TOWN OF HILLSBOROUGH | STORMWATER MANAGEMENT PROGRAM

Bellevue Branch

Watershed Improvement Plan

Updated October 2022

The Stormwater and Environmental Services Division oversees the town's stormwater management program and stormwater utility.

The mission of this program is to reduce stormwater runoff pollution reaching the Eno River.

Only Rain

Down the Drain

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1.0 Introduction

The discharge of stormwater runoff into local waterways is regulated by both federal and state law. The National Pollutant Discharge Elimination System (NPDES) program was established under the authority of the federal Clean Water Act. The NPDES stormwater program regulates the discharge of stormwater runoff from the Town of Hillsborough's Municipal Separate Storm Sewer System (MS4) into local waterbodies. In North Carolina the NPDES MS4 program is implemented by the North Carolina Department of Environmental Quality (NCDEQ). The town's Stormwater and Environmental Services Division works to reduce stormwater runoff impacts by maintaining compliance with the town's NPDES MS4 stormwater discharge permit.

The Stormwater and Environmental Services Division is also responsible for compliance with the State of North Carolina's Falls Lake Nutrient Management Strategy (Falls Lake Rules). These rules require the town to implement projects and practices to reduce excess nutrients found in stormwater runoff from existing development and apply strict stormwater standards to new development.

The Falls Lake Rules for stormwater runoff from existing development is being implemented in two stages. The Town of Hillsborough is meeting the first stage requirements through participation in the *Interim Alternative Compliance Approach* (IAIA), developed through the Upper Neuse River Basin Association (UNRBA). The IAIA is an investment based joint compliance program that requires the town to design and implement projects that improve water quality and reduce stormwater runoff pollution. Allowable projects under the IAIA include state approved stormwater control measures (SCM), retrofits of existing SCMs to improve pollutant removal, green infrastructure, stream and riparian buffer restoration and enhancement, programmatic approaches, and other watershed improvement projects.

WHY CARE ABOUT STORMWATER?

Adding impervious surface decreases the amount of stormwater that infiltrates into the ground. This increases the amount and velocity of stormwater runoff. This can cause accelerated erosion and downstream flooding. In addition, as stormwater flows across impervious and land surfaces, it picks up various pollutants. These include excess nutrients, oil and grease, bacteria, and sediment. Polluted stormwater flows down storm drains and ditches where it is discharged, untreated, into local streams, rivers, and lakes. Stormwater runoff pollution causes adverse impacts to aquatic ecosystems, poses human health risks, and can greatly increase the cost of treating drinking water.

This purpose of this watershed improvement plan is to identify potential projects that can be implemented to meet the town's requirements under the IAIA as well as compliance with the town's NPDES MS4 permit. Projects that not only reduce stormwater runoff pollution but provide other benefits such as pollinator habitat, tree canopy, invasive species removal, educational opportunities and other ecosystem services are preferred. This plan is a "working" document and project information will be updated periodically. This includes adding or deleting projects as appropriate.

2.0 Watershed Description

Bellevue Branch is a perennial tributary to the Eno River. Named for the Bellevue textile mill, the stream begins in the Fairview neighborhood of Hillsborough and generally flows south to its confluence with the Eno River located within the town's Gold Park. For the purposes of this plan the area also includes the Eno River downstream to the North Carolina Railroad Company corridor. A map of the watershed/study area is included as Figure 1. A watershed plan was completed for Bellevue Branch that contains a detailed description of the existing conditions and impacts. A copy of the plan is available through the town's Stormwater and Environmental Services Division.

2.1 Land use

The primary land use in the Bellevue Branch watershed is single family residential. Commercial development occurs along Cornelius Street (Highway 70) near the intersection with Faucette Mill Road. There are two school properties which include Hillsborough Elementary and Central Elementary. In fact, Bellevue Branch flows through the Central Elementary school property and while there is approximately 14 acres of forest on the parcel, there is about 129,000 square feet of impervious surface. Neither school property contains SCMs since development of the properties predated stormwater requirements.

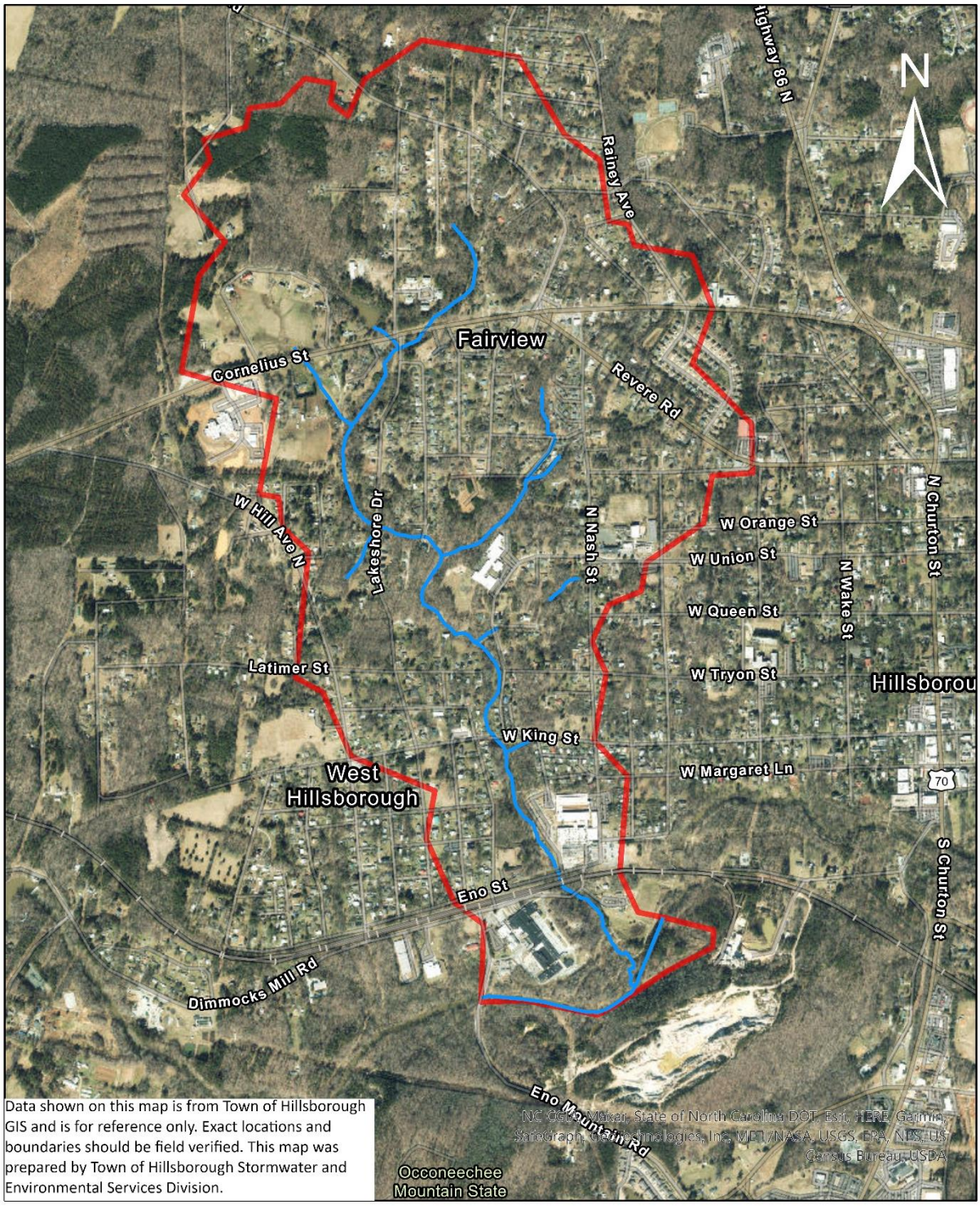
There are no industrial land uses currently in the watershed. However, two former mill sites remain. The Eno River Mill is located at the southern end of the watershed and currently houses a charter school and various commercial businesses. The Eno River Mill complex has over 386,000 square feet of impervious surface. Bellevue Mill was converted to apartments and Bellevue Branch traverses the western portion of the property. While there is a riparian buffer, the Bellevue Mill Apartments have over 100,000 square feet of impervious surface. There is also another commercial property immediately south of the apartments that is used for office/warehouse. It has almost 170,000 square feet of impervious surface and like the two mill property complexes no SCMs exist. Also included in the study area is Gold Park, a town owned park that does have SCMs and green infrastructure. Just to the south of the park is the Resco Products facility which mines pyrophyllite for use in the refractory industries.

BELLEVUE MILL HISTORY

The Bellevue Manufacturing Company, located in west Hillsborough, was incorporated in 1904. The original two-story textile mill building was built sometime between 1907-1909. It was converted from steam power to electric power sometime between 1919-1926. Local ownership and control of the mill ended in 1945, when it was purchased by Hesslein and Company. At that time half a million dollars in improvements to the mill were made. Hesslein was succeeded by Saratoga Knitting Mills. During the Vietnam War, the mill produced mosquito netting for the military. In the 1960s it was "Hillsboro Mills," and "Falk, Fibers, and Fabrics" in the 1970's. In 1987, it was acquired by Flynt Fabrics and was known as "Stokes County Yarn Company-Hillsborough Industries"; the mill closed in 2000.

Excerpted from Orange County 1752-1952, edited by Hugh Lefler and Paul Wager, published in 1953 by the Orange Printshop, Chapel Hill

Figure 1. Bellevue Branch Watershed/Project Boundary



2.2 Water Quality and Potential Impacts

Bellevue Branch is a second order, perennial stream that flows into the Eno River. Bellevue Branch does not have a specific water quality classification by NCDEQ, but the Eno River is classified as a water supply (WS-V) and nutrient sensitive water (NSW). As part of the watershed plan[1] for Bellevue Branch, three locations were sampled to determine water quality. Both water quality field parameters and macroinvertebrates present were collected. Details of the sampling are provided in the watershed plan, but generally Bellevue Branch is considered to have average to above-average water quality.

When the mills were in operation, wastewater was directly discharged to Bellevue Branch and the Eno River. Now that the mills are no longer in production, the most significant threat to the water quality of Bellevue Branch is stormwater runoff. Stormwater runoff pollution from the residential and commercial land uses are a concern. Fertilizer, bacteria and excess nutrients are the primary pollutants of concern. Additionally instream erosion and sediment are also a concern. Since there are several tracts with large amounts of impervious surface and no SCMs to help slow the velocity of the runoff, increased stream erosion is occurring. However, the watershed plan also indicated that Bellevue Branch is relatively stable in most places.

However, one particular area where there is a concern with instream erosion is within the Eno River, downstream of the confluence of Bellevue Branch. This section of the Eno River which is within the town's Gold Park, was channelized. The channelization occurred as part of the Resco Products mining operation. Originally that operation needed water from the Eno River. The channelization created a backwater area that presumably made it easier to pull out water for the mining operation. That process is no longer in place, but the channelized section of the Eno remains and is causing erosional issues and may be exacerbating flooding within the park.

MACROINVERTABRATES AND WATER QUALITY

Macroinvertebrates (e.g. aquatic insects) are often used as an indicator of water quality within a stream. Certain species are intolerant of pollution so their presence can indicate good water quality. Conversely, species that are tolerant of pollution may indicate poor water quality. Species such as mayfly, stonefly and caddisfly larvae are intolerant of pollution and thus indicate good water quality. Aquatic worms, midge larvae and leeches are tolerant of pollution and may indicate poor water quality. Macroinvertebrates are generally easy to sample and identify. Additionally, their presence indicates long-term water quality as opposed to simply conducting a one-time sample of chemical constituents in water which is really just a "snap shot" in time.

[1] Watershed Management Plan for Bellevue Branch, Hillsborough North Carolina UNC Capstone Project, Spring 2020

Another area of concern is upstream of Gold Park and just downstream of Eno Mountain Road. There is a low head weir dam and associated piping. This was all part of a raw water intake system used for the Eno River Mill. This infrastructure is no longer in use and impedes aquatic life movement.

Throughout the watershed, riparian buffer impacts are also a concern. Development that pre-dates 1997 did not have to adhere to the 50-foot riparian buffer that is now required. Invasive species are also a threat to the ecological integrity of the riparian buffer.

3.0 Watershed Improvement Projects

Watershed improvement projects include a wide range of project types. While focused on reducing pollution and excess nutrients found in stormwater runoff, projects that address multiple benefits are favored. Examples include stream and riparian buffer restoration and enhancement, invasive species management, pollinator habitat creation, aquatic habitat creation, removal of impervious surfaces, soil amendment, improving pollutant removal efficiencies of existing SCMs (i.e retrofits), rainwater harvesting, and land conservation. In other words, projects that promote nature based solutions and the use of green infrastructure are preferred. These types of projects not only improve water quality in a watershed, but they also benefit local ecosystems and citizens.

3.1 Site Prioritization/Identification

Multiple factors are considered when evaluating potential sites for watershed improvement projects. Those factors include:

- Property ownership;
- Pollution reduction potential;
- Existing land use;
- Ecosystem benefits;
- Nuisance flooding reduction;
- Site accessibility;
- Design complexity;

  and
- Estimated construction cost.

Potential sites are identified using both staff knowledge of the watershed and available Geographic Information System (GIS) data. That data includes aerial imagery, stream locations, soil types, land use, illicit discharges, property ownership and other readily available GIS data.

GREEN INFRASTRUCTURE

Green Infrastructure is an approach to stormwater management that works with the natural water cycle to enhance the ecosystem, community health, and quality of life. Basically, green infrastructure filters and absorbs stormwater where it falls. The approach uses natural components such as trees, plants, and soil amendments as opposed to piping runoff to water treatment plants. Green infrastructure combines engineering with nature based solutions to manage stormwater runoff.

Green infrastructure provides multiple benefits. These include increasing stormwater infiltration, reducing stormwater runoff pollution, reducing flooding, sequestering carbon, and moderating temperature. Green Infrastructure also improves aesthetics, provides wildlife habitat, and enhances biodiversity.

Staff utilizes that information to score and prioritize potential projects sites using the town's *Stormwater Retrofit Screening Form*. That form uses the factors listed above to provide a more quantitative assessment. Each factor is given a relative score. For instance, properties already owned by the town receive a higher priority over private properties. However, private properties may be feasible if the owner is a willing partner. Other key considerations include cost to complete the project and whether it corrects a significant source of stormwater runoff pollution.

3.2 Current Projects

Table 1 summarizes projects that have been completed or are currently in progress. Specific project plans and details are maintained electronically in a folder for each project. Table 1 provides a summary and will be updated as necessary. Current/completed project locations are also shown in Figure 2.

Table 1. Current and Completed Projects within Bellevue Branch Watershed

Project Name:	Gold Park GI
Location:	415 Dimmocks Mill Road, 36°04'14.4"N 79°06'38.8"W
Property Owner	Town of Hillsborough
Description:	*Stormwater wetland* – installed as part of park development. *Pollinator garden (bioretention)* – installed as part of park development; Hillsborough Garden Club converted it to a pollinator garden. *Compost blanket* – Installed in 2022 to eliminate erosion on slope near parking lot.
Ecosystem Benefits:	Nutrient/pollution reduction; runoff reduction; pollinator habitat; aquatic habitat; erosion reduction; educational/outreach opportunities.
Partners:	None
Status:	Complete

Project Name:	Roberts Heirs Parcel
Location:	611 Latimer Street, 36°04'38.9"N 79°06'53.1"W
Property Owner	Roberts Heirs
Description:	Conserve approximately 2 acres of land on Bellevue Branch
Ecosystem Benefits:	Land conservation; riparian buffer protection; future riparian buffer enhancement.
Partners:	Roberts Heirs
Status:	Property purchased by Town of Hillsborough

(*Table 1 continued next page*)

Table 1. Current and Completed Projects (continued)

Project Name:	Odie Street GI
Location:	Fairview Community, 36°05'31.8"N 79°06'59.9"W
Property Owner	Town of Hillsborough, Odie Street right-of-way
Description:	Design and install 7 bioswales; install 15 rain barrels and conduct educational workshops for residents.
Ecosystem Benefits:	Nutrient/pollution reduction; runoff reduction; pollinator habitat; rainwater harvesting; educational/outreach opportunities.
Partners:	Habitat for Humanity, Piedmont Conservation Council
Status:	Under construction

3.3 Future/Potential Project Sites

Future/potential projects have also been identified and are listed in Table 2. Since this is a "working" plan, projects may be added or deleted as necessary. Determining whether a future/potential project moves forward is discussed in *Section 4.0 Implementation* of this document. Once a project moves forward it will be listed in the Table 1. Current/potential project site locations are also shown in Figure 2.

Table 2. Future/Potential Projects within Bellevue Branch Watershed

Project Name:	Odie Street Stream Stabilization
Location:	Fairview Community, 36°05'31.8"N 79°06'59.9"W
Property Owner	Town of Hillsborough, Odie Street right-of-way
Description:	Stabilize approximately 200 linear feet of ephemeral/intermittent stream that crosses Odie St in the Bellevue Branch headwaters. The proposed design and construction will address observed impacts, including lack of riparian vegetation, channelization, and channel erosion. The stabilization will also improve drainage patterns and reduce the potential for nuisance flooding within the residential lots and along the street. This project is a second phase of the Odie Street GI project.
Ecosystem Benefits:	Stream restoration; nuisance flood reduction; aquatic habitat improvement; in-stream erosion reduction
Partners:	Habitat for Humanity, Piedmont Conservation Council
Status:	Existing conditions survey complete

(*Table 2 continued next page*)

Table 2. Future/Potential Projects (continued)

Project Name:	Daye Street GI
Location:	Fairview Community, 36°05'30.3"N 79°06'55.7"W
Property Owner	Town of Hillsborough Daye Street right-of-way
Description:	Install bioswale(s) and/or treatment swales within the Daye Street right-of-way.
Ecosystem Benefits:	Nutrient/pollution reduction; runoff reduction; pollinator habitat; educational opportunities.
Potential Partners:	Residents currently residing on Daye Street
Status:	Future project, not started

Project Name:	Redeye Parcel
Location:	505 Eno Street; 36°04'18.8"N 79°06'45.9"W
Property Owner	Vouthaus LLC
Description:	Remove old parking area, restore/enhance riparian buffer and install an SCM retrofit to treat impervious surface.
Ecosystem Benefits:	Nutrient/pollution reduction; runoff reduction; riparian buffer habitat; impervious surface removal.
Potential Partners:	Vouthaus LLC, Redeye Worldwide
Status:	Future project, not started

Project Name:	Kenion Grove Retro-fit
Location:	Kenion Grove Subdivision, 36°05'10.6"N 79°06'33.4"W
Property Owner	Kenion Grove Homeowners Association
Description:	Convert existing dry detention basin to a stormwater wetland.
Ecosystem Benefits:	Nutrient/pollution reduction; aquatic habitat
Potential Partners:	Kenion Grove HOA
Status:	Future project, not started

(*Table 2 continued next page*)

Table 2. Future/Potential Projects (continued)

Project Name:	Central Elementary
Location:	154 Hayes Street, 36°04'49.1"N 79°06'58.3"W
Property Owner	Orange County Board of Education
Description:	Riparian buffer enhancement; land conservation
Ecosystem Benefits:	Land conservation; riparian buffer protection; invasive species removal; riparian buffer enhancement
Potential Partners:	Orange County Schools; Piedmont Conservation Council; Orange County Government
Status:	Future project, not started

Project Name:	Eno River Brewing
Location:	329 Allison Street, 36°04'07.3"N 79°06'49.8"W
Property Owner	Eno River Brewing
Description:	Bioretention; native plantings; riparian buffer enhancement
Ecosystem Benefits:	Pollution reduction; pollinator habitat
Potential Partners:	Eno River Brewing
Status:	Future project, not started

Project Name:	Eno Dam Removal
Location:	Downstream of Eno Mountain Road; 36°04'05.2"N 79°06'53.1"W
Property Owner	NCDOT
Description:	Removal of dam and associated water intake structures
Ecosystem Benefits:	Aquatic habitat improvement; aquatic species movement; sediment reduction
Potential Partners:	NCDOT
Status:	Future project, not started

(*Table 2 continued next page*)

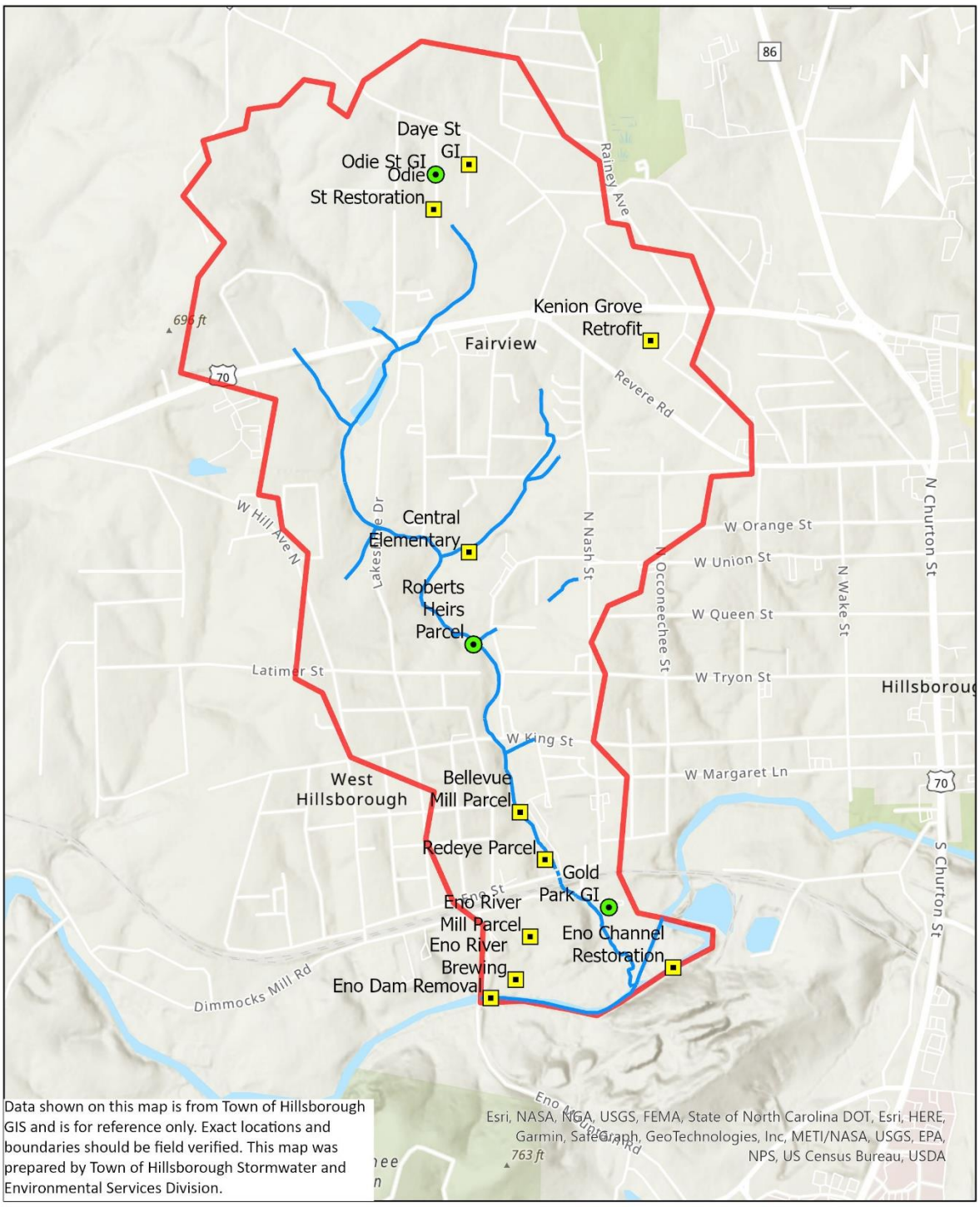
Table 2. Future/Potential Projects (continued)

Project Name:	Eno Channel Restoration
Location:	210 Piedmont Drive; 36°04'06.5"N 79°06'34.1"W
Property Owner	Resco Products, Inc.
Description:	Restore original channel of Eno River
Ecosystem Benefits:	Stream restoration; flood reduction; floodplain improvement; aquatic habitat improvement; in-stream erosion reduction
Potential Partners:	Resco Products
Status:	Future project, not started

Project Name:	Bellevue Mill Parcel
Location:	206 S Nash Street; 36°04'23.1"N 79°06'49.7"W
Property Owner	Bellevue Mill, LLC
Description:	Riparian buffer expansion and enhancement; disconnected impervious surface
Ecosystem Benefits:	Nutrient/pollution reduction; runoff reduction; riparian buffer habitat; impervious surface removal.
Potential Partners:	Bellevue Mill Apartment LLC
Status:	Future project, not started

Project Name:	Eno River Mill Parcel
Location:	437 Dimmocks Mill; 36°04'10.8"N 79°06'48.5"W
Property Owner	Eno River Mill, LLC
Description:	Bioretention; pollinator gardens; filttera tree boxes
Ecosystem Benefits:	Nutrient/pollution reduction; runoff reduction; pollinator habitat
Potential Partners:	Eno River Mill, LLC; building tenants, The Expedition School
Status:	Future project, not started

Figure 2. Bellevue Branch Watershed Current and Future Projects



4.0 Implementation

As part of the annual Stormwater and Environmental Services Division budget process, the list of future projects will be assessed to determine whether they are feasible and when funding is available. Projects may be added or deleted as necessary. For instance, if landowner of an identified project site decides against the project, it may be determined to be unfeasible and deleted. If another possible site is identified, it will be added. Once a project is determined to be feasible, a detailed project plan is developed and funding options determined. Ultimately, available funding will determine if a future/potential project is moved to the current project list. Table 3 provides a summary of project implementation status.

Table 3. Project Implementation Status Summary

Project Name	Next Step(s)	Date
Gold Park GI	Completed Operation & Maintenance Education & Outreach	10/4/2022 Ongoing Ongoing
Roberts Heirs Parcel	Property Purchased Evaluate riparian buffer enhancement	06/20/2020
Odie Street GI	Funding secured – EEG grant obtained through PCC Design Completed Construction Begun Monitoring – funding secured by NC State Education and Outreach	1/10/2022 6/22/2022 10/31/2022 TBA Ongoing
Odie Street Stream Stabilization	Existing Survey Conditions Completed Grant funding submittal Design Construction	2/1/2023 3/1/2023 5/31/2023 TBD
Redeye Parcel	Contact Redeye Complete Initial Design Investigation Determine Funding Options	TBD
Kenion Grove Retro-fit	Contact Kenion Grove HOA	TBD
Central Elementary	Contact OC School District Staff	TBD
Eno River Brewing	Discuss project ideas with owner	TBD
Eno Dam Removal	Determine ownership of the dam and infrastructure Contact owner to determine willingness to remove Complete assessment and design Determine Funding Options	05/31/2023
Eno Channel Restoration	Contact Resco to determine interest and feasibility	05/31/2023
Bellevue Mill Parcel	Contact owners to determine interest	TBD
Eno River Mill Parcel	Contact owners to determine interest	TBD
Daye Street GI	Reach out to property owners once Odie St GI project is complete	TBD