WCC ISSUE RAISED		
Drainage, Water Quality and Flooding	**J Wyndham Prince RESPONSE**	**WCC COMMENTS ON RESPONSE**
The report states (page 34) that the Calderwood Urban Development Project (CUDP) is consistent with the controls by Wollongong City Council. However upon viewing the flood maps provided, it is clear that the development is inconsistent with Wollongong City Council Local Environmental Plan (LEP), 2009 and Wollongong Development Control Plan (DCP), 2009 controls. From an LEP perspective, the development has not demonstrated: (i) suitable evacuation from the land, (ii) maintaining the existing flood regime and flow conveyance capacity, and (iii) avoiding significant adverse impacts on flood behaviour and affectation of other properties. From a DCP perspective (Chapter D16), the development has not demonstrated: (i) the creation of all new residential lots to be above the 1% AEP plus 0.5m freeboard, (ii) no net removal of floodplain storage capacity.	In 2009, CUDP was declared a State Significant Project under the State Environmental Planning Policy (SEPP) 2005. The SEPP rezoned the land to permit urban development and as a result, removes the need for CUDP to comply with both Wollongong City Council and Shellharbour City Council's Local LEP. The provisions particular to the Project site are found in Part 28 Schedule 3 of the State Environmental Planning Policy (State Significant Precincts) 2005. No local environmental plan is applicable to the Project site (refer to Clause 5 of the SEPP). Therefore, WCC's LEP and associated guidelines do not apply to the CUDP. CUDP needs to comply with the SEPP and the approved Concept Plan including the relevant Water Cycle Management Report. Therefore, the need to maintain existing flood regimes, flow conveyance or to have no net removal of the floodplain storage capacity up to the PMF as set out in the WCC LEP and DCP and associated guidelines is not applicable. The flood evacuation strategy has already been approved for all CUDP residents as detailed in Section 5.6 of the Floodplain Risk Management Study - Calderwood (FPRMS) (Cardno, 2010) which detailed that evacuation is not required and therefore a "shelter in place" strategy results in less risk to life. There is no need to determine a flood evacuation strategy for CUDP or Yallah-Marshall Mount area in order to support the MOD 4 modification due to its consistency with the original FPRMS.	**No further comment.**
The report states (page 32) that flood free access in the local Probable Maximum Flood (PMF) event for emergency services will be achieved to the north portion of the CUDP within the Wollongong LGA. However, the strategy for flood access has not been determined for the Yallah/Marshall Mount area. There is no current flood free access route from Yallah-Marshall Mount to the CUDP. Council has not seen a design for the Escarpment Drive Bridge over Marshall Mount Creek. Thus it is unclear how a substantially new development area (CUDP) can rely on a flood access strategy through Wollongong LGA that has not yet been determined. This outcome typically results in additional ongoing pressure on the Emergency Services to assist in times of flood.	While the specific engineering details are still to be finalised, the WCFM Strategy has tested a proposed bridge structure over Marshall Mount Creek in the hydraulic (TUFLOW) modelling. The result demonstrated that flood free access via Escapement drive can be provide to north portion of CUDP. As mentioned above, the evacuation strategy for CUDP is for all residents to "shelter in place" therefore there is no need to determine a flood evacuation strategy for CUDP or Yallah-Marshall Mount area in order to support this modification. CUDP does not need to rely on any flood evacuation strategy from the adjacent catchment. The original FPRMS (Cardno, 2010) required that vehicle access to CUDP is required in a PMF event across both the Macquarie Rivulet and Marshall Mount Creeks. The Stage 1 approved bridge and the	The current report includes a proposed bridge over Marshall Mount Creek designed to be flood free in a PMF event. The latest report also indicates that the Calderwood Urban Development Project (CUDP) concept approval was approved on the basis of a shelter in place strategy and no requirement for evacuation from the site. The current report also dismisses any need for access to the CUDP via external roads under the current MOD4 application. **This comment is considered resolved**.

	proposed bridge across Marshall Mount Creek (i.e. Escarpment Drive bridge) deliver this requirement. The design and location of Escarpment Drive ensures that the bridge provides safe evacuation routes during the PMF event. It is also understood that WCC are concerned about how emergency service personnel will travel to CUDP during a flood event. The access to CUDP via roads outside of CUDP is not a matter to be dealt with in the MOD 4 application. The flood assessment completed as part of MOD 4 also complies with Statement of Commitment No. 41. The accepted PMF flood impacts as part of MOD 3 remain consistent in the MOD 4 assessment and there are no additional impacts associated with MOD 4 outside the accepted impacts detailed in the previous MOD. Therefore the MOD 4 has delivered: • Minimum 0.5m freeboard will be provided to flood affected properties in the 1% AEP event. • Safe evacuation routes during the 1% AEP flood event have been provided for the development located within the PMF. • Bridge decks for approved Macquarie Rivulet and proposed Escarpment Drive bridges (across Marshall Mount Creek) have been designed above the 1% AEP flood level to allow uninterrupted road traffic throughout the development during events up to and including the 1% AEP flood, and • Design and location of all major spine roads (i.e. Escarpment Drive) within the CUDP development are currently at or above the PMF level.	
The report is silent on the potential loss of flood storage for any storm event and also the potential cumulative impacts associated with the proposed land form. These considerations are required as part of undertaking floodplain risk management studies for catchment areas according to the NSW Floodplain Development Manual (2005).	The loss of flood storage is consistent with the approved 2010 Concept Approval assessment. The 2010 concept design approval demonstrated that CUDP does not result in an unacceptable flood impacts downstream of CUDP. The 2010 assessment included similar reduction in floodplain storage which forms part of this modification application. The comprehensive flood assessment completed as part of this modification application demonstrates that the loss of floodplain storage does not result in flood impact in either the 1% AEP and PMF event. J. Wyndham Prince Consulting Civil Infrastructure Engineers & Project Managers Document: 3154001_1_Addisons edits - 110073-07-Submissions Response Letter. JWP response.docx 7 of 24 Furthermore, the NSW Floodplain Development Manual (2005) discusses the	The current report indicates that the loss of flood storage for this modification is consistent with the 2010 concept approval and that it does not result in flood impact in either the 1% AEP and PMF. However, the latest report is silent on the potential cumulative impacts of the CUDP and other nearby developments on flooding as required by the NSW Floodplain Development Manual 2005. **This comment is not resolved**.

	definition of flood storage as "those parts of the floodplain that are important for the temporary storage of flood waters during a passage of a flood". The manual also mentions that the loss of floodplain storage can also cause a significant redistribution of flood flows. The WCFM Strategy demonstrates that the proposed loss of floodplain storage does not result in a redistribution of flood flows, nor results in flood impacts outside of CUDP in excess of that which has already been approved under the court approved Concept Plan and the Stage 1 Project Approval (NSW Land and Environment, Matter No. 10492 of 2012). Thus, the assessments are compliant with the NSW Floodplain Development Manual (2005). The assessment has considered the impacts of loss of floodplain storage by modelling the change in landform in the model and modelling the hydrograph from the WBNM model (not a steady state flow). The resultant flood level changes are included in Appendix C and show there are no adverse impacts predicted.	
It is unclear how the effects of climate change, as required by item 11 of the SEARS, were modelled and implemented across the proposed landform for this modification.	Given the PMF assessments which are not influenced by climate change impacts, demonstrated acceptable flood outcomes, any minor event with climate change consideration (i.e. 1% AEP) will not result in any measurable changes in flood levels greater than the flood levels of a PMF event. Notwithstanding this position, an assessment of flooding impacts for the 1% AEP including an assessment of the effects of climate change is included in the revised WCFM strategy report. Figure 8.09 shows that the increase in flood levels with the uplift in dwelling yield under a climate change scenario are less than 0.5m The floodplain development manual states that freeboard is a factor of safety that considers the "changes in rainfall patterns and ocean water levels as a result of climate change". Therefore the 0.5m of freeboard is suitable for accounting for increases in rainfall that could occur in the future due to climate change.	The effects of climate change have been addressed in the current report – indicating an increase in flood levels of <0.5m for the 1% AEP event and thus can be considered as part of the 0.5m freeboard. **This comment is considered resolved**.
Figure 3 of the report indicate areas of proposed cut and fill across the site, however does not indicate the maximum depths of cut/fill. In this respect, it is unclear whether the proposal satisfies item 9 of the SEARS relating to potential visual impacts associated with the amount of cut/fill proposed.	A comprehensive landscape/restoration plan will form part of the future DA for WCC's consideration. A cut and fill plan has been provided as part of the revised WCFM which indicates locations and depths of the proposed cut and fill. Refer to Figure 8.10 for details. Any visual impacts of the proposed cut/fill will be addressed as part of future DA assessments.	The current report indicates that a visual impact relating to the cut/fill on site will be addressed as part of future DA assessments. This would be contrary to item 9 of the SEARS which requires the visual impacts of the proposed MOD against the concept approval to be addressed as part of the current MOD. **This comment is not resolved**.

Figure 7 of the report indicates significant flood affectation in the 1% AEP (Annual Exceedance Probability) in Stage 5 south. Apart from being a poor outcome for a greenfield site, no evidence has been provided on how the flood risk to future development will be managed and whether the flood planning level (i.e. 1%AEP + 0.5m) will be achieved.	Stage 5 south is not flood affected in the 1% AEP and is located on the northern side of North Macquarie Road (refer to Figure 4 Indicative Subdivision Plan in the Environmental Assessment Report prepared by Ethos Urban dated 24 July 2018). WCC is likely referring to the "non-core" land located on the southern side of North Macquarie Road (refer to DA No 577/2017). Nevertheless, the original modelling surface did not account for the proposed development at 128 North Macquarie Road, Calderwood (non-core landowner). The surface information has been updated as part of the revised Watercycle and Flood Management Strategy to reflect this proposed development, and Figure 8.04 indicates that 128 North Macquarie is now flood free.	The current report indicates that the latest surface information has been included in the model which now indicates the 'non-core' land is now flood free. **This comment is considered resolved**.
Figure 8 of the report indicates significant flood affectation in the 1% AEP over a road in Stage 5 north. It is unclear how future residents in this location will achieve 1% AEP flood free access during this storm event and compliance with item 41 of the statement of commitments.	As mentioned above, the surface information has been updated as part of the revised WCFM strategy report which has resolved any impacts surrounding Stage 5.	This item has not been addressed, however the area of concern should be Stage 7B and not Stage 5 north. **This comment is not resolved**.
Figures 8 and 13 of the report indicate significant increased flood affectation (>0.4m) downslope of the CUDP for both the 1% AEP and PMF events, with no explanation on how these impacts will be managed. This is contrary to item 11 of the SEARS.	Flood affectation downstream of CUDP for both 1% and PMF events is consistent with the original concept approval that indicated that flood impacts downstream of the site are between 0.02 – 0.2 m. Flood affection in PMF downstream of CUDP is illustrated in Figure 8.08 of the WCFM strategy and complies with the MOD 3 Terms of approval for the Stage 1 Project application: Part B of Condition B26.1, which states to "minimise off-site impacts in the PMF event such that the maximum increase does not exceed 0.3 m". As this document sets the conditions of consent for the precinct, compliance with these terms is appropriate for the Mod 4 approval.	Figure 8.08 of the current report indicates that flood depth increases greater than 300mm occur at three locations outside of the site boundary, being contrary to condition B26.1 for MOD 3 terms of approval and also section 26 (Flood Planning) parts 1c and 3b of the SEPP. **This comment is not resolved**.
Figure 12 shows between 0.5-1.0m of flood affectation in the PMF to the town centre (east) and residential areas Stage 7A, town centre and stages 4, 8, 9. It is unclear how the flood risk to future development will be managed for this event.	While this is acknowledged that flood impacts are present in the PMF event within Stages 8 and 9, it is important to note that, no formal landform design north of Mount Marshall Creek has been completed. Given the depth of inundation in PMF event is only between 0.5 -1.0 m, in Stages 8 & 9 located in WCC LGA, conveyance of PMF flows will be managed by an appropriate road and drainage design as the development progresses and will reduce any "extreme event" impacts. Furthermore, adequate 0.5m freeboard will be provided to flood affected properties in the 1% AEP event through site filling. The maximum increase in flood levels for the PMF event are indicated in Figure 8.08 of the WCFM report. We have also	Figure 8.07 of the current report indicates areas of flood affectation on lots and roads between 0.5-1.0m and also 1.0-2.0m deep in Stages 4, 7A and town centre east without realistic mitigation measures to alleviate this flood risk. The proposal to alleviate these depths with appropriate road and drainage design in future applications is considered unacceptable. **This comment is not resolved**.

	prepared a detailed local PMF assessment that demonstrates the management of local PMF flows and this is included in Section 8 of the revised WCFM report. Further refinement has also been completed for surface levels for stages 8 & 9 surrounding Marshall Mount Creek which demonstrates that PMF impacts will be reduced once a detail subdivision design is completed.	
Figure 13 shows significant increased flood impacts in the PMF (>0.4m) within the Wollongong LGA, school site, retirement site and town centre east when compared to the existing scenario. It is unclear how flood risk to future development in these areas will be managed for this event. Also it is unclear what the maximum increase in flood levels are within the affected areas.	(see above response)	The proposal to alleviate these depths with appropriate road and drainage design in future applications is considered unacceptable. **This comment is not resolved**.
Figure 14 shows significant increased flood impacts in the PMF, however it is unclear what the maximum increase in flood levels are for the affected areas.	(see above response)	This item has not been addressed. **This comment is not resolved**.
A map should be provided indicating the differences between the 1% AEP and PMF events for the CUDP to identify the potential flood affectation beyond the flood planning level of 1% AEP + 0.5m.	Figure 8.05 and Figure 8.08 provide the 1% AEP, and PMF flood differences maps are provided within the WCFM strategy report. As there is no requirement for lots to be above the PMF, provision of flood affectation maps above the flood planning level is not necessary.	The current report states that this item is not necessary. Council requires this information to be provided to enable a detailed assessment. **This comment is not resolved**.
There is no information in the report on the assumptions made for Manning's roughness and % imperviousness for the proposed development. This information is critical in the assessment of flood reports.	Table 8-1 of the Watercycle and Flood Management Strategy report details the Manning's roughness used in the assessment, which is consistent with the Floodplain Risk Management Study prepared for the 2010 Concept Plan Approval (Cardno, Mar 2010). The Manning's roughness assumption J. Wyndham Prince Consulting Civil Infrastructure Engineers & Project Managers Document: 3154001_1_Addisons edits - 110073-07-Submissions Response Letter. JWP response.docx 9 of 24 used is a depth variable Mannings based on the flow depth within discreet areas of the model (i.e. roughness reduces with increasing flow depth) to reflect a 'realistic' flood scenario. Percentage impervious are based on those used in the WMA model plus modification as shown in section 8.1.2 of the report.	Table 8-1 addresses this item. **This comment is considered resolved**.
New Item	N/A	Section 8.2.4 of the current report states that "…there are no impacts greater than 300mm external to CUDP…" However figure 8.08 clearly indicates three areas in the northern portion of the site marked yellow which represents 'area now flood

		affected by more than 300mm in modelled event' according to the legend. Thus the statement in section 8.2.4 of the report is misleading.
New Item	N/A	Section 8.3 of the current report states that "…during most extreme storm events safe access for emergency vehicles to all points of the CUDP is provided." However, according to figure 8.07, some streets in stage 4 and 7A, town centre east and the Fischl development site have depths in excess of 0.5m depth and up to 2m in the PMF, making it impassable for emergency vehicles. Thus the statement in section 8.3 of the report appears to be misleading.
New Item	N/A	Section 8.3.1 of the current report states that "…for the whole of the CUDP all houses will not be subject to high hazard flow." However figure 8.11 clearly indicates proposed lots in Stage 4 subject to hazard category 'H5' being 'unsafe for vehicles and people, buildings vulnerable to structural damage…' according to the legend. Thus the statement in section 8.3.1 of the report is misleading and is also contrary to section 26 (Flood Planning) Part 3 of the SEPP.
Transport & Accessibility	**Cardno RESPONSE**	**WCC COMMENTS ON RESPONSE**
It is difficult to understand the inclusions of the updated Cardno 2036 Tracks models as there are no model network plots or land use zone tables attached to the report. This is especially so for the modelling done to assess the impacts of the proposed yield increase in the 'ultimate' West Dapto development scenario (section 4.3.4 of the report). This clarity should be provided.	The CUDP land use assumptions adopted for the model assessment in the updated T&TR is documented in Table 4-1. Further detail is provided below. **Land use & 2036 CUDP Proposed Modification** Residential 6,000 dwellings Town centre – retail (GFA) – 20,000 sqm 600 jobs Town centre – other (GFA) – 20,000 sqm 400 jobs Neighbourhood centre – retail (GFA) – 5,000 sqm 150 jobs Neighbourhood centre – other (GFA) – 1,000 sqm 20 jobs 2 Public Primary Schools (2,000 students total) 200 jobs 1 Public High School (2,000 students) 200 jobs Community centre 40 jobs Town centre – additional retail (GFA) – 5,000 sqm 150 jobs Aged care 60 jobs Retirement living 80 jobs Construction work (civil works and building) 180 jobs The non-CUDP land use is presented in Table 1-2 and is inherited from the APRB TRACKS model provided by RMS. The	The explanation from Cardno is very high-level and does not show how the additional land use was distributed over Tracks land use zones according to the MOD4 proposal to allocate additional dwellings to the R1 zoned areas in the CUDP. In their response to Shellharbour Council item 4.1, Cardno state *"Most of the additional dwellings proposed in the latest ILP are located in close proximity (or within) the Town Centre, whereby local employment is provided"*. Additionally, in section 4.1.3 of the updated Cardno Traffic & Transport Report, it states that *"Cardno increased the number of zones in the CUDP to better match the development stages as indicated on the latest yield analysis plans provided by Lendlease*". Without access to model information (network files, land use zone files etc), it is not possible to confirm how/where the land use has been distributed, which has a direct bearing on outcomes for the WDURA. In terms of network, the APRB model (upon which the Cardno model is based), has very simplistic and outdated network arrangements for CUDP and significant broad-scale network changes would be required for the MOD4 analysis (in contrast to Cardno's statement in section 4.1.3 of the revised Traffic

	background and reasoning behind using these updated models are discussed in further detail in Section 1.4.3 and Section 4.1.2 of the updated T&TR.	Report *"**Minor** changes to the CUDP internal road network were made to reflect infrastructure on the ground and latest road planning information"*). Again, provision of the models is important for transparency & to allow Council to assess/confirm impacts as noted by Cardno within the Wollongong LGA, particularly within Stage 5 of the WDURA. In terms of their assessment of impacts at ultimate WDURA development levels (section 4.3.4 of the revised Cardno Traffic Report), Council is seriously concerned that the lack of model information provided does not allow any review of modelling or assessment of the impacts of the additional proposed CUDP yield in the Wollongong LGA, which would appear to be grossly understated (see comments under 3rd Transport issue below).
It is noted that Cardno recommends changing the 2010 TMAP arrangements for the road connection from Calderwood Urban Development Project (CUDP) to the Wollongong Council area (Marshall Mount). Whilst it is acknowledged that the recommended T-intersections would provide priority for the Escarpment Drive/Marshall Mount Road traffic, it appears the two proposed intersections are closely spaced and there may be operational issues under the ultimate development scenario. The Cardno/WCC agreed ultimate development Tracks modelling that was used to inform VPA negotiations shows a daily volume of 27,500vpd on Marshall Mount Rd/Escarpment Dr at this location. At this volume level it is likely there would be interactions between the two intersections (queuing etc.) and consideration should be given to performance of the recommended arrangements under these demands to ensure satisfactory long-term operations.	Cardno assessed two (2) options for the proposed Escarpment Drive / Marshall Mount Road intersections using the operational microsimulation traffic model. The intersection performance of the preferred design (Option B – separate T-intersections) indicate both intersections would operate satisfactorily (and there would be no operational issues) with a LOS B during the AM and PM peak hour in the 2036 CUDP Proposed Modification scenario. Furthermore, the average queue length results (<5 vehicles) indicate queuing from the approaches of either intersection are not at risk of impacting each other. Escarpment Drive and Marshall Mount Road (east) will carry the highest volume and thus should take priority over Marshall Mount Road (west). This assessment is detailed in Section 4.2.3.2.2 of the updated T&TR.	The fact remains that the intersection performance and requirements have not been determined under full development scenario (ie full Calderwood Valley yield plus full WDURA), only at the full CUDP development level (2036). Whilst the existing West Dapto Section 94 Development Contributions Plan (2017) includes signalisation of Nth Marshall Mt Rd/Marshall Mt Rd, the intersection of Escarpment Dr/Marshall Mt Rd will need future upgrading (eg to signals or roundabout) under these full urban development demands. As per previous feedback from Wollongong City Council, the operation of the two closely spaced intersections should be analysed under the full development case, to determine if there are any operational impacts between the two intersections, for example, from queuing. This will avoid any costly complications later on, as noted by Cardno in the SEARs Traffic & Transport Report, section 4.4.2 when referring to Calderwood Rd: *"Consideration should be given to the ultimate road infrastructure requirements in this area to avoid expensive reconstruction works".* Additionally, it is considered that as the CUDP urban development is creating the need for this road (Escarpment Dr), then the cost of future upgrading of the Escarpment Dr/Marshall Mt Rd intersection should not be a cost that Wollongong City Council should have to bear.
Section 4.3.4 states 6000 dwellings were modelled for CUDP as part of the VPA work. Assumptions modelled by Council for the Lend Lease development area were 4,800 dwellings, and 7,700 for the whole Calderwood Valley. Council recommends the Department seek clarification of what was	The Calderwood Voluntary Planning Agreement (VPA) with Wollongong City Council outlines contribution amounts for road upgrades in the local area. For the purposes of the modelling done as part of the VPA discussions, the CUDP yield was assumed to be 6,000 dwellings. The Calderwood Voluntary	The statement by Cardno that the modelling done as part of the VPA incorporated a CUDP yield of 6,000 dwellings is incorrect. The modelling for the VPA was jointly carried out and agreed between Cardno (on behalf of Lend Lease) and Wollongong City Council. The model included 4,800 dwellings for the CUDP area

modelled for Cardno's analysis in section 4.3.4. No details of model inclusions (land use zone tables etc.) are provided.	Planning Agreement (VPA) executed with Wollongong City Council and Lendlease Communities on 13 December 2017 refers to contributions for up to 6,000 allotments (see Schedule 4 of the VPA). In the previous version of the traffic and transport report, some commentary and analysis was included in Section 4.3.4 to compare the traffic impacts between the scenario modelled at the time (6,500 dwellings) and the scenario adopted in the VPA work (6,000 dwellings). The yield has since been revised to 6,000 dwellings (consistent with the scenario modelled for the VPA) and therefore, the comparison is no longer required.	and a further 2,900 dwellings in the Calderwood Valley (outside the CUDP area), totalling 7,700 dwellings for the entire Calderwood Valley (as per the Illawarra-Shoalhaven Urban Development Program Update 2016). Cardno state that there is no need to model the impacts of the additional MOD4 yield (refer below item response to WCC) at ultimate development, given that Lend Lease has revised the yield review to 6,000 dwellings. This is also incorrect given that the VPA modelling did not include a 6,000 dwelling yield for the CUDP. Modelling should be completed that determines the impacts of an additional 1,200 dwellings in the CUDP under the full development scenario (ie 4,800 previous + 1,200 new = 6,000 dwellings). This does NOT constitute assuming that the additional 1,200 dwelling yield in CUDP is part of the 2,900 dwellings elsewhere in Calderwood Valley in the Tracks model. The model would need to be run with the 7,700 dwellings for the Calderwood Valley (as identified in the Illawarra-Shoalhaven Urban Development Program Update 2016) PLUS an additional 1,200 dwellings distributed appropriately to the CUDP model land use zones as per the MOD4 proposal. The model should include any updates to the CUDP internal road network and zoning that were carried out for the 2036 model analysis (eg Cardno increased the number of land use zones in the CUDP to better match the development stages according to the latest yield analysis by Lend Lease). The results and any impacts on the West Dapto Stage 5 road network should be documented and addressed. This would allow Council to better understand impacts on the road network of Stage 5, WDURA and assist Council to determine if additional infrastructure funding arrangements would be required (such as review of the planning agreement between WCC and Lend Lease).
There is minimal explanation provided in Section 4.3.4 regarding modelling done to determine impacts at ultimate development. The peak period volume differences shown in Table 4-8 do not show the percentage increase in Calderwood traffic on Yallah Marshall Mount roads, only numerical increases. There is no LOS analysis documented for this assessment – the "relatively minor" increase in volumes may push LOS into an unacceptable category, requiring infrastructure upgrades to address. When considered as percentage, it is found that there are notable increases, for example, Marshall Mount Road (west) of	See above - This is no longer applicable given Lendlease has revised the yield review to 6,000 dwellings.	See comments under 3rd Transport issue above. The revised modelling should clearly identify the changes in traffic demand on WDURA Stage 5 roads, with a Level of Service (LOS) analysis to determine if and where any infrastructure upgrades are required to address LOS issues.

+8%. Further information should be provided regarding the impact of this change on road infrastructure requirements.		
The 2010 TMAP included a 10% shift away from private car. It is unclear if the updated 2036 modelling undertaken by Cardno for MOD4 retains this mode shift as the report does not give any details. The applicant should also clarify what mode shift was included for West Dapto development at 2036. If it is 15%, then it is likely underestimating traffic generation, as the 15% mode shift target is long term and based on the final development scenario for West Dapto (circa 2060).	Cardno's approach to the model assessment includes adopting the APRB TRACKS model. Trip generation rates including mode shift, are inherent to the model. Any mode shift % incorporated in the trip generation rate is therefore consistent with previous and other modelling assessments that are based on the outputs of the APRB model and its parent – WOLSH TRACKS model. These include West Dapto, Tallawarra, CUDP (2010), Tullimbar, and has informed infrastructure such as Albion Park Rail Bypass and even S94 contributions plans. It is important to note that mode shares for different transport modes are not coded into the model. Based on land use and transport infrastructure assumptions, the model helps forecast transport demands at a strategic level.	Whilst Cardno states that they have used the APRB model with inherent trip generation rates and mode shift inclusions, it is noted that the model is not strictly the APRB model, as the land use and network were significantly reviewed/altered as part of the preparation of a 2036 (rather than 2041) time horizon (refer section 4.1.3 of the updated Cardno Traffic & Transport Report). As part of this work, it is Council's view that the model mode shift inclusions should have been reviewed in line with the CUDP TMAP (Cardno, 2010) that supported the Concept Plan approval, given their direct influence on traffic demand on the CUDP and surrounding road network, as well as resulting infrastructure requirements. The 2041 APRB model includes a 15% mode shift for West Dapto & Calderwood Urban Release areas and was used for strategic transport purposes. Given a mode shift target of 10% for the CUDP is included in the TMAP and Revised Statement of Commitments (Item 23), it is considered that the 2036 modelling for the MOD4 application should include this mode shift, rather than adopting the 15% mode shift simply because it was inherent in the 2041 APRB model. This is particularly important for internal CUDP trips and determination of road infrastructure requirements. For example, the updated Traffic Report states that as the yield has been revised down from 6,500 to 6,000 dwellings, the previous need to widen Calderwood Rd from 2 to 4 lanes is no longer required. However, under the approved 10% mode-shift scenario the resulting traffic demand on Calderwood Rd may actually require the 4 lane configuration. The 10% mode shift at 2036 should be modelled and used to inform road infrastructure requirements.
The ultimate (ie full West Dapto development) scenario context should be considered by the applicant for internal road planning, especially for the roads in the north of the CUDP. The June 2018 rezoning to allow urban development at Yallah-Marshall Mount (Stage 5 of West Dapto Urban Release Area (URA)) is expected to result in circa 4,000 new dwellings, whereas the Cardno 2036 analysis (on which their network performance analysis is based) only considers circa 2,000 dwellings in Stage 5. As an example, Wollongong City Council Tracks modelling shows that the full West Dapto development scenario	**THIS COMMENT DOES NOT APPEAR TO BE ADDRESSED**	(See WCC responses above for 2nd and 3rd issues)

results in a 29% increase in daily traffic on Escarpment Drive south of Marshall Mount Road, when compared to the 2036 scenario. This would have implications for road type/cross section and intersection requirements and should be considered. The Cardno report recommends priority "T" intersections for Marshall Mount Road/Escarpment Drive and North Marshall Mount Road/Escarpment Drive – this may be acceptable under 2036 demands but the ultimate demands would require intersection upgrades, (signals or roundabouts). The consideration of ultimate Urban Release Area development and its implications for the transport network should be considered. The importance of this is highlighted by Cardno in the SEARs Traffic & Transport Report in section 4.4.2 when referring to Calderwood Road: *"Consideration should be given to the ultimate road infrastructure requirements in this area to avoid expensive reconstruction works".*		
The proposed road types B1, B2, C2, D1, D3 (major/minor collectors & village centre roads with bus services) in Table 4-10 have parking lanes of 2.5m width. TfNSW *"Guidelines for Public Transport Capable Infrastructure in Greenfield Sites"* specify a minimum parking lane width of 3m to allow for bus stops and to allow the bus to move out of the through lane.	Localised widening of the parking lane (from 2.5m lane to a 3.0m lane) is proposed at bus stop locations and reflected in the updated T&TR.	No further comments
Proposed Penrose Station – the reference to this station in 4.6.6, included as part of the Long Term Public Transport Plan Figure 4-28 of the Cardno EAR report is incorrect. The concept of a station at this location was abandoned in 2008 following feedback from RailCorp/Transport for NSW and through Council planning which recognised the constraints to delivering efficient land use outcomes around a station at this location. It is not reflected in any of Council's current planning documents pertaining to West Dapto, including the draft West Dapto Vision & Structure Plan (2018). The long term bus strategy shown in Fig 4-27 would therefore need to be modified, however ultimately this is subject to planning/negotiation with Transport for NSW. Council recommends the Department seek comment from Transport for NSW in that regard.	Reference to Penrose Station has been removed in the updated T&TR. The Strategic Bus Network is, as acknowledged by Council, ultimately subject to TfNSW and the local bus provider (Premier Illawarra). The Strategic Route is derived based on the 2036 design horizon and is proposed to align with the likely development locations in West Dapto, Huntley, Cleveland and Avondale.	No further comments
It is noted that the modified street typology for CUDP (Table 4-10 in Cardno report) allows for a 2.5m shared path	Note Escarpment Drive is now built to Calderwood Road (approximately 55-60%) with the proposed street profile (2.5m	No further comments

on a number of road types including Sub-Arterials and Type B3 (major collector adjacent rural lands). This change is supported as it will better allow for active transport connectivity and continuity between the West Dapto and Calderwood release areas. In order to further strengthen the attractiveness of this linkage and active transport in general, it is suggested that consideration be given to allowing for a shared path on both sides of the main north-south sub-arterial road through the CUDP. This would then provide seamless connectivity with West Dapto release area, as Marshall Mount Road is proposed to have a 2.5m wide shared path on both sides of the road. It is also noted that the verge widths for all Sub-Arterial roads as shown in Table 4-10 are capable of accommodating a shared path on both sides. In relation to Marshall Mount Road to the north-west of the CUDP, it is agreed that a shared path on one side only (i.e. as per Type B3) is appropriate given the rural lands on the west side of the road.	share way to the east and 1.5m footpath to the west). Refer to discussion in Section 0.3 above.	
Community Facilities & Public Domain	**Ethos Urban RESPONSE**	**WCC COMMENTS ON RESPONSE**
It is not clear from the EA how the increase in dwellings and additional population of 4,750 specifically affects community facilities, open space and public domain needs in the Wollongong LGA component of the Concept Plan.	The additional population is only for 1,200 principal dwellings and that the majority of these will be located within the Shellharbour LGA. Additional information within the updated Calderwood Valley Public Domain Report and Open Space Plan at Appendix J provides a delineation between open space areas of WCC and SCC. Community facilities has been distributed in accordance with the approved concept plan and is not apportioned between each LGA.	Whilst no figures have been supplied for the increase in dwellings within the Wollongong LGA, it is accepted that the majority of additional dwellings are in the Shellharbour LGA and thus the community facilities would remain in Shellharbour LGA.
Section 4.6.1, specifically proposes modification to Condition C12 – Local Infrastructure Contributions but does not provide clarity of proposed changes in the Wollongong LGA. Similarly Section 6.8 Community Facilities and Open Space does not provide clarity on the implications of the increased population on the Wollongong LGA.	As the additional population will be primarily concentrated in Shellharbour LGA, it is appropriate that any changes to community facilities will be primarily focused around the Town Centre which is in Shellharbour LGA. In respect of open space, additional open space is proposed in both the WCC and SCC areas. Lendlease commits to work with WCC at the appropriate time when it comes to designing the open space areas that are located in the Wollongong LGA and are to be dedicated to WCC.	It is noted that 'The Open Space provision is based on applying the 2.83 ha per 1000 people standard'. With the proposed 0.9039 ha new active sport field it is considered that the open space within Wollongong LGA satisfies open space requirements. Clarity of the proposed modification to Condition C12 in relation to the changes within Wollongong LGA is still required. The proposed reduction of the minimum size for a local park (as shown in MOD4 PPR Appendix J *Revised Public Domain Report and Open Space Plan* - Figure 5.0 on page 8) from 0.3ha to 0.2ha is not supported. The NSW DPE *Recreation and Open Space Planning Guidelines for Local Government* provide that a local park should be between 0.5ha and 5ha. This standard is reiterated in WCC's *West Dapto Vision 2018* which also provides that a local park

		should be between 0.5ha and 2ha. The original Concept Plan application identified that local parks should be a minimum of 0.3ha. The reduction of minimum size standards for local parks outside of existing standards is therefore not supported.
The EA should clarify what the impact of the proposed increase and dwellings and population is expected in the Wollongong LGA component of the Concept Plan and the resulting local infrastructure demand implications. If it is identified that additional active open space is required to service the Wollongong population the EA should demonstrate the useability of the area identified for those active open space outcomes.	As shown on the proposed open space plan at Appendix J, a proportion of the additional open space provided as part of this modification is provided within the Wollongong LGA.	See comments above. The useability of the open space within Wollongong LGA has not been identified.
Biodiversity	**Eco Logical Australia RESPONSE**	**WCC COMMENTS ON RESPONSE**
The Ecological [sic] (2018) desktop assessment of threatened ecological communities has failed to identify MU13 Moist Box-Red Gum Foothills Forest by NPWS (2002) as part of the EPBC Act listed critically endangered ecological community Illawarra and South Coast Lowland Forest and Woodland as described in Section 2.7 of the Environment Protection Biodiversity Conservation (EPBC) Act Approved Conservation Advice (incorporating listing advice) for the Illawarra and South Coast Lowland Forest and Woodland Ecological Community (TSSC 2016).	The Federal Conservation Advice does include MU13, but only part of it. The conservation advice expressly excludes where rainforest species are dominant. Accordingly, areas on site where rainforest species were dominant were excluded from the mapping exercise of EPBC Act listed threatened ecological communities. Where MU13 has been mapped as per the original Concept Plan, there are no impacts on that vegetation type.	No plot based assessment according to Section 2.6 of the Approved Conservation Advice (TSSC 2016) has been carried out. Similarly, no plot based assessment was carried out for the original Concept Plan and where vegetation community and condition mapping was validated only by random meander (Eco Logical Australia, 2010). Further, it's evident from the representative image of MU13 in the CUDP, MU13 has the form of an open woodland dominated by Eucalyptus sp and Acacia sp in the canopy with Lantana in the understory and a grassy groundcover. The 0.06 ha of MU13 identified for removal in Stage 3B North in Table 7 of Eco Logical Australia (2018), is noted.
Based on the vegetation condition assessment (Section 3.1.3), Fig 5 of Ecological (2018) where all areas of MU13 adjoin or are close to MU23 or MU24, and the absence of detailed assessment including field surveys according to Section 2.6 of the Approved Conservation Advice (TSSC 2016), a precautionary approach requires the inclusion of all MU13 in the study area as EPBC Act Illawarra and South Coast Lowland Forest and Woodland in addition to all MU23 and MU24	Data collected during the Concept Plan field assessments indicated where there was a dominance of rainforest and mesic species contained in the mapping area. These areas therefore do not conform to the EPBC Act threatened matter.	No plot based assessment according to Section 2.6 of the Approved Conservation Advice (TSSC 2016) has been carried out. Similarly, no plot based assessment was carried out for the original Concept Plan and where vegetation community and condition mapping was validated only by random meander (Eco Logical Australia, 2010). Further, it's evident from the representative image of MU13 in the CUDP, MU13 has the form of an open woodland dominated by Eucalyptus sp and Acacia sp in the canopy with Lantana in the understory and a grassy groundcover.
The suggestion by Ecological (2018) that 'Significant impacts on Illawarra and South Coast Lowland Forest and Woodland are unlikely' are based on general discussion points rather than detailed impact assessment according to	The SEARs do not require consideration or assessment of EPBC Act listed matters as it is a separate jurisdiction under the Commonwealth. As such, it will be separately addressed in	According to the SEAR's 'Key Issues' 'Item 7. Biodiversity' the applicant is to - *Provide an updated assessment the biodiversity impacts*

EPBC Act MNES Significant Impact Guidelines (DotE 2013) and Section 2.6.5 of the Approved Conservation Advice for the critically endangered ecological community (TSSC 2016). The absence of full surveys and detailed impact assessment, according to the Approved Conservation Advice (TSSC 2016) and legislated process is a failure of the Ecological (2018) report.	accordance with the EPBC Act. The area where the proposed yield increase would occur had already been approved for removal under the Concept Plan and subsequent modifications. That is, despite the increase in yield the areas affected had already been approved for clearing. The yield increase would result in smaller lot sizes, more vehicles, a greater number of residents and potentially greater numbers of domestic animals. There would not be an increase in the area of native vegetation or potential threatened species habitat to be removed because of the yield increase. Assessment of indirect impacts included examining the impact of increases in traffic, numbers of people, potential for increases in rubbish and numbers of domestic animals.	*associated with the proposal (particularly impacts on Endangered Ecological Communities located on the site) and provide a description of the proposed actions to avoid or minimise potential impacts*. The reference to '*Endangered Ecological Communities located on the site'* neither distinguished between EEC's (or TEC's) listed under the BC Act or EPBC Act. It's unclear how the SEAR's could be misinterpreted in view of: • It's conventional and implicit, rather than exceptional, that major projects, SSD, SSI, as well as Part 4 developments and Part 5 activities, will fully assess the potential impacts to threatened biodiversity where its known and there is a potential for impacts. • The Biodiversity Assessment report - Modification to Calderwood Part 3A Concept Plan (Eco Logical Australia, 2018) discusses at Section 4.2 multiple previous impact assessments for EPBC Act MNES in the 2010 flora and fauna assessments and acknowledges the presence of Illawarra and South Coast Lowland Forest and Woodland EPBC Act CEEC and identifies up to 11ha of the CEEC will be directly impacted by forthcoming stages. • On review of several MP, SSD and SSI projects for the locality, conventionally all include full assessment of impacts to all known and observed EPBC Act MNES. According to the SEAR's 'Consultation' requirements the applicant is 'required to consult with the relevant local, State **or Commonwealth Government authorities**,...'. The Department of Environment and Energy is the relevant Commonwealth Government authority as it clearly has jurisdiction through the EPBC Act over the MNES in the project area and on the subject site including for those entities that have not been previously assessed. The detailed impact assessment according to EPBC Act MNES Significant Impact Guidelines (DotE 2013) and Section 2.6.5 of the Approved Conservation Advice for the critically endangered ecological community (TSSC 2016) remains outstanding. The absence of full surveys and detailed impact assessment, according to the Approved Conservation Advice (TSSC 2016) and legislated process is a continuing failure of the Ecological Australia (2018) report. The failing has not been satisfactorily

		justified by Ecological Australia and the supporting studies overlook the implicit intent of the SEAR's and jurisdiction of the **Commonwealth Government** embedded in the SEAR's. Further, on review of the accompanying documents: • There is no updated ecological assessment. • There is no discussion or commitment in the PPR and revised SoC's that the EPBC Act CEEC will be 'separately addressed in accordance with the EPBC Act'.
The Lowland Dry-Subtropical Rainforest (MU4) noted in Tables 3 and 7 likely equates to the soon to be EPBC Act listed Illawarra-Shoalhaven subtropical rainforest ecological community	Noted. While this may be listed at some point in the future, the matter is not currently listed.	
The Ecological (2018) report has misinterpreted the definition of an Action under the EPBC Act [see EPBC Act Policy Statement Definition of 'action' DSEWPaC (2013)]. In addition, Ecological (2018) have overlooked the requirement to assess the likely impacts to EPBC Act listed threatened entities prior to an EPBC Act Action commencing (including series of activities in a project) regardless of, and subsequent to, the previous 2010 EPBC Act Referral for the 'Calderwood Urban Development Project' (CUDP). The statement in Section 4.2 that 'The activity to be carried out pursuant to the proposed modification is generally consistent with the action referred to the Commonwealth on 2 March 2010 (EPBC 2010/5381) in terms of area and impacts on the listed matters.' is false as the Action will impact on an additional MNES that have not been previously assessed and are identified in the project site. The Actions associated with the existing approved DA's [sic] where no clearing of the CEEC has yet commenced and current proposed modification is considered a 'new or increased impact' as defined by the Department of Environment and Energy (2017) in Guidance on 'new or increased impact' relating to changes to approved management plans under EPBC Act environmental approvals.	The SEARs do not require consideration or assessment of EPBC Act listed matters as it is a separate jurisdiction under the Commonwealth. As such, it will be separately addressed in accordance with the EPBC Act. See also s158A of the EPBC Act; which provides that the determination that an action is Not Controlled Action can be relied upon, despite subsequent new listings and uplistings. The guideline mentioned by Council refers to plans of management, not planning approvals plans or reports. .	According to the SEAR's 'Key Issues' 'Item 7. Biodiversity' the applicant is to - *Provide an updated assessment the biodiversity impacts associated with the proposal (particularly impacts on Endangered Ecological Communities located on the site) and provide a description of the proposed actions to avoid or minimise potential impacts*. The reference to '*Endangered Ecological Communities located on the site'* neither distinguished between EEC's (or TEC's) listed under the BC Act or EPBC Act. It's unclear how the SEAR's could be misinterpreted in view of: • It's conventional and implicit, rather than exceptional, that major projects, SSD, SSI, as well as Part 4 developments and Part 5 activities, will fully assess the potential impacts to threatened biodiversity where its known and there is a potential for impacts. • The Biodiversity Assessment report - Modification to Calderwood Part 3A Concept Plan (Eco Logical Australia, 2018) discusses at Section 4.2 multiple previous impact assessments for EPBC Act MNES in the 2010 flora and fauna assessments and acknowledges the presence of Illawarra and South Coast Lowland Forest and Woodland EPBC Act CEEC and identifies up to 11ha of the CEEC will be directly impacted by forthcoming stages • On review of several MP, SSD and SSI projects for the locality, conventionally all include full assessment of impacts to all known and observed EPBC Act MNES.

		According to the SEAR's 'Consultation' requirements the applicant is 'required to consult with the relevant local, State or **Commonwealth Government authorities**,...'. The Department of Environment and Energy for EPBC Act MNES is a relevant Commonwealth Government authority as it clearly has jurisdiction through the EPBC Act over the MNES in the project area and on the subject site. The detailed impact assessment according to EPBC Act MNES Significant Impact Guidelines (DotE 2013) and Section 2.6.5 of the Approved Conservation Advice for the critically endangered ecological community (TSSC 2016) remains outstanding. The absence of full surveys and detailed impact assessment, according to the Approved Conservation Advice (TSSC 2016) and legislated process is a continuing failure of the Ecological Australia (2018) report. The failing has not been satisfactorily justified by Ecological Australia and the supporting studies overlook the implicit intent of the SEAR's and jurisdiction of the **Commonwealth Government** embedded in the SEAR's. Further, on review of the accompanying documents: • There is no updated ecological assessment. • The there is no discussion or commitment in the PPR and revised SoC's that the EPBC Act CEEC will be 'separately addressed in accordance with the EPBC Act'. Reference to s158A of the EPBC Act is noted including that an exemption is at the discretion of the Minister, through '**consultation**' with the Department of Environment and Energy, as opposed to the perception of the person or entity proposing the Action.
Recent EPBC Act impact assessments of Illawarra and South Coast Lowland Forest and Woodland CEEC in the locality including the Albion Park Rail Bypass (EPBC Referral No's 2018/8192, 2017/8048 and 2017/7909) which will directly impact areas of much less than that of the of the 'Calderwood Urban Development Project' (CUDP) (see EPBC Referral No 2018/8192), have been found to result in significant impacts and have accordingly been determined by the Department of Environment and Energy as 'Controlled Actions'	Noted. That project is entirely different, and the two projects should not be conflated. EPBC Act matters are a separate jurisdiction to those being assessed here.	It should have been well understood that the direct and irreversible impacts to terrestrial threatened biodiversity such as complete removal of areas of CEEC during construction are substantially equal as opposed to entirely different, regardless of whether it is for infrastructure, industrial, residential, agricultural, etc developments. That is, there is a fundamental baseline equivalency for all actions and activities directly impacting EPBC Act MNES. No projects in the locality (ie EPBC Referral No's 2018/8192, 2017/8048 and 2017/7909) have been conflated with the CUDP. Clearly the references to EPBC Referral No's 2018/8192, 2017/8048 and 2017/7909 are to objectively demonstrate: • Following convention, full and proper assessment of

		the EPBC Act CEEC has been carried for other projects in the locality including one infrastructure (with SEAR's), one industrial and one residential (as nearby as 2km from the CUDP). • Assessment by DoEE that each of the cited Referrals triggered a 'Controlled Action' separately which are impacting on a lesser quantum of Illawarra and South Coast Lowland Forest and Woodland CEEC than the up to 11ha for the CUDP. As highlighted above, according to the SEAR's 'Key Issues' 'Item 7. Biodiversity' the applicant is to - *Provide an updated assessment the biodiversity impacts associated with the proposal (particularly impacts on Endangered Ecological Communities located on the site) and provide a description of the proposed actions to avoid or minimise potential impacts*. The reference to '*Endangered Ecological Communities located on the site'* neither distinguished between EEC's (or TEC's) listed under the BC Act or EPBC Act. It's unclear how the SEAR's could be misinterpreted in view of: • It's conventional and implicit, rather than exceptional, that major projects, SSD, SSI, as well as Part 4 developments and Part 5 activities, will fully assess the potential impacts to threatened biodiversity where its known and there is a potential for impacts. • The Biodiversity Assessment report - Modification to Calderwood Part 3A Concept Plan (EcoLogical Australia, 2018) discusses at Section 4.2 multiple previous impact assessments for EPBC Act MNES in the 2010 flora and fauna assessments and acknowledges the presence of Illawarra and South Coast Lowland Forest and Woodland EPBC Act CEEC. • On review of several MP, SSD and SSI projects for the locality, conventionally all include full assessment of impacts to all known and observed EPBC Act MNES. According to the SEAR's 'Consultation' requirements the applicant is 'required to consult with the relevant local, State or **Commonwealth Government authorities**,...'. The Department of Environment and Energy for EPBC Act MNES is a relevant Commonwealth Government authority as it clearly has jurisdiction through the EPBC Act over the MNES in the

		project area and on the subject site.
Based on recent assessments, its [sic] considered that direct impacts (and not accounting for indirect impacts) to close to 11 ha of vegetation equating to EPBC Act Illawarra and South Coast Lowland Forest and Woodland, comprising approximately 36% of all Illawarra and South Coast Lowland Forest and Woodland within the project site, would be assessed by the Department of Environment and Energy as triggering a Controlled Action.	Noted. The SEARs do not require consideration or assessment of EPBC Act listed matters as it is a separate jurisdiction under the Commonwealth. As such, it will be separately addressed in accordance with the EPBC Act. This report does not pre-suppose what the Federal Minister for the Environment would consider as a Controlled Action.	According to the SEAR's 'Consultation' requirements the applicant is 'required to consult with the relevant local, State or **Commonwealth Government authorities**,...'. The Department of Environment and Energy for EPBC Act MNES is a relevant **Commonwealth Government authority** as it clearly has jurisdiction through the EPBC Act over the MNES in the project area and on the subject site. Setting aside pre-supposition the clear failing of the report is the impact assessment has not adopted the requirements or intent of SEAR's, followed convention, due diligence and proper process for MNES. It should have been well understood that to suggest 'Significant impacts on Illawarra and South Coast Lowland Forest and Woodland are unlikely' without detailed impact assessment according to EPBC Act MNES Significant Impact Guidelines (DotE 2013) and Section 2.6.5 of the Approved Conservation Advice for the CEEC (TSSC 2016) is premature and that the range of procedural steps prior to a determination of a Controlled Action by the Minister may include; • A pre-referral meeting with the Department of Environment and Energy which can be undertaken at any time prior to submitting a referral for an Action that has the potential to result in a 'significant impact' to a MNES. ie consultation with the relevant **Commonwealth Government agency.** • EPBC Act referral for an Action that has the potential to result in a 'significant impact' to a MNES where there is uncertainty on whether it is important, notable, or of consequence. • EPBC Act referral for an Action that has the potential to result in a 'significant impact' to a MNES after assessment against the relevant guidelines and policy statements. • The Minister 'calling in' a development or activity for assessment of whether or not it would be a Controlled Action, regardless of the referral process.
In view of Council's comments, and as part of the stakeholder agency consultation, it is recommended that the Department of Planning and Environment invite the Commonwealth Department of Environment and Energy to review and comment on the direct impact to over 10ha of	The SEARs do not require consideration or assessment of EPBC Act listed matters as it is a separate jurisdiction under the Commonwealth. As such, it will be separately addressed in accordance with the EPBC Act.	According to the SEAR's 'Consultation' requirements the applicant is 'required to consult with the relevant local, State or **Commonwealth Government authorities**,...'. The Department of Environment and Energy for EPBC Act MNES is a relevant **Commonwealth Government authority** as it clearly has

an EPBC Act listed critically endangered ecological community as part of the CUDP.		jurisdiction through the EPBC Act over the MNES in the project area and on the subject site. In the absence of the applicant making a reasonable attempt to comply with the SEAR's, it is recommended that the Department of Planning, Industry and Environment invite the Commonwealth Department of Environment and Energy to review and comment on the direct impact to over 10ha of an EPBC Act listed critically endangered ecological community as part of the CUDP.
Ecological (2018) has failed to take into account the need for further specialist studies to assess the impact to groundwater and GDE's[sic] (expressing as aquatic ecosystems) from increased hardstand and impervious surfaces and cut any fill on the alluvial floodplains from the proposed project modification and future development applications. (JWP 2019, Douglas Partners 2010 & 2018, Cardno 2010 and Ethos Urban 2018).	The Douglas Partners report states that there will not be a change in the post-development flows of groundwater compared with the pre-development flows. The extent of impervious surface area is determined by the amount of fill used across the project. The extent of fill is the same proposed by this modification as the area approved previously. The impact on GDEs will be the same. Groundwater infiltration of Marshall Mount Creek at the upstream extent of the project boundary, is shown as being groundwater dependent (Figure 4) and this was confirmed by a site visit on 3 April 2019 by Dr Peter Hancock (Groundwater Ecologist). There will be no increase in impermeable surface area adjacent to this reach, nor in the upstream part if the floodplain, so groundwater recharge will not be affected. Likewise, the reaches of Macquarie Rivulet that are indicated as being groundwater dependent are located adjacent to areas where groundwater infiltration of the shallow alluvial aquifer will be ether unaffected or only minimally affected by an increase in impermeable surfaces. One terrestrial GDE is mapped as occurring on the site (Figure 4). A site inspection found that the vegetation community here is unlikely to depend on groundwater. This area will be an environmental reserve (ER4), and the vegetation retained in its current condition.	Additional summary assessment and site inspection noted regarding the terrestrial GDE. However, the additional summary assessment has overlooked impacts GDE's expressing as aquatic ecosystems. The response to Councils submission is unsatisfactory as: • No specialist studies to assess the impact to GDE's expressing as aquatic ecosystems have been carried out. • The summary content falls substantially short of 'a detailed assessment of the potential impacts of the proposal, particularly any additional impacts, beyond those already assessed and approved' as required by the SEAR's.
The EA by Ethos Urban (2018) states that 'Flows to and from terrestrial groundwater dependent ecosystems are expected to be maintained'. This statement does not appear to have basis as the EA also notes that the detailed impact assessments on groundwater and therefore GDE's [sic] (such as the aquatic ecosystems of Marshall Mount Creek, Macquarie Rivulet and Lake Illawarra) have not been completed.	The development footprint poses a low – moderate risk with respect to groundwater. The Concept Plan Modification Comment (Douglas Partners 2018) and Watercycle and Flood Management Strategy Updates (JWP 2019) are consistent in their conclusions that the proposed increase in yield would be unlikely to affect GDEs, assuming that detailed design for areas above RL-20 is undertaken at the DA stage. These assessments have remained consistent with the initial Water Cycle Management Study (Cardno 2010), Flood Modelling Report	

	(2011) and Groundwater Assessment (2010) initially prepared for the CUDP. The Ethos Urban Statement is based on these results and the recommendation that detailed study is undertaken for areas of moderate groundwater risk and is therefore consistent with the results of the technical studies. A site inspection by Dr Peter Hancock on 3 April 2019 revealed that the reaches of Marshall Mount Creek and Macquarie Rivulet that are dependent on groundwater (Figure 4) occur at the upstream end of the Project boundary. Therefore, recharge of the aquifer supporting these river baseflow GDEs will occur outside of the area proposed for fill.	
The conclusion 'Below RL 20 or in localised low lying areas adjacent to creek-lines, groundwater may present itself as a moderate constraint due to its proximity to the ground surface. This will require further assessment in the subsequent development stages.'	This conclusion was made by Douglas Partners (2010) in their Groundwater Assessment. As above response indicates, the conclusion in the updated report by Douglas Partners (2018) is consistent with the conclusions made in 2010.	
Local groundwater present in 'shallow aquifers' generally 'contained in the alluvial deposits of Marshall Mount Creek and Macquarie Rivulet' and 'limited by the underlying bedrock' (Douglas Partners, 2010) are considered likely to be providing base flow into both waterways (i.e. base flow stream ecosystem). This hydrological connectivity is considered to form an important functional element in the maintenance of the aquatic biodiversity values and services and the persistence of the Marshall Mount Creek and Macquarie Rivulet GDE's [sic]. It's clear from the preliminary geotechnical investigations that there is a very high probability of alteration of spatial and temporal flows into the shallow aquifers and GDE's [sic] these are expected to support.	The reaches of Marshall Mount Creek and Macquarie Rivulet that are dependent on groundwater (Figure 4) occur at the upstream end of the Project boundary, so recharge of the aquifer supporting these river baseflow GDEs will occur outside of the area proposed for fill. The Groundwater Assessment concluded that areas of above RL-20 (i.e. areas of alluvial deposits) would require careful planning when deep cuts (>2m) are expected to occur (Douglas Partners 2010). Further, this risk was considered a moderate groundwater constraint (Douglas Partners 2010). The Assessment also concluded that with careful planning at these stages and strategic placement of basins, impacts on above RL-20 could be avoided. Increased flows from hard stand surfaces is expected, however these would be managed through measures outlined in the Water Cycle Management Study (Cardno 2010). The updated Watercycle and Flood Management Study assessed the impact of increased lot yield on flood impacts (JWP 2019). The study concluded that utilising the latest TUFLOW model and WSUD model the increase in lot yield would still meet water quality objectives, would not alter flow regimes and would not increase flood risk (JWP 2019). Provided appropriate groundwater and water cycle management measures are implemented development in areas of above RL-20 changes to spatial and temporal flows would be minimal and would not significantly affect the GDEs. This is because most of the recharge areas occur outside the	

	project area and the use of compacted material in the floodplain was approved in the Concept Plan. Compacted fill is likely to intercept rainwater. However, the use of compacted fill has not arisen due to this proposed increase in yield. The use of fill is consistent with the Approved Concept Plan and subsequent modifications.	
There is no mention or assessment of potential impacts to DPI mapped Key fish habitat of Marshall Mount Creek, Macquarie Rivulet and Lake Illawarra in accordance with the Policy and guidelines for fish habitat - conservation and management (DPI, 2013) in the Ecological (2018) report.	Marshall Mount Creek and Macquarie Rivulet are mapped as Key Fish Habitat and would likely be classified as Class 2 – Moderate Key Fish Habitat. Portions of these watercourses are located in the study area. No development within the Key Fish Habitat areas are expected, and the implementation of measures to manage indirect impacts would be implemented. These include the management of water quality, restoration and improvement of riparian vegetation along waterways and removal of significant agricultural nutrient inputs. If any impacts to Key Fish Habitat were to occur, a permit under Section 200 / 201 of the *Fisheries Management Act 1994* would be required at the DA stage. However, impacts on these habitats are not expected and would be actively avoided to minimise any potential harm to the environment.	
It is clear that Marshall Mount Creek, Macquarie Rivulet and Lake Illawarra are important aquatic habitats and significant and ecologically sensitive areas. Consistent with Actions of the Illawarra-South Coast Regional Plan (I-SRP, DPE 2015), although the SEAR's require inclusion of Lake Illawarra in the impact assessment, the study area of the aquatic ecology impact assessment has generally overlooked Lake Illawarra. The statement by Ecological (2018) that 'The lake [Lake Illawarra] is an important ecological and recreational feature in the region and some of the fringing wetlands are unlikely to be influenced by flows from this site.' presents a vague impact assessment and needs clarification eg identify (by mapping) what CM Act Coastal wetlands, Key fish habitat and DPI (2009) mapped seagrass beds in Lake Illawarra are likely to be impacted and what would be the severity and timeframe for the impacts.	Key Fish Habitat is mapped along Marshall Mount Creek and Macquarie Rivulet in the development footprint (Figure 1). The Coastal Management SEPP maps Marshall Mount Creek as a Coastal Wetland (Figure 2). There are no estuarine macrophytes mapped within the development footprint. The closest aquatic macrophytes are mapped along the edges of Lake Illawarra (Figure 3). Direct impacts on coastal wetlands, estuarine macrophytes or Key Fish Habitat is not expected. Indirect impacts would be managed through a range of environmental management measures implemented throughout the life of the project. These would include sediment and erosion control measures prior to and during construction, implementation of Vegetation Management Plans, water sensitive urban design (WSUD) features to treat hard surface runoff, prevention of runoff into existing waterways, flood management measures and strategic placement of water quality basins. These decisions have been based on the results of numerous studies including a Water Management Study (Cardno 2010), Flood Study (Rienco Consulting 2010). Floodplain Risk Management Study (Cardno 2011), Groundwater Assessment (Douglas Partners 2010) and the updated Watercycle and Flood	

	Management Strategy Update (JWP 2019). The Water Management Study concluded that the WSUD features implemented would improve stormwater quality for any water originating at the site, and reduce pollutant loads such that they would meet the annual load reduction targets (Cardno 2010). The management of pollutant loads, and stormwater runoff described, are consistent with the national water quality guideline Australian Runoff Quality and meet the then Director General's Requirements for water quality and water sensitive urban design related issues (Cardno 2011). The Watercycle and Flood Management Study assessed the impact of increased lot yield on flood impacts (JWP 2019). The study concluded that an increase in lot yield would increase the pollutant loads generated from the development. However, water quality objectives can still be met by increasing the size of treatment devices within some areas in the footprint. Updated modelling of expected pollutant loads into wetlands 6a, 6b and 6c concluded that the current size of the wetlands was sufficient to support an increased pollutant load and ensure that minimum water quality objectives are still met (JWP 2019). In addition, increasing the size of treatment devices in other areas would ensure that the increase in lot yield would not affect water quality objectives (JWP 2019). Therefore, any likely impacts expected to occur would be indirect and of very low severity over the life of the development.	
In view of the significant limitations of BoM Groundwater Dependent Ecosystems Atlas geospatial database 'potential' GDE mapping of 'Aquatic Ecosystems' for the Sydney Basin Bioregion, the Ecological (2018) two paragraph discussion on GDE's is unsatisfactory and not considered to be 'a detailed assessment of the potential impacts of the proposal'	There are three Groundwater Dependent Ecosystems (GDE) mapped in the Project area footprint (Figure 4). A site inspection confirmed that the two river baseflow reaches are likely to be connected to shallow groundwater, as the stream water level corresponded to the approximate water level in nearby bores. It is unlikely that the vegetation community indicated as groundwater dependent and dominated by *Eucalyptus tereticornis* (ER4) is groundwater dependent. This is because the area is elevated and probably has no connection to the floodplain. A Groundwater assessment (Douglas Partners 2010) was conducted across the entire Project area. The Groundwater Assessment provides further detail on GDE. The assessment concluded that generally, groundwater would be unlikely to present a constraint to development in areas of above RL 20.	Additional summary assessment and site inspection noted regarding the terrestrial GDE. However, the additional summary assessment has overlooked impacts GDE's expressing as aquatic ecosystems. The response to Councils submission is unsatisfactory as: • No specialist studies to assess the impact to GDE's expressing as aquatic ecosystems have been carried out. • The summary content falls substantially short of 'a detailed assessment of the potential impacts of the proposal, particularly any additional impacts, beyond those already assessed and approved' as required by the SEAR's.
Further surveys and impact assessments are required by specialist aquatic ecologists who are experienced in impact	A site inspection was conducted by groundwater ecologist Dr Peter Hancock on 3 April 2019. Two river baseflow GDEs	

assessment of the full range of ecosystems that fall into the definition of GDE's either as part of the current investigation or to accompany future investigations as Statement of Commitment (SoC) requirement. Given the scale of the project modification it is not unreasonable that the same level of detail for impacts on GDE's be investigated and assessed as required in the SEAR's for the Albion Park Rail Bypass (SSI 6878).	occurred along short reaches of Marshall Mount Creek and Macquarie Rivulet. These would be partially dependent on groundwater during dry periods but would also depend on overland flow during periods where flow is present. Sections of the aquifers responsible for providing baseflow to these waterways are outside of the areas proposed for fill, so their recharge regime will be unaffected and connectivity between the river and aquifer will be maintained. Groundwater assessment indicates that there is not likely to be a significant change in groundwater flows as a result of the change in yield for this proposed modification. The vegetation community at ER4 is not likely to be dependent on groundwater, as it is raised above the floodplain. Earthworks adjacent to this location also indicate that the water table is below the likely rooting depth of the trees. Further, Statement of Commitment 69 was included to specifically address future development below RL 20 as follows: *Future detailed applications will include a commitment, that where cuts greater than 2 metres in depth are proposed in areas located below RL 20, during detailed design and construction activities a suitably qualified PCA will certify that wetland base levels are appropriately positioned relative to the level of the ground water table, lining of wetlands has been provided if necessary, and, should the base of the wetlands intercept the groundwater table, then the groundwater table will be temporarily lowered to facilitate construction.*	
Given the Directions and Actions of the I-SRP (DPE 2015) and current priority Actions that relate to Lake Illawarra, the revised aquatic ecosystems impact assessments need to have significantly more content on the probable construction and in perpetuity impacts of the project on Lake Illawarra that incorporates the impacts of Albion Park Rail Bypass as part of the cumulative impact assessment	The Illawarra Shoalhaven Regional Plan (the Plan) outlines one Action specifically relating to Lake Illawarra: "*Implement a risk-based decision-making framework to manage water quality and waterway health outcomes for Lake Illawarra"* (NSW DP&E 2015). According to the Plan, Office of Environment and Heritage would assist Council in ensuring that the water quality of Lake Illawarra is maintained or improved. No specific water quality or river flow objectives are contained within this plan (NSW DP&E 2015). The *Risk-based Framework for Considering waterway Health Outcomes in Strategic Land-use Planning* (Dela-Cruz et al 2017) included a case study for Lake Illawarra. That report stated: [T]*he post-development stormwater TN load-reduction targets specified in the local council's DCP improve the*	

	micro-algal concentration in the lake, but not enough to meet the sustainable TN load. The 'no net increase' or 'no worsening' management response provides no improvements, if used ubiquitously. To meet the sustainable TN load, post-development stormwater TN load-reduction targets must be at least 20 per cent less than the existing load from the planned sites of development. The Water Cycle Management Study concluded that the *"development will improve stormwater quality for water originating from the site. The pollutant load reduction also meets the required annual load reductions of 80%, 45%, 45% TSS, TP and TN respectively from urban developed areas, in accordance with the national water quality guideline Australian Runoff Quality"* (Cardno 2010). The updated Water Cycle Management Study has re-designed the Water Sensitive Urban Design model (WSUD) to manage increased surface runoff and pollutant loads associated with the increase in lot density (JWP 2019). These design iterations have been modelled on maintaining the same pollutant load reduction achieved in the Cardno 2010 Water Cycle Management Study (JWP 2019). Further, the WSUD model has been developed consistent with both Wollongong City Council and Shellharbour City Council traditional water quality objectives which aim at post development flows that achieved an 85% reduction in Total Suspended Solid (TSS), 65% reduction in Total Phosphorous (TP) and 45 % reduction in Total Nitrogen (TN) (JWP 2019). This would meet or exceed the targets as identified in the Dela-Cruz et al report (2017). Further, the benefit map as shown in the Dela-Cruz (2017) report identifies that the area within which the Calderwood project sits, should aim for a maintain or improve outcome. The modelling as shown in the Cardo and JWP reports show that improvement is feasible. Flood modelling was updated using recently available data that was not available at the time of the 2010 Flood Management Study (Rienco 2010). The updated Water Cycle Management Study concluded that the increase in development density would have comparable flood impacts to those outlined in the Concept Approval and subsequent development applications (JWP 2019). Further, the updated Water Cycle Management Study concluded that "…*the development of CUDP in accordance with this strategy will be consistent with the*	

	controls and principles established by the NSW Government…. Though there has been a refinement of design, the revised water cycle and flood management strategy remains consistent in philosophy with the original 2010 concept approval" (JWP 2019). There is no requirement as part of the Plan or other water quality guidelines to assess cumulative impacts of a project to water quality or flooding.	
The Modification to Calderwood Part 3A Concept Plan Biodiversity Assessment (Ecological, 2018) states it will outline any consultation with relevant government stakeholders including WCC. It is noted that there is no discussion of consultation on biodiversity and riparian matters with WCC in the Ecological (2018) report as none has occurred.	Noted.	Further to the initial and persisting failing to consult with WCC on biodiversity matters, on further review, despite the SEAR's 'Consultation' requirements that the applicant is 'required to consult with the relevant local, State or **Commonwealth Government authorities**,...'. such as the Department of Environment and Energy for EPBC Act MNES, the Ecological (2018) report does not discuss consultation Department of Environment and Energy.
Riparian Impacts	**Eco Logical Australia RESPONSE**	**WCC COMMENTS ON RESPONSE**
The Ecological (2018) and JWP (2018) reports have entirely overlooked the Illawarra Water Quality and River Flow Objectives for the Illawarra catchments including but not limited to the Water Quality Objectives for protection of, aquatic ecosystems and secondary and primary recreation contact and River Flow Objectives for maintaining 'natural rates of change in water levels' through measures to, 'Maintain natural flow variability' and 'Manage groundwater for ecosystems' amongst other things.	The Illawarra Water Quality and River Flow Objectives are synonymous to the ANZECC 2000 Guidelines (DECCW 2010) which were used as a basis to determine required pollutant reductions in the Water Cycle Management Study (Cardno 2010) and the subsequent updated Water Cycle Management Study (JWP 2019). The pollutant reduction targets identified in the Water Cycle Management Study would result in reduced pollutant loads below the ANZECC triggers. Thus, the development could be considered consistent with the Illawarra Water Quality and River Flow Objectives.	No further comments
Given the incompleteness of the GDE impact assessment and other issues highlighted above, the riparian impacts assessment is considered to be equally incomplete and further impact assessments are required either as part of the current investigation or to accompany future investigations as SoC requirements.	Two riparian corridors originally marked for retention (reaches 15 and 35) are proposed for removal. Reaches 15 and 35 are both first order streams. A water quality basin is proposed to replace part of reach 35. The installation of a basin would allow the modification to proceed without increasing flood risk (JWP 2019). Reach 15 would be partially removed, with only the terminating arm to be affected. An additional basin would be installed adjacent to the portion of the reach that would be retained to accommodate for the changes to the reach (JWP 2019). The changes to reach 15 were part of the assessment conducted by JWP (2019). The assessment concluded that additional impacts to watercycle management and flooding are not expected to occur. The Water Cycle Management Study concluded that the development would improve stormwater	No further comments

	runoff for water that originates from the site (Cardno 2010). The updated Water Cycle Management Study has re-designed the Water Sensitive Urban Design model (WSUD) to manage increased surface runoff and pollutant loads associated with the increase in lot density (JWP 2019). These design iterations have been modelled on maintaining the same pollutant load reduction achieved in the Cardno 2010 Water Cycle Management Study (JWP 2019). Further, the WSUD model has been developed in accordance with best practice water quality objectives which aim at post development flows that achieved an 85% reduction in Total Suspended Solid (TSS), 65% reduction in Total Phosphorous (TP) and 45 % reduction in Total Nitrogen (TN) (JWP 2019). Flood modelling was updated using recently available data that was not available at the time of the 2010 Flood Management Study (Rienco 2010). The updated Water Cycle Management Study concluded that the increase in development density would have comparable flood impacts to those outlined in the Concept Approval and subsequent development applications (JWP 2019). Further, the updated Water Cycle Management Study concluded that "*…the development of CUDP in accordance with this strategy will be consistent with the controls and principles established by the NSW Government…. Though there has been a refinement of design, the revised water cycle and flood management strategy remains consistent in philosophy with the original 2010 concept approval*" (JWP 2019). As such, additional assessments of potential impacts to riparian corridors is not considered necessary. Further there are about 18 Statements of Commitment that relate to riparian assessments and management measures. In addition, Statement of Commitment 69 specifically relates to the requirement to assess impacts on GDE at the design stage.	

ADDITIONAL WCC ISSUE RAISED ON ADDITIONAL PROPOSED MODIFICATION (IN RESPONSE TO SUBMISSIONS)

Proposed use of the term "principal dwelling"

The amended MOD4 (response to submissions) proposes an additional change that did not form part of the original MOD4 application.

The MOD4 Response to Submissions document *Response to Submissions and Preferred Project Report_ 31 May 2019* (the letter) introduces the term 'principle dwellings'.

The use of the term 'principal' dwellings is not supported for the following reasons:

1. The term 'dwelling' is used throughout the concept plan approval. The Standard Instrument definition of 'dwelling' includes a secondary dwelling.

2. On page 16 of the letter it is stated that *'The current approved 4,800 dwellings and proposed total of 6,000 dwellings relates to principal dwellings only. As detailed in the Elton report (Appendix R of the Consolidated Concept Plan), the proposed dwelling mix within the CUDP did not comprise secondary dwellings…'.*

   This statement is considered incorrect. Although secondary dwellings are not included as a specific term within *Table 4: Proposed dwelling mix and yield* (page 17 of the letter), it is considered that this type of dwelling **was** factored into the overall dwelling yield, just not separately defined. For example, the terms single dwelling, dual occupancy and multi-dwelling housing are also not included in Table 4, however these types of dwellings are expected to occur and are therefore reasonably included within the term 'dwelling'. Therefore, rather than using standard defined terms, Table 4 appears to use colloquial terms for 'dwelling types', and it is reasonable expected that dual occupancies and secondary dwellings (to name a few dwelling types) are reasonably included within the overall term 'dwelling'.

3. Further, it is put forward (see page 16-17) that '*if council wishes to levy contributions for secondary dwellings, it would be able to do so via a section 7.11 contributions plan.*' This statement is also considered incorrect, as Wollongong City Council has no capacity or authorisation to adopt a contributions plan over the CUDP and levy contributions within the Shellharbour Council LGA, and vice versa.

4. Additionally, it is considered unreasonable that any future population that will be housed within secondary dwellings are not adequately planned for and considered in the infrastructure requirements for the overall site. For example, open space requirements have been calculated on a per person (population) basis, however the population of secondary dwellings has not been included.

It is suggested that, should MOD4 be approved by the Department, the current approved term being 'approximately 4,800 dwellings' is amended to 'approximately 6,000 dwellings' and the term 'principal dwellings' is not brought into the Concept Plan Approval. This will ensure that all dwelling types, including secondary dwellings, continue to be included in the overall dwelling yield and that adequate infrastructure provision is made for these future residents.