Onsite Wastewater Treatment Systems Database

Business Plan

Prepared for

Prepared by

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Executive Summary

Ayres Associates and Yahara Software were engaged by Iowa Department of Natural Resources (IDNR) to develop a business plan for the implementation of a state-wide septic inventory system. The project included preliminary research into database needs and requirements, suitability of commercially available database systems, and implementation planning. A stakeholders committee was convened to provide guidance for the process. The requirements for a database from the perspectives of IDNR, individual counties, and other interested parties were compiled and used to develop a preliminary database design. Necessary components for the system have been compiled and ranked based on necessity.

Once the database requirements were determined, existing database systems were evaluated to determine whether any provide the desired functions. A Request for Information (RFI) was sent out to companies that were identified as providing wastewater treatment data management systems. The respondents were each asked to address the list of requirements developed during the first phase of this project (see Appendix A: Requirements Document) and indicate whether their product provided the required functionalities or if not, whether workarounds were available. Four companies responded. A thorough analysis of the responses was performed and a comprehensive comparison was compiled.

Of the four companies, two offer a product that appears to satisfy all required functionalities as well as a good portion of the desirable functionalities. The cost to purchase and implement a commercially available solution ranged from $375,000-$2,800,000.

Based on preliminary estimates, development of a customized software solution may be a more cost-effective option. There are benefits associated with implementing a custom software solution. Software functionalities can be implemented exactly to IDNR's specifications. With an existing commercial system, the functionalities have already been implemented and thus can only be customized to the extent to which the vendor allows. The cost of development can be managed by limiting the functionalities to only that which are initially necessary. Consequently, IDNR would not be paying for functionality that would neither be used or is necessary.

However, there are risks associated with development of customized software. A commercial application can be evaluated before being purchased and experience with existing implementations can be surveyed. The risk of a non-functional or incomplete system can be mitigated through demonstration of the existing product. Since the product does not yet exist with a custom solution, this risk needs to be mitigated through a thorough vetting of potential vendors. Only vendors with an established track record of successful custom software development and implementations should be considered.

This document completes the first phase of the project, which had the following goals:

Convene a stakeholders committee to provide guidance throughout the project regarding the requirements, design, development, and implementation of the database

Visit selected counties to determine current practices, county requirements, and data migration and integration needs

Develop an initial database design to support the requirements identified

Evaluate commercially available software packages through a Request for Information (RFI) to identified vendors

Provide recommendations for implementation of a database to meet current needs and anticipate future needs

Prepare a business plan for the design and implementation strategy for the database

This document is the business plan for the purpose of serving as road map for the continuing process of implementing an onsite wastewater treatment data management system. The appropriate next step in the process is to create an RFP for development of a cost-effective custom software solution meeting the requirements that have been established IDNR and the stakeholders. Vendors who participated in the commercial software RFI should be included in this RFP and may leverage their existing products but the goal is to find a cost effective solution that meets the requirements of IDNR. The remainder of this document outlines areas that should be addressed in the RFP.

Onsite Wastewater Treatment Systems Database

System Requirements

A Requirements Document was compiled with the assistance of the stakeholders committee and individual counties (Appendix A). This document is the result of identifying each of the functions, which IDNR and the stakeholders committee consider to be needed and beneficial. Each of these functions were categorized as being either critical/required or "nice to have". For any database system to be considered for implementation, the critical/required functions must be addressed. The "nice to have" or desirable functions are to be analyzed for amount of effort and cost associated with their implementation versus the estimated value or cost savings gained with the function.

The initial focus of a new database is on capturing basic information from each county regarding onsite treatment system inventory including system location and type. Also, the new database is to provide an improved system for inventorying and managing the NPDES program and track the maintenance required of those treatment systems installed with help of a loan from IDNR's Onsite Wastewater Systems Assistance Program (OSWAP) .

See Appendix A for the detailed requirements and data elements that are to be tracked by the system.

Environments/Platforms

A multiple server setup will be used consisting of a Database Server and a Web Server. This setup will aid in performance and add a security layer between the web server and the database. The Information Technology Section of IDNR (IT) is most familiar with Microsoft platforms and would prefer working in these environments. The platforms include Microsoft Internet Information Server (IIS) for the web server and Microsoft SQL server for the database platforms. Other platforms may be acceptable and shouldn't be discouraged; however IDNR IT will review them to assure that they can be supported.

A tiered architecture that allows for separating all presentation and business logic from the database functions will be requested from the vendors. This type of architecture will allow for easier maintenance enhancement of the database in the future, and allows for more reuse of existing code to minimize long-term costs.

A single central repository is to be used for all counties. This architecture eliminates the need for each county to purchase additional server hardware. The system architecture is pictured below.

Public Users

IDNR Employees

County Employees

Service Providers/Registered Professionals

Internet

IDNR Employees

Web server

Database server
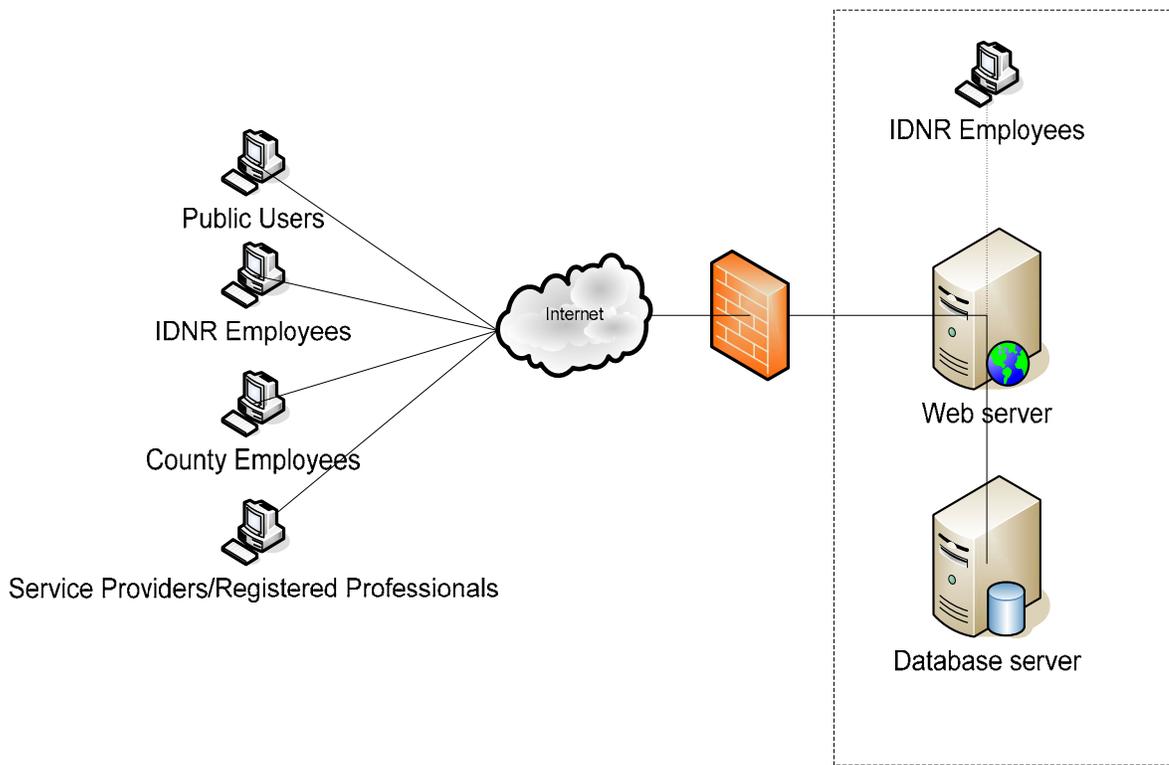
Ease of Operability

The system must be easy to use. An intuitive menu-driven web interface is to be utilized for ease of navigation. The system will include user-role based security that limits access by each user group to only those functionalities necessary. Additional functionality should be hidden from users who do not have the requisite permission or need to view or use it.

Role-based access for the following user groups is to be supported:

- IDNR staff

- County personnel

- Service providers and maintenance contractors

- Homeowners/general public (database search only)

Integration and Migration

Existing data from each county needs to be imported. This will entail a one-time importation from each existing system either a) directly into the new system or b) into an intermediate format to be imported into the new system. The easiest way to accomplish this task for all 99 counties is to define an intermediate format that allows for a standardized data exchange format between the counties' legacy systems and the new system. Data from each county will need to be formatted accordingly and then imported into the new system.

Also, interfacing with the following systems must be addressed:

Required: OneStop

This will be accomplished through Data Transformation Services (DTS) packages. These packages are created in Microsoft SQL Server but will support interfacing with most commercial database platforms. The vendor will be required to provide data mappings of the fields in their database that correspond to the OneStop database fields. In general the fields that need to be mapped are property address fields and high level permit information. The IDNR IT group can provide more detailed information and example data maps.

Desirable: Other county departments (assessors, soil maps, etc.)

The integration of the database into these systems may take a number of forms:

Required: Occasional data import routines (using DTS) to sync property and site data as well as permit information

Desirable: Allow individual counties to create hyperlinks to access other systems

Desirable: Data export to a standard GIS format, which can be used to overlay data on existing maps (e.g., systems overlaid on a soils map)

Desirable: A web service, which would allow counties to upload data into the database system

Documentation/Training

An online help system for use by IDNR and county employees should be implemented. A user manual should be distributed to county employees, service providers, and other users as necessary.

Approach

A Request for Proposal (RFP) will be developed to pursue a custom software solution. Vendors that have an established track record of successful custom software development and implementation will be invited to respond. Also, a Stakeholders Committee or Users group should be formed to review the interim development release and provide timely feedback on the usability of the system throughout the development process. Committee or Group members should be representative of those who ultimately will be using the system after deployment. Based on potential budgetary constraints the project will need to be developed in more than one phase to achieve the functionality required by a system that could be used by all of the counties. Based on discussions with IDNR it is likely that the funding for this project will need to be requested in three increments of roughly $50,000. To accommodate the phased approach, functionality of the database should be divided based on priorities between these 3 phases. Each of the phases should consist of the following high level functionalities:

Phase 1

Property Identification

Site Inventory

System Permitting
Basic Search and Reporting
Phase 2
Site Evaluation
System Design
Phase 3
System Monitoring
System Inspection
System Maintenance
Additional Reporting
Desired Features (as budget allows)

More detail is provided in Appendix A on how the envisioned system requirements should be categorized and in which of the three phases they would likely be addressed.

Database Requirements

Respondents to the RFP should address each of the requirements listed in Appendix A. Cost estimates for the database development are to be itemized for both the critical/required and desirable functionalities. A detailed breakdown of time and cost will be requested so that features can be further evaluated to determine the return of investment (ROI) and make cost/value decisions on whether "desirable" or low priority features should be implemented.

Budget

Based on the current requirements, it is estimated that development and deployment of a system that satisfies all of the critical requirements will require an investment of $150,000. As previously discussed, this investment will likely have to be spread across a minimum of three phases. This cost estimate includes server hardware/software, application development and testing, and limited user training.

Importation of existing county data could affect the project cost significantly. It is recommended that the vendor provide a file format that can be imported into the system to control costs. The counties will be responsible for organizing their data into this format. Since most of the counties have developed and maintained their own systems, it is likely that their staff will be able to accomplish this, but the vendor should be asked to provide hourly rates that would be extended to any county who desires assistance. It is assumed that in most cases the effort need to extract the data from the county system into the appropriate format would be 2-3 days unless a county's system is proprietary or very complex.

Warranty of Work

IDNR should perform due diligence before selecting a vendor. Success rates for completing a custom software project can be relatively low. Therefore, the respondents will be requested to warrant successful product implementation. The warranty period should extend at least one year after successful deployment so that any defects, which are found in the operation of the system, are addressed without additional costs. IDNR and the selected vendor should agree upon a set of acceptance criteria that will be reviewed when the application is released to IDNR. The warranty period will commence once all of the acceptance criteria are met and agreed to by the IDNR.

Maintenance and Support

The vendor will be requested to provide detailed descriptions of any ongoing maintenance fees, services provided for these fees, and a support plan. The database system is assumed to be business critical during normal business hours. Thus, a 10x5 support plan must be implemented (8am-6pm Central Time M-F). Support requests submitted via email or by phone are to be accepted. Critical defects should be addressed within 48 hours of submission. Enhancements are to be submitted as a work request through the appropriate channels. IDNR will consider performing the first level of support to address issues that may just require user training to help control the cost of the support agreement.

Ownership

It is in the best interest of IDNR to ensure that ownership of the final product (including source code) is given to the department. This step will help to mitigate some of the risks associated with the development of a custom solution. Full access to the source code will ensure that if changes need to be made after the completion of the project, the department will have the means to make the changes without having to obtain permission from another party. In addition vendors should be required to request IDNR approval for using any third party software components. The vendors will be required to register IDNR as the licensed user of any and all third party software components needed to operate the database system at the completion of the project.

Deployment Strategy

Since IDNR intends that each of Iowa's 99 counties use this system, rollout of the system is to be staged. After the system is feature complete, IDNR representatives and a select group of end users participate in an Alpha test phase. This Alpha test phase will allow IDNR to confirm that all of the features are implemented and function as desired before releasing the system to a larger audience. After the completion of Alpha testing, a number of counties should be chosen for a pilot program or beta testing phase. The pilot program will provide a limited-exposure environment through which any unforeseen issues can be identified and addressed. Upon successful completion of the pilot program, a broad rollout will be planned.

Return On Investment

By centralizing the onsite wastewater systems data reporting, a fair amount of dual-entry by IDNR staff will be eliminated. Counties are to be responsible for ensuring that their data are input completely and accurately. IDNR staff will no longer need to gather data from many disparate systems and manual tabulation should be reduced or eliminated.

Timeline

The following phases, along with rough estimates for total duration, are foreseen:

RFP Solicitation	4 weeks
Send out RFP to potential vendors and choose a vendor based on responses and due diligence	(Allows 2 weeks for responses and 2 weeks for reviewing responses and selecting vendor)
Finalize requirements with the stakeholders committee and chosen vendor	2-4 weeks
Phase 1	
Development and testing	6-8 weeks
Alpha Testing	2 weeks
Rollout to pilot counties	2-3 weeks
Beta Test application	3 weeks
Phase 1 Duration	13-16 weeks
Phase 2	
Development and testing	6-8 weeks
Alpha Testing	2 weeks
Rollout to pilot counties	1 weeks
Beta Test application	2 weeks
Phase 2 Duration	11-13 weeks
Phase 3	
Development and testing	6-8 weeks
Alpha Testing	2 weeks
Rollout to pilot counties	1 weeks
Beta Test application	2 weeks
Phase 3 Duration	11-13 weeks
Rollout to remaining counties (staggered release to groups of counties)	6-8 weeks
Total Duration	48-58 weeks

Appendix A –Requirements Document

Major Required Features

The requirements of the proposed software can be broken out into the following functional categories:

- Property Description

- Site and Soil Evaluation

- System Design

- System Construction

- System Inspection

- System Monitoring

- System Maintenance (repair and pumping)

- System Permitting

- Reporting/Integration

- Service Provider Registration/Certification/Licensing

- Custom Features for Individual Counties

The following sections break down the features of the desired system that were identified from interviews conducted with representative Iowa counties and subsequently prioritized by the stakeholders committee. The features are broken out into two major groups, those that are critical to have in the system and those that are not critical but desirable. The desirable features will need to be evaluated for the benefit they provide versus the cost to implement them to decide whether they should be implemented.

Critical Features

Property Description (Phase 1)
Store and track the following information:

- Property identification

- Property location

- Property owner, including history of change of ownership

- Mailing address

Site and Soil Evaluation (Phase 2)
Store and track the following testing data:

- Soil boring/pit locations and elevations against permanent benchmark

- Soil profile descriptions

- Percolation test locations and results

- Estimated depth to seasonally high groundwater

Store and track the following attributes:

- Well locations (including adjacent lots)

- Slope and landscape position

- Horizontal setbacks from wells, surface waters, property boundaries, etc.

Wastewater Characteristics (Phase 2)

Store and track the following:

- Type of wastewater (domestic, commercial, etc.)

- Plumbing fixtures (garbage grinder, spa, other)

- Estimated design flow

- Pollutant concentrations (commercial and other)

System Design (Phase 2)

Store and track the following:

- Design considerations, system parameters and calculations

- System design type

- Drain field application rate, type size and configuration

- Method of distribution (gravity, dosing, pressure, etc.)

System Construction (Phase 1)

Store the following:

Record drawings and specifications

Final inspection/certification

System Maintenance (Phase 3)

Allow for:

- Tracking repair and maintenance information, including history of maintenance events

- Setting up maintenance contracts and schedules

System Monitoring (Phase 3)

Allow for:

Tracking discharging systems management and monitoring requirements along with results and history, e.g. NPDES testing, manual testing, etc.

- Setting up a monitoring schedule to alert user that monitoring event is due

System Permitting (Phase 1)

Allow for tracking the permit process for each onsite wastewater system including:

- Construction permit

- Abandonment certification

- NPDES permit effective/expiration date

- OSWAP scheduled monitoring dates

Reporting

The following reporting needs are required:

- IDNR report of number, type, and status of systems (Phase 1)

- IDNR NOI reporting for discharge systems (Phase 1)

- IDNR Loan Program (Phase 1)

- Ability to generate maintenance standardized "reminder letters" to owners, e.g. for pumping, testing, etc. (Phase 3)

Non-functional Requirements

- **Easily understandable** – the system should be easy to learn, understand, and use

- **User friendliness** – the system should be intuitive and easy to use for IDNR employees, county employees, service providers, registered professionals, and public users

- **Data protection** – the system should prevent users from deleting and/or changing historical data

Desirable Features

Property Description (Phase 3)

Store and track the following information:

- System status, including history of change in status

- GPS coordinates of property corners, wells, soil borings, other

System Design (Phase 3)

Store and track the following:

- Additional considerations as defined on a state-wide or county-specific basis

- System components of installed system, including manufacturer, model, description, etc.

System Construction (Phase 3)

Store the following:

- Files for each system, e.g. pictures, CAD drawing, etc.

- GPS coordinates of selected system components

Site Inspection (Phase 3)

Allow for tracking the following:

- Inspection information

  o Allow setting up an inspection schedule to alert owner that inspection is due

  o Allow setting up inspection checklists for each individual county

- History of inspections

Site Monitoring (Phase 3)

Allow for tracking the following:

- Track monitoring information, including history of monitoring events
- Allow setting up a maintenance schedule to alert owner that servicing and maintenance is due
- Complaint information and history

Site Maintenance (Phase 3)

Allow for tracking the following:

- Pumping information and history, including treatment location and description
- Allow setting up maintenance checklists for each individual county

Site Permitting (Phase 3)

Allow for tracking the permit process for each onsite wastewater system; this includes:

- Application for permit
- Permit approval
- Expiration date for permits
- Any number of additional permit types, based on the county

Reporting (Phase 3)

The following reporting needs are required:

- Health Department quarterly reporting
- System completion report
- Ability to generate maintenance customizable "reminder letters" to owners, e.g. for pumping, testing, etc.
- Ability to generate customized form letters and notices
- Ability to customize reports on a county-by-county basis
- Ability to analyze data for state-wide trends, e.g. component failures, types of systems, etc.
- Allow for integrating with other systems, including:
- GPS data export allowing for overlaying system data on soil maps
- Link to other county department databases
- Interface with other systems (assessor's databases, soil maps, NRCS soils information, etc.). This can be done through custom hyperlinks per county or exported GIS data for map overlays

Service Providers (Phase 3)

Allow for tracking service providers, including:

- Registration and license requirements for contractors
- Ability to obtain list of registered/licensed service providers for each county
- History of status of registered service providers
- Training attended by registered professionals at each service provider

Customized by County (Phase 3)

The following items should be able to be added on a county-by-county basis:

- Maintenance checklists

- Inspection checklists

- Design flow considerations (e.g. garbage disposal, water softener, spa, etc.)

- System type and design criteria

- Permit types (support for an unlimited number per county)

- Maintenance categories (e.g. tank repair, pumps/switches, etc.)

- Inspection categories (e.g. mechanical aerobic, time of transfer, etc.)

- Service provider licensing and status (requirements differ by county)

- Training events attended by service providers and their registered professionals

- Ability to break a county into multiple regions

Non-functional Requirements

Enhancibility – the system should be able to be customized per county while utilizing a single shared database for all counties. Customizable attributes include:

- Design flow, treatment types, maintenance, monitoring, and inspection reports

- Custom characteristics for property and septic system entities

- Maintenance and inspection checklists

- Types and statuses of service providers.

- Other customizable components include:

  o User interface

  o Reports

  o Form letters

- Enable/disable any module by county

Portability – the system should run using the following web browsers (and later versions): IE 5.0, Firefox 1.0, Netscape 7.0, Safari 1.0

Reusability – the components of the system should be reusable

Performance/responsiveness – the system should provide good performance while responding to user interaction quickly

Adaptiveness – the system should be able to adapt to changes

Data Elements

The following sections detail the database fields that would be necessary to store the information managed by the system. Like the system features, these fields have been prioritized for implementation. Those fields flagged as *"Not Required"* are deemed to be non-critical to the successful deployment of the application.

General Site Information
Property Location
County
Address1
Address2
City
State
Zip
E911 Address – *Not required*
E911 City – *Not required*
Quarter1
Quarter2
Section
Township
Range
Parcel ID number
Zoning – *Not Required*
Lot area
Custom field - *Not required*

- Description
- Field name
- Allowed data type
- Possible values
- Value
- Label to be displayed

Property Owner
First name
Last name
Address
City
State
Zip
Home phone
Work phone - *Not required*
Email - Not required
Date purchased
Date sold
Custom field - *Not required*

- Description
- Field name
- Allowed data type
- Possible values
- Value

- Label to be displayed

System

Permit number

Permit issue date

Comment(s) - *Not required*

Type

Date

Commented by

Comment text

Location

- Longitude
- Latitude

Service providers - *Not required*

Treatment types (customizable)

- Description
- Advanced treatment (Y/N)

Design flow considerations (list of considerations is customizable by county)

- Description
- Value
- Comments

Status (includes history) - *Not required*

- Description
- Date

Custom field – *Not required*

- Description
- Field name
- Allowed data type
- Possible values
- Value
- Label to be displayed

Files – Not required

File type (customizable)

Description

Extension (e.g. PDF)

File name

File size

Creation date

Last modified

Permit Information

Permit type (customizable by county)

Fee

Description

Date issued
Date expires

Site Evaluation Information

Percolation Test
Date performed
Performed by
Comments
Test holes (0 or more)

- Location - Not required
- Longitude
- Latitude
- Limiting factor depth - ***Not required***
- Results
- Time
- Rate

Custom field - ***Not required***

- Description
- Field name
- Allowed data type
- Possible values
- Value
- Label to be displayed

Soil Evaluation
Date performed
Performed by
Comments - ***Not required***
Soil borings (0 or more)
Location - Not required
Longitude
Latitude
Elevation (relative to permanent benchmark) - ***Not required***
Type (customizable) - ***Not required***
Description
Limiting factor depth
Soil boring profile

- Depth
- Horizon
- Color
- Redox
- Texture
- Structure
- Consistence
- Boundary

- Roots

Soil based type

Custom field - ***Not required***

- Description
- Field name
- Allowed data type
- Possible values
- Value
- Label to be displayed

Site Design Information

System Characteristics

Design flow

- Number of bedrooms
- Waste water category

Pumping interval

- Maintenance interval

Discharging (T/F)

System distribution type (customizable)

- Description

System dispersal type (customizable)

- Description
- Infiltration area

Record drawing (T/F) - ***Not required***

Custom field - ***Not required***

- Description
- Field name
- Allowed data type
- Possible values
- Value
- Label to be displayed

System Components

Component Type (customizable)

- Description
- Manufacturer
- Comment - Not required

Status (customizable, includes history) - ***Not required***

- Description
- Date

GPS coordinates - ***Not required***

- Longitude
- Latitude
- Elevation
- Description

Manufacturer - *Not required*
Name
Address
City
State
Zip
Phone
Email
Comment
Custom field - *Not required*
- Description
- Field name
- Allowed data type
- Possible values
- Value
- Label to be displayed

Service Report Information

Maintenance Event
Service provider
Date
Next scheduled maintenance event
Type (customizable by county)
Component
- Description

Comment - Not required
Custom field - *Not required*
- Description
- Field name
- Allowed data type
- Possible values
- Value
- Label to be displayed

Maintenance Checklist - *Not required*
Type (customizable by county)
Component
Description
Items (1 or more checklist items)
- Description of item
- Possible responses
- Allowed data type

Maintenance Checklist Results - *Not required*
For each question in the checklist:

- Result
- Comment

Pumping Event - *Not required*

Service provider/licensed pumper list
Date
Next scheduled pump date
Treatment type

- Description

Treatment location

- Address
- City
- State
- Zip

Pumping condition

- Pumped volume
- Comment

Custom field

- Description
- Field name
- Allowed data type
- Possible values
- Value
- Label to be displayed

Inspection Event - *Not required*

Service provider
Date
Next scheduled inspection date
Type (customizable by county)
Component

- Description
- Result
- Comment

Custom field

- Description
- Field name
- Allowed data type
- Possible values
- Value
- Label to be displayed

Inspection Checklist - *Not required*

Type (customizable by county)
Component

- Description

Items (1 or more checklist items)
- Description of item
- Possible responses
- Allowed data type

Inspection Checklist Results - *Not required*

For each question in the checklist:
- Result
- Comment
- Monitored Items
- Name
- UOM
- Limit (possible values)

Monitoring Event

Date

Next monitoring date

Items monitored (1 or more monitor items)
- Name
- Unit of measure
- Limit
- Result
- Violation
- Comment

County Information

County

Name

Address

City

State

Zip

Phone number

Email

Regions (0 or more per county) – *Not required*

Approved service providers by type – *Not required*

Custom field
- Description
- Field name
- Allowed data type
- Possible values
- Value
- Label to be displayed

Service Provider – *Not required*
Name
Address
City
State
Zip
Phone number
Email address
License registration number
Type (customizable)
- Description
- Comment

Status (customizable, includes history)
- Description
- Date

Custom field
- Description
- Field name
- Allowed data type
- Possible values
- Value
- Label to be displayed

Users

User
Login
Password
County
First name
Last name
Phone number
Email address

User Roles
- Role name
- Description

Appendix B – Sample Screenshots

Based on the requirements gathered, the system is envisioned to look something like the screen shots below. A simple navigation menu should be available either on the left or top each page. A consistent look-and-feel and an intuitive interface should be maintained throughout the site.

Figure 1 – Example Property Record Screen
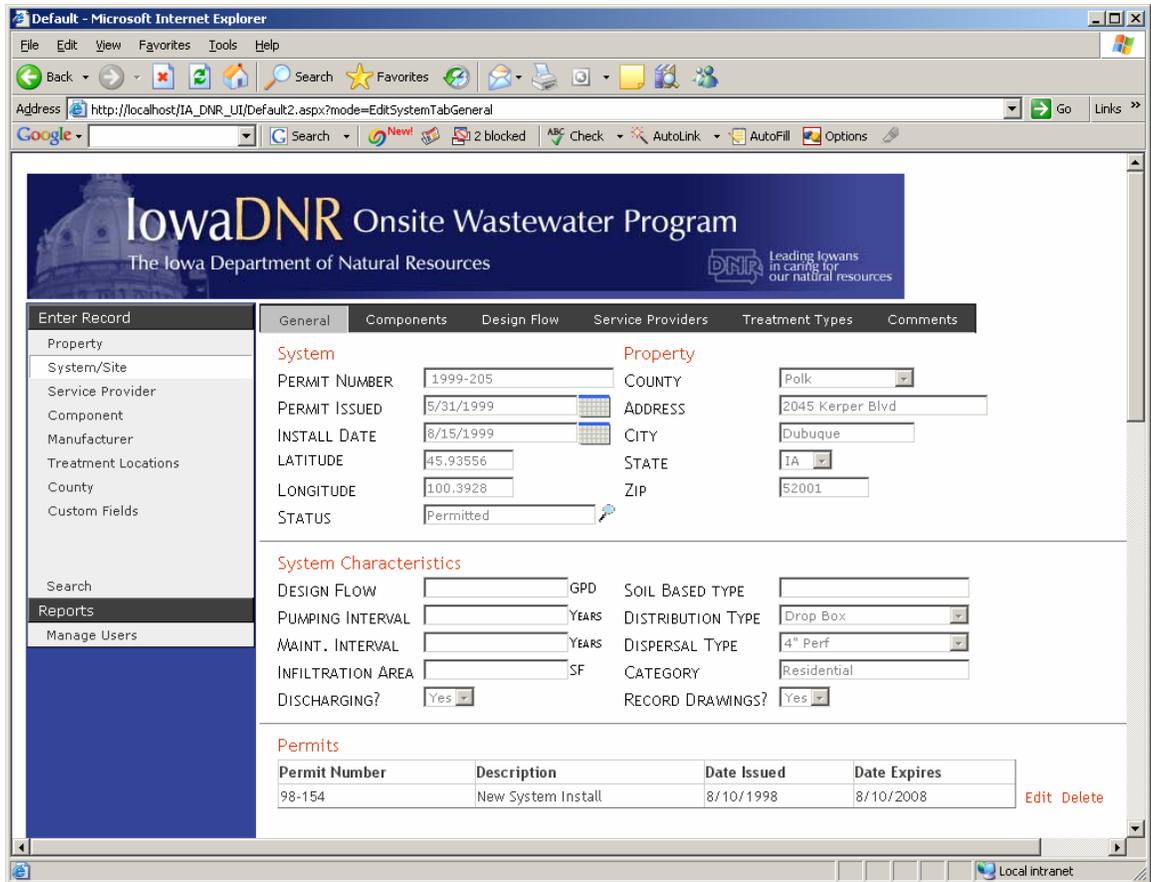
Figure 2 – Treatment System Record Screen
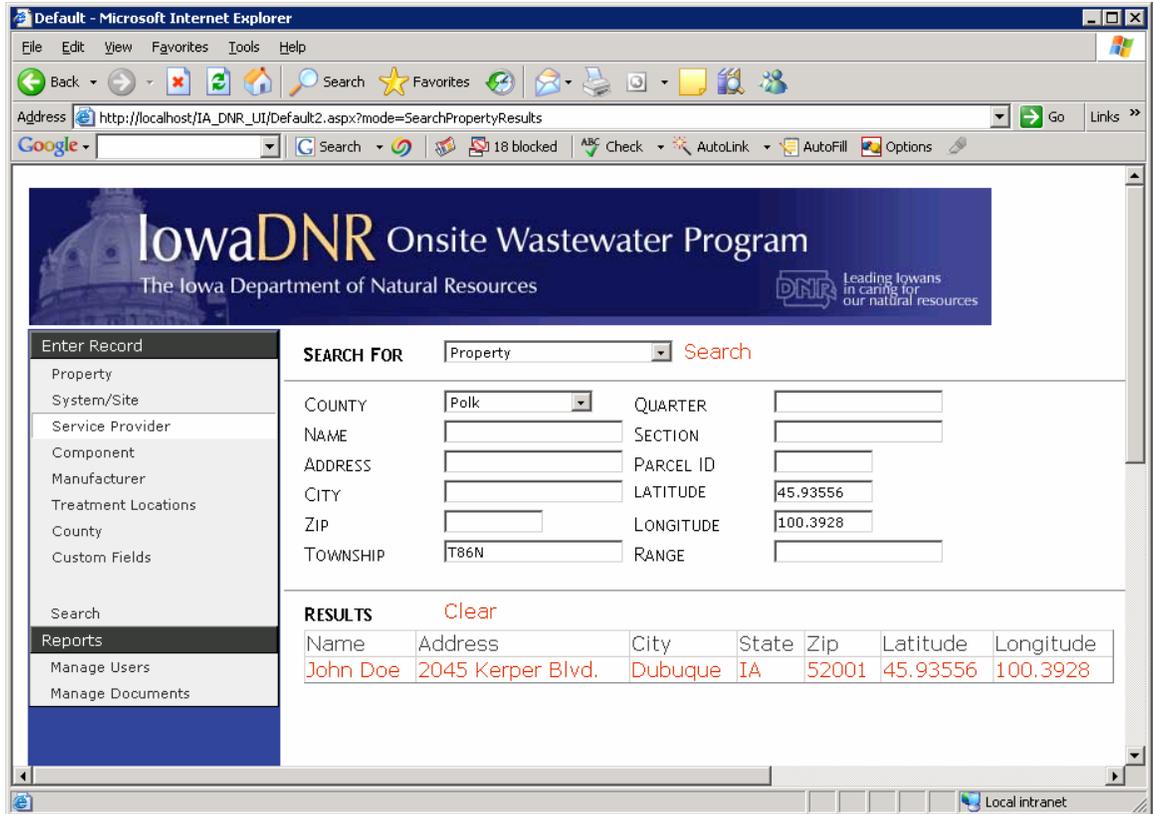
Figure 3 – Example Search Screen