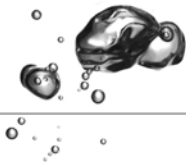


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19. Cumulative Impacts

19.1 Introduction

This section provides on the overall impacts of the Project and discusses the interrelationship of these impacts. The cumulative impacts as they relate to particular issues are also discussed in this chapter. Cumulative impacts of the Project activities are linked to related activities where they can be identified. The assessment then identifies the likely cumulative impacts on the key environmental issues identified in the EIS.

There are three areas with potential for cumulative impacts:

- impacts above existing levels
- other projects in Stanthorpe Shire
- indirect impacts of the Project

The cumulative impacts as they relate to particular issues (e.g., water, air, terrestrial ecology, aquatic ecology, and noise) are also discussed in this chapter. These impacts have been discussed elsewhere but have been consolidated in this section of the EIS.

Other projects occurring in Stanthorpe Shire were identified through the consultation process for the EIS including government agencies, local businesses and the public.

Indirect impacts are impacts that are not a direct result of the construction and operation of the Project, but may as a result of a complex pathway. The major potential for indirect impacts of Emu Swamp Dam is associated with the increase in water availability for the Shire. There will also be indirect socio-economic impacts occurring as a result of the construction and operation of the dam.

19.1.1 Surface Water

The effects of the Urban Water Supply Dam and Combined Urban and Irrigation Dam on the flow regime of the Severn River are:

- no impact on flow regime upstream of the proposed dam;
- downstream impacts are localised to between the proposed dam and the confluence of Accommodation Creek;
- the dam has minimal impact on the flow regime downstream of Accommodation Creek; and
- the dam has negligible impact on the flow regime at Sundown National Park.

The major change in flow regime downstream of the dam have already occurred as a result of the development for existing water entitlement. The Emu Swamp Dam option will have negligible impacts on the existing flow regime.

The flood assessment shows there is a minor reduction in peak flood level downstream of the proposed dam and a minimal increase in flooding within the buffer area. There is no effect upstream of the buffer area.

The SWAMP water quality data demonstrated overall compliance with the ANZECC Water Quality Objectives and Queensland Water Quality Guidelines, with the exception of nutrients, temperature and some metals.

DO was low throughout the dam catchment, possibly reflective of low flow conditions.

Herbicides in the Severn River catchment were monitored on four sampling occasions in 2005 and 2006. Individual sample results instead of medians were compared with trigger values, because the majority of sample locations were sampled on less than three occasions. Of the four herbicides examined, diuron was reported an order of magnitude higher than the low reliability trigger values. Diuron however, did not exceed the health based guideline value of 30 µg/L (NHMRC 2004).

The operational activities which have the potential to compromise water quality conditions include the following:

- runoff from the new roadways may result in increased sediment, and pollutant loads into the waterway. Motor vehicles would be the principal source of any pollutants present in road runoff, derived from tyres, clutch and brake linings, hydraulic fluids, automotive fuels, and particulates from exhaust emissions. These pollutants would be small in mass and impact;
- construction of the dam wall will reduce flow through this section of the river, potentially reducing the degree of mixing in the water column. This may result in stratification within the Dam and the creation of a thermocline and reduced dissolved oxygen concentrations at depth. The Dam however, will be less than 5 m deep and therefore, there should not be significant reductions in temperature and DO at depth, as long as there is sufficient mixing through the water column;
- reduced flow conditions contribute to an increased potential for algal blooms. Nutrient concentrations in the Emu Swamp Dam catchment are elevated, however, concentrations likely to occur in the dam would not be dissimilar to those reported for Quart Pot Creek in Storm King Dam, which does not have a history of algal blooms;
- disturbed sediment in the storage area will move to the lowest parts of the storage and fill the existing channel and low points. In the interim, sediments may be resuspended in the water column compromising water quality conditions;
- organic plant material (either left over from clearing activities, existing vegetation, or new regrowth) within the storage will rot during filling of the dam, and may lead to oxygen depletion, which has the potential to influence water quality conditions in the Severn River; and
- changes in flows from dam construction have the potential to influence water quality conditions by impacting on the amount of water in the catchment, the degree of mixing occurring and sedimentation processes.

19.1.2 Groundwater

Assessment of existing data indicates that there is no regional groundwater resource of significance within the vicinity of the Project. The data indicates only low to very low yields of groundwater.

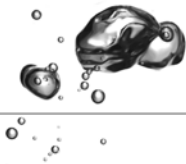
A localised increase in groundwater levels may potentially occur in the immediate vicinity of the Emu Swamp Dam. However, no significant adverse impacts are anticipated because of the quality of stored surface waters; the absence of local or regional sensitive receptors and the absence of a groundwater resource.

19.1.3 Terrestrial Ecology

The Commonwealth Environment Protection and Biodiversity Conservation Online Protected Matters database indicates a 'Critically Endangered' vegetation community described as 'White Box, Yellow Box, Blakely's Red Gum Grassy Woodland and derived Native Grassland' is present in the Project area. Six Regional Ecosystems (REs) are mapped within the Project area, three of which are listed as 'Endangered', one as 'Of Concern' and one as 'Not of Concern'

A total of 295 species of vascular plants were recorded within the dam inundation and Stalling Lane Access areas. The survey of the inundation area recorded 5 of the 51 species of Endangered Vulnerable Rare (EVR) taxa potentially occurring in the Project area; including *Acacia latisepala*, *Melaleuca flavovirens*, *Melaleuca williamsii*, *Rulingia hermaniifolia*, and *Thelionema grande*. The survey of the proposed Stalling Lane Access recorded 2 of the 51 species of potential EVR taxa including *Acacia pubiflora* and *Melaleuca williamsii*. The survey of the Urban Pipeline route recorded 3 of the 51 potential EVR species including *Acacia latisepala*, *Mibelia confertiflora* and *Melaleuca williamsii*. The survey of the Irrigation Pipeline route recorded 3 of the 51 potential EVR species including *Acacia latisepala*, *Grevillea scortechinii* subsp *scortechinii* and *Melaleuca williamsii*.

In total, 187 terrestrial vertebrate species were recorded from the Project area, including 35 species of mammals, 118 birds, 23 reptiles and 11 amphibians. Fourteen species of special conservation significance were recorded in



the Project area. Twenty-three species of special conservation significance were not recorded but are predicted to occur in the Project area.

The potential impacts of the Project on terrestrial flora and fauna include the loss of remnant and non-remnant vegetation; fragmentation of riparian vegetation along parts of the Severn River; disturbance from construction activities and proliferation of exotic species, including pests and weeds.

Assessment of the cumulative impacts associated with clearing and construction activities are taken into account in the assessment of endangered vegetation communities and EVR flora and fauna species under Commonwealth, State and Local Government legislation.

19.1.4 Aquatic Ecology

There are a number of weirs on the Severn River and some of these weirs would represent major barriers for fish passage. Fish passage is currently extremely limited along at least 12 km of river below Campbell's Weir (located within the inundation area of the proposed Emu Swamp Dam) and above the junction with Accommodation Creek. The level of existing weir development will have led to significant impacts on ecology, particularly on fish that rely on shallow flowing areas or need a period of sustained higher flows to disperse.

In total, 38 species of aquatic flora have been recorded in the Project area. The macroinvertebrate fauna appeared reasonably diverse and abundant, with representatives of all the major taxonomic groups. The main fish species captured in the aquatic ecology surveys were large numbers of Eel-tailed catfish, four species of native carp gudgeon, three species of introduced native predators (Murray cod, Silver perch and Yellowbelly), and introduced Mosquito fish. Two Bell's turtle were captured during the surveys; one in Bald Rock Creek (a reference tributary) and another in the Severn River near Somme Lane, downstream from the proposed dam site.

Species of conservation significance in the area include *Maccullochella peelii peelii* (Murray Cod), *Bidyanus bidyanus* (Silver Perch), *Mogurnda adspersa*, *Ambassis agassizii*, and *Elseya belli* (Bell's turtle).

The construction of Emu Swamp Dam will not represent a significant change in fish movement opportunities in comparison with the existing situation. The benefit of a fish transfer device at Emu Swamp Dam would probably be limited. Stanthorpe Shire Council intends to fund a study of the present distribution and abundance of those endemic species that are currently impacted and develop a management plan to repopulate areas of remaining suitable habitat.

19.1.5 Air Quality

The existing air quality in the Project area is good with emissions sources including agricultural activities, motor vehicles and occasional bushfires and control burns. Background concentrations of PM₁₀ was assumed from ambient air quality monitoring by the EPA in Toowoomba. These are considered a conservative representation of ambient air quality levels at the Project site.

The potential air quality impacts of Project construction was determined through air dispersion modelling. The air quality goals in the *Environmental Protection (Air) Policy 1997* are unlikely to be exceeded during construction of the Project.

19.1.6 Noise and Vibration

Noise levels were monitored at sensitive receivers close the proposed dam construction area. Background noise levels were low with insects, birds and occasional motor vehicles the most significant noise sources.

There are no formal noise guidelines for construction projects in Queensland. The ambient noise goal of 55 dB(A) in the *Environmental Protection (Noise) Policy 1997* has been adopted for daytime (6 AM to 6 PM) and evening (6 PM to 10 PM) periods. For construction works at night, an ambient noise goal of 52 dB(A) has been adopted to minimise the potential for sleep disturbance impacts. Targets for noise and vibration from blasting have been established by the EPA.

Noise modelling for dam construction has determined the potential for noise impacts at the nearest sensitive receivers. Predicted noise levels were generally below the adopted noise targets. Concrete batching at night during the Left Half RCC Wall Construction exceeded the night time noise goal at one sensitive receiver.

The major noise sources during dam operation include the pump stations for the Urban and Irrigation Pipeline. Other potential noise sources may include recreational boating and people using the recreational area. The pump stations are located significant distances (between 200 and 500 m) from sensitive receivers and are unlikely to generate noise impacts.

19.2 Other Projects in Stanthorpe Shire

There has already been significant agricultural development in Stanthorpe Shire. This agricultural development has been included in the description of existing environment and the impacts assessments for the EIS.

There are no other significant Projects occurring or proposed for Stanthorpe Shire.

19.3 Indirect Impacts of the Project

19.3.1 Water Availability

Urban

The Urban Pipeline would supply the urban area of Stanthorpe, providing additional water and improving the reliability of water supply. This would support planned future development. The two key areas for future development are an area zoned Residential in the northern section of Stanthorpe and an area zoned Industrial in the western section of Stanthorpe.

Development of the identified urban residential area has commenced. This area retains some vegetation cover. The Planning Scheme advises that this is the preferred area for future residential development due to the lack of possible land use conflicts.

The improvement to the water supply would benefit the ongoing development of this area but it is unlikely to, by itself, significantly increase the rate of its development. Factors such as the provision of other infrastructure, the availability of jobs and services, and the requirements of relevant legislation and the Planning Scheme are also important to how this area develops.

A section of the identified industrial area has been developed for industrial uses. The majority of the site remains under significant vegetation cover which would be an important issue for future development. The development of this area for industrial land uses in the future is unlikely to result in land use conflicts as it is separated from residential land uses.

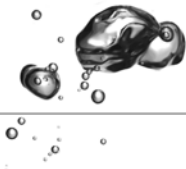
It is considered that while the improved water supply and reliability would assist future development as proposed by the Planning Scheme, it is unlikely to result in a significant change in the timing of how this land develops.

Irrigation

The majority of the properties that would receive irrigation water are currently used for horticultural, agricultural and associated tourism purposes. A number of these properties are undeveloped or retain undeveloped sections. Topographical and other constraints will limit further development on these properties.

Further development of rural purposes would be consistent with the Planning Scheme but tourist uses would require assessment and approval. Possible conflicts would be addressed through the requirements of the Planning Scheme.

Given the requirements of the Planning Scheme, non-rural uses would not be supported on these rural properties.



19.3.2 Socio-Economic

Indirect employment opportunities are also likely to be created during the construction phase through increased demand for goods and services. This would have positive benefits for local residents, including increased workforce participation and income levels.

The provision of secure water supply for Stanthorpe Town will allow the recent growth in industrial and commercial water use to continue. The irrigation component of the Combined Urban and Irrigation Project will significant economic benefits for the Darling Downs region.

19.4 Conclusion

There are potentials cumulative impacts above existing levels but the impacts will be managed by the proposed monitoring programs and mitigation measures.

There are no other Projects to have cumulative impacts.

Indirect development impacts in the region are not anticipated and can be managed by existing legislative controls. The Project is also likely to have a number of positive indirect socio-economic benefits for Stanthorpe Shire.