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Dear Anthony

TALLAWARRA LANDS – FLOOD RISK MANAGEMENT ISSUES
RESPONSE TO COMMENTS RECEIVED FROM OEH AND COUNCIL

We have provided below a detailed response to the various comments which have been received from the Office of Environment and Heritage (OEH) and Wollongong City Council. A copy of the draft Statement of Commitments relating to flood risk management has also been prepared and is attached for your consideration.

RESPONSE TO FLOOD ISSUES RAISED BY OEH

(These issues are those raised during the meeting at DoPI offices on 31 January 2012 and listed under the 'Flood Risk Management' section of Attachment 1 of OEH's letter of 7 November 2011)

Issue 1: ***Consideration of flood issues with the Concept Plan are being undertaken outside of the 'whole-of-catchment' floodplain risk management process (as detailed in the 2005 Floodplain Development Manual)***

Response:

1. The Government's Flood Prone Land Policy and the Floodplain Development Manual advocate a "*merit approach"* for all development decisions in the floodplain "*which balances social, economic, environmental and flood risk parameters to determine whether particular development or use of the floodplain is appropriate and sustainable*".[1]

2. The NSW Floodplain Development Manual sets out a process for management of floodplain development and offers councils indemnity for their decisions and actions in relation to floodplain developments if they act in accordance with the Manual.

3. The process described in the Manual hinges around the preparation of floodplain risk management studies and plans for catchments. These studies and plans are prepared by Councils with state and federal government financial assistance and

[1] The Manual also states that by using this merit approach, "*the policy avoids the unnecessary sterilisation of flood prone land. Equally it ensures that flood prone land is not the subject of uncontrolled development inconsistent with its exposure to flooding.*"

can take typically 2-5 years to complete. These studies and plans are essentially strategic planning exercises where the flood risks are examined and the council and its floodplain management committee oversee the process of balancing "social, economic, environmental and flood risk parameters" in relation to a floodplain, including future major land releases.

4. Bewshers and Don Fox have worked together in developing over 25 major floodplain risk management studies and plans for councils over the last two decades and have probably completed more studies and plans than any other consultant in NSW. They have completed a number of these studies and plans in the Wollongong LGA including those for the adjacent Mullet Creek (Dapto) immediately to the north, and which included the West Dapto Release Area. Bewshers and Don Fox have also been the principal authors of the DCP controls for flood risk management in the Wollongong and Shellharbour LGA and more than 20 other NSW councils.

5. There has been no floodplain risk management study and plan prepared for the Duck Creek catchment and the Tallawarra Lands. A flood study (which is the precursor to the flood risk management study) has only just been completed. Discussions with Council suggest the floodplain risk management study for Duck Creek may possibly be completed in another five years.

6. It is not uncommon for floodplain risk management studies not to have been completed prior to the planning of major land releases. By way of example, the Hawkesbury Floodplain Risk Management Study which covers some of the State's most significant flood risks has still not been completed. Once LEPs are prepared, it is rare for floodplain risk management studies to be initiated in respect of individual developments. Whilst ideally floodplain risk management studies should be completed before any land planning is undertaken, this is rarely feasible.

7. Where floodplain risk management studies have not been undertaken, additional consideration of flood risk issues is usually required as part of local environmental studies supporting LEPs and land releases. (A specific flood-related S117 Direction recognises the need for this). This was no doubt the case in respect of the rezoning of Tallawarra Lands.

8. The Concept Plan has been prepared on the basis that a range of land uses are permissible on the Tallawarra Lands and that wider strategic planning considerations concerning the appropriateness of location of some land uses in other parts of the catchment have already been undertaken previously. Further even if these wider whole-of-catchment considerations were to be undertaken now, any outcomes could not be implemented through the current Concept Plan approval process.

9. An issue that could arise in whole-of-catchment considerations is the potential impact of upstream developments on downstream development. This issue is addressed below under 'Issue 6'.

Issue 2: ***Estimation of appropriate design flood levels and reporting of flood planning***

Response:

10. It is recognized that ‘post-development’ flood regimes need to be explicitly modelled. To date reasonable estimates of these levels have been provided which in our

opinion, are of sufficient accuracy for the level of planning currently being undertaken.

11. Further our December 2010 report details how the proposed project works are almost wholly outside of the 100 year floodplain and hence there is no imperative to do such modelling at this stage of the project.

12. OEH's issues related to "*land form modifications, future development in the catchment, impacts of proposed riparian rehabilitation works and potential impacts of climate change*" have already been addressed in our December 2010 report and the supplementary advice dated 9 August 2011.

13. All flood planning levels (FPLs) for Tallawarra Lands will be fully consistent with Wollongong City Council's requirements as set out in Chapter E13 of their DCP (including the draft DCP revisions currently under consideration by Council). These requirements conform to current best practice for flood risk management practice across NSW.

Issue 3: ***Consideration of Council's (draft) Lake Illawarra FRMS&P (latest version being Cardno 2011)***

Response:

14. This document was prepared after the December 2010 flood study report and therefore could not be referenced in the report.

15. Management studies such as this (as well as others that may be produced in the future) will be taken into account as the planning of the project proceeds.

16. The consultant is not aware of any issues relating to the draft Lake Illawarra FRMS&P which would alter the content of the December 2010 report.

Issue 4: ***Consideration of impacts of existing infrastructure upstream of the site***

Response:

17. This infrastructure has been fully considered. OEH may be unaware of the extent of modelling and investigative work that has been undertaken.

18. We confirm that the combination of hydrologic (WBNM) and hydraulic (TUFLOW) modelling undertaken for the December 2010 report did not preserve the de-facto basin approach utilized previously by Cardno Forbes Rigby. That is, the current floodplain regime – including modelling of flood storage matters immediately upstream of and within the Tallawarra Lands site – was undertaken explicitly within the TUFLOW model. This approach is consistent with best practice.

19. We also advise with regard to "structure differences" that all the structures listed in the December 2010 report were inspected in the field by the consultant's staff (but for one exception where the advice of rail corridor staff was relied upon). Accordingly all reasonable precautions have been undertaken by the consultant to ensure appropriate advice is provided to TRUenergy and the DoPI for consideration within the Concept Plan.

Issue 5: ***Emergency Management***

Response:

20. Again OEH may not be aware of the extent of work undertaken by the consultants.

21. This issue has been addressed within the December 2010 report. Consideration of PMF flood levels has been provided together with guidelines for minimum road access levels to facilitate emergency management during flood events.

Issue 6: ***Upstream development may alter flood conditions on Tallawarra Lands***

Response:

22. This issue was discussed at length during the 31 January 2012 meeting.

23. The following summarises the advice provided at that meeting:

    (a) Planning to date has assumed that any development upstream would not exacerbate flood behaviour at this site.

    (b) Any future upstream developments will need to include flood mitigation measures (e.g. stormwater detention) to ensure there are no downstream impacts. Should the consent authority fail to require mitigation measures be included within any upstream development proposals, all adversely affected downstream land owners could initiate legal action to require such measures be provided.

    (c) The manner in which Tallawarra Lands have proposed to deal with upstream development is consistent with the normal practice throughout NSW including within the Wollongong LGA.

RESPONSE TO FLOOD ISSUES RAISED BY COUNCIL

(These issues are those raised under Item 3 of Council's letter of 4 November 2011).

Issue 1: ***A comprehensive flood report should be provided that identifies the flooding behaviour through the site and surrounding area for the post developed state (i.e. ultimate development). The report should incorporate 1 or 2-dimensional hydraulic modelling that analyses the post developed state (i.e. including the proposed site levels, road and bridge structures and proposed riparian corridor planting) for all storm events up to and including the Probable Maximum Flood (PMF) event. All data used, assumptions made and results obtained from the modelling should be clearly documented within the report. All aspects***

of the report should be in accordance with Chapters E13 and E14 of the Wollongong City Council Development Control Plan 2009, and the NSW State Government Floodplain Development Manual (2005). Other specific requirements from the NSW Office of Environment and Heritage relating to Climate Change and State Emergency Services (SES) relating to evacuation should also be adhered to.
The flood report should clearly demonstrate that the proposed development has no net impact on flooding behaviour, no net impact from flooding and no impact on evacuation or emergency services access. The report should also demonstrate that reliable access is available from all access points of the development site for all relevant storm events.

Response:

1. Project flood modelling undertaken by Bewsher Consulting has already seen the use of best practice two dimensional hydraulic modelling software to examine the existing conditions 100 year flood regime. Since that modelling showed that the development precinct footprints almost exclusively occupied areas which were outside the 100 year floodplain there was seen to be no present requirement to model the "post developed (i.e. ultimate development) state". Our report has also laid down principles for floodtime access including associated road levels and bridge structure levels in accordance with best practice.

2. As part of the detailed design stage of the project, the flood model would be utilized to test all facets of the project including engineering design features of floodplain crossings and riparian corridor plantings, etc. This will include running the model for the 100 year (with and without climate change) and PMF regimes. All aspects of the report would be in accordance with the requirements of Council's DCP 2009 and also the 2005 State Government Floodplain Development Manual. Any specific requirements of other agencies such as the NSW Office of Environment and Heritage would also be addressed. As such the report (prepared as part of the detailed design phase of the project) will demonstrate that the project has no net impact on flood behaviour, has no net impact from flooding and no impact on evacuation or emergency services access. It will also demonstrate that reliable access is available from all access points of the development site.

Issue 2: ***A minimum 150mm diameter, PVC Class SH inter-allotment drainage system should be provided to drain proposed lots where roofwater and surface water from future development cannot be discharged directly into the street drainage system.***

Response:

3. This is an appropriate consideration for the detailed design stage.

Issue 3: ***The design of the development should ensure there are no adverse effects to adjoining properties or upon the land as a result of flood or stormwater run-off. Attention should be paid to ensure adequate protection for buildings against the ingress of surface run-off.***

Response:

4. The development has no downstream/adjacent properties that would be adversely affected by the development.

5. Stormwater within the development would be controlled through designated overland flowpaths along road ways and natural drainage paths.

6. Prevention of ingress of runoff into buildings would be addressed at the building stage.

Issue 4: ***Allowance should be made for surface run-off from adjoining properties. Any redirection or treatment of that run-off should not adversely affect any other property.***

Response:

7. Allowance has been made in the hydrologic assessment for catchment areas draining through Tallawarra Lands from adjoining properties.

8. The development does not include any proposal to re-direct run off from adjoining properties.

Issue 5: ***Overflow paths should be provided to allow for flows of water in excess of the capacity of the pipe/drainage system draining the land. Blocked pipe situations with 1 in 100 year ARI events should be incorporated in the design. Overflow paths should also be provided in low points and depressions.***

Response:

9. Major overland flowpaths would be provided to manage flows in excess of the minor drainage system capacity up to the 100 year ARI flow.

10. Overland flowpaths would coincide with roads and natural drainage corridors.

11. The development would be designed to ensure that no trapped low points would be formed within the development.

Issue 6: ***The depth and location of all services (i.e. gas, water supply, stormwater, sewer, electricity, telephone, traffic lights, etc) should be ascertained and reflected on the plans issued for Construction.***

Response:

12. The concept plan does not seek detailed design or construction approval. The detailed design of the future works will be the subject of future, separate applications. Considerations relating to construction can be dealt with as conditions to the subdivision development consent.

Issue 7: ***Civil design plans should be provided for all proposed site regrading, road and bridge infrastructure on the development site and also all***

necessary upgrades to existing roads and bridges. The design should be in accordance with Wollongong City Council Subdivision Code, Austroads manual and the relevant Australian Standards.

Response:

13. See response to Issue 6.

Issue 8: ***A detailed stormwater management design should be provided for the proposed development in accordance with Chapter E14 of the Wollongong City Council's Development Control Plan 2009.***

Response:

14. A detailed stormwater management design would be prepared at detailed development application stage for Tallawarra Lands.

Issue 9: ***The design of all bridge structures and approach embankments should be undertaken by a suitably qualified certified practicing engineer with proven extensive experience in design of bridge structures of comparable magnitude. Each bridge structure is to be designed with a minimum of 500mm freeboard above the estimated 100 year flood level to the underside of the bridge deck, taking into account the effects of climate change and Council's blockage criteria. The design of the structure and approach embankments should be undertaken in accordance with, but not limited to, the requirements of AS 5100.1-2004 Bridge Design and Austroads "Waterway Design – A Guide to the Hydraulic Design of Bridges".***

Response:

15. See response to Issue 6.

Issue 10: ***The design of all road bridges should be in accordance with the current version of AS5100 – Bridge Design. All bridges should be designed to cater for an SM1600 loading. Prior to work commencing, a Certificate of Compliance from a qualified engineer experienced in bridge design should be submitted to the consent authority.***

Response:

16. See response to Issue 6.

Issue 11: ***All stormwater outlets and overland flow paths should incorporate appropriate scour/erosion protection measures.***

Response:

17. See response to Issue 6.

CONCLUDING REMARKS

1. Future development will be protected from flooding to a standard that exceeds or equals that currently applied by Wollongong City Council to the West Dapto Release Area.

2. Potential safety risks to future occupants during flood emergencies have been rigorously considered and managed to a standard consistent with best floodplain management practice.

3. In regard to risks to property and risks to life, the proposed development is fully consistent with the requirements of the NSW Floodplain Development Manual.

4. An advanced copy of Council's draft Duck Creek Flood Study has been reviewed. No inconsistencies with the modelling undertaken for Tallawarra Lands and used for the preparation of the Concept Plan, have been identified.

5. A meeting was held on 23 March 2012 with Council's Senior Floodplain Management Engineer, Mr Peter Garland, at which all the flood risk management issues associated with the project were discussed, including the content of the draft Duck Creek Flood Study and the matters contained within this document. Mr Garland indicated his support for the flood risk management approach which has been adopted and for the draft Statement of Commitments which address flood risk management issues.

Yours sincerely

Drew Bewsher
Director