparatively few flood events (has been in a drought-dominated climate regime) – see figure below.



Flood- and Drought-Dominated regimes since 1947, based on a cumulative Southern Oscillation Index, as derived from Bureau of Meteorology data

The difference in flooding conditions in Wallsend and Maryland is likely to have less to do with the floodgates and more to do with climatic variability.

Modelling has shown that the impacts of the project on flooding beyond the immediate swamp area are very limited.

New development around the swamp (eg Maryland) has been situated on higher land, above a level of RL 3.5m AHD, which is the 1 in 100yr flood level from the Hunter River. There would be no impact on flood levels of this magnitude as a result of opening the floodgates, as the entire floodgate structure, along with large sections of the rail embankment, would be overtopped by flood waters.

4.

An increase in the ponding of water within the swamp will provide an opportunity for mosquito production. There are, however, already very large mosquito populations produced from Kooragang Island and Tomago Wetlands, which can disperse into the greater Newcastle area, including areas around Hexham Swamp. Unlike both Kooragang and Tomago, the key advantage of Hexham Swamp as a mosquito breeding area is the fact that mosquito populations can be controlled through pro-active management of the floodgates (eg restricting inflows during king tide periods) should monitoring indicate a significant increase.

The production of mosquitoes in Hexham Swamp in the last few years has been extremely low, primarily due to the lack of rainfall and ponding within the wetland. Wet periods would typically produce much higher numbers of mosquitoes, regardless of whether the gates are open or closed. The typically higher number of

mosquitoes in the swamp prior to the installation of the floodgates is likely to relate to the more dominant wet weather conditions experienced during this time (refer discussion on historical flooding).

With respect to mosquito-borne disease, the Hunter remains a high risk area due to the large numbers of mosquitoes produced from regional wetlands stretching from Port Stephens to Lake Macquarie. There is activity of both Ross River virus and Barmah Forest virus on an annual basis within the greater Hunter region. Risks associated with these viruses increase with an increase in mosquito population (which is mostly reflective of meteorological conditions, i.e. rainfall).

It is acknowledged that greater production of mosquitoes in Hexham Swamp may result in a detriment impact on residents immediately surrounding the swamp. However, strategies are available, such as floodgate manipulation and larvicides, should mosquito numbers in Hexham Swamp increase significantly following opening of the gates.

Response to Public Submission 3

(1) *Port Newcastle is a highly modified basin. For instance, there has been increased salt intrusion into the littoral zone* (It is presumed that this is what was intended by the phrase “literal zone”) *resulting in an intrusion of salt into previously freshwater environments* [p. 1, para. 1].

It is true that modifications to Newcastle Harbour along with the well-documented sea level rise of the past 50 or so years have changed the tidal hydrology of the harbour and the Hunter River, and this may have resulted in some localised areas of increased tidal intrusion. However, there has been a substantial net decrease in saline wetlands due to flood mitigation works, filling, etc.

(2) *There has been a 30% increase in mangroves over the past 50-60 years (which is positive for fish) at the expense of freshwater habitat* [p. 1, para. 1].

Again, there is some basis for this statement. Williams *et al.* (2000), using photogrammetry, identified a net increase in area of mangroves in the Hunter estuary between 1954 and 1994 of 30.6%, although this was not a linear increase nor consistent across the whole estuary (there were substantial losses in some areas, such as Hexham Swamp). However, the increase in area of mangroves has not been at the expense of freshwater habitat but, mostly, at the expense of saltmarsh and mudflats. There has, in fact, been a net decrease in area of estuarine wetlands. All estuarine wetland types are important for estuarine/oceanic fisheries, and it is the overall net loss that is of concern.

(3) *The proposal to turn Hexham Swamp “back to what it was” is dubious and the proposal will turn the area into a “full estuarine system”* [p. 1, para. 1].

It is not intended to restore Hexham Swamp to some pre-existing condition. Even if it was possible to control tidal hydrology and other factors to such a degree that it was possible to accurately create a desired condition, it is not obvious what pre-existing condition would be desirable. A number of studies have shown that Hexham Swamp has been in a state of change at least since European settlement. It is also not correct that the whole of Hexham Swamp would become estuarine under the proposal. There are both saline tidal and freshwater catchment runoff inputs into Hexham Swamp, and the extent of estuarine habitat would be determined by the relative ‘strength’ of these two inputs. While it is possible that there may be an increased saline tidal input due to changes in Newcastle Harbour since the Ironbark Creek floodgates were installed, there has also been a substantial increase in development in the catchment of Hexham Swamp since that time, as I showed in my thesis, and this would have resulted in an increase in freshwater input (Winning 2006). It is the complexity of these and other factors that make it difficult to model the future hydrology and, therefore, ecology of Hexham Swamp, which is why a managed rehabilitation process has been proposed.

(4) *The loss of freshwater habitat would "devastate millions of common freshwater species (frogs, reptiles and birds) … through a "simple" calculation it would "displace more than 40 million frogs"* [p. 1, para. 2].

While it is correct to state that freshwater habitat would be lost, with a resultant drop in the sizes of local populations of fauna species dependent on that habitat, the figures presented in the submission are a gross exaggeration. The impacts on existing habitats and species were considered as part of the assessment presented in the EIS, and it was concluded that the loss of freshwater habitat and species was acceptable within the context of the gains for estuarine habitat and species. No species would be placed at risk of extinction by the proposal.

(5) *There has been no regard for potential impacts on the nearby Ramsar-listed Shortland Wetlands Centre* [p. 2, para. 1].

This is not correct. The Wetlands Centre, as well as other neighbours, have been, and are continuing to be consulted about measures to protect their land from any unwanted tidal intrusion. The project has also been referred to the Department of Environment and heritage under the EPBC Act.

(6) *Impacts on threatened freshwater species, such as Magpie Goose, Australasian Bittern and Southern Myotis have been dismissed. It would be unacceptable if any irreversible damage was caused to these species [*p. 2, para. 1].

Impacts on these, and other, threatened species were duly considered and while it was concluded that the predicted impacts were acceptable within the context of the project, it is misleading to say that these species were "dismissed". As previously advised in information provided to DoP, the habitat for these and other species in Hexham Swamp is declining due to the spread of Common Reed. Doing nothing will result in the eventual almost complete coverage of Hexham Swamp by Common Reed, followed by a successional trend towards Swamp Oak Forest (Winning 2006). This monoculture would provide habitat for a low diversity fauna assemblage, and none for the threatened species.

(7) *The proposal will result in serious encroachment of Green & Golden Bell Frog habitat* [p. 2, para. 1-2].

The potential for impacts on GGBF has been a major concern for the project, and much time has been spent looking at this issue over the past five or so years. It is important to note that the correspondent's use of the term "critical habitat" does not have the same meaning as the use of that term by the *Threatened Species Conservation Act 1995.* Also, the map provided by the correspondent purporting to show GGBF "critical habitat" needs some explaining. GGBF is a highly mobile colonizing species which moves large

distances from breeding ponds (after good breeding seasons) in search of new habitats to colonise, and some of the areas shaded green represent locations where dispersing rather than resident individuals were detected. That is, while individuals have been detected there, such areas are not necessary suitable residential habitat, let alone breeding habitat for GGBF. This is the case with the large green area on the edge of Hexham swamp shown on the map. This area supports mostly Swamp Oak Forest and Common Reed with no permanent or semi-permanent pondages. I have searched this area, and many of the areas indicated on the map in pink and not detected any GGBF in the past 5 years, which is consistent with the dispersal explanation. As previously advised to the DoP, there is concern that the GGBF local population core breeding area (the '2HD pond') is no longer occupied by GGBF, in which case the local population has become extinct. However, searches are still regularly undertaken in this area in the hope of detecting some individuals.

(8) *The money already spent on the Kooragang Wetland Rehabilitation Project has not resulted in demonstrable benefits for fish nor migratory waders* [p. 2, para. 3].

The benefits of wetland rehabilitation are not immediately obvious, and research is continuing on the HWRP site (Ash Island) to confirm the benefits of the project.

(9) *Better policing of commercial and recreational fishing is required to improve fisheries* [p. 2, para. 4].

Not within the scope of the Hexham Swamp Rehabilitation Project.

(10) *Improved land management practices in the catchment combined with a clean-up of pollutants and pests would improve the existing freshwater habitats in Hexham Swamp* [p. 2, para. 5].

While such measures are desirable, and many are actually implemented on an ongoing basis by the CMA, they do not address the central issue (which has been totally missed by the correspondent), the habitat degradation that has resulted from the cessation of tidal inundation. The changes in vegetation and habitats since the construction of the floodgates have been well documented, and the cause-and-effect relationship reasonably well established (Winning 2006). It is true, and documented, that Hexham Swamp provided important freshwater habitat for waterbirds and frogs for a period after the construction of the floodgates, but the continuing successional changes initiated by the construction of the floodgates has lead to the gradual degradation of the freshwater habitat such that the waterbird assemblage is now depauperate, and the frog community is simplified (G. Winning, unpublished data).

(11) *The proposal would result in a worsened mosquito problem [*p. 2, para. 6 - p. 3, para. 1].

An increase in the ponding of water within the swamp will provide an opportunity for mosquito production. There are, however, already very large mosquito populations produced from Kooragang Island and Tomago Wetlands, which can disperse into the greater Newcastle area, including areas around Hexham Swamp. Unlike both Kooragang and Tomago, the key advantage of Hexham Swamp as a mosquito breeding area is the fact that mosquito populations can be controlled through pro-active management of the floodgates (eg restricting inflows during king tide periods) should monitoring indicate a significant increase.

The production of mosquitoes in Hexham Swamp in the last few years has been extremely low, primarily due to the lack of rainfall and ponding within the wetland. Wet periods would typically produce much higher numbers of mosquitoes, regardless of whether the gates are open or closed. The typically higher number of mosquitoes in the swamp prior to the installation of the floodgates is likely to relate to the more dominant wet weather conditions experienced during this time (refer discussion on historical flooding).

With respect to mosquito-borne disease, the Hunter remains a high risk area due to the large numbers of mosquitoes produced from regional wetlands stretching from Port Stephens to Lake Macquarie. There is activity of both Ross River virus and Barmah Forest virus on an annual basis within the greater Hunter region. Risks associated with these viruses increase with an increase in mosquito population (which is mostly reflective of meteorological conditions, i.e. rainfall).

It is acknowledged that greater production of mosquitoes in Hexham Swamp may result in a detriment impact on residents immediately surrounding the swamp. However, strategies are available, such as floodgate manipulation and larvicides, should mosquito numbers in Hexham Swamp increase significantly following opening of the gates.

Response to Transgrid

Without knowing the locations of Towers T39 and T46, it is difficult for us to comment further on the implications of the proposed works. Given that the towers are on elevated ground, it may be reasonable to assume that they are located some distance from the main waterway channel, in which case the potential for groundwater table changes are small.

Given the low-level nature of the wetland, it is expected the groundwater table throughout Hexham Swamp is variable, dependent on antecedent rainfall and flood conditions. A small increase in groundwater table of typically less than about 0.2 metres is considered to be within the natural variability of groundwater.

Negotiations regarding the agreement to inundate between Transgrid and HCRCMA are underway.