TWEED SHIRE COUNCIL

TWEED DISTRICT WATER SUPPLY AUGMENTATION OPTIONS STUDY

TABLE 1: DETERMINATION OF COARSE SCREEN RATINGS

MULTI CRITERIA ANALYSIS FOR ASSESSMENT OF OPTIONS

APPENDIX E

		ASSESSMENT CRITERIA																	
	Option	Secure Yield		Planning Obligations		Established Technologies & Feasibility		Environmental Constraints		Social Acceptability		Legislative Acceptability		Cultural Heritage Impacts		Lead Time for Construction & Potential for Escalation of Costs		Capital, Operations, NPV & Annualised Cost per ML		Greenhouse Gas & Energy Consumption	
No.	Description	Rating	Description	Rating	Description	Rating	Description	Rating	Description	Rating	Description	Rating	Description	Rating	Description	Rating	Description	Rating	Description	Rating	Description
1	Raising Clarrie Hall Dam	5	Previous studies show this option will provide an additional 8,250 ML/annum, which is in excess of the required additional secure yield of 5,250 ML/annum over the planning horizon.	4	The existing dam area is zoned for a dam. Council owns most of the new inundation area with the remainder being zoned rural land.	5	Foundation conditions and potential materials areas are well understood at this site	3	Some significant forest and threatened species have been identified in the area to be inundated. Preliminary investigations completed.	3	Some land acquisition will be required and small deviation of local roads. Social impacts considered relatively minor since raising is on the site of an existing dam.	4	No significant legislative hurdles for raising on the site of an existing dam.	3	Sites of known Aboriginal significance will be inundated. Preliminary investigations completed.	3	Environmental investigations and approvals processes, together with dam raising period require significant lead times.	5	Annualised cost over 30 years is very favourable as $569 / ML.	5	GHG emissions are high initially during the construction phase, but thereafter are negligible under normal operations.
2	Byrrill Creek Dam Construction	5	Previous studies show this option will provide an additional 9,000 ML/annum, which is in excess of the required additional secure yield of 5,250 ML/annum over the planning horizon.	3	Council owns part of the inundated area. The majority of the area is zoned for a dam with some land zoned rural.	5	Foundation conditions are expected to be similar to the Clarie Hall Dam with few potential unknowns.	2	Higher potential than CHD for impacting upon significant flora and threatened species in the inundated area and near the dam site.	2	Some land acquisition will be required and probable closure, or deviation of Byrrill Creek Road.	2	NSW Weirs Policy discourages the construction of new on-stream storages. This, together with new acquisitions poses legislative difficulty.	1	Several sites of known Aboriginal significance will be inundated.	1	Environmental investigations and approvals processes, together with dam raising period require significant lead times, and more so than for CHD Raising.	4	Annualised cost over 30 years is favourable as $653 / ML.	4	GHG emissions are higher than for CHD raising during the construction phase, but thereafter are negligible under normal operations.
3	Oxley River Dam Construction	5	Previous studies show this option will provide an additional 20,000 ML/annum, which is well in excess of the required additional secure yield of 5,250 ML/annum over the planning horizon.	2	Land that will be inundated is zoned Rural 1(a), Forestry 5(a) and Environmental Habitat 7(i).	5	Foundation conditions are not expected to raise serious concerns from the potential unknowns.	1	Actual effects are unknown, but given dense vegetation and other land uses, there are likely to be significant effects to flora and fauna, cultural heritage and private landowners.	1	Significant land acquisition will be required. Closure of Tyalgum Road and significant potential for flooding of Tyalgum village.	1	NSW Weirs Policy discourages the construction of new on-stream storages. This, together with significant acquisitions poses legislative difficulty.	2	Sites of Aboriginal significance are yet to be documented, but are likely to be significant.	1	Environmental investigations and approvals processes, together with dam raising period require significant lead times, and more so than for CHD Raising.	4	Annualised cost over 30 years is favourable as $696 / ML.	4	GHG emissions are higher than for CHD raising during the construction phase, but thereafter are negligible under normal operations.
4	Pipeline to Rous Water	1	The estimated additional supply of 1,800 ML/annum is insufficient as a stand-alone solution.	4	Pipelines for water supply may be constructed without development consent.	5	No insurmountable issues envisaged with pipeline construction technologies.	4	Pipeline route is along the Old Coast Road, which has already been disturbed, but is in proximity to the Billinudgel Nature Reserve.	3	Potential for water to flow in either direction, enhancing water security to both Tweed and Byron communities. However, inter-valley water transfers have previously been politically problematic.	3	Inter-valley transfers and the proximity of environmentally significant areas will require careful application of legislative procedures.	3	The majority of the pipeline would be constructed in areas previously disturbed, but no investigations have been carried out and an Archaeological Survey would be required.	3	Environmental approvals still required, but construction period longer than that for the pipeline to SEQ Water Grid.	1	Annualised cost over 30 years is unfavourable at $2,444 / ML.	3	GHG emissions will be relatively moderate during the construction phase. Emissions during operations will be linked to mechanical and electrical plant for pumping.
5	Pipeline to SEQ Water Grid	3	Although this option may provide an additional 7,500 ML/annum, there is a risk that it may not be available when required.	2	Needs Federal EPBC Act approval and pipeline will be in future road reserve of Cobaki Lakes development.	5	No insurmountable issues envisaged with pipeline construction technologies in road reserves.	5	Pipeline route is adjacent to the Tugun By-pass and along a future road reserve as part of Cobaki Lakes development.	3	Potential for water to flow in either direction. However, cross-border water transfers have previously been politically problematic.	1	Agreement for transfer of water between the States is likely to be a protracted process.	4	Areas were previously identified under the Tugun By-pass EIS, but the majority of construction will be in areas previously disturbed.	4	Environmental approvals still required, but construction period is less than that for dams.	2	Annualised cost over 30 years is unfavourable at $1,655 / ML.	1	GHG emissions will be relatively moderate during the construction phase. GHG emissions during the operating phase will be very high where purchased water is produced by the Tugun Desalination Facility.
6	Desalination	4	Depending on further investigation and the final receiving network configuration, this option may provide an additional 7,500 ML/annum.	3	Development consent is likely to include onerous requirements for brine disposal and siting of plant and pipelines. However, precedents do exist in NSW.	3	Thermal and membrane desalination technologies for public water supplies are still developing and highly specialised, but are now recognised in Australia.	1	Disposal of brine by-products is a significant concern. Potential for impacts along the 18 km pipeline, including at coastal headlands and for acid sulphate soils. High chemical and energy use during operation.	2	Social concerns are expected to be raised over disposal of the brine wastes to either Norries Head, or near Bogangar Beach.	1	The requirements for the disposal of the brine wastes and water extraction (among others) are likely to involve Ministerial discretionary powers.	3	Archaeological surveys will be required over the 18 km brine waste pipeline and the plant site.	2	Relatively long lead time required for approvals process under Part 3A of EP&A Act.	1	Annualised cost over 30 years is unfavourable at $2,782 / ML.	1	Both the construction phase and the operating costs will contribute significantly to GHG emissions.
7	Groundwater	1	The estimated additional supply of 1,470 ML/annum is insufficient as a stand-alone solution.	2	Development of groundwater resources requires conformance with two State and one Federal legislative frameworks.	4	Whilst borefield technologies are well understood, the outcomes can be uncertain.	2	Borefields to be regulated for set-back distances from wetlands and for adverse effects upon terrestrial vegetation.	3	Concerns may be raised over unacceptable environmental impact.	3	There is an increasing legislative complexity being applied to the development of groundwater resources.	4	Traditional Owner groups regard groundwater resources as of particular cultural significance.	3	Lead time can be significant for environmental investigations, community consultation and approvals.	1	Annualised cost over 30 years is unfavourable at $2,535 / ML.	3	GHG emissions will be relatively moderate during the construction phase. Emissions during operations will be linked to the mechanical and electrical plant for pumping and water treatment.
8	Indirect Potable Reuse	3	This option may provide an additional 10,200 ML/annum, depending on further investigation, the final site configuration and possible staging.	1	Development consent is likely to include onerous requirements from a broader range of agencies for siting of pipelines and disposal of treatment process by-products and toxins.	3	MF / RO advanced water treatment technologies for public water supplies are still developing and highly specialised, but are now recognised in Australia.	2	Disposal of treatment process by-products and toxins is a concern. Potential for impacts along the 50 km pipeline including acid sulphate soils. High chemical and energy use during operation.	2	Social concerns are expected to be raised regarding assurance of public health and disposal of the brine wastes.	2	The requirements for public health assurances and the disposal of the brine wastes (among others) are likely to involve Ministerial discretionary powers.	2	Archaeological surveys will be required over the 50 km of pipelines. Much of this is in previously disturbed road reserves.	2	Relatively long lead time required for approvals process under Part 3A of EP&A Act.	1	Annualised cost over 30 years is very unfavourable at $3,579 / ML.	1	Both the construction phase and the operating costs will contribute significantly to GHG emissions.
9	Direct Potable Reuse	3	This option may provide an additional 10,200 ML/annum, depending on further investigation, possible staging and the final site and receiving network configurations.	1	NSW legislative framework not yet developed for this option. Development consent is likely to include onerous requirements from a broad range of agencies for brine disposal and siting of pipeline.	1	Advanced water treatment multi-barrier technologies for public water supplies for direct potable reuse are untested in Australia.	2	Disposal of treatment process by-products and toxins is a concern. Potential for acid sulphate soil impacts during construction. High chemical and energy use during operation.	1	Significant social concern is expected regarding assurance of public health where DPR has not been implemented in Australia - and other options exist.	1	Legislative framework is not yet tested and significant legislative hurdles are envisaged.	4	Minimal impacts as the 2.8 km pipeline is in previously disturbed road reserves.	2	Relatively long lead time required for approvals process under Part 3A of EP&A Act.	1	Annualised cost over 30 years is very unfavourable at $3,318 / ML.	1	Both the construction phase and the operating costs will contribute significantly to GHG emissions.

Notes: Rating is the impact upon the Assessment Criteria, which may be a risk, difficulty, etc: (The Rating is used in Table 2 to determine the Score for each option.)

1	High negative risk, impact, difficulty
2	Difficulties encountered, which can be managed with special treatment
3	Moderately straightforward with a low degree of difficulty
4	Low negative impact
5	Very low negative impact / excellent

TWEED SHIRE COUNCIL

APPENDIX E

TWEED DISTRICT WATER SUPPLY AUGMENTATION OPTIONS STUDY

TABLE 2: DETERMINATION OF COARSE SCREEN SCORES AND RANKINGS

MULTI CRITERIA ANALYSIS FOR ASSESSMENT OF OPTIONS

		ASSESSMENT CRITERIA																													
	Option	Secure Yield			Planning Obligations			Established Technologies & Feasibility			Environmental Constraints			Social Acceptability			Legislative Acceptability			Cultural Heritage Impacts			Lead Time for Construction & Potential for Escalation of Costs			Capital, Operations, NPV & Annualised Cost per ML			Greenhouse Gas & Energy Consumption			Total Score	Rank
No.	Description	Rating	WF	Score	Rating	WF	Score	Rating	WF	Score	Rating	WF	Score	Rating	WF	Score	Rating	WF	Score	Rating	WF	Score	Rating	WF	Score	Rating	WF	Score	Rating	WF	Score	Out of 250	1 to 9
1	Raising Clarrie Hall Dam	5	5	25	4	4	16	5	4	20	3	4	12	3	3	9	4	4	16	3	4	12	3	2	6	5	4	20	5	3	15	151	1
2	New Byrrill Creek Dam	5	5	25	3	4	12	5	4	20	2	4	8	2	3	6	2	4	8	2	4	8	1	2	2	4	4	16	4	3	12	117	2
3	New Oxley River Dam	5	5	25	2	4	8	5	4	20	1	4	4	1	3	3	1	4	4	2	4	8	1	2	2	4	4	16	4	3	12	102	5
4	Pipeline to Rous Water	1	5	5	4	4	16	5	4	20	4	4	16	3	3	9	3	4	12	3	4	12	3	2	6	1	4	4	3	3	9	109	4
5	Pipeline to SEQ Water Grid	3	5	15	2	4	8	5	4	20	5	4	20	3	3	9	1	4	4	4	4	16	4	2	8	2	4	8	1	3	3	111	3
6	Desalination	4	5	20	3	4	12	3	4	12	1	4	4	2	3	6	1	4	4	3	4	12	2	2	4	1	4	4	1	3	3	81	7
7	Groundwater	1	5	5	2	4	8	4	4	16	2	4	8	3	3	9	3	4	12	4	4	16	3	2	6	1	4	4	3	3	9	93	6
8	Indirect Potable Reuse	3	5	15	1	4	4	3	4	12	2	4	8	2	3	6	2	4	8	2	4	8	2	2	4	1	4	4	1	3	3	72	8
9	Direct Potable Reuse	3	5	15	1	4	4	1	4	4	2	4	8	1	3	3	1	4	4	4	4	16	2	2	4	1	4	4	1	3	3	65	9

Notes: **Rating** is the impact upon the Assessment Criteria, which may be a risk, difficulty, etc:

- **1 =** High negative risk, impact, difficulty
- **2 =** Difficulties encountered, which can be managed with special treatment
- **3 =** Moderately straightforward with a low degree of difficulty
- **4 =** Low negative impact
- **5 =** Very low negative impact / excellent

WF is the weighting factor, which is the relative level of significance placed on the Assessment Criteria as follows:

- **1 =** Very Low
- **2 =** Low
- **3 =** Moderate
- **4 =** High
- **5 =** Very High

Score is the product of the Rating and Weighting Factor to identify the preferred options for the Fine Screen

Rank is the relative preference from most preferred (ranked 1) to least preferred (ranked 9), based on the comparison of scores from all assessment criteria.