# APPENDIX 5: PRELIMINARY ASSESSMENT OF PRIMARY SOURCES

| Option | **Yield or Capacity** (Ability to supply bulk water and make a significant contribution to water supply deficit in the region) | **Availability/ Reliability** (will the option be able to supply water when most needed (i.e. drought) | **Scalability** (can the option be expanded sequentially to reduce initial capital) | **Compatibility** (is the option compatible with existing infrastructure or operations, and the surrounding built environment) | **Acceptability** (Social/ Political/ Cultural Heritage/ Legal) | **Timeliness** (can the option be implemented efficiently in the timeframe required) | **Technical Feasibility** (is the technology proven and reliable, can it be applied with certainty) | **Environmental Sustainability** (ecological impact, resource use, etc.) | **Potential Attractiveness** (how certain are we that this could be part of the regional solution given our current knowledge) | **Key approval issues and potential solutions** | | **Indicative Cost** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | **Issue** | **Solutions** | **Capital** | **Operating (per ML)** |
| Large scale, centralised desalination | Excellent. Virtually unlimited – full 14,000 ML/a 2060 deficit could be accommodated. | Excellent. This option is not climate dependant | Excellent. Easily scalable | Good. There are no fundamental hurdles to incorporating this solution.<br>Interconnection of the high growth areas between the Tweed and Rous Water systems, with the desalination plant located centrally would provide the greatest regional benefit. New electricity supply infra-structure would be required. | Good. There are several contemporary examples of new plants being approved, but is generally regarded as being an expensive option with high energy needs. | Low- Moderate – Although significant study, site selection, land acquisition, etc. is required, there is no reason to doubt that this option could not be implemented by the required time | Good. There are many case studies from which to draw on and the key uncertainties are environmental, not technical in nature. The technology is considered to be maturing and further advances in technology are likely which may be able to be retrofitted in the future. | Moderate.<br>Although desalination of seawater is energy intensive, these impacts can be offset. Other potential issues include potential effects on coastal visual amenity from plant and power infrastructure, effects of the brine discharge on receiving waters (relatively minor) | Good. This has been an accepted solution in several other locations within Australia and overseas. There is no fundamental reason why the same level of acceptability will not apply locally. | Source water availability | Seawater supply line needs to extend a significant distance offshore to avoid coastal processes. | High | High |
| | | | | | | | | | | Brine discharge | Brine discharge to ocean is the best option and would necessitate offshore pipeline | | |
| | | | | | | | | | | Energy usage and power supply availability | Desalination plants can be either co-located with energy sources (e.g. on site solar) or utilise grid power where offsets are available through the purchase of green power. | | |
| | | | | | | | | | | Infrastructure effects on coastal processes, visual amenity | Under-boring of pipelines, low-impact site and power line route selection. | | |
| Raise Clarrie Hall Dam | Good. The estimated yield of the dam (raised by 8.5m to FSL 70m) would be increased by 8,250 ML/a and further benefits may arise due to interconnection | Moderate but does not provide any additional independence from existing surface water sources | Low. FSL 70m is maximum optimum size | Excellent. There are no fundamental hurdles to incorporating this solution with the existing system | Moderate. Raising of CHD was ranked highly in Tweed's studies but there is significant opposition from parts of the community. Heritage studies have not been undertaken. | Low-Moderate. Approvals, land acquisition, design and construction is likely to be protracted. | High. Foundation conditions and<br>potential materials areas are<br>well understood. Some revision of concepts required following spillway upgrade. | Moderate. Additional inundation of land and properties and Aboriginal site. Threatened species and potential referral under EPBC Act. | Moderate. There are no known issues with raising the dam. Interconnection transfer rates and feasibility is not known at this time. | Inundation of land | No direct mitigation, only offsets available (e.g. veg regeneration elsewhere) | High | Low |

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| | | | | | | | | | | **Issue** | **Solutions** | **Capital** | **Operating (per ML)** |
| Raise Toonumbar Dam and create town water supply licences with pipeline to South Lismore | Good. 10,000 ML/a could be available with 10m raising. Raising up to 20m is technically feasible. Unknown additional yield from larger storage. | Moderate. Raising of the dam provides additional security, however this location has higher risk of climate change reductions in yield than more coastal storages | Moderate. Raising to 20m may be feasible following 10 m raising. | Moderate. This option would also require new pipeline and WTP to connect to existing system | High. Inundation of pasture and regrowth only. | Low - Moderate – although significant study required there is no reason to doubt that this option could not be implemented by the required time. | Good. Unknown with respect to pipeline however there are no obvious technical show stoppers. | Good. Nothing significant identified to date. | Moderate - Details of dam raising, pipeline route or WTP have not yet been investigated. | Ability to procure and convert licences to town water | May require a market study or licence holder survey | High | Medium |
| | | | | | | | | | | Pipeline route issues | Constraints mapping and preliminary EA in the to identify issues | | |
| Dunoon Dam | Good. Storages of 17,000 to 85,000 ML considered. 6,100ML/a yield from 50,000 ML storage. Potentially additional 6,000 ML/a with larger storage and further benefits may arise with interconnection | Moderate. Dunoon Dam will be similarly affected as Rocky Creek Dam and does not provide full hydrological independence | Moderate. Dam design may incorporate options to raise the dam. | Excellent. There are no fundamental hurdles to incorporating this solution with the existing system | Poor. There is significant opposition to the building of new dams and presence of Aboriginal burial sites, however this option may be approved if other viable alternatives are not identified | Moderate. Land acquisition, preliminary design and investigations are well progressed | Good. No major technical obstacles have been identified | Low-Moderate. Some high value terrestrial habitat lost, significant resources involved in new dam construction. | Moderate. No insurmountable issues have been identified with the dam. Interconnection transfer rates and feasibility is not known at this time. Yield of larger storage unknown. Heritage issues will need to be resolved to improve the viability of this option. | Landholder displacement and potential compulsory acquisition | Increased compensation | High | Low |
| | | | | | | | | | | Aboriginal burial sites | To be negotiated with the Aboriginal community | | |

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| | | | | | | | | | | **Issue** | **Solutions** | **Capital** | **Operating (per ML)** |
| Large-scale groundwater (decentralised implementation) | Potentially high with up to 10,000 ML/a allocated to town water in the draft Water Sharing Plan | Good – the resource is less climate dependent than surface water sources, however availability may be constrained by environmental requirements and saline intrusion | Excellent. This option can be highly modular and can be deployed in numerous locations | Excellent. Only minor additional treatment is likely to be required. | Excellent. Groundwater is a generally well accepted solution. | Moderate.<br>Technical investigations and trials required. | Moderate.<br>Although the technology is well established, yield, recharge rates, potential for saline intrusion and linkage to GDE's for specific areas are unknown. | Unknown impacts on Groundwater Dependent Ecosystems such as coastal lakes | High. This option is likely to be particularly attractive for emergency supply and source augmentation on a local scale, but not likely to be suitable to develop as a single centralised solution. | Effects on GDEs | Extraction limits | Low | Low |
| | | | | | | | | | | Saline intrusion | Extraction limits | | |
| | | | | | | | | | | Potential effects of groundwater contamination on supply | Appropriate selection of source aquifer depth, etc. | | |
| | | | | | | | | | | Terrestrial habitat inundation and effects on threatened species | Provision of compensatory habitat. | | |
| | | | | | | | | | | Reduced capacity for future primary production due to conversion of licences | Unknown | | |
| Byrrill Creek Dam | Good. Storage up to 36,000 ML considered (9,000 ML/a yield from 16,300 ML storage). Unknown additional yield from larger storage. Further benefits may arise with interconnection | Good. Large storage, moderately close to the coast will be less climate change affected than more western storages. | Moderate. Dam design may (?) incorporate options to raise the dam | Highly compatible as Bray Park weir and WTP used. | Poor. There is significant opposition to the building of this dam. Not permitted in current Water Sharing Plan. | Low-Moderate. Approvals, land acquisition, design and construction is likely to be protracted. | No major technical obstacles have been identified | Poor. Large inundation area and effects on threatened species. Large carbon footprint in construction. | Low-Moderate. The dam is highly controversial.<br>Interconnection transfer rates and feasibility is not known at this time. | Landholder displacement and potential compulsory acquisition. | Increased compensation | High | Low |

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| | | | | | | | | | | **Issue** | **Solutions** | **Capital** | **Operating (per ML)** |
| Raise Rocky Creek Dam (by 8m) | Poor. Secure yield increase is estimated at 1,200 ML/a. | Moderate but does not provide any additional independence from existing surface water sources | Low. Raising of dam >8m not likely to be achievable/ justifiable | Poor. Dam raising would inundate existing treatment infrastructure | Poor. This option inundates WHA listed forest | Low-Moderate. The approvals process is likely to be protracted. | Unknown | Poor.<br>There is significant inundation of WHA, however the actual ecological impacts are unknown. Large carbon footprint in construction Small yield gain for degree of impact. | Low. This option provides minimal yield increase and is unlikely to gain stakeholder acceptance or approval. | Inundation of WHA land | Potential offsets (problematic due to WHA status) | High | Low |

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|---|---|
| Green | Excellent |
| Blue | Good |
| Brown | Moderate |
| Orange | Low-Moderate |
| Red | Poor |