NEWRY PIPELINE

NEXT STEPS: WATER BALANCE REPORT

The Newry pipeline project is part of the final phase of works that complete Southern Rural Water's MID2030 strategy. The strategy delivers a modern irrigation system that improves customers' production and wellbeing, provides a safer workplace for staff and customers, and reduces farm runoff and seepage to water tables that lead to algal blooms and land salinisation.

Newry Supply Upgrade

Water savings

*Water for production ~ 6GL

*Water for environment ~ 1GL

Improved service

More production from improved service, safer workplace for staff and customers

On-farm investment

Improved Irrigation

More production, improved time management for customers

Reduction to nutrient discharges and seepage to high water tables

WATER BALANCE REPORT FINDINGS AND OUTCOMES

The water balance report was prepared to address concerns in the Newry community about the effects of the Newry pipeline on local water resources.

The attached executive summary confirms that effects on creek flows and groundwater bores (including Section 51 licences and stock and domestic bores) are likely to be minor from the decommissioning of open channels. There could be reduced access to water for properties that currently benefit from channel outfalls or have bores that potentially gain from nearby channel seepage.

In collaboration with its partner agencies, SRW commits to:

- Share the water balance report publicly
- Monitor groundwater levels post-construction to identify any changes
- Identify opportunities for customers to obtain water shares to meet any shortfalls
- Work with partners to develop community plans to protect shared environmental and heritage values.

Executive Summary

Southern Rural Water engaged SMEC to assess potential impacts from channel modernisation on groundwater and the surface water users at Newry. The potential impacts arise from:

- Reduction to groundwater recharge from irrigation channel seepage.
- Removal of channel outfalls from the Newry River Channel system that discharge to the Newry Creek, other drains and natural depressions.

The investigation involved desktop reviews of relevant previous studies based on surrounding areas, data analysis and consultation with SRW staff and other agencies. It does not include an ecological impact assessment.

Groundwater

Groundwater Recharge

Groundwater is typically recharged by infiltration from rainfall through the ground surface or by flow from adjacent aquifers and streams. Recharge to the shallow aquifer at Newry is predominantly from rainfall and irrigation of farmland (SKM, 1998, Reid 2004, GHD, 2010). Recent modelling in Gippsland (GHD, 2010 and DELWP, 2015) indicated that rainfall, irrigation, and potential channel seepage is between 93% and 99% of total groundwater recharge. The remaining recharge is from throughflow (from other aquifers) and rivers when in high flow.

Annual groundwater recharge estimates (refer Table 1) for the Newry Irrigation Area were prepared to understand the significance of channel seepage on groundwater recharge.

Table 1: Annual Recharge Volume for the Combined Newry Irrigation Area

SOURCE	AREA (HA)	ANNUAL RECHARGE RATE		ANNUAL RECHARGE VOLUME	
		Min	Max	ML/year - min	ML/year - max
Rainfall	2,670	50 mm/year	80 mm/year	1,335	2,136
Farmland Irrigation [1]	2,100	20% of annual irrigated volume[2]	30% of annual irrigated volume[2]	1,600	2,400
Channel Seepage	-	100% of seepage		400	400
Total				3,335 1.2 ML/ha	4,936 1.8 ML/ha

1. *Delivered by irrigation channels (i.e. excludes irrigation from groundwater)*
2. *Annual irrigated volume is approximately 8,000 ML/year*

The range of total groundwater recharge within the study area is between 3,335 ML/year and 4,936 ML/year and the recharge from channel seepage is between 8% and 13% of the total annual groundwater recharge.

Groundwater Licences

Table 2 shows that the total volume of groundwater licenses is within the total range of recharge. No new licences can be issued in this groundwater management area (Wa De Lock 1) but can be accessed by trade with an existing entitlement. Typical usage is less than 30% of the licence volume. This indicates the aquifer is able to sustain pumping, retain water for storage and discharge excess water to streams and natural depressions.

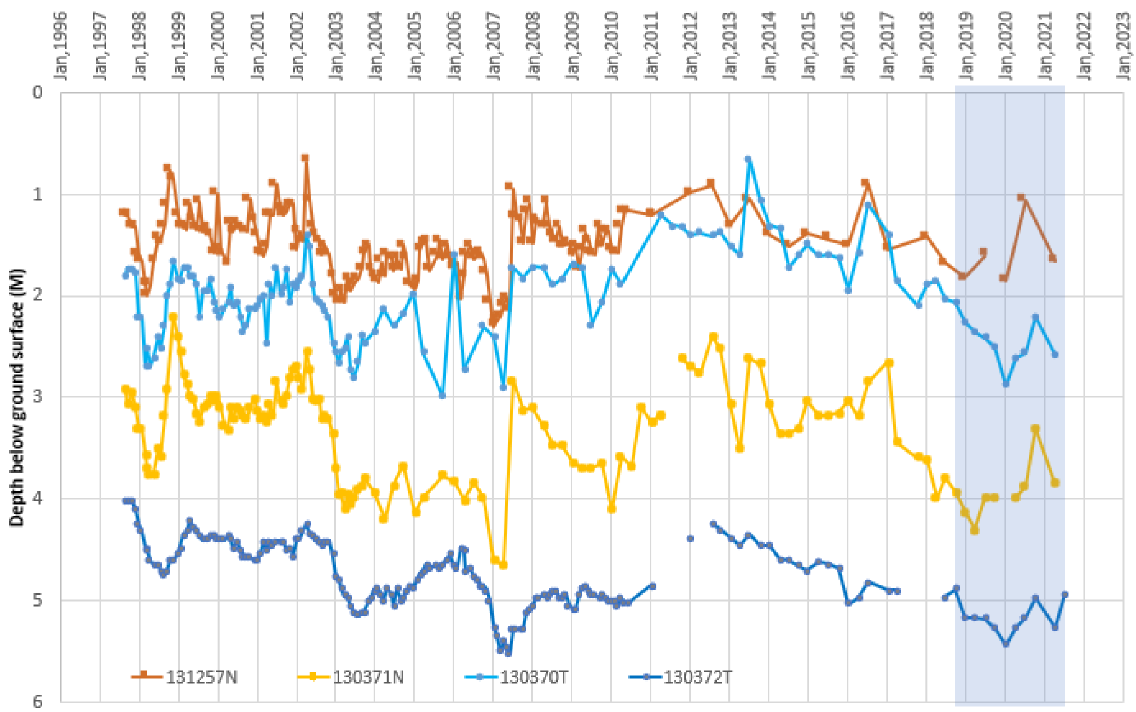
Table 2: Groundwater licence summary

	LICENCE VOLUME (ML)	AVERAGE USAGE (ML)
Licence volume	3,601	989

Groundwater Level Impact

The annual fluctuation in groundwater levels represents a change in the total volume of groundwater stored in the aquifer, with the level rising and falling in response to the annual fluctuation in recharge (from rainfall, irrigation seepage etc.) and discharge (to streams, natural depressions and groundwater pumping).

Figure 1: Groundwater hydrographs for Newry and Tinamba bores



Annual groundwater levels in the Newry area typically fluctuate up to 0.5 m between seasons (orange and brown lines on Figure 1). There are significant rainfall related changes or periods that contribute to the trends. For example the run of dry years from 2000 to 2010 combined with groundwater pumping significantly lowered the groundwater level. Given that channel seepage provides approximately 8% to 13% of recharge, its impact to annual groundwater levels is of similar proportion. As a result, a conservative estimate of seepage from irrigation channels contributes approximately 40 mm (8% of 0.5 m) to 65 mm (13% of 0.5 m) of the annual groundwater fluctuation.

The locations most likely to be affected by the decrease in channel seepage are near to irrigation channels (e.g. sites within 100 to 200 m of a channel). The chart in Figure 1 compares the Newry observation bores (orange and brown lines) with Tinamba observation bores (light blue and blue lines) on the opposite side of the Macalister River including the period of the Tinamba pipeline has been in operation. Over the period of record groundwater levels in Tinamba have followed a similar pattern to the Newry bores. This indicates that changes to groundwater levels observed in Tinamba are predominantly driven by rainfall and irrigation with the pipeline only likely to have a minor influence in localised areas. A similar pattern is expected following the Newry pipeline construction.

Newry Creek Flows

Newry Creek flows are largely from catchment rainfall runoff and channel outfalls during irrigation season.

Natural Catchment

Newry Creek is a tributary of the Macalister River. It has a significant catchment to the north of the irrigation area. There is no inflow data because the catchment is ungauged but outflows to the Macalister River were gauged from 2000 until 2013.

<u>Irrigation System</u>

There are five channel outfalls to be decommissioned. One of these (754D) flows directly into the creek while the other four discharge directly to or via a drain into the Macalister River and to natural depressions. The data below shows a reduction to outfalls of almost 40% since 2016.

Table 3: Summary of channel outfalls

OUTFALL	PRE 2016 DISCHARGE (ML)	2016-2021 DISCHARGE (ML)	OUTFALL RECEPTOR
754D	440	270	Newry Creek
804	958	536	Natural depression
818D	244	186	Drain 6 (Macalister River)
831	140	21	Macalister River
Newry 4 ex	139	201	Natural depression
TOTAL	1,921	1,214	

The combined licence volume from Newry Creek and natural depressions is 1,083 ML. These sites are not metered because the Newry Creek has operated as an irrigation drain (i.e. usage from the stream has been encouraged to reduce nutrient outfalls to the Macalister River downstream).

There are several licences upstream of the existing outfalls, located in closed natural depressions. These licence sites do not rely on channel outfalls.

<u>Newry Creek Water Balance</u>

As there is no creek inflow data available, a comparative assessment was undertaken using the annual volume of water leaving catchment, channel outfalls and diversion licences. This analysis is presented below:

Table 4: Newry Creek Water Balance

COMPONENT	NEWRY CREEK FLOWS (ML)	
	AVERAGE	MEDIAN
Leaving (Gauge @ Bellbird Corner)	4,296	2,536
Gains (Channel outfalls @ 754)	268	262
Outcome if no outfall	3,937	2,989

Table 5: Newry Creek Diversion Licenses

	VOLUME (ML)
Total licences	1,083
Licences downstream of channel outfalls	654

Overall the coarse data analysis suggests the removal of channel outfalls will reduce annual flows by less than 10%. Actual flows along the stream course are more complex because it meanders through a system of pools that are not always connected, and along the way, there are gains (drainage lines, groundwater seepage) and losses (pumping, seepage, evapotranspiration). Except in two or three instances where licence sites are directly below outfalls the impact to licence holders from reduced outfalls is likely to be minor.

Conclusions and Recommendations

It is concluded that the modernisation of the Newry irrigation system by replacement of channels with a pipeline is likely to result in the following:

- Groundwater levels could decline by up to 65 mm mostly adjacent to irrigation channels. Based on Tinamba observation bores the impact well away from the channels should be negligible.
- Slightly lower groundwater levels should not affect bore yields noting that bore performance is also affected by low rainfall, bore condition and pump settings.
- Removal of channel outfalls will have minimal impact to creek flows but may affect pumps immediately downstream.

Further investigations are recommended to:

- Observe groundwater levels post construction to identify any changes.
- Improve data base of licence sites and private bores.
- Undertake a desktop assessment of potential environmental impacts