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PELICAN WATERS NORTHERN LAKE DESIGN WATER LEVELS AND OPERATION OF NAVIGATION LOCK GATES

The Pelican Waters Northern Lake is a non-tidal lake connected to the Lamerough Canal and the Pumicestone Passage. Except in times of catchment runoff and high tides which overtop the outlet weir, the water level in the lake is relatively constant and is controlled by a weir at the downstream end of the lake. The nominal lake water level is RL0.6m AHD, which is approximately 0.5m above mean sea level. A navigation lock has been constructed adjacent to the weir to enable boating access between the lake and the Lamerough Canal at any stage of the tide.

Typical tidal levels in the Lamerough Canal are:

- Lowest Astronomical tide (LAT): RL-0.66m AHD
- Mean Low Water Spring Tide (MLWST): RL-0.36m AHD
- Mean High Water Spring Tide (MHWST): RL0.45m AHD
- Highest Astronomical tide (HAT): RL0.85m AHD

Water quality in the Northern Lake is maintained by means of a pumping system which draws water from the Pumicestone Passage and discharges it at the upstream end of the lake. This water passes through the lake and is discharged, over the weir, to the Lamerough Canal. The weir has a crest level of RL 0.6m AHD and is 52m long. The locations of the Northern Lake and its associated infrastructure are shown on Figure 1.

The other function of the weir is to convey catchment discharges which enter the Northern Lake from Lamerough Creek, Duckholes Creek, the Pelican Waters Golf Course and the adjacent residential areas. The performance of the weir and the expected water levels in the Northern Lake have been extensively modelled in computer simulations undertaken by specialist hydraulic engineers. A physical hydraulic scale model of the weir, navigation lock and the upstream and downstream waterways was also commissioned and tested at the Queensland Government Hydraulics Laboratory.

The lake water levels determined from this analysis have been used to set the allotment and road levels within the urban areas adjacent to the Northern Lake. In setting these levels, the 100 year average recurrence interval storm surge level, in Pumicestone Passage, of RL 2.3m AHD has also been considered.

The minimum allotment levels within the urban areas adjacent to the Northern Lake are RL2.65m AHD. Generally, slab on ground floor levels are, approximately, at least 200mm higher than this. The minimum allotment levels are at least 0.5m above the 100 year average recurrence interval water level of RL 2.09m AHD in the lake, resulting from catchment runoff, and 0.3m above the 100 year average recurrence interval storm surge level, in Pumicestone Passage.

The relationship between the allotment levels and the predicted lake water levels is shown on Figure 2. From this figure, it can be seen that the batter within the allotments, between the top of the revetment walls and the building platform, is subject to inundation during a range of catchment runoff events, but that the building platform

remains flood free with a freeboard of 0.51m, for the 100 year average recurrence interval event.

In the past, in response to community concerns about elevated water levels in the vicinity of the golf course lakes, there have been times when the lock control system has manually been overridden and the gates at both ends of the lock have been opened at the same time to allow large outflows, from the Northern Lake, to occur through the lock chamber. The lock gates have been opened due to the perception that the lowering of water levels within the Northern Lake would have a beneficial effect in also lowering water levels in the golf course lakes.

The golf course lakes are connected to the Northern Lake by an outlet channel, approximately 2.5km long. A weir at RL 0.85m AHD and four 1,200mm diameter concrete pipes connect the downstream (northern) end of the outlet channel to the Northern Lake. During small flood events, up to 2 years average recurrence interval, flood flows from the golf course area are also directed to Bells Creek by means of a flood relief culvert.

Computer modelling has recently been undertaken to determine if the operation of the lock gates has any beneficial effects in reducing the water levels in the golf course lakes. This modelling has shown that the effects of opening the lock are limited to the Northern Lake only, and that there is no discernible reduction in water levels within the golf course lakes, due to the large distance between them and the Northern Lake. The results of the modelling show that the opening of the lock gates is not justified on the basis that it would reduce water levels within the golf course lakes.

The operation of the lock gates in this manner is also not necessary for the Northern Lake to function as designed, and may result in damage to the lock structure. The effect of the opening of the lock gates to increase outflows from the lake was not included in any of the hydraulic modelling of the lake, from which the design lake water levels were determined and is not recommended as a routine method of operation.

Council is concerned that the operation of the Pelican Waters lock as a flood control device may result in the failure of the lock and that this could compromise the control of water levels within the Pelican Waters Northern Lake and may pose a risk to privately owned infrastructure within the lake.

The overtopping of the revetment walls and the inundation of the batters to the Northern Lake are expected occurrences, for which the walls and batters have been designed, and are not a cause for concern and do not indicate that floor level flooding is imminent. The installation of the flood relief culvert within the Pelican Waters Golf Course also assists in the release of flood waters from the golf course area.

On the basis of the above, Council intends to cease the operation of the lock gates as a flood control mechanism for the prevention of inundation of revetment walls and batters or for the perception that this would lower water levels within the golf course lakes.