I. Project Information*

Project Director	Rebeca de Jesus Crespo
Project Title	Linking Coastal-Watershed Resilience to Urban Reinvestment: Build Baton Rouge and Louisiana Watershed Initiative Region 7
Project Location	City of Baton Rouge–Parish of East Baton Rouge, Louisiana Watershed Initiative Region 7, Amite River Basin

Project Summary	Climate driven events have caused massive population displacements across the U.S., triggering spikes in housing demand into safer “receiving communities.” The resulting urbanization patterns often reflect our history of segregation and car-oriented development, leading to urban disinvestment and sprawl, which in turn contribute to additional environmental hazards, such as floods, and exacerbate social inequalities. Proactive planning approaches are needed for urban development that is informed by climate resilience and housing equity. For this purpose, our study will develop a decision-support tool for classifying parcels within a region in terms of their urban revitalization and flood hazard mitigation potential. We will evaluate legal, planning, and policy instruments to propose ways for implementing this decision-support tool in the creation of new land disposition policies that maximize social, financial and environmental resilience. We will conduct our study in East Baton Rouge (EBR), Louisiana, a receiving community in the aftermath of Katrina, and partner with the Louisiana Watershed Initiative and Build Baton Rouge (BBR). Our focal program will be the BBR Land Banks, a program to return vacant, abandoned and/or deteriorated (VAD) properties into productive use in alignment with community needs. Our partners will help inform the project through stakeholder engagement efforts aimed at reevaluating land development needs, crowdsourcing data and information, and developing capacity as it relates to the planning and decision-making process. Our project outputs will help improve resilience of historically segregated and underinvested communities and increase the equity considerations applied to the reuse of VAD properties in receiving communities.

II. Progress Report Questions

1. Please revisit your proposal and review your goals and the outcomes you were seeking to achieve through this grant. How successful were you in meeting your goals? Please assess your success against the criteria you set in your proposal and use any combination of anecdotes, stories, graphs, charts, visuals as well as data to explain your success. Upload supporting files if you choose.*

We developped a desicion support tool for linking flood resilience to urban redevelopment in the Amite River Basin, the watershed that includes the city of Baton Rouge, Louisiana. Our desicion support tool is available to the public in the following dashboard: https://www.arcgis.com/apps/dashboards/140ec398f6504ccab93ef7d69e072044

We describe the tool development process in detail in the report attached.

We have worked closely with the partner organizations (Build Baton Rouge, Capital Region Planning Commission) through the process. They envision using the tool in their practice and their feedback has helpped improve our work and continuous to do so. We will continue to work closely with these organizations for implementing the tool.

We conducted stakeholder engagement events and a policy analysis for the city. The goal for these activities was to identify barriers and opportunities for implementating our tool and using data for desicion making. Our findings are summarized in the attached report.

We evaluated socio-demographic predictors of flood exposure in the study area, and summarized our findings on a manuscript, which was submitted for review to Environmental Research Letters.

Overall, we were able to succesfully acomplish our main goals for this project.

Optional File Upload

ConsolidatedReport_08302024.pdf

Filename: ConsolidatedReport_08302024.pdf **Size:** 1.4 MB

2. How has your work benefited your organization, professional field, community, or other stakeholders?*

1. We established a novel collaboration between LSU, Capital Region Planning Commission and Build Baton Rouge that has become stronger over time and benefits the goal of linking knowledge to action. We are planning on continuing this collaboration.
2. We have trained graduate students in policy (Georgetown University Climate Center), urban planning (New York University Center for Urban Science), and Environmental Science (Lousiana State University).
3. We have developed a tool that addresses the barriers identified for using data and implementing flood resilience goals in the city (e.g., integrating data files into a composite index, using vetted models accessible across the USA, and creating an easy-to-navigate dashboard). The tool can be replicated in other locations in the USA.
4. We identified barriers to applying desicion support tools, both in terms of policies and regulations, as well as financial/human resource limitations.
5. We researched the linkages between flood exposure and socio-demographic factors across the study area, allowing decision-makers to account for equity considerations in flood resilience planning.

3. Are there any other successes related more broadly to this project that you would like to share with us?*

1. A decision support tool: https://www.arcgis.com/apps/dashboards/140ec398f6504ccab93ef7d69e072044
2. A replicable process for applying this decision support tool in other locations.
3. A case study on barriers for the implementation of decision support tools (Manuscript In. Prep).
4. A research manuscript: Socio-demographic predictors of flood exposure in the Amite River Basin during the 2016 Louisiana (USA) Floods (Submitted to Environmental Research Letters; ERL-119290).
5. Several presentations in scientific conferences related to our work with this project. A list of these may be available upon request.

4. What did you learn (positive or negative) as a result of this grant? What lessons would you share with other organizations or the field at large?*

1. Positive: Stakeholders in our study area were happy to collaborate, provide information and have academics provide supportive research to their organizations. The support from stakholders across many different agencies was much greater than anticipated.
2. Negative: Meaningful outputs require longer-term engagement than the 18 months of the grant. It takes time to build trust between academics and practitioners, and it takes time for team members to get on the same page. We spent around 2 years working on this project, and I think we were successful because we had very specific and tractable goals in mind. However, we still found it hard to complete these goals in the 18 month period and had to request extensions. The biggest problem we faced was a high rate of staff turnover in several of the partnering organizations. This is a difficult challenge to overcome and further complicates implementing a project in a short time window.

5. How do you characterize your relationship with the GRP and what suggestions do you have for improvement?*

The GRP personnel has been supportive, informative and responsive through this process. The GRP program has helped expand my network and the awards I have received from GRP have expanded my visibility and recognition as a researcher.

6. Please provide any other feedback or comments you have for the GRP.*

I have been very pleased with this program overall.

7. If applicable, please identify and describe the ways you or your organization leveraged GRP's grant (e.g., other funders, volunteers who worked on the program, in-kind donations etc.) Please specify the value and/or number/hours of volunteers if possible.

(No response)

Linking Flood Resilience to Urban Re-Investment: Tool Development

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Background

The *Flood Resilient Redevelopment* Index aims to facilitate the application of existing models in the management of flood risk and the promotion of smart growth principles. The index is intended to help decision makers plan for sustainable development and climate resilience in urban environments.

To develop this index, we linked three existing decision support instruments: InVEST Flood Risk Mitigation Model (1), USEPA Walkability Index (2), and First Street Foundation Flood Factor ™ (3) into one composite value at the parcel scale. We also considered the parcel area in acres as a decision criterion for prioritizing development locations. The resulting index presents relative urban redevelopment prioritization values. We applied it within one focal watershed, the Amite River Basin (ARB) in Southeast Louisiana, USA. The results for this study area can be visualized in our project dashboard (4).

In this document we provide a brief overview of our rationale, and the steps to replicate the process in other locations within the USA.

InVEST Urban Flood Risk Mitigation: Runoff Retention Ecosystem Services

Runoff retention by natural vegetation provides flood risk mitigation ecosystem services in urban environments (5). This ecosystem service should be valued and incorporated into flood-resilient planning. Parcels with high runoff retention capabilities should be enhanced and regarded as a natural asset of a city providing tangible public benefits.

The Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) Urban Flood Risk Mitigation (UFRM, 1) model can be used to estimate runoff retention ecosystem services. This model is based on the curve number, a parameter derived from land use land cover, and soil composition, which estimates runoff production (and retention) during pre-defined design storm events (6). This method is widely accepted and applied currently in development practice. For example, the Louisiana Department of Transportation and Development (DOTD) recommends the Curve Number method as a potential way to estimate runoff during their hydraulic design process (7).

The output of the InVEST UFRM model includes a raster file (30m pixel resolution) representing runoff retention estimates in cubic meters (m^3) across the entire extent of the study area (i.e. the Amite River Basin), for a given rain event (8). Another output is a shapefile of total runoff retention within each study unit (i.e. parcels). Details of the computations conducted to generate these outputs can be found in the InVEST UFRM users' manual (1). A list of inputs required to run this model is included in Table 1.

Table 1. InVEST UFRM model input variables and sources. For more details, refer to the user guide (1).

Inputs	Description	Source
Area of Interest	A map of the area over which to aggregate the final results. Here we have used the watersheds and parcels.	Watersheds: https://www.usgs.gov/national-hydrography/access-national-hydrography-products Parcels Baton Rouge: https://ebrgis.maps.arcgis.com/home/search.html?restrict=true&sortField=relevance&sortOrder=desc&searchTerm=parcels#content
Land Use Land Cover	A Land Use Land Cover map in raster format. The raster values must have corresponding entries in the Biophysical Table (see below).	https://www.usgs.gov/centers/eros/science/national-land-cover-database
Soil Hydrologic Group	A map of soil hydrologic groups in raster format. The raster pixels should have values 1, 2, 3, or 4, corresponding to soil hydrologic groups A, B, C, or D, respectively.	https://www.arcgis.com/home/item.html?id=be2124509b064754875b8f0d6176cc4c
Biophysical Table	A table of curve numbers for each LULC class. All LULC codes in the LULC raster must have corresponding entries for each soil group.	NRCS TR-55. 1999. Urban Hydrology for Small Watersheds. https://www.nrc.gov/docs/ML1421/ML14219A437.pdf. Extracted CN tables also at https://www.hec.usace.army.mil/confluence/hmsdocs/hmstrm/cn-tables.
Rainfall Depth	The depth of rainfall for the design storm of interest.	https://hdsc.nws.noaa.gov/pfds/

Flood Factor™: Flood Risk

A property's flood risk is often characterized by FEMA's Special Flood Hazard Area SFHA, which represents the 100-year flood plain (9). Properties within the FEMA SFHA have a high risk of flooding, and as such, these are locations for which mortgage lenders require proof of flood insurance (10). Outside the SFHA, some areas are also flood-prone, especially during events that exceed the 100-year recurrence interval. These events are expected to become more common due to climate change (10).

New models are available across the United States to represent flood risk accounting for climate change scenarios. In particular, First Street Foundation's Flood Factor ™ (3) provides a ranking of 1-10 at the property level, classifying properties as having minimal to extreme risk of flooding based on the probability of flooding, and the depth of the potential floods during the next 30 years. Their models account for future scenarios and for all major types of flooding (pluvial, fluvial, storm surge, etc.) (10).

Flood factor ™ scores for properties are readily available online through First Street Foundation's online tool (3). Access to Flood Factor ™ raw data to conduct our analyses was possible thanks to a license acquired by our partners the Capital Region Planning Commission (ID: e ID: 6B7C8AB1-14D6-43CA-BA60-1B1712E60318).

EPA National Walkability Index: Smart Growth

The principles of smart growth call for cities that offer walkable neighborhoods with access to multiple transportation choices (11). They also call for compact building designs within existing urban communities, while preserving critical natural areas (11). The USEPA developed the National Walkability Index (NWI) to facilitate the application of smart growth principles. The NWI incorporates proximity to transit,

pedestrian-oriented intersections, and existing employment and housing opportunities into a score ranging from 1-20, from least to most walkable (12, Table 2).

Table 2. National Walkability Index scores and definitions. For more details, refer to the use guide (12).

National Walkability Index Scores	Definitions
1-5	Least Walkable
6-10	Below Average
11-15	Above Average
16-20	Most Walkable

We will use the NWI as an indicator of smart growth for this project. The NWI data is available at the census block group level throughout the United States (12,13). We linked the NWI data to the parcels of the ARB. A complete description of this index is provided in the user manual (12).

Flood Resilient Redevelopment Index: ArcGIS Suitability Analysis

We combined flood mitigation, flood risk, and smart growth indicators into a *Flood Resilient Redevelopment Index*. We used ArcGIS Suitability Analysis to calculate the index. The suitability analysis workflow is fully defined in the ArcGIS Business Analyst help page (14). Briefly, the variables of interest are classified in terms of the direction of influence (positive or negative) and their relative weight of importance. We classified our variables in this manner as detailed in Table 3. We attributed equal weight of importance (30%) to the main factors of interest: flood risk, runoff retention, and walkability. We attributed the remaining 10% to the parcel area. According to the smart growth principles of compact building design, land use mixes, and walkability, single projects should be encouraged to be embedded in the existing urban infrastructure (11). This goal may be facilitated by focusing on redeveloping smaller parcels. On the other hand, flood mitigation may be maximized by conserving larger, open spaces whenever possible.

For the *Flood Resilient Redevelopment* index, we assigned a positive influence to walkability and a negative influence on all the other parameters. Therefore, a small parcel with high walkability, low flood risk, and low runoff retention would score high for flood-resilient redevelopment. Changing the direction of influence on these four parameters could generate other indices of interest. For example, we can calculate a *Flood Resilient Conservation* index, by assigning a positive influence to flood risk, runoff retention and size, and a negative influence to walkability (i.e. large parcels that are flood-prone, retain a lot of runoff, and have low walkability, would score high for *Flood Resilient Conservation*).

Table 3 summarizes the relative weights we suggest assigning to each parameter, and the direction of influence depending on the final goal.

Table 3. Flood Resilient Index parameters, weights, and direction of influence based on end goals.

Variables	**Weights**	**Flood Resilient Indices (Direction of Influence)**		
		Redevelopment	Conservation	Green Space
Flood Risk	30%	-	+	+
Runoff Retention	30%	-	+	+
Walkability	30%	+	-	+
Area	10%	-	+	+,-

The score for each factor per site is achieved through the Equations below:

$$Site\ score\ for\ positive\ influence = \left(\frac{variable\ value\ for\ a\ site - minimum\ value}{maximum\ value - minimum\ value}\right) * Variable\ Weight$$

$$Site\ score\ for\ negative\ influence = \left(\frac{maximum\ value - variable\ value\ for\ a\ site}{maximum\ value - minimum\ value}\right) * Variable\ Weight$$

The final score per site, is the sum of all of the weighted scores for each of the four factors.

Steps for replicating the calculations

The process that we followed in the ARB can be replicated in other locations within the United States. We outlined the detailed steps to calculate these indices in the following section. The steps require intermediate to advanced experience with ArcGIS software, and access to the Microsoft Windows operating system (17).

Part I. Characterize each parcel in terms of the parameters of interest.

1. Download and run the **InVEST UFRM** (1) (https://naturalcapitalproject.stanford.edu/software/invest/invest-models). Use parcels as the area of interest. The output should contain a shapefile with a name similar to "flood risk service x". The x should be the user-defined suffix that would help identify the details of the scenario. For example, in this case, it may be called "flood_risk_service_parcel_4inch_event". We will use this as our example, but the suffix can be changed anytime, based on the area of interest and design storm.
2. The resulting shapefile will have an attribute titled: "rnf_rtn_m3". This is the attribute of interest here and contains the runoff retention in cubic meters.
    a. Load the "flood_risk_service_parcel_4inch_event" shapefile in Arc GIS
    b. Load the original area of interest shapefile as well (i.e. parcel.shp).
    c. **Add Spatial Join** (Arc GIS tool) on the "parcel.shp" to link the "flood_risk_service_parcel_4inch_event.shp". Use the match option "have their center in" or "is identical" for better results.
        i. The "parcel.shp" will now have linked the values from the InVEST model outputs. To make the values stay there permanently do the following:
            1. **Add a new field** on the "parcel.shp". Name it accordingly. For example "RR_m34in" could denote runoff retention in cubic meters for a 4inch rain event. The file names should follow ArcGIS convention are described elsewhere (16). The field should be "double" or "float" type. Save the new field.
            2. Once the field is in the attribute table, right-click on it to do a **"calculate field**". Make the field equal to the joined "rnf_rtn_m3". This is to copy the values from the joined table into the new field permanently.
            3. **Remove all joins**. Now your "parcel.shp" will have runoff retention values associated with it.
            4. **Check Results**: more details on how to check and address null values on Step 5.
3. Download **National Walkability Index data** from the state of interest here (13): https://edg.epa.gov/EPADataCommons/public/OA/WalkabilityIndex.zip

a. The data will be at the census block group level. Therefore, all parcels within the same block group should have the same value.
b. **Add Spatial Join** (Arc GIS tool) on the "parcel.shp" to link the National Walkability Index data to each parcel. Use the match option "have their center in" for better results.
    i. The "parcel.shp" will now have linked the values from the National Walkability Index. To make the values stay there permanently do the following:
        1. **Add a new field** on the "parcel.shp". Name it accordingly. For example "WalkInd". The names should follow ArcGIS convention as described elsewhere(16). The field should be "double" type. Save the new field.
        2. Once the field is in the attribute table, right-click on it to do a **"calculate field**". Make the field equal to the joined "NatWalkInd". This is to copy the values from the joined table into the new field permanently.
        3. **Remove all joins**. Now your "parcel.shp" will have walkability values associated with it.
        4. **Check Results**: more details on how to check and address null values on Step 5.

4. **Flood Risk** can be calculated with Flood Factor ™ or FEMA Special Flood Hazard Area.
    a. If using Flood Factor ™
        i. Flood Factor ™ Disclaimer: Environmental risk data is provided by First Street™. First Street models are designed to approximate risk and not intended to include all possible scenarios.
        ii. Flood Factor ™ raw data can be accessed by purchasing a license with First Street Foundation (10). The data may be available as a spreadsheet with latitude and longitude data. Use these coordinates and the **Add XY coordinates** tool in ArcGIS.
        iii. Once the values are in point format (with their associated Flood Factor ™ scores), do a spatial join to the parcel.shp using the "intersect" match option. Follow the steps described in 1.c and 2.b. (Add a new field, calculate field, remove all joins) to add the Flood Factor ™ scores to the "parcel.shp" permanently.
        iv. **Check Results**: more details on how to check and address null values on Step 5.
    b. If using FEMA SFHA
        i. Download the FEMA SFHA layer from here (17) https://www.fema.gov/flood-maps/national-flood-hazard-layer
        ii. **Add a new field** to this layer called Flood Risk (numeric, short integer).
        iii. Classify flood risk numerically as follows:
            1. **Select by attributes** all features classified within the 100-year flood: Zone A, Zone AO, Zone AH, Zones A1-A30, Zone AE,

Zone A99, Zone AR, Zone AR/AE, Zone AR/AO, Zone AR/A1-A30, Zone AR/A, Zone V, Zone VE, and Zones V1-V30. Once these fields have been selected, right-click on the new "Flood Risk" field and click "**calculate field**". Make the selected features equal 10 (as in high flood risk). Once the values are added to the selected features, you may turn off the selection using "**clear**".

2. **Select by attributes** all features classified as moderate flood hazard areas: Zone B or Zone X (shaded). These are the areas between the limits of the base flood and the 0.2-percent-annual-chance (or 500-year) flood. Once these fields have been selected, right-click on the new "Flood Risk" field and click on "**calculate field**". Make the selected features equal 5 (as in moderate flood risk). Once the values are added to the selected features, you may turn off the selection using "**clear**".
3. **Select by attributes** all features classified as having minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood: Zone C or Zone X (unshaded). Once these fields have been selected, right-click on the new "Flood Risk" field and click on "**calculate field**". Make the selected features equal 1 (as in minimal flood risk). Once the values are added to the selected features, you may turn off the selection using "**clear**".
4. The result should be a new column "Flood Risk" with areas inside the FEMA SFHA classified as having a flood risk of 10, areas within the 500-year flood plain classified as having a flood risk of 5, and areas within higher ground classified as having a flood risk of 1.

iv. Once the flood risk is in numerical form, do a **spatial join** to the parcel.shp using the "intersect" match option. Follow the steps described in 1.c and 2.b. (Add a new field, calculate field, remove all joins) to add the Flood Risk scores to the parcel permanently.

v. **Check Results**: more details on how to check and address null values on Step 5.

5. **Parcel area** can be calculated directly within the "parcel.shp".
   a. **Add field** type numerical "double". Name it for example "AreaAcres". Save.
   b. Right click on the new field and click on "**Calculate Geometry**" and select area in acres.
6. **Check Results**: The result of steps 1-4 should be a "parcel.shp" with data on runoff retention, walkability, flood risk, and area for all parcels. During this process, you may end up with some null values. These are often due to a failure of the **Spatial Join**. Reasons for a failure of the Spatial Join include choosing an inadequate match option for certain parcels. For example, "have their center in" may not work for places with geometries where the center is hard to determine. In cases such as these, it is

recommended to conduct separate join processes for these problematic locations. Another issue could be that the parcel has no data for some of the parameters of interest. In cases such as these, we recommend adding the values of the nearest parcel, or conducting an interpolation process to infer the values (18).

Part 2. Run the Suitability Analysis in ArcGIS.

1) In ArcGIS click on the tool "Make suitability analysis layer". This tool is part of "ArcGIS Business Analyst" therefore this license should be enabled. The input feature will be the "parcel.shp" with all the variables, created in Part 1 of this guide.
2) Once this layer is created, you will see a "Suitability Analysis" tab in the upper right panel. Click on that tab.
3) Once there, **Turn off the auto-calculate** option
4) Then in the criteria tab, click "**Add Criteria**" and choose "**Add fields from Input Layer**". Add the fields specified in Part 1 (Flood Risk, Runoff Retention, Walkability, Area).
5) In the suitability criteria panel, specify the weights for each of the variables (Table 3). Click on "Additional Options" to specify if the influence is positive or negative (i.e. positive, inverse).
6) Click calculate. Note that it may take a few hours to complete the calculation depending on the size of the area of interest and the computer's capabilities.

The output layer will include several values which are described in more detail elsewhere (19). We will use the "Final Score" as our index. This new suitability layer is only on the map temporarily. Export it into a new shapefile to store permanently. In addition, **Spatial Join** to the layer "parcel.shp" using the match options "Is Identical to" or "Has their center in". Add a new field as described in Part 1 (1.c and 2.b.) to add the "Final Score" to the parcel layer.

The final score is on a scale from 0-1. It is a comparative value among other units within the area of interest. Therefore, the scores for a site only make sense relative to other sites within the same study area.

Final Notes

Our *Flood Resilient Redevelopment* index is meant to assist decision-makers in selecting parcels that are suitable for redevelopment or conservation. It is based on pre-existing models that have been vetted, are based on sound science, and are the result of rigorous work by reputable agencies. The index is not meant to replace existing policies or regulations. We recommend using it in conjunction with other existing datasets and models that could provide a more holistic view of the decision context on a case-by-case basis. For more information regarding this index, please contact the project PI Dr. Rebeca de Jesús Crespo, rdejesucrespo1@lsu.edu.

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Linking Flood Resilience to Urban Re-Investment: Outreach and Engagement

By Manny Patole

We conducted stakeholder engagement and outreach activities to help inform the development of our decision support tool: Flood Resilient Redevelopment Index (https://www.arcgis.com/apps/dashboards/140ec398f6504ccab93ef7d69e072044).

Our outreach and engagement activities consisted on a set of interviews with key stakeholders and a demonstration workshop. These activities were reviewed and approved by the LSU Internal Review Board: IRBAM-22-0313

1. Interviews

We conducted interviews with stakeholders who we felt were data consumers and producers, those who would potentially use a tool like this as part of their day-to-day work. Between April and May 2023 we interviewed organizations and institutions who had direct day-to-day work in the land use space in Amite River Basin within East Baton Rouge Parish, such as Build Baton Rouge (BBR), Huey and Angelina Wilson Foundation (HAWF), Capitol Region Planning Commission (CRPC), East Baton Rouge Planning Commission (EBRPC), The Park and Recreation Commission for EBR (BREC), Mayor-President of the City of Baton Rouge and East Baton Rouge Parish (Mayor's Office), and Amite River Basin Commission (ARBC. Although we did extend the invitation to others who work in this space, availability, and capacity prevented them from participating.

We scheduled 90-minute interviews within a 2-month window. We standardized the process through a script. The demonstration of the tool was kept static for each interview for three reasons: consistency of presentation, prevention of any connectivity issues related to virtual presentation, and visualization/computational lag related to the device and location of presentation hosts. Our approach was as intentional substantively as it was administratively.

Our script consisted of introductions, review of the project and purpose, introductory questions about land use and data, demonstration of the tool, and final reflections. After introducing ourselves and introductions by the stakeholders, we read the same description of the project and the asked the following questions in advance of the demonstration:

- Who are you and what is your role in land use decision making in Baton Rouge?
- What are some barriers to your work in Baton Rouge?
- What data, indices, etc do you use to inform your work and decision making?
- How does qualitative/quantitative data inform your work and decision making?
- How does qualitative/quantitative data provide solutions or create barriers in your work?

After the demonstration we asked questions about what they saw:

- What are your general thoughts about the tool as presented today?
    - What did you like? Why?
    - What would you change? Why?
- Considering your role in land use development and what you just saw today…
    - How would you use this tool in your day-to-day work?
    - Who would be the users of this tool?
    - What adjustments to the datasets presented would you make to make it more useful for your work?"

The stakeholders interviewed provided the O&E team robust qualitative insight on the functionality of the tool to improve its utilization by those working in the land use space. There were a few common themes presented during the process as well as one-off comments worth noting that are shared below.

Responses

Based on our pre-demo questions, a few common themes emerged related to resources, data, and political environment.

Resources

New policies enacted, new projects initiated, new programs implemented require people and money. Resources, or lack thereof, was one of the strongest themes when asked about barriers to their work generally and as it relates to data. The resource constraints can be divided into financial and human.

As a barrier those interviewed across the board immediately mentioned financial constraints to do what they need to do or asked to do. The primary issue was having enough money and how it limits their ability to fulfill their mission through hiring people or purchasing tools. For some of our interviewees, their budgetary constraints are strongly linked to the political environment, which will be discussed later. Additionally, those interviewed state they experience a disconnect of what is asked of them as compared to resources allocated to accomplish those asks. Financial resource issues are also linked to the sources of funds: restricted funds for specify program/project types, limitations on administrative overhead, not enough to do what is asked, no funds provided for monitoring and evaluation that would create data for future uses.

Those interviewed all discussed the need for people to do the work. The human resource is three fold: total personnel needed, bandwidth of existing personnel, and capacity limitations of personnel. To the first point all interviewed stated they had open positions to fill. The pandemic and great resignation exacerbated the primary reason for the shallow labor pool in Baton Rouge: low salaries. It was mentioned that the state of Louisiana is among the lowest in average salary for planners and related fields and within the state Baton Rouge is at the bottom. This leads to the second issue - bandwidth of existing personnel. The numerous vacancies in some of these organizations creates a structural cap on operational bandwidth of current employees. The cap can result in low quality and delayed progress of existing work. Furthermore, the number of personnel and their bandwidth can impact the priority of corresponding staff across agencies focused on

similar projects to move work forward. Lastly, both of these human resource issues lead to the third, personnel capacity. The speed of technology requires personnel to keep up with the latest methods and policies around this work. However, fewer people with limited time means existing personnel may not have the necessary time for professional development.

The resource issues have a knock-on impact data, the second main barrier discussed by those interviewed.

Data

Our conversations highlighted some issues related to Enterprise Data Management. Discussed earlier, lack of financial and human resources can and will impact data quality, accessibility, and integration. EDM is crucial for any enterprise, like local governments, to build a standardized system to source, monitor, manage, store, access, secure, and share data across functions. However, many governments did not have the resources (time/money/people/capacity) to create a plan for EDM infrastructure. In an ideal scenario where EDM is implemented, it helps all organizations and institutions to streamline operations, make better decision-making in real time, create space for innovation, better response to customer needs and market changes, improve regulatory compliance, and reduce operating costs. Many of the points raised by the interviewees relate to some of these aforementioned, specifically data quality, integration, and master data management.

Data received from disparate sources or created internally can be unorganized, unstructured, incomplete, or even inaccurate. As a barrier those interviewed mentioned data quality as a concern. Given the resource constraints and capacity issues the ability to maintain quality control/quality assurance of all data sources is understandably limited.

To make the most of any data, it is important that data be received from different sources and formats and integrated into a centralized repository for easy access. As a barrier those interviewed discussed the difficulty to crosswalk data within organizations in Baton Rouge as well as between bureaucratic levels (state, regional, federal). For example, the different administrative boundaries of EBR Parish, ARBC, and CRPC are not the same and as a result may have different values for similar queries. Furthermore, the taxonomy and nomenclature may differ between these institutions which can cause integration problems.

Integration is a result of data coming from disparate silos and can be addressed by master data management (MDM), the process where data is organized, categorized, centralized, and transformed. As a barrier those interviewed did not directly mention MDM as a concern but many of their comments can be linked to it. MDM can help with the quality of the data as well as make data-driven solutions easier. Furthermore, the ability to bring about uniformity in other data, facilitate analytics and may eliminate data redundancies.

It is important to mention here that our project is intentionally utilizing open source data for scalability and replicability of the tool in other locations. In addition, Baton Rouge part of Bloomberg Philanthropies City Data Alliance and will leverage these networks to advance their local government innovation. That said

Political environment

Local politics and the political environment plays a pivotal role in shaping the development and execution of essential planning projects within a community. These projects encompass infrastructure development, urban planning, and public services, and their success hinges on the decisions and actions of local political leaders. As a barrier those interviewed mentioned how the political environment exerts a significant impact on planning projects by shaping funding, policies, and priorities, all related to the previous barriers mentioned. We stated the financial resource issues earlier but it was internally focused. From the external perspective, those interviewed discussed the idealistic view of government and how it should/could do everything however many do not want to provide the money to do so, usually through taxes and fees. The result is a perceived catch-22 where organizations either do not have enough to provide the right level of service or increase the tax burden on citizens. In reality, there is only one choice in politics and that is to stay in office, which means agencies are often asked to do more with less.

Most political environments have an institutional culture that draws strength from how things have been done for so long. The aforementioned statement often raises conflicts between doing what is best for the future of a city versus what is best for the current political machine. For example, the idea of limiting floodplain development is a sound social, economic and environmental policy but politically is dangerous. Moreover, another concern (less a barrier) was how to address a planning issue larger than one organization that spans multiple jurisdictions. Using the floodplain development example again, political silos can impact strategic plans that have ripple effects many do not understand (ie progress on project, cooperation issues between organizations). The result is a communication challenge for the boots on the ground with direct leadership around the conflict between job security and institutional efficacy.

In summary, the interviews conducted with various stakeholders, including representatives from the Amite River Basin Commission, BREC, and others, highlight a comprehensive approach to addressing flood risk and urban development through data-driven decision-making. The participants emphasized the integration of diverse data sources, such as GIS, census data, and public engagement, to inform community development plans. They acknowledged the importance of real-time data generated by departments like the Department of Development and the GIS team. Overall, the interviews underscored the critical role of data in enhancing flood resilience and urban development, while also highlighting the need for improved tools and processes to overcome existing barriers.

2. Workshop

The workshop was held on June 13, 2023, and began with a welcome and a basic overview of the project. This was followed by introductions, including team members and participants, facilitated through an icebreaker activity. Short presentations by the team were next, where each member provided a 10-minute outline of their role in the project, the objectives of their research component, the methods used, current results, and next steps. These presentations were divided into three focus areas: Data, Policy, and Community, with a general Q&A session afterward.

After a 15-minute break, we demonstrated our Flood Resilient Redevelopment tool. Computers and devices were distributed to participants, and the basics of the tool and its indices were reviewed. Participants had the opportunity to interact with the tool and complete a survey about their experience, followed by a final Q&A session.

Based on interactions with participants and their feedback we organized this qualitative data into five main buckets:

1. **Tool Utility and Development Potential**: The tool is generally well-received and viewed as promising, especially if it could be applied to all parcels within the parish and include a standardized redevelopment difficulty rating. Users are excited about the reconnection index and the potential to incorporate data layers for planning, such as repetitive loss layers and BREC data. The ability to compare parcels and overlay multiple layers is also highlighted as a significant enhancement.
2. **User Interface and Data Presentation Concerns**: There are concerns about the clarity and readability of the tool's layers, particularly when similar colors are used, such as with flood factor and adjudicated properties. Ensuring that the tool's interface is user-friendly is crucial, including making sure that important details like addresses appear in pop-ups and that layers can be easily toggled and compared.
3. **Public Outreach and Terminology**: The terms used, such as "redevelopment suitability," may cause confusion or concern among the public, particularly if vibrant, established neighborhoods are labeled as suitable for redevelopment. Clear definitions and descriptions are essential to prevent misunderstandings and alarm. Additionally, providing a more comprehensive explanation of what "redevelopment suitability" entails is necessary to avoid varied interpretations that could affect communities differently.
4. **Inclusivity of Local Conditions and Flexibility**: The tool should account for local conditions which might be overlooked by generic indicators like Flood Factor. Users suggest incorporating local insights to tweak these measurements for greater accuracy. There's also a recommendation to allow users to assign their own weights to different factors, which would make the tool more adaptable to various user needs and preferences.
5. **Audience and Educational Needs**: Identifying the primary users of the tool—whether it is the general public, planners, or impact investors—is crucial for tailoring the tool's functionalities and educational components. Given that some aspects, such as adjudicated properties, could be confusing, comprehensive educational materials and explanations are necessary to help users understand and effectively utilize the tool. The tool should also consider the impact on development practices, ensuring that data-driven approaches do not unintentionally reinforce undesirable development patterns.

3. Observations and Analysis

Our outreach and engagement activities with stakeholders focused on utilizing data-driven approaches to enhance flood resilience and urban development. Participants discussed the integration of diverse data sources, the challenges faced in data utilization, and the potential of new decision support tools. Emphasis was placed on overcoming historical biases and ensuring equitable development through better data practices and ongoing education.

Here are the common themes related to data mentioned in the interviews:

1. **Integration of Diverse Data Sources**:
    - Combining quantitative data (e.g., GIS, census data) and qualitative data (e.g., public engagement) to inform decision-making.
2. **Real-Time Data Utilization**:
    - Importance of generating and using real-time data by departments such as the Department of Development and GIS teams.
3. **Public Engagement as Data Source**:
    - Using public engagement to gather vernacular data about community needs and integrating it with quantitative data.
4. **Accessibility and User-Friendliness**:
    - The need for data to be consolidated into user-friendly formats and indices that are easy to interpret and actionable.
5. **Holistic View**:
    - Developing a comprehensive understanding of issues such as blight, housing problems, and infrastructure needs through integrated data sources.
6. **Decision Support Tools**:
    - Development and potential of new decision support tools to make complex data accessible and support informed decision-making.
7. **Effective Resource Allocation**:
    - Using data to identify areas of need and allocate resources effectively.
8. **Equitable Development**:
    - Ensuring data supports equitable development by considering historical biases and current community needs.
9. **Ongoing Education**:
    - The importance of ongoing education about available data and its applications to enhance data literacy among stakeholders.
10. **Future-Oriented Planning**:
    - Emphasis on planning for future needs and changes by using comprehensive and updated data sets.

Moreover, public engagement is also considered a crucial data source. It provides vernacular data about community needs, which can be integrated with quantitative data to offer a holistic view of

the area’s challenges and opportunities. As another interviewee mentioned, "We use public engagement as a source of data to write vernacular data about communities and community needs" . By combining these diverse data sources, stakeholders can develop indices that make complex information accessible and actionable.

However, the current challenge lies in effectively consolidating this data into user-friendly formats. The development of a new decision support tool aims to address this by providing indices that are easier to interpret. This tool is seen as a significant step forward in making data more accessible to decision-makers and community leaders. In summary, the integration and effective utilization of diverse data sources are seen as critical to informed decision-making and the development of resilient, equitable urban communities.

Several barriers hinder the effective use of data in urban development and flood resilience projects. One major challenge is integrating diverse data sources to create a comprehensive and accurate picture. The complexity of this task is compounded by the need to maintain the accuracy of data collection over time. Historical biases in data collection further complicate the situation, as they can reinforce past inequities and hinder progress. One participant pointed out, "Data reinforces historical bad practices", highlighting the need for a critical approach to data utilization.

Another significant barrier is the difficulty in gaining consensus among diverse stakeholder groups. Bringing together various perspectives and interests to focus on data-driven solutions is challenging. As one interviewee explained, "It's challenging to bring together so many different diverse groups of people to focus on the data". This issue is exacerbated by the different priorities and understandings of data among stakeholders, making it difficult to achieve unified action.

Here are the common themes related to barriers mentioned in the interviews:

1. **Integration Challenges**: Difficulty in integrating diverse data sources to create a comprehensive and accurate picture.
2. **Data Accuracy and Maintenance**: Maintaining accurate data collection over time and ensuring data remains current.
3. **Historical Biases**: Historical biases in data collection reinforcing past inequities and hindering progress.
4. **Stakeholder Consensus**: Challenges in gaining consensus among diverse stakeholder groups with different priorities and perspectives.
5. **Technical Expertise**: Lack of technical expertise among stakeholders to interpret and apply data effectively.
6. **Complexity of Data Utilization**: Complexity in using data for decision-making processes, making it difficult for stakeholders to take actionable steps.
7. **Accessibility and Relevance**: Making data accessible and relevant to stakeholders, ensuring it directly supports actionable steps and decision-making.
8. **Resource Limitations**: Limited resources and capacity within communities to conduct advanced data analysis or hire consultants.

9. **Communication and Education**: Need for ongoing education and communication about data availability and applications to enhance data literacy.
10. **Overcoming Resistance**: Resistance to change and adopting new data-driven approaches among some stakeholders.

Additionally, the complexity of using data in decision-making processes poses a barrier. Many stakeholders may lack the technical expertise to interpret and apply data effectively. This issue points to the need for ongoing education and capacity-building to ensure that data can be used meaningfully. As one interviewee mentioned, "Making it relevant for them to be able to go out and access funding" is crucial, indicating that data must be presented in ways that directly support actionable steps.

Overall, overcoming these barriers requires a multifaceted approach, including better integration of data sources, addressing historical biases, fostering consensus among stakeholders, and enhancing data literacy. By addressing these challenges, communities can better leverage data to support equitable and effective urban development and flood resilience initiatives.

The interviews highlighted several legal and policy challenges that impact flood resilience and urban development. The top three institutional, legal, and policy challenges discussed in the interviews are the rigidity of existing regulations, inconsistencies in policies across different levels of government, and complex permitting processes. The rigidity of current regulations hinders the adoption of new data-driven approaches and innovative resilience strategies. Inconsistencies between federal, state, and local policies create confusion and impede coordinated efforts. Lengthy and complex permitting processes slow down the implementation of necessary resilience measures. Addressing these challenges requires policy reform and streamlined procedures to enable effective flood resilience and urban development initiatives. Here are the other main challenges mentioned:

1. **Navigating Complex Federal Regulations**:
    - Legal and policy challenges often stem from the need to comply with complex federal regulations that govern flood risk management and urban development projects. These regulations can be difficult to interpret and apply, which complicates project planning and execution.
    - **Quote**: "We have to play according to the current rules. But at this stage of my career, I'm sort of thinking a little bit more outside the box and maybe this would be beneficial for those outside to consider."
2. **Outdated Policies and Frameworks**:
    - Existing policies and frameworks, such as those established by the National Flood Insurance Program (NFIP), are often outdated and do not reflect current technological advancements or data availability. This creates challenges in effectively addressing flood risks.
    - **Quote**: "Flood risk has been distorted and financial flood risk has been distorted by the lack of updated and modernized NFIP".

3. **Bureaucratic Inertia**:
    - There is often resistance within bureaucratic systems to adopt new approaches or update existing policies. This inertia can slow down the implementation of innovative solutions and hinder progress.
    - **Quote**: "And there's political reasons in historical reasons. There were great reasons why the NFIP was set up initially the way it was. And I won't belabor that".
4. **Funding and Resource Allocation**:
    - Legal and policy frameworks can make it difficult to secure adequate funding and resources for flood mitigation projects. The complexity of benefit-cost analysis required for grant applications can be a significant barrier.
    - **Quote**: "We can't plug that data into a benefit-cost analysis tool... there's a benefit-cost analysis process for. Dotd statewide flood control grant program".
5. **Equity and Fairness Issues**:
    - Policies may not always account for equity and fairness, leading to disparities in how resources are allocated and how different communities are protected against flood risks.
    - **Quote**: "Most of our communities in South Louisiana have no clue the level of data that we're about to be provided that we have on file".

These challenges highlight the need for policy reforms and updates to legal frameworks to better support contemporary flood risk management and urban development initiatives.

The interviews and workshop led to suggestions from participants to improve the decision support tool, focusing on enhancing its functionality, accessibility, and applicability. Key improvements include:

1. **Customization and Flexibility:** Stakeholders recommended adding features that allow users to adjust the weights of different variables, making the tool adaptable to various funding streams and specific project requirements. This customization would help tailor the analysis to different grant programs and priorities.
2. **User-Friendly Interface:** Enhancing the tool’s interface to make it more intuitive and accessible for users with varying technical expertise was emphasized. This includes simplifying data presentation and ensuring the tool is easy to navigate.
3. **Integration of Diverse Data Sources:** Expanding the range of integrated data sources, including real-time and historical data, to provide a more comprehensive and accurate analysis. This would help in capturing the full spectrum of factors affecting flood risk and urban development.
4. **Ongoing Education and Training:** Providing educational modules and tutorials within the tool to improve users’ understanding of data interpretation and application. This would build capacity and ensure effective utilization of the tool.

5. **Stakeholder Collaboration:** Incorporating features that facilitate better communication and collaboration among stakeholders, allowing for more cohesive and coordinated planning efforts.
6. **Transparency and Accountability:** Ensuring transparency in data usage and decision-making processes to build trust among community members and stakeholders.

By incorporating these suggestions, the tool can become more versatile, user-friendly, and effective in supporting data-driven decision-making for resilience and sustainability projects.

4. Additional Comments

Economic redevelopment projects at the intersection of climate data and politically contested environments face challenges internally and externally on multiple fronts that require careful navigation and strategic planning. The challenges related to data, policy, and institutions discussed in the interviews echo common issues faced in other economic development projects intersecting with climate change, resilience, and sustainability.

A decision support tool, like the Flood Resilient Redevelopment Index, can mitigate the challenges faced in flood resilience and other economic development projects intersecting with climate change, resilience, and sustainability. Here's how:

1. Regulatory Flexibility and Integration:

- **Consolidating Data Sources:** The tool integrates diverse data sources (e.g., GIS, census data, public engagement), which can provide a comprehensive view of current conditions and potential impacts. This helps in crafting more adaptable and flexible regulations by showcasing real-time, evidence-based needs and opportunities.
- **Scenario Planning:** By using predictive analytics and modeling, the tool can simulate various scenarios, aiding policymakers in understanding the potential outcomes of regulatory changes. This can foster more dynamic and responsive regulatory environments.

2. Policy Consistency and Coordination:

- **Unified Data Platform:** The tool can serve as a centralized platform for data sharing among federal, state, and local agencies, ensuring that all levels of government have access to consistent and updated information. This can harmonize policies and reduce contradictions.
- **Stakeholder Engagement:** By providing a common framework for data analysis and visualization, the tool facilitates better communication and consensus-building among diverse stakeholders. This can lead to more coordinated and cohesive policy development and implementation.

3. Streamlined Permitting Processes:

- **Efficient Data Access:** The tool can streamline the data collection and analysis process, reducing the time required for permit reviews. Agencies can access necessary data quickly, ensuring that all required information is available in one place.

- **Automated Compliance Checks:** The tool can automate some aspects of compliance checks, ensuring that projects meet regulatory requirements more efficiently. This reduces administrative burden and accelerates the permitting process.

4. Enhancing Technical Expertise and Decision-Making:

- **User-Friendly Interface:** The tool's user-friendly design can make complex data more accessible to stakeholders with varying levels of technical expertise. This democratizes data access, empowering more stakeholders to participate in informed decision-making.
- **Training and Education:** Incorporating educational modules and tutorials within the tool can enhance stakeholders' understanding of data interpretation and application. This builds capacity and ensures that data is used effectively.

5. Supporting Equitable Development:

- **Identifying Vulnerabilities:** The tool can highlight areas with high vulnerability to climate impacts, ensuring that interventions are targeted where they are most needed. This supports equitable development by prioritizing resources for the most affected communities.
- **Transparent Decision-Making:** By making data and analysis transparent, the tool promotes accountability and inclusivity in decision-making processes. This helps in gaining community trust and support for development projects.

6. Catalyzing Innovation:

- **Encouraging Best Practices:** The tool can showcase best practices and successful case studies from various regions, inspiring innovation and adoption of effective strategies across different projects.
- **Fostering Collaboration:** By providing a collaborative platform, the tool can connect different stakeholders, fostering partnerships and collaborative efforts that can drive innovative solutions in resilience and sustainability projects.

In summary, the decision support tool can address regulatory, policy, and procedural challenges by providing integrated, real-time data, fostering coordination among stakeholders, streamlining permitting processes, enhancing technical expertise, supporting equitable development, and catalyzing innovation. This holistic approach can significantly improve the effectiveness and efficiency of economic development projects intersecting with climate change, resilience, and sustainability.

Linking Flood Resilience to Urban Re-Investment in Baton Rouge: Policy Analysis

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Introduction

Decisions regarding the development or conservation of a particular parcel will depend on a variety of factors, including flood risk, ecological value and ecosystem services provided, connectivity factors, and legal, planning, and policy factors such as zoning, development regulations, and comprehensive planning. In the specific context of Vacant, Abandoned, and Deteriorated [or Distressed] (VAD) properties, additional factors must be considered such as state and local law relating to "blighted" properties, processes for determining blight, and the circumstances of adjudicated properties. State and local redevelopment laws relating to the acquisition and disposition of property are also relevant in this context. This policy document is intended to accompany the decision support tool developed for the project "Linking Flood Resilience to Urban Reinvestment in Baton Rouge," and it lays out the considerations under state and local laws and plans that may be relevant to decision-making regarding VAD parcels in Baton Rouge.

State and Local Law Related to VAD Properties

The term "Vacant, Abandoned, and Deteriorated [or Distressed]" does not appear in Louisiana state law or in Baton Rouge City/Parish local law. Instead, state and local law define and establish policy and authorities related to "blighted" and "slum" areas and "adjudicated" properties. Some of these terms are defined multiple times depending on the legal context in the Louisiana Constitution, state statutes, and East Baton Rouge Code of Ordinances.[1] State law establishes it a matter of public policy to reduce or eliminate the existence of blight,[2] and calls for the creation of redevelopment plans to revitalize areas affected by blight.[3] State law authorizes the creation of redevelopment authorities and the exercise of certain powers needed to rehabilitate areas, including expropriation.[4] The East Baton Rouge Redevelopment Authority (known as Build Baton Rouge, and hereafter referred to as BBR) was created under state law in 2007 to develop programs designed to eliminate and prevent the spread of blight and redevelop areas classified as blighted or slum areas.[5]

Broadly, there appear to be three categories of definitions of "blight:" (1) those used for administrative determinations; (2) those used for the purposes of redevelopment authority activities; and (3) those used in the context of adjudicated properties.[6] The latter two categories are most relevant and informative in

[1] *See*, *e.g.*, La. Rev. Stat. 33:4625; East Baton Rouge Code of Ordinances, 12:651.
[2] *See* La. Rev. Stat. 33:4625(B); 33:4720.151(B).
[3] La. Rev. Stat. 33:4625(B).
[4] La. Rev. Stat. 33:4625(E)-(F).
[5] La. Rev. Stat. 33:4720.151.
[6] Frank S. Alexander, *Louisiana Land Reform in the Storms' Aftermath*, 53 Loy. L. Rev. 727, 748-749 (2007).

the context of VAD parcels that may be redeveloped through processes overseen or supported by BBR. In the context of redevelopment authority activities, in general under state law, "blighted" property can be acquired by purchase or expropriation if the area is determined by the governing authority to be "blighted," and is included in an approved redevelopment plan.[7] Local law in East Baton Rouge Parish calls for the designation of community improvement areas from the "blighted" areas of the parish requiring most urgent attention.[8]

Many of the VAD properties in Baton Rouge fall within the category of "adjudicated" properties, or those that have come under local government authority due to unpaid property taxes. Political subdivisions can acquire a tax sale title under certain circumstances and pursuant to procedures set out in state law.[9] In Baton Rouge, tax sales are held annually for properties with unpaid taxes for prior years, and the properties that are not bid on are "adjudicated" to the City-Parish, granting the government a type of tax deed.[10] In these instances, the property remains assessed in the name of the tax debtor despite the adjudication.[11] As the redevelopment authority, BBR has priority to bring adjudicated properties into the land bank that it operates. However, many challenges remain following tax sale and adjudication processes, because it can be a lengthy process to clear title on the property, which can delay or prevent redevelopment activities.

In response to the legal and administrative barriers that can prevent the return of blighted and adjudicated properties into commerce and redevelopment, the City-Parish is exploring ways to improve state and local code enforcement and take other actions that could reduce the lengthy timelines often tied to clearing title on adjudicated properties. Some of these efforts are reflected in recent planning processes, as described below.

Planning Context for Redevelopment and Conservation in Baton Rouge

Under state law, cities and parishes in Louisiana are authorized to create a planning commission,[12] which (if established) is tasked with building out a master plan for the area.[13] Of particular importance in the context of redevelopment of VAD properties, master plans provide recommendations for future development, including the "general location, character, and extent" of infrastructure, parks and open space, and of replanning for blighted or slum areas.[14] In the case of municipalities, a municipal planning commission also serves as the municipal zoning commission,[15] as we see with the Baton Rouge Planning Commission.

FUTUREBR: The City-Parish Comprehensive Master Plan

The Planning Commission has identified key goals for Baton Rouge in FUTUREBR, the city-parish's comprehensive master plan, which is nearing the end of a 5-year update process in late 2023. The plan

[7] La. Rev. Stat. 33:4625.
[8] East Baton Rouge Code of Ordinances, 12:650; 12:652.
[9] La. Rev. Stat. 47:2122(2); 47:2196.
[10] https://www.brla.gov/Faq.aspx?QID=281
[11] La. Rev. Stat. 47:2197.
[12] La. Rev. Stat. 33:102.
[13] La. Rev. Stat. 33:106.A.
[14] La. Rev. Stat. 33:106.B.(2).
[15] La. Rev. Stat. 33:106.D.

includes elements related to land use, transportation, community design and neighborhoods, housing, environment and conservation, parks and recreation, infrastructure, economic development, and public services. Many of these elements identify goals, objectives, and actions that relate to redevelopment, urban revitalization, environmental conservation, and other topics that align with the goals of this project.

Multiple objectives across different FUTUREBR plan elements reflect goals to revitalize distressed areas and redevelop vacant or blighted areas. For example, Community Design and Neighborhoods Goal 1 identifies actions to address blight and help stabilize distressed areas, including by encouraging infill development "through assistance with acquisition, pre-development, development and homebuyer subsidies"[16] and eliminating blighted properties by improving outreach, code enforcement, and policy reform.[17] It also aims to focus infill development on areas with "prime redevelopment potential" that can encourage connectivity and pedestrian use.[18] The draft Land Use Element notes that infill development has been one of the key focus areas since the 2018 version of FUTUREBR, and it recommends updating the Unified Development Code to encourage redevelopment of small parcels.[19] Land Use Goal 4 focuses on maintaining, stabilizing, and strengthening existing neighborhoods, including by taking actions to help revitalize under-utilized land[20] and eliminate blight (Objective 10.6). The Economic Development Element establishes an objective to support investment in neighborhoods, including through continued efforts to address title challenges with adjudicated properties, and by prioritizing revitalization of underserved areas.[21] Goal 3 in the Housing Element focuses on ensuring the strength and stability of neighborhoods, and taking actions to improve code enforcement, speed up condemnation of abandoned property, and reduce blight with better data.[22] Housing objectives also emphasize the need to support the development of more affordable housing through a variety of approaches, including simplifying the process for clearing title on adjudicated properties.[23]

FUTUREBR also identifies goals to protect and improve the environment and ecology, noting that much of the parish's environmental network is under private ownership and not protected from development. This includes prioritizing protection of open space and areas that are of high ecological value,[24] including through collaboration with BREC and other land acquisition and management efforts. It recommends strengthening and improving on enforcement of regulatory standards for water quality, drainage, and allowable impervious surfaces related to development activities.[25] The plan objectives aim to protect flood storage capacity of floodplains, as well, through greater actions to limit or discourage development in floodplains, requiring mitigation within the same watershed, and regularly updating regulations as data and best practices improve.[26] FUTUREBR notes that BREC's Green Infrastructure Initiative aims to improve

[16] FUTUREBR, Community Design and Neighborhoods (Final Draft, Sept. 2023), 30-32.
[17] FUTUREBR, Community Design and Neighborhoods (Final Draft, Sept. 2023), 32.
[18] FUTUREBR, Community Design and Neighborhoods (Final Draft, Sept. 2023), 33.
[19] FUTUREBR, Land Use Element (Final Draft, Sept. 2023), 30-31, 37.
[20] FUTUREBR, Land Use Element (Final Draft, Sept. 2023), 36.
[21] FUTUREBR, Economic Development Element (Final Draft, Sept. 2023), 24.
[22] FUTUREBR, Housing Element (Final Draft, Sept. 2023), 23.
[23] FUTUREBR, Housing Element (Final Draft, Sept. 2023), 21-22.
[24] FUTUREBR, Environment and Conservation Element (Final Draft, Sept. 2023), 27; Land Use Element (Final Draft, Sept. 2023), 38.
[25] FUTUREBR, Environment and Conservation Element (Final Draft, Sept. 2023), 28.
[26] FUTUREBR, Environment and Conservation Element (Final Draft, Sept. 2023), 29.

flood resilience and leverage open space to mitigate stormwater runoff and provide natural flood risk reduction.[27]

Other planning goals that relate to redevelopment efforts for VAD properties include those addressing drainage infrastructure requirements. FUTUREBR recommends improving on the drainage master plan, including with the development of a new manual for green infrastructure alternatives, and improving ordinances relating to drainage and stormwater management.[28]

Overall, FUTUREBR outlines a vision for a more sustainable city and parish, with a vibrant economy, healthy environment, and equitable access to amenities, services, and opportunity. In creating the FUTUREBR plan and its more recent update, the city-parish has emphasized the importance of community input and engagement. Public input highlighted concerns with abandoned and declining areas, among other priorities, and the plan responds with many goals and objectives that aim to focus on – and actively track – redevelopment and infill development as opposed to emphasizing new or sprawl development. As these goals and objectives are translated into updates to the Unified Development Code, and other implementation efforts, Baton Rouge may see more small-scale redevelopment of underutilized parcels in and conservation of ecologically valuable parcels that provide flood risk reduction.

Redevelopment Planning

As noted above, BBR was established as the redevelopment authority for East Baton Rouge Parish, and holds a wide range of authorities enabling it to "undertake and carry out redevelopment projects and related activities."[29] Among those powers is the ability to prepare and adopt a redevelopment plan for an area that has been determined by the local governing body to be a "slum" or "blighted" area, and provided that the parish or municipality has already adopted a general plan.[30] Redevelopment plans must be reviewed by the local planning commission and be deemed in conformity with the parish or municipality's general (or master) plan.[31]

BBR led the development, in partnership with residents and other stakeholders, of community improvement plans for several districts that were targeted for redevelopment. One of these plans (the Scotlandville Community Strategic Plan) has been formally adopted by the Metropolitan Council and incorporated as a "small area plan" into the FUTUREBR comprehensive plan. This means that development and redevelopment activities within the area are reviewed for consistency with both the small area plan and with the goals and objectives of FUTUREBR as a whole.

Local Regulations and Policies Affecting Redevelopment and Conservation of VAD Properties

Planning efforts in Baton Rouge City-Parish are useful for informing on the future direction of development, environmental initiatives, and regulation. However, existing regulations incorporated in the Baton Rouge Code of Ordinances and the Unified Development Code (UDC) provide a reflection of current policies and requirements affecting new development, redevelopment, and conservation efforts. The most relevant considerations for the purposes of either redeveloping or conserving VAD properties

[27] FUTUREBR, Infrastructure Element (Final Draft, Sept. 2023), 9.
[28] FUTUREBR, Infrastructure Element (Final Draft, Sept. 2023), 19-20.
[29] La. Rev. Stat. 33:4625(F).
[30] La. Rev. Stat. 33:4625(G).
[31] Id.

include zoning, open space, floodplain, drainage, streets and sidewalks, landscaping, and parking regulations. Each of these categories are discussed briefly below.

Zoning

Chapter 8 of the UDC covers zoning districts. It should be noted that FUTUREBR and previous comprehensive plans also establish character areas, which are broader in nature, but aim to preserve existing distinctive neighborhoods while allowing for evolution and growth. There are four character areas (Downtown, Urban/Walkable, Suburban, and Rural), and the zoning districts create more specific use and building requirements or restrictions that are applied across and consistent with these four character areas.

Chapter 8 outlines eleven categories of districts, as well as several inactive districts that are not currently in use. Some of these categories (e.g., predominantly single family residential; neighborhood districts; office districts; etc.) include multiple zoning districts within them. The purpose for each zoning district is identified, as well as any specific size, building, use, or other restrictions and specifications. Therefore, for the purposes of VAD properties, the types of projects that would be permitted on any given lot are going to vary across different district types.

Planned Districts (UDC Section 8.4.9) are intended to incorporate a mix of land uses, encourage flexibility, and preserve natural amenities of an area, among other purposes. Also of note, planned districts may be useful for preventing soil erosion or surface flooding, or providing "infill development and adaptive reuse of abandoned or blighted properties."[32] Although certain specifications (such as density, lot area, and setbacks) may vary depending on the specific development plan, there are general minimum percentages to be left as common open space for planned districts.

Another example of a zoning districts conducive to diverse development projects is the Traditional Neighborhood Development, or TND zoning district (UDC Section 8.4.10). This type of district emphasizes mixed-use, including addition of residential areas, and is also in alignment with the City-Parish's goals for more 20-minute neighborhoods, where residents can walk to all of their needed services like grocery stores. It also encourages a diverse environment of massing and character between buildings, meaning there would be less restrictions with regards to what is built and how than in a historic district, for example. The zoning code notes that TND districts are intended to provide an "increased range of options" compared to what would be allowed under conventional zoning. In addition, the code highlights the importance of "environmental and social equity for residents."[33] Requirements for this district can draw on the requirements from other types, allowing for more flexibility. This flexibility could be especially valuable when trying to redevelop with climate impacts in mind. Like planned developments, TND districts also incorporate recreational and open space minimum requirements, including a requirement that 90% of the lots within areas devoted to residential uses shall be within a quarter mile from common open space.[34] TND districts also have specific requirements for stormwater management that are intended to minimize runoff and pollutant discharge and promote on-site filtration.

[32] Baton Rouge Unified Development Code, Section 8.4.9(A)(8); 8.4.9(A)(12).
[33] Baton Rouge Unified Development Code, Section 8.4.10(A).
[34] Baton Rouge Unified Development Code, Section 8.4.10(C)(5).

The type of zoning district that a certain parcel exists within (or sometimes the multiple overlapping districts that it exists within) can also dictate the kinds of uses that are permitted and when a variance may be needed to complete a project. Permitted, limited, conditional, and accessory uses are listed for each zoning district in UDC Chapter 9. For example, a community garden is permitted as an accessory use on any parcel as long as the owner consents.[35] Limited and conditional uses are certain types of development or use that are pre-approved for a particular zoning district but subject to additional requirements or conditions, and a permit may be required. For example, manufactured homes are permitted as a limited use so long as there is no more than one such home per parcel and certain distance and frontage requirements are met.[36] A variance allows for a certain use of the property that, although not normally allowed under the zoning restrictions of whatever district the parcel sits within, is a granted exception that is approved by the city.[37]

Flood Mitigation, Stormwater Management, and Drainage

Chapter 15 of the East Baton Rouge Unified Development Code addresses Floodways, Floodplains, Drainage, and Water Quality. The regulations in this chapter are intended to minimize flood losses. The chapter incorporates the latest FEMA special flood hazard areas (FEMA SFHA) and flood insurance rate maps (FIRMs) for the parish by reference, and establishes the position of a parish Floodplain Administrator to administer the provisions of the chapter.[38] In response to historic and widespread flooding that the parish experienced in 2016, the Metropolitan Council passed a resolution requesting the Planning Commission and Department of Development to propose amendments to Chapter 15 that would improve flood protection and standards for stormwater facilities.

The Chapter 15 regulations include restrictions on certain uses in the floodplain, controls on how and when fill material may be used, controls on alterations to natural features that convey floodwater or provide natural flood protection, and additional provisions. The most restrictive provisions apply to new construction and substantial improvements in FEMA SFHAs, and include specific elevation requirements applying in the context of residential and nonresidential development, manufactured homes, and other instances.[39] In general, the use of fill material is not permitted in SFHAs unless mitigation is provided and meets certain requirements set out in the chapter.[40] Chapter 15 also includes provisions requiring minimum setbacks around all mapped stream segments, and development within these areas is limited to “improvements that have No Adverse Impact on the stream corridor,” such as those related to conservation or recreation.[41] Additionally, Stormwater Management Plans (SMPs) are required for “development and redevelopment projects that require demolition or complete removal of existing

[35] Baton Rouge Unified Development Code, Section 9.5.2(B).
[36] Baton Rouge Unified Development Code, Section 9.3.5.
[37] Chapter 7 of the UDC covers nonconformities there is an existing nonconforming use. In that case, the city allows that nonconforming use to be "grandfathered in" but the nonconforming aspects of the property cannot be expanded. If something currently conforms but there is a desire to change the use in a way that would not conform, that's when a variance is required. Chapter 2, Section 2.3.3(C) and (D) covers variances and the circumstances under which or purposes for which they may be authorized. The Board of Adjustment, an entity created under La. Rev. Stat. 33:4727, oversees variances.
[38] Baton Rouge Unified Development Code, Sections 15.7.1, 15.9.
[39] Baton Rouge Unified Development Code, Sections 15.20-15.21.
[40] Baton Rouge Unified Development Code, Section 15.21(F).
[41] Baton Rouge Unified Development Code, Section 15.25.

structures or impervious surfaces at a site and replacement with new development."[42] SMPs must include site descriptions (e.g., land cover and soil types, drainage features, wetlands, and SFHAs), proposed drainage improvements to provide capacity for 2-year through 100-year storm events, and proposed stormwater BMPs – including "green infrastructure opportunity areas."[43] Drainage Impact Studies and Water Quality Impact Studies are also generally required for new development, with limited exceptions.[44]

In late 2017, the Parish also initiated an effort to develop a Stormwater Master Plan and 20-year Stormwater Capital Improvement Plan for the purpose of identifying risks related to flooding and recommending code changes and capital improvements that would help mitigate flood risk and ensure that the EBR stormwater system accounts for a changing climate.[45] In September 2021, the Metropolitan Council of Baton Rouge passed an ordinance implementing a temporary moratorium on new development approvals affecting certain projects (particularly larger projects requiring Planning Commission approval) proposed within SFHAs.[46] The ordinance also established new drainage design requirements for projects with more than 25% of the developed site area occurring within special flood hazard areas. The temporary moratorium and enhanced drainage requirements were initially to be effective over a 12-month period, allowing time for more permanent revised development standards to be adopted following the completion of the Stormwater Master Plan.

Since 2016, the Metropolitan Council has adopted multiple revisions to the UDC to improve flood mitigation and resilience, including tightening regulations for the use of off-site fill mitigation credits, increasing the design storm event for developments to 25-years (from the 10-year event), requiring regular maintenance and inspection of drainage facilities on private property, adding requirements for open space preservation in residential development, and requiring stormwater conveyance checks as part of drainage impact studies to verify upstream and downstream capacity, among other new changes.[47] Effective in April 2023, the parish also defined a Community Defined Special Flood Hazard Area (CD SFHA) and Community Defined Flood Elevations (CD FE), which delineates the areas expected to be flooded during the *future* 100-year storm event, based on scientific and engineering analysis.[48] Related, the parish also established Floodplain Conveyance Zones, which are defined as "areas determined to be critical to the conveyance and storage of flood water discharges," within which offsite drainage assessments are required for any proposed development, to demonstrate that proposed development will not increase peak surface water elevations outside of the development area for 2-year to 100-year storm events. [49]

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[42] Baton Rouge Unified Development Code, Section 15.13.
[43] Baton Rouge Unified Development Code, Sections 15.13-15.14.
[44] Baton Rouge Unified Development Code, Sections 15.15-15.17. For example, if the total impervious surface area does not exceed 20% of a developed site, a drainage impact study is not required.
[45] https://stormwater.brla.gov/
[46] Ord. No. 18252 (adopted Sept. 8, 2021), *available at* https://www.brla.gov/AgendaCenter/ViewFile/Minutes/_09082021-1125.
[47] *See* Ord. No. 18252 (adopted Sept. 8, 2021), *available at* https://www.brla.gov/AgendaCenter/ViewFile/Minutes/_09082021-1125 (at p. 22).
[48] Baton Rouge Unified Development Code, Section 15.7.2.
[49] Baton Rouge Unified Development Code, Section 15.24.

These and other revisions to the UDC have been adopted in response to recommendations developed through the Stormwater Master Plan Process.[50]

Open Space and Landscaping Requirements

Chapter 12 of the UDC outlines open space requirements for new development. Open space requirements are intended to preserve and protect natural areas, help manage stormwater, protect water quality, and provide recreational opportunities for residents, among other benefits. Certain types of developments are required to have open space including single-family residential, two-family, or townhouse developments of six or more lots; multi-family developments of more than 25 units; manufactured home parks; and certain mixed-use developments. In the redevelopment of VAD parcels, most of which will likely contain some residential elements, open space may be an important consideration. Open space requirements can be met with uses like preserved tree canopy, undisturbed natural features like wetlands and streams, stormwater management facilities, landscape buffers, plazas and courtyards, areas designated for active recreation, and utility servitudes available for passive recreation.[51] However, some of these uses may account for a greater proportion (up to 100%) of the open space requirements, while others – particularly those with semi-paved areas, like plazas and courtyards – may only account for up to 50% of the required coverage. Requirements also differ slightly depending on the character area (rural, suburban, urban, or downtown) and whether the development involves residential uses versus manufactured home parks.

Somewhat related to open space, Chapter 18 of the UDC covers landscaping requirements. These can play into the use of open space, or increasing green infrastructure, but they do stand as a requirement on their own. Landscaping requirements only apply in certain circumstances, including a residential development with 3 or more units, parking lots with 10 or more spaces, and other specific non-residential developments or expansions of existing developments.[52] Landscaping buffers are required when properties with incompatible uses abut each other, with specific standards depending on the uses of the existing abutting property and the proposed site.[53] Under this section, proposed developments must submit a landscape plan to the city, demonstrating that at least 10% of the site will be landscaped and that the property owner will be responsible for maintenance.[54] The UDC also outlines certain required and optional plant material for the site, and encourages the preservation of existing mature and valuable trees to help meet yard, buffer, street or other landscaping requirements.[55]

Parking

Finally, parking requirements for development, which are addressed in UDC Chapter 17, might also factor into redevelopment of VAD parcels. Chapter 17 establishes requirements relating to the number of parking spaces for a development, the number of handicapped accessible parking spaces, and the design and locational standards for parking areas. Similar to many of the building and zoning requirements

[50] East Baton Rouge Stormwater Master Plan: Codes and Ordinance Recommendations (presentation, January 2023), *available at* https://stormwater.brla.gov/wp-content/uploads/2023/01/EBR-SMP-Policy-Recs-to-Metro-Council_Jan-2023.pdf.
[51] Baton Rouge Unified Development Code, Section 12.4, Table 12.B.
[52] Baton Rouge Unified Development Code, Section 18.2.
[53] Baton Rouge Unified Development Code, Section 18.3.3.
[54] Baton Rouge Unified Development Code, Section 18.3.
[55] Baton Rouge Unified Development Code, Section 18.6.

already discussed, the parking requirements in this section depend on the type of development on the lot and the type of zoning district and character area that the lot sits within. The code allows for reductions in the required number of parking spaces if certain conditions are met (e.g., proximity to public transit, on-street parking, and contributions to tree preservation nearby).[56] The code also allows for off-site parking if certain conditions are met, which is an effort to better encourage and accommodate infill development and redevelopment where it may be difficult to provide on-site parking.[57] It is also worth noting that, in an effort to minimize unnecessary impervious surface area – which contributes to flooding challenges – the code requires that parking not exceed 125% of the minimum requirement, unless other conditions are met that would help mitigate the flooding impacts from added impervious surfaces (e.g., the use of permeable pavement or additional vegetated areas).[58] Consistent with the FUTUREBR plan, parking requirements have been modified in recent years to provide more flexibility, particularly in character areas that emphasize walkability.[59]

Conclusion

State law as well as many local laws, regulations, and planning initiatives in East Baton Rouge play into the efficient and effective utilization of VAD properties for the purposes of either redevelopment or conservation and open space. Many barriers exist that prevent the timely disposition of adjudicated properties, and at the same time, local policies have in the past encouraged sprawling development that is not resilient to flooding. However, at the local level, there has been increasing recognition of the need to encourage infill development and redevelopment and reduce sprawl, as well as the need to discourage development in areas at high risk of flooding and better utilize natural landscapes for flood mitigation. These planning and policy goals, as they translate to local law and regulation, may over time help to shift the trends in how VAD properties are used and promote the reuse of these areas for redevelopment or community amenities like green infrastructure and parks that provide natural resilience benefits.

[56] Baton Rouge Unified Development Code, Section 17.4.4.
[57] Baton Rouge Unified Development Code, Section 17.4.5 .
[58] Baton Rouge Unified Development Code, Section 17.4.2.
[59] FUTUREBR, Community Design and Neighborhoods (Final Draft, Sept. 2023), 14-15.