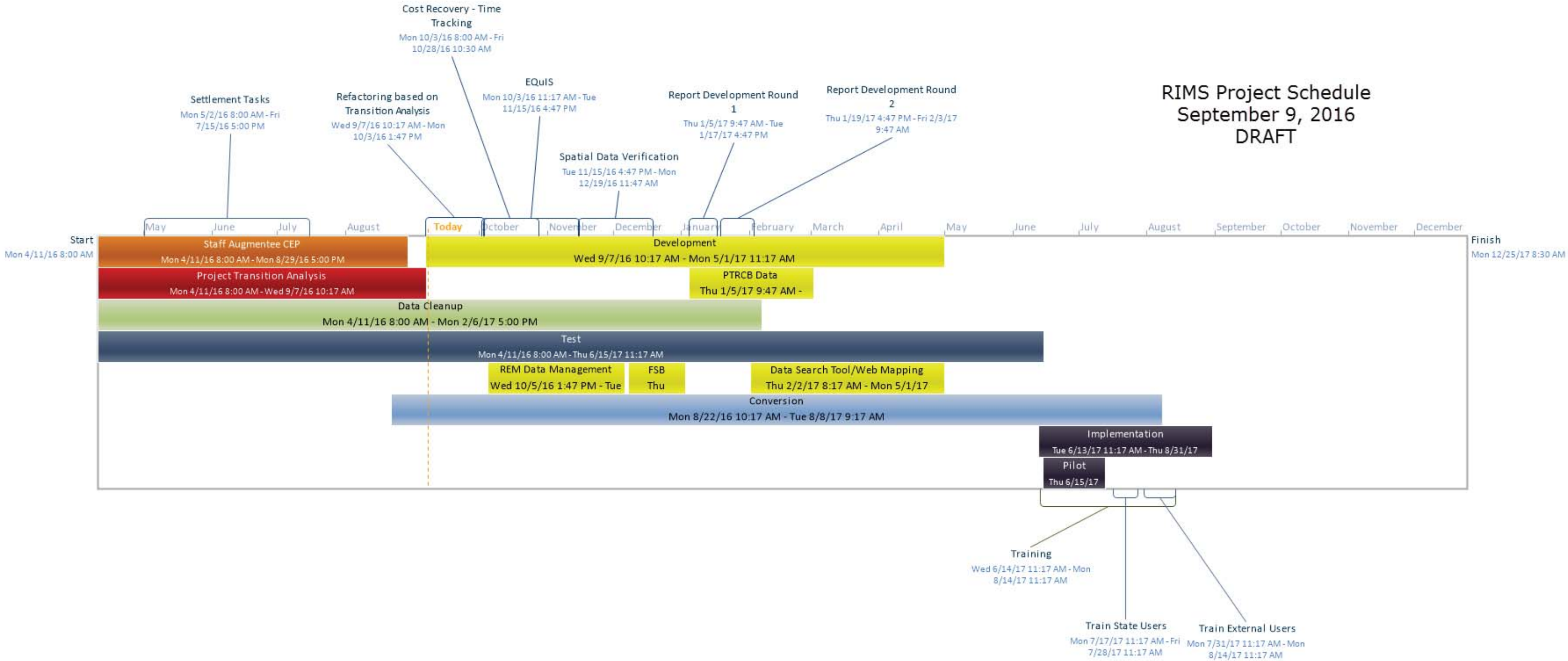


RIMS Project Schedule September 9, 2016 DRAFT



Tracking Remedial and Environmental Actions Data System (TREADS)

*Gap Analysis for Transition of Design, Development, and
Implementation from Windsor to DEQ*



Montana Department of Environmental Quality

September 8, 2016



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1 INTRODUCTION

1.1 About this Document

This document contains a discussion of the current state of the RIMS Project and the Tracking Remedial and Environmental Actions Data System (TREADS) and a corrective action plan to address deficiencies in both. Input to the document included:

- TREADS Priority 1 Requirements
- Project Change Requests
- Requirements Change Requests
- TREADS Bug List
- TREADS Backlog
- TREADS Deliverable Acceptance Requests
- DEQ Database Review Meeting Minutes
- DEQ transition analysis team feedback
- Knowledge gained from technical training received in .NET MVC and Angular.js

The DEQ Transition Analysis Team, referred to as the “team” within this document was comprised of the following DEQ staff:

Name	Organization	Role
Staci Stolp	WMRD/ATS	Project Manager/Systems Analyst (SA)
Kelly Hanna	ITB/ADS	Technical Lead
Bruce Arnold	ITB/ADS	Database Administrator
Sean Behlmer	ITB/ADS	Systems Analyst (SA)/Developer
Byrne Manley	ITB/ADS	Systems Analyst (SA)/Developer
Kate Cederlund	ITB/ADS	Systems Analyst (SA)/Developer
Kim Wells	WMRD/ATS	Observer/Trainee

1.2 Document Control

The DEQ Project Manager or designee will control this document via Document Number and Version Number, with Version 1.0 representing the first major release.

1.3 Revision History

Version	Date	Name	Description
0.1	09/2/2016	Staci Stolp	Initial Draft
0.2	09/07/2016	Staci Stolp	Incorporated Jenny Chambers Comments, feedback from transition analysis team, and revised budget
0.03	09/08/2016	Staci Stolp	Updated summary with full cost estimates

1.4 Reference Documents

Document No.	Document Title	Location	Author
NA	RIMS_P1_RD02_RTM_Consolidated.xlsx	http://deq.sharepoint.mt.gov/teams/Projects/equiseval/Execution/02a-Requirements/RIMS_P1_RD02_RTM_Consolidated.xlsx	Staci Stolp and Byrne Manley
PCR – 001 to PCR - 033	Project Change Requests	http://deq.sharepoint.mt.gov/teams/Projects/equiseval/Lists/RIMS_Tracker/PCR.aspx	Associated past and present team members
RCR – 001 to RCR - 041	Requirements Change Requests	http://deq.sharepoint.mt.gov/teams/Projects/equiseval/Lists/RIMS_Tracker/RCR.aspx	Associated past and present team members
NA	TREADS Backlog (User Stories/Sprints) at the time of the Windsor/DEQ Settlement Agreement	http://deq.sharepoint.mt.gov/teams/Projects/equiseval/Planning/Transition_Analysis/RemainingSprintsforTREADS_20160818.xlsx	Associated past and present team members
NA	Open List of TREADS Bugs	OpenListofTREADSBugs_20160818.xlsx This list is also available via the DEQ’s JIRA site for TREADS: https://mtdeqtreads.atlassian.net <i>Note: You must log-into JIRA to see these bugs</i>	Associated past and present team members

1.5 Terms and Acronyms

Term	Definition
ADS	Application Development Section
AML	Abandoned Mine Lands
ATS	Administrative and Technical Section
BDS	Business Development Section
CSCB	Hazardous Waste Site Clean-up Bureau
DDI	Design, Development, and Implementation
DEQ	Department of Environmental Quality
DIR	Decision Information Request
FFB	Federal Facilities and Brownfields
FSB	Federal Superfund Bureau
ITB	Information Technology Bureau
ITSD	Information Technology Services Division

Term	Definition
PCR	Project Change Request
PTC	Petroleum Tank Cleanup
PTRCB	Petroleum Tank Release Compensation Board
RCR	Requirements Change Request
SAS	Systems Administration Section
SSU	State Superfund Unit
UST	Underground Storage Tank
WMRD	Waste Management and Remediation Division
WUTMB	Waste and Underground Tank Management Bureau

2 BACKGROUND OF PROJECT AND SYSTEM

In August 2014, DEQ contracted with Windsor Solutions to serve as the Design, Development, and Implementation (DDI) vendor that would develop TREADS, ultimately replacing the department's legacy systems supporting:

- 1) Underground Storage Tank Section
- 2) Petroleum Tank Cleanup Section
- 3) Federal Facilities and Brownfields Section
- 4) Petroleum Tank Release Compensation Board
- 5) State Superfund Unit
 - a) Site Response Section
 - b) State Superfund Section
- 6) Federal Superfund and Construction Services Bureau
- 7) Abandoned Mine Lands Section

The following goals and objectives address how TREADS should operate in order to best support its associated programs. All goals and objectives are applicable to all programs unless otherwise noted.

- 1) The new system must be flexible, modular, reliable, easy to update, and easy to maintain.
 - a) The State must be able to make changes easily within the system, including changes to reports, queries, tables, and business rules. The State must be able to maintain business rules if they choose to do so. This flexibility and updateability is required for the system to be responsive to evolving program business needs.
 - b) The system must be maintained over the long-term with relative ease. End users must be able to perform this long-term maintenance.
 - c) The system must be scalable and modular.
- 2) The system must be user-friendly from the State and external user (i.e., laboratories, consultants, regulated community, and the public) perspectives.
 - a) The new system must be easy to learn for new and existing State employees. The onscreen text must be written in plain English, so a user can look at a screen and know

- why he or she is on that screen, and know what to do to use the screen successfully. State employees must not have to remember illogical codes or workarounds to use the system. The system must be intuitive.
- b) The system must incorporate a search functionality to make it more useable.
 - c) The system must incorporate system training modules and/or a system help function.
 - d) The system must incorporate policy training modules and/or links to department policy manuals. This will allow staff to answer questions quicker and more accurately, improving staff, business partner, and/or clients' experiences.
 - e) The system must have a common "intake" function so site and other shared information only needs to be entered once.
 - f) The system must be as paperless as possible.
 - g) The system must be accessible to all, including people with disabilities.
 - h) The system should be able to accept external information (e.g., sample data, plans, and reports).
 - i) The system must include spell check for case notes and notices.
 - j) The system must have flexible and easy to use correspondence, to which changes can be made easily. System-generated correspondence must have basic word processing functionality including word wrap, the ability to have different line spacing, and a variety of formatting options (e.g., fonts, and bold and italics).
 - k) At a minimum, online availability is required between 8:00 a.m. and 5:00 p.m. Mountain Time seven days a week. The system must be available for longer hours in special circumstances (e.g., to support large-scale emergency response).
 - l) The system must have a consistent look and feel.
- 3) The system must be able to exchange data with other systems easily.
- a) The system must coordinate with and be compatible with other information systems. Data must be exchanged between systems easily.
 - b) Interfaces must be intelligent and real-time. The system needs to be able to interface with other Montana State systems and other non-State program partners (i.e., laboratories).
 - c) System users must be able to smoothly transition to other software applications (e.g., MS Word, Excel, Adobe Acrobat Reader, ArcGIS) from the system.
- 4) The system must have the ability to create reliable, comprehensive, flexible, usable, ad-hoc and canned reports for case management, sample and field data management, and program management.
- a) The reporting capabilities must demonstrate accountability to and compliance with State and Federal standards.
 - b) The system must automatically produce managerial reports, including case load reports, and the system must give staff the ability to query data to generate any other reports needed (ad-hoc reports).
 - c) The system must have the ability to create accurate Federal reports (e.g., Underground Storage Tank Performance Measures Report).
 - d) The system must have the ability to implement and accurately measure legislative performance measures.
 - e) The system must be able to produce consistent reporting statistics.
 - f) The system must retain accurate records.
 - g) Reports must be clear, flexible, accurate, and timely.

- 5) The system must have robust security and controllable system access.
 - a) Data within the system must be secure and accessible only to those with proper access.
 - b) The system must have varying levels of access. Confidential information needs to be accessible only to people with a certain security level.
 - c) The system must have theft and fraud prevention built in to it.
 - d) The system must contain a history of each user ID and the dated actions taken by specific users.
- 6) System development processes must be efficiently and effectively coordinated with other systems.
 - a) The system must be completed successfully under budget and on time.
- 7) The system must have well-defined data fields and rules. The system must serve the right people with the right services at the right time.
 - a) Data must be accurate and reliable in the new system.
 - b) The system must contain strong controls to limit and correct errors. Certain errors must be able to be corrected without programmer involvement.
 - c) The system must minimize agency-caused errors.
- 8) The system must support efficient case management.
 - a) The system must contain an effective case management capability
 - b) The system must retain a history of case action, which must be easily searchable.
 - c) The system must help department staff manage their time efficiently.
- 9) The system must support sample and field data management.

Key constraints associated with adoption of the new system include:

- The new system must be web-based.
- The new system must use State and Department accepted application and database technology
 - Application Technology
 - Windows servers are running IIS 7.
 - New applications are predominantly .NET applications.
 - We use SITSD's servers and hosting, rather than third party vendors.
 - Web applications must conform to the Federal 508 standard, where possible.
 - If the system has a public facing side there may be some design limitations in place (DEQ's website look and feel, or the "[egov](#) template" look and feel).
 - Database Technology
 - Oracle and SQL Server are the State's database standard. The Department does not have a preference between these two database platforms.
 - Sample Data Management Software
 - Current version of EQUIS Enterprise, Professional, EDP, and Data Quality Module.
 - GIS Technology
 - Reference the provided Location Based Application standard ITB-GIS-STD-001; section 2.5 Web based Mapping Applications. This document is located in the Procurement Library. The name of the zip file is DEQ_IT_Standards[1].

- All geodatabases and subsequent mapping/spatial services against them will be done through ArcGIS Server creating REST endpoints to access them. (Refer to ITB-GIS-STD-001-2.5-2.b.ii in the procurement library).
- ArcGIS API for JavaScript is the only DEQ ITB GIS supported web mapping development API
 - It is not specifically tied to an OS or browser plugin like Flex or Silverlight
 - It marries directly with supported spatial services from ArcGIS Server
 - It leverages/supports new web concepts like mobile development and HTML5 & CSS3.
- The new system must conform to Federal, State, and Department data standards, where possible.
- The new system must conform to State and Department security standards
- The proposed design, development, and implementation costs must remain within budget for priority 1 requirements. The budget for design, development, and implementation (does not include maintenance, supporting software, or hardware) of RIMS is \$1,820,000.
- The State has approximately \$150,000 set aside to support hardware and software costs (e.g., [SITSD service rates](#) and purchasing additional hardware or software). We have some flexibility with how we use these funds (e.g., in the case of a COTS solution we would expect more cost would be attributed to software costs compared to a custom system.) The State has also set aside some contingency funding for the project to address unforeseen project costs.

TREADS, as proposed by Windsor Solutions, was to be comprised of a combination of software products developed by Windsor Solutions, custom-developed software modules, and third-party software tools. Currently, the custom TREADS software integrates with the following applications from Windsor and third-party vendors:

- Windsor Solutions
 - nForm – Permitting and Release forms
 - nSpect – Inspection forms
 - nSite – GIS viewer and environmental data warehouse
- Alfresco – Document Management
- Brava for Alfresco – Viewer and redaction tool for documents in Alfresco
- EQUIS – Sample data management.

The custom TREADS software was also intended to integrate with the following State of Montana systems:

- ePass – Authentication for internal state and external users
- Common Checkout – On-line payment system (for eChecks and credit cards)
- SABHRS – HR and employee time tracking data
- SABHRS – Financial data on invoices to responsible parties (for cost recovery)
- MT Pi– Contracts for work plans and task orders with consultants and contractors
- SIA – Interface for submitting invoice transactions to SABHRS
- CEDARS – Enforcement Actions
- ArcGIS – Spatial data

- DST/WMA – Data Search Tool and associated Web Mapping Application - GIS viewer and environmental data warehouse.

Windsor’s nSuite products are integrated with a custom-developed TREADS-specific data management module that is focused on supporting the workflow process needs of the DEQ programs associated with TREADS. Document management and sample data management capabilities are provided by third party tools provided by Alfresco/IGC and EarthSoft. The diagram below (Figure 1) outlines the proposed application architecture for the TREADS:

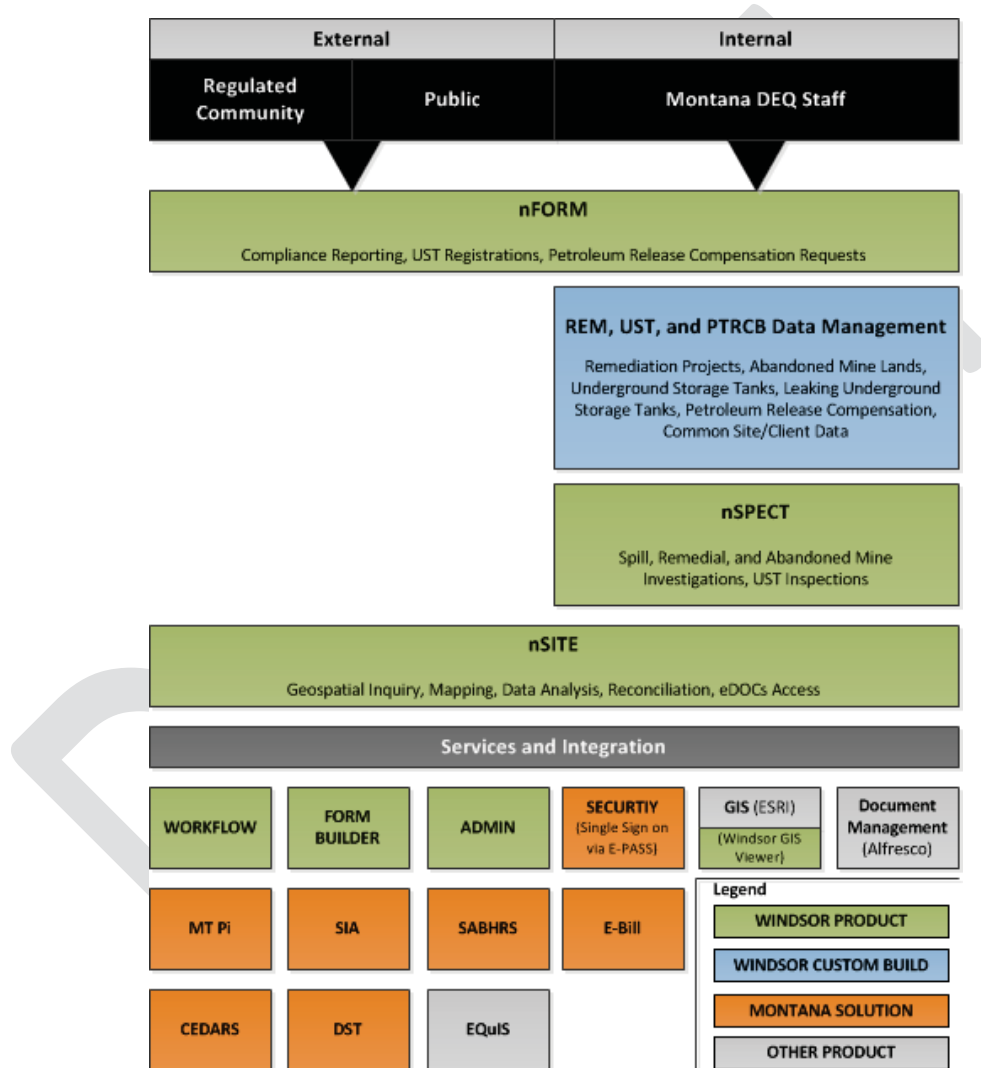


Figure 1. Proposed TREADS Architecture

On Jul 15, 2016, DEQ and Windsor entered a settlement agreement which ended the relationship between the two parties. The project and system was incomplete at the time.

3 CURRENT STATE

3.1 Project

3.1.1 Deliverables

Table 1 displays the status of the project deliverables for the RIMS Project. The RIMS Project was using an Agile development methodologies and thus, Design, Development, and Testing status reflect the % complete of TREADS functionality as the documentation and tasks associated with these project phases were being completed incrementally.

Table 1. Project Deliverable Status

Project Phase	Deliverables	Status
1. Prepare for Development		
a. Project Plan	<ol style="list-style-type: none"> 1) Project Plan - including schedule, staffing, quality, and communication plans 2) Risk Register 	Complete
b. Requirements Validation and Workflow Process Analysis	<ol style="list-style-type: none"> 3) Training for product owners and other stakeholders on the Agile/Scrum process 4) Requirements validation and workflow process analysis workshop sessions 5) Product Backlog - a prioritized list of user stories that are aligned with the workflow processes 6) "To-Be" workflow process diagrams for each application area (Remediation, UST, PTRCB) 7) Requirements Traceability Matrix - Updated based on workflow analysis and validation 8) Change Management request for changes to requirements requested by DEQ. 	Complete
c. Design and Architecture	<ol style="list-style-type: none"> 9) Technical Architecture Specification: Network, Security, and Data architecture. 10) User Interface mock-ups and software prototypes 11) User Interface Style Guide - Visual design (colors, fonts, etc.) and user interactions 12) Information Model for each application area (Remediation, UST, PTRCB) 13) Entity Relationship Model and Data Dictionary for each application area (Remediation, UST, PTRCB) - Initial skeleton sufficient for starting development. 14) Design Specification Document - Initial skeleton sufficient for starting development 15) Product Backlog – Updated 16) Requirements Traceability Matrix – Updated 17) Change Management requests for changes to requirements requested by DEQ. 	65% Complete
2. Development (sub-phases in parallel)		
a. Detailed Design and Development	<ol style="list-style-type: none"> 18) Application software release candidate installed and running a Test environment in the Windsor Cloud - each iteration 19) Detailed Design Workshop sessions - for user stories in a sprint 	65% Complete

Table 1. Project Deliverable Status

Project Phase	Deliverables	Status
	20) Product Backlog - Updated each iteration for user stories and acceptance criteria in a sprint. 21) Design Specification Document - Updated each iteration based on completed stories. This includes user interface mock-ups, business rule decision tables, and other information needed to support the user acceptance criteria for user stories. 22) Information Model for each application area (Remediation, UST, PTRCB) - Updated 23) Entity Relationship Model and Data Dictionary for each application area (Remediation, UST, PTRCB) - Updated each iteration. 24) Test Plan - Updated each iteration based on completed stories. Requirements Traceability Matrix - Updated each iteration based on completed stories. 25) Change Management requests for changes to requirements requested by DEQ.	
b. Data Conversion	26) Data converted from the legacy data sources into the new RIMS database 27) Data conversion scripts installed and ready to run in the User Acceptance Test (UAT) environment (in the Windsor Cloud or hosted internally by DEQ) 28) Data Conversion Design Specification: Covers the strategy, requirements, data mapping details, and test plan for data conversion work. 29) Data Conversion Test Results Report 30) Entity Relationship Model and Data Dictionary for each application area (Remediation, UST, PTRCB) - Updated each iteration. 31) Product Backlog - Updated each iteration based on completed stories. 32) Requirements Traceability Matrix - Updated each iteration based on completed stories. 33) Change Management requests for changes to requirements requested by DEQ.	65% Complete
3. Implementation		
a. User Acceptance Test and Training	34) User Acceptance Test (UAT) Plan 35) Training Plan and Training Materials 36) Training Classes Conducted 37) User Acceptance Test Environment - RIMS application software installed and running in a DEQ testing environment 38) Data converted from the legacy data sources into the new RIMS database 39) UAT Test Results recorded (in Windsor's Issue and Bug Tracking software) 40) Test Results Report 41) Product Backlog - Updated each iteration based on completed stories. 42) Requirements Traceability Matrix - Updated each iteration based on completed stories. 43) Change Management requests for changes to requirements requested by DEQ.	65% Complete
b. Pilot Operations	44) Pilot Operations Environment-RIMS application software installed and running in a DEQ testing environment 45) Data converted from the legacy data sources into the new RIMS database	Not Started

Table 1. Project Deliverable Status

Project Phase	Deliverables	Status
	46) Help Desk support services 47) Pilot Operations issues recorded (in Windsor’s Issue and Bug Tracking software) 48) Pilot Operations Results Report 49) System Administration Guide 50) User Guide (Operations Manual) for each application area: Remediation, UST, and PTRCB. 51) Product Backlog - Updated each iteration based on completed stories. 52) Requirements Traceability Matrix - Updated each iteration based on completed stories. 53) Change Management requests for changes to requirements requested by DEQ.	
c. Production Deployment	54) Implementation Plan 55) Operational Readiness Assessment 56) Post-implementation Operational Monitoring Plan 57) Operations Plan 58) Obtain State Approval for Production Deployment 59) Application software installed and running in a Production environment at a DEQ hosted site 60) Data converted from the legacy data sources into the new RIMS database 61) Source Code 62) System Administration Guide - Updated based on Production deployment 63) Product Backlog - Updated each iteration based on completed stories. 64) Requirements Traceability Matrix - Updated each iteration based on completed stories. 65) Change Management requests for changes to requirements requested by DEQ	
4. Operations and Maintenance		
a. Operations and Software Maintenance	66) Help Desk support services 67) Software maintenance services 68) Change management request for training, configuration changes or software enhancements 69) Monthly Operations Report	Not Started
b. Turnover	70) Turnover Plan 71) Knowledge Transfer Strategy 72) Operational Resources 73) Knowledge Transfer Services	Not Started

3.1.2 Budget

Table 2 displays the status of the budget for the RIMS Project as of August 10, 2016. Total hard costs (i.e., not including DEQ staff costs), is \$1,520,737.17

Table 2. Current Budget

Cost Category	Expected	Actual	Variance	Comments
State Costs				
DEQ Personnel Services (estimated)	\$2,150,000.00	\$1,650,000.00	\$0.00	Soft costs for project
Communications	\$335.00	\$0.00	\$335.00	Mail/FedEx other communication costs related to the project
Equipment and Supplies	\$6,624.00	\$0.00	\$6,624.00	Includes paper, pens, binders, printing costs, etc. Includes copiers, printers, and computers for State Staff.
SITSD Hosting	\$51,401.73	\$39,224.42	\$12,177.31	
<i>Original Estimate</i>	<i>\$17,196.00</i>	<i>\$17,196.00</i>	<i>\$0.00</i>	
<i>PCR-014 Software and SITSD hosting increases</i>	<i>\$34,205.73</i>	<i>\$22,028.42</i>	<i>\$12,177.31</i>	
Software	\$285,903.73	\$245,126.75	\$40,776.98	
SITSD VPN	\$5,715.00	\$1,507.90	\$4,207.10	
COTS Software	\$280,188.73	\$243,618.85	\$36,569.88	
<i>Original Estimate</i>	<i>\$245,983.00</i>	<i>\$243,618.85</i>	<i>\$2,364.15</i>	
<i>PCR-014 Software and SITSD hosting increases</i>	<i>\$34,205.73</i>	<i>\$0.00</i>	<i>\$34,205.73</i>	
Training	\$84,767.00	\$48,447.00	\$36,320.00	
<i>Original Estimate</i>	<i>\$38,000.00</i>	<i>\$35,146.00</i>	<i>\$2,854.00</i>	\$28,846 dollars was spent prior to the kick-off of the DDI project to train core team members. This funding was not officially assigned to the project when we moved to the DDI phase of the project.
<i>PCR-008, Alfresco Administrator Training</i>	<i>\$16,767.00</i>	<i>\$0.00</i>	<i>\$16,767.00</i>	
<i>PCR-026, Technical Training</i>	<i>\$30,000.00</i>	<i>\$13,301.00</i>	<i>\$16,699.00</i>	
Other	\$9,928.00	\$0.00	\$9,928.00	Travel and meeting costs
Contracted Costs				
Design, Development, and Implementation	\$1,527,605.80	\$1,061,749.80	\$465,856.00	
<i>Windsor DDI Contract</i>	<i>\$1,061,749.80</i>	<i>\$1,061,749.80</i>	<i>\$0.00</i>	
<i>Base Contract</i>	<i>\$1,820,000.00</i>	<i>\$1,061,749.80</i>	<i>\$758,250.20</i>	
<i>Windsor Settlement (less contract)</i>	<i>(\$758,250.20)</i>	<i>\$0.00</i>	<i>(\$758,250.20)</i>	
<i>Alfresco Consulting Services</i>	<i>\$5,856.00</i>	<i>\$0.00</i>	<i>\$5,856.00</i>	

Table 2. Current Budget

Cost Category	Expected	Actual	Variance	Comments
<i>IT Staff Augmentation Contract(Pending)</i>	\$300,000.00	\$0.00	\$300,000.00	
<i>PCR-003 EQUIS Adoption and Configuration</i>	\$160,000.00	\$0.00	\$160,000.00	
Independent Verification and Validation	\$165,038.60	\$126,189.20	\$38,849.40	POD Data Solutions is our IV&V vendor
<i>Base Contract</i>	\$132,960.00	\$126,189.20	\$6,770.80	
<i>PCR-025, Contract extension - Mod 1</i>	\$28,463.60	\$0.00	\$28,463.60	
<i>Mod 2</i>	\$3,615.00	\$0.00	\$3,615.00	Mod 2 was put into place to correct mathematical errors with Mod 1 calculations
<u>Total including retainage and holdbacks[1]</u>	\$4,281,603.86	\$3,170,737.17	\$185,757.46	
Total minus soft costs	\$2,131,603.86	\$1,520,737.17	\$185,757.46	
Contingency	\$488,396.14			
Total including Contingency and Soft Costs	\$4,770,000.00			

3.1.3 Resources

The current resources assigned to the project include:

- 1) Project Steering Committee (Table 3)
- 2) Core Team (Table 4)
 - a) Project Manager
 - b) Product Owners
 - c) Development Team
 - d) Subject Matter Experts
- 3) Independent Verification and Validation Contractor (Table 5)

Table 3. Current Project Steering Committee Members

Name	Organization	Role	Email Address	Voting Member
Dan Chelini	DEQ CIO	DEQ Chief Information Officer (CIO)	dchelini@mt.gov	Yes
Vacant	Fiscal Services	Manager, Accounting		Yes
Jerry Steinmetz	ITB/ADS	Chief, Application Development Section (ADS)	jsteinmetz@mt.gov	Yes
Dave Nagel	ITB/BDS	Chief, Business Development Section (BDS)	dnagel@mt.gov	Yes

Table 3. Current Project Steering Committee Members

Name	Organization	Role	Email Address	Voting Member
Mike Jares	ITB/SAS	Chief, System Administration Section (SAS)	mjares@mt.gov	Yes
Terry Wadsworth	PTRCB	Executive Director, Petroleum Tank Release Compensation Board (PTRCB)	twadsworth@mt.gov	Yes
Jenny Chambers	WMRD	Waste Management and Remediation Division Administrator (Sponsor)	jchambers@mt.gov	Yes
Autumn Coleman	WMRD/AML	Supervisor, Abandoned Mines Section (AML)	acoleman@mt.gov	Yes
Tom Stoops	WMRD/FSB	Chief, Federal Superfund Bureau (FSB)	tstoops@mt.gov	Yes
Mike Trombetta	WMRD/CSCB	Chief, Hazardous Contaminated Site Clean-up Bureau (CSCB)	mtrombetta@mt.gov	Yes
Ed Thamke	WMRD/WUTMB	Chief, Waste and Underground Tank Management Bureau (WUTMB)	ethamke@mt.gov	Yes
Nat Carter	ITB/ADS	DEQ GIS SME	ncarter@mt.gov	No
Roy Duelfer	ITB/ADS	Information Systems Supervisor (Web, SharePoint, and .NET Systems)	rduelfer@mt.gov	No
Leanne Hackney	WMRD/WUTMB/UST	Underground Storage Tanks Supervisor	lhackney@mt.gov	No
Sherry Blair	WMRD/FS	WMRD Fiscal Services Supervisor	sblair2@mt.gov	No
Jeff Kuhn	WMRD/CSCB/FFB	Federal Facilities and Brownfields Supervisor	jkuhn@mt.gov	No
Rebecca Ridenour	WMRD/CSCB/PTC	Petroleum Tank Cleanup Section (PTC) Supervisor	rridenour@mt.gov	No
Denise Martin	WMRD/CSCB/SSU	Site Response Supervisor	demartin@mt.gov	No
Moriah Bucy	WMRD/CSCB/SSU	State Superfund Supervisor	mbucy@mt.gov	No

Table 4. Current Core Project Team Members

Name	Organization	Role	Email Address
Staci Stolp	WMRD/ATS	Project Manager/Systems Analyst (SA)	sstolp3@mt.gov
Development Team			
Vacant	ITB/ADS	Technical Lead/Manager	
Bruce Arnold	ITB/ADS	Database Administrator	barnold@mt.gov
Sean Behlmer	ITB/ADS	Developer	sbehlmer@mt.gov
Byrne Manley	ITB/ADS	Developer	bmanley@mt.gov
Kate Cederlund	ITB/ADS	Developer	kcederlund@mt.gov
Contractor 1	TBD	Senior Developer	
Contractor 2	TBD	Senior Developer	
Contractor 3	TBD	Senior Database Architect/Administrator	

Table 4. Current Core Project Team Members

Name	Organization	Role	Email Address
Roy Duelfer	ITB/ADS	Information Systems Supervisor	rduelfer@mt.gov
Nat Carter	ITB/ADS	Lead, GIS	ncarter@mt.gov
Product Owners			
Terry Wadsworth	PTRCB	Product Owner, PTRCB	twadsworth@mt.gov
Autumn Coleman	WMRD/AML	Product Owner, Abandoned Mine Lands	acoleman@mt.gov
Jason Seyler	WMRD/CSCB/FFB	Product Owner, FFB	jseylor@mt.gov
Rebecca Ridenour	WMRD/CSCB/PTC	Product Owner, PTC	rridenour@mt.gov
Moriah Bucy	WMRD/CSCB/SSU	Product Owner, State Superfund	mbucy@mt.gov
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Subject Matter Experts			
Kim Wells	WMRD/ATS	SME, Abandoned Mines Database	kwells@mt.gov
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Patrick Skibicki	WMRD/CSCB/FFB	SME, Brownfields and DSMOA	pskibicki@mt.gov
Scott Gestring	WMRD/CSCB/FFB	SME, DSMOA Back-up	sgestring@mt.gov
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Sherry Blair	WMRD/FS	SME, Fiscal Services	sblair2@mt.gov
Keith Large	WMRD/FSB	SME, Federal Superfund Data	klarge@mt.gov
Pam LaFontaine	WMRD/WUTMB/UST	SME, UST Database	plafontaine@mt.gov

Table 5. Independent Verification and Validation Contractor

Name	Organization	Role	Email Address
Ralph Whitaker	POD Data Solutions	Project Manager	Ralph.Whitaker@poddatasolutions.com
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3.2 System

The focus of the first production release of TREADS was to address 1,518 Priority 1 requirements intended to support the following high-level requirement categories:

- 1) Underground Storage Tanks
- 2) Remediation
- 3) Petroleum Tank Release Compensation Board
- 4) Common (e.g., Document Management, Security, etc.)
- 5) Contractor Services (include DDI activities for the project)
- 6) Interface (e.g., requirements for interfacing with other DEQ and State systems)

It is these requirements for which provide the basis for TREADS' functionality. The [requirements traceability matrix](#) (RTM) indicates the following status of the following areas in TREADS (Table 6):

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Table 6. TREADS Percent Complete based on Priority 1 Requirements

Requirement Category	# Priority 1 Requirements	Priority 1 Requirements with no Development	% Complete
Underground Storage Tanks	126	16	87%
Remediation	462	207	55%
Petroleum Tank Release Compensation Board	152	62	59%
Common	738	231	69%
Contractor Services	30	30	0%
Interface	10	10	0%
Totals	1518	556	64%

Below is a summary of the areas under each requirement category that are incomplete:

Requirement Type/Category/Subcategory	Requirements Count
Common	231
Actions	1
Public Participation & Comment	1
Administrative	1
System Administration	1
Document and Records Management	2
Data Retention	1
Workflow	1
Financial Management	155
3rd Party Buy-Sell-Agreement	6
Accounts Payable	2
Bankruptcy	22
Bids	1
Contracts	12
Eligibility - Brownfields	1
Eligibility - PRTCB	6
Financial Assurance	19
Governmental Accounting Standards Board	1
Grants	5
Liens	13
Maintenance	5
Probate	15
Property Acquisition	12
Reports	3
Settlement	14
Task Orders	1
Time Tracking	17
General	20
Data Integrity	1
De-Duplication	4
Forms	1
Office Automation	1
Reports	13
Graphical User Interface & Navigation	1

Requirement Type/Category/Subcategory	Requirements Count
Online Help	1
Site Information	38
eAMLIS Administrative Information	5
Facility Site	14
Feature Information/ eAMLIS Program Areas	1
Feature/Problem Information	1
Geographic Coordinates	15
Release/Event Information	2
Staff Management	2
Employee Information	1
Supervisor/Program Management	1
Technical	11
Audits	1
Database	1
Exception Handling	2
External Interface Architecture	5
Security	2
Contractor Services	30
Contractor Support	30
Construction	1
Conversion	1
Design	1
Functional/Business Training	6
Help Desk	9
Implementation	1
Installation & Configuration	3
Operations and Maintenance	1
Pilot	1
Requirements Analysis and Validation	1
Start-up	1
Technical Training	2
Testing	1
Turnover	1
Petroleum Tank Release Compensation Board	62
Appeal Information	6
Claim Information	25
Forms	8
Insurance	2
Invoice Information	8
Rate Information	6
Release Information	7
REM	207
Coal/Hard Rock Maintenance & Monitoring	11
Annual Inspection	1
General Inspection	7
Re-Vegetation and Weed Control	1
Warranty Inspection	2
Coal/Hard Rock Priority	2
General	1

Requirement Type/Category/Subcategory	Requirements Count
Reclamation Investigation	1
Construction	3
Determine AML Litigation	1
Final Construction Report	1
Warranty Support	1
Control Implementation	3
Actions	3
Control Monitoring	11
Actions	7
Referral	4
Control Pre-Implementation	1
Actions	1
Control Termination	4
Actions	2
Control Termination Checklist	2
Controls	46
Engineering Control	4
IC Event	15
IC Instrument	8
IC Location	2
IC Objective	3
IC Resource	14
Delisting	1
Actions	1
LUST Trust	4
Cost Recovery	4
Public Facing Tools	89
Search	5
Tier 1 Results	7
Tier 1 Results-AML	1
Tier 2 Results	1
Tier 2 Results - Action Information	15
Tier 2 Results - Contaminant Information	17
Tier 2 Results - Documents	5
Tier 2 Results - General Information	9
Tier 2 Results - Location Information	12
Tier 2 Results - Release Information	2
Web Mapping Application	15
Release, Reporting, Investigation, and Confirmation	1
Leak Line	1
Reports	24
Actively Managed Sites	1
Affiliation By Site Report	1
Archived Records by Site	1
Brownfields Registry	1
Closure Status	1
Closures receiving NFCA	1
Complete Site Information Report	1
Confirmed Release Report	1

Requirement Type/Category/Subcategory	Requirements Count
Controls Report	1
Cost Recovery Summary Report	1
Emergency Response Report	1
Enforcement Report	1
Interim Actions Report	1
LUST Trust Fund Forecasting	1
LUST Trust Semi Annual Report	1
LUST Trust Site Performance Report	1
Petro board Report	1
Potential Sites list	1
Program Statistics Report	1
Public Comment Report	1
Response Priority Report 2	1
Site Planning Report	1
Sites Listed or Delisted by Year	1
Sites Under Order	1
Voluntary Cleanup and Redevelopment Program	7
Actions	1
Financial	3
Land Use	2
Operation and Maintenance	1
Underground Storage Tank	16
Reports	16
Grand Total	546

At the time Windsor stopped work on the project, the Project was conducting User Acceptance Testing (UAT) on the developed portions of the system. Between testing conducted by Windsor and DEQ UAT staff, there were 105 open items on the bug list as reported in JIRA (Table 7). Of these bugs, 41 had been confirmed to be “bugs.” The remaining reported items still need to be triaged by the team to determine if the reported items is a bug, a user training issue, or related to functionality that has yet to be developed for the system.

This list included one Blocker, one Critical, and 39 High priority bugs. The remaining bugs had a Low or Medium priority level. Of the reported items, a few items of note include: 23 items were associated with Document Management, 6 were associated with data migration, 9 were related to workflow, 16 were associated with UST, 8 were associated with PTC, 7 items were associated with Environmental Events and Interests, and 10 were related to Administrative functions. A summary of the “components” affected by the reported items are listed in Table 8.

Table 7. Open TREADS bugs reported to date

Key	Summary	Priority	Status	Component/s
MTTREADS-6730	US Zip Code needs to display in TREADS UI formatted as 5-4 digits (i.e., 12345-6789)	Medium	Confirmed	TREADS- User Experience
MTTREADS-6921	UAT: User Admin suggestions	Medium	Triage	TREADS- Admin

Table 7. Open TREADS bugs reported to date

Key	Summary	Priority	Status	Component/s
MTTREADS-7363	Facility Date fields accept invalid data	Medium	Confirmed	TREADS- Site and Contact Management
MTTREADS-7504	Inspector Name is legacy data is not appearing in the control (Legacy data)	Medium	On Hold	TREADS- Admin
MTTREADS-7652	USER EX- I.E. Browser anomalies	Low	Confirmed	TREADS- User Experience
MTTREADS-7665	USER EX- System appears Locked up/ Screen Freezes (IE Only)	Low	On Hold	TREADS- User Experience
MTTREADS-7832	nFORM - The Breadcrumbs used in nFORM do not seem to respond via Treads	Low	On Hold	nForm
MTTREADS-7838	PDF files wont print correctly with default reader associated with Windows 8	Low	Confirmed	nForm
MTTREADS-7982	Facility/Site not shown for Permit notification in notifications list	High	Confirmed	TREADS- Notifications
MTTREADS-8016	User unable to create a Release Report after checking for notification duplicates.	Medium	Confirmed	TREADS- Workflow
MTTREADS-8061	Form Submission - Submission ID clickable link does nothing	Low	Confirmed	TREADS- Workflow
MTTREADS-8068	No notice sent to user that an nFORM revision of a submission (ex 24 hr. report) failed.	Low	Triage	nForm, PTC - Reporting, Investigation, Confirmation
MTTREADS-8084	Permissions to delete a report from dashboard is not set up	Medium	Confirmed	TREADS- Admin
MTTREADS-8090	nForm allows the user to select invalid data per TREADS	Medium	On Hold	nForm, PTC - Initial Response and Abatement, PTC - Reporting, Investigation, Confirmation
MTTREADS-8094	Institutions -Advanced Search field says "Search by Name, Abbreviation,"	Low	Confirmed	TREADS- Site and Contact Management, TREADS- User Experience
MTTREADS-8140	Process Role-Security Role dropdown not in alphabetical order	Low	Confirmed	TREADS- Admin
MTTREADS-8145	Forms - Alfresco Directory dropdown not alphabetical	Low	Confirmed	TREADS- Admin, TREADS- User Experience
MTTREADS-8154	Facility Detail, right utility bar link to Inspections is not a hypertext link if "Scheduled" inspections only	Medium	Confirmed	UST - Oversight Inspections
MTTREADS-8199	MAJOR - Pipe Installation (Supplement B) & Closure Import failed due to timeout	Medium	Confirmed	nForm
MTTREADS-8218	Release - Receptors - line highlighting	Low	Confirmed	TREADS- User Experience

Table 7. Open TREADS bugs reported to date

Key	Summary	Priority	Status	Component/s
MTTREADS-8278	Violations – When Creating New Violation, User allowed to Save without required field “Citation Significance”	Medium	Confirmed	UST - Compliance Inspections
MTTREADS-8280	Violations – When Creating New Violation or Editing an existing Violation, User allowed to Save Due Date and Violation Closed Date that are before Issued Date	Medium	Confirmed	UST - Compliance Inspections
MTTREADS-8317	UAT: Logging into Windsor test cloud through ePass	Medium	Confirmed	TREADS- Authentication
MTTREADS-8335	Facility - Affiliation - incorrect start date errors on Save	Medium	Confirmed	TREADS- Site and Contact Management
MTTREADS-8336	Notification Rule List Status does not match detail status	Medium	Confirmed	TREADS- Notifications
MTTREADS-8432	Document Access Level dropdown problem on Create New User action	Medium	Confirmed	TREADS- Admin
MTTREADS-8463	Double click on save required to confirm a petroleum release	Medium	Confirmed	PTC - Initial Response and Abatement
MTTREADS-8465	Release / SSU Event History Date Invalid	Medium	Confirmed	TREADS- Environmental Events and Interests Management
MTTREADS-8468	UAT: Suspect release folder is separate of confirmed release folder	Medium	Prepare to Triage	PTC
MTTREADS-8504	UAT: BF Eligibility Form loading errors	Medium	Prepare to Triage	FFB, nForm
MTTREADS-8509	UAT: nForm Submission - Time out errors	Medium	Client Testing	nForm, TREADS- Workflow
MTTREADS-8512	UAT: Cannot save document from Communications Tab on State Superfund and Release pages	High	Prepare to Triage	TREADS- Document Management
MTTREADS-8513	Disable or Hide 'Create New' folder option on Documents tab if don't have permissions	Medium	Confirmed	TREADS- Document Management, TREADS- User Experience
MTTREADS-8514	UAT: What logic is used to populate a letter template when there is more than one record available?	Medium	Prepare to Triage	TREADS- Form Letter Generation
MTTREADS-8518	UAT: View Document option not available to user (unless "restricted" access level); user selects download option to view	Medium	Prepare to Triage	TREADS- Document Management
MTTREADS-8519	Can't upload empty alfresco document	Medium	Confirmed	Alfresco
MTTREADS-8531	UAT: Closed date for petroleum release not appearing on right-hand bar (IE & Firefox)	Medium	Confirmed	PTC, TREADS- User Experience
MTTREADS-8532	Error saving user with dup email	Medium	Confirmed	TREADS- Admin

Table 7. Open TREADS bugs reported to date

Key	Summary	Priority	Status	Component/s
MTTREADS-8534	UAT: "Missing" listed as date in Status History for PTC releases	Medium	Client Testing	PTC, SSU
MTTREADS-8538	UAT: Erroneous constraint rules for End Date on Environmental Interests tab on Facility	High	Confirmed	TREADS- Environmental Events and Interests Management
MTTREADS-8543	Form Submission Delete (trash can icon) throws error	Medium	Confirmed	TREADS- Admin
MTTREADS-8544	UAT: Time stamp in TREADS off by 1 hour (UAT environment)	Medium	Confirmed	TREADS- User Experience
MTTREADS-8545	UAT: Error message is received when attempting to assign a process step or submit an nForm	Medium	Confirmed	TREADS- Workflow
MTTREADS-8546	UAT: Legacy Document Conversion	Medium	In Progress	TREADS- Document Management
MTTREADS-8547	UAT: Under 'Service Request' when you click on the "View History' button, nothing happens	Medium	Prepare to Triage	TREADS- Workflow
MTTREADS-8548	UAT: Task assigned to me is past due. No notification is received, (email or notification).	Medium	Confirmed	TREADS- Notifications
MTTREADS-8549	UAT: Once a document is loaded into a project, facility or TREADS; that document may not be deleted unless the deletion is performed by two DEQ staff. External users shall not be allowed to delete documents from the system.	Medium	Prepare to Triage	TREADS- Document Management
MTTREADS-8552	Document Search - Advanced search does not have search and select options	Medium	Confirmed	TREADS- Document Management, TREADS- User Experience
MTTREADS-8599	Do not get "Yes" / "No" removal confirmation on Communication entry created.	Medium	Confirmed	TREADS- Document Management
MTTREADS-8603	Edit Communication option and function for Document after removing Communication associated incorrect	Medium	Confirmed	TREADS- Document Management
MTTREADS-8604	Unable to Edit Communication after Deleting Document associated	Medium	Confirmed	TREADS- Document Management
MTTREADS-8616	AML Project - Upload Documents - cancel message	Medium	Confirmed	TREADS- Document Management
MTTREADS-8617	UAT: Error trying to login to EPASS with State Employee Credentials	Blocker	Triage	TREADS- Authentication
MTTREADS-8618	UAT: FFB, PTC & PTRCB document folders are being created using the event ID instead of the Release ID	Medium	Confirmed	TREADS- Document Management
MTTREADS-8619	UAT: Editable release on release details page	High	Confirmed	PTC
MTTREADS-8622	UAT: Checking documents in after editing in Alfresco	Medium	Triage	PTC

Table 7. Open TREADS bugs reported to date

Key	Summary	Priority	Status	Component/s
MTTREADS-8627	UAT: Status History should contain the complete history and reflect the correct status change dates.	Medium	Triage	TREADS- Environmental Events and Interests Management
MTTREADS-8628	UAT: Some facilities that have more than one release or are associated to more than one program are coming into TREADS as multiple facilities.	Medium	Triage	Legacy Data
MTTREADS-8629	UAT: There are facilities in TREADS that are also in TREADS as Institutions	Medium	Triage	Legacy Data
MTTREADS-8634	UAT: The system does not allow deletion of a document from documents tab	High	Triage	TREADS- Document Management
MTTREADS-8635	UAT: The system does not allow deletion of a document from documents tab	High	Triage	TREADS- Document Management
MTTREADS-8636	UAT: System allows deletion of communications, but does not delete associated document	High	Triage	TREADS- Document Management
MTTREADS-8637	UAT: Deletion warning prompt flashes, but does not allow selection of yes/no before deleting	High	Triage	TREADS- Document Management
MTTREADS-8638	UAT: Cannot enter an Individual and Institution in the Affiliations Tab	High	Triage	TREADS- Environmental Events and Interests Management
MTTREADS-8654	UAT: Odd error with Inspection Type Code Reference table	High	Triage	TREADS- Admin
MTTREADS-8655	UAT: Task cannot be edited/deleted from the State Superfund Work Plans tab	Medium	Triage	SSU
MTTREADS-8656	UAT: State Superfund Work Plans Tab, Work Plan Estimated Total field does not calculate as it should	Medium	Triage	SSU
MTTREADS-8657	UAT: Cannot save updates made to an existing communication	High	Triage	TREADS- Document Management
MTTREADS-8658	UAT: cannot save a new Affiliation in a Facility where an environmental event has not been created	High	Triage	TREADS- Environmental Events and Interests Management
MTTREADS-8659	UAT: cannot save a new SSU Event for a new or existing site	High	Triage	TREADS- Environmental Events and Interests Management
MTTREADS-8663	UAT: Search and Select fields erroneously entering information	High	Triage	TREADS- Document Management, TREADS- Site and Contact Management
MTTREADS-8664	UAT: UST cannot create service request	High	Triage	UST - General
MTTREADS-8665	UAT: UST Operating Permit Owner Information is incorrect (data conversion)	High	Triage	Legacy Data - UST/FITS

Table 7. Open TREADS bugs reported to date

Key	Summary	Priority	Status	Component/s
MTTREADS-8666	UAT: While testing in the Windsor cloud 6.0.357; Cannot delete an erroneously created service request/workflow	Medium	Triage	TREADS- Workflow
MTTREADS-8667	UAT: Tank information entered on nForm 1-V and/or Tank Questionnaire did not load to Tank tab of the Facility.	Medium	Triage	PTRCB - User Experience
MTTREADS-8669	UST-FITS data migration to TREADS errors	High	Triage	UST
MTTREADS-8670	UST - Treads not populating data from nForm	High	Triage	UST - Notification of Underground Storage Tanks
MTTREADS-8671	UST Licensee Renewal - cannot create service request to renew license	Medium	Triage	UST - Licensing-Renewal
MTTREADS-8672	UAT: UST cannot save a new violation for a facility	Critical	Triage	UST - Compliance Inspections
MTTREADS-8673	UAT: UST facility violation - cannot search and select on citation field	High	Triage	UST - Compliance Inspections, UST - User Experience
MTTREADS-8674	UAT: UST new violation for a facility - no default for citation significance	High	Triage	UST - Compliance Inspections, UST - User Experience
MTTREADS-8675	UAT: UST new violation does not create a default due date	High	Triage	UST - Compliance Inspections, UST - User Experience
MTTREADS-8676	UAT: UST new violation - issue date is not a default number	Medium	Triage	UST - Compliance Inspections, UST - User Experience
MTTREADS-8677	Release Number is required for AML Service Request	High	Triage	TREADS- Workflow
MTTREADS-8678	User can't create a new Facility/Site if steps are not completed in order	High	Triage	TREADS- Site and Contact Management
MTTREADS-8679	UAT: Data Migration - Individuals and Institutions should be linked	High	Triage	Legacy Data
MTTREADS-8680	UAT: Data Migration The institution and associated individuals should be associated systematically to the appropriate facility	High	Triage	Legacy Data
MTTREADS-8681	UAT - UST - New Facility Notification	High	Triage	UST, UST - Notification of Underground Storage Tanks
MTTREADS-8682	UAT - UST Owner/Operator Change Error	Medium	Triage	UST - Notification of Underground Storage Tanks
MTTREADS-8683	UAT - UST delete tanks button	Medium	Triage	UST - Notification of Underground Storage Tanks
MTTREADS-8684	UAT: Data Migration - Each address for an individual or an institution should be identified by program	High	Triage	Legacy Data, Legacy Data - PETRO, Legacy Data - UST/FITS

Table 7. Open TREADS bugs reported to date

Key	Summary	Priority	Status	Component/s
MTTREADS-8685	Service Request: No way to delete a Service Request	High	Triage	TREADS- Workflow
MTTREADS-8686	AML Problems Spatial Data	High	Triage	TREADS- Site and Contact Management
MTTREADS-8687	Facility/Site-Alias Tab- Available to Public Checkbox	High	Triage	TREADS- Site and Contact Management
MTTREADS-8688	AML Projects-Communications Tab-List	High	Triage	TREADS- Document Management
MTTREADS-8689	Facilities/Sites and AML Projects Documents and Communications Tabs	High	Triage	TREADS- Document Management
MTTREADS-8690	AML Projects Folders	High	Triage	TREADS- Admin, TREADS- Document Management
MTTREADS-8691	Task List Search- Task Status Dropdown List	Medium	Triage	TREADS- Workflow
MTTREADS-8692	1-R Eligibility Import Error	High	Triage	PTRCB - Eligibility
MTTREADS-8693	Form 1 V Error	High	Triage	PTRCB - Eligibility
MTTREADS-8694	UAT: When adding a new environmental interest, the user is not automatically taken to the new interest	Medium	Triage	TREADS- Environmental Events and Interests Management
MTTREADS-8695	UAT: TREADS automatically defaults the most recently added number to display on the main Individuals page	High	Triage	TREADS- Site and Contact Management
MTTREADS-8696	UAT: Not all Facility/Site communications are showing up under the State Superfund communications portion for the same site	High	Triage	TREADS- Document Management
MTTREADS-8697	UAT: There is no display of file name on Communications tab	High	Triage	TREADS- Document Management
MTTREADS-8698	UAT - UST nForm Supplement C	High	Triage	UST - Construction Permitting

Table 8. Summary of TREADS components associated with reported bugs

TREADS Component	Count of Component/s
Alfresco	1
FFB, nForm	1
Legacy Data	4
Legacy Data - UST/FITS	1
Legacy Data, Legacy Data - PETRO, Legacy Data - UST/FITS	1
nForm	3
nForm, PTC - Initial Response and Abatement, PTC - Reporting, Investigation, Confirmation	1

Table 8. Summary of TREADS components associated with reported bugs

TREADS Component	Count of Component/s
nForm, PTC - Reporting, Investigation, Confirmation	1
nForm, TREADS- Workflow	1
PTC	3
PTC - Initial Response and Abatement	1
PTC, SSU	1
PTC, TREADS- User Experience	1
PTRCB - Eligibility	2
PTRCB - User Experience	1
SSU	2
TREADS- Admin	8
TREADS- Admin, TREADS- Document Management	1
TREADS- Admin, TREADS- User Experience	1
TREADS- Authentication	2
TREADS- Document Management	18
TREADS- Document Management, TREADS- Site and Contact Management	1
TREADS- Document Management, TREADS- User Experience	2
TREADS- Environmental Events and Interests Management	7
TREADS- Form Letter Generation	1
TREADS- Notifications	3
TREADS- Site and Contact Management	6
TREADS- Site and Contact Management, TREADS- User Experience	1
TREADS- User Experience	5
TREADS- Workflow	8
UST	1
UST - Compliance Inspections	3
UST - Compliance Inspections, UST - User Experience	4
UST - Construction Permitting	1
UST - General	1
UST - Licensing- Renewal	1
UST - Notification of Underground Storage Tanks	3
UST - Oversight Inspections	1
UST, UST - Notification of Underground Storage Tanks	1
Grand Total	105

In addition, seven requirements change requests were submitted by the UST Program to clarify existing requirements and add new functionality for the project's consideration and include:

#	Title	Description	Justification/Reason
RCR - 035	Tank and Piping History	UST Tank and Piping History Requirements	Current database design does not meet the need for UST and PTRCB tank and piping history requirements.
RCR - 036	Tank serial number	The UST Program wants to be able to track the serial number of a tank in TREADS.	To assist owner regarding warranty information.
RCR - 037	Tank Buoyancy Calculation	The UST Program wants to maintain the buoyancy calculation for a tank.	To assist DEQ with construction compliance
RCR - 038	Tank recertification/repair date	The UST Program wants to track the tank recertification/repair date in TREADS.	To assist DEQ with construction compliance
RCR - 039	Tank lining/upgrade date	The UST Program wants to track the tank lining/upgrade date in TREADS.	To assist DEQ with construction compliance
RCR - 040	2015 EPA Rule Changes for UST	The UST Program needs to track and report on the following information: 1. Tank overfill device make and model (TREADS and Construction Permit) 2. Tank overfill prevention test date 3. Tank spill bucket test date 4. Tank double-walled spill bucket - check box (TREADS and Construction Permit) 5. Spill bucket continuous interstitial monitoring - check box (TREADS and Construction Permit) 6. Pipe MLLD function test date 7. Pipe ELLD function test date 8. Pipe sensor function test date 9. Certification for compatibility with alternate/biofuels	To support new 2015 EPA Rules
RCR - 041	UST Risk Assessment Model Fields	The UST Program will need to track and report on the following fields for their new Risk Assessment: <ul style="list-style-type: none"> • Under-dispenser containment • Tank riser containment • Age of tank • Age of oldest tanks • UDWSPZ (aka Drinking water protection zone) • Depth to groundwater • Soil Texture • Population density • Distance to POD • Compliance Points • Distance to streams • In Wetland • Distance to Lakes • Aquifer Access Zone • Water Quality Assessment • Current LUST • Previous LUST 	To support UST's new Risk Assessment Model

#	Title	Description	Justification/Reason
		UST would need assistance with implementing the risk assessment process as well and would like a separate estimate for the analysis support needed to ferret out the process as well as the software development.	

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3.2.1 Database

As mentioned in section 2, TREADS is comprised of multiple third-party applications and components as well as a custom DEQ business application also referred to as TREADS. The full system is comprised of several core databases associated with these applications, including:

- 1) TREADS
- 2) nSpect
- 3) nForm
- 4) nSite
- 5) EQuIS
- 6) Alfresco

All of these databases are hosted at SITSD. The database technology is Microsoft SQL Server 2012. Specific details regarding these databases can be found in the [TREADS Technical Architecture Document](#).

While contracted with DEQ, Windsor Solutions used an Agile Development Methodology. As a result, the custom TREADS module and its associated database were developed iteratively and revised as needed per the Windsor development team, each development cycle. After the completion of each development cycle, Windsor submitted a Deliverable Acceptance Request (DAR) to DEQ for review. Feedback provided on DARs 8 – 15 indicated that DEQ's primary concern with the TREADS database was its incomplete normalization.

During the transition analysis phase of the project, the DEQ transition analysis team identified the following items they specifically felt should be refactored:

- 1) Normalize Tank table and absorb the PTRCBTankEligibility table
- 2) Collapse the 100 plus reference tables into a code/decode table
- 3) Restructure the workflow tables to allow more flexibility of use, specifically, to allow:
 - a) Reuse of processes by multiple programs without the need to maintain a separate process for each program when the processes used by more than one program are the same.
 - b) The association of sub-processes to high-level processes.
- 4) Add a cross reference table for 'Address,' 'Correspondence,' and 'Questions' so that a user can tie one document to multiple facilities, etc.
- 5) Collapse the following tables into the workflow engine to help reduce the multiple data stores between the workflow and data management tables that lead to data integrity issues resulting in incorrect or poor information for program decision making:
 - a) Project
 - b) Work plan
 - c) Appeal
 - d) Construction Permit Mod
 - e) Enforcement Request
 - f) Inspection
 - g) Institutional Control
 - h) Invoice/Claim
 - i) Permit Closeout Requirements

- j) Violation
- k) Voluntary clean up
- l) Sub-invoice claim
- m) PTRCB tank eligibility
- n) Process
- o) Activity
- p) Eligibility payment
- q) Invoice/Claim adjustment

3.2.2 Code

The custom portion of TREADS is built using a variety of coding languages, development tools, development frameworks, and packages. The list of languages, tools, and frameworks is documented in (Table 9).

Table 9. Languages, Development Tools, and Development Frameworks used to Develop TREADS

Languages	Tools	Frameworks and Other
C#	Visual Studio	.NET MVC
aspx	NuGet	Angular.js
JavaScript	SQL Server Management Studio	REST web services
SQL		dynamic JavaScript webpage generation
xml		
html		
CSS		

The list of 3rd party packages used in the development of the custom TREADS module is documented in (0).

Table 10. 3rd Party Packages used in the Development of TREADS

3rd Party Packages	Description / Notes	Folder
Ajax	JavaScript library for asynchronous data transfers	TREADS
Alfresco	.net file management	TREADS
Alfresco	Commercial Enterprise Content Management System	Alfresco
Angular	JavaScript MVC library	TREADS
Apache Log4Net	.net error logging	TREADS
Autofac	.net - inversion of control container.	TREADS
Autofac		Tests (automated testing)
Automapper	.net - Maps one object to another. "AutoMapper is a simple little library built to solve a deceptively complex problem - getting rid of code that mapped one object to another."	TREADS

Table 10. 3rd Party Packages used in the Development of TREADS

3rd Party Packages	Description / Notes	Folder
Bcrypt	.net password encryption	TREADS
bootstrap	front end framework. (html, CSS, jQuery)	TREADS
Cassette	.net - builds JavaScript, CSS, and html templates	TREADS
DocX	.net - Word Document manipulate	TREADS
Edge.JS	calls .net functions from JavaScript	TREADS
Elmah	.net error logging, and handlers	TREADS
FakeO		Tests (automated testing)
HtmlAgilityPack		Tests (automated testing)
Humanizer	.net - formatter for strings, dates timestamps, numbers	TREADS
Ionic	javascript mobile app SDK	TREADS
jQuery	JavaScript library	TREADS
KellermanSoftware		Tests (automated testing)
lodash	JavaScript utility functions	TREADS
lodash.js	JavaScript library for handling arrays, numbers, objects, strings, etc.	TREADS
moment.js	JavaScript Parse, validate, manipulate, and display dates	TREADS
nClam	.net - file upload Virus Scanner	TREADS
Net.SourceForge.Koogra	.net excel file reader	TREADS
NewtonSoft.json	.NET code for generating JSON JavaScript objects. It is also part of the Windsor. Commons package	TREADS
Newtonsoft.Json		Tests (automated testing)
nForm	Windsor Solutions online form submission and management tool	TREADS
nSite	Windsor Solutions Spatial Data Viewer	TREADS
nSpect	Windsor Solutions mobile data collection software	TREADS
NVelocity	.net - generates documents from templates.	TREADS
Owin	.net -OWIN defines a standard interface between .NET web servers and web applications. The goal of the OWIN interface is to decouple server and application,	TREADS
PetaPoco	.net - Database ORM, it is included in the Windsor.Commons package	TREADS
Quartz	.net job scheduler	TREADS
restangular	JavaScript library for RES API data transfer, works with angular js	TREADS
RestSharp	.NET REST service tool	TREADS
SAML2	security assertion markup language. Authentication and SSO	TREADS

Table 10. 3rd Party Packages used in the Development of TREADS

3rd Party Packages	Description / Notes	Folder
Selenium	integration testing tool	Tests (automated testing)
SHA3Portable	c++ hashcode algorithms	TREADS
SQL Server Compact 4.0	.net SQL dll files. refer to section 1b of the SQL Server Compact 4.0 software license terms.	TREADS
stable.js	JavaScript sortable array	TREADS
techtalk SpecFlow	Use SpecFlow to define, manage and execute automated acceptance tests from business-readable specifications. SpecFlow acceptance tests follow the Behavior Driven Development (BDD) paradigm: define specifications using examples understandable to business users as well as developers and testers.	Tests (automated testing)
ThinkTecture	mobile and cloud code.	TREADS
validatejs	JavaScript validation	TREADS
WebDriver	automated testing tool	Tests (automated testing)
Windsor.Commons	.net custom made Windsor package; web validation, MVC, workflow, GIS...	TREADS
Xunit	unit testing	Tests (automated testing)

Overall, the DEQ transition analysis team did not see any catastrophic issues with the custom TREADS code that Windsor Solutions provided to DEQ. The recommendation is to move forward with finishing development using this code base. With that said, the development team has expressed the following concern related to the TREADS code that will add risk to the effort:

- 1) The application code has very specific requirements enforced through C#. This complicates determining which layer a bug occurs in (application, business logic, database or some combination). Some of these examples include that a table name cannot end with a 's', the table primary key must have the table name with 'Id' attached at the end, and the MVC model must have the primary key, changedon, changedby, createdon, createdby fields removed which is not commonly seen when using MVC.
- 2) Future development will also present the same challenges as it is not common to have imposed custom rules that restrict how database tables can be named or the form they must follow through the application code.
- 3) TREADS uses custom Windsor packages (reusable pieces of code) for which DEQ does not have source code. They do not know at this time, if these packages will present a problem with future development. Therefore, DEQ will add the fact that we do not have the source code for these packages as a risk. These packages include:
 - a) Windsor.Commons.Core
 - b) Windsor.Commons.Gis
 - c) Windsor.Commons.Integration
 - d) Windsor.Commons.Integration. Msmq

- e) Windsor.Commons.Mvc
 - f) Windsor.Commons.NewtonsoftJson
 - g) Windsor.Commons.PetaPoco
 - h) Windsor.Commons.WebValidation
 - i) Windsor.Commons.WorkFlow
 - j) Windsor.Commons.AspNet
 - k) Windsor.Commons.Authentication
 - l) Windsor.Commons.Authentication.Web
 - m) Windsor.Commons.Autofac
 - n) Windsor.Commons.AutofacAspNet
 - o) Windsor.Commons.AutofacMvc
 - p) Windsor.Commons.Language
 - q) Windsor.Commons.Messaging
 - r) Windsor.Commons.NVelocity
- 4) The Windsor custom HTML tags re-write standard html tags. For example, the text input fields use a custom Windsor directive that defines a text input across several javascript and html files. Errors have occurred while trying to use these custom tags when developing the workflow prototypes.
- 5) Reverse engineering functions that use the compiled C# Windsor code adds a significant amount of time.

The development team envisions a multitier approach for dealing with the above risks. For example, the Windsor custom developed tags should be replaced with standard HTML tags during any development activities. There would be little to no time effect on the schedule. Using standard html tags would take less time than using Windsor tags (there is a learning curve to implementing any custom developed tool of course). For example, replace the 'wnd-input' tag with the standard html 'input' tag.

The custom code restraints are a risk effecting bug fixing and development times, however, it is felt this cannot be avoided for release 1. The custom code should be removed after the first release. Details of how the custom code is removed would be discussed then.

3.2.3 Data Migration and Cleanup

As with database and application development, Windsor was working through data migration and cleanup of legacy data iteratively with each program throughout the project. The conversion process used by Windsor is outlined in the [TREADS Data Conversion Plan](#). As outlined in Section 4.1 of the Conversion Plan, the conversion process was a relatively cumbersome multistep process. The process typically took several days from start to finish.

Initial testing of converted data by programs had identified several issues with data quality and conversion business rules. Some of these issues were recorded in the JIRA bug list, in addition, to being communicated directly to Windsor, including issues with key core data sets associated with Individuals, Institutions, Affiliations, and Facility/Sites. Windsor and DEQ were in the

process of prioritizing and addressing these issues prior to the termination of the contracting relationship between the two entities.

As part of the Transition Analysis, the team reviewed Windsor’s conversion process and rules. The team found errors in the conversion scripts, largely related to the core datasets discussed in the previous paragraph and inconsistencies between the projects data mapping documents and conversion scripts. The transition analysis team recommends revising the conversion process to address these errors and to allow for rapid conversion of legacy production data into the TREADS format. For development, the goal will be to refresh testing data from the current legacy production environment in 30 minutes or less. This will require technology to interface with oracle and SQL server in the same program. The development team will write a new front end allowing selection of only a portion of data to be rapidly refreshed, that is can be directly initiated by select non-IT team members and process is not expected to take more than 10 – 15 minutes.

Existing conversion will be evaluated and reorganized in the system. The code may need to be modified to only convert a subset of data instead of all. Program specific data will be done ahead of time, if time allows. Two-weeks prior to a program’s development sprint a data conversion/clean up sprint will be scheduled. Known data elements will be evaluated for integrity and converted several times to test. Data identified in the development cycle will be included in future data cleanup and conversion sessions.

Similarly, the development team also is in the process of developing a front end for data cleanup that captures what action a user would like to have performed on the record identified as a potential issue. These action options may include Ignore(I), Delete(D), Merge(M), etc. After a user has identified these items, a batch process will be run (daily, weekly, monthly, or upon request) to go back into the legacy system and perform deletions and merges for the user. Missing data will be completed by the user in the legacy system.

4 POTENTIAL ALTERNATIVES TO ADDRESS DEFICIENCIES

Four development alternatives were evaluated based on feedback from the team:

TREADS Development Activities	Alternative 1	Alternative 2	Alternative 3	Alternative 4
REM Data Management 1) Refactoring of facilities and projects for a) AML b) FFB c) SSU 2) State Superfund Data Management 3) Federal Superfund Data Management	✓	✓	✓	✓
PTRCB Data Management	✓	✓	✓	✓
EQuIS Integration (facility and contacts) and updates to reference values	✓	✓	✓	✓

TREADS Development Activities	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Spatial Data Verification Tool	✓	✓	✓	✓
Time Tracking for Cost Recovery	✓	✓	✓	✓
Report Development	✓	✓	✓	✓
Public Facing, Data Search Tool and Web Mapping Integration	✓	✓	✓	✓
Bug fixes	✓	✓	✓	✓
PCR 27 - Data Cleanup	✓	✓	✓	✓
PCR 28 - Data Conversion and Migration	✓	✓	✓	✓
PCR 30 – Adding missing cross reference tables	✓	✓	✓	✓
PCR 33 – PTRCB Priority 1 Reports and Letters	✓	✓	✓	✓
PCR 31 - Reference/Code Table Consolidation		✓	✓	✓
PCR 32 - UST RCRs 35 - 40		✓	✓	✓
PCR 29, Phase 1 and 2 – Design/Build Application/Database Infrastructure Components for refactored workflow.			✓	✓
PCR 29, Phase 3, Refactor and Design pages for non-management users				✓

The following assumptions have been made regarding the Alternatives evaluated for this document:

- 1) All alternatives are developed using the existing code base and subsystems (e.g., nForm, nSpect) DEQ received from Windsor.¹
- 2) Substitution of one or more subsystems (e.g., nForm) will affect
 - a) Development costs
 - b) Operation and Maintenance Costs
 - c) Schedule
 - d) Functionality
 - e) Risk
- 3) The project is fully staffed, including contracted and DEQ development staff

Each alternative was evaluated in terms of the following five attributes:

- **Supports Business Functionality** – the ability to meet most, if not all, functional requirements
- **Supports Technical Strategy** – the extent to which the alternative can support the current technology strategy as documented in the Department CIO’s strategic plan
- **Supports Time to Implement** – the time required to implement the information system under the proposed alternative
- **Cost** – the cost of implementing and operating the system

¹ Integration with Amigo Cloud was investigated as a possible alternative for nSpect, however, based on staffing, technology, and general workload constraints it is not recommended to move forward with Amigo Cloud integration for the first release of TREADS.

- **Risk** – the risks associated with each alternative including the following types:
 - **Financial Risk** – risk of deviation from the proposed budget
 - **Technical Risk** – risk related to the complexity of development and implementation
 - **Operational Risk** – risk associated with disruption to current operational processes and routines
 - **Schedule Risk** – the risk of deviation from the proposed schedule
 - **Implementation Risk** – the risk or complexity associated with implementation

4.1 Alternative 1

Alternative 1 proposes that the Department completes TREADS using the latest code base and subsystems DEQ received from Windsor. Areas that will need to be completed include:

- a) REM Data Management
 - i) Refactoring of facilities and projects for
 - (1) AML
 - (2) FFB
 - (3) SSU
 - ii) State Superfund Data Management
 - iii) Federal Superfund Data Management
- b) PTRCB Data Management (partially complete), in addition to priority 1 reports and letters defined in PCR 033.
- c) EQuIS Integration (facility and contacts) and updates to reference values
- d) Spatial Data Verification Tool
- e) Time Tracking for Cost Recovery
- f) Report Development
- g) Public Facing, Data Search Tool and Web Mapping Integration
- h) Bug fixes
- i) Data Cleanup
- j) Data Conversion and Migration

Table 11 shows ratings for Alternative 1 in terms of the five attributes. The following ratings apply:

- Red is the lowest attribute rating for an attribute and indicates there are significant barriers to implementation of the alternative.
- Yellow recommends caution in implementing the alternative because there are some barriers to implementation.
- Green is the highest rating for an attribute and indicates that issues and risks can be managed effectively.

Table 11. Attribute Ratings for Alternative 1

Attribute	Rating
Supports Business Functionality: The current system would meet a majority of the priority 1 requirements, but would not address the change requests received by the UST Program.	

Table 11. Attribute Ratings for Alternative 1

Attribute	Rating
Supports Technical Strategy: This alternative supports the department technical strategy.	
Time to Implement: This alternative is estimated to take the least amount of time to implement as it requires no major database or code changes for existing functionality that could would require additional time for development, testing, integration, and documentation updates. <i>The estimated date of completion for this alternative is October 2017. Link to schedule: pdf or MS Project</i>	
Cost: This alternative is the least expensive alternative to implement as it requires no major database or code changes for existing functionality that could would require additional time for development, testing, integration, and documentation updates. <i>Estimated costs for adding PCRs 30 and 33 to the project are ~ 5-10,000 in soft costs.</i>	
Risk: Out of all of the Alternatives proposed, Alternative 1 poses the lowest Technical risk as this Alternative is not proposing significant database or code changes for existing functionality that could would require additional time for development, testing, integration, and documentation updates. The biggest risk for Alternative 1 is acceptance of the system by the Underground Storage Tanks Program, as this Alternative does not include incorporation of any new requirements that the program has submitted as change requests to the project. If the product owners would like to add alternatives 2,3 or 4 at a later time it would require all of the design changes, refactoring on the front end, testing and retraining staff at a later date.	

4.2 Alternative 2: Alternative 1 plus Tank RCRs and Code Table Consolidation

Alternative 2 proposes additions to the effort proposed for Alternative 1, including six out of the seven change requests submitted by the UST Program and one change request submitted by ITB as follows:

- UST RCRs 35 – 40 (PCR 032)
- PCR 031 – Reference Code Table Consolidation

Alternative 2 would require multiple database changes to break apart the Tank associated tables and add additional fields. It would also require consolidation of over 100 reference tables and re-association of the relationships of these code tables to the rest of the database. Design and UI changes will be required for the Tank, Inspection, and Reference Table Administration pages of TREADS. Additional Design and form changes will be required for up to 11 UST nForm forms. Unit, System and User Acceptance Tests would need to be revised and re-run. Associated design documentation will need to be updated to account for the changes. It is estimated that it would take an additional four, two week sprints to complete the additional work associated with this Alternative.

Table 12 shows ratings for Alternative 2 in terms of the five (5) attributes.

Table 12. Attribute Ratings for Alternative 2: Alternative 1 plus Tank RCRs and Code Table Consolidation

Attribute	Rating																								
Supports Business Functionality: The current system would meet a majority of the priority 1 requirements and would include a majority of the new requirements for the Underground Storage Tank Program.																									
Supports Technical Strategy: This alternative supports the department technical strategy.																									
Time to Implement: It is estimated that Alternative 2 would take an additional six sprints or twelve weeks to complete versus Alternative 1. <i>The estimated date of completion for this alternative is the end of January 2018. Link to schedule: pdf or MS Project</i>																									
<p>Cost: Alternative 2 is estimated as requiring an addition \$185,743 in soft and hard costs to complete over Alternative 1 as follows:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #d3d3d3;">Cost Categories</th> <th style="background-color: #d3d3d3;">Cost</th> <th style="background-color: #d3d3d3;">Comments</th> </tr> </thead> <tbody> <tr> <td>PCR 031</td> <td>\$63,120</td> <td> <ul style="list-style-type: none"> Hard Costs = \$48,000.00 (Augmentation Staff) Soft Costs = \$15,120 (DEQ staff) </td> </tr> <tr> <td>PCR 032</td> <td>\$91,200</td> <td> <ul style="list-style-type: none"> Hard Costs = \$48,000 (Augmentation Staff) Soft Costs = \$43,200 (DEQ staff) </td> </tr> <tr> <td>EQuS Licensing</td> <td>\$20,000</td> <td>Additional licensing due to extension of schedule</td> </tr> <tr> <td>SITSD Hosting</td> <td>\$6,000</td> <td>Additional hosting charges due to extension of schedule</td> </tr> <tr> <td>VPN Charges</td> <td>\$1,251.60</td> <td>Additional VPN charges due to extension of schedule</td> </tr> <tr> <td>Project Status</td> <td>\$4,171.50</td> <td>Additional project status meeting charges due to extension of schedule</td> </tr> <tr> <td>Total Cost</td> <td>\$185,743.10</td> <td></td> </tr> </tbody> </table> <p>The soft cost estimate is based on additional Program, Developer, Database, Business Analyst, and PM support to complete this effort.</p>	Cost Categories	Cost	Comments	PCR 031	\$63,120	<ul style="list-style-type: none"> Hard Costs = \$48,000.00 (Augmentation Staff) Soft Costs = \$15,120 (DEQ staff) 	PCR 032	\$91,200	<ul style="list-style-type: none"> Hard Costs = \$48,000 (Augmentation Staff) Soft Costs = \$43,200 (DEQ staff) 	EQuS Licensing	\$20,000	Additional licensing due to extension of schedule	SITSD Hosting	\$6,000	Additional hosting charges due to extension of schedule	VPN Charges	\$1,251.60	Additional VPN charges due to extension of schedule	Project Status	\$4,171.50	Additional project status meeting charges due to extension of schedule	Total Cost	\$185,743.10		
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Total Cost	\$185,743.10																								
Risk: Alternative 2 poses a bit more Technical risk than Alternative 1 due to multiple areas of refactoring in the database, UI, and several nForm forms. Program and technical staff will be required and engaged for these sprints to assist with design, development, testing, and documentation updates. The biggest positive risk for Alternative 2 is acceptance of the system by the Underground Storage Tanks Program.																									

4.3 Alternative 3: Alternative 2 plus Workflow Table and Workflow User Interface Changes

Alternative 3 proposes additions to the effort proposed for Alternative 2. These additions include complete restructuring of tables supporting the TREADS workflow and UI changes to support the revised table structure (PCR 29, Phase 1 and 2). The proposed benefit gain to restructuring the workflow tables is more flexibility and efficiency in the workflow module associated with TREADS, specifically, to allow:

- 1) Reuse of processes by multiple programs without the need to maintain a separate process for each program when the processes used by more than one program are the same.
- 2) The association of sub-processes to high-level processes.

In addition to Alternative 2, Alternative 3 would require additional database changes to restructure the workflow tables. Design and UI changes would be required for the New Service Request, Service Request, and Task. Task Detail, Process Template Administration, and Role Based-Security Screens. Unit, System and User Acceptance Tests will need to be revised and re-

run. Associated design documentation will need to be updated to account for the changes. It is estimated that it would take an additional six, two week sprints to complete the additional work associated with this Alternative compared to Alternative 2.

Table 13 shows ratings for Alternative 3 in terms of the five (5) attributes.

Table 13. Attribute Ratings for Alternative 3: Alternative 2 plus Workflow Table and Workflow User Interface Changes

Attribute	Rating																														
<p>Supports Business Functionality: The current system would meet a majority of the priority 1 requirements, would include a majority of the new requirements for the Underground Storage Tank Program, and would revamp the workflow portions of TREADS to allow for the reuse of processes by multiple programs without the need to maintain a separate process for each program when the processes used by more than one program are the same, and it would allow for the association of sub-processes to high-level processes.</p>																															
<p>Supports Technical Strategy: This alternative supports the department technical strategy.</p>																															
<p>Time to Implement: It is estimated that Alternative 3 would take an additional 12 sprints or twenty four weeks to complete versus Alternative 1. <i>The estimated date of completion for this alternative is the end of April 2018. Link to schedule: pdf or MS Project</i></p>																															
<p>Cost: Alternative 3 is estimated as requiring an additional \$356,600 in hard and soft costs to complete over Alternative 1.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #d3d3d3;">Cost Categories</th> <th style="background-color: #d3d3d3;">Cost</th> <th style="background-color: #d3d3d3;">Comments</th> </tr> </thead> <tbody> <tr> <td>PCR 031</td> <td style="text-align: right;">\$63,120.00</td> <td> <ul style="list-style-type: none"> Hard Costs = \$48,000.00 (Augmentation Staff) Soft Costs = \$15,120 (DEQ staff) </td> </tr> <tr> <td>PCR 032</td> <td style="text-align: right;">\$91,200.00</td> <td> <ul style="list-style-type: none"> Hard Costs = \$48,000 (Augmentation Staff) Soft Costs = \$43,200 (DEQ staff) </td> </tr> <tr> <td>PCR 029, Phase 1</td> <td style="text-align: right;">\$108,800.00</td> <td> <ul style="list-style-type: none"> Hard Costs = \$64,000.00 (Augmentation Staff) Soft Costs = \$44,800 (DEQ staff) </td> </tr> <tr> <td>PCR 029, Phase 2</td> <td style="text-align: right;">\$54,400.00</td> <td> <ul style="list-style-type: none"> Hard Costs = \$32,000 (Augmentation Staff) Soft Costs = \$22,400 (DEQ staff) </td> </tr> <tr> <td>EQuIS Licensing</td> <td style="text-align: right;">\$20,000.00</td> <td>Additional licensing due to extension of schedule</td> </tr> <tr> <td>SITSD Hosting</td> <td style="text-align: right;">\$10,500.00</td> <td>Additional hosting charges due to extension of schedule</td> </tr> <tr> <td>VPN Charges</td> <td style="text-align: right;">\$1,627.08</td> <td>Additional VPN charges due to extension of schedule</td> </tr> <tr> <td>Project Status Meeting</td> <td style="text-align: right;">\$6,952.50</td> <td></td> </tr> <tr style="background-color: #333; color: white;"> <td>Total Cost</td> <td style="text-align: right;">\$356,599.58</td> <td></td> </tr> </tbody> </table> <p>The soft cost estimate is based on additional Program, Developer, Database, Business Analyst, and PM support to complete this effort.</p>	Cost Categories	Cost	Comments	PCR 031	\$63,120.00	<ul style="list-style-type: none"> Hard Costs = \$48,000.00 (Augmentation Staff) Soft Costs = \$15,120 (DEQ staff) 	PCR 032	\$91,200.00	<ul style="list-style-type: none"> Hard Costs = \$48,000 (Augmentation Staff) Soft Costs = \$43,200 (DEQ staff) 	PCR 029, Phase 1	\$108,800.00	<ul style="list-style-type: none"> Hard Costs = \$64,000.00 (Augmentation Staff) Soft Costs = \$44,800 (DEQ staff) 	PCR 029, Phase 2	\$54,400.00	<ul style="list-style-type: none"> Hard Costs = \$32,000 (Augmentation Staff) Soft Costs = \$22,400 (DEQ staff) 	EQuIS Licensing	\$20,000.00	Additional licensing due to extension of schedule	SITSD Hosting	\$10,500.00	Additional hosting charges due to extension of schedule	VPN Charges	\$1,627.08	Additional VPN charges due to extension of schedule	Project Status Meeting	\$6,952.50		Total Cost	\$356,599.58		
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Project Status Meeting	\$6,952.50																														
Total Cost	\$356,599.58																														
<p>Risk: Alternative 3 poses significantly more Technical risk than Alternative 1 due to extensive areas of refactoring in the database, UI, and several nForm forms. Program and technical staff will be required and engaged for these sprints to assist with design, development, testing, and documentation updates. The biggest positive risk for Alternative 3 is a workflow process that is more flexible, efficient, and intuitive.</p>																															

4.4 Alternative 4: Alternative 3 plus Complete Workflow Table and User Interface Changes

Alternative 4 proposes additions to the effort proposed for Alternative 3. These additions include a revised configuration module for Workflow that would allow TREADS super users/administrators the ability to configure the right-hand panel of the Edit Task Screen. This would provide the means for DEQ to tailor these screens to assist users in completing tasks. Table 14 shows ratings for Alternative 4 in terms of the five attributes.

Table 14. Attribute Ratings for Alternative 4: Alternative 3 plus Complete Workflow Table and User Interface Changes

Attribute	Rating																																	
Supports Business Functionality: The current system would meet a majority of the priority 1 requirements, would include a majority of the new requirements for the Underground Storage Tank Program, and would revamp the workflow portions of TREADS to allow for the reuse of processes by multiple programs without the need to maintain a separate process for each program when the processes used by more than one program are the same, and it would allow for the association of sub-processes to high-level processes.																																		
Supports Technical Strategy: This alternative supports the department technical strategy.																																		
Time to Implement: It is estimated that Alternative 4 would take an additional sixteen sprints or 32 weeks (approximately eight months) to complete versus Alternative 1. <i>The estimated date of completion for this alternative is the end of June 2018. Link to schedule: pdf or MS Project</i>																																		
Cost: Alternative 4 is estimated as requiring an additional \$470,503.90 in hard and soft costs to complete over Alternative 1.																																		
<table border="1"> <thead> <tr> <th data-bbox="196 1180 440 1209">Cost Categories</th> <th data-bbox="440 1180 602 1209">Cost</th> <th data-bbox="602 1180 1326 1209">Comments</th> </tr> </thead> <tbody> <tr> <td data-bbox="196 1209 440 1276">PCR 031</td> <td data-bbox="440 1209 602 1276">\$63,120.00</td> <td data-bbox="602 1209 1326 1276"> <ul style="list-style-type: none"> Hard Costs = \$48,000.00 (Augmentation Staff) Soft Costs = \$15,120 (DEQ staff) </td> </tr> <tr> <td data-bbox="196 1276 440 1344">PCR 032</td> <td data-bbox="440 1276 602 1344">\$91,200.00</td> <td data-bbox="602 1276 1326 1344"> <ul style="list-style-type: none"> Hard Costs = \$48,000 (Augmentation Staff) Soft Costs = \$43,200 (DEQ staff) </td> </tr> <tr> <td data-bbox="196 1344 440 1411">PCR 029, Phase 1</td> <td data-bbox="440 1344 602 1411">\$108,800.00</td> <td data-bbox="602 1344 1326 1411"> <ul style="list-style-type: none"> Hard Costs = \$64,000.00 (Augmentation Staff) Soft Costs = \$44,800 (DEQ staff) </td> </tr> <tr> <td data-bbox="196 1411 440 1478">PCR 029, Phase 2</td> <td data-bbox="440 1411 602 1478">\$54,400.00</td> <td data-bbox="602 1411 1326 1478"> <ul style="list-style-type: none"> Hard Costs = \$32,000 (Augmentation Staff) Soft Costs = \$22,400 (DEQ staff) </td> </tr> <tr> <td data-bbox="196 1478 440 1545">PCR 029, Phase 3</td> <td data-bbox="440 1478 602 1545">\$108,800.00</td> <td data-bbox="602 1478 1326 1545"> <ul style="list-style-type: none"> Hard Costs = \$64,000 (Augmentation Staff) Soft Costs = \$44,800 (DEQ staff) </td> </tr> <tr> <td data-bbox="196 1545 440 1575">EQuIS Licensing</td> <td data-bbox="440 1545 602 1575">\$20,000.00</td> <td data-bbox="602 1545 1326 1575">Additional licensing due to extension of schedule</td> </tr> <tr> <td data-bbox="196 1575 440 1604">SITSD Hosting</td> <td data-bbox="440 1575 602 1604">\$13,500.00</td> <td data-bbox="602 1575 1326 1604">Additional hosting charges due to extension of schedule</td> </tr> <tr> <td data-bbox="196 1604 440 1633">VPN Charges</td> <td data-bbox="440 1604 602 1633">\$1,877.40</td> <td data-bbox="602 1604 1326 1633">Additional VPN charges due to extension of schedule</td> </tr> <tr> <td data-bbox="196 1633 440 1684">Project Status Meeting</td> <td data-bbox="440 1633 602 1684">\$8,806.50</td> <td data-bbox="602 1633 1326 1684"></td> </tr> <tr> <td data-bbox="196 1684 440 1713">Total Cost</td> <td data-bbox="440 1684 602 1713">\$470,503.90</td> <td data-bbox="602 1684 1326 1713"></td> </tr> </tbody> </table>	Cost Categories	Cost	Comments	PCR 031	\$63,120.00	<ul style="list-style-type: none"> Hard Costs = \$48,000.00 (Augmentation Staff) Soft Costs = \$15,120 (DEQ staff) 	PCR 032	\$91,200.00	<ul style="list-style-type: none"> Hard Costs = \$48,000 (Augmentation Staff) Soft Costs = \$43,200 (DEQ staff) 	PCR 029, Phase 1	\$108,800.00	<ul style="list-style-type: none"> Hard Costs = \$64,000.00 (Augmentation Staff) Soft Costs = \$44,800 (DEQ staff) 	PCR 029, Phase 2	\$54,400.00	<ul style="list-style-type: none"> Hard Costs = \$32,000 (Augmentation Staff) Soft Costs = \$22,400 (DEQ staff) 	PCR 029, Phase 3	\$108,800.00	<ul style="list-style-type: none"> Hard Costs = \$64,000 (Augmentation Staff) Soft Costs = \$44,800 (DEQ staff) 	EQuIS Licensing	\$20,000.00	Additional licensing due to extension of schedule	SITSD Hosting	\$13,500.00	Additional hosting charges due to extension of schedule	VPN Charges	\$1,877.40	Additional VPN charges due to extension of schedule	Project Status Meeting	\$8,806.50		Total Cost	\$470,503.90		
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Risk: Alternative 4 poses a significantly more Technical risk than Alternative 1 due to multiple areas of refactoring in the database, UI, and several nForm forms. Program and technical staff will be required and engaged for these sprints to assist with design, development, testing, and documentation updates. The biggest positive risk for Alternative 4 is a workflow process that is more flexible, efficient, and intuitive.																																		

4.5 Summary of Findings

4.5 summarizes the ratings of the four alternatives across the five attributes. As in previous tables, the ratings are as follows:

- Red (R) is the lowest attribute rating for an attribute and indicates there are significant barriers to implementation of the alternative.
- Yellow (Y) recommends caution in implementing the alternative because there are some barriers to implementation.
- Green (G) is the highest rating for an attribute and indicates that issues and risks can be managed effectively

Table 15. Comparison of Attribute Ratings for All Alternatives

Attribute	Alternative 1	Alternative 2	Alternative 3	Alternative 4				
Supports Business Functionality	Yellow	Green	Green	Green				
Supports Technical Strategy	Green	Green	Green	Green				
Time to Implement	October 2017	January 2018	April 2018	June 2018				
Cost ²	Total including retainage and holdbacks	\$4,646,426.55	Total including retainage and holdbacks	\$4,832,170.15	Total including retainage and holdbacks	\$5,003,026.63	Total including retainage and holdbacks	\$5,116,930.95
	Total minus soft costs	\$2,146,426.55	Total minus soft costs	\$2,269,678.15	Total minus soft costs	\$2,370,553.63	Total minus soft costs	\$2,437,803.95
	Contingency	\$473,573.45	Contingency	\$350,321.85	Contingency	\$249,446.37	Contingency	\$182,196.05
	Total (Hard, Soft and Contingency Costs)	\$5,120,000.00	Total (Hard, Soft and Contingency Costs)	\$5,182,492.00	Total (Hard, Soft and Contingency Costs)	\$5,252,473.00	Total (Hard, Soft and Contingency Costs)	\$5,299,127.00
Risk	Yellow	Yellow	Red	Red				

- **Supports Business Functionality:** As shown in 4.5, Alternatives 2 through 4 received a Green rating on Supports Business Functionality. Alternative 1 received a Yellow rating even though it would meet all of the Department's functional priority 1 requirements as it does not cover the change requests for UST and PTRCB that cover missed and new requirements. Without these items being addressed in Alternative 1, the team does not believe the system will be accepted by these two programs.
- **Supports Technical Strategy:** All alternatives received a Green rating on Supports Technical Strategy.
- **Time to Implement:** Estimates to complete Alternative 1 suggest that the project can be completed in early October of 2017. Choosing Alternative 2, 3 or 4 extends the project out an additional three, six or nine months, respectively.
- **Cost to Implement:** All alternatives fall within the hard cost budget for the project of \$2,711,343.04, but all alternatives are over the original budgeted amount of the project when soft costs are considered.
- **Risk:** Alternatives 3 and 4 involve substantial risk associated with cost, time and complexity to implement, but they provide for efficiencies in general users and maintenance of the system.

² Cost includes total of hard and soft cost estimates. Soft cost estimates include the costs of DEQ staff.