Item 10.3.1

Carbon Dioxide Mineralized Concrete

Diane Praught
Director of Technical Services
CarbonCure Technologies

Halifax Regional Municipality
Environment and Sustainability Standing Committee

September 5th, 2019


Did you know?
Concrete is the most abundant man-made material in the world.
As a result, cement production creates ~7% of the world's
CO_2 greenhouse gas emissions

Our solution

CARBONCURE™
SIMPLY BETTER CONCRETE

Providing a useful end-product, and economic value, for waste CO_2.

About CarbonCure

Breakthrough Energy VENTURES

- Founded and based in Dartmouth, NS
- 35 full-time employees
- Award-winning, innovative Canadian technology company

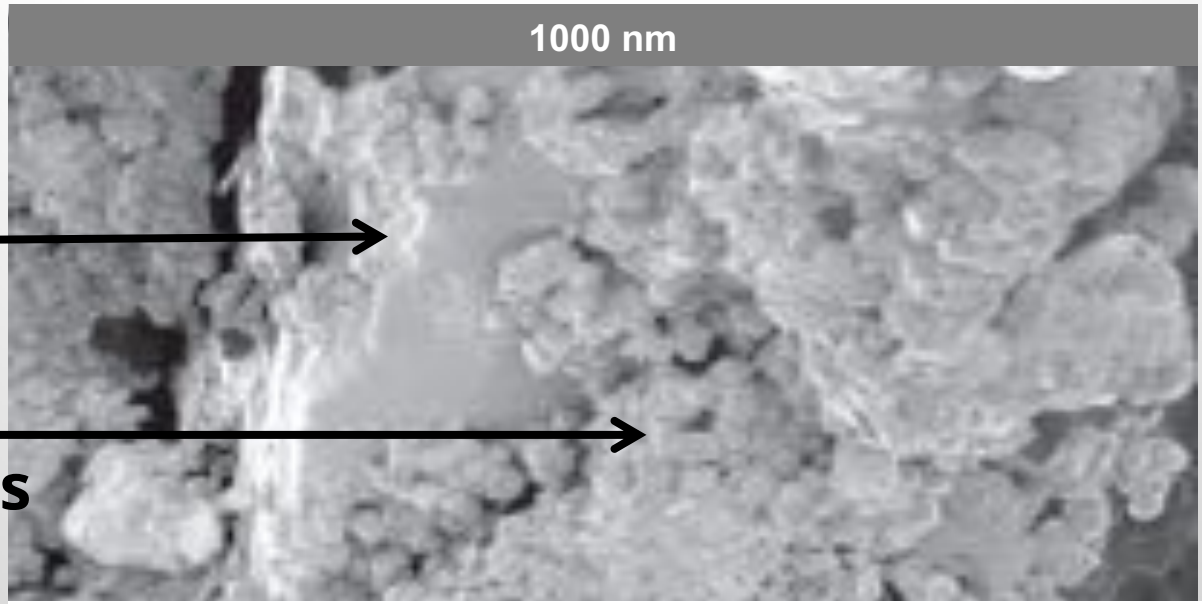
2019 GLOBAL CLEANTECH100 COMPANY

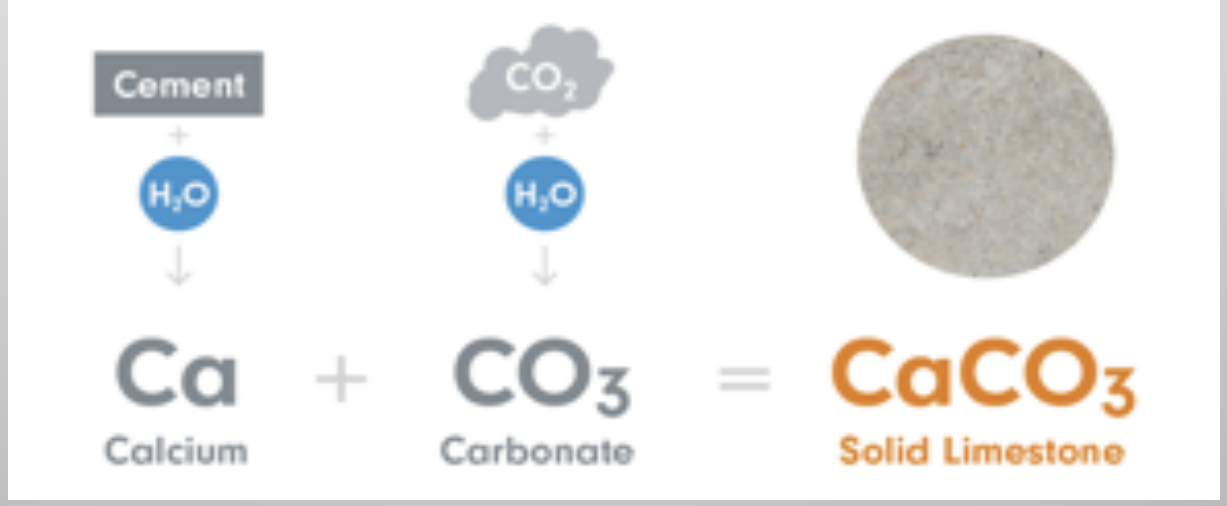
Produced by Cleantech Group

REIMAGINE CO_2

nrg cosia CARBON XPRIZE

Converting CO_2 gas to a solid mineral





The CarbonCure Solution

- CarbonCure installs its patented technology into existing concrete facilities.
- The equipment injects waste CO_2 into fresh concrete as it is mixed
- The CO_2 chemically converts into a mineral and improves the environmental footprint of the concrete

Our Local Partners

Project Details

Owner: Halifax Regional Municipality
Project Size: 175,000 square feet
Architects: Architecture49
Developer: EllisDon
Completion: September 2017
Concrete Supplier: Quality Concrete
CMU Supplier: Shaw Brick
Total CO_2 Saved: 207,458 pounds

- >10,000 yards of CO_2 – mineralized ready mix concrete poured to date in HRM
- Validated in HRM since 2013

Sustainability Benefits

- 1 cubic meter of Ready Mix concrete = approximately **12 kg CO_2** reduced
- 65 concrete masonry blocks = **1 kg CO_2** reduced

Considerations for Local Governments

Technology is not exclusive to any producer

- Traditional public sector competitive bid processes are not impacted

No impact on cost, quality, and scheduling

- Producers often able to deliver CO_2 mineralized concrete at a comparable price,
- CarbonCure works with new and existing producer partners to perform rigorous QA/QC processes

Drivers of change

- Local governments are typically responsible for 60%+ of infrastructure
- Policies that communicate a preference for mineralized concrete can send a powerful market signal

Precedents

Urging All Cities to Consider Using Carbon Dioxide Mineralized Concrete for Future City Building and Infrastructure Projects Utilizing Concrete

United States Conference of Mayors, 2019

City of Honolulu Resolution 18-283

CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII

No. 18-283

RESOLUTION

REQUESTING THE CITY ADMINISTRATION TO CONSIDER USING CARBON DIOXIDE MINERALIZATION CONCRETE FOR ALL FUTURE CITY INFRASTRUCTURE PROJECTS UTILIZING CONCRETE.

Benefits of CO_2-Mineralized Concrete to the Halifax Regional Municipality

- ✓Direct contribution to achieving corporate CO_2 emissions reduction targets as outlined in the HalifACT 2050 plan
- ✓Cost-competitive product that does not impact quality or scheduling of construction projects
- ✓Market-ready solution that has already been tested and deployed in HRM successfully

CARBON CURE™

THANK YOU!

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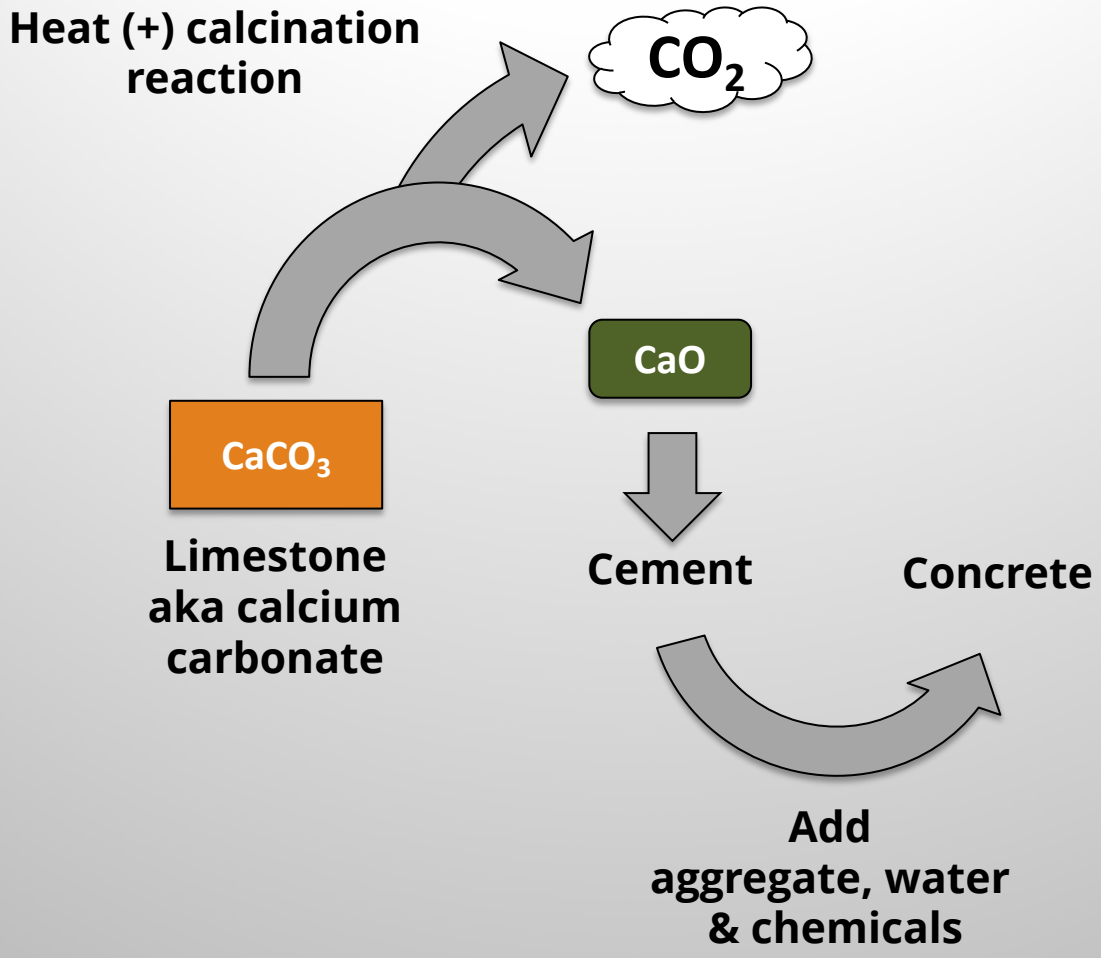
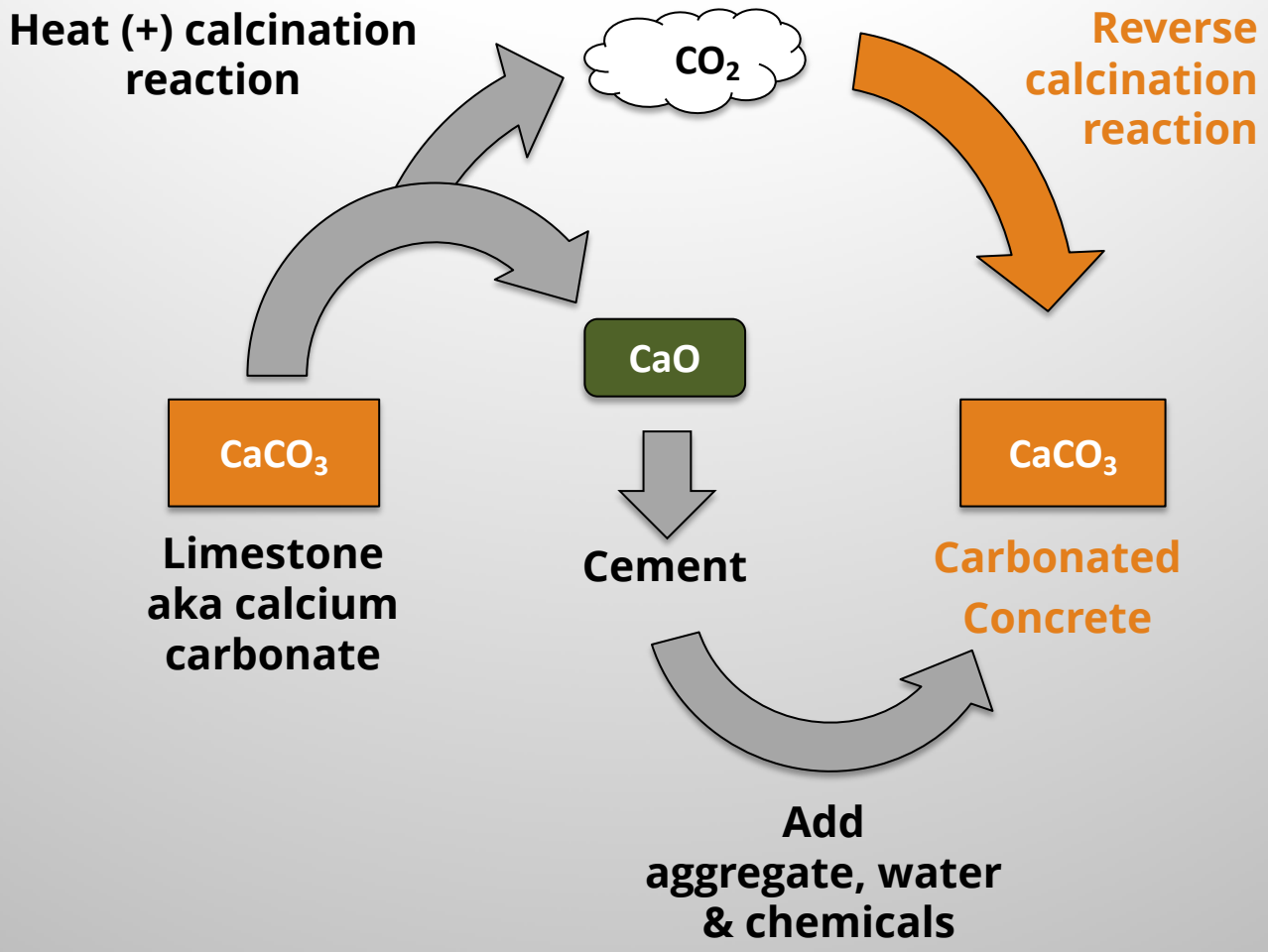
Mineralized Concrete

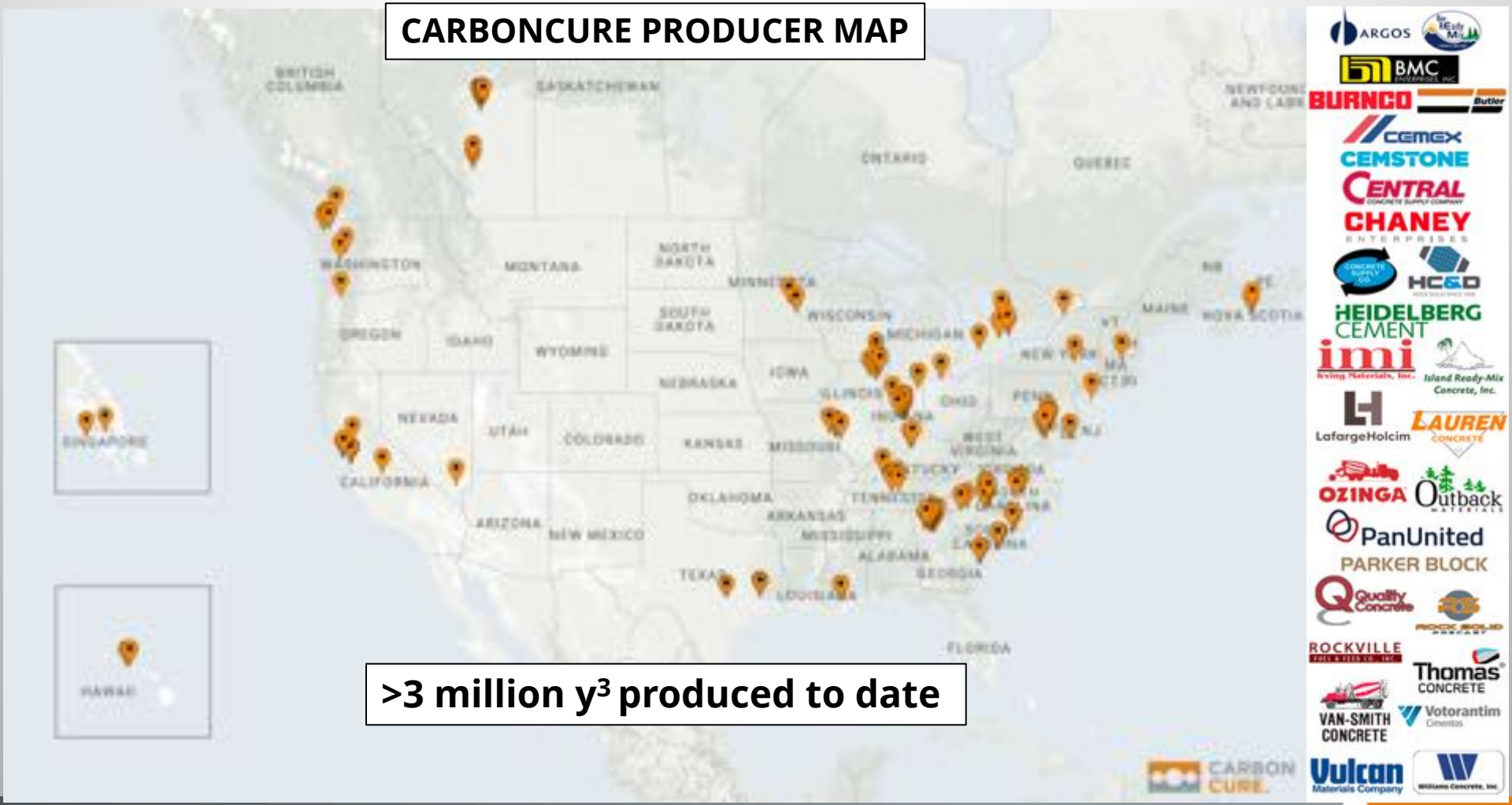


Mineralized Concrete



Validated From Coast to Coast

The CarbonCure Technology is in nearly **150 concrete plants** across North America and in Singapore, with expansion into Europe and Asia underway.



Application to LEED

LEED v4.1

Materials & Resources

Focuses on minimizing embodied environmental impacts to support a life-cycle approach that improves performance.

Option 4: Whole Building Life Cycle Assessment (3 points)

Show a 10% impact reduction in embodied CO_2 emissions + 2 other impact categories shown on an Environmental Product Declaration

→ CarbonCure helps to reduce all impact categories, including CO_2e

Policy

CITY COUNCIL
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HONOLULU, HAWAII

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WHEREAS, there is a growing awareness that climate change, whether caused by human activity, natural climatic cycles, or a combination of both, is occurring and that action is necessary to increase resilience in our community to climate change impacts; and

WHEREAS, the Intergovernmental Panel on Climate Change, an intergovernmental body of the United Nations that is dedicated to providing the world with an objective, scientific view of climate change, reported in 2013 that the last 30 years were the warmest since 1850 and likely the warmest in the past 1,400 years; that carbon dioxide, methane, and nitrous oxide levels are at their highest levels in 800,000 years; and that global mean sea level rose 0.62 feet from 1901 to 2010; and

WHEREAS, the State of Hawaii has set a requirement to reduce greenhouse gas emissions in the State to 1990 levels by 2020; and

WHEREAS, the State of Hawaii is committed to a 100 percent renewable energy portfolio standard by 2045, which makes Hawaii the first state in the nation to set such a goal; and

WHEREAS, Act 15, Session Laws of Hawaii (SLH) 2018, addressed the effects of climate change by calling for the State's mitigation of its greenhouse gas emissions through the sequestration of more atmospheric carbon and greenhouse gases than the State produces as quickly as practicable, but no later than 2045; and

WHEREAS, Act 15, SLH 2018, also created a permanent Greenhouse Gas Sequestration Task Force within the State Office of Planning to establish a baseline for greenhouse gas emissions within Hawaii and short- and long-term benchmarks for increasing greenhouse gas sequestration in the State's agricultural and natural environment; and

WHEREAS, in 2016, Honolulu voters approved a charter amendment establishing the Office of Climate Change, Sustainability and Resiliency within the City and County of Honolulu to address the planning, development, and implementation of effective policies, plans, and actions for mitigating potential climate change-related impacts to the City and creating sustainable and resilient communities; and

Policy

ENVIRONMENTAL COMMISSION MOTION 20190619 007c

Date: June 19, 2019

Subject: Low Carbon Concrete for City Construction Projects

Motion by: Katie Coyne **Seconded by:** Pam Thompson

RATIONALE:

WHEREAS, the annual benefits of the use of this concrete in Central Texas, if universally utilized, would be equivalent to the carbon sequestration for tens of thousands of acres of preserved forest; and

WHEREAS, the quality of concrete is improved in this technique and the cost compared to traditional methods is offset by lower materials cost; and

WHEREAS, the City of Austin aims to be climate neutral by 2050 and the increase in carbon sequestration locally and regionally will help us to attain that goal; and

WHEREAS, the City of Austin has the opportunity to be a leader in the state of utilizing this technology; and

WHEREAS, this technology has been proven successful in other cities and regions.

THEREFORE, the Environmental Commission recommends supporting the development of pilot programs that utilize Carbon Dioxide Mineralization Concrete for future Austin infrastructure projects.

VOTE 7-0

For: C. Smith, Thompson, Neely, Guerrero, Gordon, Coyne, and Rauzberg
Against: None
Abstain: None
Absent: Creel, B. Smith, and Maceo

Approved By:

Linda Guerrero, Environmental Commission Chair