Statement of Reasons for TPDNO Determination and Direction to conduct inshore reef monitoring and additional water quality monitoring for Marine Farming Lease No. 55 Long Bay

I, Wes Ford, Director, Environment Protection Authority, provide this statement of reasons in support of my determination of Total Permissible Dissolved Nitrogen Output (TPDNO) and direction to conduct inshore reef monitoring and additional water quality monitoring for Marine Farming Lease No. 55 at Long Bay (MF55) under Management Control 3.2.1 and Management Control 3.02 of *Tasman Peninsula and Norfolk Bay Marine Farming Development Plan September 2018* (the 'Plan').

The determination is valid from 1 August 2023 to 31 July 2026.
The direction commences on 1 August 2023, is ongoing and will be reviewed biennially by EPA.

The purpose of this statement is to provide the basis for my decisions regarding the setting of TPDNO (in accordance with Management Control 3.2.1) and increasing the environmental monitoring requirements for MF55 (in accordance with Management Control 3.02). I also explain the method which was used to determine the TPDNO.

Determination under Management Control 3.2.1

1. The Total Permissible Dissolved Nitrogen Output attributable to finfish farming activity within MF55 for any 12-month period from 1 August 2023 is 48 tonnes.

Direction under Management Control 3.02

2. To conduct inshore reef monitoring and additional water quality monitoring.

Basis for Decision

2.1. In 2019, members of the public contacted EPA about concerns they held that the salmon farm at Long Bay was causing environmental impacts. Issues raised included poor water quality, degraded seagrass beds and high amounts of nuisance algae.

2.2. In response to these concerns, EPA commenced independent environmental monitoring in Long Bay and Port Arthur in 2019.

2.3. In 2020, EPA commissioned the Institute of Marine and Antarctic Studies (IMAS) to undertake a study investigating potential links between environmental impacts and fish farm emissions in Long Bay.

2.4. Environmental monitoring results and IMAS reef research have identified organic enrichment effects in Long Bay that are linked to finfish farming activities in Long Bay.

2.5. The aim of the TPDNO determination is to reduce the impacts of elevated dissolved nitrogen on inshore rocky reefs within Long Bay.

2.6. The aim of the direction to include inshore reef monitoring and increase the number of water quality monitoring sites within Long Bay is to ascertain the effectiveness of the reduction in TPDNO in reducing environmental impacts on inshore rocky reefs.

2.7. In setting TPDNO and requiring additional environmental monitoring I have considered the following factors:

2.7.1. EPA analysis of environmental monitoring data collected by Tassal and EPA during the period 2013 to 2023 shows that Chlorophyll *a* concentrations have increased at some monitoring sites within Long Bay since salmon farming recommenced in Long Bay in 2017.

2.7.2. EPA's nutrient and Chlorophyll *a* study conducted in 2022 at Port Arthur identified elevated concentrations of TAN, Total Nitrogen, Total Kjedahl Nitrogen, Total Phosphorus and Chlorophyll *a* within Long Bay that were more significant when the farm was stocked compared to when the farm was not stocked (fallow);

2.7.3. Nitrogen isotope data from the IMAS reef study confirmed that the salmon farm is a source of nutrients for the reef ecosystems at 100m and 400m from the farm;

2.7.4. Results from the IMAS reef study identified organic nutrient enrichment impacts at reef sites 100m from the farm and at a site 400m to the west of the farm; and

2.7.5. There are some knowledge gaps regarding water currents and residence times, nutrient sources, nutrient budget and biological/nutrient cycling processes that operate in the marine waters of Long Bay and Port Arthur.

2.8. I have considered a range of monitoring results and scientific reports (Attachment 1) to investigate potential linkages between environmental impacts and finfish farming activities in Long Bay.

2.9. After considering the above information I met with representatives of Tassal and followed up with a letter seeking input regarding a reduction to feed input at MF55. Tassal concurred with the position I had presented.

2.10. As such, I believe that the implementation of a TPDNO that results in an approximate reduction of 20% in dissolved nitrogen outputs, calculated from feed input levels since 2019, is warranted and that this level should be maintained for a period of three years, subject to review at my discretion, to allow evaluation of results of inshore rocky reef and water quality monitoring.

2.11. The resultant TPDNO for MF55 will be 48 tonnes *p.a.*

Attachment 1: Information Considered in Making this Determination and Direction

I have considered the following lines of evidence to support the determination and direction.

IMAS Inshore Reef Study 2021/2022:

Surveys of rocky reefs conducted by IMAS in 2021 and reported in 2022 found that sites directly adjacent to the lease (100m sites) and the sites 400m and 1,000m to the north in Long Bay were all typical of an environment subject to low wave exposure and nutrient enrichment, including the proliferation of nuisance, epiphytic and filamentous algae and a lower canopy cover. The results at 100m sites were consistent with the influence of nutrient enrichment from the salmon lease on the local rocky reefs, this was confirmed by Nitrogen isotope data. The degree of enrichment observed at sites 400m and 1,000m north of the lease is likely to also be affected by terrestrial nutrient sources.

Follow up surveys by IMAS in 2022 replicated and confirmed the above findings and found a Nitrogen isotope signature from the fish farm at the 400m sites. The 400m south and 400m east sites are assimilating the nutrients well and impacts detected at the 400m north site cannot be attributed to farm nutrients alone. The 400m west site shows intermediate impacts and is likely to be impacted by the farm.

EPA Default Guideline Values for Port Arthur:

EPA developed Default Guideline Values (DGVs) for aquatic ecosystems for the Port Arthur region. Data from August 2013 to July 2017 allowed for the derivation of annual and seasonal DGVs of surface, 5 metre depth, integrated depth, and bottom waters for key indicators. For dissolved oxygen, temperature, and pH the 20th percentile represents the lower DGV and the 80th percentile the upper DGV, whilst for all other indicators the 80th percentile represents the DGV.

The DGVs are based on the Oil Spill Response Area (OSRA) segments and provide a level of refinement over the interim Default guideline values for Coastal and Marine waters based on the IMCRA bioregion. Through this process, the Ecosystem Classification assigned to the Port Arthur region was *Slightly to Moderately Disturbed Ecosystem.*

EPA Environmental Monitoring:

EPA conducted water quality monitoring in the Port Arthur area from October 2020 to March 2021 and October 2021 to May 2022 to increase the understanding of water quality across the area, in particular within Long Bay

The data for the 2021 and 2022 monitoring indicated that the water quality of the Port Arthur region is similar to that of the baseline period on which the DGV's were derived. For most parameters the concentrations were within the overall range of the baseline dataset.

Water within the Port Arthur area is chiefly of marine origin and nature. The upper section of Long Bay is at times subject to catchment runoff following rainfall events. Some elevation in TAN and Total Nitrogen is discernible within waters near the finfish lease. These elevations were not persistent over the period surveyed and seemed to be limited to the surface water in the immediate vicinity of the lease, as noted at site EPA-PA1. Nutrient

availability from marine inputs, catchment runoff and the finfish lease contribute to the elevated Chlorophyll *a* concentrations noted within Long Bay.

The pattern of epiphytic growth was not consistent for sites within Long Bay and or Stewarts Bay and were not clearly related to location or season. The level of epiphytic growth noted was comparable to that for other sea grass habitats across the south-east of Tasmania.

EPA intends to continue conducting regular environmental monitoring in Long Bay and Port Arthur to supplement and provide verification of the range of environmental monitoring that Tassal is required to conduct in relation to MF55.

EPA Nutrient and Chlorophyll *a* Investigation 2022:

EPA conducted an assessment of nitrogen and phosphorus compounds and chlorophyll *a* concentrations in Long Bay and the Port Arthur area between February and April 2022. The assessment aimed to investigate nitrogen, phosphorus and chlorophyll *a* concentrations whilst the Long Bay finfish lease was stocked and destocked (fallow) across the survey area and in particular within Long Bay

Elevated TAN and Total Phosphorus concentrations and spatial extent were greater whilst the lease was stocked, compared to when the lease was fallowed. Total Nitrogen and Total Kjeldahl Nitrogen demonstrated elevated concentrations at sites within 100 metres of the lease when the lease was stocked, compared to concentrations when the lease was fallowed.

Chlorophyll *a* concentrations and spatial extent were also elevated when the finfish lease was stocked compared to when it was fallowed. The Chlorophyll *a* concentrations whilst the farm was stocked were double compared to the survey conducted during fallowing. Typically, the shallow water sites in Long Bay and Carnarvon Bay displayed higher Chlorophyll *a* concentrations regardless of the lease being stocked or fallow, although the concentrations were generally lower whilst the lease was fallow.

The reduction in Chlorophyll *a* concentrations within Long Bay whilst the lease is fallowed suggests the phytoplankton biomass is in part coupled with the status of nutrients released from the lease as well as the surrounding environment. This is a complicated process where nutrients released from anthropogenic activities undergo a process of remineralisation, including nutrients released from benthic and pelagic detritus and dissolved organic and inorganic substances.

Port Arthur Water Quality Monitoring 2013-2023:

Tassal conducted environmental monitoring at four sites (PA1-4) within Long Bay and Port Arthur for the period 2013-2017 and recommenced farming at MF55 in Long Bay in August 2017.

Water quality monitoring at site PA1-4 became an environmental licence requirement in 2017 and monitoring commenced at sites PA5, PA6, PA7 and PA8 within Long Bay in 2020.

From the long-term data set for 2013 to 2023, Chlorophyll *a* concentrations at PA1, located next to the farm and near the mouth of Long Bay, have been increasing at a greater rate since Tassal re-commenced farming in 2017, compared to Chlorophyll *a* concentrations at the three monitoring sites (PA2-4) outside of Long Bay (Figure 1). For sites PA5, PA6, PA7 and PA8, Chlorophyll *a* concentrations between 2020 and 2023 have shown a similar trend to that of PA1.

In the period 2017 to 2023, it would appear from the annual mean Chlorophyll *a* dataset available, that the waters at site PA1 within Long Bay have shifted from low-mesotrophic to mid-mesotrophic, based on trophic status classification metric from Smith 1998, who found:

- oligotrophic conditions when annual mean chlorophyll < 1 mg m^3
- mesotrophic conditions when annual mean chlorophyll was 1–3 mg m^3
- eutrophic conditions when annual mean chlorophyll > 3 mg m^3

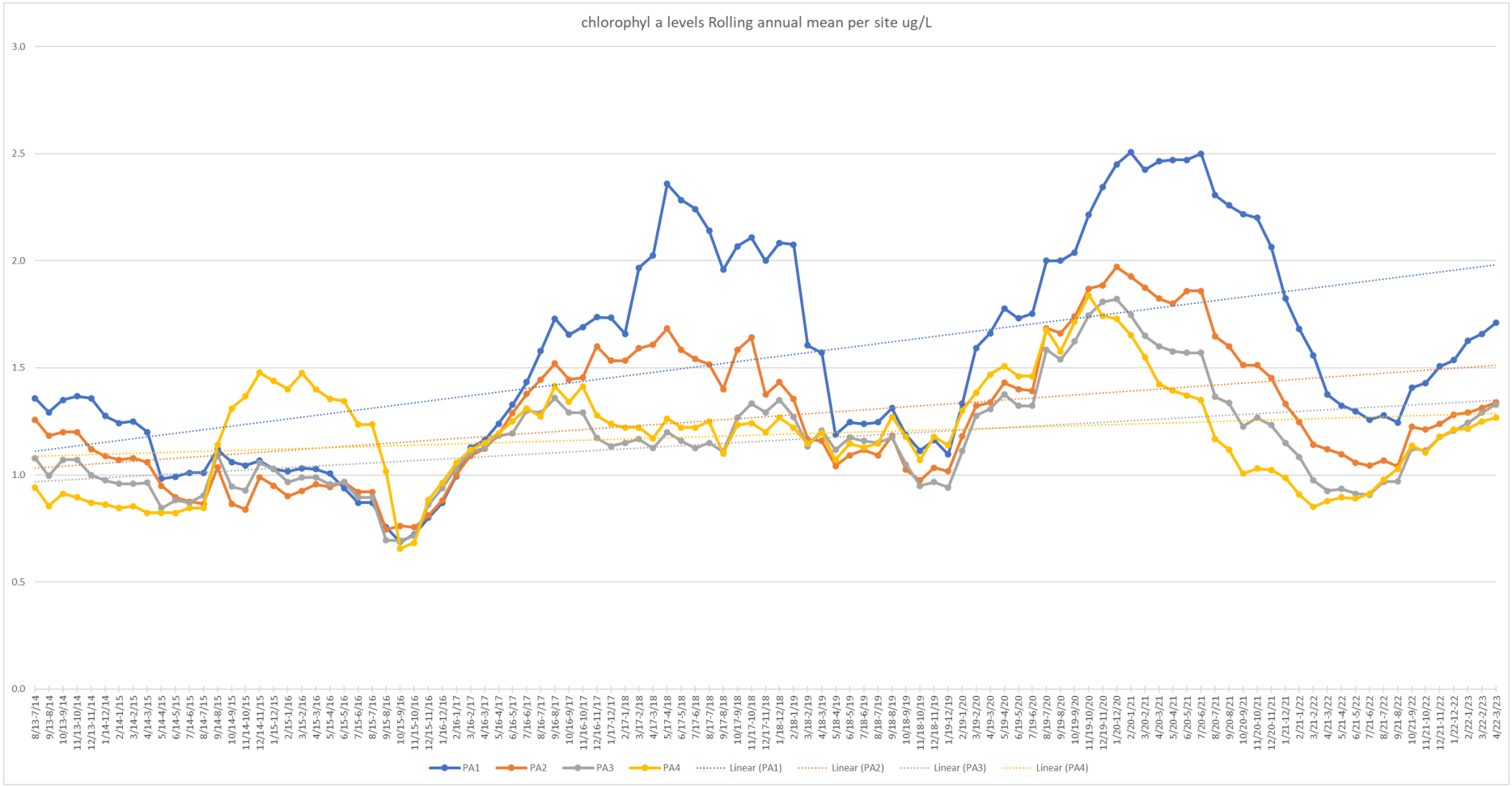
Annual mean Chlorophyll *a* concentrations in the waters outside of Long Bay have also increased since 2017, but have remained at low-mesotrophic levels based on the classification metric from Smith 1998 (Figure 1).

Knowledge Gaps -Long Bay/Port Arthur Ecosystem and Ecology:

Despite the significant volume of environmental monitoring and research effort that has been undertaken by Tassal, EPA and IMAS since 2013 in relation to MF55, some knowledge gaps exist in relation to water currents and residence times, nutrient sources, nutrient budget and recycling and biological processes that operate in the marine waters of Long Bay and Port Arthur.

The imposition of a TPDNO is expected to reduce dissolved nitrogen concentrations arising from MF55 and it is EPA's expectation that the inshore rocky reef monitoring is fit for purpose to detect measurable improvements in environmental condition of inshore rocky reefs over time. To augment these impact mitigation measures, EPA will also consider the best mechanism to improve the understanding of important ecosystem and ecological issues within Long Bay.

Figure 1 – Chlorophyll *a* rolling annual mean (ug/L) for water quality monitoring sites PA1-4 at Port Arthur



References

Smith, V.H., 1998. Cultural eutrophication of inland, estuarine and coastal waters. In: Pace, M.L., Groffman, P.M. (Eds.), Successes, Limitation and Frontiers in Ecosystem Science. Springer-Verlag, New York, pp. 7–49.