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UNICOMER GROUP COMMERCIAL COMPLEX

ENVIRONMENTAL IMPACT STATEMENT

Submitted to the Development Control Authority Antigua and Barbuda

November 5, 2021

UNICOMER GROUP COMMERCIAL COMPLEX

Environmental Impact Statement

Submitted to the

Development Control Authority

Antigua and Barbuda

By

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Acknowledgements

This EIS was prepared by Deborah Brosnan & Associates. We appreciate the input and guidance from the Department of the Environment and the Development Control Authority, and acknowledge the input of other scientists and engineers consulted in this effort. The report was prepared by Alanna Waldman, M.S., Deborah Brosnan, Ph.D., and Torben Abbott, P.E.

UNICOMER GROUP COMMERCIAL COMPLEX
ENVIRONMENTAL IMPACT STATEMENT

EXECUTIVE SUMMARY

Unicomer Group is a multinational retailing group headquartered in San Salvador, El Salvador. The Group operates chains of retail brands, specializing in furniture, audio & video, appliances, and electronics throughout its stores located in Central America, the Caribbean, and the United States. Unicomer is expanding its operations in Antigua and has acquired land on Friars Hill Road where it seeks to construct a commercial complex that will provide a variety of modern goods to the Antiguan community, and additional jobs. Unicomer already operates three existing retail stores on Antigua, and the Company is a recognized and stable commercial presence on the Island.

In November 2020, The Unicomer submitted a G-Application (#G14-2020) to the Development Control Authority (DCA) of Antigua and Barbuda for construction of a commercial complex on Friars Hill Road, Antigua on a 2.52-acre plot. On December 1, 2020, the DCA and Department of Environment (DoE) conducted a site visit to the proposed project location. The agencies then issued a Terms of Reference (ToR) for an Environmental Impact Statement (EIS) and which was sent to Deborah Brosnan & Associates in May 2021. The Company discussed the ToR with representatives of DCA and DoE to further understand the required scope and detail necessary for the EIS document. During the course of the impact analysis, the team consulted with several GoAB agencies to ensure a more complete assessment (details provided in the text) The EIS completed here follows the format and topics requested in the ToR provided (see Annex 3).

The site is located in the northwestern portion of St. John's Antigua (Lat/Long: 17.1382504, -61.8350566). The area consists primarily of industrial and commercial enterprises and to the east there is a plot of land zoned for rough grazing. The plot is zoned for commercial use and is adjacent to a variety of stores and restaurants, local produce stands, shopping malls, an oil storage facility (West Indies Oil) and a power plant (APUA). It is located along one of the main traffic roads, Friars Hill Road, in Antigua. The site is relatively flat, and low-lying. No watercourses were identified on or adjacent to the site. It is located c. 1.5 km from McKinnon's Pond and the nearest coastline is c. 3 km from the project site. Heavily populated residential and industrial areas and road facilities separate the location from the coastline and pond.

The Unicomer proposes to build a modern mixed-use facility in two buildings. The buildings will be steel-framed construction with metal cladding, designed to withstand up to a category 5 hurricane. The complex is planned as a 15,000 square foot building used for retail, and a 45,000 square foot building for warehousing and office space. The complex will also include parking facilities for customers and employees.

Direct benefits from the project include the development of a new retail store for local residents to purchase items and the creation of jobs for the community. More specifically, Unicomer will employ 150 local individuals for the construction phase of the project. Once construction is complete, Unicomer will hire 50 permanent employees for the operational phase to work in the retail store and offices. In light of the pandemic and the uncertainty it brings for several industries, Unicomer notes that creating 200 local jobs will be beneficial to the Antigua economy and the well-being of Antigua residents.

An initial site visit was conducted by the science team on June 5, 2020 and a landscape and vegetation survey was subsequently completed. Field surveys were conducted on 2.52 acres and these assessments were enhanced by drone imagery conducted subsequently over the site. Remote sensing via Google Earth was used to assess historic land use and condition.

The site has been cleared several times since at least 2003 and prior to Unicomer acquiring the location. Surveys found that vegetation consists mostly of opportunistic, weedy, and invasive plants and no sensitive species were observed. As a result, the environmental impact on native or sensitive vegetation is minimal, although most of the site will be cleared for development. However, to reduce impacts of the construction and operational phases, where possible Unicomer plans to vegetate the site, particularly with native species. We recommend including mature trees in the landscape plan. Strategic landscape planting can support water management, soil stabilization, and provide other ecological benefits.

The ToR identified stormwater runoff, sewage treatment and disposal, construction pollution, and disaster management as main factors to address in the assessment.

To minimize the impacts of storms, Unicomer will employ techniques to reduce runoff and erosion, including planting vegetation throughout the parking lot and around the perimeter of the plot. Additionally, Unicomer will route rainwater from the roof into detention tanks for release into the storm drain. A cistern is also planned for the complex; however it will not collect rainwater for reuse, but will hold potable water from the city supply for the restrooms and fire system. The parking area will be paved with asphalt or concrete for durability. Some areas, however, will utilize grass crete pavers, which incorporates grass into the paved areas. The grass crete will create a permeable surface for sustainable drainage to help minimize any potential flooding.

Unicomer plans include a sewage treatment plant, which is sized to accommodate the estimated wastewater flow for the commercial complex. With the permission of Unicomer, the plans for the wastewater treatment plant were submitted to the DCA for review prior to submission of this EIS. DCA assessed the plant and reported that they have no objections to the proposed sewage treatment plant for the commercial complex.

The Unicomer commercial complex will generate construction debris, electronic waste, and daily disposable waste. Construction waste and refuse will be removed to Cooks Landfill in accordance with the National Solid Waste Authority Act, 2005. Solid waste material will be recycled and reused when possible, and will be brought to the Antigua and Barbuda Waste Recycling Corporation.

Noise pollution will not exceed normal construction levels. However, maintaining construction hours between 8 a.m. – 5 p.m. will minimize any potential impacts to neighboring properties. Unicomer should adopt the necessary precautions in accordance with the Noise Abatement Act, 1996 for site construction and operation.

Air pollution will be minimized by taking the appropriate measures to reduce dust, particularly during windy conditions, and as outlined in the EIS. Dust will be a greater issue during the construction phase. Unicomer should maintain the threshold criteria laid out by EPMA, 2019, Schedule VIII.

Initially the complex will rely on centralized energy from APUA. However, within five years of opening, Unicomer plans to transition to using solar energy. Unicomer will install solar panels on the roof, specifically enough panels to produce c. 80% of the power demand. The science team calculated that the roof has sufficient area to accommodate solar panels to produce power for 80% of the estimated energy needs of the building. We recommend that Unicomer continually review the timing of transitioning to renewables.

An Environmental Monitoring and Management Plan (EMMP) has been developed to ensure the proper procedures are in place for compliance with health and environmental standards and regulations. The EMMP outlines plans for sewage treatment, stormwater runoff, and disaster management.

Based on the science team's assessment and findings, including consideration of the current land use and zoning, the team did not find any major concerns that would prevent the project moving forward. This conclusion is also based on the project following the proposed design and mitigation efforts and implementing an EMMP.

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UNICOMER GROUP COMMERCIAL COMPLEX
ENVIRONMENTAL IMPACT STATEMENT

1.0 INTRODUCTION

This document is the Environmental Impact Statement (EIS) for a proposed commercial complex development at Friars Hill Road, Antigua. In November, 2020, The Unicomer Group submitted a G-Application (#G14-2020) to the Development Control Authority (DCA) of Antigua and Barbuda in accordance with Part IV, Sections 17-19 of the Physical Planning Act of 2003. The project proposes construction of a commercial complex to be built on Friars Hill Road in a commercially-zoned area where today land use covers a variety of industrial, commercial, and rough grazing use.

On December 1, 2020, the DCA and Department of Environment (DoE) conducted a site visit to the proposed project location. The DoE then prepared and issued a Terms of Reference (ToR). In May, 2021, the DCA and DoE subsequently provided Deborah Brosnan & Associates the final ToR for an EIS. The EIS completed here follows the format and addresses the topics requested in the ToR provided (see Annex 3).

This EIS is conducted to professional standards and follows the EIS outline and contents requested by DoE in its ToR. Several assessment methodologies were used including site surveys, drone and satellite imagery, published literature, results from previous studies conducted by the science and engineering team, and professional expertise. The ToR specifically requested that Sewage Treatment and Disposal; Construction Pollution; and Storm and Disaster Mitigation be addressed. Each of these topics was assessed and findings are reported in the relevant sections in the EIS. The DCA/DoE specified that the EIS incorporate a Waste Disposal and Pollution Management Plan and a Disaster Management Plan. These are included in the relevant sections in the EIS. Prior to conducting the EIS, the science team communicated with DCA and DoE to clarify the level of detail required by the agencies for this study, and their feedback was followed in the preparation of this document. The team additionally contacted other relevant agencies e.g. Central Board of Health (CBH), for additional details that informed this assessment (see text below)

1.1 Project Sponsor

The Unicomer Group is the leaseholder of 2.52 acres on Friars Hill Road, St. John's Antigua. Mr. Juan Jose Siman is the Project Director of Unicomer Stores, the Caribbean Consultant Manager, and the lead developer.

Juan Jose Siman Siri
Email: juanchosiman@gmail.com

The proposed complex is located on 2.52 acres of land on Friars Hill Road and will comprise a modern mixed-use facility in two buildings. The buildings will be steel-framed construction with metal cladding, designed to withstand up to a category 5 hurricane. The complex is planned as a 15,000 square foot building used for retail, and a 45,000 square foot building for warehousing and office space. The complex will also include parking facilities for customers and employees.

The buildings will be wheelchair accessible for entries and exits, equipped with smoke and fire detectors with alarms, have fire suppression systems, a sewage treatment plant, potable water cistern, run-off water holding facility, and will be equipped to support solar panels within 5 years of the opening of the complex.

The following legislation and policies have been considered and incorporated into this EIS:

- Physical Planning Act, 2003
- Environmental Protection and Management Act, 2019
- National Sustainable Island Resource Management Zoning Plan (SIRMZP), 2012
- Noise Abatement Act, 1996
- National Solid Waste Authority Act, 2005

1.2 Project Background and Location

Unicomer is a multinational retailing group headquartered in San Salvador, El Salvador. It operates chains of retail brands, specializing in furniture, audio & video, appliances, and electronics throughout its stores located in Central America, the Caribbean, and the United States. Unicomer is expanding its operations in Antigua and has acquired land on Friars Hill Road where it seeks to construct a commercial complex that will provide a variety of modern goods to the Antiguan community. Unicomer already operates three existing retail stores on Antigua and is recognized as an established and stable company on the Island

Unicomer proposes to build a complex on Friars Hill Road, Antigua on 2.52 acres of land. The plot of land is located on the corner of Friars Hill Road and Madeira Drive and the site is located an area zoned for commercial development (e.g. SIRMZP, 2012, Figures 1.1 and 1.2). Major business enterprises are located in the vicinity. The plot of land north of the proposed facility and on the northern side of Madeira Drive has been developed with the Royal Palms Place Shopping Mall and a parking lot 0.8 hectares (1.9 acres) in size. An engineering building, financial services offices, and an ice cream shop are also located in plots of land directly to the north of the proposed facility (Figure 1.3).

To the south of the plot, the land has been developed with stores for home goods, pets, wine, hardware, electronics, and imports. Within 200 meters and south of the proposed complex is the APUA Friars Hill Power plant. Notably, on the western side of Friars Hill Road and 250 meters west of the proposed complex, The West Indies Oil Company industrial plant has been developed on 40 ha (97 acres) of land (Figure 1.4). Both the power plant and oil plant have been developed on plots of land zoned for industrial use. Directly to the east of the Unicomer plot is undeveloped land covered in vegetation. This plot of land has been zoned for rough grazing for livestock use, although no active grazing was observed.

The Friars Hill Road site already has infrastructure for public utilities (water and electricity), and there are drainage lines running under the site. Friars Hill Road was recently renovated to be climate-resilient, improving its ability to withstand storms and flooding. The adjacent roads can provide easy access for delivering materials to the site for construction and the project should not require new roads or intrusion onto other plots of land to accommodate construction materials. However during construction, there will likely be some temporary traffic delays for movement of large trucks/machinery. Friars Hill Road is major traffic artery in this part of Antigua, and small traffic jams are not unusual.

1.3 Project Details

Unicomer proposes to build a commercial complex that will include two buildings: a 15,000 sq. ft. building used for retail and a 45,000 sq. ft. building for warehousing and office space (Figure 1.5). The larger building will include a mezzanine to accommodate a technical service department on the ground floor and corporate offices on the first floor. Both buildings will be steel-framed construction with metal cladding, designed to withstand a category 5 hurricane. Parking facilities will be included in the design for customers and employees.

The buildings will be wheelchair accessible for entries and exits and equipped with smoke and fire detectors with alarms. The buildings will have fire suppression systems, a sewage treatment plant, potable water cistern, run-off water holding facility, and will be equipped to support solar panels within five years of the inauguration of the building.

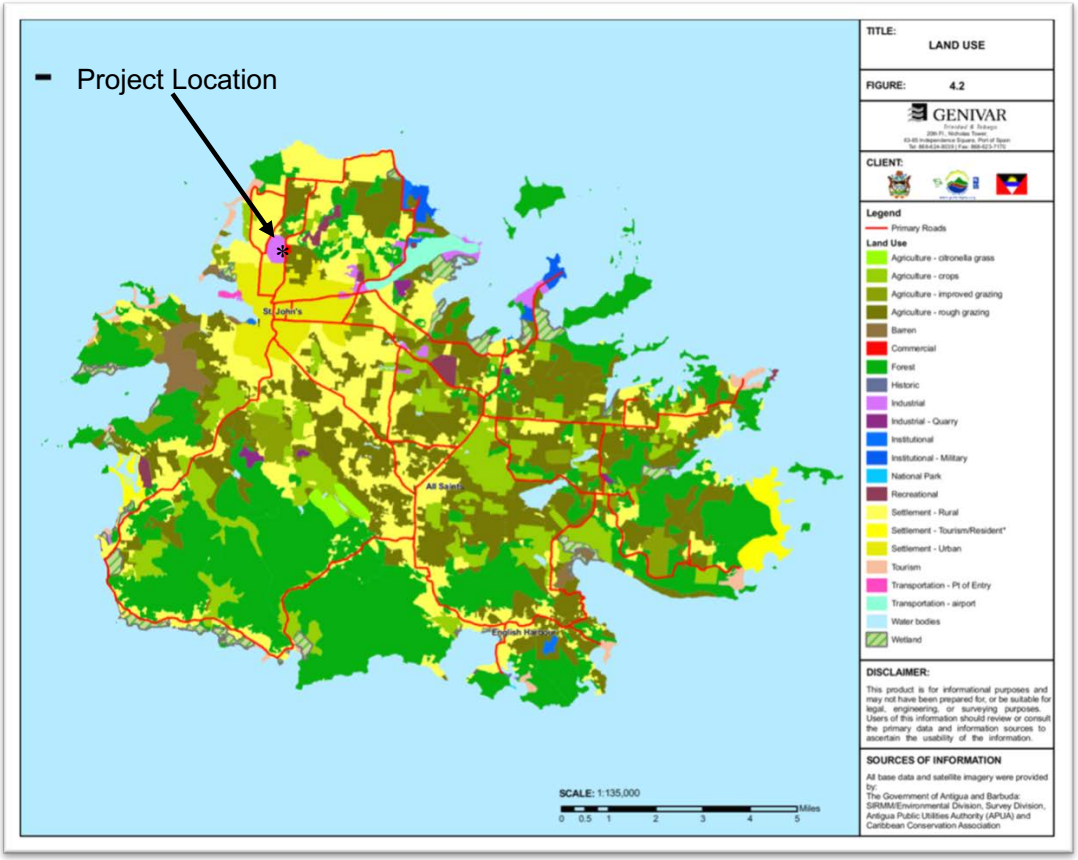

Figure 1.1. Current land use map of Antigua with project location marked.

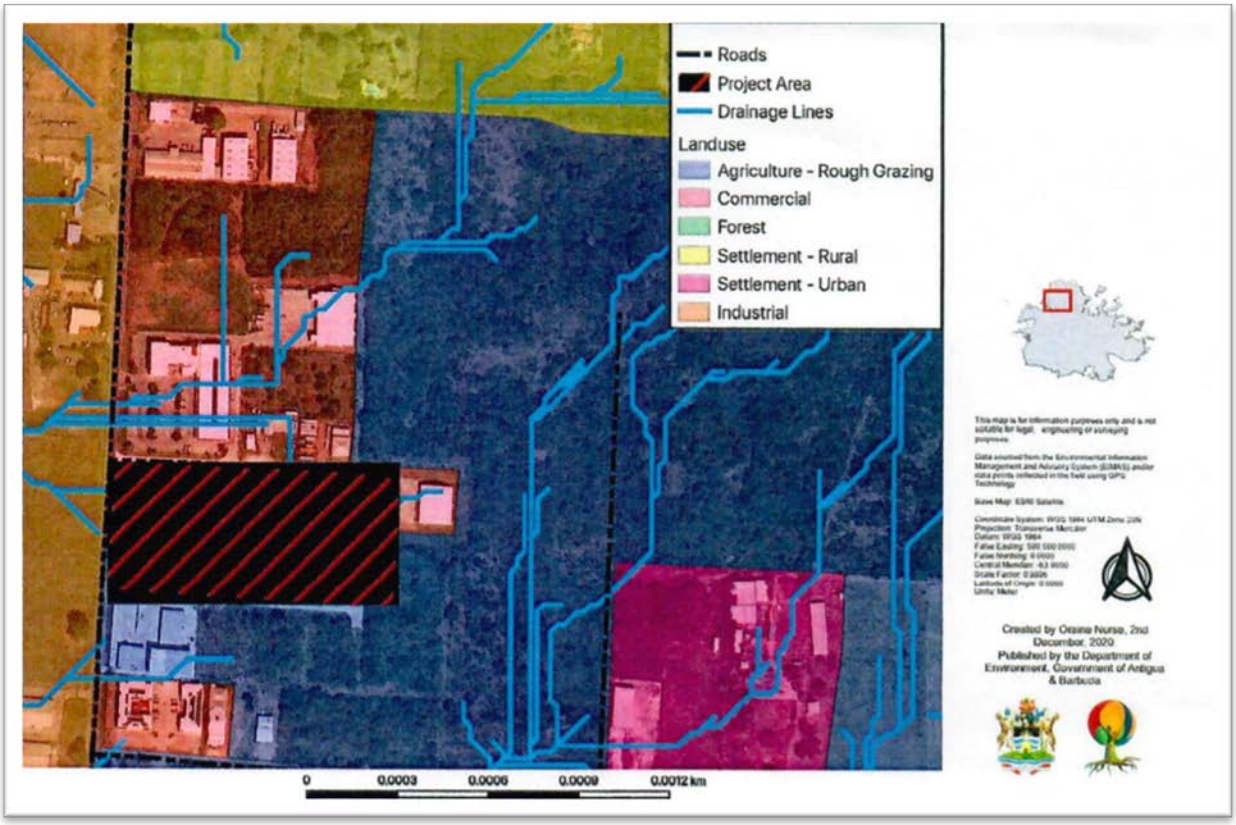

Figure 1.2. Project location in an area zoned for commercial development by SIRMZP, 2011.

Figure 1.3. Project location along Friars Hill Road surrounded by commercial developments.

Figure 1.4. Current land use map of Antigua with project location marked.

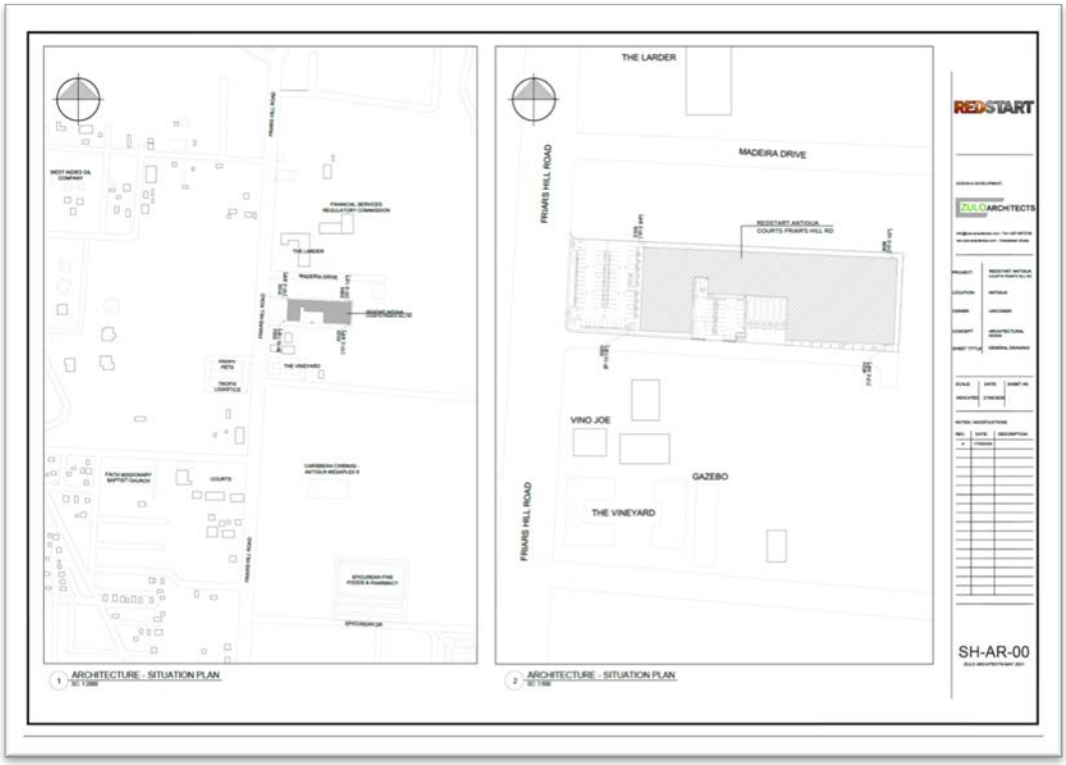

Figure 1.5. Unicomer Commercial Complex site plans.

1.4 Project Methods

On June 5, 2021, the science team conducted a site visit to the 2.52 acres of land proposed for development to collect baseline data. A landscape and vegetation survey was completed over the entire plot of land. These assessments were followed up by drone survey imagery carried out on June 14, 2021, covering 11 acres (4.5 ha) (Figure 1.6). Remote sensing via Google Earth was used to assess historical use and to make comparisons with current use and condition.

Figure 1.6. Area assessed by field surveys in red and drone imagery in June, 2021.

1.5 Project Site

The site is located in the northwestern portion of St. John's, Antigua (Lat/Long: 17.1382504, -61.8350566). The site is relatively flat, and low-lying. The site is not located near major bodies of water or watersheds. The closest body of water is McKinnon's Pond, about 1.5 km to the west of the site. The nearest coastline is c. 3 km from the project site. These water bodies are separated from the site by dense industrial and residential developments. The western side of the plot (45 meters width) is adjacent to a paved sidewalk and a main road with three lanes for traffic (Friars Hill Road). The southern side is bounded by an unnamed and paved road, which was paved between 2013 and 2014. Friars Hill Road is a major traffic artery for commercial and private vehicle traffic.

The vegetation on the proposed property consists primarily of opportunistic, introduced, and invasive vegetation species- a plant assemblage indicative of successional growth in disturbed areas (e.g., where land has been recently or repeatedly cleared). Historic aerial imagery of the site obtained via Google Earth for the years between 2003-2021 (for which satellite imagery is available), shows that the area has been disturbed and cleared several times prior to being acquired by Unicomer. In 2003, the site was a grass and shrub-dominated field suggesting that the site had been cleared even prior to this time since the surrounding area has mature vegetation (Figure 1.7). The proposed plot was cleared before any of the commercial plots to the north and south were cleared and developed for malls and stores. Historic satellite imagery shows that successional plants established in the intervening periods between clearing, only to be subsequently removed by the next clearing cycle. Imagery from August 2018 shows the entire plot of land selectively cleared of vegetation-mature trees were preserved in this clearing episode (Figure 1.8).

The DoE observed (in the ToR) that the proposed complex will be located in a low-lying area and could potentially be subject to flooding during rainfall. To assess susceptibility, the science team visited the site on August 16, 2021, following rainfall from a tropical storm of c. 152 mm of rain. No flooding was observed. Although there was no flooding observed, we have included precautionary mitigation measures for potential flood risks during construction (and as requested by DoE). The potential impacts of construction and the mitigation measures are described below in Section 2.0 Potential Impacts and Mitigation Measures.

Figure 1.7. Satellite imagery of the project location (red box) from February 2003, before industrial and commercial developments adjacent to the proposed site.

Figure 1.8. Satellite imagery of the project location (red box) from August 2018, the land has been cleared of vegetation and mature trees were selectively left untouched.

1.6 Environmental Baseline

Deborah Brosnan & Associates' field biologists completed a site visit and field surveys on June 5, 2021, and subsequently on August 16, 2021, to assess the environmental conditions at the Unicomer commercial complex site. Additional data were separately acquired by drone surveys and Google Satellite imagery.

During the field surveys, plant species and assemblages on the site were identified, and their condition evaluated. The native plant diversity is low, and the site is dominated by opportunistic and, in some cases, introduced, and invasive plant species. This is likely the result of the historic and frequent land disturbance noted earlier. Most plants identified on-site are adapted to exploit freshly disturbed habitats and are commonly found in marginal habitat and edge zones. No sensitive vegetation species were observed on-site. Sensitive species are those species that are listed as threatened or endangered by the IUCN Red List, protected per the Antigua and Barbuda EPMA, 2019, or are regionally endemic (as determined by Pratt et al., 1997). A list of plants observed by the field biologist on the site is provided in Table 1.1. No wildlife were documented using the site during the assessment.

Native plants identified on site include the Wild Tamarind (*Leucanena leucocephala*), Moon vine (*Ipomoea sp.*), Sage (*Lantana camara*), and field grasses (various species). The Wild Tamarind is a neotropic, shrubby species. *Ipomoea sp.* are fast growing vines, weedy in nature, and generally considered native to the Caribbean region. These vines are often used as ornamental vegetation and are found in areas that are subject to periodic disturbances (e.g. sandy habitats at the edge of the sea). Sage is an ornamental and weedy shrub native to the neotropics. Despite the fact these flora are native, they are sporadic on the site. In this location, they do not form part of a natural assemblage of native species that can provide robust ecosystem services such as quality habitat for native fauna, or prevention of soil erosion. None of the above plants recorded on the site are listed as a protected species in Antigua and Barbuda.

Neem Trees *(Azadirachta indica*) are growing on the plot. They are an introduced species to Antigua from the Middle East and India (Figure 1.9) but are not considered invasive. If left uncontrolled, however, the tree's prolific seed dispersal can be detrimental to native forests. Invasive species recorded during the surveys include Caster Oil Plant *(Ricinus communis*) and Acacia (also known as Alabamba or Cassie) (*Vachellia macracantha*). Invasive species outcompete native flora for resources, and should be removed immediately to prevent the spread and propagation to other adjacent plots of land.

Table 1.1. List of plants observed on the Unicomer site.

Common Name	Botanical Name	Native
Acacia	*Vachellia macracantha*	No
Castor Oil Plant	*Ricinus communis*	No
Grasses	(various species)	Unknown
Moon Vine	*Ipomoea sp.*	Yes
Neem tree	*Azadirachta indica*	No
Sage	*Lantana camara*	Yes
Wild Tamarind	*Leucanena leucocephala*	Yes

Figure 1.9. Image taken in June, 2021 during the site visit and survey of the disturbed land-grasses and neem tree visible in this image.

1.7 Project Benefits

Direct benefits from the project include the opening of a new retail store, and in a readily accessible location, for residents of Antigua and Barbuda to acquire furniture, audio & video, appliances, and electronics. Importantly, the construction and operational phases will create local jobs for the community. Unicomer will employ 150 local individuals for the construction phase of the project. Once construction is complete, Unicomer will hire 50 permanent employees for the operational phase to work in the retail store and offices. In light of the pandemic and the uncertainty it brings for several industries, Unicomer notes that creating 200 local jobs will be beneficial to the Antigua economy and the well-being of Antigua residents. Antigua has a total population estimated at 95,882 people, and adding 200 jobs will have a significant impact on the local economy.

2.0 POTENTIAL IMPACTS AND MITIGATION MEASURES

In the ToR provided, the DoE identified sewage treatment and disposal, construction pollution, and storms and disasters as potentially impacting the environment and community. To address these concerns, we describe below the terrestrial environment, the water environment, pollution management, and energy conservation, specifically identifying impacts and discussing mitigation actions.

2.1 Terrestrial Environment

Anticipated Impacts

The Unicomer site has been disturbed and cleared several times in recent years. It is largely dominated by early-successional, opportunistic and weedy vegetation. During the surveys the field biologist recorded no sensitive plant species on-site. As a result, there are few significant impacts to native species anticipated. However the site will be cleared, and about 90% will be occupied by the complex.

The site is largely flat and with a slight slope east to west towards Friars Hill Road, which will affect the flow of runoff and sediment on the site. Due to these characteristics, there are several impacts to consider. During the land clearing and construction activities, the land surface will be cleared to allow for construction of the complex and parking lot. Subsequent building on land with impermeable surfaces can increase runoff and flooding (pooling) on impermeable surfaces while adjacent soils can be impacted by erosion and compaction during heavy rains and storms. Heat absorption is also increased, raising temperatures onsite.

Mitigation Measures

To mitigate for these potential impacts, a robust stormwater plan supported by the use of native vegetation (in swales or by using clusters of individual plants) for water absorption and management are the two primary options for this development. Stormwater is discussed below. Given the amount of space that will be occupied by the buildings and parking lot (c. 90% of the lot), there is little area available for vegetation or nature-based solutions. However, where possible and especially in the more low-lying parts of the land, vegetation should be incorporated into the design to address potential flooding and extreme rainfall events. Based on the plans provided, Unicomer has included landscaping with native vegetation along the perimeter of the plot and in the parking lot (Figure 2.1).

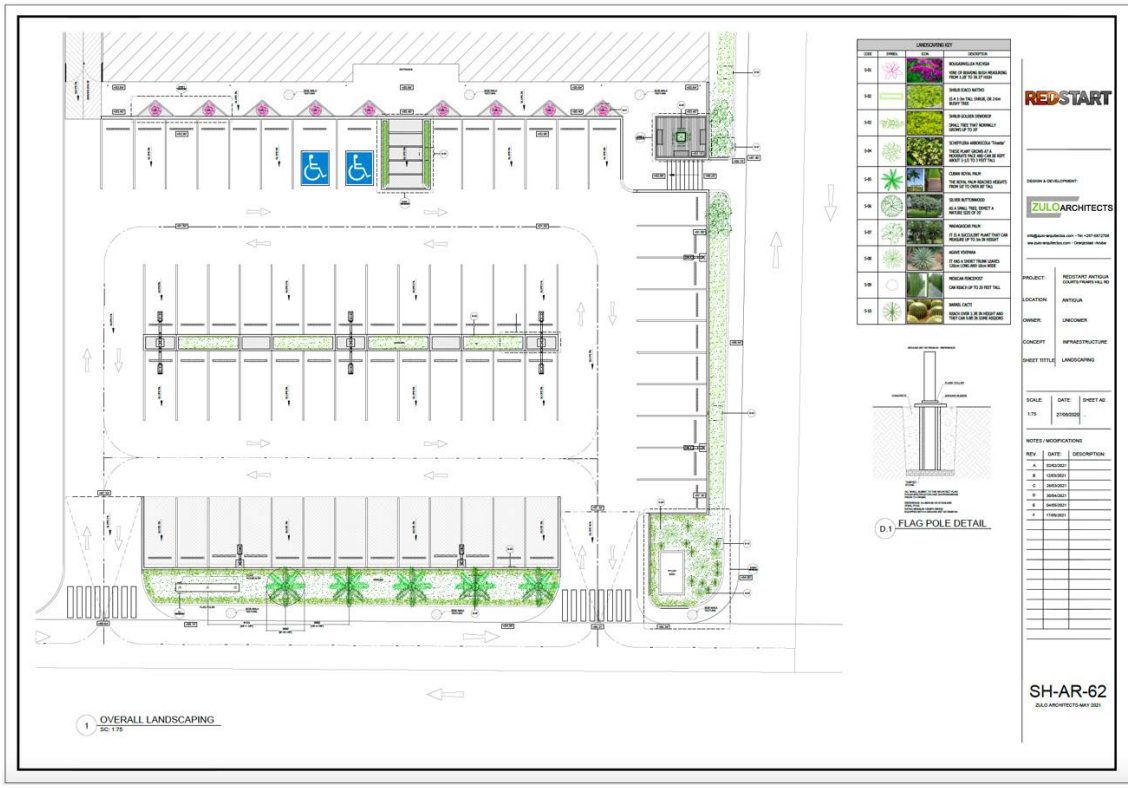

Figure 2.1. Landscaping plans for the Unicomer Commercial Complex.

While the landscape plan does incorporate trees, the vegetation planned consists of mostly shrubs. The small plant assemblages will assist with site drainage and water absorption. We do recommend, however, planting additional mature trees, such as the Silver Buttonwood, that can be obtained locally and has a more robust canopy than palm trees. The larger canopy areas reduce the amount of rain falling on the land and have higher transpiration rates. Realistically, based on the potential density of plants that can be established on the site, these ecosystem values will not be high. Nevertheless they will add meaningfully at a site level to the overall water and flooding management, and as potential biofilters for runoff.

Additional benefits are also likely to be achieved, and while not significant at an island-wide scale, vegetation can provide site benefits and encourage more climate-resilient and environmental construction. For instance, leafy trees provide shade, which can help to cool the urban environment. Specifically, planting trees on the east side of the building where the sun rises has been shown to reduce air conditioning demand, therefore reducing electricity demand.

This project will have a large, paved parking lot, and paved areas absorb heat. To reduce heat absorption and keep the site cooler, a robust density of trees can be planted around the perimeter and between medians of the planned parking lots to shade the area, and cool the space. Revegetating the areas around the new structure will also lower the temperature of the site, as vegetation cools the air by removing heat to evaporate water. Evaporation and shading together can reduce peak temperatures; Studies indicate that suburban areas with mature trees are 4°-6° Fahrenheit cooler than suburbs without trees.

Vegetation assemblages store and sequester carbon from the atmosphere, serving as a carbon sink and reducing greenhouse gas emissions. For example, a recent project in Florida, USA that developed a large parking lot and office building incorporated the planting of c. 200 tropical mature trees (i.e. a combination of Silver Buttonwood, Gumbo Limbo, Seagrape, Green Buttonwood, Palms) (Waldman pers comm). The vegetation was calculated to sequester approximately 5.5 tons of carbon dioxide per year. The scale of the Florida development was roughly on par with the proposed Unicomer complex (Waldman pers comm). On an island-wide scale, this is not significant; however, it contributes to a better carbon budget for the site and becomes part of a larger effort to combat climate change on island. Commercial buildings that are 60,000 sq ft have an estimated carbon footprint of 2,500 tons of carbon dioxide per year. This small contribution coupled with implementing solar energy will support the reduction of the complex' carbon footprint.

Tree leaves also remove pollutants from the air and reduce evaporative emissions from parked vehicles. Removal of pollutants and emissions improves air quality and subsequently, human health. The value of adopting the above measures is to improve the site in terms of cooling, water management, and carbon footprint and in addition it provides a more conducive environment for human health. An added value is to encourage this type of climate-resilient approach for small developments that when combined can add up to a significant positive impact.

To minimize erosion and for water management during construction, silt fencing and impermeable covering should be used where there are piles of loose soils on site. These piles may be washed away during heavy rains or storms. The fencing and covering will stop sediment-laden runoff from spilling out of the site and into the drainage system or the road. It is recommended that silt fencing remains in place until the area and soils are stabilized.

2.2 Water Environment

Stormwater Runoff Anticipated Impacts

Sound water management is crucial for the sustainability of developments on small islands with arid climates. Antigua experiences variable rainfall throughout the year, with pronounced wet seasons and prolonged dry seasons. This variability in rainfall highlights two important considerations for the water environment: 1) the importance of capturing and storing rainwater to reduce the need for additional water sources and avoid shortages; and 2) the understanding of periodic flash floods that can increase erosion, runoff and overwhelm stormwater management systems. Successful water management is derived from an understanding of the variability of rainfall and an ability to capture and retain most of the water that falls during large rain events. This allows for an efficient capture of water in retention systems; reducing the amount of stormwater runoff.

The buildings, walkways, and parking lots of the commercial complex will comprise approximately 100,000 square feet of the project site, which is about 90% of the total site acreage (Figure 2.2). Stormwater runoff within highly developed areas tends to flow quickly and aggressively, picking up pollutants such as sediment and nutrients as it flows into receiving waters.

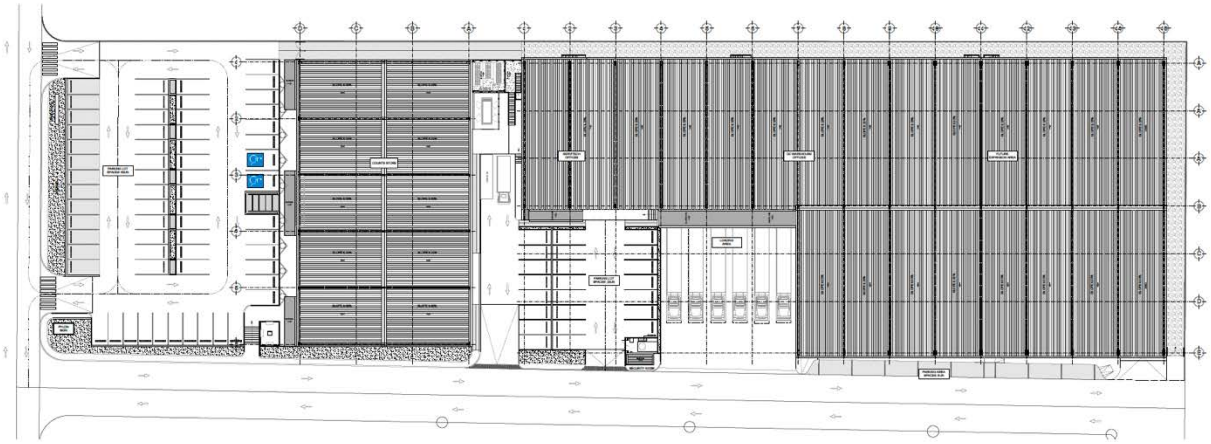

Figure 2.2. The site plan with two buildings and parking lots planned.

Stormwater Runoff Mitigation Measures

Unicomer engaged Theobalds Consulting, an engineering and management firm, to design underground water detention tanks for the complex (Figure 2.3). Detention tanks are an artificial flow-control structure that are used to temporarily store stormwater runoff from a rainfall event, and then release the water into the ground or into the public stormwater system. For this design, water will be captured in the tanks and released into the storm drains. Water will remain stored in the tanks if the drains are full. As soon as the drainpipes begin to empty, the tank will resume the release of its contents into the drainage system. This proposed detention tank system outlines plans for the roof drains to route to the underground detention tanks (Figure 2.4). Based on a 60-minute storm, with rainfall intensity of 32.4 mm/hour, Theobalds Consulting team calculated that the detention tanks would need to hold 102.6 m^3 of water (Figure 2.5). Based on these calculations, and to include additional capacity, the consultants recommended that the detention tanks be sized to hold a total of 114.48 m^3. This recommendation is being implemented by Unicomer in the design.

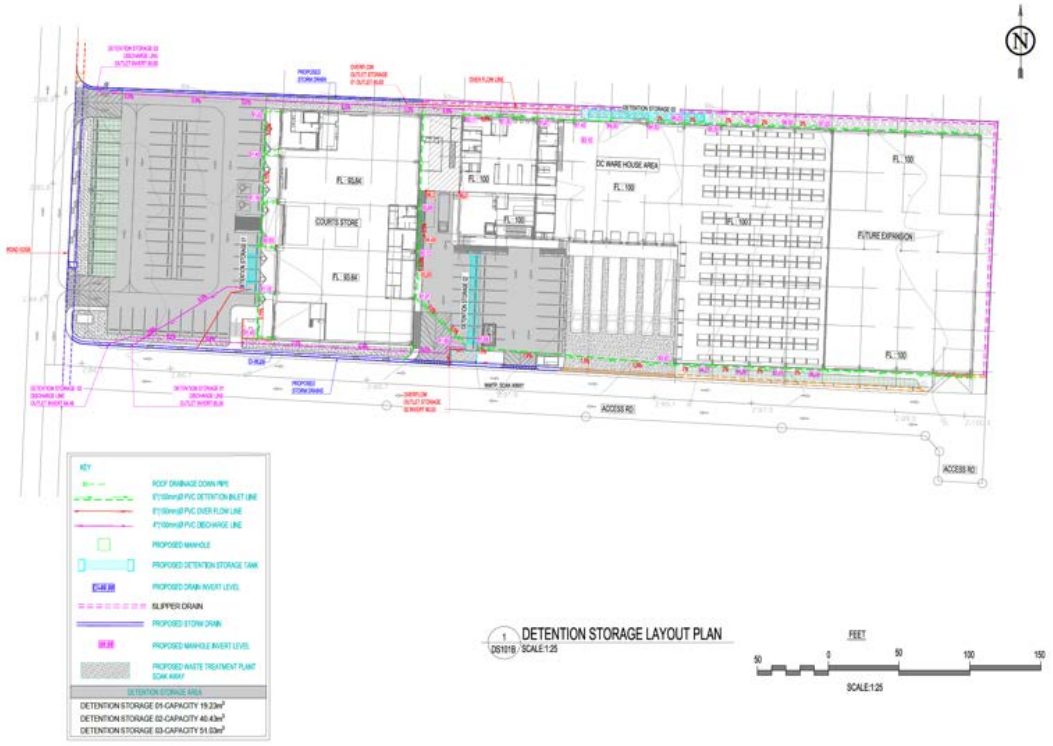

Figure 2.3. Detention tank layout plan.

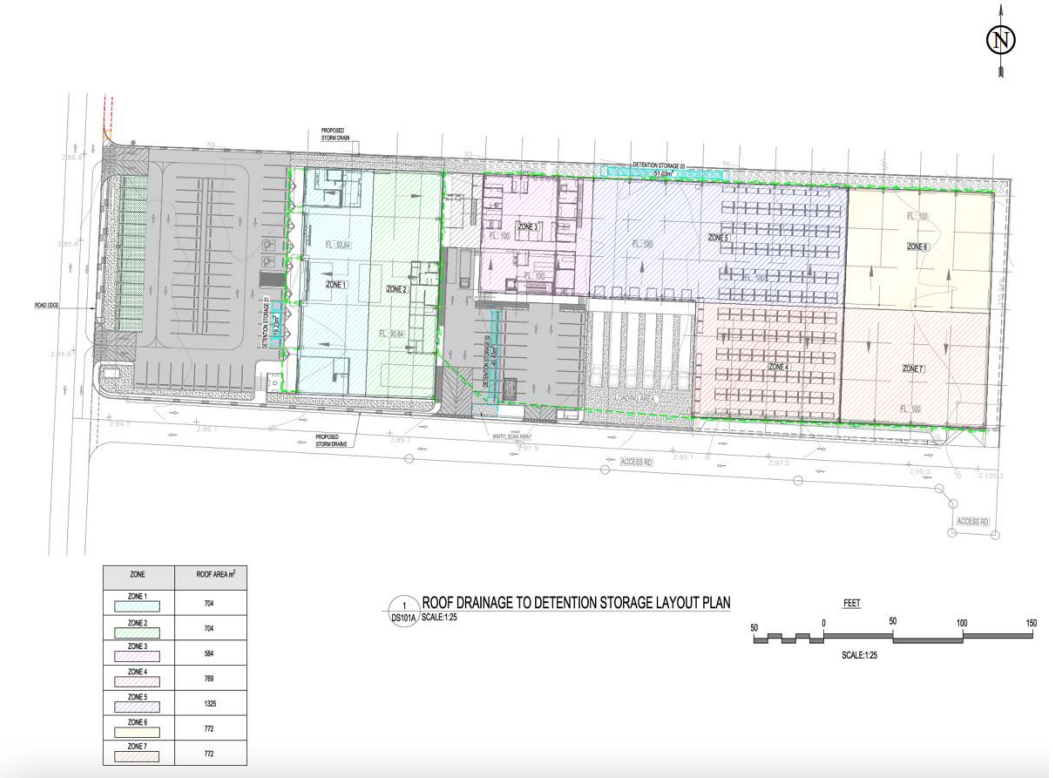

Figure 2.4. Roof drainage to detention tank plan.

THEOBALDS CONSULTING
ENGINEERING AND MANAGEMENT CONSULTANTS

Courts Antigua
Friar's Hill, Antigua

Detention Tank Sizing
May 18, 2021

Design Storm: 2 Year Return Period

Duration (min.)	Rainfall Intensity mm/hr	Rainfall Depth mm	C	Dentention Storage 01			Dentention Storage 02						Dentention Storage 03						TOTAL
				Zone 1 Area (ha)(Half Store)	Runoff (m3)	Storage Volume Req'd (m3)	Zone 2 Area (ha)(Half Store)	Zone 4 (DC)	Area 7 (Future DC)	Total Area	Runoff (m3)	Storage Volume Req'd (m3)	Zone 3 (Servitech)	Zone 5 (DC)	Area 6 (Future DC)	Total Area	Runoff (m3)	Storage Volume Req'd (m3)	Storage Volume Req'd (m3)
60	32.4	32.4	0.95	0.070376	21.68	12.83	0.070376	0.076852	0.077230	0.224458	69.14	40.91	0.058456	0.132503	0.077230	0.268189	82.61	48.87	102.60554

C for Predevelopment Peak Flow	0.15	
C for Post Development Peak Flow	0.95	
Storm Type	III	
Qo/Qi	0.158	Peak outflow discharge / Peak inflow discharge
Vs/Vr	0.493	Storage Volume / Runoff volume
FOS	1.2	Factor of Safety

Area of Site 109,248.00 sf
1.014947131 ha

	Pipe Dia (m)	Pipe Length (m)	Volume Provided (m3)
Detention Storage 01	1.5	6	20.50
Detention Storage 02	1.5	18	41.69
Detention Storage 03	1.5	24	52.29
TOTAL			114.48

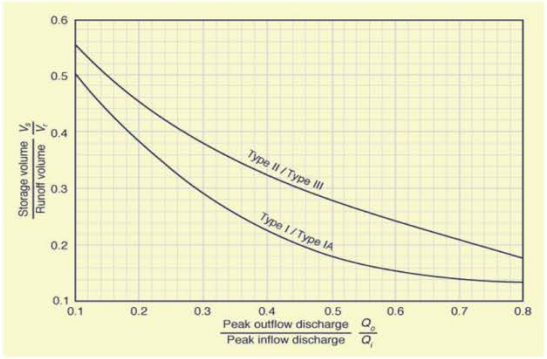

Figure 2.5. Water detention tank sizing plans for the commercial complex.

Additionally, as part of this assessment, our consulting engineer (T. Abbott) concluded that the detention is sufficient for capturing the "first flush" of runoff, which is the first 25.4 mm of water. The first flush has the heaviest concentration of pollutants, picking up and transporting settled dust and/or chemicals that may be on surfaces. Capturing this portion of runoff in detention tanks gives the water an opportunity to infiltrate into the soil, significantly improving the quality of runoff conveyed downstream, reducing environmental impacts. The stormwater detention calculations for the proposed system show the capture of the first approximately 31.75 mm of rainfall, which exceeds the volume needed to account for the first flush. Stormwater detention tank development in the United States prioritize the capture of the first flush as the most important aspect of the system, thus this detention tank is adequately sized to mitigate for environmental impacts.

The complex will have a cistern system, which are widely used systems in Antigua and throughout the Caribbean in residential and commercial properties alike for storing water. The planned cistern will hold potable water from the city supply for the restrooms and fire suppression system. The cisterns will only be used for fresh, potable water, and will not be used for rain catchment or reuse. Rainwater will be captured in the detention tanks, which will be released into the storm drain.

Considering the several tropical storms and heavy rain events that occur in Antigua as well as periods of prolonged drought, we recommended to Unicomer that the complex review options to collect rainwater from the roof to use in the complex (e.g. for restrooms and fire suppression). However in discussions with us, Unicomer indicated that it will not be capturing rainwater for reuse in its cisterns, as the plans and budget do not include or account for storage and treatment of captured rainwater for reuse.

The site generally drains from east to west toward Friars Hill Road. The elevation drops from approximately 100 feet across the back of the site to 87 feet at the front of the site. This is an approximate slope of 2% towards Friars Hills Road. The proposed construction includes a drainage path around the site, for water that is not captured in the detention tanks. The drainage path will be composed of concrete box storm drain and inlets along the front portion of the site and a combination of concrete lined swales and slipper drains along the back portion of the site. The concrete box storm drain is designed to maintain the drainage path of the existing swale along Friars Hill Road. This will provide a stabilized path to minimize sediment transport once construction has been completed. This also maintains the natural drainage path for the land to the east of this site. The proposed drainage will be constructed of concrete, which is an impermeable material and therefore where possible, it is recommended that swales be vegetated, allowing for slow water infiltration into the ground and trapping sediment effectively.

The parking area will be paved with asphalt or concrete for durability, however some areas will utilize grass crete pavers, which incorporates grass into the paved areas. The grass crete pavers will create a permeable surface for sustainable drainage to reduce the risk of flooding.

During construction, the science team also recommends steps to be taken to minimize runoff from disturbed areas. This can be done by a combination of erosion control best management practices (generally referred to as BMPs). The primary BMPs applicable to this site are silt fence and fiber logs (Figures 2.6 and 2.7) These BMPs should remain in place until final paving and landscape is complete. The BMP installations should be inspected weekly and immediately after rainfall events and repaired as needed.

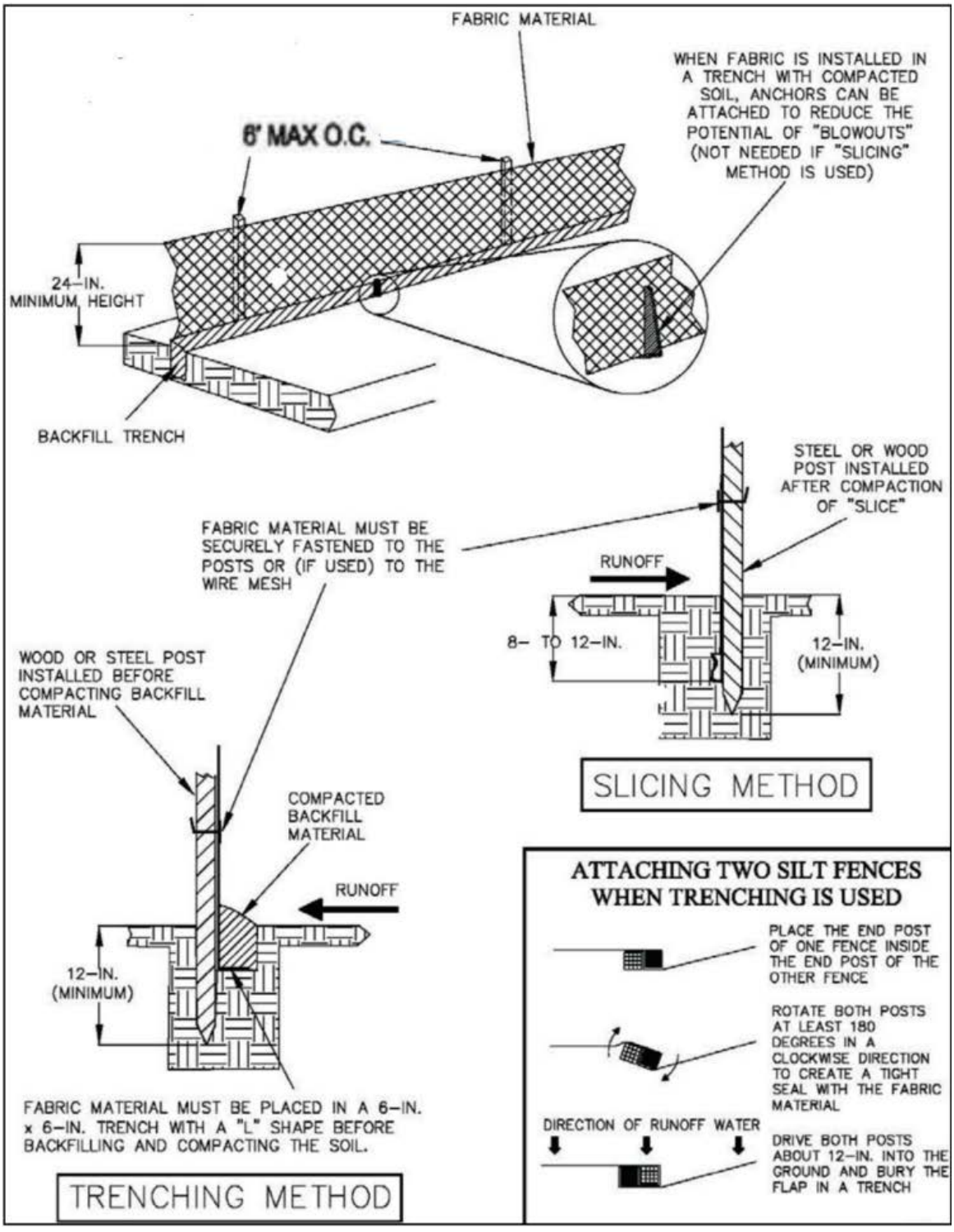

Figure 2.6. Silt Fence BMP.

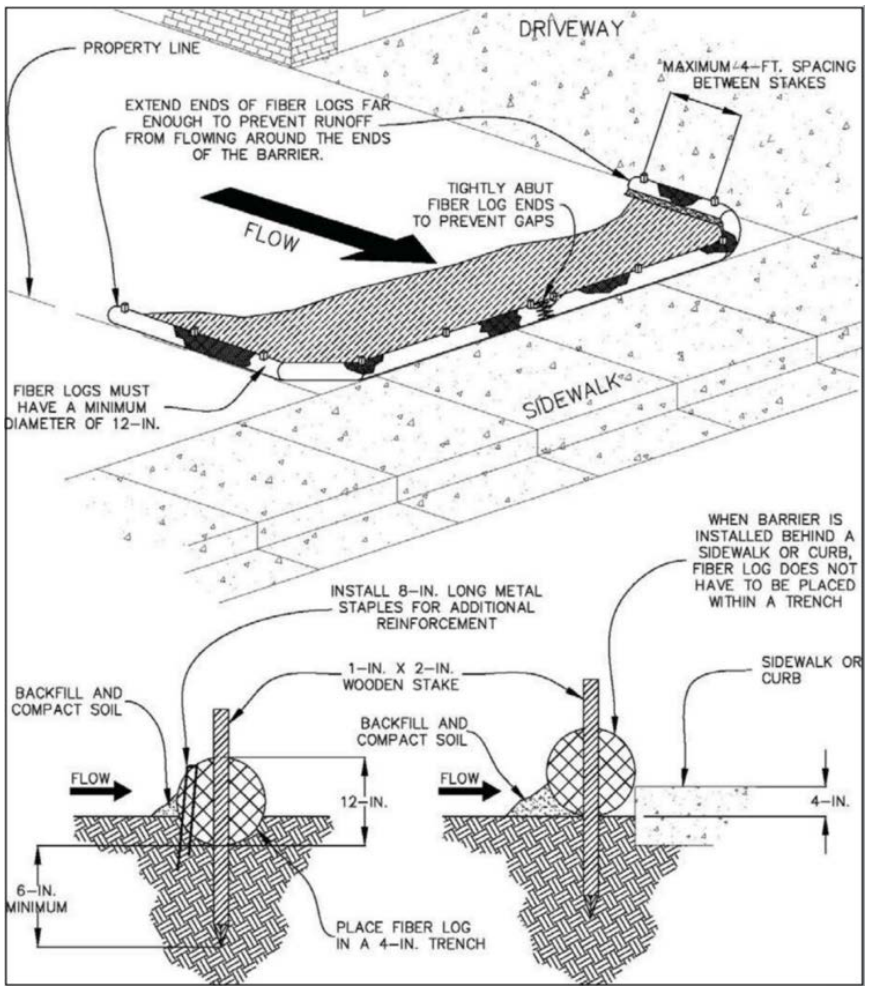

Figure 2.7. Fiber Log BMP.

Sewage Treatment Anticipated Impacts

The Cartagena Convention of 2010, of which Antigua and Barbuda is a signatory nation, identifies domestic sewage as one of the biggest threats to the Caribbean Sea and outlines a framework to establish appropriate policies, legislation, and regulation to implement effective sewage infrastructure (Deborah Brosnan & Associates, 2018). At a national level, water management is guided by the 1973 Public Utilities Act which outlines responsibilities for water management across a number of government agencies. In 2011, Antigua and Barbuda completed the preparation of an Integrated Water Resources Management (IWRM) roadmap which aims to integrate strategies to improve wastewater, land management, and disaster preparedness (Global Water Partnership, 2014).

The management of sewage treatment on small islands is a well-recognized challenge. In many areas a combination of aging septic infrastructure and flooding especially in high-density developments often contributes negatively to water quality. The impacts of inadequately treated sewage have the potential to pollute soils and water, increase nutrient flow into receiving water bodies, contribute to excessive algae growth, and lead to adverse public health effects. Other potential risks arise from extreme rain events causing spills into the local environment.

Currently businesses on Friars Hill Road utilize activated sludge sewage treatment plants to collect and treat their waste. A concern expressed by the Central Board of Health (August 17, 2021 pers comm) is that many of these existing plants are aging, in poor condition and not well maintained, which can result in inadequately treated effluent being deposited into drainage systems. Due to the flat terrain, the drainage along the roadway is also not ideal for high volumes of effluent from the several plants along the road. The CBH indicated that when high volumes of effluent are deposited in the drain, the effluent is stagnant and remains in the drains until it is absorbed by soils or evaporated. The standing wastewater potentially poses a risk to public health and the environment. It is important that Unicomer avoids exacerbating any of these existing problems.

Based on the plans provided, our engineer calculated that daily wastewater production will be c. 2,640 gallons per day at full occupancy for the Unicomer commercial complex. For instance, for retail and office space, the estimate of wastewater production is 10 gallons per 1,000 square feet. Warehouse space is 3.5 gallons per 1,000 square feet. The volumes estimated are reasonable and less than the average for similar spaces.

Sewage Treatment Mitigation Measures

Unicomer has identified a wastewater treatment plant (FV10) for the commercial complex and contracted THERMOAIRE/CIRCUITO consultants to carry out the mechanical, electrical and plumbing (MEP) design. Durman Esquivel will supply the parts and it is the largest supplier of sanitary systems in Latin America. The proposed sewage treatment plant model has been tested and used in Costa Rica, Panama, Guatemala, Honduras, Nicaragua, El Salvador, Mexico, Dominican Republic, Peru, and Jamaica. The water treated will be from the use of bathrooms and sanitary services in the retail, office, and warehouse sections of the building, routed to one of the detention tanks underground with gravity drawing the wastewater down. The proposed model, FV10, for this project is a 10 m^3/d sewage treatment plant. The model is prefabricated in fiberglass with ribs in the lower part where phreatic levels are highest. The system is aerobic using activated sludge technology. Secondary sedimentation will ensure that effluent can be discharged directly to the soil. The effluents will be discharged to a soil absorption system on a soak-away into the terrain.

Design Parameters:

- Flow to be treated 10 m^3/day
- Average design flow 0.12 l/s
- Organic load BOD5 3.00 kg/d

This proposed system has an 85-95% efficiency in removal of organic matter and suspended solids. The raw water will reach the treatment plant through permanent PVC pipes, so the sanitary sewer will avoid discharge to unwanted places.

Treatment will begin with primary solid treatment, which is responsible for removing thick, plastic, non-biodegradable material, among others. This system will be comprised of a primary settler which should be cleaned by means of a tanker every 6 months. The aerobic reactor will be a Durman Esquivel system for aeration and complete mixing of the tank volume. The accelerated plate settler will then retain the biomass (microorganisms) that leave the aeration tank, allowing it to obtain an effluent without solids in suspension, free of odor and color. The special design with parallel plates allows for efficient sedimentation. The sludge generated in the system will be sent to the primary tank for sludge digestion. The aeration equipment is the Tsurumi model and the sludge recirculation equipment is the ½ HP Tsurumi pumps.

System Units:

- Primary Solid Treatment
- Aerobic Reactor
- Secondary Settler
- Blower Aeration Equipment
- Sludge Recirculation Equipment
- Electrical Control Panel and Wiring
- Internal Mechanical Piping

The water quality of the treated effluent from the plant meets the following standards:

- Chemical Oxygen Demand (COD) ≤ 100 mg/L
- Biochemical Oxygen Demand (BOD) ≤ 35 mg/L
- Total Suspended Solids (TSS) ≤ 50 mg/L
- Fats and Oils (F&O) ≤ 20 mg/L
- Methylene Blue Active Substances (MBAS) ≤ 10 mg/L
- Median total coliform bacteria count NMP/100>1000
- Fecal coliform count NMP/100>1000
- pH variation 6 to 9
- Total nitrogen to total phosphorus ratio concentration 3:1
- Total phosphorus ≤ 5 mg/L
- Total nitrogen ≤ 15 mg/L
- Dissolved oxygen concentration 1 mg/L

The proposed wastewater treatment plant requires periodic operations and maintenance. The company overseeing installation, Durman Esquivel, will train the operator designated by Unicomer who will oversee the routine operations and maintenance of the plant.

Based on our team's calculations, the plant size is reasonable to accommodate wastewater based on fixture units, which Unicomer estimated as 2,640 gallons per day. If additional water closets or restrooms are added to accommodate the large square footage of the complex, a bigger system will need to be considered.

As described above, a concern expressed by the Central Board of Health (August 17, 2021 pers. Comm.) is that many of the existing plants along Friars Hill Road are aging, in poor condition and not well maintained, causing inadequately treated sewage. This plant will be brand new, with updated technology and parts that have proven effective for sewage treatment in 10 Latin American and Caribbean countries. Durman Esquivel will also ensure that Unicomer personnel are trained so that the plant is maintained for effective sewage treatment.

In addition to speaking with CBH, with the permission of Unicomer, the wastewater treatment plant plans were shared and discussed with DCA for review prior to submission of the EIS to ensure it met the standards of the DCA. DCA assessed the plans and the Deputy Town & Country Planner, Clement Antonio, reported that "I have no objections [to the proposed plant] and advise that you proceed to submission" (pers. comm. October 26, 2021).

In addition to the proposed plant described above, we recommend that Unicomer should:

- Ensure backup power for electrical components of the plant in case of failure.
- Conduct periodic analysis of effluent quality to meet manufacturing performance metrics.
- Install alarm system on the plant to signal malfunction in electrical/mechanical components.
- Develop contingency plan for unexpected problems.

To ensure the water quality of the sewage effluent meets health and environmental standards, water quality monitoring of the discharge will be performed. The frequency of effluent testing should be agreed upon with the relevant government agency. Samples will be collected by designated personnel from Unicomer and can be sent to the Department of Analytical Services Laboratory to be analyzed, which has the capabilities to test for several physical, chemical, and biological parameters.

2.3 Solid Waste, Noise, and Air Pollution from Construction Activities

Solid Waste Anticipated Impacts

Construction and operation of a commercial complex generate solid waste. Depending on the type of construction and complex, there are varying types of waste that must be managed and disposed of, including e.g. construction debris, industrial/commercial waste, used electronic equipment, etc.

The handling of solid waste is governed by the National Solid Waste Authority Act, 2005. The complex will not generate hazardous waste. It will produce construction debris and electronic waste during the construction and operational phases. Electronic waste is a recognized challenge for small island development, and in Antigua there are no facilities to recycle and dispose of this type of waste. Solid waste on Antigua is disposed of at Cooks Sanitary Landfill in the Five Islands area, and there are facilities to handle recyclables, such as Antigua and Barbuda Waste Recycling Corporation.

Noise Pollution Anticipated Impacts

In addition to solid waste, construction activities also generate noise pollution. Noise pollution is governed under the EPMA, 2019, Section 27-107, Antigua and Barbuda. Because the commercial complex is already in an industrial area, there are sources of commercial external noise including from high-traffic volumes and site activities. However, construction noise level will increase as the complex is built. Sources of noise will come primarily from construction such as site preparation and building infrastructure during the early phases of the project. Noise from operations will be largely associated with activities such as generators for electricity production, traffic, local maintenance, etc.

Air Pollution Anticipated Impacts

Impacts to air quality are anticipated to occur largely during the construction phase of the project. Effects on air quality will come from the use of construction materials, vehicles for the transport of materials, and temporary use of diesel generators. Due to the dry conditions that are common in Antigua, construction managers and contractors will need to pay attention to dust generated during the construction phase. Particulate matter from unvegetated soils can be made airborne by vehicle and equipment movement and winds. Wind action can also pick up dust from unprotected aggregate piles.

Solid Waste Mitigation Measures

The Unicomer commercial complex will dispose of construction debris, electronic waste, and daily disposable waste at Cooks Landfill in accordance with the National Solid Waste Authority Act, 2005. Construction waste and refuse should be removed to Cooks Landfill following the completion of construction. Solid waste material will be recycled and reused when possible, and will be brought to the Antigua and Barbuda Waste Recycling Corporation. Currently, the complex does not have a formalized waste disposal plan, but our team recommends documenting protocols for personnel so that materials are always disposed of correctly throughout the lifespan of the project in all phases.

Table 2.1. Solid waste types and management actions.

Type of Solid Waste	Description	Management Action
Recyclable Material	Glass, Tin, Cardboard, Paper, Plastic, Glass	Recyclable Items Will Be Sent to Local Recycling Facilities on Antigua
Large Disposable Items	Electronics, Appliances, Machinery, Construction Waste, etc.	Disposal At Landfill
Regular Disposable Waste	Daily Waste That Cannot Be Recycled	Disposal At Landfill

Additional measures recommended to be taken by the developer include:

- Developing a waste/pollution management and disposal plan based on the mitigation measures outlined above.
- Ensuring adequate number of waste receptacles on the property and in the building for trash disposal.
- Building a central dumpster that is enclosed for disposal of trash from the waste receptacles.

Noise Pollution Mitigation Measures

It will not be possible to eliminate construction noise adjacent to the development. However, mitigation measures can be taken, including limiting construction work to normal business hours. Especially for construction workers and employees, mitigation measures will include adopting the necessary precautions in accordance with the Noise Abatement Act, 1996 for site construction and operation. Unicomer should also follow standard operations guidelines to confine construction to normal working hours.

Noise pollution control should be initiated for the construction phase of the project. Any construction noise pollution should be largely temporary. The Occupational Safety and Health Administration established permissible noise exposure limits for employees under the OSHA Hearing Conservation Program Amendment and we recommend adherence to the levels listed below.

Table 2.2. Permissible noise exposures limits for employees, as outlined by OSHA (1970).

Duration per day (hours)	Sound Level (dB(A)) Slow Response
32	80
16	85
8	90
6	92
4	95
3	97
2	102
1-1/2	105
1	110
<1/4	115

Air Pollution Mitigation Measures

Unicomer should take appropriate measures to minimize the amount of dust movement, particularly during windy conditions, to maintain the threshold criteria laid out by EPMA, 2019, Schedule VIII. Minimizing dust creation is one of the best mitigating measures to manage air quality which can be done using the following steps:

- Using water trucks to spray down exposed areas or surfaces.
- Sealing and/or re-vegetating disturbed areas as soon as possible after completion of each stage of construction works.
- Planning haulage routes on sealed surfaces and using dust suppression on unsealed roads within construction sites.
- Covering loads on public roads.
- Using wind breaks.
- Seeding, stabilizing, covering or containing stockpiles where necessary.

The development should ensure that construction equipment and continued operations will operate at standards keeping with EPMA, 2019, Schedule VIII for particulate matter as well as air pollutants of carbon monoxide, lead, nitrogen dioxide, ozone, and sulfur dioxide.

Table 2.3. Summary of Anticipated Impacts and Mitigation Measures.

Category	Anticipated Impacts	Mitigation Measures
Terrestrial	*Direct* • Loss of vegetation from land clearing *Indirect* • Erosion • Flooding • Increased Temperatures on site	• Landscape with native plants and mature trees to stabilize soils, decrease storm runoff, and cool site (especially paved areas) • Install fencing to capture loose sediment and soils
Stormwater	*Direct* • Hard surfaces increase volume of runoff • Increased pressure on drainage system *Indirect* • Erosion • Flooding	• Use permeable materials for paved areas • Ensure pipes are properly sized and installed • Collect rain in detention tanks
Sewage	*Direct* • Failure of system or inadequate treatment leads to pollution	• Ensure adequate sewage treatment • Ensure backup power for plant • Monitor effluent water quality

	Indirect • Human health • Environmental health	• Ensure operators are trained in daily operation and maintenance • Install alarm system to signal malfunction • Develop contingency plan for unexpected problems
Solid Waste	*Direct* • Unpleasant odors • Pollution • Infestations *Indirect* • Human health • Environmental health	• Recycle waste appropriately • Dispose of construction and e-waste per laws and regulations and in a timely manner • Place waste receptacles throughout the site • Develop waste/pollution management plan
Noise Pollution	*Direct* • Nuisance to adjacent establishments • Loss of hearing from prolonged exposure	• Generator installed in acoustic enclosure • Operators have protective equipment • Heavy equipment work during normal work hours
Air Pollution	*Direct* • Particulate formation *Indirect* • Human health • Nuisance	• Service vehicles and equipment • Re-vegetate areas • Dust suppression techniques

2.4 Energy Conservation

The proposed construction will utilize Insulated Sandwich Panels (ISPs) which provide an energy efficient building envelope. The foam panels will be placed between the thin steel construction, insulating the building, reducing air conditioning loads and significantly lowering the overall energy use. Lowering energy consumption and air conditioning use will not only reduce costs, but will also decrease greenhouse gas emissions and the building's carbon footprint. Implementing an energy efficient building envelope is the most important step in energy conservation This is a positive energy usage immediately

Initially Unicomer will source its energy needs from APUA. Ultimately, Unicomer plans to utilize solar energy to offset c. 80% of the total energy load being drawn from conventional sources. The complex will be designed so that solar panels can be installed on the roof within 5 years of the operational phase of the complex. During the first years of operation Unicomer will monitor its energy usage in order to determine the optimal solar panel solutions. No plans for solar technology were submitted for review. Solar technology is continually evolving and decisions on such technologies are based on several factors (cost/benefit, time to return on investment, permits etc.).

It is considered best practice to first evaluate the energy budget of a building when operational in order to ensure that the technology is adequate to meet the energy needs. For instance, the average energy consumption of a commercial complex ranges between 1-5 watts per square foot and an accurate understanding is critical to plan for the appropriate solar technology. Based on current-day technology the engineer recommends that Unicomer consider the use of Photovoltaic Solar Panels and Solar thermal panels. Photovoltaic Solar Panels are conservatively estimated to produce 10 watts per square foot and are 15-20% efficient in the production of electricity from sunlight. Solar thermal panels are 80-90% efficient in warming water, and should be used to meet the hot water needs of the complex (instead of using solar to run an electric water heater, which is inefficient and consumes more energy).

3.0 ENVIRONMENTAL MONITORING AND MANAGEMENT PLAN (EMMP)

Unicomer proposes to build their commercial complex in an area that has been heavily impacted by development. To reduce impacts of this project, and to be in compliance with GoAB laws, an EMMP is required. Monitoring ensures compliance with prescribed mitigation measures; Good monitoring can help to detect issues before they become problems and demonstrates the effectiveness of environmental actions taken by the developer. An adaptive approach which involves monitoring, reviewing findings, and revising as necessary is the best approach.

Specific monitoring roles of operations personnel should be established, and an onsite environmental committee created. This committee will set objectives and targets; report on its operations and environmental performance in the operational phase; and document any preventative actions taken. Areas to be reported on include:

- Sewage treatment plant-wastewater use and disposal.
- Stormwater and disaster management plan.

The DCA with DoE will provide guidance on frequency of monitoring and reporting. The following government agencies should be engaged:

- Environment Division (environmental impacts)
- Central Board of Health (management of waste and materials)
- Development Control Authority (permitting agency; building codes and standards)
- National Solid Waste Management Authority (waste management)

Based on our assessment of environmental impacts, a variety of key features will need to be monitored, including both biological and physical parameters:

Biological Parameters

- Water quality of sewage effluent and stormwater runoff

Physical Parameters

- Drainage systems
- Water collection systems
- Materials (windows/doors/roof/siding) up to code for hurricane and other disaster standards

3.1 Environmental Monitoring and Management Plan Development

Unicomer recognizes that a comprehensive and adaptive Environmental Monitoring and Management Plan (EMMP) is necessary to implement protocols and necessary oversight as the development moves forward.

An EMMP should be developed which outlines the environmental policies, objectives, targets, monitoring and management strategies for the Unicomer commercial complex project, and should be guided by five principal components:

1. Clearly Articulated and Measurable Environmental Goals and Timelines
    a. The impacts identified in this environmental assessment and the recommendations to mitigate them should be used as targets within the EMMP.
    b. Appropriate schedules for implementation, monitoring, assessment, and reporting should be put in place.

2. A Framework for Adaptive Management
    a. Conceptual understanding of the system and an evaluation of its current condition.
    b. Identification of issues that could adversely impact natural resources of the area.
    c. Robust monitoring plan that includes collection of data, evaluation of results, and response options.
    d. Framework for analyzing and presenting results for making management decisions and other adjustments as needed.
    e. Re-assessment of the system and an ability to implement changes/adapt management protocols as necessary.

3. Clearly Defined Educational Training Plans
    a. Training is an essential and cost-saving investment that helps ensure all personnel are aware of the EMMP's benefits, objectives, procedures, and targets.
    b. Training raises awareness of the strategic importance of EMMP implementation, raises general environmental awareness, and enhances worker's skills.
    c. The EMMP should outline training needs, identify trainers, and put a training schedule in place to ensure learning is ongoing.

4. Clear Management and Project Communications with the Following Parties:
    a. Contractors, suppliers, construction crews, and on-site workers.
    b. Investors, shareholders, residents, and visitors.
    c. Local community, educational, government, and non-governmental organizations.
    d. Local business sector and the general public.

5. Independent Reporting and Verification with Monitoring Data that Details the Following:
    a. Clearly identified chain-of-command for site management.
    b. Documentation and accountability to policies outlined in this EIS.
    c. Incident reporting and management plan.
    d. Clearly defined reporting responsibilities.

3.2 Data Management System

A data management system should be set up to track and manage the environmental data collected and resultant actions. These data should be made available to the relevant government agencies and should be backed up to ensure that valuable data and information are not lost through catastrophic storm damage. The data will be reported and accessible in the spirit of improving development practices with known ecological impacts and economic costs in order to develop and improve best practices. This system can function as a database for future commercial developments with the goal of reducing costs as well as reducing environmental impact.

3.3 Sewage Treatment Plant

Throughout the operation of the commercial complex, and in accordance with the laws of Antigua and Barbuda, a representative of the Central Board of Health will conduct annual visits and meet with the complex's environmental officer to monitor and audit the following:

- Operation of the sewage treatment plant which includes review of operation logs, testing input/output effluent.
- Holding tank for treated sewage is aerated properly.
- Safety protocols implemented to handle and store hazard material.

Periodic testing and monitoring of the effluent from the sewage treatment plant should be undertaken by the technicians at the Central Board of Health and a representative at the commercial complex to ensure that the:

- sewage treatment plant is operating in accordance with standards agreed upon with DCA (sewage inflow/outflow quantity and quality).
- tank storage for treated effluent has adequate aerator and operating in accordance with manufacturer specifications.

Water quality samples should be collected at a frequency indicated by the relevant government authority for the treatment plant effluents to test for the parameters indicated in the sewage treatment anticipated impacts section.

3.4 Stormwater Runoff

Stormwater should be monitored by Unicomer and/or by the relevant government authority to ensure that:

- proper drainage systems are in place to divert runoff into drains.
- contaminated water is pumped and drained from excavations and filtered through silt traps.

Concrete wash is usually a concern during construction, however Theobalds noted that the concrete wash will be kept under the layers of fill/slab and/or pavement, and therefore does not need to be channeled to a dedicated wash out area. Additionally, Theobalds noted that the earth moving process will be carried out during the drier season (January to April) in an effort to decrease the possibility of stormwater runoff issues.

The elements listed above and water quality of the runoff should be monitored (frequency to be determined during the construction phase) and any breach or complaints remedied and a report submitted to DCA.

3.5 Disaster Management Plan

Storms, hurricanes, and accompanying coastal inundation are a feature of the Caribbean and occur with predictable frequency. These hazards existed before the onset of recent climate change, which does not alter the region's exposure to these types of natural hazards. However, changes in sea level rise, precipitation patterns, and atmospheric factors have interacted with these existing hazards to change and often exacerbate their impacts on the landscape.

Hurricane season for Antigua and Barbuda typically lasts from June 30 through November 1. Due to the location of the islands, the nation is highly susceptible to tropical systems. From 1851 to 2015, a period of 164 years, 64 tropical storm and hurricane centers have passed within 50 miles (80km) of Antigua. On average, Antigua is affected by a tropical storm or hurricane every 2.6 years. Over the 164-year timeframe, 9 of the storms were Category 3 or higher, e.g. "major hurricanes". More recently, from 1950-2015, 29 hurricanes have passed within 50 miles. Of these, 6 have been major hurricanes. The most damaging hurricanes affecting the Antigua and Barbuda area occurred in 1928, 1960, 1995, and Hurricane Irma in 2017. However, as Hurricane Irma illustrates proximity and travel speed are critical in determining impacts on land, Hurricane Irma was the strongest Atlantic Basin hurricane recorded outside the Gulf of Mexico and the Caribbean sea, maintaining a windspeed over 185 miles per hour (160 knots) for 37 hours (NERC, 2018). Although it passed within 50 miles of Antigua, it did minimal damage to the island and critical infrastructure. By contrast, Hurricane Irma passed over the northern coast of Barbuda (20 miles to the NE) and devastated the island.

The Disaster Management Plan for the Unicomer commercial complex should take a similar approach to natural disaster management as the National Office of Disaster Service (NODS) in Antigua and Barbuda. Unicomer should maintain a liaison to the NODS office and work with the office in order to remain current with any hazard plans and policies. Unicomer must heed all warnings from NODS and take measures (evacuation etc.) recommended or required in the event of an impending or ongoing hazard. Unicomer's plan framework should include measures for disaster preparedness, response, recovery, and mitigation. Unicomer will implement natural disaster response procedures as they pertain to safety and evacuation of the community during hazards, particularly storms. Staff and personnel will be educated on these procedures and designated staff will be assigned to disaster risk reduction duties and participate in exercise drills.

Additionally, the Caribbean Disaster Emergency Management Agency (CDEMA) has developed a Comprehensive Disaster Management (CDM) Strategy and Results Framework for 2014-2024 that outlines the need for the development of multi-hazard contingency and coordinated response plans as a means to mitigate and lessen their potential impacts. This framework outlines 4 priority areas designed to work together to increase the community's ability to prepare and mitigate, respond, recover, and rehabilitate in order to build resilience of the Caribbean nations (see Figure 3.1).

The Unicomer development should also adopt a Risk Management Plan (RMP) in the event of a potential chemical accident although no hazardous chemicals are planned to be stored on the site. This type of plan is a standard precautionary plan that is typically developed for warehouse facilities and so is included here. This plan should follow standards for reporting chemicals found on the List of Regulated Substances (see Pesticides and Toxic Chemicals Regulations 2013) – An RMP for Unicomer commercial complex will address the following: 1) Hazard assessment that deals with potential effects of an accidental release and evaluation of worst-case and alternative accidental releases; 2) Prevention program that includes safety precautions and maintenance, monitoring, employee training measures; and 3) Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g. the fire department) should an incident occur (CDEMA, 2014).

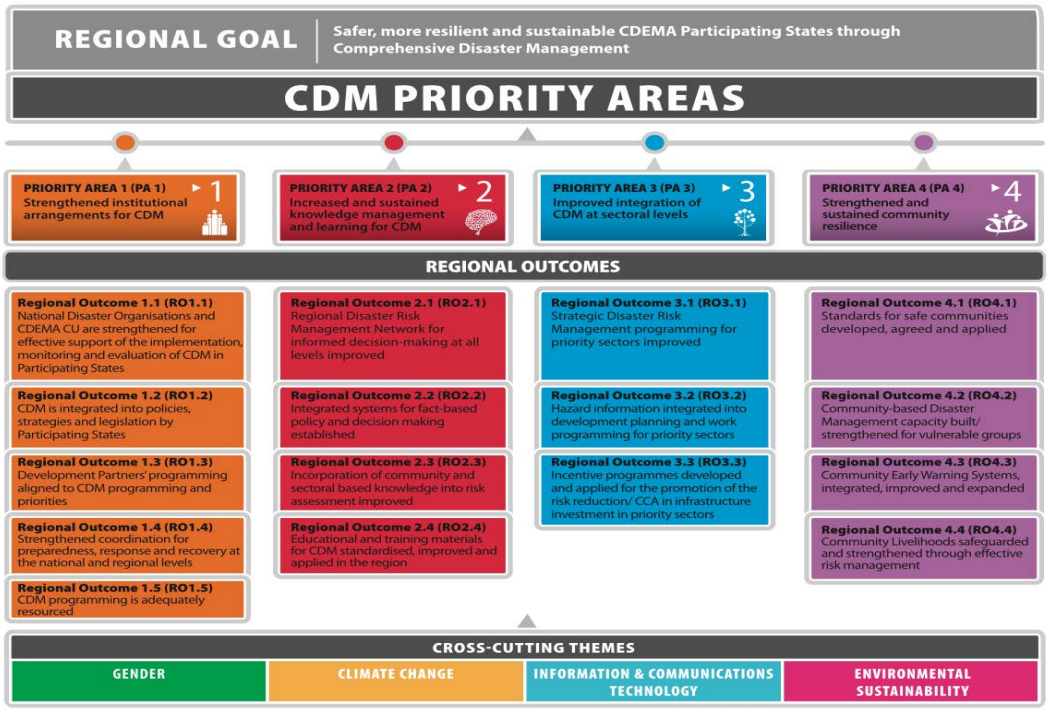

Figure 3.1. Priority Areas of disaster management (adapted from CDEMA, 2014)

Additionally, Emergency Response plans should be developed to ensure compliance with environmental regulations and health standards including the development of ERPs for:

- malfunction/repair of sewage treatment plant and effluent storage tank
- intense rain days when effluent storage tank is at capacity
- spills, leaks, accidents
- hurricanes and droughts.

Specifically, the IC should take the following steps to prevent adverse effects from natural disasters including:

Hurricanes – the building will be designed to withstand a Category 5 hurricane however ancillary structures (exterior lighting, trees, etc.) can pose a risk in the event of damage and to reduce risks):

- Strengthen and secure roofs, windows, doors and secure or remove any external structures.
- Assess and repair drainage systems before and after major storms.
- Create area dedicated to the safe store hazardous materials in case of storm/hurricane, and locate all such materials there prior to the storm.

Flooding:

- Establish a flood warning protocol.
- Use permeable pavements for construction.
- Utilize detention tanks.
- Preserve and plant vegetation in areas where possible.
- Assess/repair drainage systems.

Drought:

- Store runoff in cisterns when possible.
- Conserve water with ecologically friendly faucets in sinks.
- Recycle grey water for landscaping and toilet flushing.
- Use drought-resistant native plants for landscaping.

All of these actions will safeguard the complex from negatively impacting environmental and human health.

4.0 SUMMARY & CONCLUSION

Unicomer Group proposes to construct a commercial complex on Friars Hill Road, St. Johns, that will provide a source of household and electronic goods to the local community on Antigua and Barbuda. The commercial complex will create 150 local jobs in the construction phase of the project, and 50 local jobs for the operational phase. This is a significant employment contribution to Antigua.

The proposed Unicomer complex is located in an area zoned for commercial use and adjacent to dense commercial and industrial development. The field assessment and remote sensing identified that 100% of the proposed land has been repeatedly disturbed by land clearing activities for over 15 years. Vegetation is mostly early opportunistic and invasive species. The ecological impact of building on the natural vegetation site will be minimal; however, over 90% of the land will be cleared for construction. Potential impacts of new construction (even on a disturbed but undeveloped site) include an increase in stormwater runoff, construction pollution, and sewage effluent.

To minimize the impacts of storms, Unicomer will plant vegetation throughout the parking lot and around the perimeter of the plot to reduce runoff and erosion. Unicomer will utilize grass crete pavers in developing the outdoor space and will route rainwater from the roof into detention tanks for release into storm drains to help minimize any potential flooding.

Unicomer proposes to use an established brand of sewage treatment plant which is utilized throughout Latin America and the Caribbean. It is sized to accommodate the estimated wastewater flow for the commercial complex. DCA has reviewed the plant plans and has no objections to the proposed wastewater treatment plant.

The Unicomer commercial complex will generate construction debris, electronic waste, and daily disposable waste. Construction waste and refuse will be removed to Cooks Landfill in accordance with the National Solid Waste Authority Act, 2005. Solid waste material will be recycled and reused when possible, and will be brought to the Antigua and Barbuda Waste Recycling Corporation.

To minimize noise pollution, Unicomer should adopt the necessary precautions in accordance with the Noise Abatement Act, 1996 for site construction and operation. Air pollution will be minimized by complying with threshold criteria laid out by EPMA, 2019, Schedule VIII.

The building will be constructed for energy efficiency using Insulated Sandwich Panels. Within 5 years of the opening of the commercial complex, solar panels will be installed on the roof to supply power required to operate the commercial complex and offset c. 80% of the energy load being drawn from conventional sources. Solar panels will create enough power to fulfill the estimated energy budget of the building. During the construction phase, Unicomer should incorporate the necessary electrical infrastructure into the building plans to accommodate the energy transition to renewable energy.

Based on our assessment and findings, including consideration of the current land use and zoning regulations, the team did not find any major concerns that in its view would prevent the project moving ahead.

This EIS was carried out in accordance with the terms of Reference (ToR) provided by DoE to DCA and following additional communication with the agencies to determine the detail required and areas of concern.

5.0 ANNEXES

ANNEX 1. Disclosure of Consultants Engaged

Annex 1. Disclosure of Consultants Engaged

DEBORAH BROSNAN, PH.D.

Dr. Deborah Brosnan has 30 years of experience in crafting science-based solutions to environmental risk and with a specialty in Small Island Developing States. She brings extensive experience in leadership and management combined with scientific knowledge to help resolve a diversity of challenging situations

PRESIDENT AND FOUNDER, DEBORAH BROSNAN & ASSOCIATES
A company focused on solutions to environmental risks globally, provides expertise in land land/sea planning and decisions, disaster risk reduction and climate change, endangered species. Science based, strategically and solution focused and serving clients in all sectors 2011-present. St Barthelemy FWI and Washington D.C.

FOUNDER AND CEO, SUSTAINABLE ECOSYSTEMS INSTITUTE
A non-profit organization that integrated science and carried out scientific research to address environmental problems throughout the USA 1994-2011. Established and grew organization, focused on endangered species, forestry, oceans, laws and policies & held several multi-million IDIQ government contracts. Built and deployed effective multi-sector and multi-disciplinary outcome orientated teams Recruited 1,000 credentialed scientists to affiliate as on-call experts

ACADEMIC APPOINTMENTS
Full Adjunct Professor of Biology Virginia Tech. Faculty of the Global Change Institute and Fellow of Global Forum for Urban and Regional Resilience. 2012- Present.
Environment and Policy Faculty. One Health Institute, University of California Davis, 2011- 2015
Senior Visiting Researcher, Smithsonian Institution 2013-2016.
Visiting Scholar, Stanford University, Dept. of Biology 2009-2010 and 2002-2003.
Visiting Professor Northwestern School of Law. Developed and co-taught marine science and law, and curriculum on ecological science and law. 1999- 2002 and on occasional basis.

EXPERIENCE
Science-based Environmental Risk Reduction and Problem-Solving
Dr. Brosnan has led several teams that successfully resolved national environmental challenges involving multiple interests and complex issues where financial and environmental stakes were high and costs escalating (e.g., several high-risk/high-profile situations e.g., Everglades Restoration, endangered species) and for multi-sector clients. The process she developed was independently evaluated as the subject of a Ph.D. dissertation (by M. McEathron) and won praise from all sides in the environmental debate for its effectiveness. Dr. Brosnan holds an MOU with the U.S. Dept. of Interior US Geological Survey to provide scientific advice and resources during hazards and crises and has held IDIQ with US Government. Specific Project Examples: S, Florida Everglades Restoration: Management of the Missouri River; Columbia River Dredging and Endangered Species: Atlantic Salmon (State of Maine); Land Use/Development California, Caribbean, Colorado, High-altitude wetlands, public-private partnership for marsh restoration. Dr. Brosnan has provided expert testimony to US Senate and US House Committees

Sustainable Development

Private land use and development is often fraught with investment and regulatory risks. Private landowners, investors, and resort developers have sought Dr. Brosnan's assistance on investment and development strategies in a diversity of environmental areas. Work has included sustainable forestry practices under land management and compliance; Resort and private development covering topics such land suitability; cost-effective building with nature; environmental regulatory compliance; climate change risks and mitigation; biodiversity and sensitive habitats; risks and return on investment; environmental certification. Relationships between private and government sectors must often be brokered for solutions that benefit environment and enterprise, permission must be secured, and community concerns and benefits addressed- these are areas in which she has a proven track record. The scale of her projects has ranged from ownerships of 23.5sq miles (66 km2), properties and entire small islands up to 11sq miles (28 km2), to individual properties with complex developments.

ISLANDS AND EMERGING NATIONS

Dr. Brosnan, a resident in the Caribbean maintains a specialized practice in islands.
Examples of work include:
Assessments, EIAs, Land and Marine use planning and development for private and public sectors spanning ecological, environmental, energy issues. (several islands)
Design and implementation of ecosystem-based solutions Assisted multi-sector clients on building with nature in a cost-effective way as part of their ethic, brand, solution to climate-change and hazard risks, and compliance. Project have spanned design to implementation and included e.g. entire beach length dune-restoration, coral reef restoration, site assessments e.g., hydrodynamic and biological analysis, building community relations, permitting etc. Numerous Islands include St Barthelemy, St Kitts and Nevis and adjacent state; and the integration of environment, natural resources and infrastructure for solutions in the Montserrat Volcanic crisis
Design and implementation of the Marine Reserve, St Barthelemy the first network-designed reserve in the Caribbean.

SOLUTIONS TO HAZARDS, DISASTERS AND CLIMATE CHANGE

Science and Technology for Resilience. As part of the leadership team with NASA and The Nature Conservancy, we have designed a state of the science GIS based resilience tool that is web accessible and can be used by the community in their evaluation and decision-making. (2014-present)
Tsunami Planning California. Evaluated risks and consequences to California and the national economy from distant-sourced earthquakes and tsunamis. As part of the leadership Dr. Brosnan led the scenario effort on impacts on ports, fisheries, endangered species, protected lands and coasts, evaluating ecological, economic and social impacts. Working with 6 teams of scientists from disciplines including economics to engineering, we provided forecasting on direct and cascading impacts.
Extreme Geohazards. As a member of the Geo-hazard team we evaluated the likelihood of extreme volcanic eruptions and their potential impacts on communities, trade and policy (project at the request of European Science Foundation).
Design and Implementation of New Town and Port Facility to mitigate Montserrat Volcano: Led the environmental assessment and planning the engagement of government and community and worked with the engineers and government to design an ecologically-sustainable new town and port facility that would provide necessary infrastructure, transportation, government and community services and natural resource and habitat basis for fisheries, tourism and farming. This proved vital when subsequently the eruption destroyed main town, transportation and services.

CAPACITY BUILDING AND MULTI-DISCIPLINARY ENGAGEMENT

Dr. Brosnan has developed and implemented innovative and cross cutting workshops and capacity building experiences including:

Integrating ecosystems, Disaster Risk Reduction and Climate Change in policy and actions for Organization of Eastern Caribbean States (11 nations) 2016.

Science in the Courtroom: Workshops and lectures for State Supreme Justices and US Justices.

Science Arbitration: Using science to resolve complex environmental disputes (Lecture and Workshop series for professionals and graduate students)

Marine science and Law: Course for environmental lawyers and students and practitioners.

Recent Presentations (2016-2017)

Upcoming Sustainable Infrastructure, Miami Green Infrastructure Conference March 2018.

TEDx Aligning with Nature: Sun Valley 2017

Green, Gray and Hybrid Solutions: Why they matter to you? American Society of Civil Engineers Sustainable Infrastructure Conference (Speaker and Session Convenor) Nov 2017.

Ports and Coasts: Evaluating Risks and Designing Solutions. World Ocean Council (Industry Group for Oceans and Maritime issues) Nov 2016 Rotterdam

Oceans – 3 Lectures in French Polynesia 2016

Workshop on New Sustainability: Incentives and Opportunities in Design and Legal Framework Florida Green Building Coalition Convention Miami Sept 2016

Innovations in ecosystem-engineering for disasters and climate Change (Workshop U.N. Bonn 2016)

In the heat of the moment effective use of science and scientists during crises and hazard events (Workshop San Francisco Dec 2016)

PUBLICATIONS

Over 50 publications in peer reviewed, reports and popular literature, including edited book

Frequent Expert Contributor to Huffington Post on science environment and disasters. http://www.huffingtonpost.com/author/brosnan-132 Articles and OpEds published to Washington Post, New York Times

BOARDS OF DIRECTORS AND ADVISORY BOARDS

Dr. Brosnan serves and has served on a number of Boards and Advisory Boards including:

President of the Board of Directors, Wild Geese Network of Irish Scientists- international diaspora of Irish scientists, engineers and technologists. 2014- present

Board of Trustees and Past Chair- University of California Davis, Wildlife Health Center, SeaDoc Society. 2000-present. A wildlife science and medicine program to restore and sustain ecosystem and human health.

American Society of Civil Engineers. Member of Committee on Sustainability. 2016-present

National Courts and Sciences Institute. Science Board Member 2014- Present. Education of justices in scientific practices and knowledge.

Board of Directors, PADI Project AWARE a global SCUBA diving conservation organization office in 8 Regions around the world 2011- Present

Science Advisor to The Environmental Agency St Barthelemy FWI. 2013-Present.

Commissioner IUCN Commission on Ecosystems 2014- Present.

Global Risk Forum, Davos, Board of Advisors 2014- Present. Comprehensive Disaster Risk Reduction globally

Conservation Committee, American Ornithological Society 2014-2016.

Joint USA- Italy Commission on hazards and disasters 2015-2016

BBC The World, Science Advisor 2006-2012 3BBC Radio Series.

Oregon Health and Sciences University, Board of Advisors, Coastal Oceans Monitoring Program 2005 to 2015. High-tech ocean observation and monitoring system for biological and physical aspects of the ocean including fisheries conditions and tsunami risks.
Public Trustee, Board of Directors, Oregon State University, College of Forestry, appointed by State as the Public Representative 1997-2005. State oversight and assistance for forestry research and practices.
Board Member of National Science Foundation Group to form the National Ecological Observatory Network (NEON) 2001-2004. Developed vision, organizational structure and legal entity, and set up the US NEON Observatory platform.
Chair, US Department of the Interior, Blue Ribbon Scientific Ethics Panel 2002.Led the effort to develop and review a code of scientific ethics adopted for the conduct of science by all the agencies under the US Dept. of Interior.

Other Fellowships and Awards
Inducted into Ireland 100 for services to US higher education and learning. 2015
Science-artist in residence Cill Rialig Ireland August 2015.
Senior Whiteley Fellow, University of Washington 2010, 2005
Red Cross Hero's Award for saving lives in 747-plane crash.

ADDITIONAL COMMUNITY WORK
Founded Tsunami Reef Fund (2005) linking international scientists, professional divers with local communities affected by the tsunami. Provided practical economic and scientific assistance locally in marine debris clean up and reef recovery, and re-engage communities with the ocean. Travelled throughout region to establish program and long-term linkages.

LANGUAGES
English, French, and Gaelic

ACADEMIC CREDENTIALS
Ph.D. Oregon State University. Effect of extreme events on marine community dynamics. 1994
M.S. National University of Ireland Fisheries Science: Thesis Experimental Fishery for Spider Crab Maia squinado 1982
B.S. honors in Zoology and Botany, University College Galway 1978

EIS Role: Dr. Deborah Brosnan reviewed and assessed the information presented in this EIS.

ALANNA WALDMAN, M.S.
Project Manager

Ms. Waldman has a strong background in environmental research and reporting. She has worked on marine ecosystems to compile and analyze data to inform coastal and marine resource management projects in Florida and throughout the Caribbean. Specifically, this research has focused on coral reef restoration, assessment, and monitoring to inform conservation efforts, beach renourishment projects, marine protected area management, and mitigation of invasive species impacts.

Through her experience in research and outreach, she has worked with U.S. federal, state, and non-governmental agencies on best practices for coral restoration and management. Ms. Waldman has conducted field work collecting data on fishes, stony corals, macroalgae, sponges, water quality, and beach renourishment and port development impacts on coastal ecosystems. She has extensive experience in project and program management with research and nonprofit organizations. Ms. Waldman holds a Master of Science Degree in Marine Biology from Nova Southeastern University.

EIS Role: Ms. Waldman has been the project lead involved in all aspects of the EIS including baseline background research, synthesis of previous studies, and EIS management, as well as text preparation.

LAURA FLYNN
GIS and Vegetation Specialist

Ms. Flynn specializes in GIS based platforms to spatially analyze ecological characteristics and develop user-friendly applications. With 19 years of background in coastal zone habitat management, she has successfully completed a diversity of projects to include mapping of species composition, distribution and health of marine habitats throughout the state of Florida and Caribbean. Her work in field assessments routinely incorporates spatial data that are used to create user friendly map products and provide end decision-makers and all users' accessible information for the long-term management of resource areas.

EIS Role: Ms. Flynn has used her experience and expertise to support the vegetation field assessment for the Unicomer commercial complex. Contributions to the project include species identification of the flora on the Unicomer site.

TORBEN ABBOT, P.E., LEED AP
Civil Engineer

Mr. Abbott is a Civil Engineer with 25 years' experience in designing development solutions for projects in the US, China and the Caribbean, specializing in site-grading, stormwater and utility engineering design. Mr. Abbott has worked on numerous, wide-ranging development projects, developing infrastructure systems that both serve the needs of the end-user and work with respect to and in tune with the local environment.

EIS Role: Mr. Abbott reviewed the site infrastructure needs and made recommendations for water collection, wastewater treatment, renewable energy, and stormwater management.

ANNEX 2. Letter of Submission

Annex 2. Letter of Submission

Mr. Frederick Southwell
Chief Town and Country Planner
Development Control Authority
Transportation Board, Factory Rd
St. Johns, Antigua
5th November 2021

Dear Mr. Southwell,

Deborah Brosnan & Associates is pleased to submit this EIS for the proposed Unicomer Group commercial complex. Plan Application #G14-2020.

This EIS is submitted according to the review and Terms of Reference provided to Deborah Brosnan & Associates in May, 2021. We confirm that this work was completed by Deborah Brosnan & Associates.

Yours sincerely,

Deborah M. Brosnan

Deborah Brosnan Ph.D.
President,
Deborah Brosnan & Associates

ANNEX 3. Terms of Reference

Annex 3. Terms of Reference

GOVERNMENT OF ANTIGUA AND BARBUDA

Seen 8/12/2020 CT&CP

December 2, 2020

Department of Environment
Ministry of Health and the Environment
#1 Victoria Park, Botanical Garden
P.O, Box W693
St. John's
Antigua, W.I.
Tel: (268) 462-6265
Fax: (268) 462-4625
Email: antiguaenvironmentdivision@gmail.com

ATTN: Mrs. Ruth Simpson
Mr. Rohan Jarvis
Mrs. Siobhan Martin
Mr. Akim Browne

Please ensure that the developers receive a copy of this document and carry out the recommendations.

Chief Town and Country Planner
Development Control Authority
Transport Board Head Quarters
Herbert's Estate
P.O. Box 895
St. John's
Antigua

DEVELOPMENT CONTROL AUTHORITY REGISTRY DEC 08 2020 MINISTRY OF HOUSING, LANDS AND URBAN RENEWAL

REF #D.o.E 9/6/2020-11-003

Plan Application #G14-2020 (Unicomer Commercial Complex)

Dear Mr. Southwell,

On November 30, 2020, the Department of Environment (DoE) received a Development Control Authority (DCA) Plan Application #G14-2020. The DoE recognizes that the Physical Planning Act (PPA) lists Sewage Treatment Plants as requiring a mandatory EIA.

The DoE also recognizes that the development conforms to the Commercial zone in which it is located.

Kindly advise the developer to have prepared for further consideration an EIS, as guided by the ToR attached. Specifically, the EIS must also include:

- A Waste Disposal and Pollution Management Plan
- A Disaster Management Plan

Best Regards,

Chief Environment Officer
Department of Environment

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Development Application:	Application #G14-2020 Location: Friars Hill Road, Antigua
Proposal Concept:	Commercial Complex
Date Received:	November 30, 2020
Site Visit:	December 1, 2020
Report Submitted:	December 2, 2020
Recommendation:	Request more information
EIA Request	Yes-See Appendix 1
Legislative/ Policy Considerations:	1. Physical Planning Act (2003) 2. Environmental Protection and Management Act (2015) 3. The Sustainable Island Resource Management Plan (SIRMZP)
Environmental Risks/Concerns:	1. Sewage Treatment and Disposal 2. Construction Pollution 3. Storm and Disaster Mitigation
Lead Author	Arry Simon, Climate Assessment and Information Officer
Reviewed by:	Ato J. Lewis, Senior Environment Officer Jenniael Flemnius, Apprentice
Approved by:	Diann Black-Layne, Director, Department of Environment

Background

On November 30, the DoE received a DCA Plan Application #G14-2020. The application was submitted by Unicomer for a Commercial Complex on Friars Hill Road. A site inspection was conducted on December 1, 2020, and the following report has been generated.

Project Description

The facility which will be located on 2.52 acres of land will comprise a modern mixed-use facility (retail, office, and warehousing), in two buildings. The buildings will be steel-framed construction with metal cladding, designed to withstand up to a category 5 hurricane. The complex will include parking facilities for customers and employees.

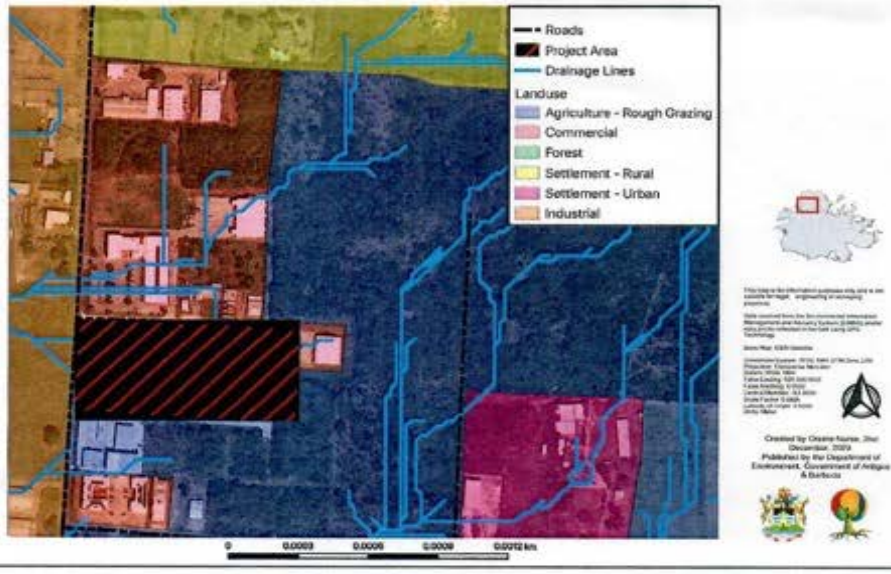
One building will comprise of 15,000 sq. ft., used for retail, while the other which will be used for warehousing and office space will be 45,000 sq. ft., of which a section of the building will be mezzanine to accommodate a technical service department on the ground floor and corporate office on the first floor.

The buildings will be wheelchair accessible for entries and exist, equipped with smoke and fire detectors with alarms, have fire suppression systems, a sewage treatment plant, potable water cistern, run-off water holding facility, and will be equipped to support solar panels in the future.

Location

Application G14-2020 associated with enivronmental and physical features.

General Reference map displaying the proposed area of interest layered with environmental and physical features.



Environmental Concerns

The Department of Environment (DoE) reviewed the proposal for this plan application and identified the following issues of concern.

1. Sewage Treatment and Disposal

A sewage treatment system was mentioned in the application. However, no further details or plans were provided. The DoE would therefore require the developer to provide such information regarding this plant for consideration. Further, it should be noted that sewage treatment plants trigger the need for an EIA.

2. Construction Pollution

The act of construction will result in the generation of waste, noise, and air pollution. The developer is required to develop a waste/pollution management plan to minimize any negative impacts of the activities on the environment.

3. Storm and Disaster Management

The DoE is cognizant that the area in which the complex is to be located is relatively low-lying, making it susceptible to significant flooding during heavy rains. However, the newly renovated Friars Hill road has been built to be Climate-resilient. As such the developer should be required to advise on the mitigation measures being taken to address the flood risk associated with that area.

The developer would need to provide a detailed disaster mitigation plan of how life, the environment, and property would be protected or recovered in case of any natural disaster that would occur.

Recommendation

The Department of Environment (DoE) has reviewed Plan Application #G14-2020 and recognizes that the Physical Planning Act (PPA) lists Sewage Treatment Plants as requiring a mandatory EIA.

The DoE also recognizes that the development conforms to the Commercial zone in which it is located.

Specifically, to meet all environmental concerns the developer should seek to have prepared for further consideration an EIS, as guided by the ToR attached, which shall include:

- A Waste Disposal and Pollution Management Plan
- A Disaster Management Plan

TERMS OF REFERENCE

ENVIRONMENTAL IMPACT STATEMENT

Application #G14-2020 (Unicomer Commercial Complex)

Objective

The purpose of the Terms of Reference (ToR) for the preparation of the Environmental Impact Statement (EIS) is to guide project proponents and consultants to execute the appropriate analyses and prepare a report with relevant project specific data, which are informative, compact, and easy to comprehend. The findings of the assessment as well as impacts of the development and mitigation measures to address these should be documented in an EIS to be submitted to the Development Control Authority (DCA) for onwards submissions to the DoE to review, comment, and make final recommendations.

1.0 Executive Summary

This section should allow for a clear understanding of the project proposal and summarize the significant results of the EIS study, e.g., positive and negative environmental, social and economic impacts, options considered, reasons for selection of the proposed option and the measures to be implemented to prevent or mitigate negative impacts or capitalize on positive impacts.

2.0 Introduction

This chapter should cover the following.

- Profile of the project proponent, name, and contact address.
- Purpose of the project, brief description of the project- name, nature, size, location of the project, its importance to the country and/or the region.
- Profile of Consultant(s)
- A map of the project area, delineating the major topographical features such as land use, drainage, major constructions including roads, pipelines, industries if any in the area are to be mentioned.
- The site layout plan of the development shall be submitted

1.0 Potential Impacts and Mitigation Measures

This chapter will provide information regarding the potential (and if work commenced before conducting the EIS), impacts to build environment and socio-economic systems.

3.1 Water Environment

The impact of operational phases on the water resources on account of the development is to be estimated. Impacts on water resources are likely to fall into one or more of the general categories of contamination, amount, or behaviour.

Anticipated Impacts:

- Water contamination
- Wastewater generation
- Information regarding how the wastewater is to be disposed of

Mitigating measures:

Suggested mitigating measures to minimize the pollution level and/or water loss as may be necessary. These may include:

- Water conservation techniques or technologies
- Pollution prevention techniques and technologies

- Adequate measures to be adopted for water conservation during the operation stage.
- Water sampling and testing of discharge

3.2 Solid waste and Environment

Solid wastes during the operation phase. Details of the following are to be given:

- Hazardous waste
- E-waste

Anticipated impacts:

The impact of the project during operational phases for the generation of waste is to be assessed.

Mitigation measures:

- Mitigation measures to reduce adverse effects. Options for the minimization of solid waste and environmentally compactable disposal are to be given.
- The developer is required to develop a waste/pollution management plan.

3.3 Energy Conservation

- The use of alternate renewable resources, such as solar power is to be discussed.
- Discuss the options considered for supplying the power required for the project and the environmental implications, including opportunities to increase the energy efficiency of the project.

4.0 Environmental Monitoring and Management Plan (EMMP)

A draft environmental monitoring and management plan must be developed which will detail the monitoring requirements for the operational phase of the project. This will include recommendations to ensure the documented implementation of mitigation measures and long-term minimization of negative impacts and maximization of positive impacts.

The EMMP should discuss in detail the following aspects:

- *Sewage Treatment Plant*

  A sewage treatment plant has been proposed to treat the wastewater from the development. The wastewater is to be treated to tertiary level and after treatment, reused for flushing of toilets in complex and gardening.

- *Stormwater/Disaster Management Plan*

  A Stormwater Management Plan should be implemented to prevent sudden discharge of excessive volumes of stormwater to the receiving drainage and road networks, thus reducing the shock load on the municipality drainage system and impact on receiving water body are to be detailed out.

5.0 Summary & Conclusion (Summary EIS)

This document should summarize the significant findings of the EIS report. The summary must describe each significant environmental issue and its resolution in sufficient detail so that its importance and scope, as well as the appropriateness of the approach taken to resolve it, are well understood. Wherever possible, the summary should make use of base maps, tables, and figures given in the report.

ANNEX 1 Disclosure of consultants engaged

This chapter shall include the names of the consultants engaged with their brief resumes and the nature of consultancy rendered.

ANNEX 2 Declarations of Completeness and Authenticity

This section is to be on the form of a letter from the EIS consultant containing an indication of the completeness of the work and the authenticity of the information reported

1. **Enclosures**

Conceptual plan / Questionnaire / Photos

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Smart Solutions to Environmental Risks

Washington, DC • St. Barthélemy, FWI • Antigua, BWI