

PLACING THE PAST: USING GIS TO RECONSTRUCT THE MARITIME  
LANDSCAPE OF THE 18<sup>TH</sup> CENTURY ALEXANDRIA, VIRGINIA WATERFRONT

A Thesis

by

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## ABSTRACT

The town of Alexandria, Virginia sits along the Potomac River in the northeast region of the United States. Established in 1749, Alexandria has a rich history spanning over 250 years, and during the late 18<sup>th</sup> and early 19<sup>th</sup> century the waterfront underwent a drastic landscape transformation. To reconstruct the maritime landscape transformation, historic records and archaeological sites were incorporated into a Geographic Information System (GIS) to spatially analyze the development process. This process included the creation of artificial land to extend the eastern shoreline of the town deep into the Potomac River channel. Investigations into the motives and methods for artificial land creation were sparked by the discovery of four ships buried beneath the waterfront. Inclusion and analysis of the ship sites and historic structures in conjunction with economic, political, and population data, facilitated the tracking of shoreline transformation at a temporal scale previously inaccessible. Utilization of GIS also focused the deposition date range for the four ships recently unearthed, furthering our understanding of the historic transformation of Alexandria's waterfront.

## DEDICATION

With all my gratitude, I would like to dedicate this to my parents Mike and Tracy, my sister Lindsey, and my partner Kyle for their unwavering support. I could not have realized my dreams without these amazing people in my life.

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## CHAPTER I

### INTRODUCTION AND HISTORICAL BACKGROUND

The discovery of four 18<sup>th</sup> century shipwrecks between 2015 and 2018 in the waterfront district and surrounding area of Alexandria, Virginia, gained international attention and sparked interest in the city's rich waterfront history. Archaeological excavations began in 2016 to research these sites and materials to understand their role in the changing landscape and narrow down the stages of development that took place along the waterfront during the 18<sup>th</sup> century.

To reconstruct the events of the past in a highly dynamic location like the colonial Alexandria waterfront, it is necessary to analyze both archaeological material indicative of development, as well as the influential processes like economics and politics that contributed to the continuous transformation of the maritime landscape. Understanding Alexandria's local-scale trade variations and development trends was possible through the analysis of population, political, and economic factors at the regional scale.

The sources analyzed for this research endeavor included archaeological sites, specifically ships and commercial structures; historic sources including maps, advertisements, census data, travelers accounts, and government records; and geographic data extrapolated from historic records of surveyors, cartographers, land parcel transfer accounts, and other proceedings. Historians, anthropologists, and local enthusiasts amassed a detailed history of Alexandria's urban development during the 18<sup>th</sup> and 19<sup>th</sup> centuries. Accurate and extensive economic and political data at the local level during

this period is less than satisfactory for analysis. Therefore, a better local perspective is gained by taking a broader regional approach to understanding the economic and political climate of colonial America. This provided a foundation for the analysis of Alexandria's past and the possible effects its maritime economy had on the urban development of the waterfront area. The objectives for this research were reached by examining and comparing all these sources within a spatial context.

The objective was to use Geographic Information Systems (GIS) to reconstruct the maritime landscape development that took place on the waterfront during the late 18<sup>th</sup> and early 19<sup>th</sup> centuries. The Geographic Information System (GIS) platform utilized for this project was ESRI's ArcGIS Pro and a geodatabase was created to spatially visualize the historic expansion on the waterfront. The temporal focus for this study was narrowed down to roughly ninety years between 1748 and 1838, concentrating on a period of drastic shoreline transformation for Alexandria's waterfront. Digitized shorelines from historic maps provided a sporadic spatiotemporal scale for waterfront expansion. The inclusion and analysis of the ship sites and historic structures in conjunction with economic, political, and population data, which influenced urban development, allowed for the creation of interpretive shorelines to narrow the scale of expansion along the waterfront and focus the deposition date range for the four ships recently unearthed.

### **Economy and Maritime Trade**

Early development in the colonies, specifically the Chesapeake region, centered around the economy and imperial trade interest. Growth and trade of tobacco during the

late 17<sup>th</sup> and early 18<sup>th</sup> centuries stimulated development in Virginia with investors seeking out fertile land to plant profitable tobacco crops and the importation of slaves to the region to maintain them. By the 1720's, more than 2,000 slaves were brought annually to the region, and by 1735 the Virginia government had distributed land patents throughout the region south of the Potomac River.<sup>1</sup> This boom in land development and slave labor led to growth of the local population, with planters and merchants settling in the region to manage the crops. Growth in the economy and subsequent development of systems of local government were also a result. William Rogers, an 18<sup>th</sup>-century migrant to Virginia from Pennsylvania, "testified to the way the quest for good land also produced a landscape of economic competence and family settlement".<sup>2</sup>

At the local level, a substantial portion of trade in Alexandria between the 1720s and 1750s was controlled by foreign traders and businessmen from Scotland, which included most of the tobacco trade in Virginia between 1740 and 1770. Local planters were aware of changes and fluctuations in international demand and tailored their growth operations to reflect the market. Virginia and Maryland planters shifted their crops from tobacco to wheat around the mid-18th century in response to price and demand fluctuations in Europe. An example of demand fluctuations in Europe can be seen in the 1760s, when insufficient wheat harvests in the Mediterranean caused Alexandria to become a global leader in wheat production and export between Great

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<sup>1</sup> Bushman, 2001.

<sup>2</sup> Hofstra 2001, 459.

Britain and the American colonies.<sup>3</sup> Early development of the colonies was a result of this supply and demand-based trade relationship with Great Britain. As this relationship changed, so would the colonial landscape.

Maritime trade and the economy in the 18<sup>th</sup> century were synonymous, especially when it came to trade with Great Britain and the colonies. The use of ships was vital in transporting goods, people, and communications between the two continents. The local Alexandria economy was heavily dependent on ships and maritime trade which influenced waterfront development. Surviving trade records indicate that Alexandria's continued economic success relied on the exports of agricultural products like tobacco, wheat, flour, and corn. Also important was the local sale of imported household goods, artisan's tools, hardware, and dry goods from Europe and the West Indies, and sewing tools from Great Britain.<sup>4</sup>

Great Britain profited immensely from trade with the colonies due to the Navigation Acts, which channeled American commerce through Great Britain. The Navigation Acts were first enacted in 1651 and designed to promote and regulate English ships, trade, and commerce between England, its colonies and everyone else.<sup>5</sup> British commodities imported into the colonies began to attain cultural significance in local communities; they defined social status in relation to these foreign commodities. The ability to purchase higher priced foreign goods indicated a level of disposable

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<sup>3</sup> Williams, 2000.

<sup>4</sup> *Ibid*, 34.

<sup>5</sup> Reeves 1792, 579.

income; locally produced wooden dishes and homespun clothes were replaced by store-bought imported goods.<sup>6</sup>

In 1780, Alexandria became a separate port of entry for goods imported to Virginia.<sup>7</sup> An argument can be made for the direct impact of consumer demand on the urban landscape of the region. To accommodate the increase in imported goods and in services being offered, there was a need for centrally located market areas, stores, warehouses, and wharves to carry goods to and from ships. The increase in imported goods and range of choice is evident in advertisements from the period. An example from the *New York Journal* in the 1720s shows less than 15 items per month were advertised for sale. In contrast, listings for over 9,000 different manufactured goods were in a single month's published advertisement by the 1770s. Advertisements for various goods and services for Virginia and Alexandria are seen in the *Virginia Journal* and *Alexandria Advertiser* from 1784. These advertisements offered services from various artisans like tailors, bakers, and painters.<sup>8</sup> Alexandria was one of the top 20 busiest ports in the United States by 1791, and by 1795 there were approximately 1,000 vessels entering its port annually.<sup>9</sup> This increase in commercial prosperity directly affected Alexandria's development initiatives. The dynamic processes effecting the landscape changes are not localized to economic forces. Political developments directly influenced the economy and social environments drastically after mid-century.

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<sup>6</sup> Breen 2001, 468.

<sup>7</sup> Rothgeb 1975, 15 cited in Engineering Science Inc. 1993, 30.

<sup>8</sup> Virginia Journal and Alexandria Advertiser. 1784-1789, cited in Williams 2000, 29.

<sup>9</sup> Rothgeb 1975, 15 cited in Engineering Science Inc. 1993, 30.

## Political Development

Politics fueled changes in the economy and in turn fueled changes in development of the waterfront of 18<sup>th</sup>-century Alexandria. Between the 1760s-1770s, economic factors triggered a shift in the political relationship between Great Britain and the colonies. The increase in trade taxes and tightening of laws associated with the Navigation Acts in 1764 bred an environment of frustration and anger throughout the colonies. The Stamp Act, passed by British Parliament on March 22, 1765, imposed a tax on all printed paper used including “ship’s papers, legal documents, licenses, newspapers, other publications, and even playing cards”.<sup>10</sup> This act was one of the first seen by colonists as a “direct attempt by England to raise money in the colonies without the approval of the colonial legislatures”.<sup>11</sup> This taxation of goods without colonial consent set the tone for colonial protests. The Boston Tea Party is probably the most famous example of these protests, where on December 16<sup>th</sup>, 1773, the ‘Son’s of Liberty’ group protested Britain’s taxation on tea by throwing 342 chests of British tea into the harbor in Boston, Massachusetts.<sup>12</sup> The colonists were utilizing British imports to protest the crown and foreign imported goods took on a new symbolic meaning. They had previously represented a high social status in local communities, and now they provided a language of revolution.<sup>13</sup>

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<sup>10</sup> Burgan 2005, 4.

<sup>11</sup> *Ibid.*

<sup>12</sup> Carp, 2010.

<sup>13</sup> Breen 2001, 471.

There was a social transformation at this time; the private consumer acts of individual households became public political statements. Between 1764 and 1765 there was a non-importation movement where urban colonists promoted the non-importation of British goods, attempting to force the British to repeal the Stamp Act and other unfair taxation policies.<sup>14</sup> At the local level we see evidence of Alexandrian's frustration with unfair British taxation with the approval of the Fairfax Resolves of 1774, written by George Mason and George Washington, in which they call for an end to the trade relationship with England.<sup>15</sup> This movement was rooted in economic and political motives and simultaneously impacted the social and cultural landscape of the colonies. Colonists were drawn together in support of this cause and attempted to reverse patterns of consumption that had been prevalent since the 1740s. They strived to be more self-sufficient and rely less on imported goods. In December 1774, James Lovell explained to his friend Joseph Trumbull, "The country seems determined to let England know that in the present struggle, commerce has lost all the temptations of a bait to catch the American farmer".<sup>16</sup>

During the Revolutionary War, Alexandria's residents provided two companies of men for the local militia and made attempts to secure their own boarders in 1775 with shore batteries and a small flotilla to protect their harbor.<sup>17</sup> During this period, Alexandria underwent political changes including the 1779 Act of Incorporation which

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<sup>14</sup> Raphael, 2001.

<sup>15</sup> Washington and Mason, 1774.

<sup>16</sup> Jensen 1968, 486.

<sup>17</sup> City of Alexandria 2017, 24 May.



replaced Alexandria's Board of Trustees with a council system and an elected mayor.<sup>18</sup> The town undertook improvement activities like extending and paving streets and increasing real estate development which affected the geography of the city and its population. This increase in population, from 2,874 in 1790 to 4,971 residents by 1800, led to more housing and commercial structures being constructed.<sup>19</sup> A petition by George Washington in 1791, for the relocation of the nation's capital to a city along the Potomac, put Alexandria in the running.<sup>20</sup> These development initiatives are indicative of attempts to improve the look and functionality of the city to increase its chances of being chosen. A visitor to the town in 1788, Brissot de Warville wrote:

“Alexandria...is now, indeed, smaller than Baltimore but plans to surpass her...At the end of the war the people of Alexandria imagined that the natural advantages of their situation, the salubrity of the air, the depth of the river channel, and the safety of the harbor, which can accommodate the largest ships and permit them to anchor close to the wharves, must unite with the richness of the back country to make their town the center of a large commerce. In consequence they are building on all sides, they have set up superb wharves and raised vast warehouses.”<sup>21</sup>

In 1791, the District of Columbia was chosen as the new capital, and boundary markers were placed, officially incorporating Alexandria into the new federal city by 1801.<sup>22</sup>

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<sup>18</sup> City of Alexandria 2017, 24 May.

<sup>19</sup> Williams 2000, 34.

<sup>20</sup> *Ibid*, 89.

<sup>21</sup> Harrison, 1964 cited in Claypool and Johnston 2014, 5.

<sup>22</sup> Shuster, 1909.

These political processes, fueled by economic trends, had the largest impact on landscape change at both the local and regional levels. The evidence provided above explains the second phase of major expansion 1780s, and a third phase of expansion in the 1790s with Alexandria's desire to be included in the nation's capital.

While tracking both the political and economic changes throughout the 18<sup>th</sup> century it is important to consider the movement of people into the area. One of the largest drivers for urban development is population growth, and Alexandria's population during the 18<sup>th</sup> century was expanding just like its landscape.

### **Population Trends**

Around the second quarter of the 18<sup>th</sup> century, there were population increases due to settlements moving northward and westward along the Potomac, where those looking to profit from farming and trade sought out land well-suited for agricultural production. According to population censuses taken in the colonies and states during the colonial and pre-federal period, Virginia's population grew from an estimated 180,400 people to 339,700 between 1740 and 1760 and jumped to 538,000 by 1780.<sup>23</sup>

Research into population trends at the local level in Alexandria was first conducted by T. Michael Miller, a historian for the Historical Society of Alexandria. Miller compiled newspapers, property records, city directories, census records, published works, and unpublished studies to estimate Alexandria's population between 1780 and

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<sup>23</sup> United States Census Bureau, 1975. Population estimates at the regional or state level were taken from census records.

1800.<sup>24</sup> Dr. James Munson, a historian specializing in Alexandria's history, used Miller's compiled records to estimate Alexandria's population size prior to 1780. Munson calculated population size was based on the average dwelling occupancy and the total dwelling count recorded annually.<sup>25</sup> In 1749/1750, around the time of the town's founding, Munson estimated about 30 extended family groups were residing in Alexandria<sup>26</sup>, and the estimated population of the town was 186 people including slaves.<sup>27</sup> By 1760, the population had increased to an estimated 310 people. This growth rate of 6.6% between 1750 and 1760 falls within the average growth rate of Virginia during this period. Between 1770 and 1777, approximately 54 people immigrated to Alexandria, and by 1780, nearly five times as many people came to call Alexandria their home as the population increased to 1,259 people.<sup>28</sup>

The significant population jump in the 1780s can be explained by the expansion of the city limits in 1786 to include the county of Fairfax. Political factors drove population growth as well, with many northern migrants fleeing south to Alexandria during the Revolution to avoid the British. By 1790, the total population of Alexandria was estimated to be 2,748 people, including free African Americans and 543 slaves.<sup>29</sup> This roughly matches the population approximation of a visitor to Alexandria in 1790, who wrote,

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<sup>24</sup> Miller, 2016.

<sup>25</sup> Munson 1984, 163 quoted in Williams 2000, 163.

<sup>26</sup> *Ibid*, 163.

<sup>27</sup> Williams 2000, 27. The equation used to estimate rough populations numbers by Munson, used a multiplier of 6.2 to calculate the dwelling size.

<sup>28</sup> Munson 1984, 163.

<sup>29</sup> United States Census Bureau, 1975.

"Alexandria, is now thriving rapidly...the situation of the town will' soon make it a very important post...there are about 3,200 inhabitants; the houses are principally brick; the streets are not paved and being of clay, after rain they are so slippery it is almost impossible to walk in them".<sup>30</sup>

The northern migrants fleeing to Alexandria included merchants and shipbuilders from Philadelphia, and due to this influx of knowledgeable shipwrights, by 1790, the Potomac River shipyards had "more marine artisans than any other river on the East Coast".<sup>31</sup> By the 1800s, the population had increased 80% to 4,971 people, but growth rates would begin to slow into the new decade.<sup>32</sup> The population ratio between white and African American residents also shifted, with a significant decline in white residents and the population of Alexandria's free African American population almost doubling between 1800 and 1812.<sup>33</sup> This shift in demographics directly affected the economy, influencing occupation trends and development.

### **Urban Development and Landscape Transformation**

Alexandria experienced steadily increasing rates of population and economic growth since its founding in 1749. These changes were accompanied by increased urbanization and expansion of the landscape. When early traders petitioned the Virginia General Assembly for the right to establish a town in October of 1748, the original town

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<sup>30</sup> Smith 1917, 62-63, in Shomette 1985, 83.

<sup>31</sup> Williams 2000, 39.

<sup>32</sup> Williams 2000, 66.

<sup>33</sup> *Ibid.*

boundaries included sixty acres, two public landings (Point West and Point Lumley), and nine streets.<sup>34</sup> In May of 1749, the petition was accepted, and the town of Alexandria was created.<sup>35</sup> By July of 1749, the town was organized into eighty-four half acre lots by the Board of Trustees, which included the traders who petitioned the Virginia General Assembly and other wealthy businessmen. The original Board of Trustees included: Thomas Lord Fairfax, William Fairfax, George Fairfax, Richard Osborne, Lawrence Washington, William Ramsay, John Carlyle, John Pagan, Gerrard Alexander, Hugh West, and Philip Alexander.<sup>36</sup> Construction of the town began in the northeastern section and moved along the waterfront.<sup>37</sup> The original streets of Alexandria included Oronoko Street, Princess Street, Queen Street, Cameron Street, King Street, Prince Street, and Duke Street running east to west; and Royal Street, Fairfax Street, and Water Street (now Lee Street) running north to south.<sup>38</sup> This land was put up for sale shortly after its organization and the purchasing records indicate lots changed hands quite frequently but only between the original trustees and their families. Only 5 of the original 84 lots of Alexandria were owned by new settlers of the town by the 1790s.<sup>39</sup>

The town experienced slow infrastructure development at first; in 1749, there were 33 recorded buildings and only four new buildings were added the following year.<sup>40</sup> A local historian quoted a visitor to the area in 1750 as saying "signs of

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<sup>34</sup> Brockett and Rock 1888, 7 and Riker, 2008a.

<sup>35</sup> Riker, 2008b.

<sup>36</sup> Brockett and Rock 1888, 7.

<sup>37</sup> Williams, 2000.

<sup>38</sup> Washington, 1749. Map.

<sup>39</sup> Alexandria City Records. Hustings Court 1791-96, 179 in Williams 2000, 25.

<sup>40</sup> Munson 1984, 163.

development are few and indicate slow growth rate"... "urban development proceeded very slowly".<sup>41</sup> By 1754, the total building count was brought to 44 buildings. At the beginning of the new decade in 1760, there were a total of 50 buildings and the town had grown by 15 acres.<sup>42</sup> The town Trustees dictated that all owners of riverfront lots were entitled to build on and improve lots for their own personal use.<sup>43</sup> This would prove a pivotal turning point in Alexandria's development and the expansion of the waterfront.

Through the comprehensive analysis of economic, political, and population history for the region and Alexandria locally, it is evident that these processes contributed to the urban landscape development of the Alexandria waterfront in the mid-18<sup>th</sup> and early 19<sup>th</sup> centuries. In the following chapters, historic shipwrecks and structures are analyzed within a spatial and temporal context to reveal the land expansion processes that look place to transform the Alexandria shoreline into the modern waterfront district seen today.

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<sup>41</sup> Carne 1983, 130-31 in Cressey, n.d.

<sup>42</sup> Munson 1984, 163 quoted in Williams 2000, 26.

<sup>43</sup> Minute of the Trustees quoted in Williams 2000, 26.

## CHAPTER II

### HISTORIC SHIPS AND STRUCTURES

Past historians and GIS experts have tracked the expansion of the waterfront using historic maps.<sup>44</sup> When beginning the analysis of urban development and specifically the expansion of the waterfront, historic maps provided an adequate starting point but were not enough. There were large gaps in detailed shoreline representations, specifically for the period of greatest expansion between 1763-1798.

The discovery of the ships at the sites of Hotel Indigo and Robinson Terminal South provided the opportunity to track the expansion at a smaller temporal scale while delving deeper into the method of shoreline expansion. Concentrating the spatial analysis to the Old Town area of Alexandria allowed for a narrowed focus on specifically urban development, which includes all land under residential, commercial, and industrial uses (including streets). Alexandria did have non-urban areas including agricultural and other developable open spaces; this type of land was omitted from the analysis of urban development trends due to the underrepresentation of surrounding non-urban areas in historical maps and the spatial focus of this study to the urban center and waterfront district.

The Old Town area of Alexandria has been the urban city center since its founding in 1749 and many of the historic sites within the boundary are included on the National Register of Historic Places.<sup>45</sup> This area has a dense concentration of historic

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<sup>44</sup> Shomette, 1985, Shephard, 2006.

<sup>45</sup> City of Alexandria 2017, 26 August.

structures, sites, and both small and large artifacts that are key to understanding the city's history. The city has excavated more than 70 sites within the Old Town boundary and report that "...virtually all properties contain artifacts. Excavation of a typical townhouse backyard yields approximately 25,000 artifacts. If the yard also contains a trash-well or privy, this number of artifacts doubles".<sup>46</sup> The abundance of archaeological material and historic structures in this area makes the analysis of the town's development that much easier. The historic structures were included in the analysis to further pinpoint sections of waterfront expansion. The inclusion of streets seen in the maps and records and their creation and extension through time were utilized in the GIS as borders for the town's boundary. This allowed the expansion to be tracked in all cardinal directions.

The four shipwrecks and historic structures such as buildings and wharves are snapshots in time and space. Looking at the establishment of wharves and warehouses can yield information about economic and trade trends because of their use to store goods along the waterfront. The construction of religious structures and government buildings can yield information about political and cultural development in the area.

The town of Alexandria was settled on high banks of the Potomac River between two inlets, West's Point and Point Lumley.<sup>47</sup> In 1749 the banks were between fifteen and twenty feet above the river, which was only around five feet (1.5 meters) deep at the shoreline and extended to forty-eight feet (14.6 meters) deeper into the channel. A

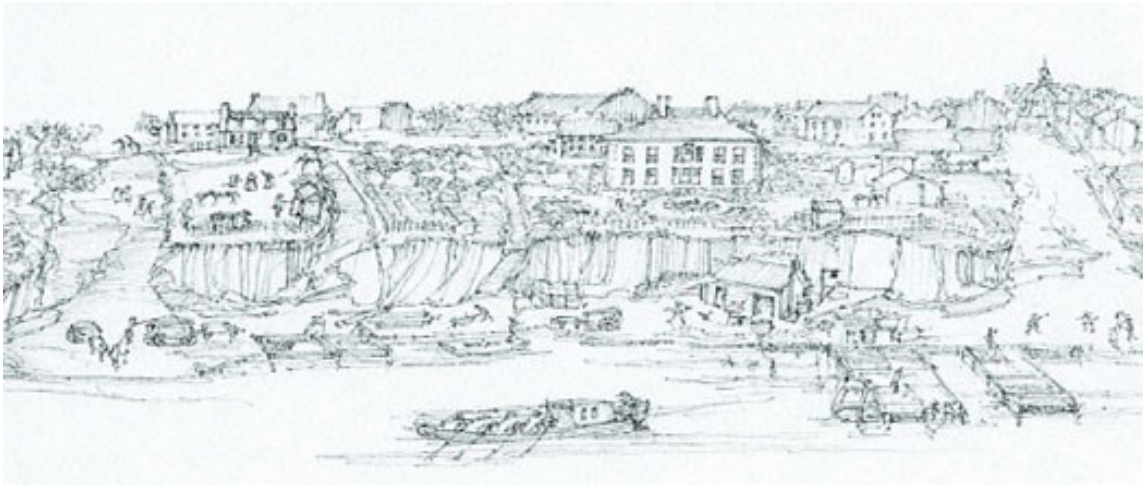
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<sup>46</sup> City of Alexandria 2017, 26 August.

<sup>47</sup> Pulliam 2008, 1.



drawing illustrates an interpretation of the landscape prior to shoreline development depicting the high bluffs of the waterfront (Figure 1).<sup>48</sup>



**Figure 1.** Interpretive illustration of the Alexandria waterfront as it might have appeared ca. 1760 to 1775, prior to shoreline expansion and development. Courtesy of Alexandria Archaeology, drawing by Elizabeth Luallen 2016.

Two creeks sat to the north of the town, Great Hunting Creek and Ralph's Gut, which was a seasonal creek that flowed to a point at the intersection of present-day Cameron and St. Asaph Streets channel.<sup>49</sup> In 1732, a tobacco warehouse and inspection station were established at West's Point in Ralph's Gut in response to calls by the Virginia legislature for inspection stations to be built along major tributaries to ensure quality tobacco export to Britain.<sup>50</sup>

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<sup>48</sup> Shephard 2006, 2.

<sup>49</sup> City of Alexandria 2015, 29 January.

<sup>50</sup> Riker 2008b, 5.

The development of commercial structures like these within the next decade along the Alexandria waterfront indicates the increasing reliance and importance of shipping and maritime trade that necessitated the expansion of the harbor.<sup>51</sup> The shallow depth of the 1748 shoreline meant that larger ships with a deep draft could not anchor close to shore without running aground. Commercial vessels would have relied on smaller boats to ferry goods to and from the shore which would have significantly increased time and cost for merchants. By building out the shorelines and constructing wharves, which extended into deep water, the import and export of goods became more efficient as the large merchant vessels could dock closer and transport their goods along the wharves to warehouses.

The 18<sup>th</sup> century Alexandrians chose to expand their waterfront eastward toward the Potomac and drastically alter the maritime landscape of the Alexandria waterfront. They knocked down the high bluffs of the crescent bay along the river and dumped it at the edge of the river to create artificial land.<sup>52</sup> This process was known as “banking out”.<sup>53</sup> Those who owned waterfront lots were given permission by the Alexandria Trustees to create new land and retained ownership of any new land created.<sup>54</sup>

There were two main methods for banking out the Alexandria shoreline, including building wharf structures that reached out into the channel and building

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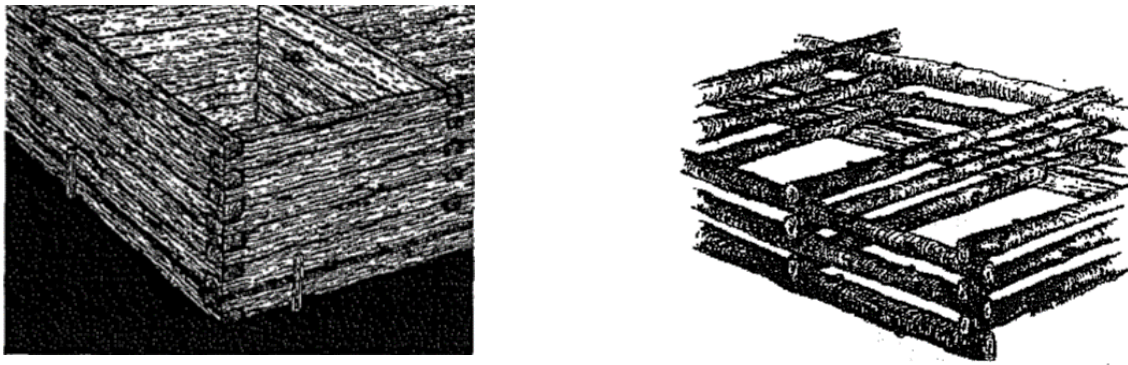
<sup>51</sup> Shomette 1985, 78.

<sup>52</sup> Virginia Journal and Alexandria Advertiser, Sept. 15, 1785, in Riker 2008a, 5.

<sup>53</sup> Pulliam 2008, 1.

<sup>54</sup> Alexandria, Virginia. Proceedings of the "Board of Trustees Town of Alexandria, Virginia, 1749-1767. Library of Congress, Washington, D.C: photostatic copy, 34.

parallel structures or bulkheads which were filled in using dirt and debris.<sup>55</sup> These two methods utilized cut and un-milled timbers to build the wharf structures, in addition to using old ships as premade bulkheads.<sup>56</sup> The drawings below illustrate the cut or un-milled timbers were stacked in an interlocking framework using either a crib or cobb configuration and then filled with stones, dirt, or wood (Figure 2).<sup>57</sup>



**Figure 2.**(A) Illustrated example of a crib wharf structure, (B) illustrated example of a cobb wharf structure. Reprinted from Heintzelman-Muego, 1983.

Ships were purposely sunk or broken apart and used in the creation of the bulkhead walls or as additional foundation for artificial land construction.<sup>58</sup> Historic records and archaeological material provide evidence for the banking out process and indicate the crescent bay section of shoreline was filled in by the end of the 18<sup>th</sup>

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<sup>55</sup> Shephard 2006, 4.

<sup>56</sup> Skolnik 2018, 7.

<sup>57</sup> Shephard 2006, 4.

<sup>58</sup> Riker, 2008a.

century.<sup>59</sup> Further expansion and construction continued into the 19<sup>th</sup> century and resembles the modern shoreline seen today. Using ships for artificial land construction is not a unique concept to the Alexandria waterfront. As far back as Egypt during the twelfth dynasty, ship timbers were reused at Lisht as foundations to facilitate the construction of the pyramid of Senwosret I.<sup>60</sup> As early as the 17<sup>th</sup> century the Royal Navy in England used ships as breakwaters and foundations for artificial land; they sunk over 48 vessels for foundations of harbor extensions at Plymouth, Portsmouth, Sheerness, Harwich, Bermuda, and Jamaica.<sup>61</sup> One of the more recent discoveries providing evidence for ship reuse is the World Trade Center shipwreck found beneath the World Trade Center in New York City. This ship, dated to the late 1770s and the 1780s, is also believed to have been used in artificial land construction.<sup>62</sup> As development continues in urban centers like New York and Alexandria, the engineering feats of the past will continue to be unearthed and shed light on construction methodology and the lengths communities went to shape the landscape to their needs.

### **Historic Ships**

Four ships were discovered in the waterfront district of Alexandria between 2015 and 2017 during the construction of a hotel (2015) and new condominiums (2017). Construction was halted to further research and excavate the sites because of Alexandria's Protection Code which is designed to protect and preserve archaeological

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<sup>59</sup> Shephard 2006.

<sup>60</sup> Creasman 2013, 169.

<sup>61</sup> Shomette 1985, 81.

<sup>62</sup> AKRF, Inc. 2013, S-2.

sites discovered within the city limits.<sup>63</sup> The first ship discovered, the 220 S. Union Street Ship (Feature 53), was found under the Hotel Indigo Site in the historic downtown district.<sup>64</sup> Three other ships were unearthed at the Robinson Terminal South Site, labeled RTS Ship #1 (Feature 200), RTS Ship #2 (Feature 155), and RTS Ship #3 (Feature 159).<sup>65</sup> The 220 S. Union Street Ship remains were excavated in 2015 and 2016 by the City of Alexandria, Thunderbird Archaeology, and researchers from the Naval History and Heritage Command.<sup>66</sup> The RTS Ships were discovered in 2017 and subsequently excavated by the City of Alexandria and Thunderbird Archaeology.<sup>67</sup>

The 220 S. Union Street Ship (Feature 53) remains measure 46.5 feet (14.17 m) long by 12.5 feet (3.81 m) wide.<sup>68</sup> The vessel was cut in half along the keel, preserving the stem, and portions of the starboard floors, first and second futtocks, a small portion of exterior sacrificial planking, and some ceiling planking, extending just beyond the turn of the bilge. Site photographs show that iron fasteners, treenails, and caulking were also found in the remains (Figure 3).<sup>69</sup>

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<sup>63</sup> City of Alexandria 2017, 27 September.

<sup>64</sup> City of Alexandria 2019, 26 February.

<sup>65</sup> City of Alexandria 2018, 25 April.

<sup>66</sup> City of Alexandria 2016, 23 February.

<sup>67</sup> City of Alexandria 2019b, 9 March.

<sup>68</sup> Skolnik 2018, 6.

<sup>69</sup> *Ibid.*, 6.

(A)



(B)



(C)



**Figure 3.** (A) Archaeologists from Thunderbird Archaeology and Alexandria Archaeology excavating the 220 South Union Street Ship, (B) Deconstructing the ship and removing the apron from the keel. (C) Photo of the planking and wooden fasteners. Photos courtesy of Alexandria Archaeology.

The remains of the stern are missing, though detailed analysis of the remains and examination of ships lines from the period allowed researchers at Texas A&M University's Conservation Research Laboratory and Ship Model Laboratory to digitally reconstruct the vessel and create a model interpreting what the vessel looked like when it was complete. The reconstruction of the complete vessel approximates the total length to be 70 feet and 6 inches (21.48 m) in length, and 64 feet (19.50 m) between the perpendiculars.<sup>70</sup> Evidence for when the ship was used in the banking out process can be narrowed down to a ten-year period between 1788 and 1789 using historic court records.<sup>71</sup> The records show there was a lawsuit in 1788 associated with the eastern boundary of Lot 69 where the ship was discovered and the plat submitted with the lawsuit indicated this area was still underwater in 1788 (Figure 4).<sup>72</sup> According to the historic map created by George Gilpin and georeferenced for this analysis, the lot was filled in by 1798.<sup>73</sup>

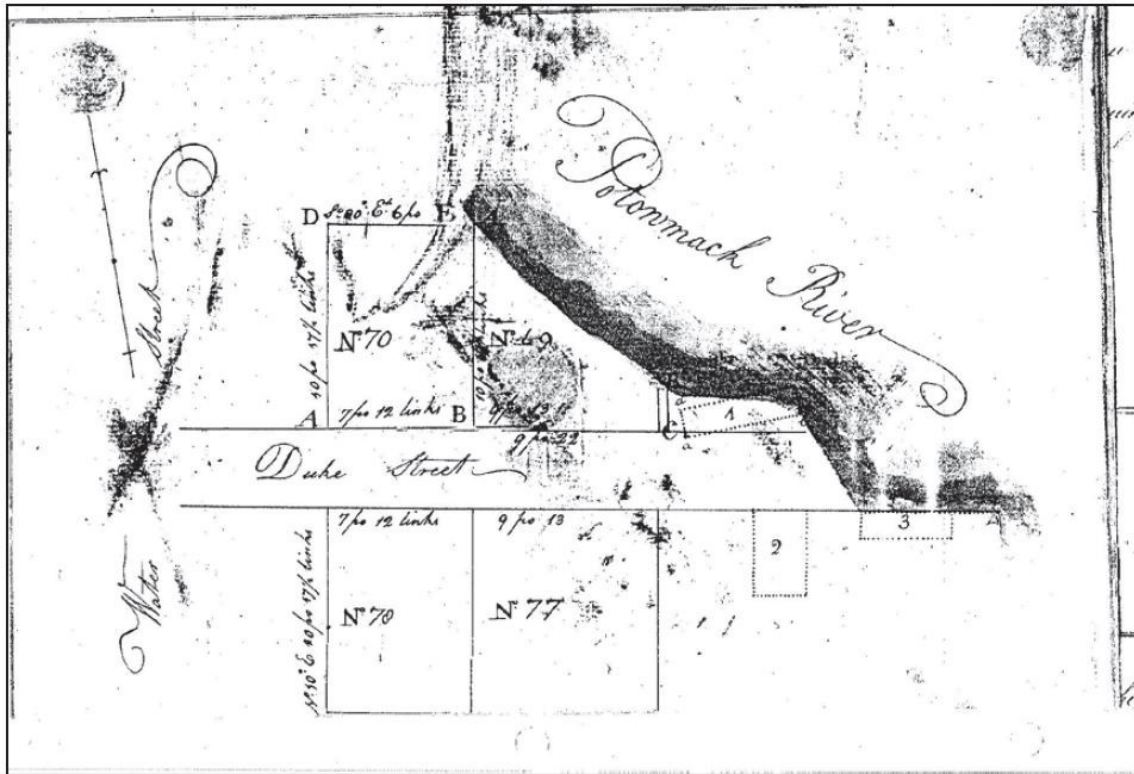
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<sup>70</sup> Dostal, Grieco, and Fix, 2019.

<sup>71</sup> Skolnik 2018, 6.

<sup>72</sup> *Ibid.*

<sup>73</sup> Gilpin, Clarke, and Thomas, 1798. Map.



**Figure 4.** Map of Alexandria Lot 69 associated with 1788 lawsuit. Reprinted from Ring, 2009.

The Robinson Terminal South Ships were discovered at the site of the Robinson Landing development project.<sup>74</sup> Excavation of this area began in early 2017, and along with the three ships discovered, other late 18<sup>th</sup>- and early 19<sup>th</sup>-century structures were unearthed including: warehouses, wharves, cribbing, the strand (an early waterfront sidewalk which lined the 1790s waterfront), and other buildings indicative of commercial activities.<sup>75</sup> These ships and structures fall into the same deposition date

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<sup>74</sup> Skolnik 2018, 7.

<sup>75</sup> *Ibid*, 7.



range as the 220 S. Union Street Ship; they were buried by the late 18<sup>th</sup> century. RTS Ship #1 (Feature 200) is situated to the north of the other two RTS ships and was discovered in early March under the remains of the 1852 Pioneer Mill foundation. The remains are sitting slightly tilted, in an east-west orientation, perpendicular to the shoreline.<sup>76</sup> Unlike the 220 S. Union Street Ship, these remains indicate it was fastened at the stern to a wharf structure, solidifying the theory that it was used to bank out the shoreline. The remains of the ship include: frames, port and starboard sections, iron fasteners, some hull and sacrificial planking, keel and keelson, and sections of the bow stem and stern. In total, the remains measure approximately 43 feet in length (13.10 m), and although reconstructions have not been produced of the vessel, it is approximated to been 55 feet (16.76 m) in length.<sup>77</sup>

The RTS Ship #2 (Feature 155) was also discovered in March, southeast of RTS Ship #1 and closer to the Potomac river. The ship is situated parallel to the shoreline and the remains show that it was disassembled like the 220 S. Union Street Ship and cut along the keel (Figure 6). The remains include: keel, keelson, planks, frames, sections of the bow stem and stern, iron fasteners, and treenails.<sup>78</sup> The remains measure to 46 feet (14.02 m) long and 12ft 6in (3.81m) wide. Associated structures for this ship include a stone warehouse foundation north of the ship and a wharf structure to which the ship had been secured to with iron fasteners (Figure 5).<sup>79</sup>

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<sup>76</sup> City of Alexandria 2019b, 1 February.

<sup>77</sup> *Ibid.*

<sup>78</sup> Skolnik 2018, 9.

<sup>79</sup> City of Alexandria 2019b, 1 February.



**Figure 5.** Image of RTS Ship #2 (Feature 155). Courtesy of Alexandria Archaeology.

The RTS Ship #3 (Feature 159) is the furthest east of the three ships, resting beneath Wolfe Street at an incline. The bow is facing the historic shoreline to the west and angled downward with the stern sitting eastward preserving the historic slope of the seabed. Due to its size and positioning along the seabed, it was likely drug up to the historic shoreline and sunk. This indicates that it may have been the first infilling structure this far east into the river during this period.<sup>80</sup> Due to preservation processes and lack of disassembly prior to use as fill, both port and starboard sides are intact. The

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<sup>80</sup> Skolnik 2018, 9.

ship remains also include the bow section, hull planking which appears to be thicker than the other three ships, and iron and wooden fasteners. At the time of writing, the ship has been excavated and is currently in wet storage awaiting conservation. The remains of the ship, visible during excavation in the image below and not including the stern section, measured to 50 feet (15.24 m) long and 25 feet (7.62 m) wide, significantly larger than the other three vessels (Figure 6).<sup>81</sup>



**Figure 6.** Image of RTS #3 (Feature 159). Courtesy of Alexandria Archaeology.

All four ships exhibit similar construction features, including the use of iron and wood fasteners, and tightly spaced floors and futtocks. The similarity in construction of all the ships and similarity to recorded ships lines from other vessels from the period

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<sup>81</sup> Skolnik 2018, 6.

supports the hypothesis that these four ships were from built and utilized during the 18<sup>th</sup> century.<sup>82</sup> The utilization of these ships to bank out the shoreline to the east acted as the foundation for the city's waterfront expansion. Images of the remains show the three RTS ships were notched and secured to wharf structures indicating their purpose was to contain the infill of the wharf, while the 200 S. Union Street Ship was found next to a bulkhead wall (Figure 7).

(A)



(B)



**Figure 7.** (A) Remains of bulkhead wharf associated with 220 South Union Street. (B) Remains of wharf structure bolted to RTS Ship #2. Courtesy of Alexandria Archaeology.

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<sup>82</sup> Chapelle, 1935.

All four ships were dated using dendrochronology, a method for dating wood that involves the analysis of tree ring growth. Based on the principle that trees grow one ring each year, the tree rings in a wood sample are measured, assigned a calendar year, and dated.<sup>83</sup> The researchers at the Oxford Tree-Ring Laboratory in Baltimore, Maryland conducted dendrochronological analysis on the wood from the 220 S. Union Street Ship and were able to determine the year and region in which the sample was harvested. The ship's timber was harvested during the early to mid- 18<sup>th</sup> century, around the 1740s/1750s.<sup>84</sup> This date indicates when the timber for the ship was felled, meaning the ship was built sometime after that date. They were also able to narrow down the region in which the timber grew to New England, most likely Massachusetts where there was a large shipbuilding industry during this period.<sup>85</sup> Dendrochronological samples have been submitted for the wharf structures and three ships at the Robinson Terminal South site to narrow down their temporal and spatial origin as well; at the time of writing the results were not available. Excavation and documentation were completed by Alexandria Archaeology, Thunderbird Archeology, EYA LLC., the Maryland Archaeological Conservation Laboratory, and the Navy's Maritime History and Heritage Command.<sup>86</sup>

### **Historic Sites and Structures**

Through the latter half of the 18<sup>th</sup> century, Alexandria underwent several types of development including the construction of new streets, maritime structures like wharves,

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<sup>83</sup> Time Team America, 30 January 2013.

<sup>84</sup> Worthington and Seiter, 2016.

<sup>85</sup> *Ibid.*

<sup>86</sup> City of Alexandria 2016, 23 February.

residential and commercial buildings.<sup>87</sup> Mapping this development began with first identifying where these historic sites and structures were and when they were constructed, and then placing them spatially within the geodatabase.

The maps georeferenced for this analysis were drawn with labeled streets except for the 1748 map. Using the streets to georeference and plot expansion proved useful in tracking the town's development. The 1749 shoreline from George Washington's map, shown below, along with the original ten streets (Royal, King, Queen, Prince, Princess, Duke, Water, Fairfax, Cameron, and Oronoko) comprise the 1749 town boundary for Alexandria (Figure 8).<sup>88</sup>



**Figure 8.** A Plan of Alexandria, now Belhaven, 1749 map illustrated by George Washington. Reprinted from Library of Congress.

<sup>87</sup> Shomette, 1985.

<sup>88</sup> Washington, 1749. Map.

Historical records reference these city streets when indicating new building development and the creation of new lots.<sup>89</sup> Plotting these streets within the geodatabase allowed for the recording of the town's boundary expansion in all cardinal directions, in addition to plotting historical sites and structures more accurately.

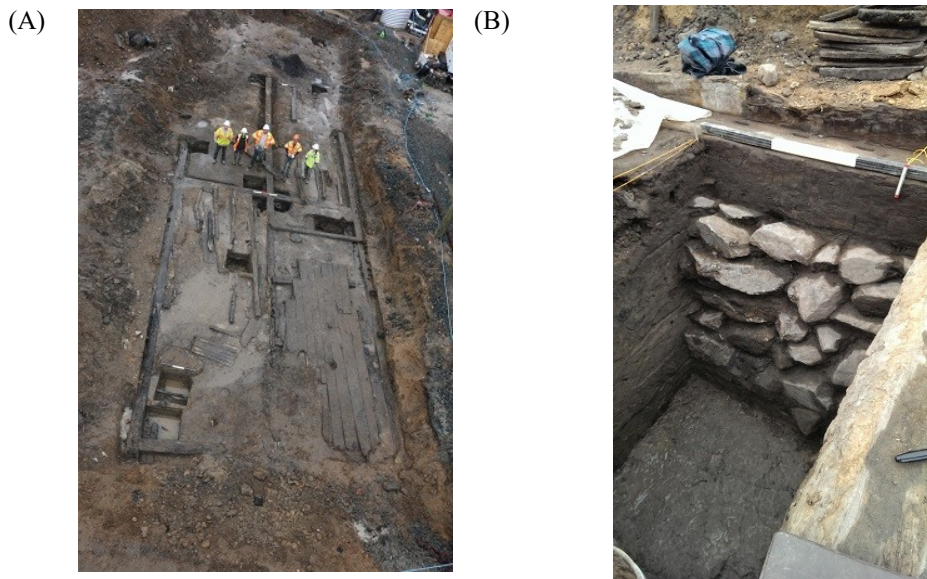
During the decade that followed the town's founding, Alexandria saw residential and commercial development. In 1752, the Carlyle House, town hall, and the court house were built.<sup>90</sup> In 1755, a public warehouse was constructed for public use by John Carlyle, one of the town's founders, at the behest of the Alexandria Trustees and located on the north side of Duke Street, present day S. Union Street. Images of the excavation of the public warehouse, also known as the Carlyle Public warehouse show wood remains and a stone foundation (Figure 9).<sup>91</sup>

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<sup>89</sup> Carne 1983, 130-3 in Cressey, n.d.

<sup>90</sup> City of Alexandria 2018, 7 November.

<sup>91</sup> Shomette 1985, 22.



**Figure 9.** Carlyle Public Warehouse. (A) Wood remains and (B) stone foundation of this structure were discovered and excavated in November 2015 by Thunderbird Archaeology and Alexandria Archaeology. Images courtesy of Alexandria Archaeology.

A shipyard, known as Thomas Flemming’s Shipyard, was also constructed in 1755 under the bank of Duke Street, which cut through the bluff overlooking the Potomac and extended down to the water.<sup>92</sup> John Carlyle proved to be a key character in the development of Alexandria; in 1759, he built the Carlyle Dalton Landing between Cameron and King Streets. This landing extended deep into the channel allowing easier transportation of goods from ocean going vessels. The right to build the landing was again granted by the Alexandria Trustees who instructed Carlyle and Dalton to build a “good and convenient landing”, and stipulated that half of the wharf would be open for public use.<sup>93</sup> By 1759, the shoreline still retained its crescent shape, evidenced by a

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<sup>92</sup> City of Alexandria 2019, 11 March.

<sup>93</sup> Riker, 2008a.



firsthand account from Archdeacon Burnaby who visited Alexandria in October of 1759 and wrote, “The town is built upon an arc of this bay; at one extremity of which is a wharf; at the other a dock for building ships, with water sufficiently deep to launch a vessel of any rate or magnitude.”<sup>94</sup> He described the bay as still being a crescent shape, and not fully “banked out” yet. He also described only one wharf, presumably Carlyle Daltons Landing as being present at one extremity, possibly Point Lumley.

The development drastically increased after 1759 and by the 1760s, Alexandria’s position as a bustling seaport had been established and various merchants and craftsmen were operating in the town. Craftsmen such as coopers, tailors, bakers, weavers, shipwrights, and their families made up the population of the town along with other merchants and slaves.<sup>95</sup> Development and infilling of the low-lying land initiatives are documented in court proceedings from 1760, where the Alexandria Board of Trustees wrote that “every purchaser of Riverside Lotts by the terms of the sale was to have the benefit of extending the said Lotts into the River ...”<sup>96</sup> The allowance of infilling by the Trustees and the addition of two new streets in 1762 mark the first large expansion of the town boundaries and shoreline, which can be seen in George West’s map from 1763 (Figure 10).<sup>97</sup>

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<sup>94</sup> Pulliam, 2008.

<sup>95</sup> Netherton, Sweig, Artemel, Hickin, and Reed 1978, 71.

<sup>96</sup> Ring 2009, 34.

<sup>97</sup> West, 1763.

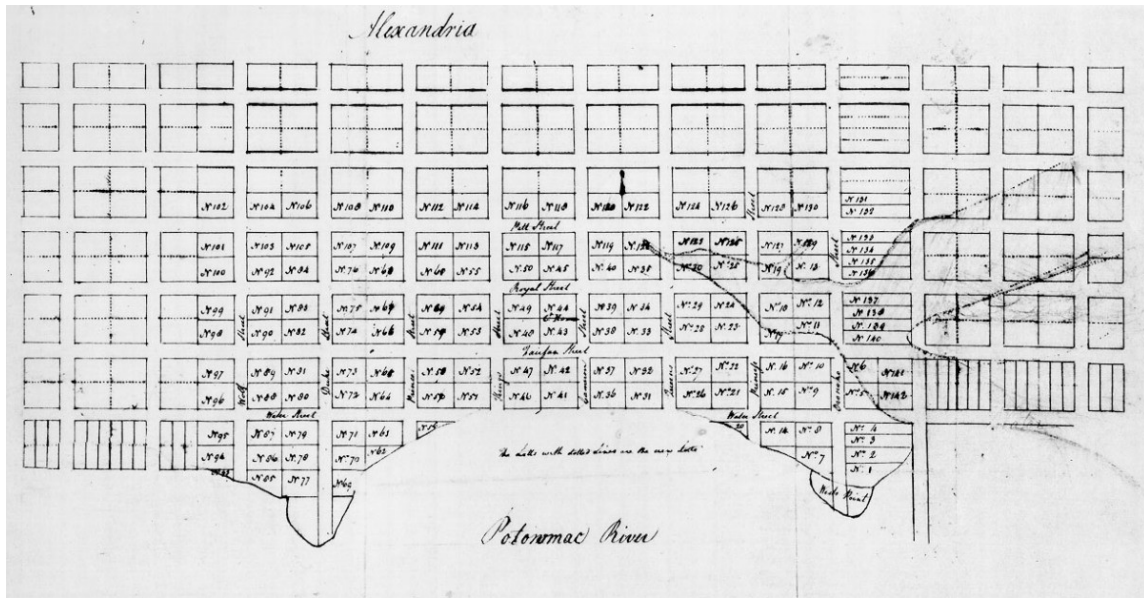


Figure 10. George West's 1763 Map. Reprinted from Library of Congress.

The shoreline expansion during this period created fifty-eight new waterfront lots, which were offered up for sale in 1763.<sup>98</sup> Public wharves at West Point and Point Lumley were still in operation, even as the low-lying land continued to be filled in.<sup>99</sup> In 1764, Kirkpatrick's Wharf was constructed after John and Thomas Kirkpatrick were granted the right to build wharves and warehouses north of Queen Street by the Alexandria Trustees.<sup>100</sup>

The act passed by the Board of Trustees allowing the expansion of the shoreline greatly encouraged landowners to develop their land, especially in the harbor area. This led to the town having numerous wharves and various commercial and industrial

<sup>98</sup> Riker, 2008a.

<sup>99</sup> Preisser, 1997.

<sup>100</sup> *Ibid.*

structures along the waterfront. Most of the archaeological evidence for waterfront development during the 1770s was discovered during the Robinson Terminal South site excavation where archaeologists unearthed a wharf structure labeled Feature 161, The Strand near the 220 S Union Street Ship and the RTS ships.<sup>101</sup> Other waterfront development during this decade included commercial structures indicative of economic processes, including a brewery and distillery.<sup>102</sup>

Feature 161, the wharf structure, is located north of Wolfe Street and runs approximately east-west and includes three bulkhead wharf structures, dated to the 18<sup>th</sup> century, that were used in the banking out process for shoreline expansion. The remains of this structure were excavated and photographed (Figure 11).<sup>103</sup>



**Figure 11.** Feature 161 Wharf Structure. Courtesy of Alexandria Archaeology. Photo by Jeff Hancock.

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<sup>101</sup> City of Alexandria 2019a, 9 March.

<sup>102</sup> Riker, 2008b.

<sup>103</sup> City of Alexandria 2019b, 9 March.

In 1770, the larger area encompassing Feature 161 called Lot 85 was sold to James Kirk, a merchant and later the Mayor of Alexandria who was responsible for the construction of a wharf and the artificial land beneath it.<sup>104</sup> The Kirk family laid out an alley prior to James Kirk's death in 1786. This alley is believed to be The Strand, a twenty-one-foot paved walkway facilitating movement along the water's edge and between wharves. Construction began in the late 1780s between Cameron and Duke Street.<sup>105</sup> Feature 161 was discovered beneath portions of this paved walkway, indicating it was used to fill in the land prior to the creation of The Strand.<sup>106</sup> Archaeological excavations of the area revealed two main walls constructed with both cut beams and unmilled logs secured in different configurations with tie backs and cross braces.<sup>107</sup> The town's western boundary was extended in 1774 with the establishment of St. Asaph's Street.<sup>108</sup> The 1780s saw significant infrastructure expansion eastward when the General Assembly of Virginia authorized the grading of Water Street and addition of Union Street in 1782.<sup>109</sup> Wharves and warehouses all along the waterfront were being constructed during the 1780s including: Ramsay's wharf (1780), Hooe's warehouse and store (1783), and Harper's wharf (1784). Remains of Hooe's warehouse and store were uncovered at 2 Duke Street in April 2017 (Figure 12). An insurance policy taken out for the building in 1796 describes the building as three stories tall, 72 feet (29.4 m) long by

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<sup>104</sup> Shephard, 2006.

<sup>105</sup> City of Alexandria 2019a, 1 February.

<sup>106</sup> Shephard, 2006.

<sup>107</sup> City of Alexandria 2019b, 9 March.

<sup>108</sup> Carne 1983, 130-31 in Cressey, n.d.

<sup>109</sup> Shomette 1985, 79-80.

44 ft. (13.4 m) wide.<sup>110</sup> Washington Street was established in 1783 and the town boundary to the west was pushed a block farther.<sup>111</sup> In 1785, Keith and Harper's wharf was constructed at the base of Franklin Street and extended 400 feet (121.92 m) into the river.<sup>112</sup> The Strand and Fitzgerald's warehouse and wharf were completed by 1789.<sup>113</sup>



**Figure 12.** Hooe's Warehouse and Store. Remains of warehouse stone foundation. Photo courtesy of Alexandria Archaeology.

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<sup>110</sup> City of Alexandria, 2019c, 9 March.

<sup>111</sup> Carne 1983, 130-31 in Cressey, n.d.

<sup>112</sup> Virginia Legislative Petitions [VLP].1785., in Artemel, J.G., Crowell, E., Hull, D. A., Knepper, D. 1988, 13.

<sup>113</sup> Riker, 2008a.

Entering the last decade of the 18<sup>th</sup> century, Alexandria underwent development to the north, south, east, and west. Between 1790 and 1791, three new wharves were constructed: Hamilton's Wharf, Gilpin's Wharf, and Roberdeau's Wharf.<sup>114</sup> In 1791 and 1792, Andrew Ellicott and his surveying team placed 40 stones at one-mile intervals to outline the perimeter between Alexandria and the District of Columbia.<sup>115</sup>

The town's boundaries saw a second wave of inland expansion with the laying out and naming of several new streets in 1796. These streets were completed and documented in 1796. Illustrated in the map below, the new streets to the north included Pendleton, Wythe, Madison and Montgomery Streets. Columbus, Alfred, Patrick, and Henry Streets were included into the town boundary to the west by 1796. Because Fayette Street, which lays to the west of these streets, was in use by 1784, the western boundary of Alexandria was not extended any further in 1796; it was simply developed to include more streets.<sup>116</sup> Payne and West Streets were established some time after 1785 and are included in the second wave of inland expansion seen by 1796. The expansion to the south included Wilkes, Gibbon, Franklin, Jefferson, and Greene Streets (Figure 13).<sup>117</sup>

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<sup>114</sup> Knepper and Prothro, 1989.

<sup>115</sup> Shuster, 1909.

<sup>116</sup> Carne 1983, 130-31 in Cressey, n.d. Streets were often laid out and named before being constructed and officially brought into the town's boundaries.

<sup>117</sup> Carne 1983, 130-31 in Cressey, n.d.



Figure 13. GIS map illustrating addition of new streets by 1796 to the North, South and West. Image by author.

Wharf construction at the turn of the century can be seen in the archaeological remains of Feature 165 and Feature 162.<sup>118</sup> These two structures were used during a final phase of colonial land expansion during the 1840s.<sup>119</sup> Both structures were built from timbers and were not associated with any ship remains. Feature 165 is a bulkhead wharf running parallel to the shore and located east of the strand, using milled timbers stacked in a “crib” construction. Feature 162 is located south of Feature 165 and does not appear to be a bulkhead wharf but instead a series of logs and tree trunks sitting perpendicular to the shoreline.<sup>120</sup> This evidence of land development into the mid-19<sup>th</sup> century indicates Alexandria was still expanding eastward.

It is evident that banking out was central to the development of the Alexandria waterfront and its establishment as a port city. The bulkhead wharves, recycled ships, and other structures used in this process provided the foundation for this city’s modern shoreline. By placing these archaeological remains and historic sites into a GIS framework, a geographical and temporal relationship can be established.

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<sup>118</sup> City of Alexandria 2018, June.

<sup>119</sup> City of Alexandria 2019a, 1 February.

<sup>120</sup> Shephard, 2006.



## CHAPTER III

### GEOGRAPHIC INFORMATION SYSTEM AND GEODATABASE

The use of Geographic Information Systems (GIS) in this study was necessary to achieve the research objective of reconstructing the maritime landscape of Alexandria. Incorporating a GIS dataset added to the research already compiled regarding Alexandria's waterfront history because it facilitated the creation of interpretive shorelines to narrow the temporal scale of expansion. Utilizing a GIS dataset also allowed the hypothesized date range for ship deposition to be focused and created a temporal visualization of expansion, which is useful when considering political and cultural influences on development.

A geographic information system organizes various datatypes with spatial components into a database for analysis and visualization, which allow the user to better understand the geographic relationships and patterns in the dataset. Spatial data can be represented within a GIS in many ways, the two most common types of spatial data are vector and raster data. Vector data are comprised of vertices and paths, represented as points (x, y coordinates), lines (connecting vertices to form a path), and polygons (connecting lines to close the path).<sup>121</sup> Raster data are comprised of pixels which are evenly spaced with each pixel having its own value.<sup>122</sup>

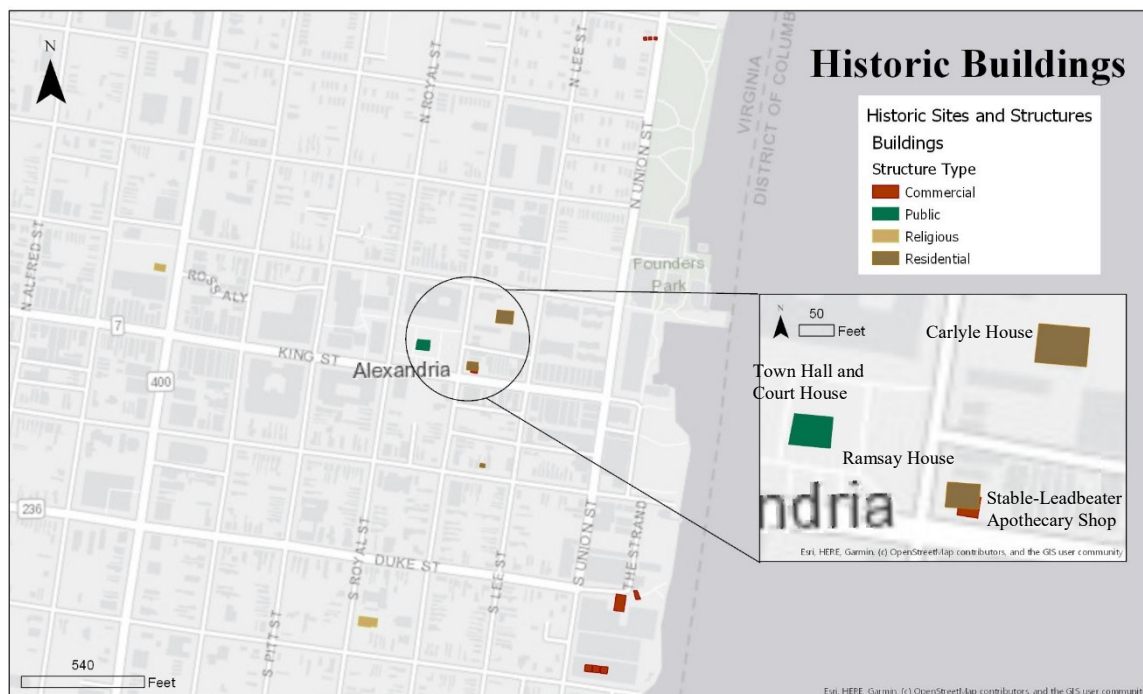
For the purposes of this analysis, the spatial data was presented in a vector data format. The vector data type was chosen because of its ability to represent multiple

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<sup>121</sup> GIS Geography, 2018, 18 February.

<sup>122</sup> *Ibid.*

datatypes (points, lines, polygons) in a single map. Each point, line, and polygon in the geodatabase represent individual features. These features are the ships, historic structures, shorelines, and town boundaries being considered for this study. Features can be organized into feature classes based on data type and theme. For example, the datatype used to represent the historic buildings are polygons, these polygons were drawn based on original dimensions found in the historic record, like Hooe’s Warehouse and Store, or based on the preserved structure, like the Ramsay House. The building polygons were organized into a group (feature class) which is represented as a layer on the map below (Figure 14).



**Figure 14.** Historic Buildings map layer. Polygon features representative of building constructed in the mid-18<sup>th</sup> and early 19<sup>th</sup> century, categorized by their structure type. Image by author, base map courtesy of Esri, DeLorme, HERE, MapmyIndia.

A map layer is like a conventional map but only represents one of the areas' characteristics or features.<sup>123</sup> In a geodatabase, these map layers are overlaid to show their spatial relationship. The geodatabase for this study was structured with the basic layering system incorporating the features, broken up by data type (point, line, or polygon), and theme (shorelines, streets, structures, and shipwrecks) into map layers. Using GIS as a tool to organize and analyze the spatial relationship between the archaeological and historical data allowed for the creation of interpretive shorelines.

Due to the complexity of placing a flat map onto a three-dimensional surface like the earth, mathematical calculations must be made to ensure the data is placed correctly and to minimize distortion.<sup>124</sup> Geographic and projected coordinate systems are used to mathematically plot spherical data onto a plane.<sup>125</sup> A geographic coordinate system defines a location on the earth using a defined three-dimensional spherical surface and a projected coordinate system is defined on a flat, two-dimensional surface. Some projected systems work better than others for placing data on the earth's surface based on the location of the data and on the application of the data.<sup>126</sup> A NAD83 State Plane Virginia North coordinate system and Lambert Conformal Conic projection were designated for all features and base maps for this project. These two systems were chosen based on the location of the spatial data, specifically Virginia, and the specific desired projection of the data in the three-dimensional space of the database. State Plan

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<sup>123</sup> Tomlin 1990, 6.

<sup>124</sup> Kennedy 2013, Chapter 1.1.

<sup>125</sup> Kennedy 2013, Chapter 1.2.

<sup>126</sup> *Ibid.*

coordinate systems are designated based on state shape and broken up into specific geographic zones.<sup>127</sup> The Lambert Conformal Conic projection works best with the Virginia State Plane system because of Virginia's shape. Virginia, or specifically the region of Virginia that Alexandria is in, is longer in an east-west direction, and using a Lambert Conformal Conic projection minimizes distortion with data positioning along an east-west axis.<sup>128</sup> Using consistent coordinate systems for all the spatial data ensures each feature is placed in the same three-dimensional space relative to one another. All maps and geographic data are scaled in feet.

For the purposes of this analysis, five historic maps from the mid-18<sup>th</sup> to early 19<sup>th</sup> century were used to track landscape changes. These maps were georeferenced to align with modern maps, and the shorelines were traced for each map to create a digitized polyline feature that marked the shoreline boundary for the year of the map's authorship.<sup>129</sup> The map of Alexandria titled *Plat of the land where on stands the town of Alexandria* was created by George Washington and used for the first shoreline in 1748.<sup>130</sup> The second map georeferenced to show expansion was also created by George Washington, titled *A plan of Alexandria, now Belhaven* dated to 1749 (Figure 15).<sup>131</sup>

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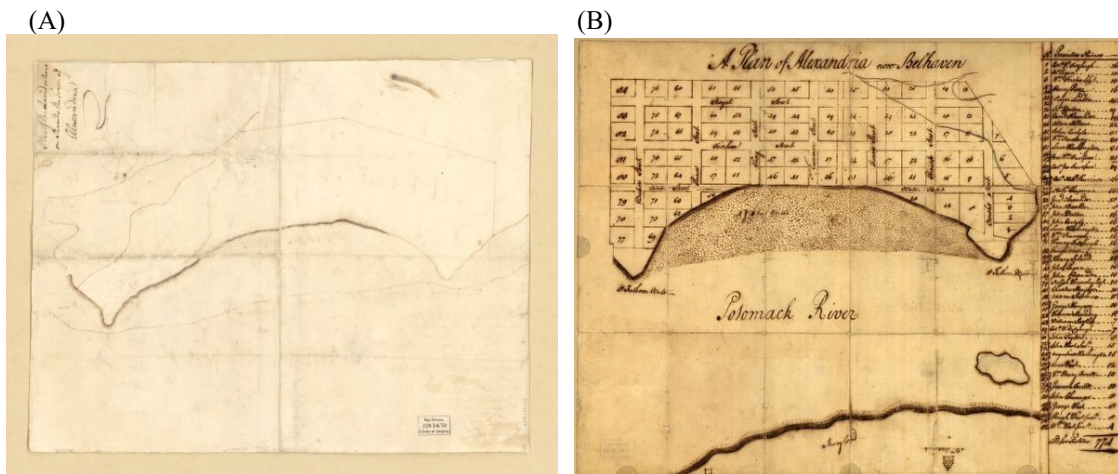
<sup>127</sup> Eye4Software 2019, 12 April.

<sup>128</sup> *Ibid.*

<sup>129</sup> Alexandria Archaeology Digital Atlas, 2019.

<sup>130</sup> Washington, 1748. Map.

<sup>131</sup> Washington, 1749. Map.



**Figure 15.**(A) 1748- *Plat of the land where on stands the town of Alexandria* by George Washington. (B) 1749 *A plan of Alexandria, now Belhaven* by George Washington. Reprinted from Library of Congress.

This map showed minor change to the 1748 shoreline and some overlap. The overlap between these two maps can be attributed to slight inconsistencies in georeferencing and level of detail between the first map and the second. The 1748 map appears to be more of a general topographic sketch of the coastline and location of the tobacco warehouses with less detail on the shoreline’s exact positioning. The 1749 map has significantly more detail including streets and lot numbers. The shoreline was drawn with multiple lines indicating a general area for the shoreline, possibly representing the high bluffs and then the actual point of contact with the river. The next map of Alexandria found in historical records and showing a detailed shoreline is from 1763. This map, created by George West and titled *Alexandria*, was the next map georeferenced to map shoreline expansion (Figure 16).<sup>132</sup>

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<sup>132</sup> West, 1763.

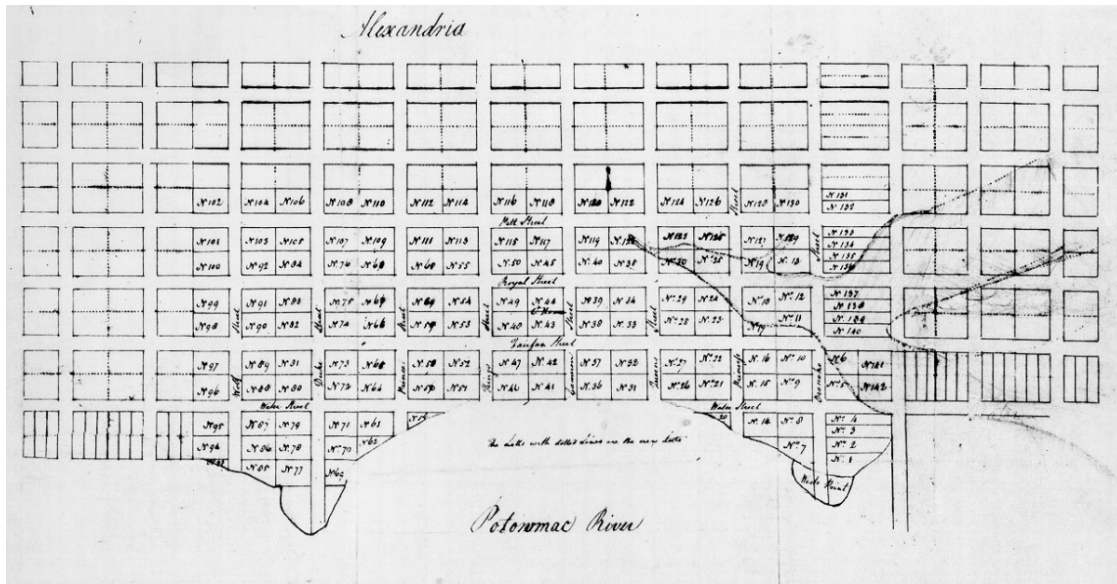


Figure 16. 1763 Alexandria by George West. Reprinted from Library of Congress.

Between 1763 and 1798, only one map has been found and provides extraordinarily little detail of the Alexandria waterfront and growth of the town.<sup>133</sup> This map was not used for expansion analysis. The next map georeferenced was created by Colonel George Gilpin in 1798 titled *Plan of the Town of Alexandria in the District of Columbia*.<sup>134</sup> This map shows lots and street expansion from Union to West (east to west) and Montgomery to Gibbon (north to south). This is the first map in the series to show a block-like shoreline representative of a modern port (Figure 17).

<sup>133</sup> Rochambeau, J.B.D.V, 1782. Map.

<sup>134</sup> Gilpin, Clarke, and Thomas, 1798. Map.

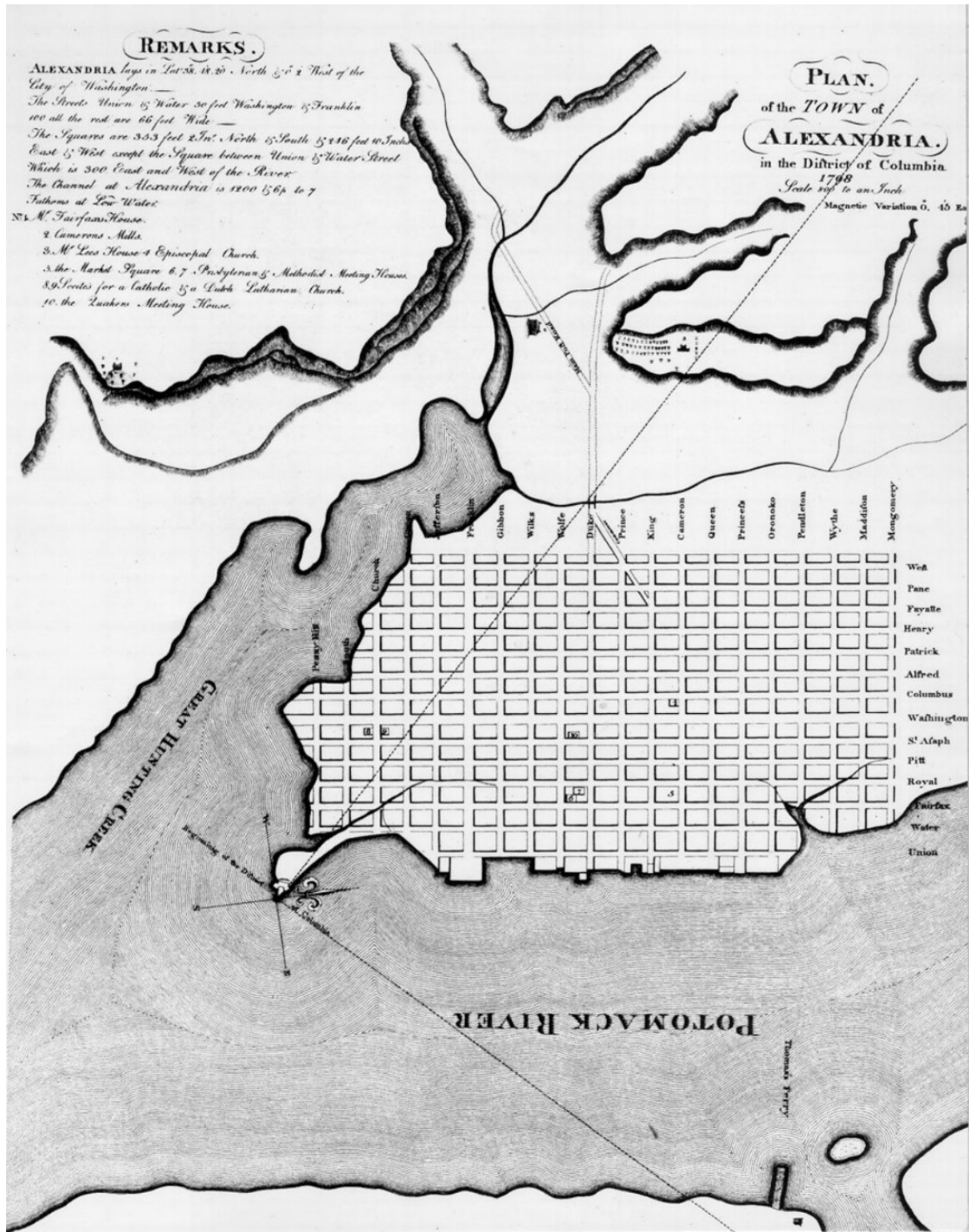
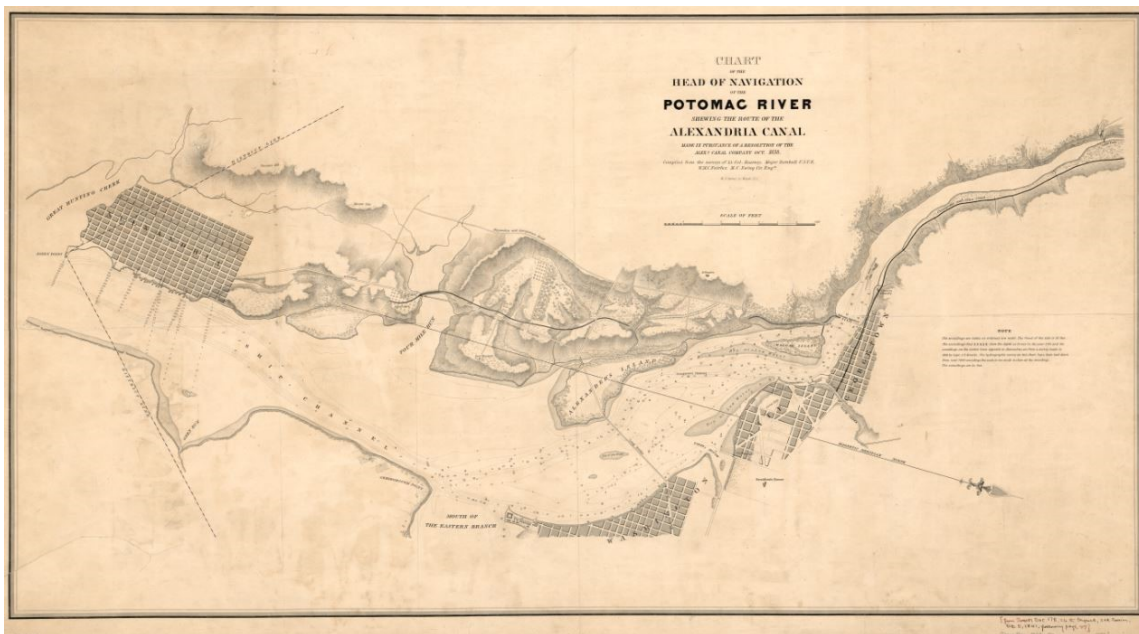


Figure 17. 1798 Plan of the Town of Alexandria in the District of Columbia by George Gilpin. Reprinted from Library of Congress.

The last map georeferenced for this database was from 1838 and created to illustrate the Alexandria canal, titled *Chart of the head of navigation of the Potomac River shewing the route of the Alexandria Canal: made in pursuance of a resolution of the Alex'a Canal Company Oct. 1838* (Figure 18). There were multiple contributors to the creation of this map including: James William Stone, James Kearney, William Turnbull, Wilson M. C. Fairfax, Maskell C. Ewing, and the Alexandria Canal Company.<sup>135</sup> This map provides an elevated level of detail for the developing shoreline, including many waterfront docks and berths along the Potomac.



**Figure 18.** 1838 *Chart of the head of navigation of the Potomac River shewing the route of the Alexandria Canal: made in pursuance of a resolution of the Alex'a Canal Company Oct.* by James William Stone, James Kearney, William Turnbull, Wilson M. C. Fairfax, Maskell C. Ewing, and the Alexandria Canal Company. Reprinted from Library of Congress.

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<sup>135</sup> Stone, W.J., Kearney, J., Turnbull, W., Fairfax, W.C., Ewing, M.C., and Alexandria Canal Company, 1838. Map.



The final shoreline representation in the database closely represents the modern shoreline in reference to the banking out and creation of artificial land. The use of historic records and archaeological material require a level of interpretation as ideal specific datasets are not always available. The interpretation of these maps offers a possible explanation for the shoreline overlap.

For this analysis, it is assumed that the intentional shoreline expansion followed a unidirectional trend, meaning it progressed from west to east into the Potomac River to reach the deeper channel to facilitate easier shipping practices. The issue with the shoreline overlap was addressed both above with possible explanations for the inconsistencies and in the GIS with the shoreline dataset. The polylines created to represent shorelines from 1748, 1749, 1763, 1798, and 1838 were widened to account for a margin of inconsistency. This ensured the analysis would not rely on the exact shoreline placement, instead outlining growth and shoreline transformation trends. The shorelines were widened using a buffer tool in the GIS to add a predetermined distance to each polyline in all directions. A buffer distance was chosen after researching tidal fluctuation trends for the area. It was assumed that some inconsistency may be attributed to surveying at high or low tide, which would affect the placement of the shoreline. The tidal fluctuation for the current Alexandria shoreline ranges on average between 0.5 ft. (0.15 m) at low tide and 3 ft. (0.91 m) at high tide based on data from 2017-2019.<sup>136</sup> Since other explanations for overlap inconsistencies could not be given a measurement

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<sup>136</sup> NOAA Tides & Currents, 2017.

for error, the determination of the buffer distance was restricted within the maximum tidal range. It cannot be assumed that the maximum tidal range today reflects the tidal range from the 18<sup>th</sup> century due to changes in weather, water use and damn construction. Therefore, a conservative buffer of only 3 feet (0.91 meters) on each side of the polyline was created to reflect high and low tide changes and provide a less specific and more general shoreline marker for each year.

Town boundary polygons were created using the streets and shorelines as borders. Population data was added as an attribute table to the town boundary polygons to show the rough population estimate of the town during a specific period (Table 1).<sup>137</sup>

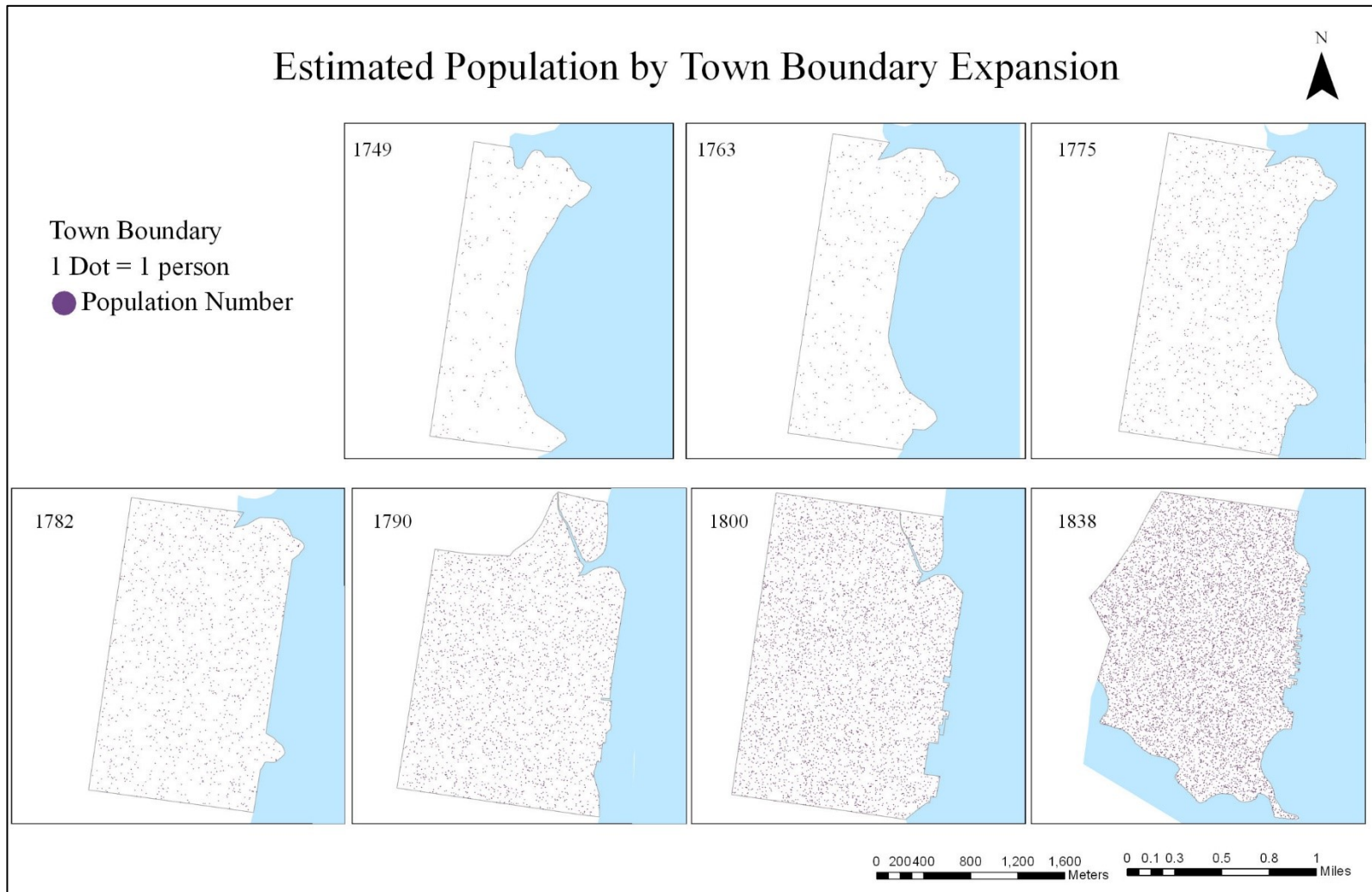
Boundary Year	Estimates Population
1748	No recorded population numbers
1749	Approximately 186 people by 1750
1763	Approximately 310 people by 1760
1775	Approximately 1,000 people by 1770, and approximately 1,054 people by 1777.
1782	Approximately 1,259 people by 1780.
1790	Approximately 2,748 people by 1790
1800	Approximately 4,971 people by 1800.
1838	Approximately 8,241 people by 1830

**Table 1.** Population Table for Town boundary polygons.

Creation of the polygons and the inclusion of the population data provide a visualization of the town’s growth in all directions through time and the relationship between population growth and the town’s physical expansion (Figure 19).

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<sup>137</sup> United States Census Bureau, 1975.



It is important to note that this does not reflect the localized population distribution for the given area, as the dispersal of residents within the town boundaries and outside of the town boundaries is not clear. To focus the study area to historic section of the town, datasets were not extended beyond the boundary of Old Town, the historic district of Alexandria.<sup>138</sup>

The historic streets described in the previous chapter were drawn as polygons using the historic maps. The streets were split into sections based on the period of expansion, and as the town boundaries expanded, each street was also extended. The street configurations in Alexandria have remained relatively the same except for interstate and highway additions and this consistency proved helpful in georeferencing the maps. The historic structures and ships were incorporated into the geodatabase as point and polygon features depending on the level of historical and archaeological detail available for the location of the site. If historic structures were still present in the current landscape, a more accurate polygon was created based on current maps. Likewise, available site maps for archaeological excavations that provided rough outlines for the boundaries of historic structures were georeferenced and traced as polygons in the geodatabase. Data that is based on interpretation and not supported by physical evidence was represented in the geodatabase as points or dotted-lined polygons. Shipwreck locations were extrapolated from site plans and recorded in the geodatabase as a polygon

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<sup>138</sup> This boundary was reproduced as a polyline feature using a Resource Area map created by the GIS section of the Planning and Zoning Department. 1989. The Old Town boundary is based on the Resource Areas designated in the Archaeological Protection Procedure. November 18, 1989.

feature with a hatched line symbology to represent the approximate extent of the ship as it was discovered.<sup>139</sup> The structures were plotted using historic records and site reports.<sup>140</sup> Each feature was given a label which includes: a brief description, a date of establishment, and a structure typology to differentiate wharf structures from residential and commercial structures.

The inclusion of these structures was key to the analysis of expansion and were chosen based on their temporal range (within the focus), their location along the expanding shoreline, and their significance to the maritime landscape of 18<sup>th</sup> century Alexandria. These structures allowed for the creation of intermittent/interpretive shorelines between 1763 and 1798 where shoreline data is lacking.

A spatio-temporal slider was created in the GIS to demonstrate Alexandria's landscape development through time. All data features were given temporal attributes to create time specific data visualizations and reveal location and development trends. This spatio-temporal slider functions to display spatial data from distinct periods as the slider is moved, in intervals of two years, ranging between 1748 and 1850. The appearance of features at given times along the shoreline allowed for the creation of interpretive shorelines which connected the features to create a new shoreline. For example, the creation of Union Street in 1782 indicated the shoreline by this year must have extended to or beyond Union Street.<sup>141</sup> The street was created as a new polygon and temporal data

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<sup>139</sup> Thunderbird Archaeology 2018. Map.

<sup>140</sup> Alexandria Waterfront Historic Sites 2019. Map.

<sup>141</sup> Shomette 1985, 82.

was added to the feature so that it only appears on the map when the slider reaches 1782. Other features along the shore, constructed before or during 1782, also appear and a new interpretive shoreline was drawn with the assumption these features were constructed on artificially made land by that time. This process was used to create four interpretive shorelines between 1775 and 1790, illustrated in the map sequence (Figure 20).

# Interpretive Shoreline Expansion 1763-1798

Shorelines  
 — Digitized  
 - - - Interpretive



**Figure 20.** Interpretive shorelines between 1763 and 1798 illustrating a smaller temporal scale of shoreline expansion. Image by author.

It is important to note that this data only provides an interpretation of the past and the reconstructed landscape does not map exact processes. Areas without known and dated structures to use as guides were drawn to mimic shoreline trends that were based on the georeferenced maps. By utilizing GIS technology and incorporating historic records and archaeological data into the geodatabase, the spatial complexity of the late 18<sup>th</sup> to early 19<sup>th</sup> century urban development in Alexandria was captured, and a smaller temporal scale of expansion was achieved.

The political, cultural, and population processes which influenced urban development during the 18<sup>th</sup> and early 19<sup>th</sup> centuries were also considered when creating the interpretive shorelines. By bridging this spatial analysis to the political, cultural, and population processes discussed in chapter one, conclusions can be drawn regarding the role that each process played in the overall development of the landscape and allowed for the creation of the interpretive shorelines; simultaneously narrowing the temporal scale of expansion and date range of ship deposition.



## CHAPTER IV

### DISCUSSION AND CONCLUSIONS

#### **Discussion**

Through the creation of a GIS geodatabase and analysis of the multiple datatypes, this study was able to answer the question of how the growth in urban populations, combined with fluctuating economic and political conditions, manifested in urban landscape change at the local level in Alexandria. Due to the availability of detailed cartographic data, previous research for the temporal focus only included digitized shorelines recording expansion at 1748, 1749, 1763, 1798, and 1838. With this geodatabase, the scale of expansion was narrowed to include interpretive shorelines between the known georeferenced map shorelines of 1763 and 1798. Four interpretive shorelines for 1775, 1782, 1785, and 1790 provide a smaller scale perspective of expansion during a pivotal time politically and economically for Alexandria.<sup>142</sup> This study also narrowed the deposition date range for the four ships.

The historically documented shoreline of 1763 by George West was the starting point for shoreline creation, and the structures, streets, and political and economic events between this year and the known 1798 shoreline were used to create the interpretive shorelines for 1775, 1782, 1785, and 1790. All structures and streets established after a shoreline's year are included in the expansion of the following interpretive shoreline. In 1763, the shoreline extrapolated from West's map depicts a crescent-shaped bay with the

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<sup>142</sup> West, 1763 and Gilpin, 1798.

waterline cutting through Water Street at King, Cameron, and Queen Streets. Although there are no wharves depicted in the map, it is known that Carlyle and Dalton's wharf was constructed in 1759 and most likely still in use four years later.<sup>143</sup> This wharf, along with Thomas Flemming's shipyard, established around the 1760s, are shown in the geodatabase at this time. Pitt Street and Wolfe Street were constructed and recorded at the time of West's 1763 map establishing a town boundary to the west and south (Figure 21).

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<sup>143</sup> Trustees, 32 in Shomette 1985, 33.

# 1763 Alexandria



**Figure 21.** 1763 Town Boundary and historic features map. Image by author.

The first interpretive shoreline was created to represent eastward expansion by 1775. There is minimal evidence for commercial development in the archaeological and historic records between 1763 and 1775. Kirkpatrick's wharf was established in 1764 between Queen Street and Princess Street after the last shoreline.<sup>144</sup> The town boundaries were extended to the west with St. Asaph Street's establishment in 1774, and Wilkes Street to the south in the same year<sup>145</sup>. The decision to create a conservative interpretive shoreline with minimal expansion was rooted in the economic and political events effecting Alexandria's development at this time. This included the Fairfax Resolves of 1774, passed due to Alexandria's opposition of unfair British taxes and the creation of shore batteries and a small flotilla by Alexandrians to protect the harbor at the beginning of the Revolutionary War in 1775.<sup>146</sup> The population growth was also slow between 1770 and 1777.<sup>147</sup> The land expansion initiative was slow during this period with attention placed elsewhere due to economic and political unrest. To create this interpretive shoreline and new town boundary, a polygon was drawn expanding eastward slightly to incorporate Kirkpatrick's wharf and to the west and south to incorporate St. Asaph and Wilkes Street, respectively (Figure 22).

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<sup>144</sup> Riker 2008a, 5.

<sup>145</sup> Carne 1983, 130-31 in Cressey, n.d.

<sup>146</sup> Washington and Mason, 1774.

<sup>147</sup> United States Census Bureau, 1975. Population estimates at the regional or state level were taken from census records.

# 1775 Map



Figure 22. Map of 1775 town boundary and historic features. Image by author.

The next two interpretive shorelines showing expansion by 1782 and 1785 were grouped at a smaller time scale due to the increased development during this decade. Alexandria's establishment as a separate port of entry in 1780 drove waterfront development.<sup>148</sup> The grading of Water Street and establishment of Union Street in 1782 was the basis for the 1782 interpretive shoreline map. The shoreline follows Union Street between Prince and Princess Street; however, the protrusion of Point Lumley is still present at this time. The area around Point Lumley was not extended prior to 1788 because of the lawsuit mentioned in Chapter 2 regarding the eastern boundary of Lot 69.<sup>149</sup> A map of the plat from 1788 shows the said lot and shoreline, which after being georeferenced shows minimal expansion eastward in this area by 1788. William Ramsay began banking out the area between King and Union Street in the 1780's. Ramsay's wharf was constructed at the foot of King Street and included in the 1782 interpretive shoreline (Figure 23).<sup>150</sup>

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<sup>148</sup> Rothgeb 1975, 15 cited in Engineering Science Inc. 1993, 30.

<sup>149</sup> Fairfax County Record of Surveys, 145-146 in Ring 2009.

<sup>150</sup> Shomette 1985, 33.

# 1782 Map



Figure 23. Map of 1782 town boundary and historic features. Image by author.

By 1785, commercial development on the waterfront exploded with the construction of Hooe's Warehouse and Store, Feature 161 (wharf structure), Keith and Harper's wharf, and Harper's wharf. The addition of Washington, Patrick, Henry, and Fayette Streets in 1783 and 1784 also extended the town's boundaries to the west, possibly due to the boom in population growth during this period.<sup>151</sup> The interpretive shoreline map for 1785 was drawn to include these structures. The wharves were placed in the GIS based on historic records and previous research (Figure 24).<sup>152</sup>

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<sup>151</sup> United States Census Bureau, 1975.

<sup>152</sup> Alexandria Waterfront Historic Sites Map. [computer map]. OHA/Alexandria Archaeology. City of Alexandria, Virginia.



# 1785 Map

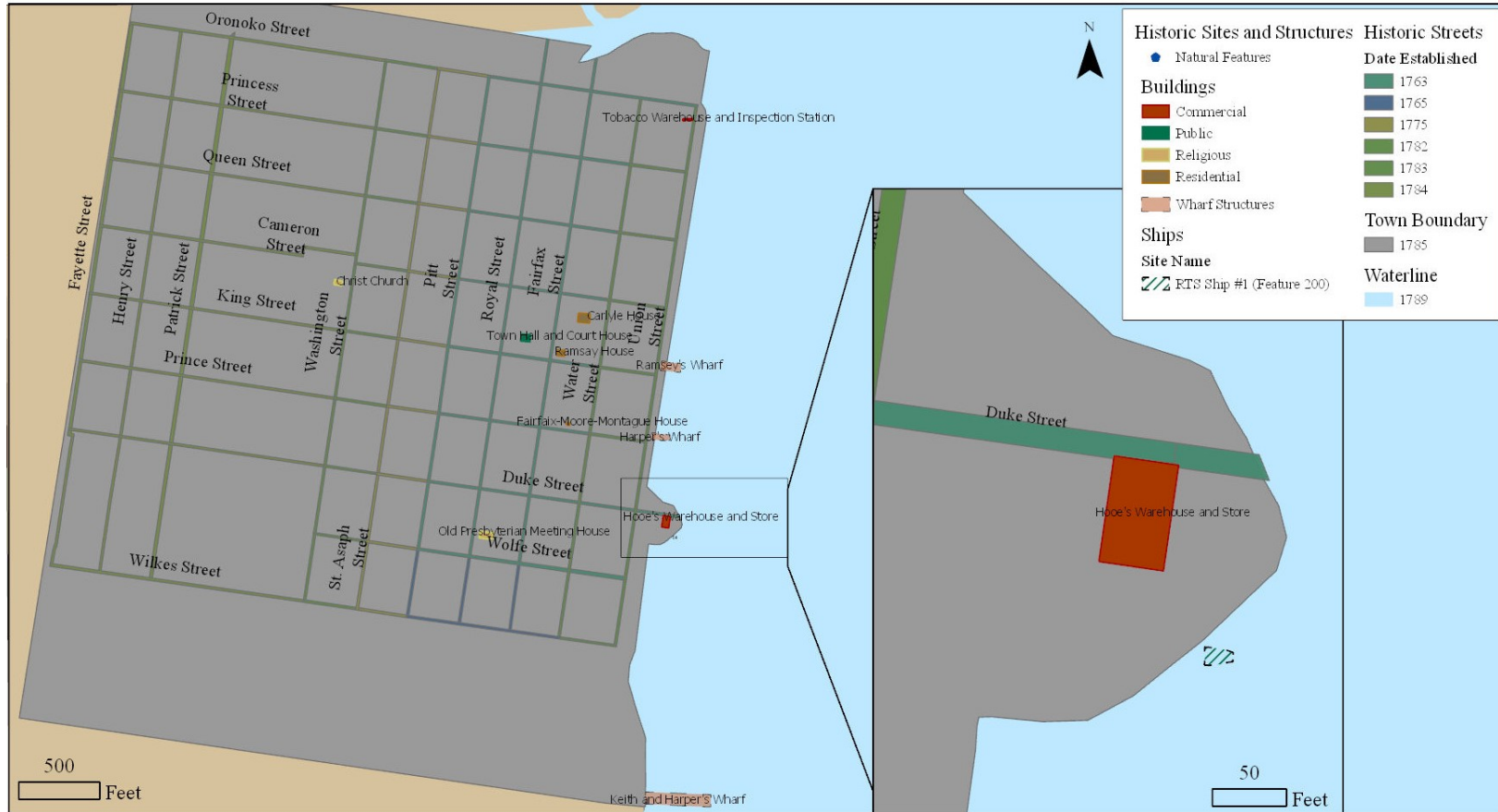


Figure 24. Map of 1785 town boundary and historic features. Image by author.

The final interpretive shoreline represents development up to 1790. Fitzgerald's warehouse and wharf were constructed south of Cameron Street by 1790 and was included in the geodatabase along the new shoreline. The Strand was completed the year prior and the archaeological remains of the alleyway, photographed below, provided a guideline for the creation of the interpretive shoreline (Figure 26).



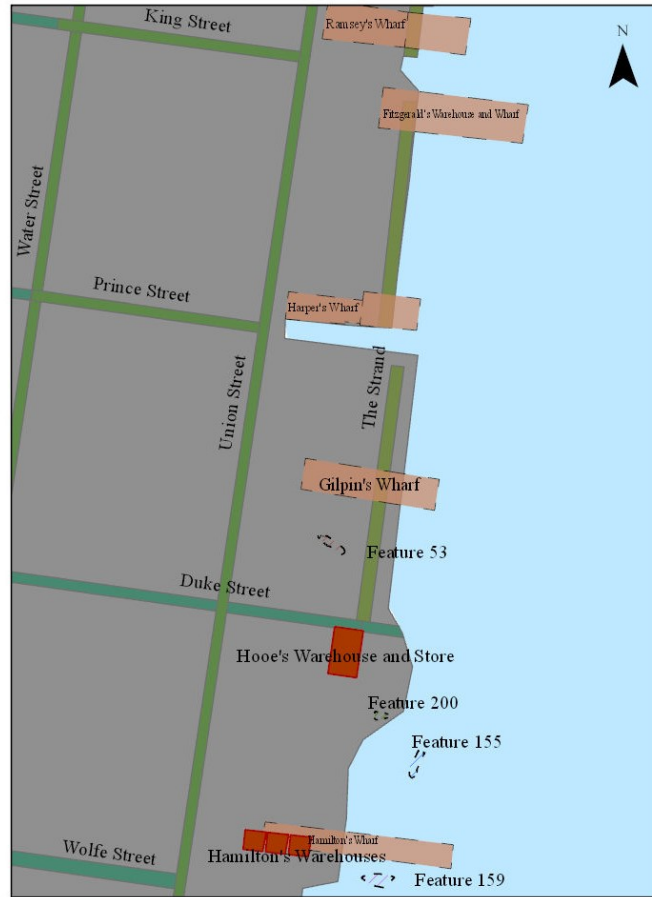
**Figure 25.** The Strand. Image of archaeological site detailing positing of the alleyway. Photo courtesy of Alexandria Archaeology.

The shoreline extended to cover the site of the 220 S. Union Street Ship, placing its deposition date range between 1788 and 1790. The RTS #1 ship is also hypothesized to have been utilized in the banking out process and completely covered by 1790 according to the interpretive shoreline map (Figure 26).

# 1790 Map



0.5 Miles



250 Feet

## Historic Sites and Structures

### Ships

Site Name

- Feature 155
- Feature 159
- Feature 200
- Feature 53

### Buildings

- Commercial
- Public
- Religious
- Residential
- Wharf Structures

### Historic Streets

- 1763
- 1765
- 1775
- 1782
- 1783
- 1784
- 1790

### Town Boundary

- 1790

### Waterline

- 1790

Figure 26. 1790 Map of town boundary and historic features. Image by author.

The 1790 interpretive shoreline and the estimated deposition dates for these two vessels are supported by economic, political, and population processes from the period. Discussed in Chapter 1, the Revolutionary War caused population increases due to northern migrants fleeing south, which included shipwrights. Although shipbuilding did not play a significant role in its economy, the increase in ship manufacturing in the region might have contributed to the retiring and recycling of older ships for development. During the 18<sup>th</sup> century, if a merchant needed a ship built, they would choose a shipbuilder to construct, usually paying them half up front and half when the ship was completed.<sup>153</sup> Basic economic principles would suggest that the influx of shipbuilders to the area would increase the local manufacturing of ships due to the merchant's increase in options or drive the price of constructing a new ship down due to market competition. If new ships were being manufactured near Alexandria at a lower rate, the old vessels may have been abandoned in the Alexandria harbor or sold to lot owners looking for cheap construction supplies to build out their waterfront properties. The infrastructure improvements like street paving to prepare for Alexandria's incorporation into the nation's capital could have also influenced the increase in development of the waterfront.<sup>154</sup>

By the 1790s, the crescent bay of the waterfront had been completely filled in, closely reflecting the modern shoreline. Eastward expansion and banking out was not complete; however, this process would continue through to the mid-19<sup>th</sup> century. The

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<sup>153</sup> Vanhorn 2004, 15.

<sup>154</sup> Shomette 1985, 93; 102-104.

1790 interpretive shoreline and 1798 shoreline vary slightly relative to expansion in the previous decade. This was due to the hypothesis that minimal artificial land was created because of the outbreak of both pestilential fever and yellow fever in the early and mid-1790's, which significantly reduced incoming vessels into the Alexandria harbor due to quarantine initiatives.<sup>155</sup> During this crisis, it is unlikely that land expansion was of high priority to Alexandrians. This also provides support for the use of derelict ships for banking out, as this would have been an easier and quicker method than creating bulkhead wharves from un-milled timbers.

The subsequent two shoreline representations for 1798 and 1838 reflect the georeferenced maps and incorporated streets of Old town Alexandria. They follow the expansion trends of the mid-18<sup>th</sup> century with deep water wharves. Shoreline expansion between 1798 and 1838 was also relatively minimal, with refinement of the waterfront to include more docks and berths for larger vessels rather than general extension of the waterfront eastward. Estimates for ship deposition for the RTS#2 and RTS #3 ships range between 1798 and 1838.

Historic records, population trends, and economic and political processes were again consulted to narrow the deposition date range for these two vessels even further to 1799-1812. City records from 1799 indicate derelict vessels were becoming a nuisance in the Alexandria harbor. The Alexandria Corporation passed an act,

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<sup>155</sup> Shomette 1985, 94-97.

“To preserve the navigation of the Public Docks in the town of Alexandria... introducing into the public docks...the decayed and rotten hulks of old vessels, boats, and craft, of different descriptions, under the pretense of repairing the same, but in reality to serve the purposes of fuel, which when cut down to the surface of the water are willfully and negligently suffered to sink to the bottom of said docks where they remain obstructions to the navigation...”.<sup>156</sup>

Those who did not abide by this new act were also liable to pay a fine of fifty dollars for sinking their ship or allowing it to sink at a public dock and not removing it before a ten-day grace period.<sup>157</sup> Therefore, the recycling of the older ships could indicate thrifty construction practices, government policies and avoidance of fines, or even economic conditions favoring local infrastructure development over overseas trade. Records from 1808 also indicate that the disposal of derelict vessels in the harbor remained an issue for almost a decade.<sup>158</sup> Political unrest with the onset of the War of 1812 slowed both waterfront development and the economy as the United States was at war with one of its biggest trade partners. The two ships were most likely used in preliminary filling (pre-fill) initiatives of this part of the shoreline by 1812 indicating the ships were sunk and used as fill, but the artificial land may have not yet breeched the surface, illustrated in the map sequence below (Figure 27).

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<sup>156</sup> Shomette 1985, 90.

<sup>157</sup> *Ibid.*

<sup>158</sup> Alexandria Gazette, 27 August 1808 in Shomette 1985, 104.

### Shoreline Expansion and Ship Deposition 1798-1838

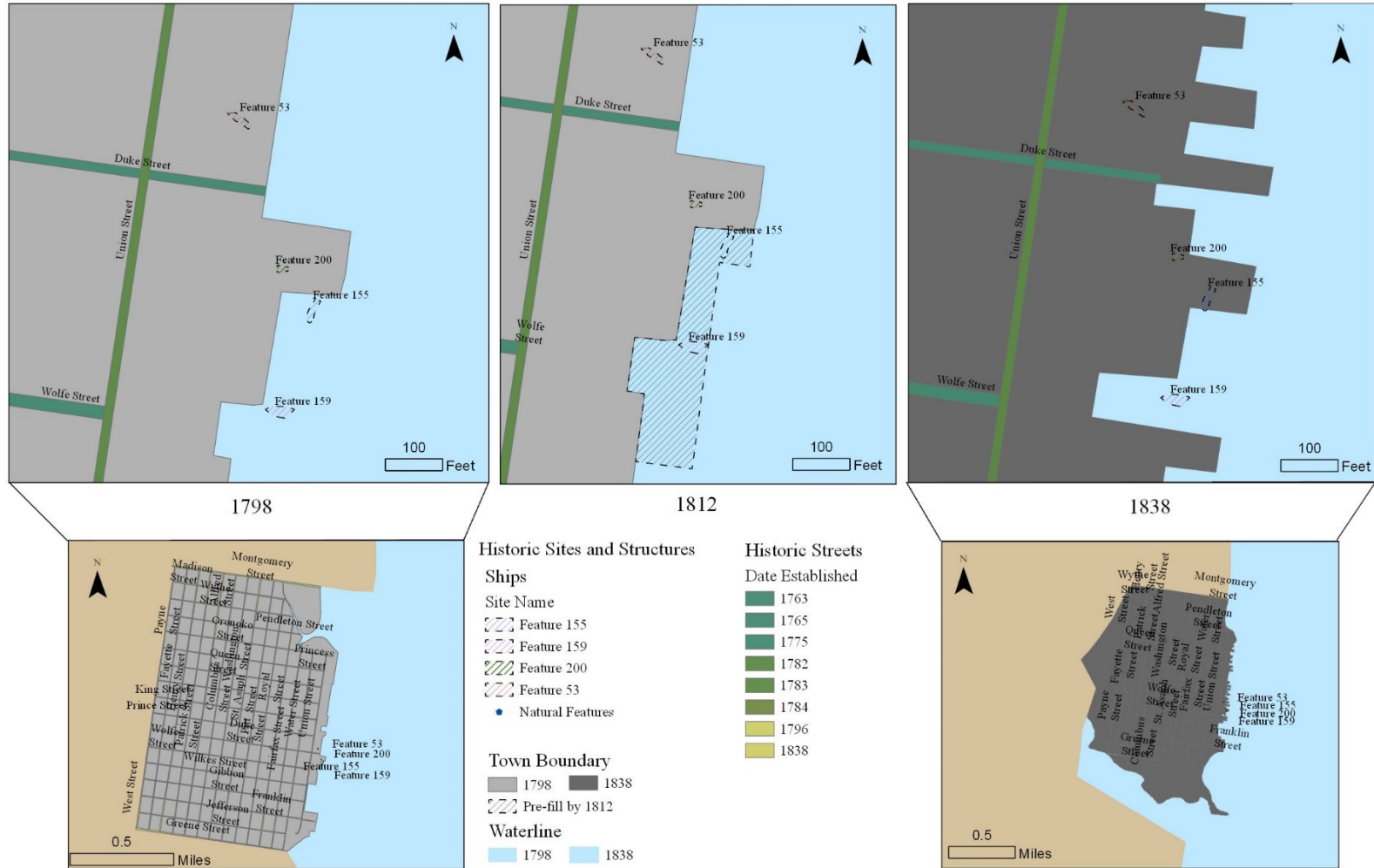


Figure 27. Map showing location of 1798 and 1838 shoreline relative to ship sites. Image by author.

## **Conclusions**

This research demonstrates that the understanding of past phenomenon like shoreline expansion utilizing ships is driven by processes that operate at multiple spatial scales. This indicates that local maritime landscape changes in Alexandria during the 18<sup>th</sup> century were tightly coupled with regional economic and political dynamics, and accessibility to the urban center had a prominent influence on the spatial formation of the urban landscape. In the case of Alexandria, access to the deep channel of the Potomac was vital and a driving force for development. The expansion and construction of ten wharves along a one mile stretch of shoreline within this temporal focus reflects the intensity of the economic growth in the region.

The GIS database aided in the spatial analysis of the ships to narrow deposition date ranges by creating a visual relationship between the historic cartographic data, historic structures, and other archaeological material. Studying the archaeology of ships helps to form a better understanding about the people who used them, either while they were on the water, or even when used as fill, as we have here. There are a myriad of small details that help us expand our understanding of our collective past, but one of the most important things to frame a study like this is the chronology. By placing a temporal attribute on each feature, the dates for land expansion were narrowed down, which allowed for the formation of more precise deposition estimates.

Maps only illustrate elements that were considered important by the cartographer when the map was drawn, and preservation bias can determine the spatial and temporal focus of a study, severely altering how a landscape is reconstructed. As development



continues along the Alexandria waterfront, more archaeological remains are bound to be unearthed. These sites can be added to the geodatabase to hopefully create a more accurate representation of the past landscape, more precise intermittent shorelines, and further our understanding of the historic transformation of Alexandria's waterfront.

## REFERENCES

- AKRF, Inc. 2013. *World Trade Center Memorial and Development Plan: Data Recovery and Analysis of the WTC Ship*. Final Technical Report, New York: The Lower Manhattan Development Corporation. S-1-8-7.
- Artemel, J.G., Crowell, E., Hull, D. A., Knepper, D. 1988. *A Phase IIA Archaeological Study of Old Ford Plant Site, Alexandria, Virginia*. Site Report, Washington DC: Engineering-Science, Inc.
- Alexandria Waterfront Historic Sites Map. [computer map]. 2019. OHA/Alexandria Archaeology. City of Alexandria, Virginia. Accessed January 15, 2019. <https://www.alexandriava.gov/historic/info/default.aspx?id=42126>
- Alexandria Archaeology Digital Atlas, 2019. City of Alexandria, Virginia: Office of Historic Alexandria.
- Alexandria, Virginia. Proceedings of the "Board of Trustees Town of Alexandria, Virginia, 1749-1767. Library of Congress, Washington, D.C: photostatic copy, 34.
- Alexandria City Records. 1798. Hustings Court 1791-96.
- Burgan, M. 2005. *The Stamp Act of 1765 (We the People: Exploration and Colonization)*. Minneapolis: Compass Point Books.
- Breen, T. H. 2001. "Baubles of Britain: The American and Consumer Revolutions of the Eighteenth Century." In *Colonial America: Essays in Politics and Social Development*, edited by S. Nider-Katz, J. Murrin and D. Greenberg, 467-496. Boston: McGraw-Hill.
- Brockett, F. L., Rock G.W. 1888. *A Concise History of the City of Alexandria, Va.: From 1669 to 1883, with a Directory of Reliable Business Houses in the City*. Alexandria, VA: Gazette Book and Job Office.

Bushman, R. L. 2001. "Markets and Composite Farms in Early America." In *Colonial America: Essays in Politics and Social Development*, edited by S. Nider-Katz, J. Murrin and D. Greenberg, 497-523. Boston: McGraw-Hill.

Carp, B. L. 2010. *Defiance of the Patriots: The Boston Tea Party and the Making of America*. New Haven and London: Yale University Press.

Chapelle, H. 1935. *The History of American Sailing Ships*. New York. Bonanza Books.

City of Alexandria. 2015, 29 January. "Out of the Attic: Finding the right location for the Port City". *Alexandria Times*: Office of Historic Alexandria. City of Alexandria, VA. <https://www.alexandriava.gov/uploadedFiles/historic/info/attic/2015/Attic20150129Location.pdf>

———. 2016, 23 February. "Nautical Discoveries- Waterfront Discoveries: The Ship" City of Alexandria Virginia. Accessed 18 January 2018. <https://www.alexandriava.gov/historic/info/default.aspx?id=28268>.

———. 2017, 24 May. "The Revolutionary Era." *Discovering the Decades: 1770s*. City of Alexandria, VA. Accessed 1 February 2019. <https://www.alexandriava.gov/historic/info/default.aspx?id=28284>.

———. 2017, 26 August. "Alexandria Archaeological Resource Areas." City of Alexandria, VA. Accessed 14 March 2019. <https://www.alexandriava.gov/historic/archaeology/default.aspx?id=39410#1OldTown>.

———. 2017, 27 September. "Archaeological Protection Code." City of Alexandria, VA. Accessed 12 April 2019. <https://www.alexandriava.gov/historic/archaeology/default.aspx?id=28146>.

———. 2018, 25 April. "Three Ships Discovered at Robinson Landing." City of Alexandria, VA. Accessed 15 December 2018. <https://www.alexandriava.gov/historic/info/default.aspx?id=103311>.

- .2018, June. “Robinson Terminal South Excavation Update: Wharves and Bulkheads (Feature 162 and Feature 165)” City of Alexandria, VA. Accessed 1 April 2019.  
<https://www.alexandriava.gov/historic/archaeology/default.aspx?id=104569>
- .2018, 7 November. “Carlyle House” *Alexandria Sites on the National Register of Historic Places*. City of Alexandria, VA. Accessed 14 January 2019.  
<https://www.alexandriava.gov/historic/info/default.aspx?id=29750>.
- . 2019a, 1 February. "Extending the Shoreline with Bulkhead Wharves." City of Alexandria, VA. Accessed 16 April 2019.  
<https://www.alexandriava.gov/historic/archaeology/default.aspx?id=107554>.
- .2019b, 1 February. "Four 18th-Century Ships." City of Alexandria, VA. Accessed 14, January 2019.  
<https://www.alexandriava.gov/historic/archaeology/default.aspx?id=107892>.
- . 2019, 26 February. "Archaeology at the Hotel Indigo Site." City of Alexandria, VA. Accessed 15 February 2019.  
<https://www.alexandriava.gov/historic/archaeology/default.aspx?id=96264>.
- .2019a, 9 March. "Robinson Terminal South Excavation Update: Wolfe Street and The Strand." City of Alexandria, VA. Accessed 16 March 2019.  
<https://www.alexandriava.gov/historic/archaeology/default.aspx?id=99029>.
- .2019b, 9 March. "Recovering Ship 1 and Wharves." Robinson Terminal South Excavation Update. City of Alexandria, VA. Accessed 20 February 2019.  
<https://www.alexandriava.gov/historic/archaeology/default.aspx?id=104009>.
- .2019c, 9 March. “Robert Townsend Hooe Warehouse and Store, Robinson Terminal South Excavation Update: Hooe Warehouse.” City of Alexandria, VA 6 April 2019.  
<https://www.alexandriava.gov/historic/archaeology/default.aspx?id=97383>
- . 2019, 11 March "The 1755 Warehouse." Hotel Indigo Excavation Update, City of Alexandria, VA. Accessed 9 January 2019.  
<https://www.alexandriava.gov/historic/archaeology/default.aspx?id=89678>.

- Claypool, J., Johnston, E. 2014. *Robinson Terminal South Property History*. Site Report, Washington, DC: History Matters.
- Cressey, Pamela. n.d. "Alexandria's Original Street Names." City of Alexandria, VA. Accessed 15 January 2019.  
<https://www.alexandriava.gov/uploadedFiles/historic/info/history/StreetNamesCressey.pdf>
- Creasman, P.P. 2013. "Ship Timber and the Reuse of Wood in Ancient Egypt". *Journal of Egyptian History* 6:2: 152–76. doi:10.1163/18741665-12340007.
- Dostal, C., Grieco, G., and Fix, P. 2019. *The Documentation and Reconstruction of an 18th-Century Wooden Ship from Alexandria, VA*. Manuscript in progress.
- Engineering Science Inc. 1993. *Maritime Archaeology at Keith's Wharf and Battery Cove(44AX119) Ford's Landing Alexandria, Virginia*. Site Report, Washington D.C.: Engineering Science Inc. 1-388.
- Eye4Software. 2019. "Hydrographic Survey Software." *The State Plane Coordinate System: Background Information on This Coordinate Systems and Instructions How to Use It in Hydromagic*. Accessed 12 April 2019.  
<https://www.eye4software.com/hydromagic/documentation/state-plane-coordinate-systems/Virginia>.
- Gilpin, G., Clarke, T., Thomas, J. V. 1798. *Plan of the town of Alexandria in the District of Columbia*. [Alexandria: I. Thomas, 1798] Map. Washington, D.C.: Library of Congress.  
<https://www.loc.gov/item/91681006/>.
- Harrison, F. 1964. *Landmarks of Old Prince William*. Berryville, VA: Chesapeake Book Company.
- Heintzelman-Muego, A. 1983. "Construction Materials and Design of 19th Century and Earlier Wharves: An Urban Archaeological Concern". Paper read at the Society for Historical Archaeology Conference, 6-9 January, Denver.

- Hofstra, W. R. 2001. "The Extension of His Majesties Dominions: The Virginia Backcountry and the Reconfiguration of Imperial Frontiers." In *Colonial America: Essays in Politics and Social Development*, edited by S. Nider-Katz, J. Murrin and D. Greenberg, 433-466. Boston: McGraw-Hill.
- Jensen, M. 1968. *The Founding of a Nation: A History of the American Revolution, 1763-1776*. New York: Oxford University Press.
- Kennedy, M. D. 2013. *Introducing Geographic Information Systems with ArcGIS: A Workbook Approach to Learning GIS*. 3<sup>rd</sup> ed. Hoboken, New Jersey: John Wiley & Sons.
- Knepper, D.A., Prothro, K. 1989. *Historical and Archaeological Investigation of Roberdeau's Wharf at Harborside, Alexandria, Virginia*. Site Report. Alexandria, VA: Engineering-Science, Inc.
- Miller, T. M. 2016. *Artisans and Merchants of Alexandria, Virginia 1780-1820*. Vol. 2, *Napey to Zimmerman*. Bowie, Maryland: Heritage Books Inc.
- Munson, J. 1984. "Empire to Commonwealth: Alexandria, Virginia, 1749-1789" PhD diss., University of Maryland.
- Minute of the Trustees of the City Council of the City of Alexandria, Virginia, 1749-1800 (omitting 1779 Feb, 6, 1792).
- Netherton, N., Sweig, D., Artemel, J., Hickin, P.P., and Reed, P. 1978. *Fairfax County, Virginia: A History*. Fairfax, VA: Fairfax County Board of Supervisors. 1-780.
- Preisser, T. 1997. "Eighteenth Century Alexandria before the Revolution, 1740-1776." Ph.D diss., College of William and Mary.
- Preisser, T.M. 1981. "Alexandria and the Evolution of the Northern Virginia Economy, 1749-1776." *The Virginia Magazine of History and Biography* 89:3: 213-220.  
<http://www.jstor.org.lib-ezproxy.tamu.edu:2048/stable/4248493>.

- Pulliam, T. 2008. "Studies of the Old Waterfront: Alexandria's First Wharf." Alexandria, VA: City of Alexandria, Office of Historic Alexandria, Alexandria Archaeology, 1-11.
- Raphael, R. 2001. *A People's History of the American Revolution*. New York: The New Press. 1-528.
- Reeves, J. 1792. *A history of the law of shipping and navigation*. London: Sabin Americana Electronic Reproduction.
- Riker, D. 2008a. "Fitzgerald's Warehouse King and Union Streets". Studies of the Old Waterfront, Alexandria Archaeology. Office of Historic Alexandria, City of Alexandria. Alexandria, VA., 1-47.
- .2008b. "A Timeline of Alexandria's Waterfront". Studies of the Old Waterfront, Alexandria Archaeology. Office of Historic Alexandria, City of Alexandria.
- Ring, C.K. 2009. *Alexandria, Virginia Town Lots 1749-1801. Together With The Proceedings Of The Board Of Trustees 1749-1780*. Edited by Pippenger W.E. Heritage Books. 1-224.
- Rochambeau, J.B.D.V, 1782. *Camp à Alexandrie ...* Scale not given. 1 map: photocopy; on sheet 33 x 21 cm. Washington, D.C: Library of Congress. <https://lccn.loc.gov/91685683>
- Rothgeb, R.M. 1975. "An analysis of the rise, decline, and possible determinants of redevelopment of the seaport of Alexandria, Virginia". Unpublished MA thesis. City College of New York, New York.
- Shepard, S.J. 2006. "Reaching for the Channel: Some Documentary and Archaeological Evidence of Extending Alexandria's Waterfront." *The Alexandria Chronicle* 1-13.
- Shomette, D.G. 1985. *Maritime Alexandria: An Evaluation of Submerged Cultural Resource Potentials at Alexandria, Virginia*. Alexandria, VA: City of Alexandria.1-300.
- Shuster, E.A. 1909. "The Original Boundary Stones of the District of Columbia- U.S Geological Survey." *National Geographic Magazine*, 356-359.

Skolnik, B.A. 2018. "Recent Maritime Archaeology on the Alexandria Waterfront." *Maritime Archaeological and Historical Society News* 29:5-10.

Stone, W.J., Kearney, J., Turnbull, W., Fairfax, W.C., Ewing, M.C., and Alexandria Canal Company. 1838. *Chart of the head of navigation of the Potomac River showing the route of the Alexandria Canal: made in pursuance of a resolution of the Alex'a Canal Company Oct.* [Washington: U.S. Senate, 1838] Map. Washington D.C.: Library of Congress. <https://www.loc.gov/item/89696869/>.

Smith, W.L. 1917. *Journal of William Loughton Smith, 1790-1791*. Cambridge: The University Press. 62-63.

Thunderbird Archaeology. 2018. *April 2018 Feature map*. Alexandria, VA: Alexandria Archaeology.

Time Team America. 2013, 30 January. "Dendrochronology." PBS. Accessed 8 April 2019. <http://www.pbs.org/time-team/experience-archaeology/dendrochronology/>.

Tomlin, D.C. 1990. *Geographic Information Systems and Cartographic Modeling*. Englewood Cliffs, New Jersey: Prentice Hall. 1-249.

United States Census Bureau. 1975. "Historical Statistics of the United States: Colonial Times to 1970 to 1975." Bicentennial edition. United States Census Bureau. Accessed 10 February 2019. [https://www.census.gov/library/publications/1975/compendia/hist\\_stats\\_colonial-1970.html](https://www.census.gov/library/publications/1975/compendia/hist_stats_colonial-1970.html).

Vanhorn, K.M. 2004. "Eighteenth-Century Colonial American Merchant Ship Construction." Thesis, College Station, TX: Texas A&M University, 1-247.

Virginia Chronicle. 1873. "Alexandria Gazette." August 8: 1-4.

n.d. "Virginia Journal and Alexandria Advertiser. 1784-1789." Alexandria [Va.] : G. Richards & Co., 1784-1789.



- GIS Geography. 2018, 18 February. "Vector vs Raster: What's the Difference Between GIS Spatial Data Types?" GIS Geography. Accessed 12 April 2019.  
<https://gisgeography.com/spatial-data-types-vector-raster/>.
- Washington, G., Mason, G. 1774. "Fairfax Resolves." George Washington Papers, Series 4, General Correspondence: Fairfax County, Virginia, Citizens, July 18, 1774, Resolutions and Abstract. Fairfax County, Virginia: From Library of Congress, July 18. Accessed 23 February 2019. [http://www.loc.gov/resource/mgw4.0330270\\_0277/?st=gallery](http://www.loc.gov/resource/mgw4.0330270_0277/?st=gallery).
- Washington, G. 1749. *A plan of Alexandria, now Belhaven*. Map. Washington, D.C.: Library of Congress. <https://www.loc.gov/item/98687108/>.
- Washington, G. 1748. *Plat of the land where on stands the town of Alexandria*. Map [n.p. 1748] Washington, D.C. <https://www.loc.gov/item/99466767/>.
- Carne, W. F. 1983. *Alexandria's Forgotten Legacy – The Annals of Williams F. Carne*. Alexandria, VA: Alexandria Library. 130-131.
- Williams, M. S. 2000. "Myth and reality: Alexandria, Virginia, 1745-1820". Paper 638, thesis., Lehigh University.
- West, G. 1763. *Alexandria*. Map. [MS, 1763] Washington, D.C: Library of Congress. <https://lccn.loc.gov/unk80006151>
- Worthington, M. J., Seiter, J. 2016. *The Tree-Ring Dating of the Alexandria Shipwreck and Wharf, Alexandria, Virginia. Dendrochronology Report*. Baltimore: Oxford Tree-Ring Laboratory. 1-20.