BerryDunn

Independent Review

Information Management System

For the

State of Vermont
Vermont Agriculture and Environmental Laboratory (VAEL)

Submitted to the
State of Vermont, Agency of Digital Services
March 12, 2018

FINAL

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1.0 Executive Summary

1.1   Introduction

This Independent Review (IR) was undertaken to evaluate the viability of, and provide a recommendation to proceed or not proceed with respect to, a Laboratory Information Management System (LIMS) Project for the State of Vermont's (State's) Vermont Agriculture and Environmental Laboratory (VAEL). For all Information Technology (IT) activities over $1,000,000, Vermont statute (or at the discretion of the Chief Information Officer [CIO]) requires an IR by the Office of the CIO before the project can begin. This IR began on January 29, 2018, and is projected to conclude by March 12, 2018.

The subject of review is the planned VAEL LIMS Project. The State issued a request for proposals (RFP) for a LIMS solution. In scope are the technology solution, implementation services (including Project Management [PM] and Technical Work), and ongoing support of a cloud-based LIMS solution. The RFP included specific requirements that the LIMS solution must meet:

1. The solution must have a SQL-based back end
2. The solution must provide user-configurable queries
3. The solution must provide sample login/identification that accommodates both Agricultural/Food and Environmental samples
4. The solution must provide flexibility to produce both .pdf and .csv report formats
5. The solution must provide ability for user to configure report formats to meet National Environmental Laboratory Accreditation Conference (NELAC) and Food and Drug Administration (FDA) standards
6. The solution must provide Quality Control Tracking and Trending
7. The solution must provide the ability to transfer all data from the existing LIMS to the new system
8. The solution must provide a method work-time unit (WTU) database with productivity review capability
9. The solution must provide a client database with project tracking and invoicing capabilities
10. The solution must provide chemical and supply inventory with onboard Occupational Safety and Health Administration (OSHA) and MSL database

Additionally, the RFP included specific Business Values that the LIMS solution should seek to achieve:

1. Customer Service Improvements: Improve workflow, efficiency, productivity, and data management.
2. Risk Reduction: Safeguard the testing and approval process. Provide audit trails and disaster recovery services.
3. Compliance: Comply with EPA, FDA, ISO 17025, GMP, USDA, GFSI, FSMA

This independent review was written as a point-in-time report as of February 23, 2018.

1.2 Cost Summary

The following table is a summary of LIMS costs as evaluated during the course of this IR.

Table 1-1 – Cost Summary

IT Activity Life Cycle:	5 Years
Total Life Cycle Costs:	$ 872,347
Total Implementation Costs:	$ 450,347
New Annual Operating Costs:	$119,900 in Year 1 $78,150 in Year 2 $78,150 in Year 3 $75,525 in Year 4 $70,275 in Year 5
Current Annual Operating Costs:	$ 118,000
Difference Between Current and New Operating Costs (increase in cost represented by a "+"; decrease in cost represented by a "-"):	$+1900 in Year 1 $-39,850 in Year 2 $-39,850 in Year 3 $-42,475 in Year 4 $-47,725 in Year 5
Funding Source(s) and Percentage Breakdown if Multiple Sources:	100% State funds

1.3 Disposition of IR Deliverables

Table 1-2 – IR Deliverables

Deliverable	Highlights From the Review *Include explanations of any significant concerns*
Acquisition Cost Assessment	Implementing WinLIMS will cost the VAEL $450,347. It will be paid for entirely with State funds.
Technology Architecture Review	The response by the vendor indicates that the solution meets or exceeds all of the non-functional requirements (NFRs) which were included in the RFP. The system is a web-based solution, which is compatible with most popular browsers and uses modern Microsoft technologies and languages. The

	solution includes hosting by the vendor with a guaranteed uptime of 99.999%.
Implementation Plan Assessment	Based on the information reviewed by BerryDunn during the IR process, there are concerns over the implementation plan. The 52-week timeline is aggressive, especially given risks around the VAEL's availability in the summer and the movement of VAEL's facility. A lack of clarity around the scope also puts the timeline at risk.
Cost Analysis and Model for Benefit Analysis	In our opinion, the benefits of the solution outweigh the greater cost, which is mainly due to the implementation of the project. Compared to the current system, which is both not completely functional and eight years old, WinLIMS offers greater functionality and will likely improve VAEL's efficiency.
Impact Analysis on Net Operating Costs	The maintenance and operations of the new solution will be less expensive than the current solution, but, when including the implementation costs of the new system, it is more expensive.

1.4   Identified High Impact and/or High Likelihood of Occurrence Risks

Table 1-3 – Impact/Likelihood of Occurrence

Risk Description	State's Planned Risk Response	Reviewer's Assessment of Planned Response	Risk Likelihood/ Probability	Risk Impact
VAEL has limited resources to put toward the project. VAEL has 14 staff, and the project will require a great deal of effort from two staff members in particular who also currently have roles in the lab. The entire staff will have to document their processes and be involved in the project while performing their regular duties. Additionally, IT resources are also limited for this project. Hunter Thompson, the IT director for the Department of Agriculture, will be involved in the project, but there is no one who has as much expertise if he were to leave. The one-year	VAEL accepts that it has limited resources but has identified the key staff it will need for the project and will cross-train staff/hire temporary staff to fill in the positions of those key staff.	VAEL understands its limitations, and it is true that projects can add pressure to an agency. However, VAEL appears to know the steps it needs to take to make sure that the key staff on the project remain focused on the project.	High	High

proposed implementation schedule would mean VAEL would struggle to find a replacement. If any staff left the agency, let alone the three staff mentioned above, VAEL would be at a disadvantage in trying to implement the project. Specifically, this could lead to an increase in the schedule and cost, and potentially a loss of clarity around the scope of the project.				
Vendor resource depth is a concern. In its calls to references, VAEL found QSI to be highly spoken of. However, the one name mentioned by all the references was James Gerry, one of three proposed project managers (PMs). The vendor has informed BerryDunn that Mr. Gerry will not be the prime PM for this project. There are concerns that not getting Mr. Gerry as the PM for the LIMS implementation could mean VAEL will not receive the same level of service from QSI that the references received.	VAEL has added language to the contract stating they can demand a new PM if needed. VAEL also has received references for QSI's proposed PM for the LIMS project and will follow up with those references to understand the PM's qualifications.	VAEL should call the references for the proposed PM to see if he is as highly spoken of as Mr. Gerry. No matter the outcome of these calls, VAEL should try to keep the language that would allow VAEL to demand a new PM if needed. These actions should help make sure VAEL has the resources it needs from QSI in this project.	Low	High
There is unclear understanding of how the cloud-based solution will interface with the configuration of the lab equipment to maximize all of the functionality of the solution. VAEL is unsure that its lab equipment will be able to interface with the preferred	This risk cannot be fully mitigated until completion of the new VAEL lab. Agency of Digital Services (ADS) staff will engage an EA to discuss solutions and methods to isolate VAEL control equipment while maintaining internet connectivity.	VAEL appears to understand its limitations with instruments, and is mindful it will have to focus on this risk throughout the project.	Medium	High

system, as described in the vendor's proposed solution due to state security limitations. This could impact the effectiveness of the solution, as this interface is an important feature of QSI's solution. State efforts to determine the feasibility of this interface could delay contract negotiations and leave questions around cost.				
VAEL is moving to Randolph, which is over 60 miles from Burlington. The State is moving VAEL from its current location, Burlington, to Randolph. The move is due to happen sometime in late 2018 or 2019 and will interrupt regular VAEL activities as personnel and equipment are moved. This move will certainly have an impact on the project. At the very least it will take some time for staff to make the move and return to normal work, let alone maintain involvement in the project. This is a potential schedule and cost risk. There is also the risk that the building has network issues that may impact VAEL's ability to connect to the new solution. Finally, there is a risk that some staff may choose to not make the move, as it would be a major change for them, which, combined with VAEL's limited staff and concentrated subject matter expertise, would have a major impact.	The lab's two LIMS experts will be making the move to Randolph, so there is no risk in losing crucial team members. Also, lab personnel are not expected to be heavily involved in the actual physical moving. It is more likely that their involvement will be in setting up lab workstations, which should only take one to two days to complete.	VAEL is changing locations and does not control the time it will move. It has accounted for the key staff on the project but should make sure the vendor is prepared for the impact of the move, even if the impact on staff is only a few days.	High	High
The vendor is offering a 90-day warranty on its	VAEL has included the following language on the contract:	VAEL has sufficiently addressed this	High	Medium

hardware/software, and not on its services. The vendor implementation plan provided by QSI states that the warranty period for hardware and software ends 90 days into the project. Since the implementation and customization services are not warrantied, it could result in VAEL's acceptance of a product, including deliverable payout, which may be deemed unusable by the lab. It also limits VAEL's ability to push back against solution issues, which could negatively impact schedule, scope, and cost.	"QSI warranties the System as described in "QSI-Maintenance-Contract" attachment. QSI warranties all customizations and documentation as described in Section 5.2 for 90 days after acceptance as described in Section 5.2 (Customer Accepts Instrument Interface/External Interface)."	risk through the contract language that was included. It should ensure that the language remains and is not diluted as part of the contract review and negotiation.		
If the project is not live by the end of spring 2019, it could mean a six- to eight-month delay in the final implementation due to seasonal testing increases at VAEL. The proposed vendor timeline, 52 weeks, is a very tight timeframe for VAEL. VAEL has limited availability during the summer season due to seasonal increases in testing, and if the project starts in late spring/early summer 2018, it means that any delay could cause a much larger delay at the end of the project, as VAEL is not able to go-live with a new system during its busy summer months. This could stretch out the implementation by six to eight months and cause an increase in cost for VAEL.	Two areas of the lab are affected by this (Nutrients and Wet labs). They can be set up first, before the busy season. Additionally, the key project staff are not heavily involved in the seasonal work impacted by this timeframe, meaning they will still have ample capacity to focus on the LIMS integration. Also, there is sufficient time in the day to both test and work on other projects, as many sample tests are started and take several hours to complete, allowing a wait period for other work to occur. Additionally, there could be the option for a phased rollout to end users (by the lab). VAEL anticipates running the new software in a test environment prior to going live, so there is an option to deploy the functionality to users during less busy times, alleviating setbacks due to busy, seasonal work.	VAEL does not seem concerned about the amount of work and believes it has backfilled for the most impacted staff. Trying to complete the affected labs before its busy season is an appropriate response, but VAEL should make sure that the vendor is aware of this and willing to configure for the Nutrients and Wet labs first prior to the summer.	Medium	High

The scope around who will be configuring the tests in the new system is not fully defined. A key aspect of the project is configuring the tests that VAEL currently runs into the new system. At this moment, VAEL is not sure who is responsible for configuring the existing tests into the new system. If VAEL is expected to configure the tests, then it has to be prepared to put in significant resources to make sure that this task is completed. It also makes training even more important. If VAEL expects the vendor to perform this task and the vendor has not accounted for this expectation in the proposed implementation plan, then it may lead to a major increase in cost and timeline. A misunderstanding around this part of the scope could have significant negative impacts on the project.	The lab has historically taken on this work and expects to configure its methods within the new system as well. One of the lab analysts dedicated to this project has been doing this, and it is part of her day-to-day assignment, so for her to configure the testing with QSI's software does not change the scope of her responsibility. Contractually, VAEL expects that QSI will configure templates that VAEL staff will use to configure state-specific methods and procedures, as well as set up reporting. The state will remain responsible for configuring the methods, per the current process. Additionally, QSI added: "This falls under the responsibility of both VAEL and QSI. Any manual entry of samples types, test, and methods would be handled by VAEL but if any of that data is being migrated from another system or spreadsheets, QSI will handle that as part of data conversion/migration services. What are referencing during those weeks are configuration of the specific menus and templates that will be set up so that sample types, methods, tests, etc. can be entered into the system." VAEL will also be adding more specific language around the configuration of the tests, requesting that a specific number of tests will need to be built by QSI and fully functional as part of the tasks for Weeks 19 – 30 in the implementation plan.	VAEL seems to better understand its role here and has come up with a plan to hold QSI accountable for completion of a majority of the work. This is an acceptable mitigation strategy, although it appears VAEL also accepts that its staff will be doing some portion of the work.	High	High

1.5   Other Key Issues

Recap any key issues or concerns identified in the body of the report.

1.6   Recommendation

Provide your independent review recommendation on whether or not to proceed with this technology project and vendor(s).

Although the proposed LIMS project has risks and concerns associated, BerryDunn does not have significant reason to oppose that the project proceed. Therefore, it is recommended that the VAEL project team continue to work to on risk mitigation and contract execution in order to encourage project success.

Six of the 11 risks outlined in Attachment 2 have a high impact, but all of the risks that can be mitigated have a strong action plan. The risks that can be addressed prior to contract execution should be a priority for the VAEL project team.

1.7   Independent Reviewer Certification

I certify that this Independent Review Report is an independent and unbiased assessment of the proposed solution's acquisition costs, technical architecture, implementation plan, cost-benefit analysis, and impact on net operating costs, based on the information made available to me by the State.

_____   _____

Independent Reviewer Signature   **Date**

1.8   Report Acceptance

The electronic signature below represents the acceptance of this document as the final completed Independent Review Report.

_____   _____

ADS Oversight Project Manager   **Date**

_____   _____

State of Vermont Chief Information Officer   **Date**

2.0 Scope of this Independent Review

2.1   In-Scope

The scope of this document is fulfilling the requirements of Vermont Statute, Title 3, Chapter 45, §2222(g):

The Secretary of Administration shall obtain independent expert review of any recommendation for any information technology initiated after July 1, 1996, as information technology activity is defined by subdivision (a)(10), when its total cost is $1,000,000 or greater or when required by the State Chief Information Officer.

The independent review report includes:

- An acquisition cost assessment
- A technology architecture review
- An implementation plan assessment
- A cost analysis and model for benefit analysis
- An impact analysis on net operating costs for the Agency carrying out the activity
- An overall risk assessment of the proposed solution

2.2   Out-of-Scope

If applicable, describe any limits of this review and any area of the project or proposal that you did not review.

3.0 Sources of Information

3.1 Independent Review Participants

List the individuals who participated in this Independent Review.*

Table 3-1 – IR Participants

Name	Employer and Title	Participation Topic(s)
Guy Roberts	Vermont Agriculture & Environmental Lab Director, Project Sponsor	Project Information, Implementation Plan Review, Initial Technology Architecture Review, Cost Analysis, and Initial Risk Assessment
Hunter Thompson	State of Vermont (SOV) Agency of Agriculture IT Lead, Project Technical Lead	Project Information, Implementation Plan Review, Initial Technology Architecture Review, Cost Analysis, and Initial Risk Assessment
Anne Charbonneau	Chemist, LIMS Expert, Project Main Point of Contact	Project Information, Implementation Plan Review, Initial Technology Architecture Review, Cost Analysis, and Initial Risk Assessment
Matthew Millard	Chemist, LIMS Expert, Project SME	Project Information, Implementation Plan Review, Initial Technology Architecture Review, Cost Analysis, and Initial Risk Assessment
John Jaworski	VAEL Lab Supervisor, Project SME, Project Invoice/Budget POC	Project Information, Implementation Plan Review, Initial Technology Architecture Review, Cost Analysis, and Initial Risk Assessment
Daniel Needham	VAEL Lab Supervisor, Project SME	Project Information, Implementation Plan Review, Initial Technology Architecture Review, Cost Analysis, and Initial Risk Assessment
Keith MacMartin	Project Enterprise Architect	Project Information, Implementation Plan Review, and Initial Technology Architecture Review

3.2 Independent Review Documentation

Complete the chart below to list the documentation utilized to compile this independent review.

Table 3-2 – IR Documentation

Document Name	Description	Source
Stakeholder Contact List	Stakeholder contact list for scheduling interviews (e.g., ADS staff, VAEL resources, proposing vendor resources); please include names, project roles, emails addresses, and telephone numbers for all stakeholders.).	Naomi Hahr
IT ABC Form	IT Activity Business Case and Cost Analysis	Naomi Hahr
IT ABC Form Accompanying Cost Spreadsheet	IT Activity Business Case and Cost Analysis (IT ABC Form) Accompanying Cost Spreadsheet	Naomi Hahr
VAEL LIMS RFI	RFI released by VAEL	Naomi Hahr
Transmittal Letter and Technical Response	Transmittal Letter and Technical Response for Information Management System Project resume awardee.	Naomi Hahr
Request for Proposal (RFP	RFP for Information Management System Project including attachments and any functional and non-functional requirements.	Naomi Hahr
Vendor Proposals	Proposals from bidders on VAEL RFP	Naomi Hahr
Scoring Sheets	Scoring sheets for VAEL LIMS RFP	Naomi Hahr
Project Charter		Naomi Hahr
Project Budget	Project budget and budget for ongoing support	Naomi Hahr
Draft Contract	Draft contract for presumed awardee (if any)	Naomi Hahr
Strategic Plan	Agency of Digital Services (ADS) – Strategic Plan, Published January 12, 2018	ADS Website

4.0 Project Information

4.1   Historical Background

Provide any relevant background that has resulted in this project.

VAEL has been in its current form since July 2015, when the Agency of Agriculture Food and Markets (Agriculture) and Department of Environmental Conservations (DEC) combined. Prior to that time, there were separate state laboratories for Agriculture and DEC. While both performed similar functions—testing samples provided by clients—the types of samples were different.

VAEL currently uses the LIMS that DEC used before the merger of the two labs: Accelerated Technology Laboratories, Inc. (ATL) Sample Master Version 9. DEC/VAEL has had Sample Master for at least eight years.

A few years after procuring Sample Master, DEC began to begin experiencing problems around accessing data that was held in the State's SQL server. They did eventually reach a solution to access this data, which involved significant customizations to Sample Master. When Sample Master upgraded to the next version (7), DEC's lab began experiencing significant problems, as the customizations no longer functioned as they did in the previous version. With every subsequent upgrade, DEC lost more and more functionality, particularly around reporting.

DEC/VAEL discussions with ATL revealed that some of the customizations that were carried out voided the service contract with the vendor. At that point, VAEL would have had to procure a new version of Sample Mater without the customizations and enter back into a valid service contract with the vendor if they wanted to have the Sample Master out-of-the-box (OOTB) functionality working properly.

DEC/VAEL has considered a new LIMS on at least one other occasion. In 2011/2012, DEC purchased a new database that came with a LIMS-like system. DEC ultimately determined that the LIMS did not have the functionality it wanted and remained with Sample Master.

VAEL began considering a new LIMS shortly after the merger between Agriculture and DEC. Sample Master worked as an interim solution, but it lacked the flexibility to support the wide range of activities that VAEL conducts, including agricultural and environmental testing. In February 2017, VAEL had LIMS demos based on an RFI. At this time, VAEL was also in contact with other state agencies about their LIMS but decided that other LIMS did not meet their needs. VAEL released an RFP in May 2017. ATL did bid on the RFP but did not bid with a solution VAEL had been hoping for. Ultimately, VAEL picked QSI as its preferred vendor.

4.2   Project Goal

Explain why the project is being undertaken.

VAEL is searching for a modern LIMS that meets the needs of both portions of the lab. Sample Master is a DEC system that is being used by Department of Agriculture Food and Markets. The switch of the program to Agriculture computers led to the VAEL losing the ability to automatically upgrade all of its Sample Master Programs at once. Agriculture would prefer to have a lab system designed with it in mind as well.

Sample Master also has serious shortcomings. Because of initial problems in creating reports, VAEL had to make major customizations to Sample Master. These customizations are not supported by ATL, and every time there is a change in versions, VAEL loses more functionality, specifically reporting capabilities. Workarounds have to be built from scratch and have shortcomings (e.g., only showing numeric symbols, meaning an entry such ">100" shows as blank). Reporting functionality is also not automated like the original OOTB functionality. VAEL staff currently have to download all data into Excel and generate their own reports. The reports can then only be sent to one person at a time and cannot be mailed to groups. Sample Master also does not allow VAEL to import raw data and instead requires VAEL staff to create Excel parsers.

VAEL would like a LIMS that can provide dashboards that can easily be viewed and where queries can be saved, neither of which are features offered by the current solution. VAEL would also like a LIMS that can directly send data to its clients and their databases. A modern solution also would have better audit trails, something Sample Master currently lacks. Finally, the lab would like a system where data from the lab instruments can be put directly into the system instead of having to go through parsers or be entered manually, as it currently must.

4.3 Project Scope

Describe the project scope and list the major deliverables. Add or delete lines as needed.

QSI is proposing WinLIMS, a Microsoft .Net-based web application. Included in QSI's proposal are 19 concurrent user licenses, 14 of which will be reserved for VAEL staff using the LIMS. The additional licenses will be used by clients so they can log in samples and check the test data. There are also 22 licenses proposed for lab equipment although the number of licenses and even the feasibility of this interface are questionable.

There are some concerns about scope, as outlined in the risk section. VAEL does not believe it will be migrating legacy data, but the vendor has proposed this. It is also unclear who will be responsible for the configuration of the current tests on the new system. QSI may be configuring all current tests, or it could be configuring a few and showing VAEL resources how to configure the rest on WinLIMS. QSI also informed BerryDunn during the vendor interview that moving the tests from the old system to the new system was within the scope of the $15,750 Data Migration listed in the Pricing section of the bidder response, though calculation-heavy assays typically need to be rebuilt manually.

4.3.1 Major Deliverables

QSI has proposed the following deliverables in its proposal:

Table 4-1 – Major Deliverables within RFP

Deliverable	Description	Acceptance
Licensed Software Purchase	WinLIMS Core License 19 Concurrent Licenses WinLIMS Quotation & Invoicing Module WinLIMS Extend & Remodel Module WinLIMS Sample Split Module	Receipt of licensed software and access to documentation, written confirmation by project lead.
Initial Project Plan/Core System Training	Initial Project Plan document showing a high level project plan. Cloud Test Environment is built out, and introductory training of core application features in a cloud the test environment.	The project team will have "hands on" training of the WinLIMS Core system. The project team will have a review of the applications within WinLIMS. Project lead will send written acceptance of initial project plan.
Requirement Documents	There may be multiple requirement documents detailed project activity and timelines, broken out in a format to use for individual task orders including associated costs. The material in these documents would have come from requirements gathering work and meetings with LIMS users. This document will list all of the deliverables, acceptance criteria.	Requirement Documents (a) will include all requirements from RFP as approved and augmented during requirements gathering and (b) breaks out the project into mutually agreed tasks and phases and (c) is accepted in writing by the project lead.
Product Configuration, Customization, Testing, and Production deployments	Task as described in the Specification Document. Each Task Orders including the deliverable and acceptance criteria will be approved in writing by both the State of Vermont Project Lead and the QSI Project Lead.	The WinLIMS system will be configured by QSI based on the State of Vermont business requirements.
Additional Licenses & Modules	WinLIMS Bridge Module WinLIMS Instrument Interface Licenses estimated to be 22 licenses. Actual number to be described in the specification document.	As delivered and brought online.
Annual Licenses Maintenance	20% of cost of licenses purchased, starting 90 days from date of license purchase.	
Project Completion	All requirements, screens, reports, and instrument interfaces are complete and	Approved in writing by the project lead.

Deliverable	Description	Acceptance
	operating in production. Maintenance plans are in place.	

In its draft contract, VAEL has proposed the following deliverables:

Table 4-2 – VAEL Proposed Deliverables

Deliverable	Description	Owner	Update Frequency	Notes
Project Charter	The Project Charter provides basic information about the project. It includes a: Scope Statement (what's in and out of scope); list of Project Deliverables; high level Project Timeline; Key Roles and Responsibilities; known Risks, Assumptions and/or Constraints. It shall be subject to State review and approval.	State PM	Once unless there are changes	
Project Schedule	A Schedule of project tasks organized by project Phase. Work Breakdown Structure development meetings will be held with the State PM and Contractor PM to ensure all project tasks – and associated time lines – are represented in the plan.	State PM	Update at least monthly	Contractor PM to provide updates to State PM to be incorporated into master schedule.
Implementation Schedule	A list of all implementation tasks (from kickoff through post-launch support) to be performed by Contractor.	Contractor	Updated as needed	Provided to State PM to incorporate into Project Schedule
Formal Acceptance	Obtain sign-off at the completion of each project deliverable as set forth in this Contract.	State PM	Once for each project deliverable	Relevant State stakeholders to provide sign-off

Deliverable	Description	Owner	Update Frequency	Notes
Change Requests Log	Tracks the specific change requests approved and their impact to the project scope, budget, and schedule.	State PM	As needed/ applicable	
Budget Log	Outlines original Contract costs by deliverable with billed and paid-to-date information. Log should also include any additional spending not included as part of the original Contract.	State PM	As needed/ applicable	Contractor to provide their budget updates to State PM
Issue/Action Items/Decision Log	A Log of open and resolved/completed Issues and Decisions.	State PM	As needed/ applicable	
Requirements	Finalized list of the project requirements to be approved by the State.	Contractor	Once unless there are changes	The State will formally accept the requirements
Test Plan	A description of the testing approach, participants, sequence of testing and testing preparations	State Project Members	Once	
Test Cases & Results	The specific test cases to be tested and the testing results. Test Cases tie back to the project requirements (to ensure each one has been met).	State Project Members	Create once then update with Results	State subject matter experts to support development of test cases
Project Status Reports	Provides an update on the project health, accomplishments, upcoming tasks, risks, and significant issues.	State PM	Biweekly	Contractor to provide relevant development updates to State PM

Deliverable	Description	Owner	Update Frequency	Notes
Implementation Status Reports	Status of the Contractor's implementation progress provided to the State PM; these updates will be incorporated into the Project Status Report that the State PM posts for all stakeholders.	Contractor	Biweekly	Delivered to State PM
Meeting Agenda/ Minutes	All scheduled meetings will have an agenda and minutes	State PM or Contractor	Once per meeting	Depending on who has called the meeting
Customer Satisfaction Survey	A survey to be completed by system users once they have had a chance to use the system for some reasonable period (~60 days). User feedback will inform the Lessons Learned and allow for a list of future phase Enhancement requests.	Contractor	Once	State resources to provide input into survey questions
Lessons Learned	A compilation of the lessons learned to have 20/20 hindsight	State PM	Once	

4.4   Project Phases, Milestones, and Schedule

> Provide a list of the major project phases, milestones, and high level schedule. You may elect to include it as an attachment to the report instead of within the body.

QSI proposed five stages in its proposal. The five stages as they were included in the vendor response are outlined below. VAEL updated the phase language in the draft contract in Exhibit 2 in order to more specifically define the expectations in the various phases. That language was not included in this report since it has not been reviewed or accepted by the vendor at this time.

Table 4-3 – QSI's five stages

Stage	Description
Stage I – Install the WinLIMS basic Software	The first Stage is the installation and familiarization by your staff members with the core WinLIMS software. This Stage is critical to the success of the project and is led by your team members. There are two goals to this Stage:
	Familiarize key staff members with the functionality and user interface of the core WinLIMS software: the more familiar you are with the core software, the more effectively you will define your site-specific requirements during the second Stage of the project. Since WinLIMS is a highly functional 'out of the box' application you can take this opportunity to reference your specific needs with the software's capabilities and possibly avoid customization in most areas altogether.
Stage II – Configuration Meetings	The second Stage is the definition of requirements which are unique to your installation. During this Stage, your team and key staff members will meet with QSI consultants to define any modifications which may need to be made. This includes changing database fields, defining additional tables, screens, functions and interfaces which will ensure that WinLIMS provides all of the benefits that you expect of the software.
	At this point it may be discovered that additional WinLIMS modules, options, additional tables and/or functions will be required which exceed the scope of the quoted standard implementation services. If this is the case, a summary of the non-standard functions and their associated costs will be defined to ensure that the addition of these unexpected items it within your budget.
Stage III – Configuration and Specification Document	QSI will deliver a Design Document(s), which describes each of the site-specific modifications that will be implemented, based on the configuration meetings previously held. Once received, your team will review the document to make sure that it accurately describes the desired screens, fields, and functionality. Your changes will be incorporated into new revision(s) of the document (if necessary). This process will continue until the document(s) properly describes your requirements. Your authorized representative will approve the document(s) and the modifications will begin. QSI cannot begin the configuration process until this document is approved, as this document will be used as the basis for subsequent acceptance testing.

Stage	Description
Stage IV – Familiarization and Feedback	Depending on the complexity of your configuration, (typically within a few weeks of approving the Design Document) a link to a QSI-hosted web site will be provided that will allow you to test the added features of the software in an environment that is convenient to both you and QSI. You will be able test the functionality to ensure that it conforms to the requirements set forth in your Design Document and report any deficiencies to the QSI staff. The QSI staff will be able to make changes in a rapid manner since we'll have full access to the environment. Modifications will be made until the software operates according to the Design Document. This iterative process is referred to as Familiarization and Feedback. Please note that during this Stage unexpected issues may arise. These can be due to requirements that were not precisely defined during the configuration meetings or new requirements discovered as a result of the on-going familiarization exercise. Usually these issues are minor and QSI will make every effort to implement most minor modifications without additional charges. Major changes will require additional charges, however. This is usually due to the impact that additional requirements have on how the software design was initially implemented. Once you're satisfied with the software's functionality, it will be installed on your server(s) during a remote session. This process usually takes about 1 hour. Please note that WinLIMS can be delivered as a VM (virtual machine) to simplify the integration into your architecture.
Stage V—Acceptance and Testing of Software	The Familiarization and Feedback process ends when all of the modifications have been made to your satisfaction and the software has been delivered to you. You may accept the software at this time and/or perform a formal acceptance test in order to ensure that the software is acceptable for use in your facilities. It is recommended that a formal 'conference room pilot' test of the application be performed. This is typically done over several days, with the oversight of the team members, during which all functionality is tested in simulated use. This pilot testing has the added benefit of familiarizing the users with the application functionality.

In addition, the vendor proposed a 52-week implementation schedule. As QSI is proposing an agile approach to the project, they did not attach specific dates to these activities but instead marked them by the number of weeks into the project they would begin and end. The full schedule can be found within the vendor's proposal and the proposed contract, but the high points are listed on the following page.

Table 4-4 – Project Schedule

Task Name	Notes	Responsibility
QSI Establishes Project Team	0 Week	QSI
QSI Proj. Mgr. establishes communication w/customer (Proj. Mgr/Proj. Team)	Week 1	QSI
Identify Key Staff	Week 1	State of Vermont

Task Name	Notes	Responsibility
QSI Installs WinLIMS Core Software	Week 2	QSI
QSI Familiarizes Customer w/Core Software	Week 2-4	QSI
Customer Delivers Results of Internal Work Review to QSI	Weeks 2 - 6	State of Vermont
QSI/Customer Conference Call to discuss Internal Work	Weeks 2 - 6	QSI & State of Vermont Together
Customer/QSI Familiarization (Sys. Adm/Proj. Mgr.)	Week 6 - 9	QSI runs thru software with State of Vermont.
Customer Familiarization Period (following Process Map)	Weeks 9 - 12	State of Vermont
QSI Starts on SOW / Working Prototype	Week 12	QSI
90-Day Warranty Ends (Support Contract Must be Picked Up)	Week 13	
QSI Delivers Scope of Work/Working Prototype	Week 16	QSI
Customer Accepts SOW/Working Prototype	Weeks 16 - 18	State of Vermont
Customer Documents Problems & Issues	Week 18	State of Vermont
Specification and Configuration	Weeks 19 - 30	QSI
QSI Delivers Specification Documents	Weeks 22 - 30	QSI
Customer Accepts Specification Documents	Weeks 24 - 32	State of Vermont
Review Instrument/Device Interface Requirements	Weeks 32 - 34	QSI & State of Vermont Together
Review & Document methods for Instrument Interface	Weeks 32 - 34	QSI & State of Vermont Together
Determine Output Type	Weeks 32 - 34	QSI & State of Vermont Together
Document output from Instrument	Weeks 32 - 34	QSI & State of Vermont Together
Capture output data sample	Weeks 32 - 34	State of Vermont
Document Instrument Function	Weeks 32 - 34	State of Vermont
Document required fields for LIMS mapping	Weeks 32 - 34	QSI & State of Vermont Together. State of Vermont identifies specific instrument-generated data items for each interface; State of Vermont and QSI agree

Task Name	Notes	Responsibility
		on which LIMS fields are best suited for those items to be mapped to.
Customization Period	Weeks 24 - 36	QSI
QSI Delivers Customizations	Weeks 30 - 40	QSI
Customer Accepts Customization	Week 32 - 42	State of Vermont
QSI Delivers Instrument Interface to Customer	Week 42 -44	QSI
Site Specific Documentation	Weeks 44 - 50	
Customer Accepts Instrument Interface/External Interface	Week 45	State of Vermont
Custom Customer Documentation Delivered	Week 52	QSI
Training	47	QSI supplies content including suitable instructors and training materials; QSI supplies suitable facilities when training is off-site. State of Vermont must attend.

In its draft contract, VAEL has also asked the vendor to fill out the following table.

Table 4-5 – VAEL Phase Descriptions

Phase	Estimated Dates	Phase Description
Project Initiation		Kick-off meeting, Planning, and preparation of project management planning documentation.
Customer workflow review		Contractor performs necessary requirements gathering to finalize functional and technical requirements and identify gaps between State requirements and Solution capabilities.
Customer /QSI familiarization - SOW development		Contractor installs and configures the Solution in a Test environment.

Phase	Estimated Dates	Phase Description
QSI – configuration and deployment of customizations		State subject matter experts perform Solution testing in in a test (not live) environment accordance with Contractor-developed Test plans.
Customer acceptance		Contractor performs training of State personnel (train the trainer or train the user).
Instrument interfacing		Contractor shall be responsible for fixing all Defects found during the Warranty Period. All Defects found within the Warranty Period, shall be corrected by Contractor at no additional cost to the State.
Site specific documentation / training		
Closeout		

In its draft contract, VAEL has proposed payment milestones at the following points of the contract.

Table 4-6 – Payment Milestones

Milestone	Payment
Project Initiation	$36,150
Customer workflow review	$59,375
Customer /QSI familiarization - SOW development	$35,541
QSI – configuration and deployment of customizations	$83,291
Customer acceptance	$65,325
Instrument interfacing	$49,250
Site specific documentation / training	$12,250
Closeout	RETAINER ($34,118)

5.0 Acquisition Cost Assessment

List all acquisition costs in the table below (i.e. the comprehensive list of the one-time costs to acquire the proposed system/service). Do not include any costs that reoccur during the system/service lifecycle. Add or delete lines as appropriate. Based on your assessment of Acquisition Costs, please answer the questions listed below in this section.

Table 5-1 – Acquisition Cost Assessment

Acquisition Costs	Cost	Comments
Hardware Costs	$0	
Software Costs	$211,400	Costs come from QSI proposal
Implementation Services	$131,250	Costs come from QSI proposal
Training	$12,250	Costs come from QSI proposal
Technical/State labor for project management	$60,000	Costs come from State ABC form (Technical Staff and State Labor for Project Management)
3% ADS estimate charge for EA and project oversight	$12,447	Calculated based on 3% of the sum of the above costs
IR	$23,000	BerryDunn proposal
Total Acquisition Costs	**$450,347**	

1. Cost Validation: Describe how you validated the Acquisition Costs.

- There are no hardware costs associated with the implementation
- Software Costs come from the QSI proposal ($211,400) and break down as follows:
    - Enterprise Application License Fees ($17,500)
    - License Fee Add-Ons (19 Additional Concurrent Licenses @$4,500/concurrent license) ($85,500)
    - WinLIMS modules ($35,000)
    - WinLIMS Instrument Interface Licenses ($44,000)
    - Support and Maintenance Fees ($29,400)
- Implementation Services Costs come from the QSI Proposal ($131,250)
- Training Costs come from the QSI Proposal ($12,250)
- Technical Staff/State labor costs for project management ($60,000) come from State IT ABC form
- 3% ADS Estimate Charge for EA and Project Oversight ($12,447) comes from a calculation of all one-time costs except the IR cost
- The IR cost ($23,000) comes from BerryDunn's proposal

2. Cost Comparison: How do the Acquisition Costs of the proposed solution compare to what others have paid for similar solutions? Will the State be paying more, less, or about the same?

VAEL did research prior to releasing its RFP. VAEL did release an RFI, which provided an idea of what VAEL would be paying for the new system. However, VAEL did not BAFO QSI before notifying QSI that it was the preferred vendor. VAEL may have missed an opportunity to drive down the preferred vendor's cost.

VAEL provided the costs from the six other vendors that proposed on the project. The analysis below examines the proposed costs and does not take the state costs of labor into account (which BerryDunn assumes would remain the same across all vendors). The proposed costs to implement the LIMS ranged from $107,680 to $615,294. QSI's implementation cost, $375,300 falls within this range. Over the five-year life cycle of the project, the prosed costs ranged from $269,664 to $989,648. Again, QSI's proposed solution falls in the middle, costing $509,400 over the five-year life cycle. Tables representing a sample of the costs are provided below.

Table 5-2 – Cost Comparisons

Vendor	Cost One-Year	Vendor	Cost Five-Year
Vendor 1	$107,680.00	Vendor 5	$269,664.00
Vendor 2	$178,547.00	Vendor 4	$296,059.63
Vendor 3	$203,888.00	Vendor 1	$436,083.00
Vendor 4	$230,621.88	**QSI**	**$509,400.00**
Vendor 5	$353,019.00	Vendor 2	$629,522.00
QSI	**$375,300.00**	Vendor 6	$845,470.00
Vendor 6	$615,294.00	Vendor 3	$989,648.00

One of the QSI references VAEL reached out to was the Massachusetts Division of Environmental Laboratory Sciences, which told VAEL that QSI was the least expensive option they had available. A search on GovWin found that the State of Oregon Department of Agriculture paid $360,000 to ATL for its new LIMS in 2017 for a three-year contract, which is less than QSI, although VAEL includes DEC labs as well. The $360,000 also is within the range of bids VAEL received for its new LIMS.

3. Cost Assessment: Are the Acquisition Costs valid and appropriate in your professional opinion? List any concerns or issues with the costs.

Based on the information above, the preferred solution is not the most expensive of those proposed. VAEL is paying a similar price to some of its peers. There are several concerns around cost, however. First, VAEL did not BAFO the preferred vendor, which means VAEL could be paying a greater cost than it might have otherwise. The lack of clarity around scope leaves the project open to cost overrun. For example, VAEL is unsure whether it will perform the

configuration of the tests, or whether the vendor will, which leaves the potential of savings open as well. VAEL has only recently decided not to migrate much of its data ($15,750 in QSI's proposal). Whether some of this cost can be transferred to another part of the project or can be used to lower the overall cost remains to be seen. The lack of clarity around the project scope should be resolved as quickly as possible so VAEL can be confident in the acquisition cost of its new LIMS.

Additional Comments on Acquisition Costs:

N/A

6.0 Technology Architecture Review

> After performing an independent technology architecture review of the proposed solution, please respond to the following.

1. **State's IT Strategic Plan:** Describe how the proposed solution aligns with each of the State's IT Strategic Principles:

    1) Leverage successes of others, learning best practices from outside Vermont

    2) Leverage shared services and cloud-based IT, taking advantage of IT economies of scale

    3) Adapt the Vermont workforce to the evolving needs of state government

    4) Apply enterprise architecture principles to drive digital transformation based on business needs

    5) Couple IT with business process optimization to improve overall productivity and customer service

    6) Optimize IT investments via sound project management

    7) Manage data commensurate with risk

    8) Incorporate metrics to measure outcomes

The QSI proposal includes a scalable, web-based solution that is hosted in the vendor's SOC 2-compliant data center. All of the vendor's proprietary software is built using modern languages (e.g., ASP.net), which are run on readily available and supported hardware and uses Service Oriented Architecture and http to connect to most modern browsers (e.g., Microsoft Internet Explorer, Firefox, Safari, Opera, etc. according to the vendor response).

The vendor is currently implementing the WinLIMS solution at the Commonwealth of Massachusetts, and references from that group have reported that QSI has delivered quality services up to this point. The vendor also has had successful implementations at the following governmental entities: Mine Safety Health Administration, Onondaga County, Ministry of Labour (Canada), City of Philadelphia Water Department, and Southwestern Energy.

The vendor has a cloud-based solution that it offers to its clients, which boasts a 99.999% guaranteed uptime. Additionally, in the response, QSI stated that its proprietary software has been scaled by large, multi-national corporations such as PepsiCo and Cabot.

The vendor does not use Project Management Institute methodology for software development. Instead, it uses an Agile and Test driven methodology, but it is also willing to comply with any needs of the State PM team. The vendor PM allocated to this project, Matt Citardi, has nearly 20 years of experience at QSI. During the reference checks for the vendor's response, it was discovered that another PM, James Gerry, was the lead PM for all of the references. BerryDunn

requested a reference at a project where Mr. Citardi was the prime PM, which QSI delivered. Please see the related risk for more details.

A representative of ADS has reviewed the technical architecture of the proposed system in the bidder response and reports no major risks associated with it.

2. Sustainability: Comment on the sustainability of the solution's technical architecture (i.e., is it sustainable?).

The solution is developed on common industry platforms, and the vendor has over 25 years of experience developing, implementing, and scaling its solutions for clients.

3. Security: Does the proposed solution have the appropriate level of security for the proposed activity it will perform (including any applicable State or Federal standards)? Please describe.

This solution meets the State's needs for security and data compliance, which were listed in the RFP, specifically ISO/IEC 17025 E. Additionally, the vendor has a documented process for handling any security incidents.

Access to the system is role-based and uses Microsoft Membership API, which can be integrated with Active Directory if the State chooses this solution.

4. Compliance with the Section 508 Amendment to the Rehabilitation Act of 1973, as amended in 1998: Comment on the solution's compliance with accessibility standards as outlined in this amendment. Reference: http://www.section508.gov/content/learn

BerryDunn confirmed via a follow-up email to the vendor that the solution is compliant with the Section 508 Amendment to the Rehabilitation Act of 1973, as amended in 1998.

5. Disaster Recovery: What is your assessment of the proposed solution's disaster recovery plan; do you think it is adequate? How might it be improved? Are there specific actions that you would recommend to improve the plan?

The disaster recovery (DR) solution included in the vendor's response has a lot of variability in its options, and the variability and lack of detail make it difficult to assess the DR plan for this solution. Specifically, the response states, "Frequency of backups and retention can be discussed based on the customer's need."

There is an associated risk logged in this report. In response to the risk that was documented, VAEL has added specific language in the contract (Exhibit 1) with more specific expectations around DR. Please see the risk register for more information.

6. Data Retention: Describe the relevant data retention needs and how they will be satisfied for or by the proposed solution.

The solution supports unlimited data storage, and the response does not specifically address auto-destruction functionality after a certain period. Additionally, there is a risk logged that VAEL does not specifically have a policy related to data retention periods for lab results.

7. Service Level Agreement: What are the post implementation services and service levels required by the State? Is the vendor proposed service level agreement adequate to meet these needs in your judgement?

As of this report, the Service Level Agreement (SLA) is targeted for 99.9% availability in the draft contract, and a credit mechanism is laid out if that SLA is not met. Attachment 8 also includes some of the service levels that QSI offers with its cloud hosting, but the SLAs and penalties have not been formally agreed upon by both parties as of the time of this report. This will be important to negotiate as part of the contract.

8. System Integration: Is the data export reporting capability of the proposed solution consumable by the State? What data is exchanged and what systems (State and non-State) will the solution integrate/interface with?

For the initial implementation, no additional integrations need to be built for any external systems. Post-implementation, there is interest in sending data to other systems such as a DEC database.

Internally, there is an instrument interface available as part of the solution to exchange data to and from instruments. The State infrastructure may not be able to support this feature of the solution, though QSI has experience setting up the interface with similar infrastructural constraints.

Additional Comments on Architecture:

N/A

7.0 Assessment of Implementation Plan

After assessing the Implementation Plan, please comment on each of the following.

1. The reality of the implementation timetable

QSI did not propose a timeline that connected dates to activities. Instead it chose to propose a 52-week timeline and connected activities to each of those weeks. This timetable provided is aggressive. There are a number of risks around the implementation schedule, many of which come from VAEL, including the move of the entire facility to an new lab more than 60 miles away from the current one and a busy summer season. It is very likely that, if QSI is unable to complete the implementation before summer of 2019, VAEL will have to wait an additional six to eight months to implement the timeline. These risks are outlined in greater detail in Section 12: Risk Register.

Additionally, the scope around who is in charge of configuring all the tests is unclear. This could have a large effect on the timeline. Whether VAEL or QSI configures all of the tests, the volume of tests and the complexity of some of them make the implementation of the system within one year very challenging.

The vendor has proposed a five-stage approach to the project. These stages (Install WinLIMS Basic Software, Configuration Meeting(s), Configuration and Specification Document, Familiarization and Feedback, and Acceptance Testing of Software) are described at a high level. BerryDunn recommends VAEL seek additional detail, in addition to adding dates to the project schedule. In a draft contract with QSI, VAEL has also created a table that asks QSI to provide the estimated dates to a more detailed list of activities. These dates, a condensed schedule, and details of each stage can be found in Section 4: Project Background.

2. Readiness of impacted divisions/departments to participate in this solution/project (consider current culture, staff buy-in, organizational changes needed, and leadership readiness).

Overall, VAEL's readiness for this project is mixed. There are positive indicators. VAEL has a small staff (14) and has informally identified key staff on the project. VAEL is also in the process of hiring several staff to perform duties to help these key staff devote more time to the project. Interviews with VAEL leadership indicated a clear desire to move to a new functional system. History with the current LIMS seems to have given VAEL resources additional motivation to move toward a new system. The many problems with Sample Master have been outlined in this document, and the opportunity to move to a system designed with both environmental and agricultural testing in mind provides additional, positive pressure to move toward a new system.

However, there are concerns around staff readiness. There is a lack of confidence around what is in scope for this project, namely the migration and/or configuration of the existing tests from the old system to the new system. If VAEL resources find that they have to put in additional effort they were not expecting to, it may dampen some of their enthusiasm for the project. Part

of the mitigation plan for this lack of clarity is for VAEL to define the expectations around configuration of existing tests in the new system in the contract.

Additionally, VAEL resources expressed that there may be some resistance to moving to a new LIMS on the part of their staff. They pointed to a failed LIMS implementation in 2011 – 2012 and that people are often resistant to change. The risks around both scope and staff buy-in are detailed in Section 12: Risk Register.

3. Do the milestones and deliverables proposed by the vendor provide enough detail to hold them accountable for meeting the Business needs in these areas?

QSI proposed a limited number of deliverables, few of which are relevant to the items below. Those that are will be noted in the appropriate heading. However, the draft contract prepared by VAEL does contain detailed deliverables related to the below headings. These deliverables, while not accepted by QSI, would hold them more accountable to the following items and would tie to deliverable payouts. A complete list of these deliverables, with descriptions, update frequency, and other notes can be found in Section 4.3.

A. Project Management

In the draft contract, VAEL laid out a number of deliverables related to project management with a detailed description and desired update frequency. These project management documents include a Project Charter, Project Schedule, Implementation Schedule, Budget, Change Request, issues and Action Item Log, and Status Reports. There is good detail surrounding these deliverables, with the caveat that QSI has not approved these deliverables.

B. Training

One of the seven deliverables outlined in QSI's proposal is "Initial Project Plan/Core System Training," included below.

Table 7-1 – QSI Training

Deliverable	Description
Initial Project Plan/Core System Training Initial Project Plan document showing a high-level project plan. Cloud Test Environment is built out, and introductory training of core application features in a cloud the test environment.	The project team will have "hands on" training of the WinLIMS Core system. The project team will have a review of the applications within WinLIMS. Project lead will send written acceptance of initial project plan.

This training does not appear to be the full training that the vendor also references in its proposal. In that proposal, QSI outlined four tiers of training it can offer "depending on the complexity of your site, some tiers may not need to be included in your training plans." These training tiers are more detailed, but VAEL should clearly outline what level of training it desires in any contract. In its draft contract, VAEL attached a payment to "Site Specific

Documentation/Training" worth $12,250 (the same cost proposed by QSI). A table with the detailed training levels can be found on the following page.

Table 7-2 – QSI's Training Levels

Tier	Description
1 - Self-teaching via WinLIMS Tutorial and Demonstration Data	Basic WinLIMS training is provided through the use of an example database (prototype) and a comprehensive tutorial. This approach allows users to guide themselves through the basic functionality and interaction with the WinLIMS application at their own pace. This approach has proven to be quite successful for most Windows applications and has been embraced by WinLIMS users.
2 - Personal Training (Remotely)	During the configuration process, the customer's assigned WinLIMS administrator and project team will be working closely with the QSI PM to define the system to fit the specific lab environment. During this process, the LIMS administrator and project team will, by necessity, learn the concepts, organization, and tools used by WinLIMS. In many cases, the LIMS administrator will become familiar enough with the system during this process to become functionally proficient in the use of WinLIMS.
3 - Training End Users (In-House or Remotely)	Once the system has been configured to meet the needs of the laboratory, the laboratory may opt to purchase end-user training. Here, a QSI PM will review the operation of the system using the configuration that was specifically designed for the laboratory. By using the end user's configuration, time is not wasted reviewing topics that are not applicable to the laboratory site. In addition, the number of students attending the training course is unlimited, so costs are reduced and productivity improved. The duration of in-house classroom training is two days and remote sessions will be dependent on the end-user functions being taught.
4 - WinLIMS Administrator Training (In-house, Off-Site or Remotely)	Should the WinLIMS administrator feel uncomfortable with the level of knowledge acquired during the configuration process, a formalized training session is offered at the QSI facility. Here, the focus of the training is on the system management functions that include general system architecture, database design, security access, screen modification, static table management, implementation options and Crystal Reports integration and basic report design. The duration of off-site WinLIMS administrator training is three days and it will include other WinLIMS users. It is strongly recommended that an alternate WinLIMS administrator attend this training session.

C. Testing

QSI did include a deliverable around testing. However, the below description indicates the importance of the Specification Document (designed in Stage III) is both for Testing and Design.

Table 7-3 – Testing Deliverable

Deliverable	Description
Product Configuration, Customization, Testing, and Production deployments. Task as described in the Specification Document. All Task Orders including the deliverable and acceptance criteria will be approved in writing by both the State of Vermont Project Lead and the QSI Project Lead.	The WinLIMS system will be configured by QSI based on the State of Vermont business requirements.

Stage V—Acceptance Testing of Software—is an important stage in this process and is included in the draft contract. VAEL has included detailed descriptions of a Test Plan and Testing Approach within its draft contract as well.

D. Design

The design and configuration portion makes up Stages 2 (Configuration Meeting(s)) and 3 (Configuration and Specification Document) of QSI's implementation plan. Design (Architect Solution) is in QSI's proposal under Implementation Services and is worth $15,750.

In its own draft contract, VAEL attached several payments to design-related paid deliverables. QSI – Configuration and Deployment of Customizations is the fourth deliverable in the project and is worth $86,291.70. The sixth deliverable is Instrument Interfacing, worth $49,250.

E. Conversion (if applicable)

QSI's proposal only mentions conversion in the context of converting data from existing lab instruments to WinLIMS. QSI's proposal states that information created by Instrument Systems are "easily consumed by WinLIMS." QSI also proposed a $15,750 cost associated with data migration. However, VAEL's proposed contract does not mention data conversion or migration. In meetings with VAEL, staff said that they do not intend to migrate legacy data, although they were unsure whether the tests currently used would be migrated by QSI or VAEL staff.

When considering the migration of data from the old to the new system, VAEL did not consider the feasibility of moving the assays/tests as part of that data migration. During the interview with QSI, BerryDunn learned that other labs have used these data migration services to move the majority of the tests from the legacy system to WinLIMS. If VAEL does not opt for this line item in the contract, then the level of effort for test configuration may be significantly higher.

F. Implementation Planning

QSI has proposed a five-stage Implementation Plan. These stages have been included in the draft contract and have been included in this document in Section 4.4. Additionally, the schedule included in the proposal provides the 52-week project timeline, but the stages are not incorporated. VAEL should push for the final project plan to include specific dates and events to specific stages.

G. Implementation

QSI provided three references in its proposal: two private labs and the Massachusetts Department of Environmental Protection. All references spoke positively about QSI. The two private labs were implemented successfully in 2016, while the Massachusetts lab is still being implemented. The vendor has implemented in laboratories, but it remains to be seen if the 52-week timeline for implementation is feasible, especially with the lack of clarity around scope.

4. Does the State have a resource lined up to be the PM on the project? If so, does this person possess the skills and experience to be successful in this role in your judgement? Please explain.

The proposed PM for this project is Naomi Hahr, who was hired by the State's Enterprise Project Management Office (EPMO) in November 2017. She will be monitored by EPMO staff as well. VAEL expects to spend $50,000 for her services, which works out to roughly 900 hours of her time over the course of the project. There is a risk around the hours allocated and the level of effort that BerryDunn estimates will be necessary based on the deliverables, which are the responsibility of the State of Vermont. That coupled with the PM's experience with state processes makes this a medium risk. This risk is outlined in greater detail in the risk register.

Additional Comments on Implementation Plan:
N/A

8.0 Cost Benefit Analysis

This section involves four tasks:

1) Perform an independent Cost Benefit Analysis. Information provided by the State may be used, but the reviewer must validate it for accuracy and completeness.

2) Provide a Lifecycle Cost Benefit Analysis spreadsheet as an **Attachment 1** to this report. A sample format is provided at the end of this report template.

 A. The cost component of the cost/benefit analysis will include all one-time acquisition costs, on-going operational costs (licensing, maintenance, refresh, etc.) plus internal costs of staffing and "other costs". "Other costs" include the cost of personnel or contractors required for this solution, enhancements/upgrades planned for the lifecycle, consumables, costs associated with system interfaces, and any costs of upgrading the current environment to accept the proposed solution (new facilities, etc.).

 B. The benefit side of the cost/benefit will include: 1. Intangible items for which an actual cost cannot be attributed. 2. Tangible savings/benefit such as actual savings in personnel, contractors, or operating expense associated with existing methods of accomplishing the work which will be performed by the proposed solution. Tangible benefits also include additional revenue which may result from the proposed solution.

 C. The cost benefit analysis will be for the IT activity's lifecycle.

 D. The format will be a column spreadsheet with one column for each year in the lifecycle. The rows will contain the itemized costs with totals followed by the itemized benefits with totals.

 E. Identify the source of funds (federal, state, one-time vs. ongoing). For example, implementation may be covered by federal dollars but operations will be paid by State funds.

3) Perform an analysis of the IT ABC form (Business Case/Cost Analysis) completed by the Business.

4) Respond to the questions/items listed below.

1. Analysis Description: Provide a narrative summary of the cost benefit analysis conducted. Be sure to indicate how the costs were independently validated.

To perform a cost-benefit analysis, BerryDunn used the QSI proposal, IT ABC form, and costs of the current solution, all of which were provided by VAEL. BerryDunn also used the costs from its IR. BerryDunn validated each cost figure through the following methods:

- Hardware Costs: There were no hardware costs. QSI is proposing a web-based solution and is hosting the solution.

- Software Costs: $211,400 for implementation comes from QSI's proposal. The $119,500 for ongoing support in the following four years comes from QSI's proposal—disaster recovery ($10,200 per year) and hosting fees ($10,200 per year)—and the cost of one additional year of Sample Master support ($17,500).

- Implementation Services Costs: The $131,250 cost comes from QSI's proposal and breaks down as Project Management ($15,750), Requirements ($15,750), Design-(Architect Solution) ($15,750), Development (Build, Configure, or Aggregate)/testing ($31,500), System Testing ($21,000), Implement/Deploy or Integrate ($10,500), Quality Management ($5,250), and Data Migration ($15,750). An implementation cost for the project life cycle—Ongoing Consultation after Implementation (non-maintenance)—will cost the state $52,500 in the following four years.

- Training: Training costs ($12,500) come from the QSI proposal.

- Personnel Costs: The $60,000 cost for Technical Staff/State Labor for Project Management comes from the VAEL's IT ABC form. Additionally, the $80,000 of State Labor to maintain the solution in the first year comes from the IT ABC and are costs for the maintenance of Sample Master, since it will not be live until 2019. The $40,000 cost for 2019 – 2022 represents WinLIMS going live at that time and being supported by State staff. This cost can be found in the IT ABC form as well, but is the cost of maintaining the proposed solution.

- The $12,447 cost for the ADS estimated charge for EA and Project Oversight (3% of acquisition costs) is a calculation that takes 3% of all implementation costs except for the cost of the independent review. Finally, the $23,000 comes for the IR comes from BerryDunn's contract.

A detailed breakdown of these costs can be found in Attachment 1.

2. Assumptions: List any assumptions made in your analysis.

- This is a five-year life cycle in which implementation of WinLIMS is not completed until 2019.
- The implementation period is separate from maintenance and support life cycle for the purposes of cost calculation.
- The maintenance costs in 2018 are for the current solution.
- The cost to maintain the current solution does not change over the five-year period.
- VAEL accepts the QSI proposal as is. As such QSI:
  - Migrates data (cost of $15,750)
  - Provides licenses for 22 lab instruments

3. Funding: Provide the funding source(s). If multiple sources, indicate the percentage of each source for both Acquisition Costs and ongoing Operational Costs over the duration of the system/service life cycle.

VAEL intends to pay for WinLIMS with state funds.

4. Tangible Costs and Benefits: Provide a list and description of the tangible costs and benefits of this project. It is "tangible" if it has a direct impact on implementation or operating costs (an increase = a tangible cost, and a decrease = a tangible benefit). The cost of software licenses is an example of a tangible cost. Projected annual operating cost savings is an example of a tangible benefit.

The largest single cost of moving to the new system is the costs of implementing the new system, costs which VAEL would not have to pay if it were not to move to a new solution. The software will cost the VAEL $211,400 to purchase WinLIMS, and its associated licenses, modules, and interfaces. There is an additional $131,250 cost from QSI for the actual implementation project as well. There is another cost for training ($12,250). Finally, there are the State-associated costs for project management: between the IR, the ADS estimated costs, and technical staff needed to implement and manage the project, VAEL will pay an additional $95,447 in the first year.

The vendor-quoted costs to support the proposed solution are higher than the proposed solution from 2018 – 2020, but lower in 2021 and 2022. In 2018, VAEL will be paying to both support Sample Master ($17,500) and WinLIMS servers ($20,400), and will still have to use State resources to support Sample Master (estimated at $80,000). In 2018, VAEL will be paying $20,400 more to support the system than it would today due to the WinLIMS hosting and DR services. WinLIMS support the following four years also has the added cost of ongoing consultation, which ranges from $15,750 in 2019 to $7,875 in 2022. This means the vendor costs to support the solution are higher in 2019 and 2020, but only by $150. In 2021, VAEL will save $2,475 on software acquisition and support costs, and $7,725 in 2022. Overall, VAEL will spend $346,900 on Software Acquisition, Maintenance, and Support of WinLIMS.

VAEL labor to support the solution is a tangible benefit to VAEL. VAEL estimates it uses the equivalent of $80,000/year in State labor to support the Sample Master. It also estimates that, due to the technical improvements of WinLIMS, it will only use the equivalent of $40,000 in State labor a year. However, in 2018, Sample Master is assumed active, and that fact combined with the use of State staff and contractors to implement the project, means that professional service costs will be $95,447 more in 2018. However, VAEL will save $40,000 a year the remaining four years, saving VAEL an estimated $64,553 over the lifetime of WinLIMS.

When tangible costs are tallied, VAEL will spend an estimated $282,347 more on WinLIMS over a five-year period than it would had it remained using Sample Master. However, VAEL does begin saving money at an increasing amount, both on software/maintenance and labor to operate the software, at the end of the life cycle.

5. Intangible Costs and Benefits: Provide a list and descriptions of the intangible costs and benefits. It is "intangible" if it has a positive or negative impact but is not cost related. Examples: customer service is expected to improve (intangible benefit) or employee morale is expected to decline (intangible cost).

A number of intangible benefits are associated with the WinLIMS system. As discussed in the project background, Sample Master is broken in many ways. Staff have to physically install patches and updates on every system and cannot just send updates. Sample Master does not work reliably on the State resources such as Microsoft Office. VAEL currently has to do much of its work outside LIMS on separate spreadsheets and in SharePoint. Reports also have to be created custom by VAEL staff and do not always work properly. Finally, Sample Master has been so heavily customized (often to create reports) that every time a new version is released, VAEL loses any functionality it has custom built, and those customizations have to be created again. WinLIMS is a new solution, without the many customizations that create difficulty for VAEL staff. For VAEL, having a functional solution that performs activities like reporting and works with staff office programs will be a major benefit.

WinLIMS is also a new system that will allow for additional functionality the State currently does not have with Sample Master but that comes with a more modern system. WinLIMS will allow the state to import from lab equipment without the use of Excel parsers. This is a time savings. VAEL will also have dashboards available in the new systems so staffers can better monitor their work. Queries can be saved for reporting. Audit trails will be improved. VAEL will be able to send its reports to more than one client at a time.

While it is hard to attach a price to these benefits, having a working LIMS system will be helpful to VAEL staff and likely save time and effort on the part of the laboratory staff. It will also reduce the strain on IT resources who currently have to support the staff. The new system will also put additional tools at VAEL's disposal.

6. Costs vs. Benefits: Do the benefits of this project (consider both tangible and intangible) outweigh the costs in your opinion? Please elaborate on your response.

Based on tangible costs, the switch to WinLIMS will be $282,347 more expensive over the five-year life cycle of the product than if VAEL stayed with Sample Master as its LIMS. However, Sample Master currently imposes constraints on VAEL from a technical perspective (customizations become obsolete every upgrade) and a functional perspective, and lifting those constraints will likely allow VAEL to operate in a more efficient manner. The benefits of having a modern, working solution outweigh the higher costs associated with it.

7. IT ABC Form Review: Review the IT ABC form (Business Case/Cost Analysis) created by the business for this project. Is the information consistent with your IR and analysis? If not, please describe. Is the life cycle that was used appropriate for the technology being proposed? If not, please explain.

The costs for the proposed solution in the IT ABC form are much higher than QSI's proposal ended up being. The IT ABC form predicted a total life cycle cost of $1,764,500 over the five-year life cycle. The total cost of WinLIMS over its five-year life cycle as calculated in this IR is $872,347. The total implementation costs—estimated in the IT ABC Form to be $900,500—were only $450,347. The largest departure within this area was the "Configuration/Installation/Implementation" section, which the IT ABC form estimated to be $650,000 but was only $143,500 ($131,250 for Implementation Services and $12,500 for training). However, actual software costs—estimated at $130,000 in the IT ABC form—were higher ($211,400).

Actual support costs also differ significantly from the IT ABC form. VAEL estimated it would spend approximately $127,000 per year to maintain the solution. The actual support costs started relatively close to this figure ($119,900 in 2018), but over time decrease to $70,275.

The five-year life cycle, while consistent between the IT ABC form and the RFP, does draw some questions. The current solution has been in use by a portion of VAEL since 2004. Other agencies within the state have had LIMS for periods longer than five years as well. However, given the long-term problems with Sample Master, this may have been too long of a life cycle. Despite this, VAEL may consider a longer life cycle for its LIMS.

Additional Comments on the Cost Benefit Analysis:

N/A

9.0 Impact Analysis on Net Operating Costs

> 1.) Perform a lifecycle cost impact analysis on net operating costs for the agency carrying out the activity, minimally including the following:
>
> a) Estimated future-state ongoing annual operating costs, and estimated lifecycle operating costs. Consider also if the project will yield additional revenue generation that may offset any increase in operating costs.
>
> b) Current-state annual operating costs; assess total current costs over span of new IT activity lifecycle
>
> c) Provide a breakdown of funding sources (federal, state, one-time vs. ongoing)
>
> 2.) Create a table to illustrate the net operating cost impact.
>
> 3.) Respond to the items below.

1. Insert a table to illustrate the Net Operating Cost Impact.

The life cycle cost analysis is included in the table on the next page. It includes both current- and future-state costs. The figures were obtained from our analysis of documents provided.

Table 9-1 – Life Cycle Cost

Impact on Operating Costs	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	5-Year Totals
Professional Services (Non-Software Costs)						
Current Costs[1]	$80,000	$80,000	$80,000	$80,000	$80,000	**$400,000**
Projected Costs[2]	$175,447	$40,000	$40,000	$40,000	$40,000	**$335,447**
Software Acquisition, Maintenance, Support, and Licenses Costs						
Current Costs[1]	$38,000	$38,000	$38,000	$38,000	$38,000	**$190,000**
Projected Costs[3]	$394,800	$38,150	$38,150	$35,525	$30,275	$536,900
Baseline Current Cost[1]	$118,000	$118,000	$118,000	$118,000	$118,000	
Baseline Projected Costs	$570,247	$78,150	$78,150	$75,525	$70,275	
Cumulative Current Costs[1]	$118,000	$236,000	$354,000	$472,000	$590,000	$590,000
Cumulative Projected Costs	$570,247	$648,397	$726,547	$802,072	$872,347	$872,347
Net Impact on Professional Services	($95,447)	$40,000	$40,000	$40,000	$40,000	**$64,553**
Net Impact on Software Acquisition, Maintenance, Support, and Licenses Costs	($356,800)	($150)	($150)	$2,475	$7,725	**($346,900)**
Net Impact on Operating Costs:	($452,247)	$39,850	$39,850	$42,475	$47,725	**($282,347)**
1. Comes from Quality Systems International Corporation Proposal						
2. Comes from State Business Case						
3. Calculated by BerryDunn						
4. Comes from BerryDunn proposal for IR						

2. Provide a narrative summary of the analysis conducted and include a list of any assumptions.

For the purpose of impact analysis of net operating costs, BerryDunn applied the following assumptions:

- This this table compares current and projected costs to determine a net difference; therefore, the projected costs for remaining the same are placed against projected costs for a new solution
- The ADS estimated charge for EA and Project Oversight cost, and the IR cost, and Professional Services operating costs in FY 2018
- This is a five-year life cycle
- VAEL will continue to pay for Sample Master Support in Year 1 (2018)
- VAEL implements every item QSI proposed

This analysis determines that VAEL will pay an additional $282,347 in operating costs for the proposed LIMS over a five-year period. The overall implementation costs ($450,347) are costs that VAEL would not otherwise have to pay. The maintenance and operations of the system will be roughly the same for the first three years of the life cycle (VAEL will still be paying for Sample Master support in 2018 and will pay $150 more per year in 2019 and 2020) but becomes less expensive toward the end of the life cycle ($2,475 in savings in 2021 and $7,725 in 2022). Despite these savings, VAEL will not make up for the cost of the initial implementation in the five-year life cycle.

3. Explain any net operating increases that will be covered by federal funding. Will this funding cover the entire life cycle? If not, please provide the breakouts by year.

The project will be entirely paid for from State funds.

4. What is the break-even point for this IT Activity (considering implementation and ongoing operating costs)?

There is no break-even point for this project. While in every year following 2018, VAEL will save between $37,850 and $45,725, the high implementation costs ($450,347) and five-year life cycle mean that VAEL will not break even on this project in the five-year life cycle. The graphic on the page below shows the projected cumulative costs for both the current and proposed solutions.

Figure 9-4 – Cumulative Current and Cumulative Projected Costs

Cumulative Current and Cumulative Projected Costs
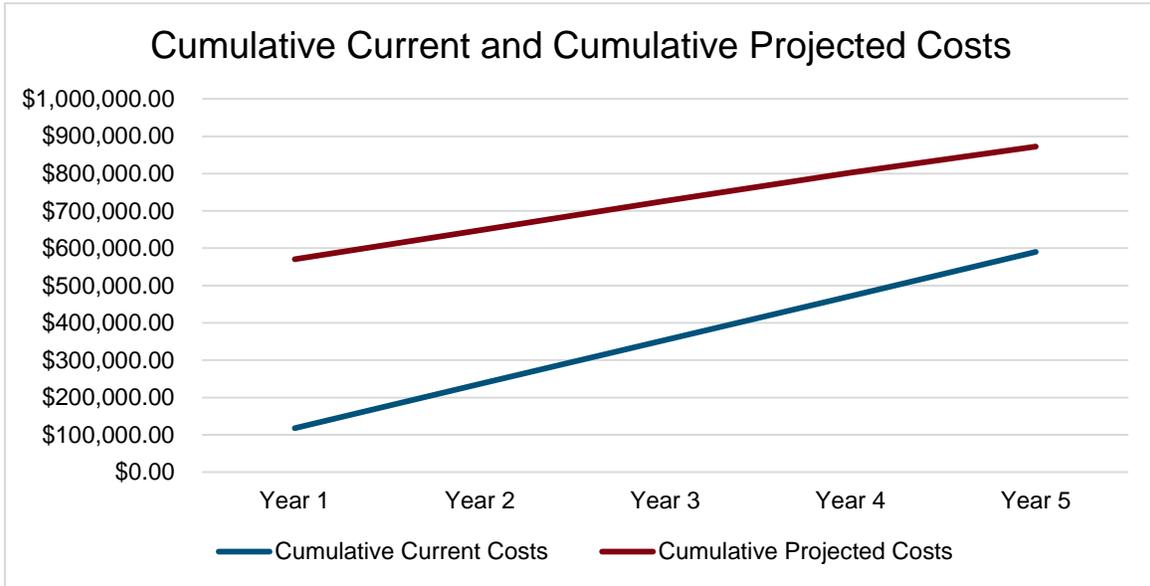
10.0 Risk Assessment & Risk Register

Perform an independent risk assessment and complete a Risk Register. The assessment process will include performing the following activities:

A. Ask the independent review participants to provide a list of the risks that they have identified and their strategies for addressing those risks.

B. Independently validate the risk information provided by the State and/or vendor and assess their risk strategies.

C. Identify any additional risks.

D. Ask the Business to respond to your identified risks, as well as provide strategies to address them.

E. Assess the risks strategies provided by the Business for the additional risks you identified.

F. Document all this information in a Risk Register and label it Attachment 2. The Risk Register should include the following:

- *Source of Risk: Project, Proposed Solution, Vendor or Other*

- *Risk Description: Provide a description of what the risk entails*

- *Risk ratings to indicate: Likelihood and probability of risk occurrence; Impact should risk occur; and Overall risk rating (high, medium or low priority)*

- *State's Planned Risk Strategy: Avoid, Mitigate, Transfer or Accept*

- *State's Planned Risk Response: Describe what the State plans to do (if anything) to address the risk*

- *Timing of Risk Response: Describe the planned timing for carrying out the risk response (e.g. prior to the start of the project, during the Planning Phase, prior to implementation, etc.)*

1. Reviewer's Assessment of State's Planned Response: Indicate if the planned response is adequate/appropriate in your judgment and if not what would you recommend.

Additional Comments on Risks:

The risks identified during this independent review can be found in the Risk Register in Section 12 of this report. The timing of the provided risks is either "prior to contract execution" or "subsequent to contract execution." For those for which a "prior to contract execution" timing is recommended, BerryDunn suggests that the entire contract be reviewed by a team of professionals with experience in reviewing contracts. This review can be multi-facetted: one team could focus on the legal components of the contract (i.e., the terms and conditions); a separate team could be engaged to review the statement of work, schedule, milestones, and deliverables described within the contract. These reviews could be accommodated using VAEL staff with contract experience, by engaging ADS, or by leveraging an external firm.

11.0 Attachment 1 – Life Cycle Cost Benefit Analysis

Table 11-1 – Life Cycle Cost Benefit Analysis

Description	Initial Implement-ation	Maintenance	Maintenance	Maintenance	Maintenance	Maintenance	
Fiscal Year	**FY 2018**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Total**
Hardware							
Equipment and Supplies	$0	$2,000	$2,000	$2,000	$2,000	$2,000	$10,000
Hardware Total	$0	$2,000	$2,000	$2,000	$2,000	$2,000	$10,000
Software[1]							
Enterprise Application License Fees	$17,500	$0	$0	$0	$0	$0	$17,500
Maintenance and/or License Fee Add-Ons (19 Additional Concurrent Licenses @$4500/concurrent license)	$85,500	$0	$0	$0	$0	$0	$85,500
WinLIMS modules	$35,000	$0	$0	$0	$0	$0	$35,000
WinLIMS Instrument Interface Licenses	$44,000	$0	$0	$0	$0	$0	$44,000
Support and Maintenance Fees	$29,400	$0	$0	$0	$0	$0	$29,400

Description	Initial Implement-ation	Maintenance	Maintenance	Maintenance	Maintenance	Maintenance	
Disaster recovery server (Replicated)	$0	$10,200	$10,200	$10,200	$10,200	$10,200	$51,000
Hosting	$0	$10,200	$10,200	$10,200	$10,200	$10,200	$51,000.00
Sample Master Gold Support[5]	$0	$17,500	$0	$0	$0	$0	$17,500
Software Total	$211,400	$37,900	$20,400	$20,400	$20,400	$20,400	$330,900
Training[1]							
Training	$12,250	$0	$0	$0	$0	$0	$12,250
Training Total	$12,250	$0	$0	$0	$0	$0	**$12,250**
Other[1]							
Implementation Services	$131,250	$0	$0	$0	$0	$0	$131,250
Ongoing Consultation After Implementation (non-maintenance)	$0	$0	$15,750	$15,750	$13,125	$7,875	$52,500
Other Total	$131,250	$0	$15,750	$15,750	$13,125	$7,875	**$183,750**
Personnel – Additional							
Technical Staff/State Labor for Project Management[2]	$60,000	$0	$0	$0	$0	$0	$60,000

Description	Initial Implement-ation	Maintenance	Maintenance	Maintenance	Maintenance	Maintenance	
3% ADS Estimated Charge for EA and Project Oversight[3]	$12,447	$0	$0	$0	$0	$0	$12,447
Independent Review[4]	$23,000	$0	$0	$0	$0	$0	$23,000
State Labor to operate and maintain the Solution[2]	$0	$80,000	$40,000	$40,000	$40,000	$40,000	$240,000
Personnel Total	$95,447	$80,000	$40,000	$40,000	$40,000	$40,000	**$335,447**
Total	**$450,347**	**$119,900**	**$78,150**	**$78,150**	**$75,525**	**$70,275**	**$872,347**
1: Comes from Quality Systems International Corporation Proposal							
2: Comes from State Business Case							
3: Calculated by BerryDunn							
4: Comes from BerryDunn proposal for IR							

![BerryDunn logo]

12.0 Attachment 2 – Risk Register

Data Element	Description
Risk #	Sequential number assigned to each risk to be used when referring to the risk.
Risk Probability/Impact/ Overall Rating	Two-value indicator of the potential impact of the risk if it were to occur, along with an indicator of the probability of the risk occurring. Assigned values are high, medium, or low.
Source of Risk	Source of the risk, which may be the Project, Proposed Solution, Vendor, or Other.
Risk Description	Brief narrative description of the identified risk.
State's Planned Risk Strategy	Strategy the State plans to take to address the risk. Assigned values are Avoid, Mitigate, Transfer, or Accept.
State's Planned Risk Response	Risk response the State plans to adopt based on discussions between State staff and BerryDunn reviewers.
Timing of Risk Response	Planned timing for carrying out the risk response, which may be Prior to Contract Execution or Subsequent to Contract Execution.
Reviewer's Assessment of State's Planned Response	Indication of whether BerryDunn reviewers feel the planned response is adequate and appropriate, and recommendations if not.

Risk #: R1	Risk Likelihood/Probability: High	Risk Impact: High	Overall Risk Rating: High
Source of Risk: Vermont Agriculture and Environmental Laboratory (VAEL)			
VAEL has limited resources to put toward the project. VAEL has 14 staff, and the project will require a great deal of effort from two staff members in particular who also currently have roles in the lab. The entire staff will have to document their processes and be involved in the project while performing their regular duties. Additionally, IT resources are also limited for this project. Hunter Thompson, the IT director for the Department of Agriculture, will be involved in the project, but there is no one who has as much expertise if he were to leave. The one-year proposed implementation schedule would mean VAEL would struggle to find a replacement. If any staff left the agency, let alone the three staff mentioned above, VAEL would be at a disadvantage in trying to implement the project. Specifically, this could lead to an increase in the schedule and cost, and potentially a loss of clarity around the scope of the project.			
State's Planned Risk Strategy: Accept/Mitigate			
State's Planned Risk Response: VAEL accepts that it has limited resources but has identified the key staff it will need for the project and will cross-train staff/hire temporary staff to fill in the positions of those key staff.			
Timing of Risk Response: Subsequent to Contract Execution			

Reviewer's Assessment of State's Planned Response: VAEL understands its limitations, and it is true that projects can add pressure to an agency. However, VAEL appears to know the steps it needs to take to make sure that the key staff on the project remain focused on the project.

Risk #: R2	Risk Likelihood/Probability: Low	Risk Impact: High	Overall Risk Rating: Medium

Source of Risk: Lab Information Management System (LIMS) Vendor

Risk Description: Vendor resource depth is a concern.

In its calls to references, VAEL found QSI to be highly spoken of. However, the one name mentioned by all the references was James Gerry, one of three proposed project managers (PMs). The vendor has informed BerryDunn that Mr. Gerry will not be the prime PM for this project. There are concerns that not getting Mr. Gerry as the PM for the LIMS implementation could mean VAEL will not receive the same level of service from QSI that the references received.

State's Planned Risk Strategy: Mitigate

State's Planned Risk Response: VAEL has added language to the contract stating they can demand a new PM if needed. VAEL also has received references for QSI's proposed PM for the LIMS project and will follow up with those references to understand the PM's qualifications.

Timing of Risk Response: Prior to Contract Execution

Reviewer's Assessment of State's Planned Response: VAEL should call the references for the proposed PM to see if he is as highly spoken of as Mr. Gerry. No matter the outcome of these calls, VAEL should try to keep the language that would allow VAEL to demand a new PM if needed. These actions should help make sure VAEL has the resources it needs from QSI in this project.

Risk #: R3	Risk Likelihood/Probability: Medium	Risk Impact: High	Overall Risk Rating: High

Source of Risk: VAEL & LIMS Vendor

Risk Description: There is unclear understanding of how the cloud-based solution will interface with the configuration of the lab equipment to maximize all of the functionality of the solution.

VAEL is unsure that its lab equipment will be able to interface with the preferred system, as described in the vendor's proposed solution due to state security limitations. This could impact the effectiveness of the solution, as this interface is an important feature of QSI's solution. State efforts to determine the feasibility of this interface could delay contract negotiations and leave questions around cost.

State's Planned Risk Strategy: Accept

State's Planned Risk Response: This risk cannot be fully mitigated until completion of the new VAEL lab. ADS staff will engage an EA to discuss solutions and methods to isolate VAEL control equipment while maintaining internet connectivity.

Timing of Risk Response: Subsequent to Contract Execution

Reviewer's Assessment of State's Planned Response: VAEL appears to understand its limitations with instruments, and is mindful it will have to focus on this risk throughout the project.

Risk #: R4	Risk Likelihood/Probability: High	Risk Impact: High	Overall Risk Rating: High

Source of Risk: VAEL

Risk Description: VAEL is moving to Randolph, which is over 60 miles from Burlington.

The State is moving VAEL from its current location, Burlington, to Randolph. The move is due to happen sometime in late 2018 or 2019 and will interrupt regular VAEL activities as personnel and equipment are moved. This move will certainly have an impact on the project. At the very least it will take some time for staff to make the move and return to normal work, let alone maintain involvement in the project. This is a potential schedule and cost risk. There is also the risk that the building has network issues that may impact VAEL's ability to connect to the new solution. Finally, there is a risk that some staff may choose to not make the move, as it would be a major change for them, which, combined with VAEL's limited staff and concentrated subject matter expertise, would have a major impact.

State's Planned Risk Strategy: Accept

State's Planned Risk Response: The lab's two LIMS experts will be making the move to Randolph, so there is no risk in losing crucial team members. Also, lab personnel are not expected to be heavily involved in the actual physical moving. It is more likely that their involvement will be in setting up lab workstations, which should only take one to two days to complete.

Timing of Risk Response: Subsequent to Contract Execution

Reviewer's Assessment of State's Planned Response: VAEL is changing locations and does not control the time it will move. It has accounted for the key staff on the project but should make sure the vendor is prepared for the impact of the move, even if the impact on staff is only a few days.

Risk #: R5	Risk Likelihood/Probability: High	Risk Impact: Medium	Overall Risk Rating: Medium

Source of Risk: LIMS Vendor

Risk Description: The vendor is offering a 90-day warranty on its hardware/software, and not on its services.

The vendor implementation plan provided by QSI states that the warranty period for hardware and software ends 90 days into the project. Since the implementation and customization services are not warrantied, it could result in VAEL's acceptance of a product, including deliverable payout, which may be deemed unusable by the lab. It also limits VAEL's ability to push back against solution issues, which could negatively impact schedule, scope, and cost.

State's Planned Risk Strategy: Mitigate

State's Planned Risk Response: VAEL has included the following language on the contract:

"QSI warranties the System as described in "QSI-Maintenance-Contract" attachment. QSI warranties all customizations and documentation as described in Section 5.2 for 90 days after acceptance as described in Section 5.2 (Customer Accepts Instrument Interface/External Interface)."

Timing of Risk Response: Prior to Contract Execution

Reviewer's Assessment of State's Planned Response: VAEL has sufficiently addressed this risk through the contract language that was included. It should ensure that the language remains and is not diluted as part of the contract review and negotiation.

Risk #: R6	Risk Likelihood/Probability: Medium	Risk Impact: High	Overall Risk Rating: High

Source of Risk: VAEL & LIMS Vendor

Risk Description: If the project is not live by the end of spring 2019, it could mean a six- to eight-month delay in the final implementation due to seasonal testing increases at VAEL.

The proposed vendor timeline, 52 weeks, is a very tight timeframe for VAEL. VAEL has limited availability during the summer season due to seasonal increases in testing, and if the project starts in late spring/early summer 2018, it means that any delay could cause a much larger delay at the end of the project, as VAEL is not able to go-live with a new system during its busy summer months. This could stretch out the implementation by six to eight months and cause an increase in cost for VAEL.

State's Planned Risk Strategy: Mitigate

State's Planned Risk Response: Two areas of the lab are affected by this (Nutrients and Wet labs). They can be set up first, before the busy season.

Additionally, the key project staff are not heavily involved in the seasonal work impacted by this timeframe, meaning they will still have ample capacity to focus on the LIMS integration. Also, there is sufficient time in the day to both test and work on other projects, as many sample tests are started and take several hours to complete, allowing a wait period for other work to occur. Additionally, there could be the option for a phased rollout to end users (by the lab). VAEL anticipates running the new software in a test environment prior to going live, so there is an option to deploy the functionality to users during less busy times, alleviating setbacks due to busy, seasonal work.

Timing of Risk Response: Subsequent to contract execution

Reviewer's Assessment of State's Planned Response: VAEL does not seem concerned about the amount of work and believes it has backfilled for the most impacted staff. Trying to complete the affected labs before its busy season is an appropriate response, but VAEL should make sure that the vendor is aware of this and willing to configure for the Nutrients and Wet labs first prior to the summer.

Risk #: R7	Risk Likelihood/Probability: High	Risk Impact: High	Overall Risk Rating: High

Source of Risk: VAEL & LIMS Vendor

Risk Description: The scope around who will be configuring the tests in the new system is not fully defined.

A key aspect of the project is configuring the tests that VAEL currently runs into the new system. At this moment, VAEL is not sure who is responsible for configuring the existing tests into the new system. If VAEL is expected to configure the tests, then it has to be prepared to put in significant resources to make sure that this task is completed. It also makes training even more important. If VAEL expects the vendor to perform this task and the vendor has not accounted for this expectation in the proposed implementation plan, then it may lead to a major increase in cost and timeline. A misunderstanding around this part of the scope could have significant negative impacts on the project.

State's Planned Risk Strategy: Accept/Mitigate

State's Planned Risk Response: The lab has historically taken on this work and expects to configure its methods within the new system as well. One of the lab analysts dedicated to this project has been doing this, and it is part of her day-to-day assignment, so for her to configure the testing with QSI's software does not change the scope of her responsibility. Contractually, VAEL expects that QSI will configure

templates that VAEL staff will use to configure state-specific methods and procedures, as well as set up reporting. The state will remain responsible for configuring the methods, per the current process.

Additionally, QSI added:

"This falls under the responsibility of both VAEL and QSI. Any manual entry of samples types, test, and methods would be handled by VAEL but if any of that data is being migrated from another system or spreadsheets, QSI will handle that as part of data conversion/migration services. What are referencing during those weeks are configuration of the specific menus and templates that will be set up so that sample types, methods, tests, etc. can be entered into the system."

VAEL will also be adding more specific language around the configuration of the tests, requesting that a specific number of tests will need to be built by QSI and fully functional as part of the tasks for Weeks 19 – 30 in the implementation plan.

Timing of Risk Response: Prior and Subsequent to Contract Execution

Reviewer's Assessment of State's Planned Response: VAEL seems to better understand its role here and has come up with a plan to hold QSI accountable for completion of a majority of the work. This is an acceptable mitigation strategy, although it appears VAEL also accepts that its staff will be doing some portion of the work.

Risk #: R8	Risk Likelihood/Probability: Medium	Risk Impact: Medium	Overall Risk Rating: Medium

Source of Risk: VAEL

Risk Description: VAEL is unsure of its records retention policy.

VAEL has to make a decision over what it will do with legacy data. It is aware that it needs to hold onto data for a number of years but is unable to find its records retention policy, specifically as it relates to lab data. Not knowing the length of time it needs to retain the data could lead to VAEL paying to migrate and/or store more data than it needs to, which would unnecessarily increase cost and schedule. It could also lead to VAEL purchasing more years of service on the legacy system as a data backup than necessary, resulting in additional costs for the State.

State's Planned Risk Strategy: Accept

State's Planned Risk Response: Different sections of the lab will retain records based on their accreditation requirements by the regulatory bodies (e.g., TNI, NELAC, FDA, NATTS, and USDA). VAEL is working on documenting a formal policy specifically around lab data with AAFM (Agency of Agriculture). VAEL has also informed its clients that SampleMaster is going to be shut down soon, so they need to pull the data off per their records retention policy.

Timing of Risk Response: Ongoing

Reviewer's Assessment of State's Planned Response: Given that VAEL works with many different stakeholders, there is more than one records retention policy. Notifying their clients and informing them that they will need to download and retain their own data removes this complication from this the project.

Risk #: R9	Risk Likelihood/Probability: Medium	Risk Impact: Medium	Overall Risk Rating: Medium

Source of Risk: LIMS Vendor

Risk Description: QSI's proposal around disaster recovery is variable.

Risk #: R9	Risk Likelihood/Probability: Medium	Risk Impact: Medium	Overall Risk Rating: Medium

When asked in their proposal to describe their disaster recovery plan, QSI answered the following:

"Various disaster recovery (DR) plans are available. We can offer a cold, warm or hot DR, based on your Recovery Time Objective (RTO), Recovery Point Objective (RPO) and budget."

An unclear disaster recovery plan puts the project and, ultimately, the solution, at risk of not meeting State requirements around disaster recovery. If VAEL were to push for changes in disaster recovery policy midway through the project, it could come with additional costs to VAEL.

State's Planned Risk Strategy: Mitigate

State's Planned Risk Response: VAEL and ADS added language to Exhibit 1 of the contract stating the following:

"QSI schedules daily backups to the shared backup devices. Backups are monitored and checked for errors, and regularly scheduled tests of the restoration procedures are performed. Backup copy retention time is seven (7) days. QSI does not warrant, however, that a valid backup is available for every day of this 7 day period, as applicable. If a disruption of the Service occurs, QSI will assign its highest priority and will make its best commercial efforts to ensure the timely restoration of the Service within 4 hours. Depending on the type of disruption that has occurred, QSI may elect to first restore the Service without the data. Any data not immediately accessible after a disruption in the Service will be restored from the most recent backup and made accessible with QSI's highest priority. In order to ensure the readiness of QSI's operators to complete the offline restoration process, QSI runs frequent drills to test restoration performance. QSI is not liable for data loss resulting from the failure or loss of backup media."

That language coupled with the "Service Unavailability Credits" in the "QSI Corporation Master Cloud Services Agreement with Customer" mitigates the ambiguity in the disaster recovery solution of the vendor's response.

Timing of Risk Response: Prior to Contract Execution

Reviewer's Assessment of State's Planned Response: VAEL and ADS have appropriately addressed this risk through contract language. It is important that the vendor agree to this language in the final version of the contract in order to minimize the level of ambiguity around the expectations for DR.

Risk #: R10	Risk Likelihood/Probability: Low	Risk Impact: Low	Overall Risk Rating: Low

Source of Risk: VAEL

Risk Description: Gaining VAEL staff buy-in could be a challenge.

In 2011-2012, the Vermont Department of Environmental Conservation (DEC), made an attempt to use a new LIMS. It was not a positive experience for staff. This experience, combined with general concerns about staff moving away from a system they've used since 2004, and a general change in processes that accompanies a new program, means that staff may be resistant to the new solution, at least initially.

State's Planned Risk Strategy: Mitigate

State's Planned Risk Response: VAEL has planned a discussion around the new system. Analysts will also be involved in workflow development and there will be a focus on the issues that Sample Master has caused which will be remediated with the new system. As VAEL works with each section, those staff would be able to look at the dashboards and have input before it's rolled out to production.

Risk #: R10	Risk Likelihood/Probability: Low	Risk Impact: Low	Overall Risk Rating: Low

Timing of Risk Response: Subsequent to Contract Execution

Reviewer's Assessment of State's Planned Response: VAEL appears to have a plan in place to mitigate the risk around staff buy-in effectively. Keeping the staff involved in the project as well as reminding them that WinLIMS is an improvement over Sample Master will be beneficial as well.

Risk #: R11	Risk Likelihood/Probability: Medium	Risk Impact: Medium	Overall Risk Rating: Medium

Source of Risk: Project

Risk Description: The State PM resource dedicated to this project may not have a sufficient number of hours allocated and this will be her first State project

The scope of the deliverables that will be delivered by the State (e.g., schedule upkeep, Test Plan, Test Cases, status reports, and business process flows) and the aggressive timeline warrant greater than 910 hours of allocation from the State PM (for a currently planned 12 month period). Additionally, while the ADS assigned PM (Naomi Hahr) has project management experience and has been with the Agency for the past six months, she does not have previous experience leading IT projects at the State – specifically projects of this magnitude, or in the lab – which can pose a schedule and cost risk if VAEL resources are challenged to deliver the necessary artifacts or need assistance managing project activities.

State's Planned Risk Strategy: Mitigate

State's Planned Risk Response: ADS staff will have additional oversight of this project. Additionally, the state PM has experience from prior employment that lends itself well to the scrum/agile methodology that the QSI wants to use for this project.

Timing of Risk Response: Prior to contract execution

Reviewer's Assessment of State's Planned Response: Assuming that ADS has sufficient oversight on the project, the approach to mitigate to the risk is acceptable.