

## Fiscal Note for Permanent Amendment of 15A NCAC 18A .2508 and .2543

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Agency:	North Carolina Commission for Public Health Department of Health and Human Services Environmental Health Section Pools, Tattoos, and State Institutions Program	
Rule Citations:	15A NCAC 18A .2508 Definitions 15A NCAC 18A .2543 Water Recreation Attractions	
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Rulemaking Authority:	S.L. 2019-88 S.L. 2011-39 G.S. 130A-280 G.S. 130A-282	
Impact Summary:	State Government:	Yes
	Local Government:	Yes
	Private Sector:	Yes
	Substantial Impact:	Unknown, substantial impact possible

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### Introduction and Purpose

Under G.S. 130A-280, artificial swimming lagoons have been defined as “any body of water used for recreational purposes with more than 20,000 square feet of surface area, an artificial liner, and a method of disinfectant that results in a disinfectant residual in the swimming zone that is protective of the public health.” These man-made bodies of water, which are characterized by their large size and crystal-clear waters, have become popular and in increasing demand globally, with lagoons currently operating in the United Arab Emirates, Chile, Texas, and Florida.<sup>1</sup>

Artificial swimming lagoons can be regulated, in part, under existing Rules that apply to public swimming pools; however, the lagoons also have unique features, such as their large size, the use of non-swimming zones for other recreational activities (e.g., kayaking), the use of a liner without a shell, and the method for maintaining water quality, that are not contemplated in the existing swimming pool Rules.<sup>2</sup> Artificial swimming lagoons therefore present a distinct set of potential water quality and injury risks to users compared to swimming pools or natural water bodies due to their size and construction. The proposed Rules account for these differences while holding artificial swimming lagoons to the same standards established for public swimming pools with regards to safety and the overall protection of the public’s health. With appropriate regulation in place to increase the safety and well-being of users, artificial swimming lagoons

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<sup>1</sup> Crystal Lagoons, “Concept & Technology,” <https://www.crystal-lagoons.com/concept-technology/>, accessed April 3, 2020.

<sup>2</sup> Id.

can provide new recreational opportunities for residents and may also lead to increased regional tourism and heightened properties for neighboring communities.

In 2019, the General Assembly passed Session Law 2019-88, which amended G.S. 130A-280 and directed the Commission for Public Health to "adopt rules governing the construction and operation of artificial swimming lagoons" no later than December 1, 2019. The Commission for Public Health used the temporary rulemaking process to timely adopt rules governing artificial swimming lagoons. The temporary rules were published in the North Carolina Register on December 16, 2019 and, pursuant to G.S. 150B-21.1(d) will expire 270 days from that date, unless permanent rules adopted to replace the temporary rules have been submitted to the Rules Review Commission. This permanent rulemaking effort is undertaken to ensure that the rule changes governing the construction and operation of artificial swimming lagoons remain in the Code. Please see the Appendix for the proposed rule text.

## **Description of Proposed Rules**

Under 15A NCAC 18A .2508 and .2543, artificial swimming lagoons are required to meet the standards established for public swimming pools, except when the proposed Rules specify otherwise.

### Definitions

15A NCAC 18A .2508 is a definitions Rule that has been updated to clarify terms and to include artificial swimming lagoons in the definition of water recreation attractions that are governed by the existing Rules that regulate public swimming pools.

### Liners

Artificial swimming lagoons are different from pools because they are designed to have a liner without a shell. Therefore, the proposed Rule .2543 permits the use of a liner without a shell, but requires that the liner meet the pool liner standards established in 15A NCAC 18A .2514. Artificial swimming lagoons need to use liners for several reasons. The size of the venue would create significant structural challenges in building a watertight rigid structure which could withstand the stresses of expansion and contraction. The aesthetic appeal of the artificial swimming lagoon is enhanced by the natural looking curves and slopes created by the use of the liner. The liners developed for use by the artificial swimming lagoon industry are superior to the minimal requirements currently in the rules. They are designed to have a lifespan significantly longer than the hard-shell construction used in traditional swimming pool construction. The artificial swimming lagoon liners are UV resistant and expected to last about 100 years.

### Method and Technology Used to Meet Water Quality Standards

Additionally, in an artificial swimming lagoon, in contrast to a pool, the water is not circulated, disinfected, and returned to the lagoon; instead, the water is treated in place using a flocking agent that causes debris to sink to the bottom of the lagoon where it is removed by a submersible pump or mechanical cleaning equipment. This method of maintaining water quality, as well as the use of underwater, motorized machinery, is not contemplated by the existing swimming pool rules, but requires regulation to protect against disease caused by exposure to contaminated water as well as injury or drowning that could result from bathers' entanglement with the submersible pumps or mechanized pool cleaning equipment.

The proposed Rule .2543 therefore requires that artificial swimming lagoons be divided into two zones: a swimming zone and a non-swimming zone (for recreational activities such as kayaking). In swimming zones, the artificial swimming lagoon operator shall be required to meet the same water quality standards as public swimming pools and to maintain a disinfectant residual. Because of only incidental exposure in non-swimming zones, operators are required to meet the Tier 1 recreational water standards as defined in 15A NCAC 18A .3402(a), with the exception of any water features that aerosolize water, which are held to the swimming pool water quality standards. Tier 1 recreational water standards were chosen because they are more protective of public health. Information provided by industry claims they can exceed these requirements in the non-swimming zones of the lagoon. The disinfectant residual is maintained in the swimming zones by direct injection into the zones through small outlets inserted into the lagoon liner. The

vacuum cleaning creates a slight negative flow from the swimming zones into the non-swimming zones to ensure that the entire swimming zone maintains the required disinfectant residual.

Rule .2543 establishes standards that apply when using a submersible pump or mechanized pool cleaning equipment, including the requirement that a registered design professional provide documentation demonstrating that suction outlets on the submersible pump or mechanical pool cleaning equipment are at least as protective as the pool and hot tub industry standard for suction outlets; a requirement that submersible pumps or mechanical pool cleaning equipment not be used in or near swimming zones when the swimming zones are open to bathers; and a requirement that all floating components of the submersible pump or mechanical pool cleaning equipment be labeled with a warning sign that sits above the water line. These provisions are intended to reduce accidental entanglement with the submersible pump or mechanical pool cleaning equipment, which could result in serious injury or drowning.

#### Additional Safety Requirements

Rule .2543 provides for safety features to reduce the risk of accident and injury to the public. In addition to meeting the safety requirements established for public swimming pools, the Rule requires signage that delineates swimming and non-swimming zones, signage that identifies “no diving” areas, use of float ropes, and depth markers, which are intended to reduce the risk of accidental drownings as well as head, spinal, and other injuries caused by diving into a shallow area. Similar to pools, the Rule also addresses nighttime use of the lagoon and lighting requirements, which serve to make it easier for those monitoring the pool to identify a bather who may need assistance or rescue.

#### Dressing and Sanitary Facilities

The proposed Rule .2543 has also been amended to no longer require that interactive play attractions have dressing or sanitary facilities. The requirement to provide them has been superseded by Session Law 2011-39 for several years. This update to the Rule is made solely to bring the Rule in alignment with the superseding law. Since this requirement was previously superseded, it does not change how the rule operates, and is not expected to have a fiscal impact. For that reason, it is not discussed further below.

#### Custom Skimming Systems

The proposed Rule .2543 has been amended at Subparagraph (d)(4) by striking the reference to justification of and approval for custom skimming systems that deviate from the requirements established in the Rule. This sentence has been struck because it is redundant; specifically, it repeats the process described in Paragraph (a) of the Rule. The elimination of this sentence is a purely technical change, it does not change how the rule operates, and is not expected to have a fiscal impact. For that reason, it is not discussed below.

### **Impact Analysis**

In absence of the rule, artificial swimming lagoons would not be permitted in North Carolina. These man-made lakes pose unique water quality and injury risks to users compared to swimming pools or natural water bodies due to their size and construction. The proposed rules would permit artificial swimming lagoons in the state by implementing operational requirements that reduce public health and safety risk.

Therefore, the proposed rules will benefit lagoon operators by allowing a new revenue opportunity. The lagoons will provide new recreational opportunities for residents and property values for nearby communities are expected to increase. The proposed operational requirements increase the costs for lagoon operators but reduce the risk of serious injury, drowning, or waterborne illness for lagoon users. The state agency and local health departments will incur costs for oversight and enforcement activities.

#### State Government Impact

We expect the proposed Rules to have a minimal economic impact on State government. The development and construction of artificial swimming lagoons is site-specific, and industry will therefore need to develop design and operation plans for individual artificial swimming lagoon projects. In accordance with the proposed Rules, industry is required to submit those plans for review and approval by State staff who are

Registered Environmental Health Specialists (REHSs). The average salary for the program staff involved in this work is \$56,452.<sup>3</sup> Using this figure, as well as an estimate of the value of fringe benefits, we have calculated the hourly rate of a State REHS staff member at \$37.50. The time spent by State-level REHS staff will be an opportunity cost, as we do not intend to hire any additional staff to help do this work.

<b>Table 1: Average Hourly Pay Rate for State REHS</b>		
<b>Salary and Fringe Benefits<sup>4</sup></b>		
Salary/Benefit	% of Salary	Total Value
Salary	100	\$56,452
FICA	7.65	\$4,318.58
Retirement, Death, and Disability Benefit	19.70	\$11,121.04
Health Insurance	10.81	\$6,104
<b>Hourly Rate Calculation</b>		
Total Salary + Fringe	Hours Worked / Year	Hourly REHS Rate
\$77,995.62	2080	\$37.50

State-level REHS staff will be responsible for reviewing the water treatment part of the design and operation plans. Although we have not had any of these plans before us for review yet, we expect, based on our experience with plan review work, that a single REHS staff member will spend three hours acquiring and reviewing the plan. Additionally, we anticipate that one State-level REHS staff person will then spend three hours communicating with the local health department that is responsible for reviewing and approving the other components of the design and operation plan about those components.

REHS staff will also need to conduct on-site construction visits. We expect that it will take one REHS staff member a total of 16 hours (two days), including travel, to conduct a total of two on-site visits needed for one artificial swimming lagoon construction project. Although State REHS staff will use State-owned vehicles to drive from Raleigh to the artificial swimming lagoon sites, there is an expense to the State of \$0.27 per mile.<sup>5</sup> We have estimated the distance of travel to and from a construction site based on our knowledge of current industry plans to develop an artificial swimming lagoon in Brunswick County, which is approximately 156 miles (one way) from our Raleigh offices.<sup>6</sup>

Finally, REHS staff will need to develop training for local health departments. Based on our familiarity with the subject matter and our past experience developing training, we expect this to be a one-time effort requiring 12 hours of work. REHS staff will present the training at annual district education meetings, which is expected to take eight hours to provide training to each of the territories. State-level REHS staff already attend these meetings to provide updates and trainings, so using these existing meetings as the vehicle for artificial swimming lagoon training does not represent a new expense for State government.

<sup>3</sup> This value was provided by the Division of Public Health, Environmental Health Section and was calculated using information available as of April 2, 2020.

<sup>4</sup> The benefits listed were identified using the North Carolina Office of State Human Resources "Total Compensation Calculator," which is available at <https://oshr.nc.gov/state-employee-resources/classification-compensation/total-compensation-calculator>. In using this tool, we did not account for years of service, which may increase an employee's annual paid sick and vacation days, which are capped at 12 and 26 days, respectively, after 20 years of qualifying service to the State.

<sup>5</sup> North Carolina Department of Administration, "MFM Rate FAQs," January 2018, <https://files.nc.gov/ncdoa/documents/files/NewRateSheetJan2018.pdf>, accessed April 6, 2020.

<sup>6</sup> Crystal Lagoons, News and Observer, "Could a tropical paradise like this be coming to NC?" June 20, 2019, <https://www.newsobserver.com/news/politics-government/state-politics/article231788923.html>, accessed April 4, 2020.

The State does not take in any fees as part of its plan review or inspection process.

<b>Table 2: Impact on State Government- Opportunity Costs</b>		
<b>REHS Staff Plan Review (per artificial swimming lagoon)</b>		
Number of Hours to Complete	REHS Hourly Rate	Cost to State Government
6	\$37.50	\$225.00
<b>REHS Staff Conduct Construction Inspections (per artificial swimming lagoon)</b>		
Number of Hours to Complete	REHS Hourly Rate	Cost to State Government
16	\$37.50	\$600.00
Total Number of Miles Est. for Travel to Construction Site	Cost Per Mile for State-Owned Vehicle	Cost to State Government
624	\$0.27	\$168.48
<b>REHS Training Development (one-time)</b>		
Number of Hours to Complete	REHS Hourly Rate	Cost to State Government
12	\$37.50	\$450.00
<b>First Year Costs:</b>		
REHS Staff Plan Review (assuming 1 artificial swimming lagoon).....		\$225.00
REHS Staff Conduct Inspections (assuming 1 artificial swimming lagoon)		
Staff work hours .....		\$600.00
Travel mileage costs .....		\$168.48
REHS Staff Develop Training (one-time) .....		\$450.00
TOTAL FIRST YEAR COST .....		<b>\$1,443.48</b>
<b>Costs Per Additional Application for a New Artificial Swimming Lagoon:</b>		
REHS Staff Plan Review .....		\$225.00
REHS Staff Conduct Inspections		
Staff work hours .....		\$600.00
Travel mileage costs .....		\$168.48*
TOTAL COST PER APPLICATION .....		<b>\$993.48</b>
* Mileage will vary based on the proposed site of the artificial swimming lagoon.		

Local Government Impact

We expect the proposed Rules to have a minimal economic impact on local government. Local health departments (LHDs) will be responsible for part of the artificial swimming lagoon plan review. This work will also be carried out by Registered Environmental Health Specialists (REHSs) who are employed by the LHDs and whose work regularly involves reviewing plans and conducting inspections for public swimming

pools. The average salary for an REHS employed by a LHD is \$48,057.<sup>7</sup> Using this figure, as well as an estimate of the value of fringe benefits, we have calculated the hourly rate of an REHS at \$31.81. Although we cannot know for certain, we expect that the time spent by REHS staff will likely be an opportunity cost, as we do not expect that LHDs will hire additional staff to help do this work.

**Table 3: Average Hourly Pay Rate for Local REHS**

<b>Salary and Fringe Benefits<sup>8</sup></b>		
Salary/Benefit	% of Salary	Total Value
Salary	100	\$48,057.00
All Benefits	37.7	\$18,117.49
<b>Hourly Rate Calculation</b>		
Total Salary + Fringe	Hours Worked / Year	Hourly REHS Rate
\$66,174.49	2080	\$31.81

The plan review process for an artificial swimming lagoon will closely mirror the review process for a public swimming pool and will include review of construction images to ensure compliance with requirements related to signage and the location of restrooms, walkways, safety equipment, an emergency phone, fencing, and gates. In addition to reviewing the plan, an REHS will have to document the plan review in a plan review letter. Based on our experience working with LHDs, we believe that a single REHS will need eight hours to conduct a review and write a plan review letter. Additionally, a REHS will need to conduct two on-site construction visits to confirm that construction is consistent with the approved plan. Site visits are expected to take one REHS eight hours in total. Mileage is not included as a cost because travel is expected to be minimal and within the county.

Although the plan review process for artificial swimming lagoons will closely mirror the review process that REHSs regularly use for public swimming pools, REHSs will need some training on how the proposed Rules have adapted common pool requirements (such as signage and safety features) to artificial swimming lagoons. As explained in the section on State government impact, this training will be provided by State REHS staff during the regularly-scheduled district education meetings. REHSs already attend these meetings to receive continuing education credits and receiving training on artificial swimming lagoons through these meetings will not result in any additional expenses or time for REHSs.

REHSs will also be responsible for reviewing the artificial swimming lagoon permit application and safety data sheet. This is the same paperwork that an REHS would review for any public swimming pool permit and it must be submitted by the artificial swimming lagoon operator and approved by an REHS on a recurring annual basis. Based on experience, we expect this review process to require one hour of time from one REHS. In addition to reviewing the paperwork, an REHS will have to conduct an on-site permit inspection. Based on experience, an inspection will require three hours of work for one REHS. Pursuant to the Rules, a public swimming pool or artificial swimming lagoon that is open year-round must be inspected twice per year. A facility is open year-round if it uses any part of the facility year-round. We expect that artificial swimming lagoons will be open year-round so that non-swimming zones can be used for recreation activities, like kayaking, even when the seasonal weather may preclude the use of swimming zones. Two permit inspections are therefore expected to require a total of six hours of a REHS's time to complete. Mileage is not included as a cost because travel is expected to be minimal and within the county.

<sup>7</sup> The average REHS salary was estimated from the UNC School of Government's 2019 County Salary Survey, which is available at: <https://www.sog.unc.edu/publications/reports/county-salaries-north-carolina-2019>.

<sup>8</sup> The value of benefits was identified using the U.S. Bureau of Labor Statistics' latest available figures from December 2019 on employer costs for employee compensation for state and local government workers, which is available at: <https://www.bls.gov/news.release/ecec.t03.htm>.

In contrast to the State plan review and inspection process, LHDs take in a fee for the plan review as well as a year-round pool permit fee. Fee amounts are set at the county level and may vary by jurisdiction.<sup>9</sup> For the purpose of this analysis, we have used the fee amounts established in Brunswick County, which is the potential site for a future artificial swimming lagoon.<sup>10</sup> Brunswick County charges a one-time fee of \$250 for the initial plan review and an annual fee of \$300 for a year-round permit. In the first year, LHDs will have to absorb a net total expense of \$181.63; however, in additional years, LHDs can be expected to net income from the fees that artificial swimming lagoon operators must pay to maintain their permits, totaling \$77.33 in income per additional year per artificial swimming lagoon.

**Table 4: Impact on Local Government- Opportunity Costs and Fee Income**

<b>Table 4a: Costs to Local Government</b>		
<b>REHS Plan Review and Writing Review Letters (one time per artificial swimming lagoon)</b>		
Number of Hours to Complete	REHS Hourly Rate	Cost to Local Government
8	\$31.81	\$254.48
<b>REHS Conduct Construction Inspection Visits (one time per artificial swimming lagoon)</b>		
Number of Hours to Complete	REHS Hourly Rate	Cost to Local Government
8	\$31.81	\$254.48
<b>REHS Permit Application and Safety Data Review (annually per artificial swimming lagoon)</b>		
Number of Hours to Complete	REHS Hourly Rate	Cost to Local Government
1	\$31.81	\$31.81
<b>REHS Permit Inspections (annually per artificial swimming lagoon)</b>		
Number of Hours to Complete	REHS Hourly Rate	Cost to Local Government
6	\$31.81	\$190.86

<b>Table 4b: Fee Income to Local Government</b>		
<b>LHD Plan Review Fee</b>		
Fee Amount	Fee Frequency	Total Fee Income Per Lagoon Per Year
\$250.00	Once per lagoon	\$250.00
<b>LHD Permit Fee</b>		
Fee Amount	Fee Frequency	Total Fee Income Per Lagoon Per Year
\$300.00	Once per lagoon per year	\$300.00

**First Year Net Costs Per Artificial Swimming Lagoon:**

<u>Total Costs:</u>	
REHS Plan Review and Review Letter (assuming 1 artificial swimming lagoon) .....	\$254.48
REHS Construction Inspection (assuming 1 artificial swimming lagoon) .....	\$254.48

<sup>9</sup> N.C.G.S. 130A-39(g).

<sup>10</sup> Crystal Lagoons, “Could a tropical paradise like this be coming to NC?” June 20, 2019.

REHS Permit Application and Safety Review (assuming 1 artificial swimming lagoon)....	\$31.81
REHS Permit Inspection (assuming 1 artificial swimming lagoon) .....	\$190.86
<b>TOTAL FIRST YEAR COST</b> .....	<b>\$731.63</b>
<u>Total Income:</u>	
LHD Plan Review Fee (assuming 1 artificial swimming lagoon) .....	\$250.00
LHD Permit Fee (assuming 1 artificial swimming lagoon) .....	\$300.00
<b>TOTAL FIRST YEAR FEE INCOME</b> .....	<b>\$550.00</b>
<u>Net Total Costs:</u>	
\$731.63 in costs - \$550.00 in income	
<b>FIRST YEAR NET TOTAL COST PER ARTIFICIAL SWIMMING LAGOON</b> .....	<b>\$181.63</b>

**Net Benefit Per Artificial Swimming Lagoon Per Additional Year:**

<u>Total Costs:</u>	
REHS Permit Application and Safety Review (assuming 1 artificial swimming lagoon)....	\$31.81
REHS Permit Inspection (assuming 1 artificial swimming lagoon) .....	\$190.86
<b>TOTAL COST PER ADDITIONAL YEAR</b> .....	<b>\$222.67</b>
<u>Total Income:</u>	
LHD Pool Permit Fee (assuming 1 artificial swimming lagoon) .....	\$300.00
<b>TOTAL FEE INCOME PER ADDITIONAL YEAR</b> .....	<b>\$300.00</b>
<u>Net Total Benefit:</u>	
\$300 in income - \$222.67 in costs	
<b>NET TOTAL BENEFIT PER ARTIFICIAL SWIMMING LAGOON PER ADDITIONAL YEAR</b> .....	<b>\$77.33</b>

Private Sector Impact

*Artificial Swimming Lagoon Industry*

The impact of the proposed Rules on the private sector, and particularly the impact on the artificial swimming lagoon industry, is challenging to quantify. We know that an operator of an artificial swimming lagoon will be required to pay \$550 in total permitting and inspection fees per year, which we anticipate will be a minimal annual expense relative to an operator’s overall costs and profit margins. To date, there are no artificial swimming lagoons in North Carolina. Absent the proposed Rules, we believe that it would not be possible for an artificial swimming lagoon to be built and permitted to operate because the lagoon would have to meet every requirement established under the existing public swimming pool Rules. These Rules do not contemplate the unique features of artificial swimming lagoons and it is therefore highly unlikely that an artificial swimming lagoon could be built and operated in a manner that satisfies the public swimming pool standards. The proposed Rules are therefore permissive in their nature: they reflect an adaptation of the swimming pool standards to accommodate the unique features of artificial swimming lagoons while still protecting the public’s health and safety, and create a regulatory environment in which artificial swimming lagoons are able to exist.



In an effort to better understand costs to the private sector, we consulted with Crystal Lagoons, a company that constructs and operates artificial swimming lagoons, on the potential economic impact of the proposed Rules. Crystal Lagoons advised that, absent any regulatory framework for artificial swimming lagoons, the company has established design and operational requirements that are based on sound engineering and align with industry best practices to protect users and the environment. Crystal Lagoons already includes in its lagoon plans many of the elements that are required under the Rules, but did advise that some requirements imposed by these Rules may increase costs.

Crystal Lagoons indicated that they would expect to encounter increased operational costs related to the requirements for chlorine residuals and water quality monitoring. The residual chlorine concentration required in swimming zones under the proposed Rules (of 1 ppm) is different from the residual concentration level in model plans and the residual concentration required in other states where artificial swimming lagoons have been built. For example, according to Crystal Lagoons, Texas requires a residual chlorine concentration of 0.5 ppm in swimming zones. This higher residual chlorine concentration is expected to require more frequent monitoring and, therefore, to increase operational costs.

Crystal Lagoons also advised that it expects to see an increase in operational costs related to the Rules' requirements for water quality monitoring and testing in non-swimming zones. It is a challenge to determine how much an operator would be charged by private labs for water sample testing, but we expect the expense to be minimal relative to the operator's overall costs and revenue. The cost of this testing is expected to vary among labs. For example, one county in North Carolina has identified water testing fees for enterococci at \$35.00 per sample.<sup>11</sup> The number of samples that must be tested pursuant to the proposed Rule will also vary, based on the overall size of the lagoon and the perimeter of areas that are not used as swimming zones. The private labs that conduct the water quality testing may see a small increase in work load and in income from a new customer for water sample testing; however, we expect the overall impact on private lab industry to be small given that, at this time, we are aware of only one plan to build an artificial swimming lagoon in the state.

Crystal Lagoons further identified that some of the safety elements included in the rules, such as emergency telephones, are decided by the local operator, in alignment with local requirements. Therefore, this may impose an additional cost.

Finally, the cost of designing, constructing, and operating an artificial swimming lagoon is tied, in part, to the size of the lagoon, which can vary from the minimum 20,001 square feet of surface area to nearly 100 acres of water surface.<sup>12</sup> The proposed Rules impose certain standards and minimum requirements for lagoon design, construction, and operation; however, Crystal Lagoons has not identified additional costs expected to arise from the Rules' design and construction requirements.

Crystal Lagoons did not provide specific estimates of the costs and benefits described. However, if the swimming lagoon industry decides to build a lagoon in the state, it is reasonable to assume that the revenue benefits are expected to exceed the costs, including any added costs due to the proposed rules.

### *Lagoon Users and Local Communities*

The proposed rules will help prevent injury, drowning, and waterborne illness at artificial swimming lagoons, just as the current rules protect the public in swimming pools and spas. Drowning is a leading cause of unintentional injury-related death for children ages 1–14 years. Non-fatal drowning can cause brain damage resulting in learning disabilities or even permanent loss of basic functioning. Injuries linked

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<sup>11</sup> Craven County, "Environmental Health Fees," <https://www.cravencountync.gov/362/Environmental-Health-Fees>, accessed April 12, 2020.

<sup>12</sup>Crystal Lagoons, "Gulf News Labels Dubai Development with Crystal Lagoons World's Largest Lagoon 'Exclusive Community Living Experience,'" <https://www.crystal-lagoons.com/latest-news/gulf-news-labels-dubai-development-with-crystal-lagoons-worlds-largest-lagoon-exclusive-community-living-experience/>, accessed April 4, 2020.

to pool chemicals accounted for 3,000–5,000 emergency department visits each year. Almost half of the patients are under 18 years of age.

Nearly 500 disease outbreaks linked to pools, hot tubs/spas, and water playgrounds occurred from 2000 to 2014. The leading cause of these outbreaks is *Cryptosporidium*. Other diarrheal illnesses caused by pathogens in recreational water include Giardia, Shigella, norovirus, and *E. coli* O157:H7. A recent study found that 11.8% (1 out of 8) of public pool and 15.1% (1 out of 7) of public hot tub/spa inspections resulted in immediate closure because of at least one identified violation that represented a serious threat to public health. Waterborne illnesses are likely to increase significantly without rules in place to help mitigate such diseases.<sup>13</sup>

Other areas of the private sector that may be impacted include the communities surrounding artificial swimming lagoons, which may see an increase in tourism due to the draw of the lagoon or an increase in property values. For example, an eight-acre artificial swimming lagoon that was developed near Tampa, Florida reportedly resulted in a 21% sales increase for the surrounding model homes, compared to a 1% to 5% increase at competitor communities over the same timeframe. Homes sold at a 9% to 10% price premium relative to comparable Tampa homes.<sup>14</sup> However, this is challenging to predict and the impact may depend on whether the artificial swimming lagoon is restricted to a particular living community or allows for public membership.

Artificial swimming lagoons may also have an environmental impact on the communities in which they are built and operated; however, information provided by Crystal Lagoons suggests that the industry has developed processes and mechanisms for mitigating impacts, particularly in comparison to the impacts that would be associated with traditional swimming pools.<sup>15</sup> For example, the technology used by Crystal Lagoons to maintain water quality, recaptures and processes the filtered water, thereby avoiding the creation of wastewater that must be treated by a downstream treatment facility. This same technology also reduces the need for pumps and electricity to operate a filtration system, which allows each lagoon to consume just 2% of the energy used by a traditional swimming pool.

Crystal Lagoons has also provided information about the development of design features and emergency plans to reduce environmental risks associated with natural disasters. In North Carolina, major storms (including hurricanes) are a concern for their ability to cause flooding of large bodies of water. Examples of steps taken by industry to address this environmental risk include the design of overflow weirs, which are an average of 50 feet long and located along the perimeter of the lagoon to prevent flooding in the event of a major storm that causes significant waterfall. Additionally, Crystal Lagoons' water quality management technology uses 100 times less chemicals than traditional swimming pools. As a result, post-storm draw-down is akin to dechlorinated pool water (which is not contaminated by runoff) and does not require a National Pollutant Discharge Elimination System (NPDES) permit when it is discharged into an authorized storm water system.

In addition to major storms, Crystal Lagoons has advised that the design of their lagoons and the use of a liner without a shell enables their artificial swimming lagoons to support most loads from seismic events. The company has had experiences with earthquakes in Chile, which to date have not resulted in damage to lagoons located in the area of impact.

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<sup>13</sup> United States Centers for Disease Control and Prevention, "The Model Aquatic Health Code (MAHC): An All-inclusive Model Public Swimming Pool and Spa Code: General Information," July 18, 2018, <https://www.cdc.gov/mahc/general-information.html>, accessed April 11, 2020.

<sup>14</sup> Diana Olick, CNBC, "Caribbean-like lagoons give homebuyers the benefits of the beach without the risk," February 13, 2020, <https://www.cnbc.com/2020/02/12/caribbean-like-lagoons-give-homebuyers-beach-benefits-without-risk.html>, accessed April 4, 2020.

<sup>15</sup> An example of a 2019 artificial swimming lagoon environmental impact review prepared by industry is available at: <https://ranchomirageca.gov/wp-content/uploads/2020/01/Sect.-31-Specific-Plan-Gen5-2019.11.26.pdf>.

## *Substantial Economic Impact*<sup>16</sup>

The economic impacts of the proposed Rules on the private sector, such as an increase in home values, the creation of new recreation and tourism opportunities, and compliance costs for industry, are site-specific and therefore challenging to quantify. Although we cannot calculate an exact figure, we anticipate that these impacts may collectively produce a substantial economic impact on North Carolina, particularly if many artificial swimming lagoons are built in the future. Due to this possibility, this fiscal note conforms to the requirements of GS 150B-21.4(b2)(5) and contains two alternatives.

### **Alternatives**

One alternative option to the proposed regulatory framework put forward in this fiscal note would have been to propose the language of the temporary rules that were adopted, without any changes. One major regulatory requirement that changed between the temporary rules and the proposed permanent rules is that the temporary rules required artificial swimming lagoon operators to close non-swimming zones to users when operating mechanical cleaning equipment. During the temporary rulemaking process, we were concerned about the unknown, potential hazards of users coming into contact with the equipment. However, following temporary rulemaking, Crystal Lagoons provided evidence of the safety of this equipment. In addition, users are expected to have only incidental contact with the water in non-swimming zones. Based on this, we were able to work with Crystal Lagoons to draft requirements to enable the use of the equipment when non-swimming zones are open. These new requirements, found in paragraph (f)(16) of Rule .2543, prioritize safety and protection of the public's health and are also expected to reduce the regulatory burden on industry, by reducing the amount of time that non-swimming zones have to be closed.

A second alternative option would have been to make fewer modifications to the existing swimming pool requirements to accommodate artificial swimming lagoons, as required by session law. This approach would have been very constraining for the industry and likely would have reduced the feasibility of constructing and operating an artificial swimming lagoon in North Carolina. For this reason, we instead worked with the industry to develop tailored requirements that protect the safety and well-being of artificial swimming lagoon users while also minimizing the regulatory burden.

### **Summary**

The State agency and local health departments will incur costs for oversight and enforcement activities. Specifically, the State agency anticipates opportunity costs of \$1,443.48 during the first year in which these Rules are in place, which accounts for staff time spent developing training on the proposed Rules, reviewing lagoon plans, and conducting inspections. In the following years, the State anticipates an opportunity cost of \$993.48 per application received for a new artificial swimming lagoon. Local health departments are expected to incur a net opportunity cost of \$181.63 in the first year for one newly-proposed artificial swimming lagoon. The net cost accounts for staff time spent conducting plan review, issuing permits, and conducting inspections, as well as income generated from two fees. Once an artificial swimming lagoon has been approved for construction and operation, the local health departments can expect to generate a small amount of fee-based revenue per existing lagoon per year in the amount of \$77.33.

The proposed Rules will benefit lagoon operators by allowing a new revenue opportunity. The lagoons will provide new recreational opportunities for residents and property values for nearby communities are expected to increase. The proposed regulatory requirements are expected to slightly increase costs for lagoon operators, but reduce the risk of serious injury, drowning, or waterborne illness for lagoon users. These impacts, although challenging to quantify, may collectively have a substantial economic impact.

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<sup>16</sup> "Substantial economic impact" is defined at GS 150B-21.4(b1) as "an aggregate financial impact on all persons affected of at least one million dollars (\$1,000,000) in a 12-month period."

## Appendix: Proposed Rule Text

15A NCAC 18A .2508 is proposed for amendment as follows:

### 15A NCAC 18A .2508 DEFINITIONS

The following definitions apply throughout this Section:

- (1) “Department” means North Carolina Department of Health and Human Services.
- (2) "Equipment replacement" means replacement of individual components of the hydraulic and disinfection systems such as pumps, filters, and automatic chemical feeders.
- (3) "Public swimming pool" means public swimming pool as defined in G.S. 130A-280. Public swimming pools are divided into five types:
- (a) "Swimming pools" are public swimming pools used primarily for swimming.
  - (b) "Spas" are public swimming pools designed for recreational and therapeutic use that are not drained, cleaned, or refilled after each individual use. Spas may include units designed for hydrojet circulation, hot water, cold water mineral bath, air induction bubbles, or any combination thereof. Common terminology for spas includes "therapeutic pool," "hydrotherapy pool," "whirlpool," "hot spa," and "hot tub."
  - (c) "Wading pools" are public swimming pools designed for use by children, including wading pools for toddlers and children's activity pools designed for casual water play ranging from splashing activity to the use of interactive water features placed in the pool.
  - (d) ~~"Specialized water "~~"Water recreation attractions" are pools designed for special purposes that differentiate them from swimming pools, wading pools and spas. They include:
    - (i) water slide plunge pools and run out lanes, which transfer the kinetic energy of the users' velocity through friction to the slide;
    - (ii) wave pools;
    - (iii) rapid rides;
    - (iv) lazy rivers;
    - (v) interactive play attractions that incorporate devices using sprayed, jetted, or other water sources contacting the users and that do not incorporate standing or captured water as part of the user activity ~~area; and~~ area;
    - (vi) training pools deeper than a 24 inch deep wading pool and shallower than a 36 inch deep swimming ~~pool;~~ pool; and
    - (vii) artificial swimming lagoons as defined in G.S. 130A-280.
  - (e) "Special purpose and therapy pools" are pools designed and used for therapeutic treatments or physical training and fitness outside of a licensed medical facility or practice of a licensed physical therapist. They include:
    - (i) float tanks used for float therapy in a salt brine solution;
    - (ii) swim spa training pools which use jetted water for stationary swimming against a water current;

- (iii) exercise therapy and treadmill pools equipped for water resistance exercise therapy; and
  - (iv) scuba pools designed and used for training swimmers to use self-contained underwater breathing apparatus.
- ~~(3)~~(4) "Registered Design Professional" means an individual who is registered or licensed to practice engineering as defined by G.S. 89C or architecture as defined by G.S. 83A.
- ~~(4)~~(5) "Remodeled" means renovated in a manner requiring disruption of the majority of the pool shell or deck, changes in the pool profile, or redesign of the pool hydraulic system.
- ~~(5)~~(6) "Repair" means returning existing equipment to working order, replastering or repainting of the pool interior, replacement of tiles or coping and similar maintenance activities. This term includes replacement of pool decks where the Department has determined that no changes are needed to underlying pipes or other pool structures.
- ~~(6)~~(7) "Safety vacuum release system" means a system or device capable of providing vacuum release at a suction outlet caused by a high vacuum occurrence due to suction outlet flow blockage.
- ~~(7)~~(8) "Splash zone" means the area of an interactive play attraction that sheds water to a surge tank or container to be recirculated.
- ~~(8)~~(9) "Unblockable drain" means a drain of any size and shape that a human body cannot sufficiently block to create a suction entrapment hazard.
- (10) "Water feature" means any component within a public swimming pool that pumps, jets, or sprays water above the waterline.

*History Note: Authority G.S. 130A-280; 130A-282; S.L. 2019-88; Eff. May 1, 1991; Temporary Amendment Eff. June 1, 1994 for a period of 180 days or until the permanent rule becomes effective, whichever is sooner; Amended Eff. April, 1, 2013; May 1, 2010; March 1, 2004; April 1, 1999; January 1, 1996; October 1, 1994. Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. July 20, 2019; Temporary Amendment Eff. December 3, 2019.*

15A NCAC 18A .2543 is proposed for amendment as follows:

### **15A NCAC 18A .2543 WATER RECREATION ATTRACTIONS**

(a) Water recreation attractions including water slides, wave pools, rapid rides, lazy ~~rivers~~ rivers, artificial swimming lagoons, and other similar features can deviate from the requirements of this Section with respect to pool profile, depth, freeboard, flow dynamics and surface skimming systems. The designing engineer or equipment manufacturer shall provide the Department with ~~information~~ design plans and technical specifications to justify such ~~deviation~~ deviation. ~~as necessary for the proper function of the attraction.~~ Water recreation attractions shall meet all other requirements of this Section.

(b) Water slide landing pools with a capacity of less than 60,000 gallons shall have a circulation and filtration system capable of turning over the entire pool capacity every two hours. Where automatic chemical controllers are used the turnover time shall be no more than three hours. Landing pool dimensions shall be consistent with the slide manufacturer's recommendation.

(c) When waterfalls are incorporated in water recreation attractions, they shall be constructed with no handholds or footholds to a height of four feet to discourage climbing.

(d) Interactive play attractions shall be constructed and operated in accordance with the ~~rules of this section~~ Rules of this Section and shall comply with the following:

- (1) The recirculation system shall contain a water capacity equal to at least three minutes of maximum flow of all feature pumps and filter circulation pumps combined and shall not be less than 1,000 gallons. Where the water capacity exceeds 10,000 gallons, the minimum capacity shall be based on the lesser of three minutes of maximum feature flow or 7.5 gallons per square foot of splash zone watershed drained to the surge container.
- (2) Access shall be provided to the surge water container.
- (3) A filter circulation system shall be provided and shall be separate from the feature pump system except that both systems can draw water from a common drain pipe if the drain and pipe are sized to handle the flow of all pumps without exceeding the flow velocities specified in Rule .2518 of this Section.
- (4) The filter circulation system shall draw water from the surge container through a variable height surface skimmer and a bottom drain located no more than 6 inches from the bottom of the container. ~~Custom skimming systems that do not comply with ANSI/NSF Standard 50 shall be approved where the operational requirements make it necessary to deviate from that standard.~~
- (5) The filter circulation system shall filter and return the entire water capacity in no more than 30 minutes and shall operate 24 hours a day.
- (6) Automatic chemical controllers shall be provided to monitor and adjust the disinfectant residual and pH of the water contained in the system.
- (7) The disinfectant residual in interactive play attractions shall be maintained at a level of at least two parts per million of free chlorine. Chlorine feeders shall be capable of producing 12 parts per million of free chlorine in the filter circulation piping.
- (8) Valves shall be provided to control water flow to the features in accordance with the manufacturers' specifications.

- (9) Splash zones shall be sloped to drains sized and located to remove all feature water to the surge tank without water accumulating on the surface.
  - (10) Deck or walkway space is not required outside the splash zone.
  - (11) Dressing and sanitary facilities shall ~~not be provided~~ required.
  - (12) Interactive play features shall not be required to have a fence except the wading pool fence requirements shall apply to interactive play features located inside a swimming pool enclosure.
  - (13) The safety provisions of Rule .2530 of this Section shall not apply except a sign shall be posted prohibiting pets and glass containers.
  - (14) Interactive play attractions built prior to April 1, 2004, that do not comply with these design and construction requirements shall be permitted to operate as built if no water quality or safety violations occur.
- (e) Training pools shall meet the requirements for swimming pools with the following exceptions:
- (1) Training pools shall be equipped with a filter circulation system that filters and returns the entire pool capacity in no more than two hours.
  - (2) The free chlorine residual in training pools shall be maintained at no less than two parts per million.
- (f) Artificial swimming lagoons shall meet the requirements for public swimming pools except as specified in this

Rule:

- (1) Pool shells shall not be required. Liners shall meet the requirements of Rule .2514 of this Section.
- (2) Underwater components of the artificial swimming lagoon or float lines with openings greater than one-half inch shall not be allowed in swimming zones.
- (3) All swimming zone float rope components shall be a color contrasting with the pool liner. The location of the float rope may vary from the requirements of Rule .2523(e) of this Section regarding breakpoint and slope. A contrasting color band shall not be required on the liner under the rope.
- (4) Each swimming zone and water feature shall meet water quality standards as required in Rule .2535 of this Section. If the water quality of a swimming zone or water feature does not meet the requirements of Rule .2535 of this Section, the operator shall close the swimming zone or water feature and post a sign at the entrance of the swimming zone with legible letters of at least four inches (10 cm) in height stating "ATTENTION: THE SWIMMING ZONE IS CLOSED. SWIMMING IN THIS AREA IS NOT PERMITTED AT THIS TIME." The swimming zone or water feature shall remain closed until the water quality in the swimming zone or water feature complies with the requirements of Rule .2535 of this Section.
- (5) All non-swimming zones shall be maintained so the bottom of the lagoon is visible in all areas.
- (6) A sign shall be posted at all entrances with legible letters of at least four inches (10 cm) in height stating "NOTICE – NO SWIMMING ALLOWED OUTSIDE OF DESIGNATED SWIMMING ZONES."
- (7) Signage shall be provided indicating swimming zones.
- (8) Depth markings and no diving markers shall be provided on decks in swimming zones as required in Rule .2523 of this Section. Signs shall be posted at all entrances to swimming zones with legible letters of at least four inches (10cm) in height stating "NO DIVING" and stating the maximum depth

of the swimming zone in Arabic numerals and shall include the word “feet” or the symbol “ft” to indicate the unit of measure.

- (9) Decks may vary from the minimum deck area requirements in Rule .2522 of this Section at zero entry areas located within swimming zones. Access to swimming zones shall be provided for emergency vehicles and personnel. No decks shall be required in non-swimming zones. The requirements of Rule .2515(g)(1) of this Section shall not apply to swimming zones and Rule .2515(g) of this Section shall not apply to non-swimming zones.
- (10) Swimming zones shall meet all safety provisions as set out in Rule .2530 of this Section. Where swimming zones are separated by more than 75 feet, each swimming zone shall separately meet all safety provisions. Non-swimming zones are exempt from the requirements in Rule .2530 of this Section.
- (11) A water treatment system that does not meet the requirements of Rules .2518 and .2519 of this Section shall be approved by the Environmental Health Section of the Department’s Division of Public Health when the treatment system performs in a manner equal or superior to the systems described in Rules .2518 and .2519 of this Section in terms of water clarification, disinfection, and removal of debris, and results in a disinfectant residual and pH level as required in subparagraph (f)(4) of this Rule.
- (12) The requirements of Rule .2529 of this Section and Rule .2526(e)–(h) of this Section shall not apply. Sanitary facility requirements shall comply with the 2018 North Carolina State Building Code: Plumbing Code, which is incorporated by reference, including any subsequent amendments or editions and available free of charge at: <https://codes.iccsafe.org/content/NCPC2018>.
- (13) Bacteriological samples shall be collected by the operator in non-swimming zones and tested weekly. One sample shall be collected for every 250 feet of shoreline, with no more than 300 feet and no less than 25 feet between any two sampling locations. The samples shall be collected at least one foot below the surface, in at least three feet of water. The samples shall be analyzed by a laboratory accredited by the North Carolina Drinking Water Laboratory Certification Program, the North Carolina Wastewater/Groundwater Laboratory Certification Program, or the National Environmental Laboratory Accreditation Program. The test results shall be maintained as part of the records required in Rule .2535(11) of this Section.
- (14) When the result of any test required by subparagraph (f)(13) of this Rule exceeds the standards in Rule .3402(a) of this Subchapter, the operator shall:
- (A) notify the permitting agency and resample the water within 24 hours of receipt of the result from the laboratory; and
  - (B) close all non-swimming zones and post a sign at all non-swimming zone entrances with legible letters of at least four inches (10 cm) in height stating “ATTENTION: ALL NON-SWIMMING ZONES ARE CLOSED. RECREATIONAL ACTIVITIES IN THIS AREA ARE NOT PERMITTED AT THIS TIME.” This sign shall remain posted until resampling determines that bacterial levels do not exceed the standards in Rule .3402(a) of this Subchapter.



- (15) Non-swimming zones shall not be required to comply with the lighting requirements of Rule .2524 of this Section. When night swimming is allowed, the operator shall provide lighting in swimming zones as required for public swimming pools.
- (16) The requirements of Rule .2537(b)(16) of this Section shall not apply. Submersible pumps or mechanical pool cleaning equipment shall not be used in swimming zones or within 25 feet of swimming zones when a swimming zone is open to bathers. If submersible pumps or mechanical pool cleaning equipment are used in non-swimming zones when a non-swimming zone is open to users, the following conditions shall apply:
- (A) A registered design professional shall provide design plans or technical specifications that demonstrate that any underwater suction outlets perform in a manner that is equally protective or more protective than the Pool and Hot Tub Alliance’s ANSI/APSP/ICC-7 2013 Standard for Suction Entrapment Avoidance in Swimming Pools, which is incorporated by reference, including any subsequent amendments or editions, and available for a fee of one hundred sixty-five dollars (\$165.00) at <https://www.apsp.org/store1>; and
- (B) All floating components of submersible pumps or mechanical pool cleaning equipment shall be labeled with a sign above the water line with legible letters of at least four inches (10 cm) in a contrasting color stating: “DANGER: MECHANICAL EQUIPMENT IN USE. STAY BACK 25 FEET.”
- (17) The requirements of Rule .2521 of this Section shall not apply to non-swimming zones.

*History Note: Authority G.S. 130A-280; 130A-282; SL 2011-39; S.L. 2019-88;*  
*Eff. April 1, 1999;*  
*Amended Eff. March 1, 2004.*  
*Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. July 20,*  
*2019;*  
*Temporary Amendment Eff. December 3, 2019.*