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| 1.1 | 03/12/2009 | Where would the earth & rock fill come from: on site, or off site & if so from where? | Email | Joanna Gardner | BCD | Construction | It is believed that the earthfill will be readily available at the dam site. Considering the exposed rocky bed of Byrrill Creek within the vicinity of the dam wall, it is expected that the required rockfill material would be able to be sourced from nearby sites within the inundation area. However this can only be confirmed once more detailed information is made available in the concept design stage. | Discussions with Public Works Sydney 14.12.2009. |
| 1.2 | 03/12/2009 | Would construction work traffic travel from the Uki end of Byrrill Creek or the Tyalgum end? | Email | Joanna Gardner | BCD | Construction | It is not clear at this early stage and will depend on several issues including development constraints, the final design, and the construction contractor. Most construction traffic would be earthmoving traffic and is likely to be directly adjacent to the dam wall or wholly contained within the dam inundation area. However, all equipment and materials would need to be imported onto the site and it is likely that some construction traffic would occur in both directions. | TSC staff discussions, Dec 2009. |
| 1.3 | 03/12/2009 | Would the road to Tyalgum be replaced by a new one, so there is a through road, or would it end at Pretty Gully? | Email | Joanna Gardner | BCD | Infrastructure | Replacement of the existing Byrril Creek Rd towards Tyalgum is under consideration and will depend on the ease of construction, costs, environmental constraints, and the need for continued access to the dam and surrounding properties. Approximate cost estimates for a windy all weather road have been included in the estimated costs for the two Byrrill Creek dam options. | MWH & Public Works report, Construction of Dam on Byrrill Creek Update of Cost estimates, Dec 2009 and discussions with Public Works Sydney 14.12.2009. (report distributed 16.12.2009) |
| 1.4 | 03/12/2009 | What is the estimated cost for the 40,000 ML Dam as compared to the 16,000ML? | Email | Joanna Gardner | BCD | Costs | The cost of the larger 40,000ML dam has been estimated at $58.4M. The smaller 16,000ML dam has been estimated at $38.3M. | MWH & Public Works report, Construction of Dam on Byrrill Creek Update of Cost estimates, Dec 2009 (report distributed 16.12.2009) |
| 2.1 | 07/12/2009 | Would you please forward to me Report Number 8 (Appendix B) - "Clarrie Hall Dam and Bray Park Weir Yield Survey", SunWater - July 2002 EO2065-01? | Email | Richard Murray | Water Supply | Secure Yield | In principle, yes we could provide this report. However it will take time for Council staff to locate and compile copies of a complex technical report of this nature, and we simply do not have the resources at present to respond to this query too. The contents of this report have a lower level of relevance for the CWG at present. I must therefore prioritise responses to more pertinent questions for the time being. I would also like to take the opportunity to stress that our time is limited and requests which are likely to assist the CWG provide considered advice on the environmental and social aspects of the four short-listed options will need to be addressed first. | NA |
| 2.2 | 07/12/2009 | Would you please forward to me "Tweed River System Water Supply Security Review" - SunWater - November 2006, G81903-02-03-03? | Email | Richard Murray | Water Supply | Secure Yield | See response to question 2.1. | NA |
| 2.3 | 07/12/2009 | Would you please forward to me "Clarrie Hall Dam - Determination of Optimum Size and Dam Raising Options study, Final evaluation Report" - NSW Department of Commerce, May 2008 - DC08060? | Email | Richard Murray | CHD | Sizing | Copy of the report supplied. | Dept of Commerce report, Clarrie Hall Dam - Determination of Optimum Size and Dam Raising Options study, Final evaluation Report, May 2008 |
| 2.4 | 07/12/2009 | Estimated cost of raising Clarrie Hall Dam? A hard copy of these reports is preferable, but a CD copy is also acceptable. | Email | Richard Murray | CHD | Costs | The estimated cost of raising CHD to 70m AHD is approximately $30M. See the response to question 2.3 for the relevant report. | NA |
| 2.5 | 07/12/2009 | 1. Whether an expert Independent Review of the consultancy team's four water augmentation options should be considered. Such a Review would support the CWG's final deliberations on this matter. | Email | Richard Murray | Coarse Screening | | The consultant's Coarse Screening (Stage 2) Report has already undergone a comprehensive expert review process. Water experts from Tweed Shire Council and NSW Public Works have carried out multiple reviews prior to finalisation of the documents. This Fine Screening (Stage 3) phase provides another level of scrutiny. In addition, once enough detailed information is compiled during the subsequent EIS phase, an expert review of the entire process and EIS recommendations will be carried out be an independent consultant to give Council further certainty before applying for development approval. | TSC staff and Public Works discussions, Dec 2009. |

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| 2.6 | 07/12/2009 | 2. One of the main sources for Tweed drinking water is the Bray Park Weir which dams the reaches of the Upper Tweed River and its connecting Oxley River. Clarrie Hall Dam supports the Bray Park Weir drinking water source supply when the two river supply source is depleted particularly during dry conditions and to flush out Bray Park Weir when affected by algal blooms. | Email | Richard Murray | Water Supply | Secure Yield | There are three water supply networks in the Tweed Shire.<br>Two small networks supply the rural villages of Tyalgum and Uki, while the major network supplies Tweed Heads and surrounds, the Tweed Coast and the Murwillumbah district.<br>The major network draws its water from the Tweed River, upstream of the Bray Park weir. The weir acts as a tidal barrage, preventing salt water from the estuary getting in to the fresh water supply. Flows into the weir are supplemented by releases from Clarrie Hall Dam situated on Doon Doon Creek - a tributary to the Tweed River.<br>It is important to note that Clarrie Hall Dam is only used to supplement the town water supply. For much of the year it is natural flows in the Tweed River that supply our water. Water is only released from the dam when flows in the freshwater section of the Tweed River fall below 95%, usually during winter and spring.<br>These releases contribute to environmental flows in the river during the drier months of the year, with the water flowing down Doon Doon Creek and into the Tweed River upstream of Uki village. It then flows down to Bray Park Weir, where it is extracted, treate of over 660km of pipes to 23 reservoirs throughout the shire. | TSC website 14.12.2009. www.tweed.nsw.gov.au/ Water/WaterSupply.aspx |
| 2.7 | 07/12/2009 | (a) How much water is drawn from the Upper Tweed River and its connecting Oxley River for urban and country supplies seasonally? | Email | Richard Murray | Water Supply | Demand Management | Approximately 9550ML of water are drawn from the Tweed and Oxley Rivers by Tweed Shire Council for urban supplies. Council does not have details on the amount of water drawn from these water sources by other domestic, agricultural or commercial users. | TSC: CCC reporting |
| 2.8 | 07/12/2009 | (b)How much Bray Park Weir stored water is released as environmental flow during dry periods when the Upper Tweed River ceases to flow? | Email | Richard Murray | Water Supply | Secure Yield | During periods of low flow Council draws off only the water released from Clarrie Hall Dam for urban use. All natural flow in the Tweed River continues to flow through the Bray Park Weir. | TSC staff discussions, Dec 2009. |
| 2.9 | 07/12/2009 | 3 (a) Has the supply demand balance been correctly assessed by the consultancy team for the time period ending 2036 when it is stated that Tweed's population will double to 160,000. This number equates to an approximate 2.69% annual increase in population for that period. | Email | Richard Murray | | | Population projections have been based on a detailed breakdown and analysis of the size and predicted timing of individual growth areas, and the effects of other issues such as infill and reduction in the average houshold size in existing areas. [Note: the Demand Management Stategy is being finalised and should go on pulic display in Jan 2010] | MWH report, Draft Demand Management Strategy, Dec 2009 (Table extract distributed 16.12.2009) |
| 2.10 | 07/12/2009 | 3 (b)Tweed Shire claims to have enough water for 105,000, enough to provide until 2017 even allowing for current demand management strategies and rainwater tanks in new developments. How has this drinking water supply source been calculated for the period to 2017? | Email | Richard Murray | | | Various water use (demand) scenarios have been estimated for the period 2006 - 2036. These are based on the population projection together with the expected per capita water savings under each scenario. One scenario based on implementation of BASIX in new residential developments only (ie the bare minimum under state legislative requirements) is the conservative demand curve used by Council in determining those figures. [Note: the Demand Management Stategy is being finalised and should go on pulic display in Jan 2010] | MWH report, Draft Demand Management Strategy, Dec 2009 (Extracted graphs of demand curves and population projections distributed 16.12.2009) |
| 3.1 | 09/12/2009 | What are the health restrictions for using rainwater tanks in urban areas? | Meeting | Katie Milne | Alternative Sources | Rainwater tanks | Council has engaged MWH to produce a technical paper on this topic which will be available in late January 2010. In the meantime I can offer some background information:<br>NSW Health in its guidelines "Use of Rainwater Tanks Where a Public Water Supply is Available" states that "A properly maintained rainwater tank can provide good quality drinking water. Occasionally there are cases of illness from contaminated rainwater. In urban areas the public water supply remains the most reliable source of drinking water for the community. In these areas NSW Health supports the use of rainwater tanks for non-drinking uses. NSW Health recommends that people use the public water supply for drinking and cooking because it is filtered, disinfected and generally fluoridated. People who choose to use rainwater for drinking and cooking should be aware of potential risks associated with microbiological and chemcial contamination".<br>State Environmental Planning Policy 4 (SEPP 4) means that rainwater tanks with a capacity of 10,000L or less do not require local council approval provided they meet the conditions of SEPP 4. All plumbing work (for rainwater tanks) is to be carried out or supervised by a licensed plumber in compliance with Council's Policy on Rainwater Tanks (attached), AS3500 and the National Plumbing and Drainage Code. | http://www.health.nsw.gov.au/policies/gl/2007/pdf/GL2007_009.pdf Technical Report distributed 26.02.2010 |

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| 4.1a | 09/12/2009 | 1)How much will our water rates rise due to both construction costs and running costs? Please answer this in present values of money. | Email | Tony Thompson | Council Rates | | Capital Costs<br>Council levels charges for the cost of augmenting the water supply on all new developments. These charges are based on the estimated future capital cost and projected population, and are reviewed every five years. In this way augmentation is paid for by the new developments that produce the additional demand.<br>To ensure an ongoing water supply, Council will need to augment the system prior to the construction of the all new developments (and prior to receiving the full amount of developer charges). Council would then borrow a portion of the capital costs which would incur financing costs (loan costs). These are not fully recouperated from developer charges and under the LGA Act Council is not permitted to include the cost of financing. This additional cost is met by the entire rate payer base. Depending on the timing of the infrastructure, the amount borrowed and the financing conditions, the increased cost to ratepayers is estimated at between 0.5-1.5 cents per kL. | TSC staff discussions, Jan 2009 |
| 4.1b | 09/12/2009 | 1)How much will our water rates rise due to both construction costs and running costs? Please answer this in present values of money. | Email | Tony Thompson | Council Rates | | Operating Costs<br>In terms of overall operating costs, the cost to operate and maintain the bulk water supply (CHD) is relatively small compared to the treatment and reticulation system (treatment plants, pipes and reservoirs).<br>Bulk water operating costs could vary significantly depending on which augmentation option is selected. There would be little change in the cost to operate an enlarged CHD. One could expect that the BCD option operating two dams (both CHD and BCD) would cost approximately twice that. Operation of the SEQ pipeline could be considered to further increase bulk water opearting costs due to the higher pumping costs. | TSC staff discussions, Jan 2009 |
| 4.2 | 09/12/2009 | 2) Where do the projected population figures come from and could we see a copy of these calculations? | Email | Tony Thompson | Population | | See response to question 2.9. | See response to question 2.9. |
| 4.3 | 09/12/2009 | 3) Are all new houses to be built going to have town water and does this mean that there are plans to put everyone on town water? | Email | Tony Thompson | Water Supply | Connections | All new houses in urban areas would be connected to "town water". There is no intention of connection new or existing rural properties. | TSC staff discussions, Dec 2009. |
| 4.4 | 09/12/2009 | 4) Has the work that has been done included any projections for global warming and could we see the figures? | Email | Tony Thompson | Water Supply | Secure Yield | Tweed Shire Council has not undertaken specific modelling of climate change effects, however it is confident that any climate change effects have been adequately taken into account. Modelling of the Tweed's Secure Yield (capacity of the water supply system) has taken into account all climate data to date including the effects of the worst droughts on record. Climate change modelling carried out for SE QLD and for Rous Water have shown that the secure yield in those adjacent regions could be reduced by between 7-15%. However, each of the short-listed water supply options are able to supply more than the required projected Secure Yield even when taking these reductions into account. | TSC staff discussions, Dec 2009. |
| 4.5 | 09/12/2009 | 5) Have evaporation figures been taken into account and are there any means being looked at such as reeds to help reduce evaporation? | Email | Tony Thompson | Water Supply | Secure Yield | Yes, modelling of the Tweed's Secure Yield (capacity of the water supply system) has taken the effect of evaporation into account within the analysis process. | TSC staff discussions, Dec 2009. |
| 4.6 | 09/12/2009 | 6) Have the sides of the dam been surveyed for any possible leakages such as areas of porous rock? | Email | Tony Thompson | CHD | | It is important to understand that no dam is water tight. However dams are designed so that water travels through the embankment in a controlled manner which limits water loss and protects the ongoing structural integrity of the dam. Some porous geological formations at the site of the Clarrie Hall Dam were identified during the construction of the original dam wall. These were sealed at that time by injecting grout into holes along the foundation of the wall. Council's regular inspections of the dam since then have not shown any signs of excessive seepage. Nor is there any indication that there is excessive seepage from other areas within the inundation zone. | TSC staff discussions, Dec 2009. |
| 4.7 | 09/12/2009 | 7) You mentioned that this is the safest dam but will that still be the case when its height is increased and could we see the calculations for this please? | Email | Tony Thompson | CHD | | Any increase in the height of a dam or a new dam will need to be designed, constructed and operated to meet all dam safety requirements. As a background to the existing situation:<br>Under the Dam Safety Act 1978, Clarrie Hall Dam is a "prescribed dam" which requires the NSW Dam Safety Committee (DSC) to monitor the safety of the dam. In particular the DSC is:<br>(a) to maintain a surveillance of prescribed dams, the environs under, over and surrounding prescribed dams and the waters or other materials impounded by prescribed dams to ensure the safety of prescribed dams<br>(b) to examine and investigate the location, design, construction, reconstruction, extension, modification, operation and maintenance of prescribed dams, the environs under, over and surrounding prescribed dams and the waters or other materials impounded by prescribed dams | Dam Safety Act 1978 http://www.austlii.edu.au/au/legis/nsw/consol_act/dsa1978124/ |

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| 4.8 | 09/12/2009 | 8) Does the expected increase in population mean that the council is about to alter its development policy and if so where are these extra properties to be built? | Email | Tony Thompson | Population | | No. Council continues to follow its existing Local Environment Plan or LEP (adopted in 2000) which designates areas earmarked for future development. The LEP is a legal planning document that provides information as to what development is permitted within the various zones within a Shire. The sum total of those zones has given rise to the population estimates used in this project (refer to the response to question 2.9). In addition to this, the NSW Dept of Planning's "Far North Coast Regional Strategy" (2006) which has also earmarked a similar population projection for the Tweed. | LEP: http://www.tweed.nsw.gov.au/PlanDevBuild/PlanningTweedPlanningDocuments.aspx DoP Strategy: http://www.tweed.nsw.gov.au/PlanDevBuild/PlanningDeptOfPlanningDirections.aspx |
| 4.9 | 09/12/2009 | 9) Is there a possibility that water from the dam could be unuseable due to algae polution in which case what back up do we have? | Email | Tony Thompson | Water Supply | Quality | As is currently the case, intermittent blooms of potentially dangerous algae could also possibly occur in a raised Clarrie Hall Dam or in a new Byrrill Creek Dam. Having a second dam would provide some additional back-up since there is a reduced likelihood that both dams would experience simultaneous outbreaks, in which case water could be drawn off from one dam while the other recouperated. Whatever the case, Council's water treatment plant at Bray Park is able to treat water containing blue-green algae to remove the danger to residents. The new water treatment plant will also have this ability. | TSC staff discussions, Dec 2009. |
| 4.10 | 09/12/2009 | 10) If the regulations were changed and every new house had to have say 40,000 litre tanks then would all this new expense be required? | Email | Tony Thompson | Alternative Sources | Rainwater tanks | Unfortunately this would cost far in excess of the amounts we are considering for the short-listed options and would not necessarily result in a secure water supply. Council has engaged MWH to produce a technical paper on this topic which will be available in late January 2010. In the meantime, as way of example we can take your 40,000kL tank and look at the costs:<br>A tank of that volume is equivalent to a round 4m diameter tank approximately 3m high. The cost to install and plumb that tank whilst building a new house would cost in the order of $10,000. If we compare the cost of raising Clarrie Hall Dam and providing reticulation to these new areas (approx $30,000,000 + $30,000,000 = $60M) then for the same budget we are able to supply approximately 6,000 homes or approximately 18,000 people with water tanks assuming an average 3 person household (60,000,000 / 10,000 x 3 person). By contrast raising the Clarrie Hall Dam will supply more secure yield than is required for the next 30yrs (servicing a population increase in excess of 80,000 people).<br>To make matters worse, the Tweed region can often go for periods of up to 100 days with decent rainfall and so to ensure the security of the water supply an average 3 person hou would actually require at least a 60,000kL tank (3 x 200L/d x 100days). There would obv be some increase in costs and therefore further reductions in cost effectiveness. | TSC staff discussions, Dec 2009. Technical Report distributed 24.02.2010 |
| 4.11 | 09/12/2009 | 11) Due to global warming and other factors the world is loosing 1% of its farmland per year and where new properties are to be built is most likely on farming property if this is true then our actions are morally wrong and must be halted. Please comment? | Email | Tony Thompson | Population | | See response to question 2.9. | NA |
| 4.12 | 09/12/2009 | 12) Will property holders be adequately compensated for loss of land and how will this be done? There is a lot of fear about this. | Email | Tony Thompson | Stakeholders | Compensation | Yes, property holders are protected under the Land Acquisitions (Just Terms Compensation) Act 1991. Under that act Council must negotiate a fair price with the landholder, which must be equal or greater to the unaffected market value of the property (ie the market value before the development was considered). Other factors are also taken into account such as severence of property, ongoing loss of income and hardship or difficulties.<br>Once a development approval has been granted for the development the acquisition process can begin. The process is one of negotiation. Usually this will mean that both the landholder and Council will engage valuers to value the property and any other factors and then use these values as a basis for negotiations. If for some reason the parties can not agree on a final value for compensation the case is referred to the NSW Valuer General who is bound by the Act and must determine the value of the just terms compensation. | http://www.austlii.edu.au/au/legis/nsw/consol_act/latca1991442/ |
| 6.1 | 09/12/2009 | That when/if a Big CWG meeting was held at Crams Farm then we invite the community along. | Email | Colleen Edwards | CWG | Meetings | As was mentioned at the last CWG meeting, we can discuss having a CWG meeting at alternative sites; and one of these could be combined with a visit to Crams Farm. However, it would not be a public meeting and would be attended by CWG members only. | TSC staff discussions, Dec 2009. |

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| 6.2 | 09/12/2009 | To increase the capacity of water storage area the silt retaining levee banks at Crams Farm be removed and used as fill in the centre gully or as top dressing. (I don't know if this was meant to be an alternative to a dam or supplement). | Email | Colleen Edwards | | | I'm not certain as to what exactly is meant by this question. Whatever the case, these types of detailed questions can only really be answered once more detailed design work has been carried out during the next phase of the project. | NA |
| 7 | 14/12/2009 | What is the land area covered by the larger Byrrill Creek Dam? | Phonecall | Joanna Gardner | BCD | Sizing | Approximately 400 hectares. The smaller 16,400ML dam covers approximately 240 hectares. By comparison, the raised Clarrie Hall Dam covers approximately 435 hectares. | TSC: GIS Contour maps |
| 8.1 | 14/12/2009 | How many properties are connected to the Water Supply Network in Tweed Shire? | Phonecall | Richard Murray | Water Supply | | There are approximately 34,500 properties connected to the water system in Tweed Shire. Of these approximately 32,300 are residential and 2,200 are commercial connections. | TSC: CCC reporting |
| 8.2 | 14/12/2009 | What is the total amount of water that is used by these properties? | Phonecall | Richard Murray | Water Supply | | Approximately 8650 ML of water is treated at the three treatment plants each year. Of this approximately 7650 ML is delivered to rated connections. The difference is due to maintenance cleaning and flushing, pipe bursts, leakage, meter inaccuracies and water theft. | TSC: CCC reporting |
| 9.1 | 14/12/2009 | Demand Management Strategy - Stage 1<br>ii Non-revenue water is currently estimated to be around 13% of the total water produced. The Infrastructure Leakage Index is relatively high at 2.3 for the Bray Park system. For systems with this level of loss, it is recommended that an active leakage reduction program be implemented.<br>Question 1: Where is the leakage reduction program up to? Has there been any new calculations on water loss? Is there room for further improvement?<br>This is revisited in Q14 from page 22. | Email | Robyn Lemaire | Demand Management | | Council has identified that the amount of Non-Rated Water (NRW) in the Tweed system can be reduced. This is a problem that is being felt by all water suppliers throughout Australia. No system will ever be completely leak free, but there is certainly room for improvement by all players within the industry. As such, leakage reduction has been identified as one of the 18 Strategic Actions in Council's Integrated Water Management Strategy. Council has begun to carry out night time "drop tests" in particular reservior service areas to determine whether the system in these areas suffers from significant leakage. To date Tweed Heads and Tweed Heads West have been tested and other areas will follow (see attached report).<br>Another major component of NRW is water theft. Council is in discussions with other Councils and service providers to determine possible ways of reducing unmetered water use and reduce water theft. | Report attached (DMS reports x3 distributed 22.12.2009) |
| 9.2 | 14/12/2009 | iii Brownfield Options<br>Question 2: What is the WELS Program? | Email | Robyn Lemaire | Demand Management | | WELS stands for the Federal government's Water Efficiency Labelling and Standards (WELS) Scheme.<br>WELS is a government regulatory scheme, underpinned by product testing to Australian Standards. WELS products must carry a WELS label showing the water efficiency star rating and the water consumption or flow rate of the product. For plumbing, WELS products are taps (with some exceptions), showers, toilets, urinals and flow controllers (optional). Some of these plumbing products will also carry a label called WaterMark. | http://www.waterrating.gov.au/watermark.html |
| 9.3 | 14/12/2009 | iv Rainwater tanks are calculated on a minimum of 160m2 roof area, a 5,000L tank, and connection to external uses, toilet flushing and cold water to washing machines.<br>Question 3: What is the Tweed average sized roof area? The roof size seems very large for the Tweed, it is latter pointed out (page 44 of report) that the SEQ area has an average of only 100m2 roof area. I would have thought that our LEP site coverage would imply that the roof coverage would be even less than this.<br>2 The Scope of the work includes TSC sourced data.<br>Question 4: Is there any other sources, and are they any different? | Email | Robyn Lemaire | Demand Management | | One potential restriction on the reliability of rainwater tanks is the area of roof (ie catchment area) that is connected to the tank. Gutters in a new home can be designed to maximise the amount of roof catchment being directed into the rainwater tank; this is potentially more difficult when retro-fitting an existing house. The figure of 160m2 is based on connection of 80% of the average 200m2 roof area in new subdivisions. This figure was used in modelling to determine the reliability of the 5000L tank and 160m2 roof size combination which gave a result within the range of previous studies for other regions (including the Gold Coast). The Gold Coast study was based on a smaller 100m2 roof catchment, and so to ensure the Tweed study did not over estimate potential water savings, a reduced yeild figure of 230L/dwelling/day was eventually adopted throughout the report (Section 5.3.1 Rainwater Tank Performance). | Demand Management Strategy - Stage 1 |
| 9.4 | 14/12/2009 | 3. The conventional water system management fails to take account of the interactions between the elements of the water cycle.<br>7. TSC estimated serviced population in 2006 was 73,185 persons.<br>8. Occupancy rates Mutli-Family Residential MFR and Single-Family Residential SFR for 2006 are 1.95 and 2.8 respectively.<br>9. At ultimate development the total residential population of these areas will be 34,003 persons.<br>Question 5: Is this based on the LEP and the current density projections? What impact will overdevelopment have on these figures? Kings Forest far exceeds population expectation under the current plan. | Email | Robyn Lemaire | Demand Management | | See response to question 2.9. | TSC staff discussions, Dec 2009. |

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| 9.5 | 14/12/2009 | 10. It was assumed that the development would commence in 2012.!<br>Table 3-2 Serviced (Water) Population Projection for Tweed Shire.<br>Question 6: Why is the serviced population reducing as time progresses? | Email | Robyn Lemaire | Demand Management | | A general trend experienced throughout Australia (and developed countries) is that the average number of occupants per residence is reducing. This is due to a number of factors including smaller family sizes. These types of demographic trends were used to improve the accuracy of estimates for projected water demand in these areas. | TSC staff discussions, Dec 2009. |
| 9.6 | 14/12/2009 | 11. Commercial Sector - Growth proportional to residential population growth.<br>Question 7: The business sector is saying that the aged population will not have this effect. How is this justified? | Email | Robyn Lemaire | Demand Management | | In the absence of better information, and given that the most of the commercial sector depends on the residential sector for its customer base, the growth rates for the residential population were used to estimate commerical baseline water use projections. It should be noted that the demand managed water use projections were based only on commercial-specific demand management actions (ie unrelated to residential demand management). | TSC staff discussions, Dec 2009. |
| 9.7 | 14/12/2009 | Rural Sector - No growth assumed.<br>Question 8: What if it declines? | Email | Robyn Lemaire | Demand Management | | In the absence of better information, and given that rural water use is less than 1% of the total water supplied by TSC, the no growth assumption is acceptable. | Demand Management Strategy - Stage 2 |
| 9.8 | 14/12/2009 | 13. The Stormwater Management Plan (TSC,2000) has identified the areas of Cudgen Creek, Cobaki Lakes and Cudgera Creek to be under increasing pressure from future development.<br>Question 9: What weighting of consideration should this be given? There will be environmental and river water quality issues. | Email | Robyn Lemaire | Demand Management | | Council's Stormwater Management Plan continues to guide stomrwater improvements throughout the Shire. Where possible, Council is working together with developers, such as in the proposed Rise development at Billambil Heights to investigate additional stormwater management systems. Installation of rainwater tanks have also been shown to assist in reducing stormwater runoff from impermeable surfaces and the associated potential affects to receiving water quality. | TSC staff discussions, Dec 2009. |
| 9.9 | 14/12/2009 | 14. The total capacity of the Tweed Shire sewage system is 29 ML/day and corresponds to 122,300EP at 240 L/EP/day. The combined dry weather flow (at 2006) has been estimated at 21.6 Ml/day. Further, there are approximately 4000 local and rural onsite wastewater treatment systems.<br>15. Banora Point STP<br>Question 10: Where is this up to? How will this work into the Plans? | Email | Robyn Lemaire | Demand Management | | See response to question 9.10. | |
| 9.10 | 14/12/2009 | Tweed Heads STP<br>Question 11: Why was this decommissioned? Has it been decommissioned? How has this impacted on BPSTP? | Email | Robyn Lemaire | Demand Management | | The Banora Point plant was designed to take the additional flows from the decommissioned plant. The old plant was decommissioned due to a combination of changes in discharge requirements, aging technology, restrictions for future use of the site, and economics. | TSC staff discussions, Dec 2009. |
| 9.11 | 14/12/2009 | Kingscliff STP<br>Question 12: Where is this now? Does this impact on any of the figures? | Email | Robyn Lemaire | Demand Management | | The new Kingscliff STP has been in operation since Feb 2009. The new treatment process and location were taken into account in the Demand Management Report. | TSC staff discussions, Dec 2009. |
| 9.12 | 14/12/2009 | 19. During the assessment it was found that the MFR consumption for 2005 was unusual high compared to previous usage. It was concluded that this figure was not representative and the data was excluded from the assessment.<br>Question 13: What happened in 2005? If it was climatically induced, for example; was it so hot that people showered more often? Washed clothing more often? Or did people need to water their gardens? Water restrictions? | Email | Robyn Lemaire | Demand Management | | There are any number of reasons for this "outlier" figure. Some of the change could be due to the factors you mention. There could also be other issues such as an error in readings or records that was not picked up at the time. Unfortunately we are not able to ascertain the reasons for such a large variation and rather than skew results it has been discarded. | TSC staff discussions, Dec 2009. |
| 9.13 | 14/12/2009 | 21. Increased residential water awareness and elevated water charges have an effect on water usage.<br>Pipe leakages and repair is not ideal.<br>22. Introduce/improve active leakage control.<br>Question 14: How far have they got into the project, and when is it considered to have been covered? What impact will this have on our supply demand? | Email | Robyn Lemaire | Demand Management | | See response to question 9.1. | |
| 9.14 | 14/12/2009 | 24 New dwellings incorporated into the forecast are assumed to have reduced internal water consumption, as a result of the use of more efficient water use fixtures. In particular it is assumed that all new dwellings will have dual flush toilets. The reduction in internal usage is generally is approximately 22 litres per person per day.<br>31. The two key processes which drive the overall demand per capita up are as follows:<br>Household size or dwelling occupancy trends; the end use model reflects a decreasing household size.<br>Question 15: Household size refers to the number of people in the house, (page 50 of report) or, the roof size of the building to catch rainwater, influencing tank harvest? | Email | Robyn Lemaire | Demand Management | | Household size refers to the number of occupants. See response to question 9.5. | TSC staff discussions, Dec 2009. |

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| 9.15 | 14/12/2009 | 4.3.6 Baseline forecast does not include the impacts of WELS or BASIXS.<br>Question 16: What differences will there be if these impacts are considered? | Email | Robyn Lemaire | Demand Management | | The difference can be clearly seen in the graphs in Figure 6.1. The four curves show the relative projections for each scenario (including with and without WELS / BASIX). | Demand Management Strategy - Stage 1 |
| 9.16 | 14/12/2009 | 34. 5.2.2BASIX with 5,000L rainwater tanks.<br>Question 17: If the BASIX states there are 3,000L tanks requirement what impact will this have on the harvestable water resources?<br>All the calculations are based on a 5.000 litre tank size. Page 50 refers to being inadequate to peak demand. | Email | Robyn Lemaire | Demand Management | | Council has engaged MWH to produce a technical paper on this topic which will be available in late January 2010.<br>A smaller tank will reduce the effectiveness of rainwater tanks as a demand management action, particularly during dryer times of peak demand on the water supply system. This is why Council is encouraging the installation of 5000L rather than 3000L tanks.<br>As discussed during the first CWG Meeting, the successfulness of these demand management actions will determine whether we more closely follow the red baseline curve or the blue demand-managed curve. Obviously, our preference is to follow the demand managed curve as closely as possible, but the effectiveness of demand management actions will depend on factors such as persuading new home owners to install 5000L tanks. | Demand Management Strategy - Stage 1 |
| 9.17 | 14/12/2009 | 37. Pimpama Coomera project the public acceptance of highly treated recycled water is very high. No problems with a comprehensive education program.<br>50. Rainwater tank scenarios were not assessed as it is assumed that tanks will not be available during periods of peak system demand, that is, tanks will not reduce the peak water demand. Although this assumption may be conservative for many normal demand years it is considered to be a prudent approach to system planning.<br>Only the growth areas in Cobaki Lakes, Bilambil Heights, Terranora, West Kingscliff, Kings Forest and infill development of Tweed Heads area were considered as contributing to future system augmentation.<br>A total of 50% of future of future Bilambil Heights growth is assumed to be served by Mcallisters Reservoir No.4, Country Club Reservoir (No.2).<br>Question 18: Where is this project at? What is the holding capacity? | Email | Robyn Lemaire | Demand Management | | Recycled water was examined and assessed within the Demand Management Stategy and was found to not be cost effective. Installation of rainwater tanks was adopted as a more cost effective demand management solution | Demand Management Strategy - Stage 1 |
| 9.18 | 14/12/2009 | A total of 50% of future Kings Forest and 100% of other growth will be served by the augmentation between South Tumbulgum to Tweed River Crossing.<br>Question 19: Where is this project at?<br>Same with Cobaki Lakes? | Email | Robyn Lemaire | Demand Management | | All growth areas were considered when determining the baseline and demand managed water requirements for the Shire. See response to question 2.9 | Demand Management Strategy - Stage 1 |
| 10 | 15/12/2009 | 7. In Appendix A: Coarse Screening Byrrill Creek Dam: it states that Division 24 of State Environmental Planning Policy 2007 enables development for water storage purposes without development consent. Does this mean no Local Council DA or Environmental Impact Assessment is needed for Byrrill Creek Dam, or does this mean on a State level? The implications of this statement are very concerning | Email | Joanna Gardner | BCD | Environment | The term "development without consent " is planning terminology and has a very specific meaning regarding which form of assessment and approval process Council will have to follow to gain development approval. Under the NSW EP&A Act there are three pathways for development consent which may be relevant to our project: Part 3A, Part 4 or Part 5. "Development Without consent" means that a planning approval under Part4 of the NSW EP&A Act is not required, however an approval under Part 5 or Part3A of the Act is still required.<br>Part 3A is for major projects and critical infrastructure of regional or state significance and the Minister for Planning is the approval authority.<br>Part 4 is traditional path for development consent where the developer liaises with all relevant government agencies and applies to Council who is the consent authority.<br>Part 5 is typically used for infrastructure projects and the determining authority is typically the proponent.<br>Whether the development is undertaken under Part4, Part 5 or Part3A of the EP&A Act, approval of the proposed development is still required, as is a detailed environmental ass a project of this type | Discussions with Public Works Lismore 22.12.2009. |
| 11.1 | 15/12/2009 | Will the representatives of the CWG's inspect the 2 dam option sites? If so, When? | Email | Colleen Edwards | CWG | Site visits | Site visits have not been planned. If all the members of the CWG would like to have site visits arranged, and a time during businees hours could be agreed upon, Council could look at organising that. | TSC staff discussions, Dec 2009. |

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| 11.2 | 15/12/2009 | What would be the approximate length of the replacement McCabes bridge? | Email | Colleen Edwards | CHD | Infrastructure | As previously discussed, it is difficult to determine the types and dimensions of structures, road deviations and infrastructure changes before the final dam level has been determined and modelling is able to more precisely estimate flood surge heights. The exact type of structure will depend on a number of factors including whether it should be flood free or a dry weather crossing only.<br>By examining the current maximum inundation area for CHD one can estimate that Commissioners Creek Rd would need to cross a water body of approximately 150m in width just to the west of the position of the existing McCabe's Bridge. | TSC staff discussions, Dec 2009. |
| 11.3 | 15/12/2009 | Some landholders have expressed the need for surveyor's pegs to be put in place. Is this possible and when? | Email | Colleen Edwards | Stakeholders | Sizing | As previously discussed, it is also potentially misleading at this stage to place survey pegs considering that the final dam level has not been determined and modelling to more precisely estimate flood surge heights is not completed. Council also does not have the resources to survey all of the four options and over 40 individual landholders. In the meantime we are prearing A1 size photo-maps for each landholder at CHD. Certainly, once the preferred option has been determined and the effects of that option are better understood, then detailed surveys of individual landholder properties will be carried out. | TSC staff discussions, Dec 2009. |
| 12.1 | 17/12/2009 | Clarrie Hall Dam, Determination of Optimum Size and Dam Raising Options Study, Final Evaluation Report: Pt.5. states: At FSL 70m, the storage and associated flood surcharge does not inundate private property.<br>Wrong. Was this oversight factored into the current costing and scoring? | Email | Colleen Edwards | CHD | | This was an ambiguous wording in the report which was attempting to explain that individual dwellings were not expected to be inundated. This is still mainly correct. Council's latest inundation maps, based on updated topographical information received since the drafting of that report, show that there may be one residence potentially affected by the increased inundation levels. | TSC GIS system |
| 12.2 | 17/12/2009 | Request Clarrie Hall Dam Update of Cost estimates (not included but supplied for Byrrill Ck). With special note to Land Acquisitions, Road and Service Relocations. The amounts stated for Byrrill Ck (16,300ML @ $1,800,000 and 36,000ML @ $2,400,000 seem very conservative to say the least. | Email | Colleen Edwards | BCD | | Cost breakdown attached. | Table distributed 22.12.2009 |
| 13.1 | 18/12/2009 | The Tweed community has also expressed their concern in the press that this project is being rushed and so I am also concerned by your statement:<br>"I would also like to take the opportunity to stress that our time is limited"<br>I hope that you would provide an explanation for this 'limited time' other than the need to meet some internal organisational planned target date to complete this part of the Project. | Email | Richard Murray | CWG | | Time considerations are important on any project, and this one is no exception. Internal target dates have been set based on the critical planning path to ensure the Shire's water supply remains secure. This has been based on the assumed demand / supply capacity curves that we have discussed in CWG Meeting 1.<br>Despite these pressures, this Stage 3 section of the project will have taken approximatey 11 months of work once complete, including five months of continuous Community consultation and involvement.<br>It can be difficult when timeing is a consideration, however I can assure you that those at arms length to the process will invariably question why the process is taking so long. | TSC staff discussions, Dec 2009. |
| 13.2 | 18/12/2009 | Is it unorthodox that the fine screening of Option One 'Raising the existing Clarrie Hall Dam' be completed even before Tweed Shire Council's Demand Management Strategy was finalised? | Email | Richard Murray | Water Supply | Demand Management | The fine screening of all the short-listed options is what is currently being carried out, and is the stage where the CWG is involved. It is by no means complete, is focussed on four options (not just Clarrie Hall Dam) and will be finalised in approximately June 2010.<br>Council's Demand Management Strategy (DMS) has been prepared in two stages. The first stage of the DMS, focussing on residential water use, has already been completed and was adopted by Council in its meeting of 17 February 2009. It had been placed on public exhibition for a period of eight (8) weeks closing 1 August 2008 with one late submission received. The report included demand-managed-water-use-projections for the entire shire to enable the continuation of ongoing planning, with a proviso that these estimates would be reviewed once the Stage 2 report was completed.<br>The consultants MWH have now produced the Stage 2 report focussing on non-residential water use and a combined summary report to coordinate the recommendations from the two stages. The Stage 1 report has also been updated and corrected to improve consistency between the documents. Subject to a Council decision, these three reports will be placed on public exhibition in January 2010. | TSC staff discussions, Dec 2009. |

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| 13.3 | 18/12/2009 | It appears that Council's policy does not provide for environmental flow through Bray Park Weir when natural flow ceases.<br>How often has natural flow over Bray Park Weir stopped this year since the winter of 2009 and how often does the release of water (a requirement of up to 25ML/d) to service the fish ladder cease? The IWCM Report claims that at 1% percentile flow at the Bray Park Weir, the natural flow is 90 ML/d | Email | Richard Murray | Water Supply | Environment | Council is required to release water from CHD for environmental flows into Doon Doon Creek, not over the weir. The release of water from CHD is only related to the Tweed River (and Bray Park Wier) once the flow drops below 95 percentile at the wier. A "cease to pump" condition applies which stops COuncil from removing water from the weirpool unless there is a respective release from CHD. | TSC staff discussions, Dec 2009. |
| 13.4 | 18/12/2009 | Draft Water Sharing Plan Since the IWCM Report in March 2006, what is the status of a proposed Draft Water Sharing Plan that includes environmental flows for the Tweed River notwithstanding that Council is required to make a decision beyond their Interim Environmental Objectives?<br>In this regard it is noted that Council approved on the 17 November 2009 that: "The cessation level for flow bypass requirements at Bray Park Weir be set at a level of 50% of the capacity of the Clarrie Hall Dam as proposed in the Department of Water and Energy (DWE) draft Water Sharing Plan for the Tweed River area." | Email | Richard Murray | Water Supply | Environment | DWE is finalising Water Sharing Plans for the Tweed and Council, as with all water users, will be required to work within the conditions of those plans. | TSC staff discussions, Dec 2009. |
| 13.5 | 18/12/2009 | In the IWCM Report (March 2006) and in more recent Council plans Tweed Shire council has consistently used a predicted population annual increase of 2%.<br>At 2% per annum the population increase for the time period ending 2036 is far less than 160,000. Do you still maintain that the predicted population of 160,000 is accurate? | Email | Richard Murray | Populatio n | | Yes. Council believes that the approach taken in determining the population figures for this project are more accurate and more appropriate than an assumed 2% annual growth rate for the next 30 years. See response to question 2.9. | TSC staff discussions, Dec 2009. |
| 14.1 | 22/12/2009 | I attended a meeting in Tyalgum last week and one of their many concerns was the release of effluent from the Tyalgum sewage treatment plant into the local creek (I think it might be Bray's creek). Can you give me more information about this topic? Specifically: 1) To what level is the sewage treated? 2) How much and how often is it released into the creek? 3) When was the last release? | Email | Sam Dawson | Tyalgum Sewerage Treatment Plant | | Tyalgum WWTP is a small plant with a design capacity of 120kL/day and current loading of approximately 40kL/day. Sewerage receives primary and secondary treatment and must meet Department of Environment, Climate Change and Water, Environment Protection Licence conditions. This Licence can be viewed on the department's web site (search by Licence #3470). Secondary treated effluent produced by the plant travels through a catch balance pond and a maturation pond (disinfection via sunlight) before being irrigated onto adjacent pasture. The irrigated area has several zones and irrigation is sequenced between them. The entire area is bunded by a shallow swale to return any surface runoff (during wet wet wether) to a catch dam. Water from the catch dam is pumped back to the matuartion pond so it can be re-irrigated. During extended wet weather the catch dam will fill and effluent will overflow and drain across pasture along an overland flow path (approx 230m) and flow into the Pumpenbil Creek. | TSC staff discussions, January 2010 |
| 14.1 | 23/12/2009 | Cont. | Email | Sam Dawson | Tyalgum Sewerage Treatment Plant | | These events generally happen only a few days per year and always coincide with high stream flows. Any impact would be negligible and would not be measurable. Stormwater runoff from all sources into these streams during such events is the primary impact on water quality. Note, the Pumpenbil Creek and Oxley River confluence is well below the Tyalgum Water Supply off take and Weir. | TSC staff discussions, January 2010 |
| 15.1 | 28/12/2009 | 1. How often has natural flow over Bray Park Weir stopped this year since the winter of 2009 and how often does the release of water (a requirement of up to 25ML/d) to service the fish ladder cease? The IWCM Report claims that at 1% percentile flow at the Bray Park Weir, the natural flow is 90 ML/d | Email | Richard Murray | Water Supply | Environment | This is usually occurs approximately four times a year when there is a combination of very low river flow and high water spring tides occurring on the new and full moon. To stop saltwater ingress into the weirpool the fishladders are closed for approximately 6 hours during the period of high tide. | TSC staff discussions, January 2010 |
| 15.2 | 28/12/2009 | 2. Question to your replied statement: "Council does not have details on the amount of water drawn from these water sources by other domestic, agricultural or commercial users. TSC: CCC reporting "Is this statement correct as I note that The Tweed IWCM - Context Study &Strategy Report, Page ii, (March 2006) states: " Water users in the catchment include extractions for town water (around 10GL/a) and rural irrigation (around 4.8GL/a) and 1.7GL/a groundwater)"? | Email | Richard Murray | Water Supply | | The initial response is correct. Council does not maintain up to date details for other water users. The responsibility for upkeep of this data lies with the NSW Office of Water, and updated information regarding current license extractions can be sourced through them. The IWCM refers to 4.8GL/a for all extractions across Tweed Shire, which were figures sourced from the relevant government department and current at the time of the drafting of that report in 2006. | TSC staff discussions, January 2010 |

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| 15.3 | 28/12/2009 | In my email of 18 December: Water quality below the Bray Park Weir. "The Tweed IWCM - Context Study & Strategy Report, Page 52,(March 2006)states: the current extraction rates from the Upper Tweed River have led to the catchment being given a 'hydrological stress rating' of high as identified in the Stressed Rivers assessment Report (DLWC 1998)"The present ecosystem health of the upper Tweed River is unknown now since the last Tweed River Estuary Ecosystem Health Report was made in 2000-2001The last anthropogenic nutrient impact assessment was carried out by the University of Queensland in their Report "Tweed River Estuary Ecosystem Health Monitoring Program (2000 to 2001) - Final Report 2003 Estuary Ecosystem Health. In this Report some parts of the upper Tweed River system were in a constant state of eutrophication." My question is. Since the University of Queensland Report what is the present studied health condition of water quality in the Upper Tweed River Ecosystem Health below the Bray Park Weir and How does Tweed District Water Supply Augmentation future strategy plan seek to the improve water quality in the Upper T | Email | Richard Murray | Water Supply | Environment | As part of the Water Sharing Plan process, the NSW Office of Water has produced report cards for each river reach and tributary. Further information can be found on their website: http://www.water.nsw.gov.au/Water-Management/Water-sharing/Commenced-water-sharing-plans/Draft-water-sharing-plans/default.aspx | TSC staff discussions, January 2010<br>Water monitoring data provided in file Annual Volumes Estimate @ Bray Park Weir 1969 to 2009.pdf on 23.02.2010 |
| 15.4 | 28/12/2009 | The CWG received a document: Demand Management Strategy - Stage 1, and advised the release of this and two other Demand Management Strategy reports were made available prior to public exhibition after January Council Meeting. "however they (the three documents) are not currently publically (publicly) available". Tweed Shire Council invited public submissions on the Draft Demand Management Strategy - Stage 1 [Reference 106740-01] during the period 5 June 2008 - 1 August 2008. Attached to the (2008) Draft and now missing from the current Draft Demand Management Strategy are 16 documents (Appendices A-O) which included Greenfield population forecasts and scenario Demand forecasts for Bilambil Heights, Cobaki Lakes, Kings Forest, Terranora, West Kingscliff and the Review of Options for Cobaki Lakes. On the 17 February 2009 Council approved nine recommendations on the (2008) Draft Demand Management Strategy. Option 1 included Brownfield areas (for the shires existing and infill development areas), with a key focus on only developing an extensive leakage control and pressure program | Email | Richard Murray | Demand Management | | It is correct that the Stage 1 report was previously publically exhibited as a draft for public comment. The report has subsequently been reviewed and updated as part of the finalisation of the Stage 2 and Combined reports. Advanced electronic copies of these three reports were provided to the CWG on 22.12.2009 and hardcopies (including all appendices) were provided during the CWG meeting on 18.01.2010.<br>The entire Demand Management Strategy subsequently went on public exhibition for a period of 6 weeks on 28.01.2010. Submissions will close 05.03.2010. | TSC staff discussions, January 2010<br>www.tweed.nsw.gov.au/OnExhibition/OnExhibition.aspx |
| 15.5 | 28/12/2009 | Question 4. (a) Why have the Brownfield Areas now been omitted from the Amended(16.11.09) Draft Demand Management Strategy (DDMS) - Stage 1 (ReferenceA187200) without explanation to CWG members, considering Council had previously approved the (2008) Strategy on 17 February 2009 | Email | Richard Murray | Demand Management | | The original DMS document referred to Brownfield and Greenfield areas within the shire. Greenfield areas refered specifically to the five major new development areas of Bilambil Heights, Cobaki Lakes, Kings Forest, Terranora, and West Kingscliff. Brownfield referred to all other urban areas including existing and new development areas. For the amended report it was felt that a clearer description for all areas should be "Whole of Council" since both existing and new developments were included. | Demand Management Strategy |
| 15.6 | 28/12/2009 | Question 4. (b) What is the reason that 2008 (Appendices A-O) have not been provided in the Amended 16.11.09 DDMS. Blue Green Algae Planning Organic contaminants, blue green algal type toxins and pesticides are present in the Tweed River's raw water source at the Bray Park Weir for several months of each year. The year 2009 was no exception when several red alerts for Blue-green algae have been in place for most of the spring, with such alerts continuing through to December. Two hundred and sixteen-tonnes of powder activated carbon are provided annually to remove blue green algal toxins, dangerous to health, from the Bray Park Weir's treated raw water. (Page 37, Paragraph 19.2, Operation - Tweed Shire Council Bray Park WTP Environmental Assessment Report) Clarrie Hall Dam, Tweed Shire Council's reserved water source, is located 14 klms from the Bray Park Weir and supplies water to the Tweed River Bray Park Weir Stored water in the Clarrie Hall Dam requires two major aerators to reduce growth of blue green algae before supply to the Tweed River. On the 9 December 2009 the North Coast Regional Algal Committee issued a 'red alert' Bul | Email | Richard Murray | Demand Management | | The appendices were not provided electronically due to the excessive size of the files. Hardcopies of the reports, including all of the appendices, have subsequently been provided to the CWG on 18.01.2010. | Demand Management Strategy - Stage 1 |
| 15.7 | 28/12/2009 | Question 5 Does Council keep a Register available recording the following data on blue-green algal blooms in drinking water sources at Bray Park Weir?* Dates when 'Red alerts' for blue-green algal blooms have issued since the1990,s * Types of toxic algal blooms present in sampling* Whether blue green toxins were detected and if so levels of toxicity >than 5000 cells/ML* Number of times water treatment was adjusted to maximise toxin removal* Number of times sample water treated and tested using mouse bioassay. | Email | Richard Murray | | | Council keeps records of routine weekly sampling, and has a separate register of all blue green algae alerts. Regular sampling is undertaken both under normal circumstances and during blue-green algae events as per the guidelines for Blue-green algae management. While the algae capable of producing toxins have been detected, no toxic events have been detected during this time. | TSC staff discussions, December 2009<br>Records supplied in NCRACC FORTNIGHTLY REPORT.xls 23.02.2010 |

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| 16.1 | 11/01/2010 | I'm not a big fan of placing dollar values on environmental areas or services but in some cases it may be necessary to help those of an infinite growth philosophy to help grasp the value of what a 'green' place can be. I want to ask if a dollar value of the environmental destruction of the various options has been taken into consideration during the cost appraisal stage? | Email | Sam Dawson | Fine Screening | Environment | No. Environmental impacts have not been converted into dollar values for direct comparison with other financial costs.<br>Council is in consultation with other government agencies to determine the extent of environmental compensatory habitats and mitigation measures that may be required for each of the options. This may provide some preliminary estimates of the dollar cost due to any environmental destruction, and will be available for input into the MCA. | TSC staff discussions, January 2010 |
| 17.1 | 12/01/2009 | Is desalination still an option in the mix and if so are other sites for a desalination plant besides Tugun such as on the Tweed coast (NSW) receiving consideration by TSC? | Email | Rob Learmonth | Water Supply | Desalination | No, desalination is not being considered further. Desalination was one of the nine options examined in the Coarse Screening Options Report which investigated three desalination sites within Tweed Shire. Desalination was discounted due to excessive costs. | Tweed District Water Supply Augmentation Options Study Stages 1 & 2 - Coarse Screen Assessment of Options (distributed 01.12.2009) |
| 18.1 | 12/01/2009 | Could you please place on the next CWG agenda - Tweed Shire Council's October 2009 submission to the NSW Office of Water on the Draft Tweed Water Sharing Plan. A visit to the Bray Park Weir to explain how current low level environmental flows are managed via the fish ladder, beyond 95th percentile flows at Bray Park Weir. | Email | Richard Murray | Water Supply | Environment | Bray Park Weir was visited as part of the site visit attended by the CWG on 01.02.2010. | |
| 19.1 | 13/01/2010 | 1. Page 7/40 Why is the population numbers declining over time, and not increasing? The number of accounts are rising over the years. | Email | Robyn Lemaire | Demand Management | | Population in existing areas is predicted to reduce due to the ongoing reduction in the average houshold size experienced in many similar areas around Australia. However the overall population numbers increase and number of accounts continues to rise due to additional greenfield development and some infilling effects in existing areas. | Demand Management Strategy |
| 19.2 | 13/01/2010 | 2. Page 15/40 Why was scenario 4 taken on for study in stage 1, but not for Stage 2? I would have thought this to be the better option. | Email | Robyn Lemaire | Demand Management | | Option 4 - Indirect potable water reuse was intrinsically included. It was investigated and compared with other reuse, greywater and rainwater scenarios for greenfield development under Stage 1. The infrastructure required for indirect potable water reuse is approximately the same regardless of its use in residential or non-residential contexts (since recycled water is returned to the headwaters of Clarrie Hall Dam). The costings of that scenario under greenfield development also applied for brownfield areas and the entire shire and would have produced an identical cost/kL for non-residential users. | Demand Management Strategy |
| 19.3 | 13/01/2010 | 3. Page 20/40<br>The base line is still very much higher than demand requires. Is this due to drought scenario? What is the advantage of having excess supply? | Email | Robyn Lemaire | Demand Management | | This graph only shows demand (ie water usage). The base demand line is the amount of water that would be used if we did not implement any demand management actions to reduce our per capita water use. The other lines show the relative effectiveness of the scenarios in reducing water use below the base demand line. In this graph scenario 1 saves water, but not as much as scenario 2, which in turn saves less water than either scenario 3 or scenario 4 (highest savings). | TSC staff discussions, February 2010 |
| 19.4 | 13/01/2010 | 4. Is Council going to sell the water at market value? (Coke-a-cola?). The historical line looks like a more realistic volume to have in supply. | Email | Robyn Lemaire | Demand Management | | Council introduced a user pays pricing policy in 2002. Users charges are structured such that 25% of water rates are a set fee and 75% are charged according to the amount of water used. Details of rates are available at http://www.tweed.nsw.gov.au/Water/WaterPricing.aspx | http://www.tweed.nsw.gov.au/Water/WaterPricing.aspx |
| 19.5 | 13/01/2010 | 5. Page 21/40 Per capital demand drops until 2021 then stabilizes at 345. Is this due to the growth areas reaching capacity? How else does this show actual population growth? | Email | Robyn Lemaire | Demand Management | | This graph shows per capita water use. The modelling predicted that even under the baseline demand case people will reduce their water usage to some extent, giving a long term water use of 345L/p/day if we do not implement any demand management actions. | TSC staff discussions, February 2010 |
| 19.6 | 13/01/2010 | Page 36/40 **Recommendation 1**, in regards to Cobaki Lakes does not afford the best water savings as option with recycled water treatment would assist the problems in the River in that area | Email | Robyn Lemaire | Demand Management | | Refer to the answer to Question 19.11 | Demand Management Strategy |
| 19.7 | 13/01/2010 | **Recommendation 8** refers to a tracking performance plan. This needs to specify outcomes at every interval. | Email | Robyn Lemaire | Demand Management | | That is correct. The recommended performance tracking plan to be adopted will enable TSC to adjust the program to ensure that the overall demand is achieving the ultimate long-term reduction goals envisioned by the program. The plan ensures that if goals are not being reached, early action can be taken to improve performance. | Demand Management Strategy |
| 19.8 | 13/01/2010 | 6. Is there a suitable Plan for the TSC to implement a water Efficiency Management Plan directly? | Email | Robyn Lemaire | Demand Management | | Council's Demand Management Strategy (DMS) is currently on public exhibition. Once adopted Council will move to meet the strategies identified in the report through implementation of specific actions. Some of these actions will require ongoing management under a management plan. | TSC staff discussions, February 2010 |

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| 19.9 | 13/01/2010 | 7. Page 51 Water savings for conservation measures. This could take 5 to 10 years to reach it's outcomes. How will this impact on the modelling? | Email | Robyn Lemaire | Demand Management | | This has been allowed for in the modelling by assuming a rate of take-up for each of the conservation measures over the timeframe. | Demand Management Strategy |
| 19.10 | 13/01/2010 | 8. Page 64 An estimated saving of 18% by 2038. This would reduce the demand for water. Has this been taken into account in calculations? | Email | Robyn Lemaire | Demand Management | | Yes, and the even greater water savings predicted have been taken into account in determining the Shire's future water requirements. Specifically, the affect of these savings has been taken into account in the blue curve contained in the graph in the Water Supply Augmentation Factsheet 1. By contrast, the red curve on the same graph does not consider any water savings. | Tweed District Water Supply Augmentation - Factsheet 1 "Why does the Tweed need more water?" http://www.tweed.nsw.gov.au/Water/WaterSupplyAugmentation.aspx |
| 19.11 | 13/01/2010 | 9. What would be the expected maximum that could be saved? Would Recycling Plans be the biggest winner considering the financial support that is available through other Government levels? | Email | Robyn Lemaire | Demand Management | | The graph in Figure 5-3 of the Demand Management Strategy Stage 1 provides a good overview of the relative predicted savings from rainwater tanks, recycled water, and combined rainwater & recycled water. The report also considered overall costs to determine the least cost per litre of water saved at the bottom of Table 5-30 on page 71 - which resulted in rainwater tanks being the most cost effective per litre of water saved. | Demand Management Strategy - Stage 1 |
| 20.1 | 13/01/2010 | 1. Feasibility Stage Cost Estimate for Clarrie Hall Dam Raising (FSL70m @ 42,300ML) Figures do not include Land acquisitions, roads and service relocations. | Email | Colleen Edwards | CHD | | For comparison purposes the costings for all options have been approached using similar methodologies. The feasibility stage costings are based on the preliminary estimates for the construction costs of the dam, plus percentage costs for design work, project management and other contingencies. This is standard industry practice for this project stage.<br>It is recognised that land acquisitions and the relocation of services will be required for each of the options, and some costs have been allocated inthe estimates for these works. These are preliminary in nature and will need to be reviewed when more detailed information becomes available. | TSC staff discussions, January 2010 |
| 20.2 | 13/01/2010 | 2. A costing for potable water was also requested. | Email | Colleen Edwards | CHD | | It is unclear what this question relates to exactly. All nine of the options looked at in the Coarse Screening Report were able to increase the secure yield of the Tweed's potable water supplies. Costings were carried out for each of those options in the report. | Tweed District Water Supply Augmentation Options Study Stages 1 & 2 - Coarse Screen Assessment of Options (distributed 01.12.2009) |
| 20.3 | 13/01/2010 | 3. Will there be any caveats put on farmers land. | Email | Colleen Edwards | CHD | | It is unlikely that Council would wish to have caveats placed on private land. In most circumstances Council will prefer to acquire enough private land to ensure a buffer around the FSL of the dam for the purposes of flood protection and catchment management. Council appreciates that land acquisitions will involve negotiations with individual owners, and will aim to provide an outcome that is mutually acceptable. | TSC staff discussions, January 2010 |
| 20.4 | 13/01/2010 | 4. Will the remaining farming land retain rural 1a category. | Email | Colleen Edwards | CHD | | Yes, there wouldn't appear to be any reason for the zoning of remaining farm land to change. | TSC staff discussions, January 2010 |
| 20.5 | 13/01/2010 | 5. How would council maintain the buffer zone. | Email | Colleen Edwards | CHD | | Maintenance of the buffer zone would be carried out much the same as it is currently at CHD. Maintenance may vary from riparian revegetation through to ongoing slashing depending on the existing condition of the area and the prevailing management plan. | TSC staff discussions, January 2010 |
| 20.6 | 13/01/2010 | 6. All dam options, CHD FSL 64.5, 67.5 and BCD 115.5 & 125.0 have been quoted with a spillway of 50m except CHD70 at 40m Why not 50m also? | Email | Colleen Edwards | CHD | | The size of spillway is dependent on several factors including the dam height and flood modelling for the individual catchment. It is not possible to make such a comparison between the CHD and BCD spillways. | TSC staff discussions, January 2010 |
| 21.1 | 16/01/2010 | Why spend all this energy, time and money to restoring a high quality conservation area to then flood it all? | Email | Joanna Gardner | BCD | | As we've discussed in meetings, these are the types of difficult issues we are all trying to deal with. There is no simple answer to this question, and to many other similar ones. We must take note of all of these (sometimes conflicting) issues when the CWG makes its recommendations. | TSC staff discussions, January 2010 |
| 21.2 | 16/01/2010 | Can a paper be written on the effects that a dam would have on Byrrill Creek, or that if that was not possible that a paper on the value of Byrrill Creek & the riparian area. | Email | Joanna Gardner | BCD | | Paper written and distributed at CWG Meeting 01.02.2010. | Email from Tom Alletson 28.01.2010 |
| 22.1 | 18/01/2010 | The demand managed curve equates to what average daily per capita water consumption? | Meeting | Richard Murray | Demand Management | | The overall demand managed curve equates to approximately 259L/person/day. The average residential per capita demand for the entire shire is 169L/person/day, while for greenfield areas the residential per capita demand has been estimated as 153L/person/day. | Demand Management Strategy - Stage 1 |

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| 23.1 | 20/01/2010 | How much silt has built up in the CHD and how much has this reduced the storage capacity? | Phone | Robyn Lemaire | CHD | | All dams collect silt in the deep areas behind the dam wall, and CHD would be no different. Anecdotal evidence suggests that there has been no appreciable reduction in the size of the storage capacity of the dam in almost 30 years since the dam's construction. The Dams Total constructed volume is 16,000 ML. the useable volume for water release is 15,000 ML. The difference of 1000 ML is allowed for siltation. The majority of settletable material will be deposited at the up stream end of the dam where flow velocities from the incoming streams reduce to almost zero even during flood events. If and ever required, dredging in these areas is a practically feasible. | TSC staff discussions, January 2010 |
| 24.1 | 24/01/2010 | 1. During Mark Hunting's Coarse screening - Rank 3 - Pipeline to SEQ Water, Grid, page 10, I asked the question about the existence of a water pipeline that was end capped at Coolangatta. Tweed Shire Council acknowledged that a 200mm water main had been capped at Coolangatta. | Email | Richard Murray | Water Supply | | There is a pipeline that runs across the border in that area. It has been in existance since mid last century. It has a metered connection however the valve has remained closed since the mid 1980's. | TSC staff discussions, January 2010 |
| 25.1 | 26/01/2010 | Have you ever questioned how the calculations of the secure water yield of 13750 ML/annum was calculated other than the formula offered?<br>It may be a coincidence but I have made the following observation.<br>NSW Office of Water currently describes the inflowing water sources of the Upper Mid Tweed River as being from the Lower Oxley River, Byrrill Creek, Upper Tweed River, Doon Doon Creek (includes Clarrie Hall Dam 16000ML capacity, Rolands Creek, Smiths Creek with a Low Flow index (80%ile) = 38 ML/day.<br><br>NSW Office of Water - Draft Water Sharing Plans describe (at 20 February 2009) as follows:<br>Total surface water entitlement of Mid Tweed River Source as 28728 ML/year 22 Water Act Licences (96% [=27578]ML/year) used for Town Water Supply, 4% used for irrigation purposes)<br><br>Comment<br>Multiply the inflowing water sources to the Upper Mid Tweed River Low Flow index (80%ile) at 38 ML/day x 365.<br>The calculation equals 13870 ML/annum. | Email | Richard Murray | Water Supply | Secure Yield | Secure Yield Calculations - The secure yield is not determined by simple calculation but by a sophisticated computer model (IQQM) of the dam, river and weir system that utilises historic rainfall and climatic data and simulates on a daily basis how the existing system reacts under a predetermined set of operating rules. In simple terms it looks at the worst year or period on record and determines what amount of water can be extracted without the system failing. For our current system that was the 2002/03 drought (it was more severe than the previous 1902/3 drought). In this 12 month period if the 95%ile flow regime was in operation an amount of 13,750 megalitres could have been extracted from the weir pool at Bray Park. Needless to say it is significantly more complicated than this but in simple terms this is how secure yield is determined.<br>It is also not possible to multiply the 80%ile flow by 365 to determine the secure yield of a system. | TSC staff discussions, January 2010 |
| 25.2 | 26/01/2010 | Council appears to have selected the Low Flow index (80%ile) when there is actually 28728 ML/year annual river flow from the inflowing water sources of the Upper Mid Tweed River.<br>I would not expect NSW Office of Water to have over allocated its 22 Water Act Licences. | Email | Richard Murray | Water Supply | Secure Yield | Councils water licence entitlement is 27,500 megalitres per annum. Other users (irrigators) make up the remainder of the amount of water contained within licences allocations for the Upper Mid Tweed (28,728 ML/annum). Councils licence entitlement would have been determined by the relevant state government department at the time (early 80's) of the construction of Clarrie Hall Dam in consultation with Council. It would have been based on the secure yield of the system as determined by the predecessor to the current IQQM model. That model utilised historic rainfall and climatic data as does the current model but was simulated on a monthly basis and did not include a 95%ile flow regime. As previously stated the latest IQQM indicates a secure yield far less than the previously determined amount. The secure yield has been peer reviewed and is considered robust and accurate. The state government have divested themselves of the role of undertaking secure yield assessments and therefore it was undertaken by Sunwater which is a Queensland Government owned consultancy. Whilst the secure yield has reduced from 27,500 to 13, 750 ML/annum the water licence allocation cannot be reduced as it is an entitlement already granted to Council. | TSC staff discussions, January 2010 |

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| 26.1 | 28/01/2010 | Has any flow monitoring and modelling been done for Byrrill Ck to determine what environmental flows are and will be when a dam is built? | Phone | Joanna Gardner | BCD | | Flow monitoring and modelling for environmental flows is carried out by the NSW Office of Water. They report that flow records for Byrrill Creek exist from 1969. It appears the Office of Water has had two gauges on Byrrill Creek, but one of those is now discountinued. Data was collected from the Byrrill Creek gauging station for the period from 1969 to 1982. Low flow index for the critical month (November) is now estimated from modelling of the discontinued Byrrill Creek gauging station, and the existing Glen Warning gauging station (201010). | Draft Water Sharing Plan, Tweed River Area Unregulated and Alluvial Water Sources, 2009 http://www.water.nsw.gov.au/Water-Management/Water-sharing/Commenced-water-sharing-plans/Draft-water-sharing-plans/default.aspx |
| 26.2 | 28/01/2010 | Where is the water quality testing location at Byrrill Creek? | | Joanna Gardner | BCD | | Council carries out water quality testing at a site near the confluence with Cedar Creek. The Office of Water also has a gauging stations at Glen Warning. | TSC staff discussions, January 2010 |
| 26.3 | 28/01/2010 | Is it at Cedar Ck? | | Joanna Gardner | BCD | | This would be the Office of Water's Glen Warning gauging station. | TSC staff discussions, January 2010 |
| 26.4 | 28/01/2010 | How often is this carried out and what is tested for? | | Joanna Gardner | BCD | | This Office of Water has this information. | TSC staff discussions, January 2010 |
| 26.5 | 28/01/2010 | Would this be a requirement once a dam was built? | | Joanna Gardner | BCD | | Both the Office of Water and the Dam Safety Committee would stipulate the requirements for water level, water flow and water quality testing. The details of these requirements would be finalised in detail as part of the EIS and licensing processes. | TSC staff discussions, January 2010 |
| 27.1 | 28/01/2010 | Does Council monitor flow quantity and quality into and out of CHD? | Phone | Joanna Gardner | CHD | | Yes, there are almost a dozen points along the dam and in the upper Doon Doon Ck catchment for monitoring of water quality and water levels. | Refer to map distributed 05.02.2010 |
| 27.2 | 28/01/2010 | How often is this carried out and what is tested for? | | Joanna Gardner | CHD | | This depends on the particular site, but there are a range of physio-chemical, microbiological, nutrient and water level & flow parameters measured. These range from instantaneous water level monitoring through to weekly, monthly or other frequencies depending on the parameters | TSC staff discussions, January 2010 |
| 27.3 | 28/01/2010 | Are there records that are accessible? | | Joanna Gardner | CHD | | Council controls a database of historical data. Council is required to report this information annually to the Office of Water as part of its KPI reporting (Key Performance Indicators). | TSC staff discussions, January 2010 |
| 28.1 | 29/01/2010 | On the 7 December 2009 I asked the question: "Whether an expert Independent Review of the consultancy team's four water augmentation options should be considered. Such a Review would support the CWG's final deliberations on this matter."<br>Further concern about an independent expert review was raised by another CWG member at our last meeting on the 18 February 2010.<br>WaterTSC advised in December 2009 that: "an expert review of the entire process and EIS recommendations will be carried out be an independent consultant to give Council further certainty before applying for development approval."<br>If Council is serious about an Independent Review then a reputable institution like the Institute for Sustainable Futures, University of Technology Sydney should be requested to carry out this expert review and not just another water consultancy. | Email | Richard Murray | Coarse Screening | | All work to date has been carried out by independent experts. The reports supplied to you thus far show the breadth and depth of that independent expertise and have included information from all of the following experts: Montgomery Watson Harza, NSW Public Works, Hunter Water, SunWater, Water Solutions, Southern Cross University, Converge Heritage & Community, Greenloaning Biostudies, Eco-sure Environmental Consultants, Tweed Landcare Inc., and Peter Parker Environmental Consultants. In additional, Council has been receiving advice from other government authorities such as NSW Office of Water, NSW Fisheries, National Parks, NSW Forestry, Catchment Management, NSW Health, and others. Over and above all this, Council's initial advice stands that "an expert review of the entire process and EIS recommendations will be carried out be an independent consultant to give Council further certainty before applying for development approval." If part of the CWG's recommendations is that additional independent review be sought at an earlier stage, the CWG can suggest this in its report however an independent review<br>will not be carried out for the CWG. | TSC staff discussions, January 2010 |

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| 28.2 | 29/01/2010 | There is no current Council plan to maximise the reuse of 92 % of reclaimed water now discharged into the Lower Tweed Estuary. A purple pipe system similar could reuse reclaimed water in the new residential developments at Cobaki Lakes (10,464); Bilambil Heights (6881); Kings Forest (10900); Terranora Area 3071: West Kingscliff (2687) and in some of the projected infill areas (25896) totalling 157048 in 2036. | Email | Richard Murray | Demand Management | | Council has investigated alternative supply schemes (such as reuse schemes) before embarking on this Water Supply Augmenetation project. Reuse in particular has been investigated in detail in the Stage 1 Demand Management Strategy which went on public exhibition and you commented on in 2008. The Stage 1 report looked at the possibility of introducing recycled water in a 'three-pipe system' to supplement 'future major greenfield development sites' at Cobaki, Bilambil heights, Area E (Terranora), Kings Forest and West Kingscliff. A three-pipe system would include a pipe for drinking water, one for sewage and the third to transport recycled water from wastewater treatment plants. The study concluded that although this system would save the equivalent amount of water as the 'rainwater tank' option, both the upfront and ongoing costs of providing a three-pipe network and establishing membrane treatment was significantly higher. These overall combined costs to the community, developers and council were approximately twice that of the rainwater tank option from a long-term financial perspective - in excess of $30 million over a period of 20 years.<br>A further two major options considered included the combination of rainwater tanks and recycled water, and an indirect potable re-use option (which would involve returning recycled water to the Clarrie Hall Dam to be collected and re-treated as part of normal drinking water). Both of these options were ruled out due to prohibitive costs.<br>From an environmental perspective, both recycled water options reduced effluent flows to the waterways but only by about 10 per cent and a considerable amount of energy would be required to treat and transport the water. The membrane treatment processes and pumping systems consume enormous amounts of energy which in turn produce significant greenhouse emissions. The total cost involved with implementing the indirect potable re-use option was found to be in excess of $184 million. | Demand Management Strategy - Stage 1 |
| 28.2 | 29/01/2010 | Council does not acknowledge or support the increasing re use of reclaimed water. Tweed shire Council should consider the following projects<br>· Australia's largest residential recycled water scheme is at Rouse Hill in Sydney's northwest;<br>· Homes in north Adelaide are being fitted with the purple-colour pipes to deliver recycled water to toilets and outdoor taps, similar to the dual-reticulation water supply pipes at Mawson Lakes.<br>· Water Sector News 29.01.2007 - The Victorian Government will mandated to have RECYCLED WATER in all new residential estates. More than 40,000 new homes in Melbourne's outer east will be required to connect to recycled water in an attempt to save 4000 ML/yr.<br>· AWA Water News 17 September 2006 - GOLD COAST CITY COUNCIL won the International Water Associations' (IWA) Global Grand Prize for Planning Innovation at the World Water Congress in Beijing for the PIMPAMA COOMERA Master Plan which aims to save up to 84% through use of Class A+ recycled water and rainwater. | Email | Richard Murray | Demand Management | | The list relates to other authorities with regard to their demand management strategies which you've consider to be best practice. It is also worth noting that despite these best practice demand management measures, all of these authorities have supply augmentation strategies which include dams and or desalination plants. For example South East Queensland have interconnected their dams (which has increased yield by 20%), have built Tugun Desalination plant are constructing Wyaralong Dam and are now proposing to build additional desalination plants. Sydney Water have increased the capacity of Warragamba Dam by accessing water below the bottom water level and are constructing a desalination plant at Kurnell. These other authorities have also found that demand management will delay but not eliminate the need for a new supply option. | TSC staff discussions, January 2010 |
| 28.3 | 29/01/2010 | A population of 157,048 Tweed persons would generate approximately 14,330 million litres reclaimed water annually in 2036. This reclaimed water could replace drinking water now being used in gardening and outside activities. Current production of drinking water is approximately 10,500Ml per annum.<br>It is estimated that 20,280 ML/annually of drinking water will be required in 2036 for a population of 157048 with a forecasting that each person uses 354 litres/capita/day.<br><br>Other nearby water supply authorities are adopting a more cautious water use plan.<br>As an example AWA Water Sector News – reported on the 16.12.2009 - WATER USE for Melbourne is subject to Target 155 campaign so that people must save water. | Email | Richard Murray | Demand Management | | These figures have compared TOTAL per capita water use with RESIDENTIAL per capita water use. The total per capita water use is calculated by dividing the total amount of water used by homes, businesses and others in the Shire by the total population. The predicted demand managed consumption for the Shire in 2036 is 14,859ML/annum which equates to approx 259L/p/yr (14859 / 157048 / 365).<br>If we just look at residential demand then this equation becomes 9700 / 157048 / 365 = 169L/p/yr. It is this number that we should be comparing with the Target 155 campaign you refer to.<br>Refer also to the answer to question 22.1 | Demand Management Strategy |

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| 28.4 | 29/01/2010 | Loss of drinking water through water leakage, theft etc<br>Tweed Shire Council IWCM update for council's January 2010 meeting reports that the present leakage index equates to 13% to 15% for unaccounted water. Council's (IWCM- March 2006) target was to reduce water loss to 12% by 2010. Council's current target for Non Revenue Water remains at 12%.<br>The loss of Non-Revenue Water in 2006 was 1274 ML per annum. In 2036 the drinking water loss is forecast at 2735 Million Litres annually.<br><br>Sad that Tweed Shire Council is not implementing a similar program as below. Several years ago Gold Coast Council introduced a program of reducing the water pressure in the mains pipelines, in order to reduce leakages and pipe failures. So far the results have been fantastic – water leakage has been reduced by 7.34 million litres per day and there has been a reduction of 42% in the number of pipe bursts! The program is continuing to extend across the city. There are 60 specific areas throughout the city and 42 have been done so far. Works are scheduled in Nerang early in 2011 (yes, I know, a full 12 months away). The pressure reduction wont impact upon residents or businesses. | Email | Richard Murray | Demand Management | | Gold Coast City Council (GCCC) – Reducing Water Leakage. GCCC is certainly working hard to reduce leaks. However, TSC also has an ongoing program of leak detection and system replacement, which is being enhanced through the introduction of computer based modelling and experimenting with alternative management techniques such as pressure and flow reduction. Initial testing for leaks using 'reservoir drop' tests involve Council staff carrying out testing late at night and in the early morning when usage is very low to see if unaccounted water is escaping the system. Based on initial testing and discrepancies found at Tweed Heads a firm has been engaged using specialised sound testing techniques to pinpoint any significant leaks so pipes can be repaired. However as described in the article about Nerang, these types of testing take time, and the analysis and replacement requires significant resources and needs to be carefully planned so as not to disrupt supply. | TSC staff discussions, January 2010 |
| 29.1 | 28/01/2010 | I am concerned that there is an error in the calculation of the volume for CHD. If the existing dam has a capacity of 16,000ML how can the new dam have a capacity of 42,300ML when the increase in depth is only 8.5m? | Meeting | Tony Thompson | CHD | | These calculations have been undertaken using accurate ground survey information and computer modelling by dam design consultants. Due to the irregular shapes of the existing and new water bodies these calcuations are difficult to estimate accurately with anything other than a computer model.<br>Tony, Robyn and Tim made some rough calculations in an attempt to confirm whether the consultant's figures were acceptable.<br>1) According to Council's GIS system, the surface area of the new dam is approx 4,5000,000m2. This was confirmed as correct by Tony, Robyn & Tim through rough calculation. The surface area of the existing CHD based on an underestimate from the Lands Dept map was approx 1,500,000m2.<br>2) Volume of the water above the existing surface area is 1,500,000m2 x 8.5m = 12,750,000m3<br>3a) One estimate of the volume of the remaining new storage was taken by assuming an average depth of inundation of 4.25m --> (4,500,000 - 1,500,000) x 4.25 = 12,750,000m3<br>This would give a total volume for the new storage of 12,750,000 + 12,750,000 + 16,300,000 = 41,800,000m3 = 41,800ML<br>This result is very close to the 42,300ML estimated using accurate survey and computer modelling.<br>3b) Tony requested another more conservative estimate of the volume be calculated assuming an average depth of 2.8m (one third of the 8.5m max inundation height). This resulted in a volume of (4,500,000 - 1,500,000) x 2.8 = 8,500,000m3 for the remaining storage.<br>This would give a total volume for the new storage of 12,750,000 + 8,500,000 + 16,300,000 = 37,550,000m3 = 37,550ML. This represents a difference of 10% on the volume calculated using accurate survey and computer modelling data and considering the rough nature of the checks would appear to be a very good estimate.<br>Tony was supplied with a detailed 2m contour map in A0 size to do further analysis if he wished. | TSC GIS system |
| 30.1 | 01/02/2010 | Is it possible to provide maps showing private owned land, the land owned by Council, and National Parks land at the two dam sites | Site visit | Various | Stakeholders | | Maps attached. | TSC GIS system |
| 31.1 | 02/02/2010 | Essential protection of the Tweed River's health; the provision of non interrupted environmental flows; the saving of bulk stormwater and the major reuse of used water, appear to be outside Council's philosophical approach as an urgent objective, in its consideration of the augmentation of Tweed District Water Supply. | Email | Richard Murray | Water Supply | Environment | These are indeed within Council's approach. In the meetings, question register and site visit we have discussed environmental flows and the Tweed River's health, and noted that Council must follows existing environmental flow conditions set down by the NSW Office of Water. We have also discussed that these conditions are likely to become more stringent in the future due to the draft water sharing plan, and any new or altered dam would almost certainly result in increased environmental flow requirements being imposed on Council. We have also discussed, and the Demand Management Strategy goes into great depth on this, that Council has investigated the use of stormwater and recycled water to reduce demand on the potable water system. | TSC staff discussions, January 2010 |

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| 31.2 | 02/02/2010 | Tweed Shire Council is planning to use only a limited range of available demand management strategies over an unsatisfactory time period. Progress in saving water has slow when you consider Tweed Shire Council's Integrated Water Cycle Management (IWCM) Strategy has been in operation since 2006 | Email | Richard Murray | Demand Management | | There are a suite of wide ranging demand management actions that Council has either already implemented or are being proposed. Over 50% of all houses in Tweed Shire have been retro-fitted with water efficient appliances - this figure is the highest of all local government areas along the north coast of NSW. Demand Management actions by their very nature require time for implementation. Many of the potential savings require the education of people and organisations to alter the way in which they use water. Council has recognised this and has invested in the waterwise education of school children for some 15 years. Total per capita water use has been reduced by 40% since 1991. This marked reduction in per capita water use and overall reduction in water use that has been seen over this period highlights the significant progress that has been made in this area. Further savings have been seen since the IWCM was adopted in 2006. All of this data is described in detail in the demand management strategy. | Demand Management Strategy |
| 32.1 | 03/02/2010 | Would it be too difficult to forecast or project were we would have been if Clarrie Hall Dam was never built, How many people could the valley have supported if Clarrie Hall Dam was not created?<br>Could we have coped with our current population etc. A bottom line of what may have been, may help our vision of what is going to be needed. | Email | Pryce Allsop | CHD | | The secure yield of the current system is 13,750ML/year (ie Tweed River, CHD and Bray Park Weir) . The secure yield of the system without Clarrie Hall Dam (ie Tweed River and Bray Park Weir only) has been estimated at less than 4000ML/year, which would support approximately 30,000 residents connected to the town water supply.<br>At the time of CHD completion in 1983 the connected population had already exceeded the secure yield of the system and was approximately 33,000. | TSC staff discussions, February 2010 |
| 32.2 | 03/02/2010 | Sam Dawson's video was interesting, is what he said accurate ? If it's not, should it be allowed to be shown. I'm all for good information. The information provided strongly suggests that whilst we may need dams they are bad for the environment. | Email | Pryce Allsop | Water Supply | | Much of the information on the options presented to the CWG has highlighted various potential impacts to the environment. In particular several of the reports prepared by experts which highlight the affect the proposed dams would have on the local environment. These are important issues that the CWG should consider, together with other social impacts in its deliberations.<br>Refer to: Natural Heritage Trust The Restoration Prioritisation of High Conservation Value Riparian Lands of the Upper and Mid Tweed River. A Preliminary Survey Using a Rapid Assessment Approach., Northern Rivers Catchment Management Authority Byrrill Creek Riparian Rehabilitation Plan – March 2006, Peter Parker Environmental Consultants Pty Ltd Byrrill Creek Forestry Venture An Environmental Assessment of Selected Harvesting – August 2000, Peter Parker Environmental Consultants Pty Ltd Byrrill Creek Reafforestation Programme A Flora and Fauna Assessment – December 1998, Greenloaning Biostudies Pty Ltd Proposed Raising of Clarrie Hall Dam – Final Report - April 2008 | Reports distributed 18.01.2010 |
| 33.1 | 04/02/2010 | What is the height in mtres, not contour levels, of the Byrrill creek Dam and the Spill way? | Email | Joanna Gardner | BCD | | At the centre point of the dam crest the wall would be between approx 35m and 40m above the existing stream. | TSC GIS system |
| 33.2 | | What is the total width of the dam running across the creek? | Email | Joanna Gardner | BCD | | The length of the dam crest varies according to the size of the dam. It has been estimated between approx 270m and 340m in length. | TSC GIS system |
| 33.3 | | 2. Could I please have a map that delineate Council Land Boundaries, National Park Boundaries & Peter Van Lieshout's land. It is confusing on the dam maps you have supplied. | Email | Joanna Gardner | BCD | | Refer to question 30.1 | |
| 33.4 | | 3. How much land within Mebbin National is inundated? | Email | Joanna Gardner | BCD | | The amount of land inundated depends on the size of the dam. The minimum area of Mebbin National Park affected has been estimated at approx 4ha, while the maximum area would be approx 21ha. | Environmental Impact Quantifier Matrix |
| 34.1 | 07/02/2010 | What plan does Council have to complete the retrofit of remaining houses in Tweed and carry out an audit of other high use water items? | Email | Richard Murray | Demand Management | | Council's Demand Management Strategy (DMS) is currently on public exhibition. Both retro-fitting and auditing have been identified as specific actions within the strategic approach. Once adopted Council will move to meet the strategies identified in the report through implementation of actions such as retro-fitting and auditing, together with a suite of other actions as identified in the DMS. | Demand Management Strategy |
| 34.2 | | It is noted that the NSW Office of Water - Draft Water Sharing Plans describes total surface water entitlement of Mid Tweed River Source as 28728 ML/year. Could Tweed Shire Council provide the historic annual river flows (the Mid Tweed River/Clarrie Hall Dam) arriving at the Bray Park Weir? This may help to explain your need for a secure yield. | Email | Richard Murray | Water Supply | Secure Yield | Refer to attachment provided under question 15.3 | |
| 35.1 | 12/02/2010 | What are the details of Option 4 that the Community Working Group is required to consider? | Email | Richard Murray | | | Refer to answer to question 38.2 | |

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| 35.2 | 12/02/2010 | The project team is yet to provide to the CWG:<br>- Full explanation of the pipeline and groundwater components in Combination Option 4 and - Actions, council needs to complete to make groundwater, both at the local and coastal level, a dependable source of temporary supply. There has been insufficient explanation to the Community Working Group (CWG) whether the two pipeline links are indeed a realistic solution as part of Combination option 4. The SEQ Water Grid or Rous Water has not confirmed in writing that they are prepared to provide a definite temporary bulk water supply to Tweed. These pipeline water supply options may be as unrealistic as Council's Option 9 "Direct potable use" | Email | Richard Murray | | | Refer to answers to questions 38.1 - 38.2 | |
| 36.1 | 16/02/2010 | Can we still ask questions because I would like it recorded that I have asked about a safety plan for any areas in danger if the Clarie Hall Dam option is chosen. The rock in this area is rent by fissures and often comprises of large boulders packed together. Any explosion near the dam wall could have a knock on effect. This should be taken into account and a safety and evacuation plan produced. I believe that this should be costed ,at least in broad terms ,before the next meeting because such a plan may be very expensive. For example having a fleet of buses standing by on blasting days. | Email | Tony Thompson | CHD | | Clarrie Hall Dam foundation construction includes grout curtains that extent up to 30m into the foundation rock. The dam has been evaluated as one of the safest dams in NSW as far as the structure goes.<br>Council has completed dam break modelling for various scenarios including flooding and earthquake. The probability of failure is extremely low. The highest Population At Risk (PAR) scenario is the dam breaking due to a massive flow with juts over 500 properties at risk. The dam under these scenarios does not fail instantaneously (there are early warning signs) and this gives Council and SES time to implement an emergency plan.<br>Council conducts regular and thorough monitoring (both manual and automatic) of the structure.<br>An emergency plan is in place and known by the SES and will be rolled out to the public once the Australia Government early alert system is clarified. | TSC staff discussions, February 2010 |
| 37.1 | 17/02/2010 | Why are we looking at 36,000 MegaLitres (the larger option) when 19,000 MegaLitres is forecast for growth to 2025 | Meeting | | | | The value of 19,000ML/yr refers to the Secure Yield. The existing water system has a secure yield of 13,750ML/y and results from the combination of the Tweed and Oxley Rivers (and all tributaries) up stream of Bray Park Weir plus Clarrie Hall Dam.<br>Secure Yield is the annual volume that can be supplied by the enitre water system with a very low probability of failure. In simple terms failure should only occur if the worst drought on record is repeated. In Tweed's case the probability of that happening is 1 in 10,000 based on 120 years of rainfall information, this includes applying water restrictions when needed. To have a secure water supply for 157,000 people we would require a system with a Secure Yield of 19,000ML/yr. | TSC staff discussions, February 2010 |
| 37.1 | 17/02/2010 | Why are we looking at 36,000 MegaLitres (the larger option) when 19,000 MegaLitres is forecast for growth to 2025 | Meeting | | | | The figure of 36,000ML refers to the storage capacity of the largest Byrrill Creek Dam. Storage Capacity is the volume of the dam. By comparison Clarrie Hall Dam has a total volume of 16,000 ML of which 15,000 ML is available to be released.<br>There is no specific relationship between dam size and secure yield. (ie between 19,000ML/year and 36,000ML)<br>What can be said is that as the size increases the, the increase in yield will be less, as the catchment has not increased in size. E.g. if you keep increasing the size of the rain water tank but not the roof area connected then it will fill les frequently if at all.<br>Additionally, the environment flow releases from a new dam on Byrrill creek are likely to be significantly larger then for Clarrie hall Dam. Therefore a larger dam is required to yield the same amount of water for use for water supply. The proposed Byrrill creek Dam is relatively shallower than CHD and will have larger evaporation losses. The rainfall at the proposed Byrrill Creek Dam is slightly less than at CHD.<br>The smaller 16,900 ML Dam option at Byrrill Creek may be just be able to provide the additional 5,000 ML/y of secure yield required given all the above reductions.<br>The 36,000 ML Dam option has been provided to show up front, what the largest feasible size dam that could be built at this site. | TSC staff discussions, February 2010 |

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| 38.1 | 21/02/2010 | The three SEQ pipeline route options are just too vague to be included in this Question Quantifier and have been described in the press in the local press of 11 and 18 February 2010 as 'Pipedreams".Discussions after our meeting indicated that a different route altogether might be chosen to connect to the SEQ water grid.You have already advised that the SEQ Water Grid Manager has not confirmed in writing whether he will guarantee water supply.Your last communication dated 24 September 2008 with QWC (SEQ Water Grid)advised:'The Queensland Government is reluctant to commit a definite supply in NSW at this stage'An indication of QWC Water Policy is shown in the revised draft of the South East Queensland Water Strategy (November 2009), (Chapter 5, Para 5.5, - Supplies to outside SEQ):" Under the System Operating Plan governing the activity of the SEQ Water Grid Manager , any supply of water to irrigators and to urban areas outside of SEQ will not be permitted to impact on the achievement of the LOS Objectives for urban customers within SEQ'. At this stage there is nothing definite in the pipeline route for the CWG to consider | Email | Richard Murray | SEQ | | The SEQ pipeline option is one of the three main options to be considered in determining a preferred option. Three potential routes were proposed during the coarse screening phase and are being considered for comparison purposes to determine a preferred option. If this option were to become the preferred option, further investigation would be required to identify the actual pipeline route and the conditions of supply from SEQ. Pipeline alignments offer some flexibility in terms of overcoming potential project constraints; it is important to focus on the issues which are likely to arise for pipelines between point Y and Z. To give you a comparison with the other options: the ultimate size of the dam options will also be decided after further investigation, however the range of potential inundation areas enables the relative impacts to be compared to assist in determining a preferred option.<br>Preliminary contact has occurred between TSC and SEQ Water and further discussion will be required before either party would be in a position to determine whether to enter into a commitment. This does not mean that the option is not possible, but certainly we have identified that the major issues for the SEQ pipeline connection relate to legislative and political factors. | TSC staff discussions, February 2010 |
| 38.2 | 21/02/2010 | The Option 4 includes:<br>* Pipeline to Rous Water, at Ocean Shores (ranked 4th option and uncertain)<br>* Groundwater supply (ranked 6th option)<br>* Smaller pipeline link to SEQ Water, at Tugun<br>Having these three contingency items in this question Quantifier and expecting considered answers listed against the Environmental and social attributes is confusing and not satisfactory. | Email | Richard Murray | | | The contingency option has been included as a shortterm option if delays occur with the preferred option. It is not under investigation as a preferred option. We would like the CWG to provide feedback and recommendations on the potential environmental and social impacts of this option so that these can be taken into account in subsequent investigation phases. | TSC staff discussions, February 2010 |
| 38.3 | 21/02/2010 | I consider that the Environmental and Social attributes documents are not satisfactory to reflect CWG's study of environmental and social attributes of the Tweed District Water Supply Augmentation Options.I trust that you will review the two Quantifier documents to reflect the CWG's main concerns on Environmental and Social Issues. | Email | Richard Murray | | | The matrices have been developed at the request of the CWG to assist members to compare the options and their impacts on a number of environmental and social issues. The list of sub-criteria was based on initial requests from the CWG and the information available to Council. At the meeting last week (15.02.2010) the CWG was asked identify additional issues that should be added to the matrices - and a number of issues were added. In our email of 19.02.2010, we also invited members to send any further issues they feel should be included. Please do so if you would like additional items included. | Impact Quantifier Matrices |
| 39.1 | 22/02/2010 | Now please could you explain that when the group was given its figures that the existing area of the Clarie Hall Dam was 1.4 million square meters and on your grid it starts at 2.25 million square meters. It means that all along I have been working to incorrect figures!! | Email | Tony Thompson | CHD | | | |
| 39.2 | 22/02/2010 | Also if the spillway were widened and we had a very heavy rain storm what damage could this cause downstream? According to what I have read on the internet this could be a serious problem. | Email | Tony Thompson | CHD | | | |
| 39.3 | 22/02/2010 | With regard to the matrices that we have been sent ,how are thes to be used in conjunction to the one we have been given.With regard to the given ones I would like to remind you of the error that needs correcting with reference to no carbon footprint after work would finish which as I pointed out to you has omitted to include the absorbtion factor for loss of trees also no reference has been made to the emmission of methane from the poor quality water in the bottom of the dam | Email | Tony Thompson | CHD | | | |