DIRT FILE: Summary of key findings

The Vales Point power station and associated underground coal mines were constructed by the NSW Government in the early 1960's, on the peninsula between Wyee and Chain Valley Bays in Southern Lake Macquarie where they operate today.

The findings presented in this dirt file reveal that under the private ownership of Sunset Power International Pty Ltd since 2015, the Vales Point power station has been responsible for chronic breaches of Environmental Protection Licence (EPL) conditions.

Delta Coal's two mines are similarly in the habit of breaches, with exceedances of discharge volumes, fecal coliform, Total Suspended Solids and oil and grease concentrations occurring multiple times in some years.

Delta's dirty deeds, done dirt cheap include:[1]

- 11 Environmental Protection License (EPL) breaches relating to water pollution and coal ash dust from Vales Point
- Failure to pass an EPL compliance audit in 2016
- 23 individual breaches since Delta Coal took ownership of the Chain Valley Colliery in 2019
- Contamination with heavy metals of off-site groundwater identified in 2021
- 2 major fish kills in Wyee Bay currently under criminal investigation by the Environmental Protection Authority (EPA) in 2022
- The near complete loss of seagrass in Wyee Bay[2] due to excessive thermal pollution between 2005 and 2023

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1 Refer to HCEC, 2023. 'Delta's dirty deeds done dirt cheap: the impacts of Vales Point power station on Lake Macquarie'....

2 BIOANALYSIS 2022. Vales Point Power Station Seagrass Monitoring Project (2021/2022). Prepared for Delta Electricity Pty Ltd. Accessed under GIPA Act EPA 860

Read the full report and get in touch at: https://www.hcec.org.au/dirt-file

Compounding the effects of thermal pollution from the Vales Point outlet on Lake Macquarie's seagrass, marine species and water quality, is the daily discharge of nutrients from effluent, metals/metalloids from ash dump waste water as well as chlorine.

To our knowledge, the potential cumulative impacts of this cocktail of contaminants and interactions at the outlet canal have never been properly assessed by the NSW EPA.

Vales Point cooling water system

The inlet located on the north western shore of Chain Valley Bay, takes in lake water which is cycled through the condensers to cool them before running through an open canal for return to the lake via the outlet, on the eastern shore of the southern end of Wyee Bay.

The once-through cooling water system in use at Vales Point results in lower dissolved oxygen concentrations in the warmer water[3] and high temperature differences between the heated discharge water and the waters receiving it, can kill seagrass and fish, [4] and has been shown to worsen algal blooms and disease outbreaks.

Thermal pollution & Seagrass

Seagrasses are highly effective, indeed essential players in a healthy ecosystem. Seagrass stores carbon, stabilizes shorelines, provides nursery habitat and food for a range of marine and estuarine species. The large-leafed species such as Zostera provide far greater habitat than the finer species, such as Halophila ovalis.[5]

The total area of Zostera muelleri sp. seagrass in Myuna Bay reduced by half upon commissioning of the Eraring power station,[6] and as early as the 1990's studies conducted on Lake Macquarie attributed seagrass loss, species assemblage changes and changes in fish species distribution to thermal pollution.[7]

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3 *Rosen, Marc & Bulucea, Cornelia & Mastorakis, Nikos & C.A, Bulucea & Jeles, Andreea & Brindusa, Constantin. (2015). Evaluating the Thermal Pollution Caused by Wastewaters Discharged from a Chain of Coal- Fired Power Plants along a River. Sustainability. 7. 5920-5943. 10.3390/su7055920*

4 *Electric Power Research Institute (EPRI). 2002. Water & Sustainability (Volume 3): U.S. Water Consumption for Power Production—The Next Half Century; Technical Report EPRI; American Public Health Association (APHA); American Water Works Association (AWWA); Water Environment Federation (WEF), 2005. Standard Methods for the Examination of Water & Wastewater: Centennial Edition, 21st ed.; APHA-AWWA-WEF: Washington, DC, USA, 2005; U.S. Department of Energy, 2015. National Energy Technology Laboratory: Pittsburg, PA, USA, : Palaniappan, M.; Gleick, P.H.; Allen, L.; Cohen, M.J.; Christian-Smith, J.; Smith, C., 2014. Clearing the Waters, A Focus on Water Quality Solutions; United Nations Environment Programme & Pacific Institute: Oakland, CA, USA, 2010. Available online: http://www.unep.org/PDF/ Clearing_the_Waters.pdf*

5 *Institute for Water and Environmental Resource Management - University of Technology, 2009. Effects of Increased Temperature Pulses on Temperate Seagrass. Report for Department of Environment and Climate Change (DECC). Accessed under GIPA Act EPA 860*

6 *NSW Department of Primary Industries, 2008. Email Dr Bob Creese (bob.creese@dpi.nsw.gov.au) to Rebecca Scrivener DECC 22 February 2008 5:05 Re: Connell Wagner seagrass reports - Lake Mac Attachments: NSW DPI comments on Myuna Bay & Wyee Bay seagrass reports by Connell Wagner. GIPA EPA860. Document 19, p12/18.*

7 *1996 Estuary Management Study of Lake Macquarie, for example.*

To avoid aquatic impacts, temperature differentials of less than 5oC, between the discharge and receiving waters is recommended[8], however thermally polluted lake water has been discharged by Delta into Wyee Bay at up to 11.3oC above average ambient Lake temperatures in Winter (maximum of 32o C[9]), and 15.7oC above ambient temperatures in Summer (maximum of 38.1°C.)[10]

GIPA documents published by HCEC show that between 2005 and 2016, Delta approached the NSW EPA on three separate occasions to request temperature limit increases (ie. further exemptions to thermal pollution limits),[11] allowing them to discharge hot water at 38.1oC, and likely maximize profits during electricity demand peaks.

The 2021/2022 consultants report prepared for Delta[12] under the 'Vales Point Power Station Seagrass Monitoring Project' EPL requirement in place since 2009 to enable the operators and regulators to track seagrass abundance in Wyee Bay, noted that:

> ***"Seagrass at all monitoring sites in Southern Lake Macquarie declined over the reporting period. No changes were detected at control sites in the north and temperatures did not exceed 32oC. Zostera continues to be absent at the monitoring sites situated 500m and 1km from the outlet, and a significant decrease is Halophila within the southern section of Wyee Bay."***

A key finding of the survey conducted for this report included:

> ***"...the total cover of seagrasses decreased significantly at all locations (including 4 locations situated outside of Wyee Bay) except the control locations situated within the north of the estuary (where no significant changes were detected) during 2021/22."***

Further, it noted "...an 18 % increase in the number of hours >32°C at the Outlet between 2020/21 (397 hours) and 2021/22 (484 hrs)."

Despite these findings, the overall fewer number of hours of thermal discharge in excess of 30°C compared to the previous reporting period as well as excessive rainfall between March and May 2022 driving increased turbidity and salinity, led to a conclusion that because thermal impacts were not the primary driver of seagrass loss over the reporting period, additional reporting requirements or action were not warranted.Our analysis of documents relating to thermal pollution obtained under GIPA Act suggest that the continued absence of seagrass - the "canary in the coal mine" of estuarine ecosystems - in Wyee Bay and to a lesser extent Myuna Bay, may be due to increasingly hostile conditions arising from the unassessed and we believe under-regulated interaction of elevated temperature, chlorine, turbidity, salinity, nutrients as well as metals and metalloids.

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8 Laws, E.A. 2000. Aquatic Pollution: An Introductory Text; John Wiley and Sons: New York, NY, USA, 2000

9 Delta Electricity (Jun 2016). Environmental Licences and Monitoring. Vales Point Power Station Monthly Environmental Data Summary; Point 22. Discharge of cooling water from the cooling water outlet canal to Wyee Bay. https://www.de.com.au/environment/environmental-licences-and- monitoring?retain=true&PagingModule=877&Pg=1

10 Delta Electricity (Feb, 2017; Sep 2018;Jan 2020; Feb 2020. Environmental Licences and Monitoring. Vales Point Power Station Monthly Environmental Data Summary; Point 22. Discharge of cooling water from the cooling water outlet canal to Wyee Bay. https://www.de.com.au/environment/environmental-licences-and- monitoring?retain=true&PagingModule=877&Pg=1

11 EPL 761 EPA s.58 Licence Variation 1053558 5-Dec-05 EPL 761 EPA s.58 Licence Variation 1109542 1-Dec-09 EPL 761 EPA s.58 Licence Variation 1549284 10-Feb-17

12 BIOANALYSIS 2022. Vales Point Power Station Seagrass Monitoring Project (2021/2022). Prepared for Delta Electricity Pty Ltd. Accessed under GIPA Act EPA 860

The establishment of a thermal mixing zone, considered best practice management of thermal impacts, is well overdue for the Lake Macquarie power stations which have been allowed to significantly reduce the ecological condition and resilience of the receiving bays, with implications for the broader health of the Lake.

- ***To encourage the rejuvenation of Zostera seagrass within Wyee Bay, a study be undertaken that determines ambient water quality, appropriate seasonal temperature differentials, seagrass sensitivity, and the assimilative capacity of Wyee Bay, and EPL 761 be varied accordingly to incorporate a scientifically established thermal mixing zone south of Wyee Marina.***

- ***To offset seagrass loss in Myuna and Wyee Bays, a Lake Macquarie Seagrass Trust be established with funding of $12M a year from Delta Electricity and $8M a year from Origin Energy to enhance seagrass meadows within Lake Macquarie and replace seagrass damaged and killed by the operations of Vales Point and Eraring power stations.***

"Issues surrounding the end of life of the Eraring and Vale's Point Power Stations need to be addressed fulsomely and forcefully by all parties, particularly at such a critical time in the national energy debate.

KLMC supports the union's demand for a regional and national authority to transition to renewable power. But all plans must consider the environment, if further pollution pitfalls are to be avoided - that requires a healthy Lake Macquarie with flourishing seagrass - the environmental canary in the coal mine."

David Ransom, Keep Lake Macquarie Clean

Chlorine pollution

The dosing of chlorine to remove fouling by sea life is commonly-practiced at coal power stations and is known to pose significant risks to the health of estuarine ecosystems.[13]

The Vales Point power station produces chlorine onsite to aid the de-fouling of its pumps and condensers situated between the inlet and outlet canal, and is currently permitted to add up to 1,200kg daily into Lake Macquarie via the outlet, Delta generates chlorine at a rate of 7.5L per second.[14]

The Environmental Protection Licence (EPL) limit on the concentration of free chlorine at the hot water discharge point into Wyee Bay is 0.2 mg/L.[15] The outlet concentration limit of 0.2mg/L is approximately 200 times above the 'No Observed Effects Criteria" limit specified by environmental consultants in a report prepared for Delta in 2007.

The report, intended to assess outlet impacts, identified a limit of 0.0009 and 0.0012 mg/L of chlorine as compatible with protection of most (95% protection limit) marine species, but also notes the "...the potential sensitivity of the marine environment to chlorine. If sensitivity to temperature is added to this, the effluent could pose localized issues for sensitive species".

No data on actual or potential temperature and chlorine levels present at the Vales Point were included in the consultants report.

Concerningly, for the marine species in Lake Macquarie, and perhaps those involved in regulatory compliance at Delta and the EPA, the chlorine concentration limit that would protect marine species (0.0009 to 0.0012 mg/L), appears to be substantially under laboratory detection limits of <0.04 mg/L.

During periods of cooler ambient Lake temperature, many species of fish and other marine life attracted to warmer waters travel up the cooling water channel, where chlorine concentrations increase towards the power station condenser where concentrations can reach between 60-80 times the concentration at the outlet Wyee Bay.

- ***A Pollution Reduction Program be established to reduce the amount of chlorine discharged into Wyee Bay, and to force Delta Electricity to upgrade its procedures for reducing biofouling of condensers and pumps.***

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13 W. L. T. van Densen & R. H. Hadderingh, 1982. Effects of entrapment and cooling water discharge by the Bergum Power Station on 0+ fish in the Bergumermeer. Hydrobiologia 95, 351-368. https://link.springer.com/article/10.1007/BF00044495#citeas

14 Ecotox, 2007. Assessment of Temperature Tolerance and Toxicity Assessment Chlorine in Vales Point Power Station Discharge Delta Electricity Test Report August 2007. Accessed via GIPA EPA860.

15 Ibid.

Impingement and entrainment of marine life

The Vales Point power station pumps twice the equivalent volume of water from Lake Macquarie every year through its cooling water system, killing many of the large fish and marine turtles at the intake screens, and most or all of the fish larvae and plankton taken through the power station.[16]

Whilst no comparable data exists for Vales Point specifically, a 2008 report prepared for Eraring power stations capacity upgrade found that in a 12-hour period in August 2006, 135 fish, crabs and molluscs including squid, cuttlefish, octopus, and prawns were caught in the screens.[17]

Ninety three per cent of the fish retrieved were alive, however about a third sustained "damage included loss of spines, scales, skin and or fins and swim bladder damage."

This equates to nearly 100,000 fish caught each year in Earing's cooling water intake screens, of which almost 26,000 fish would be damaged (26%), and 7,000 fish killed (7%).[18]

Ash leachate & transportation

18 meters deep, spanning 500 hectares and containing between 60-100 million tonnes of ash refuse, the Vales Point ash dam was constructed in the formerly undisturbed valley of Mannering Creek and up until 1995, any excess water was discharged directly into Mannering Bay, adjoining Wyee Bay.

In 2021, Delta's ash dump was identified as the source of offsite groundwater contamination with aluminum, copper, lead, and zinc in a consultant's report[19] prepared in response to a complaint made to the NSW EPA.

The consultant's report prepared for Delta in the same year regarding this offsite seepage, describes the process by which excess water use in ash transportation (the "wet-sluicing method") can elevate pH levels, ultimately aiding in the dissolution of heavy metals/metalloids into the surrounding environment.

The report recommended that wet-sluicing ash transport be discarded in favor of dense phase, and further investigations undertaken into mitigating measures.

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16 *HCEC, 2023. 'Delta's dirty deeds done dirt cheap: the impacts of Vales Point Power Station on Lake Macquarie'*
17 *DPI Fisheries submission summary in Eraring Power Station Capacity Upgrade and Attemperation Reservoir, 2008 pp 8, 9*
18 *Ibid.*
19 *Douglas Partners, 2021. Report on Groundwater Assessment In the Vicinity of Lot 421 in DP 578194, Doyalson North for Delta Electricity, Accessed under NSW Parliamentary Standing Orders 52.*

In our view, the installation of new dense phase ash transport infrastructure designed to reduce the water collecting in the ash dam, is essential to reduce groundwater contamination and the ongoing contamination of Lake Macquarie's surface water and sediment, with metals and metalloids which have already been found to have bio-accumulated in commonly-caught seafood, resulting in limits on consumption to reduce unhealthy exposure to selenium and cadmium.[20]

- ***After appropriate trials and engineering design, to minimise toxic trace elements contained within Vales Point coal ash from mobilising and entering groundwater and Lake Macquarie, EPL 761 be varied to incorporate a clause that directs Delta Electricity to install new plant and machinery for dense phase ash transport to the Vales Point Ash Dam.***

Chain Valley & Mannering coal mines

The POEO Register reveals that Delta Coal has only been compliant in six of the past 22 years, with 23 individual breaches since taking over operations in 2019.

Delta Coal can currently extract and transport up to 3.2 million tonnes per annum of run-of-mine coal from the Chain Valley Colliery (CVC) and Mannering Colliery until December 31, 2027.

The current Consolidation Project for the CVC mine proposes to increase the area mined, but reduce annual coal extraction to 2.8 million tonnes.[21] Current annual coal consumption of the Vales Point power station, owned by Delta Coal's parent company Sunset Power International Pty Ltd, is about 2.65 million tonnes.

Subsidence associated with decades of underground coal mining has caused obvious, significant damage to buildings and the terrestrial environment with a shaft collapse in the 1980's destroyed a wetland, damaged homes and infrastructure.[22]

Mining beneath much of the Vales Point dump and surrounding areas also presents an ongoing subsidence risk, and is likely to be contributing to groundwater contamination through fractures facilitating the migration of ash waste leachate.

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20 Elevated cadmium in mud-crab and selenium in fish was identified in the C&R risk assessment and advice for metal concentrations in seafood from Lake Macquarie prepared by the Office of Environment and Heritage and DPI Fisheries was accessed under GIPA by the Hunter Community Environment Centre in 2019. https://www.abc.net.au/news/2019-03-11/crabs-lake-macquarie-nsw-contaminated-with-cadmium/10887750

21 https://www.planningportal.nsw.gov.au/major-projects/projects/chain-valley-colliery-consolidation- project

22 https://www.newcastleherald.com.au/story/446425/lake-macquarie-map-shows-massive-coal-deposits/

Turbidity (TSS), subsidence and salinity also adversely impact seagrasses and water quality, presenting another set of un-assessed cumulative impacts at play in the estuary, thanks to Delta's dirty deeds and its vaguely masked recalcitrant public attitude when it comes to the EPA.

- ***A cumulative impact study be undertaken under a Variation to EPL 761 (Sunset International trading as Delta Electricity), EPL 191 (Mannering Colliery), and EPL 1170 (Chain Valley Colliery) to establish a Pollution Reduction Program for Total Suspended Solids (TSS), faecal coliforms, oil and grease, and metals and metalloids, and to determine the interaction of mine subsidence, the undermining of Vales Point ash dam, and the impacts on marine life in Wyee and Chain Valley Bays.***

Climate Change

The 2020 Lake Macquarie State of the Environment Report shows that water temperature is rising in Lake Macquarie at roughly the same rate as the ocean temperature is rising - 0.015°C per year between 1970–2010.

The State and Trends of Australia's Ocean[23] report from 2020 suggests that the temperature of ocean waters of temperate eastern Australia has increased by 0.5 degrees since Vales Point was commissioned.

The acidification of NSW estuaries will intensify with climate change, of which the retention and enhancement of seagrass and other marine vegetation is known to provide a critical buffer against.

Based on evidence compiled in this file, it appears that cumulative impacts of cooling water discharges on the ecology of Lake Macquarie has been overlooked by the NSW EPA in the regulation of Vales Point to the grave detriment of biodiversity and overall ecosystem health in Southern Lake Macquarie.Delta Electricity and Delta Coal, particularly after privatisation have been anything but good neighbors, and as evidenced here have displayed disdain for the laws and processes intended to protect our natural environment and keep local people, and the wider public informed.

Delta has engendered disdain in the hearts and minds of community members whose long-held frustrations, questions and concerns about environmental and community health impacts are being brushed aside, while the efforts of the regulator to curb pollution in line with community expectations have been consistently flouted.

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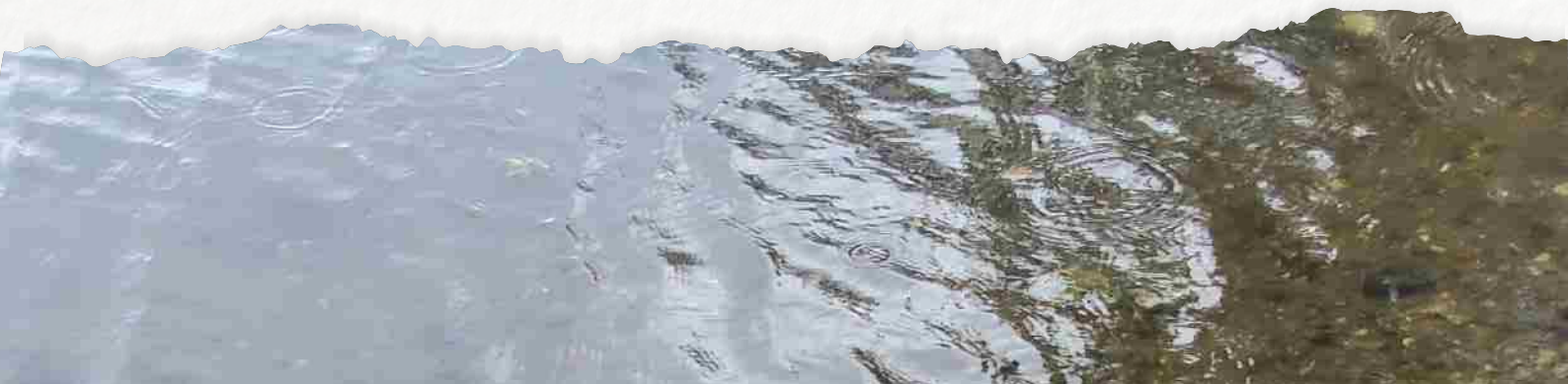
23 Richardson A.J, Eriksen R, Moltmann T, Hodgson-Johnston I, Wallis J.R. (2020). State and Trends of Australia's Ocean Report, Integrated Marine Observing System (IMOS). https://www.imosoceanreport.org.au/about/



A deep and lasting impression was left on those who witnessed the severity of the two fish kills in Wyee Bay in August and September 2022, which led to the death of an estimated 15, 000 fish and copious, larger marine species including White spotted eagle rays[24] - an endangered species occurring naturally in tropical, not temperate climates.

Just three months after the second fish kill transpired, in December 2022 the sale of Vales Point by Sunset Power to Czech mining and energy company Seven was finalized and recent comments from company spokespersons portray a reluctance to retire this power station in a coordinated, comprehensive manner this decade.[25]

Time has been called by community members truly fed up and fatigued from decades of Delta' dirty deeds, feared to have caused unknown damage to the mighty Lake Macquarie estuary.

- ***The NSW Environmental Protection Authority (EPA) be adequately funded to ensure appropriate oversight and regulation of large corporate polluters, and enhance its ability to prosecute polluters.***

- ***The $15,000 maximum penalty the EPA can issue under Infringement Notices be increased to $150,000.***

"It is hard to believe that with the wealth of Australia we are still living with 3rd world pollution standards with regard to our power stations, particularly with the Vales Point Power Station. We as a nation should be demanding our standards are brought up to Worlds Best Practice and companies who do not comply with these regulations should be fined at an escalating rate until the work is completed, even if the fines overtake the amount of profit these companies make per day.

The only way we can get remedial action is to hit them in their pockets. Maybe then the incidents of respiratory and cancer clusters will lessen and our air become safe to breathe."

Lesley Hale, Treasurer of Mannering Park Progress Association

24 https://www.hcec.org.au/environmental-news
25 https://www.abc.net.au/news/2023-03-16/new-vales-point-power-station-owner-wont-commit-to-2029-closure/102105312