



As Simple as a Pizza Tracker: AccessDEQ Permitting Transformation Program

Initiated: 2018

Completed: 2024

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Executive Summary

The N.C. Department of Environmental Quality is the lead stewardship agency for the protection of North Carolina's environmental resources. DEQ administers regulatory programs to protect air quality, water quality and the public's health and advances an all-of-the-above energy strategy that fits the state's needs. DEQ regulatory programs issue more than 150 types of permits, certificates, registrations and licenses that vary in complexity, scope and processing time. Approximately 39,000 permits were issued by five regulatory divisions in 2021. As a top-three priority, Secretary Elizabeth Biser has championed a ground-breaking transformation of the permitting process based on improved data management for staff and end users.

They work they [North Carolina] are doing to digitize the permitting process is a model for other states.

Jennifer Pahlka, author, Recoding America

Key stakeholders noted the need to make the permitting process streamlined, transparent, timely, automated, online and user friendly. In the words of then-DEQ Secretary Michael Regan: "Understanding a permit application's status should be as simple as a pizza tracker."

Unfortunately, the permitting process was far from simple. Complex, paper-based forms and documents often required duplicative data entry in systems requiring special expertise. Consultants and users had difficulty understanding an application's status. Recruiting challenges emerged among graduates expecting digital systems and practices. A lack of a unified, standardized permitting process across DEQ also created a varied permitting experience across divisions, programs and sections. Data systems were siloed, disconnected and lacked a common data format, resulting in challenges answering basic business questions such as: *How many permits did DEQ issue year over year?* This made it difficult to respond to changes in legislation, regulations and policy, in addition to business and end-user needs.

To address these challenges and modernize processes, the agency launched the Permitting Transformation Program to deliver a better experience to regulated entities with three key goals:

1. Streamline the permitting process – Ensure a consistent, transparent permitting process across five DEQ divisions
2. Modernize the permitting process – Create a web-based solution for applying, tracking and paying for permit applications
3. Create publicly accessible data – Develop web-based dashboards for DEQ data, including permits, records, compliance issues and enforcement actions

DEQ's permitting transformation has streamlined business processes, modernized its technology stack, created an enterprise data warehouse, established an agency-wide common data model, simplified payments and improved the experience for all end users.



End users may now access a portal to easily understand a permit application's status.

Idea

DEQ's permitting program previously was disjointed and convoluted and did not meet the needs of the agency or its regulated community. Divisions such as Air Quality, Coastal Management, Water Resources and Waste Management had different internal processes, operating procedures, data systems and cultural norms. As a result, regulated entities had vastly different experiences as they interacted with multiple divisions. For example, a resource-intensive, paper-based system in place since the 1970s was used for Coastal Management permits. A program might have an electronic system but not a front-end website. End users emailed and called to ask questions, address issues and check a permit's status.

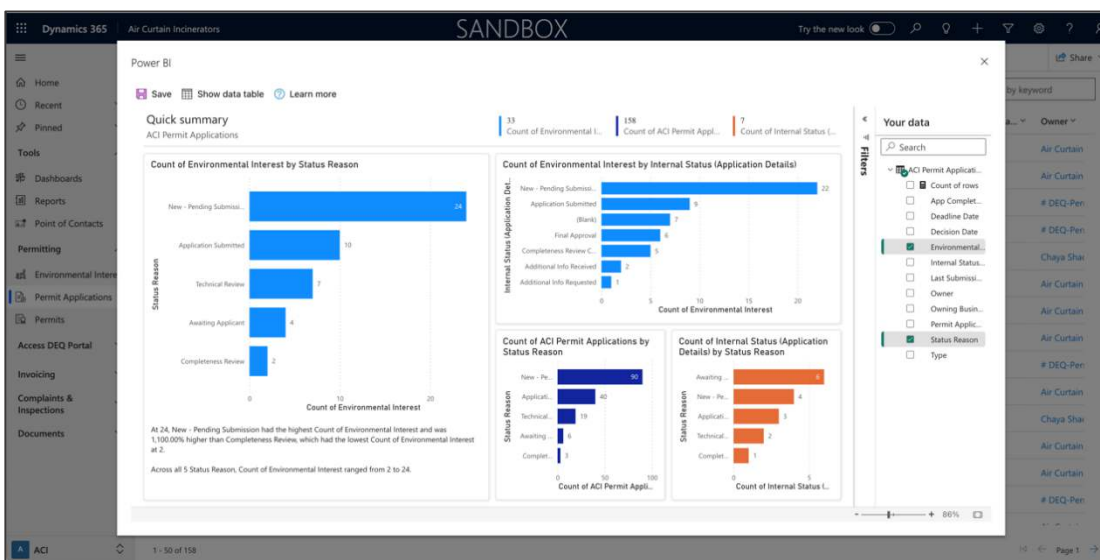
The big idea of the Permit Transformation Project is a user-friendly permitting and data platform that offers significant benefits to permitted entities, the public and DEQ, based on six elements:

- Unified enterprise data (i.e., a common data model)
- Modern technology stack heavily utilizing the Microsoft Power Platform
- Process improvement
- User-focused design/development practices
- Simplified payments
- Communication and transparency

With the N.C. Department of Information Technology, DEQ selected Microsoft Power Platform and Dynamics CRM as the primary data and app system to administer apps enterprise-wide.

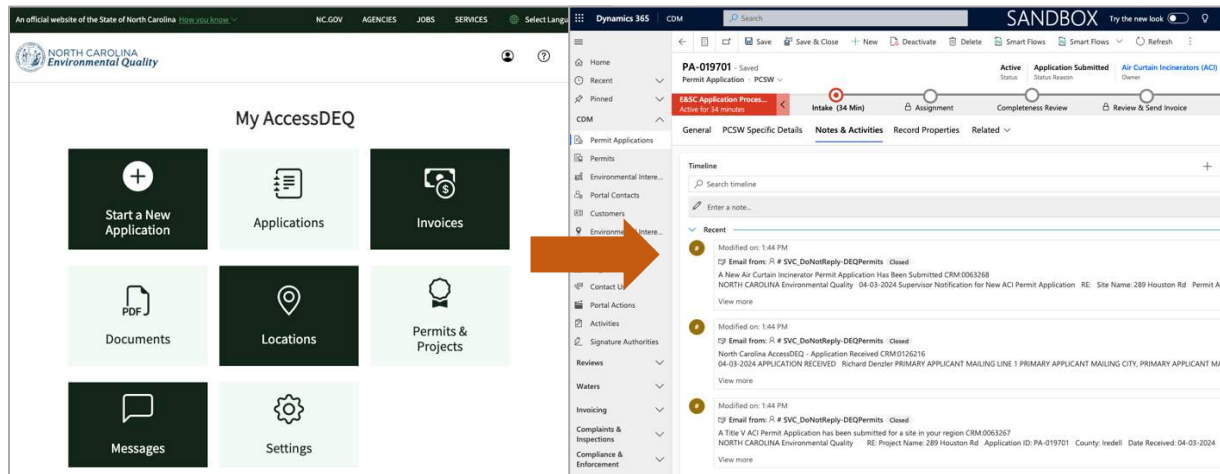
Benefits

The new online system streamlines the permitting process for permitted facilities and businesses and provides a modernized, robust way to apply, track and pay throughout the permitting process. Businesses can submit applications and renewals, make electronic payments, track project status and communicate with DEQ quickly and easily through a single portal. Data in the system, including on compliance and enforcement actions, is easily accessible to the public, making the permitting process more transparent. Staff can more easily administer permits across divisions, programs and units in a consistent, robust, user-friendly manner using Dynamics applications. DEQ business units can view reporting data in a



Analytics dashboard for air curtain incineration permit applications.

Power BI modal overlay. Historical data not migrated to Dynamics is stored in an enterprise data warehouse (Azure) easily integrated via API into the program's solution. This provides a holistic reporting snapshot regardless of where data is stored.



End users apply and manage permits in a front-end website. Data is submitted to the Dynamics backend, which provides analytics and reporting insights across programs.

Implementation

Milestones

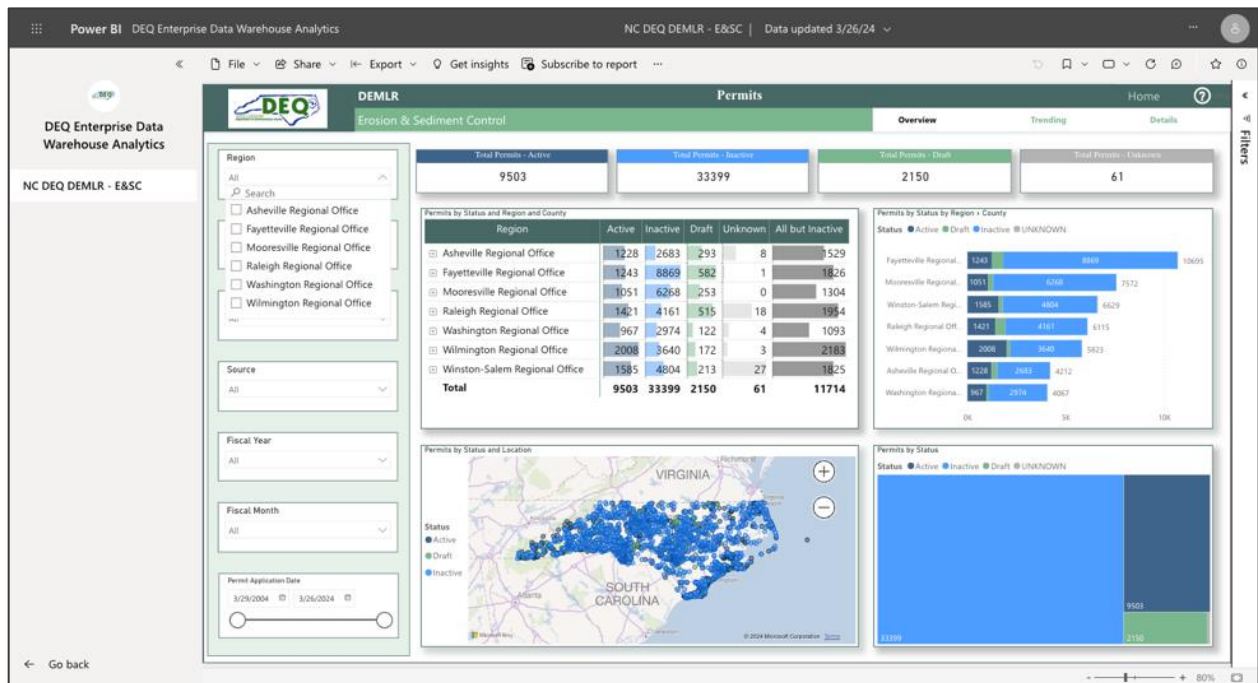
- **2018** – Discussions, planning and prototyping
- **2019** – IT development and MVP solutions launched
- **2021** – Fully funded
- **2023** – AccessDEQ Program launch, including public portal, backend system, integrations and permit solutions
- **2024** – Seven additional permit solutions in development

To streamline, improve efficiency and standardize the permitting processes, DEQ partnered with NCDIT's Process Improvement Team, which has met with DEQ divisions and led numerous workshops and LEAN trainings since 2018. Over 200 processes were grouped into 90 current state application processes. A common, standardized set of processes was created and has been implemented in the Dynamics backend solution consistently across programs.

Collaborative teams of business analysts, program staff, technical professionals and others conducted working sessions to organize business, data, user and functional requirements and elicit important initial requirements. Recognizing the challenges that emerge from requirements gathering to solution development, a nimble, iterative, Agile-based approach later took root.

DEQ next established a prioritized schedule of permitting programs to be transformed over the project. The AccessDEQ solution development teams, in partnership with program staff, data architects, project managers and others, developed the portal and backend solution pieces. Key to success was delivering small units of work (MVPs) in an iterative manner.

In parallel, the AccessDEQ data team and program staff outlined reporting metrics, transformed historical/legacy data in the Enterprise Data Warehouse and built a program-specific analytics dashboard. Solution delivery included both data analytics and permitting solution products.



Program data and analytics dashboard

Program staff were trained in an iterative manner throughout the solution development process. The development team conducted multiple rounds of user acceptance testing and, most importantly, external user testing. Feedback from actual customers was crucial to designing a user experience that meets business needs while not being too complex for real users.

Impact

Cost Savings

By switching to a common platform hosted in the Microsoft Azure Government Cloud, the annual cost of operating DEQ's digital permitting systems **will be reduced by an estimated \$800,000**. Including internal economic benefits, DEQ will **save approximately \$1.1 million in total annual operating costs**. These cost savings come from decommissioning 18 on-premise servers, server cost upgrades no longer needed, Oracle and IBM DB2 license cost savings and other ancillary software dependencies no longer needed. Internal savings are realized as staff no longer have to transcribe permit application information from paper submittals to internal systems; end users enter this information directly via the external portal.

Reporting & Analytics

A critical component to creating enterprise-level reporting and analytics involved leveraging the common data model initially based on the pre-existing DEQ data and systems. This data model is continuously being improved and further expanded to capture and incorporate current and future data elements being collected. Raw data from critical DEQ systems based in multiple technology platforms is now available in a single location: the Enterprise Data Warehouse. This process involved detailed source to destination mapping.

In addition, the data has been analyzed, consolidated and conformed to the common data model, paving the way for organizing the information in predefined KPIs and measures that make it easier for the DEQ staff to understand the data. DEQ has created over 125 detailed measures that represent a set of reusable and uniform KPIs ready to be used for reporting and analytics.

Using these measures with data from existing systems still in use today, comingled with data captured for the DEQ programs going live in the Permitting Transformation Program solution, DEQ can perform reporting and analysis, helping users understand patterns and gain insights into their data. Before implementation of the Enterprise Data Warehouse, Analysis Services and PowerBI, users had to export data from raw systems and perform individual ad-hoc analysis. This process was not streamlined or uniform across the department and could not be reused by others doing the same type of analysis. The tools used to perform the reporting and analysis were not modern and often required a development team to support. With tools like PowerBI driven by graphical user interfaces, general users can navigate a web-based suite of products like dashboards, reports and apps to aid in communicating information and providing context and insights into the data. Additionally, PowerBI users can use desktop-based software to connect to the analysis services cube and create their own dashboards and reports that leverage the defined measures, and even create their own measures if necessary.

Using the common data model and defined measures, reporting and analysis products can now be made readily available to end users in the form of a web-based application published to the PowerBI service. Below is an example of analysis trends of total permits for Erosion and Sediment Control by status and fiscal year. These components allow end users to gain valuable insights into their data easily and quickly.

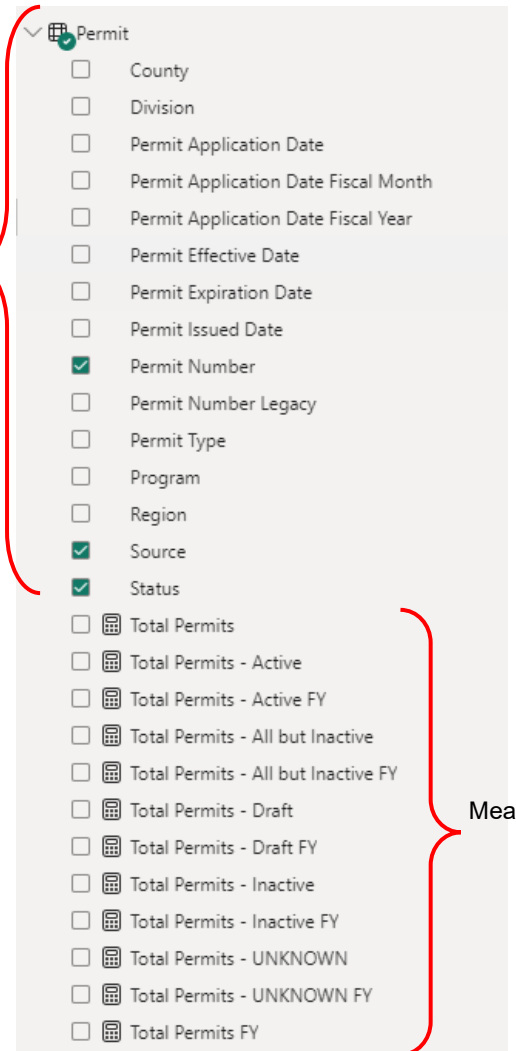
Native Mobile App

Right out of the box, with no coding necessary, permitting solutions built using the Dynamics platform are automatically and fully accessible via Microsoft's native iOS and Android PowerApps applications that can operate in both online and offline modes. DEQ staff can, for example, visit a project site, pull up a permit record and update it as needed, including capture of notes, photos and video. Use cases include compliance, enforcement and verification. The full solution is available on the mobile app, limited only by user permission settings. If the project site is in a remote area, with little to no cell coverage, the system can run in offline mode and automatically synchronize with the backend whenever the user arrives in an area with coverage.

Simplified User Experience

DEQ is striving to make the external portal as simple and as intuitive as possible. This means using a single "one-stop-shop" for all things DEQ, including permit application submittal for any permit type managed by DEQ, permit renewals, invoice review and online payment, document upload, access to messages and notifications, and more. It also means using simple terminology, linear workflows where possible, use of pre-populated fields, intuitive menus, new user onboarding "tours" and a "less-is-more" approach.

Data model
(Permit table)



Common data model and measures – PowerBI desktop

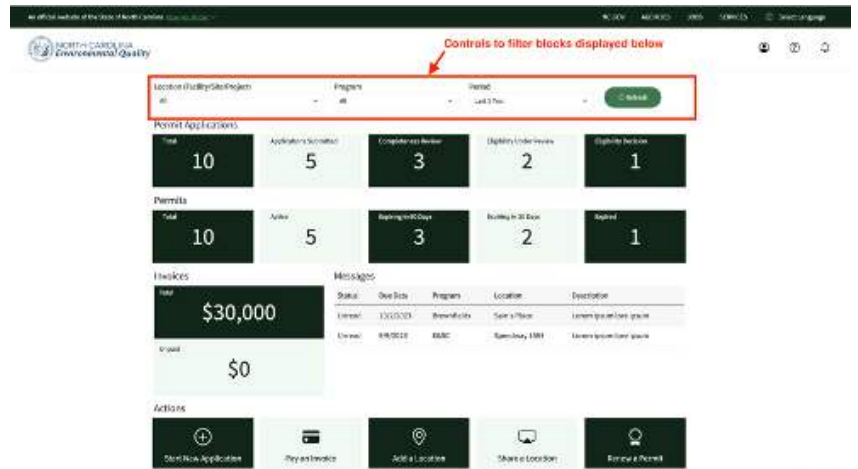
For example, instead of having a user enter information into a permit application and then asking questions that could disqualify the user from proceeding with the application, these questions are presented at the very beginning of a permit application, preventing unnecessary work for users who do not qualify for that particular permit. Similarly, certain questions were removed from the permit application because they would not be used by DEQ staff.

Other user-centric features of the external portal include **pre-populated fields; first-time user onboarding tour; explainer text on hover; universal, consistent icons and app behavior; permit-status tracker; and online invoice review and payments**, whose processing is made more accurate and faster with the capture of metadata.

Next Steps

External User Dashboard

DEQ is adding a dashboard page to the external portal. Pertinent data is displayed on a single screen and includes permit applications in review, active permits coming up for renewal and open invoice amounts. Clicking on a block will take the user to that area of the system, filtered to display only the records identified in the block.



External user dashboard under development

Collaboration Improvements

A new feature developed in the external portal will enable external users to upload large non-permit documents and reports. Currently, virtually all formal reports from external users in response to a violation, compliance, investigation or other DEQ-related reason are submitted as attachments or links via email to one specific DEQ staff member. Implementing this feature will enable the central capture of information and eliminate the siloing of information in an individual's email account. This feature will have agency-wide benefits as all DEQ divisions will have access to it once it is rolled out.

Brownfields Permitting Solution

AccessDEQ is being expanded with a solution to transform the application and administration processes for brownfields project agreements, in which DEQ works with developers to transform abandoned, idle or underused properties where the threat of environmental contamination has hindered redevelopment. The Brownfields Property Application will redesign and streamline more than 20 business processes. It will be launched in July 2024.