ATTACHMENT 3: DISCOVERY PHASE 2 Deliverable 4

Washington State Department of Natural Resources

Forest Practices Division

Forest Practices Business Analysis

Deliverable 4: Options Analysis and Cost Estimates

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Revision History

Revision Level	Date	Change Summary
1.0	5/25/2018	Incorporates changes from Treinen internal review
1.1	5/31/2018	Changes emphasizing readability
1.2	6/8/2018	Updates based on DNR feedback
1.3	6/15/2018	Additional updates based on DNR feedback
1.4	6/20/2018	Added M&O definition and fixed superscripts in M&O table; update to section 5.1.

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1 Background

The Forest Practices (FP) Online solution will connect Forest Practices information systems, databases, and mapping tools via a common, secure business portal. This portal once implemented will provide agency staff, FP application applicants and reviewers a single access point for all Forest Practices products, services and work.

One of the first steps in the envisioning of this portal was a Discovery project, the Forest Practices Integrated Business Information Systems (fpIBIS) project, which provided the foundation for this subsequent deeper-dive, the Forest Practices Business Analysis (FPBA) project. The fpIBIS project was completed over the first half of 2017, and a Request For Information (RFI) was issued during that time frame. The fpIBIS project reviewed and analyzed the RFI responses and examined a set of implementation options. Those options were defined as:

a) COTS/MOTS/Software as a Service (SaaS) solution,
b) FPARS enhancement solution,
c) Custom-built solution, and
d) Hybrid solution (Combination of custom-built, COTS/MOTS and SaaS)

Each option was evaluated for capability, feasibility, technologies employed, ability to meet requirements, ability to fill identified gaps, cost, benefits and risks. Using the options above, one of the deliverables in fpIBIS, identified as “Deliverable 6: Options Analysis and Cost Estimates,” provided DNR a recommendation for how to best implement the FP Online solution. The recommendation was for a hybrid solution (option d) that combines different aspects of custom-built, Commercial Off-The-Shelf (COTS), Modifiable Off-The-Shelf (MOTS), and Software-as-a-Service (SaaS) software into a cohesive, functionality-rich solution.

The FPBA project also recommends a Hybrid solution. This recommendation is based on the deeper analysis conducted during FPBA regarding costing, pros, cons and risks for the relevant vendors. The recommendation also takes into account that no peer organization had a solution that would meet the needs of Washington’s Forest Practices division.

1.1 Definition of Hybrid solution

A hybrid solution is one that combines different aspects of a custom-built, COTS, MOTS, and/or SaaS applications into a cohesive, functionality-rich solution. It is a construction approach that starts with a solid foundation and then adds elements to bring in functionality and features as the solution is 'built-out'. Existing DNR software will be leveraged where possible and integration of those products will be important to the project. The hybrid solution allows for that by having customization as an element. The hybrid option is appealing because it allows you to take advantage of the best components for each functionality that are already fully developed, used and refined over many installations. This approach also provides clients and vendors who have current knowledge and experience from which to draw.
The primary challenge with this option is getting each of the desired components to integrate smoothly and effectively. The best way to mitigate this challenge is to choose components that have been developed by the same provider, or components whose providers have strong partner relationships with concrete implementation experience as partners.

PROS

- Less functionality to build as custom software.
- Specific Forest Practices functionality may be available through other modules/components that have previously been built and implemented.
- Typically, there are shorter timelines for Design, Development and Implementation (DDI) than a pure custom application.
- Resources available with experience on COTS components.
- Access to new or additional features and capabilities than the COTS/MOTS systems provide.
- Lower overall risk profile.

CONS

- Solution architecture can be more of a challenge with varying products.
- Challenges in maintenance, operations and support with differing versions of components.
- Challenges in getting components to work together effectively and efficiently.

1.2 Definition of Configuration vs. Customization of Software

Configuration refers to entering information into the system in ways anticipated by the vendor that allow the stock software to work best for your business needs. Configuration means making the changes in the software, and uses existing fields, values and functionality to accomplish this. This is the flexibility that comes "out of the box" with the system. Configurations are typically supported by the software vendor through future releases.

Customization refers to changing the code, beyond configuration of the software to meet the business needs of your organization. This is, in essence, changing the source code of how the software operates. This is not "out of the box" – it is custom functionality to the specific needs of your organization. All customization has no guarantee of compatibility with future releases, is not supported by the software vendor and may need to be repaired with future versions of the software. With more complex customizations comes more inherent risk that those custom components will not be compatible with future releases. The Product Owner will know when complex customizations are being done.

2 Approach

The options were based primarily on the Market Research conducted in Deliverable 3.2. While peer research made it clear there were no peer organizations which had a solution that were a fit for DNR at that point in time, multiple states reported that they were looking to implement the same software DNR is interested in. Timeframes were not provided, but the states of Virginia and Colorado are working to realize this system. More information on these options is provided below in Section 4. As a result of peer research showing no currently available options, in depth market research was conducted.

The approach during market research was to evaluate how each vendor had previously performed on similar projects and how they might fit into our definition of a hybrid option for implementation. While the goal was to evaluate each vendor systematically, each vendor's background, projects and area of expertise with technology are not similar. This comparison gap was mitigated by providing each vendor with similar background information about the project, requirements and questions. Despite attempts to unify the answers, there will always be slight differences in the projects and information provided.

The questions sent to vendors are provided below. Tell us about your relationship with ESRI and how you have used ArcGIS in your applications?

- If you were our vendor would you use an Agile approach with us? If yes, briefly describe your Agile methodologies.
- Tell us briefly at a high level how a typical Go-Live/cut over looks for your company?
- What would you estimate support costs for this application?
- What does support look like at your company? Hours, T&M or contract?

These questions were added to the information the vendor was provided regarding similar projects/applications and their specifics. Additional questions based on the answers lead each interview down a unique path. Each vendor's answers are provided in Deliverable 3.2: Market Research. The last two questions were used to create the estimates provided in Appendix A.

Completing the analysis included several tasks:

- Review the FPBA workflows.
- Review updates to the FPBA requirements.
- Perform research on peer states and their forestry applications.
- Perform market research of applicable products, vendors and costs.

3 Options Analysis

The vendor list below is organized alphabetically by name, and no prioritization or preference is implied.

The estimated costs calculations for each of the "hybrid enhancement/custom-built/COTS/MOTS/SaaS" solution options are provided in each section and in Appendix A. Two methodologies were used to estimate costs where the data allowed.

- The first method used was the Comparable Project Cost Estimate. This is derived using project costs provided by the vendor. The project's length of time, complexity and resources are compared to the proposed FP Online solution. Not all vendors provided enough data to provide this estimate.
- The second method used was the Hourly Rate Project Cost Estimate and is derived using hourly rates from the DES ITPS Master contract or provided by the vendor. That hourly cost is blended (in each table) as project rates are often lower as they are blended across multiple roles, such as Business Analyst, Designer, Developer, Project Manager, etc. The resourcing was estimated, and the Design, Development and Implementation schedule was set at twelve months for all, except eightCloud which was set to 9 months. The Hourly Rate Project Cost Estimates are utilized in Appendix A for comparison purposes since not all vendors have a Comparable Project Cost Estimate.

3.1 eightCloud

The recommended option of a hybrid model is the model eightCloud would be implementing for the FP Online application and they would implement it using Salesforce. They have two successful Salesforce implementations at DNR, and their service and support of those applications were positive. Salesforce might be the option with the least amount of customization and based on that should have the shortest Design, Development and Implementation schedule. One of the concerns with Salesforce is the "working offline and syncing back" functionality that is a requirement for the FP Online application. Providing this functionality would require customization or third-party integration. EightCloud has never provided this functionality but is currently working with the state of Hawaii to build this. This would be a portion of the customization needed by eightCloud.

Another integration point that may require customization is between Salesforce and ArcGIS. The tools that ESRI has provided for this integration will no longer be supported. The ESRI Maps for Salesforce and the ESRI Maps Mobile for Salesforce have been placed into Mature Support, are no longer available and should not be used for FP Online. EightCloud built this integration (an Application Programming Interface, or API) for the state of Ohio, but the recommendation moving forward was to use MapAnything as a third-party tool.

With eightCloud, DNR could leverage a third-party SaaS tool for e-Signature and permitting. There are multiple vendors in this space, with the leaders being DocuSign and Adobe. Both those vendors have strong integration with Salesforce.

EightCloud should be contacted to respond to this RFP.

COSTS

The estimated costs for implementation using eightCloud are the least expensive since this is predominately a COTS/MOTS solution. A significant point to consider regarding any customization of a COTS/MOTS solution is the level of complexity of that customization. Costs along with future upgrade decisions should be considered whenever custom changes are made to Salesforce.

Licensing

The licensing costs are based on Carasoft Invoice pricing used by DNR for their Salesforce applications and are priced below.

License type	Monthly cost per user	License count	Annual Cost
Internal Named user (Force.com licensing)	$25.50	92	$28,152
Internal Admin user (Force.com licensing)	$42.50	8	$4,080
Customer Community License (Public user) (1)	$12.50	1000	$12,500

		Total	$44,732

Note 1: Community user licenses are based on usage. The version that seems best for this application is the "Customer Community Login License." These are named-based licenses and allow the user to login to Salesforce. Pricing for Customer Community User licenses is based on unique logins per site, are purchased annually and are best purchased in packs.

Costs for MapAnything were specified at $7.50, which for Government is 50% off the MSRP of $12.50 per/seat, per/month. Annual costs for that tool would land in the $5K to $9K range. These costs are not listed above since there is the possibility to roll this cost into the eightCloud costs as they may partner on this engagement.

Comparable Project Cost Estimate:

Comparable Project (1)	Months Duration	# Staff	Total Cost	Project Multiplier	Estimate Total
DNR Aquatics Project	4	1	$64,000	4.5	$288,000

Note (1) The two Salesforce applications that have been implemented at DNR were Public Records and Aquatics. These are both smaller than the proposed FP Online application, but the one that seems reasonable to use as an estimate is the Aquatics project. It was implemented by one engineer. For this estimate, that costing will be more than quadrupled based on the complexities of the FP Online application.

Hourly Rate Project Cost Estimate:

Hourly Rate (1)	# Staff	Hrs/Mo Per Staff	Monthly Cost	# of Months	Estimate Total
$144	2	166	$47,808	12	$573,696

Note (1): Pricing for eightCloud Professional Services on the DES ITPS contract dated 5/1/2018 is $175/hr. This rate was for Category 2 – "IT Business Analysis" and Category 7 – "Client/Server & Web Services". The blended rate was estimated at $144/hr.

Permitting and e-Signature tools

The licensing costs for the DocuSign and Adobe tools are identical at $480 annual per seat. The license estimate for 100 seats totals $48,000 annually.

PROS

- Previous implementations at DNR that were successful.
- Positive reviews by DNR for their service and support.
- Shorter projected implementation timeline than a predominately custom solution.
- Seattle office that allows for in-person support.
- COTS/MOTS systems tend to be more configurable than custom applications which would make future changes simpler.
- Reporting capabilities are robust out of the box.

CONS

- Salesforce upgrades are automatic and are not avoidable.
- The schedule for upgrades are on predetermined dates set by Salesforce and are typically done three times a year.

RISKS

- Minimal experience in the Forestry Management space.

3.2 ESRI

ESRI's implementation would be done by their Consulting Services team and would involve a predominately custom-built application. ESRI would be able to leverage a strong network of GIS experts, business analyst and technical staff to complete this FP Online application. They also have the advantage that they own many of the products that DNR has experience with and will continue to use for GIS tools. While public Application Programming Interfaces will be leveraged by all of the vendors to ArcGIS (as an example), but as the owner of the application, ESRI has an inside track on future modifications and enhancements to their products.

ESRI is a very large organization and is performing GIS projects all over the world and would be able to leverage components from other projects into the FP Online application. Those would need to be integrated with the custom components created for FP Online. ESRI and DNR have an excellent relationship and ESRI products will be part of the FP Online solution (i.e. ArcGIS, Survey123, Collector), whether or not ESRI is the vendor selected for FP Online.

The recommended option of a hybrid model is not the model expected for ESRI to build on this project. This would be a custom-built application.

The solution with ESRI would also leverage a third-party SaaS tool for e-Signature and permitting. There are multiple vendors in this space, with the leaders being DocuSign and Adobe, and would require additional integration.

Pricing was not provided by ESRI on their referenced projects so correlating those project's costs to FP Online is not possible. Despite that, ESRI should be contacted to respond to this RFP.

COSTS

Comparable Project Cost Estimate:

Costs were not provided by ESRI.

Hourly Rate Project Cost Estimate:

Hourly Rate (1)	# Staff	Hrs/Mo Per Staff	Monthly Cost	# of Months	Estimate Total
$200	6	166	$199,200	12	$2,390,400

Note (1): Pricing for ESRI Professional Services on the DES ITPS contract dated 5/1/2018 is at $446/hr. This rate was for Category 9 – "GIS Services." For the costing table a blended rate of $200/hr. was used.

Permitting and e-Signature tools

The licensing costs for the DocuSign and Adobe tools are identical at $480 annual per seat. The estimated license costs for 100 seats totals $48,000 annually.

PROS

- Large organization with significant experience in the Natural Resource application space.
- Custom application provides the best match to Forest Practices business requirements.
- Strong and positive relationship with DNR.
- Positive reviews by DNR for their service and support.
- Local Olympia office that allows for in-person support.
- Control over changes and enhancements to the custom application.
- ArcGIS, Survey123, Collector are ESRI products, giving them the best understanding of critical tools DNR will use in conjunction with FP Online.

CONS

- Custom software solutions typically take longer for Design, Development and Implementation than a COTS/MOTS solution.
- May not be as configurable as a COTS/MOTS product as typically a custom application provides fewer API connection points because it is new custom software built only for this environment.

RISKS

- Potentially the costs, based on research and input provided from previous ESRI engagements.

3.3 Sitka

The Sitka solution would predominately be a custom application. Sitka has built numerous systems for Natural Resource related organizations, so it does have experience in related systems. They have integrated with the ESRI tools and specifically ArcGIS Application Programming Interface on multiple systems. They also have built "offline systems that sync back the data" so there are components that could be leveraged by Sitka, but these would be pieces of a custom application.

Multiple Sitka projects were provided in a pdf as examples of Sitka's portfolio. The one project that was used as a reference was their state of Montana Sage Grouse Web Application. The costs for Design, Development and Implementation of that solution was $330K and was completed in 9 months, with Sitka providing four staff members at half-time for the project. While this is a good comparison, it is still considerably smaller than the estimated six vendor staff proposed for the FP Online application.

The recommended option of a hybrid model is not the model Sitka communicated to project members for the FP Online application. The Sitka solution would predominately be a custom-built application leveraging integration with ArcGIS and Mobile applications that they have built.

The solution with Sitka would also leverage a third-party SaaS tool for e-Signature and permitting. There are multiple vendors in this space, with the leaders being DocuSign and Adobe, and would require additional integration.

Sitka should be contacted to respond to this RFP.

COSTS

Comparable Project Cost Estimate:

Pricing was provided by Sitka in their Portfolio pdf on the following reference projects:

Project	Date Range	Cost	Project Multiplier (1)	Comparable Estimate
Sage Grouse Web App 2.0	7/11/16 - 4/17/17	$330,000	5.33	$1,760,000
EIP Tracker	2013 - Present	$520,000		
TerraTrak	2011 - Present	$1,500,000		
cbfish.org	2008 - Present	$5,800,000		
CHaMP	2011 – 2017	$2,100,000		

Note (1) Based on the staffing for the Sage Grouse Web App, the FP Online application could be estimated at three to four times larger. Using that model and multiplying by four (times the size, instead of three) the nine-month cost is $1.32M. The twelve-month cost at that same rate is $1.76M, which is an estimate comparison for the FP Online application.

Hourly Rate Project Cost Estimate:

Hourly Rate (1)	# Staff	Hrs/Mo Per Staff	Monthly Cost	# of Months	Estimate Total
$144	6	166	$143,424	12	$1,721,088

Note (1) Sitka is not listed on the DES ITPS contract dated 5/1/2018. Pricing for Sitka Professional Services was provided. Based on averaging those into a blended rate, the estimated rate is $144/hr.

Permitting and e-Signature tools

The licensing costs for the DocuSign and Adobe tools are identical at $480 annual per seat. The estimated license cost for 100 seats totals $48,000 annually.

PROS

- Significant experience in the Natural Resource application development space.
- Custom application provides the best match to Forest Practices business requirements.
- Control over changes and enhancements to the custom application.
- Sitka is located in Portland Oregon, making on-site visits significantly easier.

CONS

- Custom software solutions typically take longer for Design, Development and Implementation than a COTS/MOTS solution.
- May not be as configurable as a COTS/MOTS product as typically a custom application provides fewer API connection points because it is new custom software built only for this environment.

RISKS

- Minimal experience in the Forestry Management space.

3.4 Timmons

The Timmons solution would predominately be a custom application. Timmons was one of the vendors interviewed in our Market Research, and they were the vendor that built the state of Oregon's Department of Forestry (ODF) FERNS system. That system was built for ODF to track forest operations and practices and to provide information to the public as requested (Subscribers in FERNS). It also has a permitting component to use Fire or Power-Driven Machinery. The current application, in version 4, has a total cost of $2.4M over 4.5 years of intermittent project work with upgrades to their system.

There is interest in a DNR visit to review FERNS with ODF staff and to gather lessons learned from their project. The business rules for Forest Practices are more complex for the state of Washington than for the state of Oregon so this is a concern for re-using FERNS. Another concern was the mobile component syncing was not considered strong by ODF. However, the ODF staff said the Timmons team "are great to work with".

Timmons has a strong presence in the Forest Management space and are strong partners with ESRI, previously winning ESRI Partner of the Year. They have extensive experience integrating with ESRI tools and specifically the ArcGIS Application Programming Interface on many systems. They have previously done permitting applications and Mobile applications.

The Timmons solution would predominately be a custom-built application leveraging their previous integration with ArcGIS, along with the Permitting and Mobile applications that they have built. The solution would also leverage a third-party SaaS tool for e-Signature and permitting. There are multiple vendors in this space, with the leaders being DocuSign and Adobe, and would require additional integration.

Timmons should be contacted to respond to this RFP.

COSTS

Comparable Project Cost Estimate:

Comparable Project (1)	Months Duration	# Staff	Total Cost	Project Multiplier (2)	Estimate Total
ODF Ferns Phase 1	12	5	$700,000	2.0	$1,400,000

Note (1) Multiple Timmons projects' costs were provided via email but the ODF FERNS project seems the best option for a comparison, specifically Phase 1. Phase 1 of that project was twelve months in duration and the cost for Design, Development and Implementation was $700K and included discovery. Timmons had five to six staff involved in Phase 1 with four involved full-time.

Note (2) Based on the staffing for the FERNS application, the FP Online application could be estimated at twice the size. Using that model, the FP Online application could cost an estimated $1.4M. This estimate is likely understated since Phase 1 for FERNS did not seem to have the level of complexity that FP Online will, but it is a starting point for cost.

Hourly Rate Project Cost Estimate:

Hourly Rate (1)	# Staff	Hrs/Mo Per Staff	Monthly Cost	# of Months	Estimate Total
$175	6	166	$174,300	12	$2,091,600

Note (1) Pricing for Timmons Professional Services is provided in the DES ITPS contract dated 5/1/2018 at $225/hr. This rate was for Category 8 – "Database Services" and Category 9 – "GIS Services." The blended rate for Timmons was estimated at $175/hr.

Permitting and e-Signature tools

The licensing costs for the DocuSign and Adobe tools are identical at $480 annual per seat. The estimated license cost for 100 seats totals $48,000 annually.

PROS

- Significant experience in the Forestry Management application space.
- Custom application provides the best match to Forest Practices business requirements.
- Control over changes and enhancements to the custom application.
- Successful implementation in Oregon on a similar system.

CONS

- Custom software solutions typically take longer for Design, Development and Implementation than a COTS/MOTS solution.
- May not be as configurable as a COTS/MOTS product as typically a custom application provides fewer API connection points because it is new custom software built only for this environment.

RISKS

- Timmons is located in Richmond, Virginia.

3.5 Trimble

The Trimble solution would officially be a hybrid option as they have existing COTS/MOTS software built for the Forestry Management space. It is difficult to compare them with any of the other vendors on this list because their COTS/MOTS software is client/server. A client/server application would increase complexities to a State-wide application and will add a layer of integration the other vendors may not have. That software, known as their "Connected Forest" Suite would be Land Resource Manager (LRM) and Business Resource Manager (BRM) for the FP Online application. The Connected Forest Suite appears to be built with larger industrial firms in mind based on its components, that fits many of DNR constituents, but not all. Trimble would need to build custom Web components that integrate with their suite of applications, since their Connected Forest Suite is a client/server application. Trimble has a mobile component, Mobile Builder, which can open offline, but it is not designed to sync the data back into the system. The syncing part would need to be custom built. Trimble is migrating the suite to the web, but that project is in the early stages and no timeline was provided.

DNR has the LRM application of the Connected Forest Suite installed and working in the Forest Resources Division. Trimble recommended leveraging that instance of LRM from a Total Cost of Ownership (TCO) perspective as both LRM and BRM would be needed for the FP Online application.

The solution with Trimble would also leverage a third-party SaaS tool for e-Signature and permitting. There are multiple vendors in this space, with the leaders being DocuSign and Adobe, and would require additional integration.

Trimble should be contacted regarding the RFP.

COSTS

Comparable Project Cost Estimate:

Comparable Project (1)	Months Duration	# Staff	Total Cost	Project Multiplier	Estimate Total
Trimble LRM	20	3	$725,000	3.2	$2,320,000

Note (1): The Trimble application that was implemented at DNR was $725K and three full-time staff took twenty months to complete DDI. This system seems less complicated than the FP Online application but leveraging the existing LRM could mitigate risks and costs for the FP Online application. Using that project resource number and doubling it would result in a cost estimate of $1.45M. Of concern is that is a 20-month estimate condensed into a twelve-month

schedule means multiplying by 3.2 for increased resources, which changes the Trimble estimate to $2.32M.

Hourly Rate Project Cost Estimate:

Hourly Rate (1)	# Staff	Hrs/Mo Per Staff	Monthly Cost	# of Months	Estimate Total
$150	6	166	$149,400	12	$1,792,800

Note (1) Trimble is not listed on the DES ITPS contract dated 5/1/2018, but pricing was shared by DNR staff to get a blended rate of $150/hr.

Permitting and e-Signature tools

The licensing costs for the DocuSign and Adobe tools are identical at $480 annual per seat. The estimated license cost for 100 seats totals $48,000 annually.

PROS

- Strong presence in the Forestry Management space.
- Previous implementation at DNR that we successful.
- Positive reviews by DNR for their service and support.

CONS

- Product upgrades could be more complicated as LRM would be running for two DNR divisions.
- The core product is client-server, making integration more complex.

RISKS

- The Connected Forest suite of tools is being Web-enabled which will help DNR but does add risk.

3.6 Vestra

The Vestra solution would predominately be a custom application. Vestra has built a number of systems for state agencies in California using ESRI technologies that could be leveraged as components for the FP Online application. None of these systems taken individually provide everything in DNR's requirements, but, taken as a whole, the understanding is they do cover most of them. These components would need to be integrated with the custom components Vestra creates for FP Online application.

The recommended option of a hybrid model is not the model Vestra would likely build for this project. The Vestra solution would predominately be a custom-built application. The solution would also leverage a third-party SaaS tool for e-Signature and permitting. There are multiple vendors in this space, with the leaders being DocuSign and Adobe, and would require additional integration.

Vestra should be contacted to respond to this RFP.

COSTS

Comparable Project Cost Estimate:

Comparable Project	Months Duration	# Staff	Total Cost	Project Multiplier	Estimate Total (1)
		Unknown			Not Completed

Note (1) Pricing was provided by Vestra on two reference projects, but resourcing was not available, so an estimate was not completed:

- Development of a Cannabis Identification and Prioritization (CIPS) Solution - 5/4/2015-3/31/2017 - $199,400.
- CalMAPPER (multiple phases) - 10/1/2012- Present - $865,000 to date

Hourly Rate Project Cost Estimate:

Hourly Rate (1)	# Staff	Hrs/Mo Per Staff	Monthly Cost	# of Months	Estimate Total
$125	6	166	$124,500	12	$1,494,000

Note (1) Vestra is not listed on the DES ITPS contract dated 5/1/2018. Pricing for Vestra Professional Services was provided. Based on averaging those into a blended rate, the estimated rate is $125/hr.

Permitting and e-Signature tools

The licensing costs for the DocuSign and Adobe tools are identical at $480 annual per seat. The estimated license cost for 100 seats totals $48,000 annually.

PROS

- Custom application provides the best match to Forest Practices business requirements.
- Control over changes and enhancements to the custom application.

CONS

- Custom software solutions typically take longer for Design, Development and Implementation than a COTS/MOTS solution.
- May not be as configurable as a COTS/MOTS product as typically a custom application provides fewer API connection points because it is new custom software built only for this environment.
- Vestra is located in Northern California.

RISKS

- Minimal experience in the Forestry Management space.

3.7 Windsor

Windsor was one of the vendors that responded to the RFI. They do not have a presence in the Forest Management space, but have completed numerous Natural Resource projects, many of those projects in Washington state, and more specifically with Washington tribal organizations. Windsor has a suite of tools that they would propose for this application that fits into the custom-built/COTS/MOTS space. Their suite of tools, named "nSUITE" has components that provide permitting, scheduling, workflow automation, site administration, online payment, e-signature, mobility, ArcGIS integration and "offline" functions. Windsor has a very appealing toolset with full integration across their toolset and has most of the desired functionality of FP Online covered within nSUITE.

The recommended option of a hybrid model is the model Windsor would be implementing for the FP Online application. Windsor fits in the space well, and based on their suite of connected tools, their estimate to complete the work is ten months with a project staff of four. This shorter schedule and lower staff count is attributed to their experience with connecting their various tools together in the suite, which has been fully tested and saves a great deal of effort. .

Windsor should be contacted regarding the RFP.

COSTS

Comparable Project Cost Estimate:

Comparable Project (1)	Months Duration	# Staff	Total Cost	Project Multiplier	Estimate Total (1)
		Unknown			Not Completed

Note (1) Pricing was provided by Windsor in their Portfolio document on the following reference projects, but resourcing was not available, so an estimate was not completed:

- Wyoming Department of Environmental Quality (WyWaste) – Phase 1: about $560K; Phase 2: about $400K. About $100K in annual support ($72K of licensing, $28K of support). Windsor, like most vendors will provide development as part of support hours/bucket and will provide Development time if the bucket of hours is not fully used.
- Massachusetts Department of Environmental Protection – Underground Storage Tank Data System: Initial contract was $679K; enhancements were about $100K. About $35K in annual support (includes licenses).
- Kansas Department of Health and Environment – nSPECT/nFORCE: $140K.
- Oregon Department of Environmental Quality – nCIDENT Pollution Complaint System: $75k + $25k in annual support (includes licenses).

- Alabama Department of Environmental Management – nSPECT Mobile Data Collector: $120K.

Hourly Rate Project Cost Estimate:

Hourly Rate (1)	# Staff	Hrs/Mo Per Staff	Monthly Cost	# of Months	Estimate Total
$144	4	166	$95,616	12	$1,147,392

Note (1) Pricing for Windsor Professional Services is provided in the DES ITPS contract dated 5/1/2018 at $184/hr. This rate was for Category 2 – "IT Business Analysis", Category 4 – "IT Project Mgt", Category 7 – "Client/Server & Web Services" and Category 8 – "Database Services". The blended rate for Windsor was estimated at $144/hr.

PROS

- Shorter projected implementation timeline than a predominately custom solution.
- COTS/MOTS systems tend to be more configurable than custom applications which would make future changes simpler.
- Reporting capabilities are robust out of the box.
- Windsor is located in Portland Oregon, making on-sites visits significantly easier.

CONS

- Upgrades are on scheduled dates set by Windsor and are typically quarterly. While the upgrades are recommended, they are optional, but it is not recommended to get more than two releases behind as "hot" fixes become more difficult to implement.

RISKS

- Minimal experience in the Forestry Management space.

4 Consider waiting for another State to build this FP system

In the course of the FPBA analysis, it was discovered that two states are looking to implement a Forestry Management application that aligns with much of the functionality of the FP Online application. The states of Virginia and Colorado are building applications with a public-facing site, mapping capabilities for the public to create and save their maps and data, and an ArcGIS centric core application for staff to perform analysis and provide feedback. Both systems were in the early stages and the vendors were Timmons in Virginia and Technosylva in Colorado.

Waiting and potentially leveraging a fully-developed custom application and vendor for this implementation could be an option for DNR. Using an existing application mitigates risks in many ways and would likely result in a shorter schedule for Design, Development and Implementation (DDI) on the FP Online application. Despite these benefits, the timelines for those projects are not known and waiting for the DDI on those systems and then for them to be stabilized is not recommended based on schedule risks.

5 Recommendation

The recommendation for the hybrid solution for the FP Online project is based on the analysis completed through the review of documentation, interviews with DNR business and technical staff, REV sessions, and analysis of the previous deliverables of the FPBA project. The hybrid model allows for the most flexibility from a costing and Design, Development and Implementation timeframe.

The key factors in making this recommendation are:

- Key functionality is readily available
- Modifications to meet business requirements can be customized where necessary
- Access to experienced vendors and proven software
- Shorter overall project duration
- Experienced implementation resources available
- Lower overall risk profile

Based on the analysis, there is no existing system that is an ideal fit for the FP Online application. Both vendors noted above (eightCloud and Windsor) that are likely to provide a hybrid solution have minimal experience in the Forestry Management space. Despite this lack of industry experience, they should be considered the leading candidates from the analysis performed. All the other vendors are proposing significant levels of customization, or a custom-built application. The RFP process will be vital to evaluate and select the best fit for the FP Online application. The vendors included above should be contacted directly to ensure they are aware of the RFP. While each vendor still may choose not to bid, this communication will confirm their knowledge of the RFP, with the goal of DNR receiving a higher number of viable responses and therefore more options.

DNR should consider including in the RFP an initial phase of this project to build a “Prototype.” The prototype idea is analogous to Sprint 0 of an Agile project, with the goal to create something “real.” For example, when Forest Resources contracted with their vendor, Trimble was given two months and $75K to build a prototype. If DNR was not satisfied with the prototype, the agency could opt out of the contract. This is an excellent way to get to know and confirm your vendor without adding too much time to the project schedule. In this scenario, it is advisable to confirm a runner-up vendor during evaluations that may later become the Apparent Successful Vendor (ASV).

Providing a preferred cost for vendors, but not the complete budget for the project, within the RFP for the FP Online project is also recommended. A preferred cost, or cost range will allow DNR to evaluate vendors based on similar costs and provide vendors with a realistic cost model that is expected when developing their responses.

During the evaluation of the RFP responses, the demonstrations will be an opportunity to evaluate both the proposed product and how the technology it uses may mature over time, but also the vendor staff and their preparation of the demonstration.

5.1 COTS and SaaS tools

To maintain the hybrid option with any of the above vendors, DNR should look to leverage an existing COTS or SaaS e-Signature/permitting system that includes collection and return of payments. DocuSign Business Pro or Adobe Sign for Business are two products that can provide this functionality as a SaaS. Both provide e-Signature, form customization and have EFT payment options. Each product has a $40 per/seat, per/month cost model, $480 annually.

There are also multiple Washington State agencies that have permitting systems and DNR could leverage one of those systems (i.e. Department of Licensing, Department of Fish and Wildlife, and Department of Ecology) for the permitting aspects of FP Online. Collection of funds is not a core function of the Forest Practice Division and the building of this application is an opportunity to leverage that functionality as a service. The FP Online application simply needs to have a confirmation code on the application that funds have or have not been received. That functionality can be provided in a service.

Other COTS applications that will be part of the overall solution include ArcGIS, Survey123, Collector. These should be leveraged as they are excellent tools and are widely used at DNR. The expectation is that the FP Online application will exchange data as needed with these tools via an Application Programming Interface (API). The selected vendor will provide valuable input on how best to leverage those APIs.

This option will include some level of modification or development as the FP Online data will be shared via an interface/data exchange with current FP systems (i.e. FPETS, WTA, etc.) that have a future migration date, or potentially other systems where this data could be leveraged. Solid planning will keep the risks and costs manageable. There will be interface additions/changes to allow the efficient flow of information to these other systems. These should be evaluated and should be noted in the RFP but not detailed out until the vendor is selected as their data and Application Programming Interface might affect how these interfaces are assembled.

5.2 Project resource level estimate and support

The proposed project staffing of eight for the hybrid option was originally provided in the fpIBIS. Based on further investigation and research that number holds true for a system this size and complexity. Most of the project staff would be provided by the vendor. The preferred number of staff requested to be supplied by the vendor is six of the eight positions. The two exceptions to the staffing count of six are (eightCloud and Windsor) and this is based on their solution option being substantially more in the COTS/MOTS space.
The project roles with responsibility and a percentage estimate of each roles commitment to the project is in Appendix B.

DNR FP is considering recruitment of FP IT staff to support this application. A staffing level of two or three staff is a good target for support of an application this size. Pricing was provided at:

- The first year's loaded cost is $451,500 for two ITS4 positions.
- The cost then drops to $216,100 a year for one ITS4 support FTE, to carry in the base budget.

5.3 Cloud hosting estimates

Cloud hosting for the FP Online system was examined and pricing estimates are below. Without the specifications of the system regarding memory, storage, data transfers (I/O), and load balancing the costs are difficult to approximate. These specifications or recommendations will be provided by the vendor and may change as the solution is built.

The cost model for WaTech hosting is available here and below. Based on a standard configuration of 2 – vCPUs; 64 GB of memory; 2 TB of storage (1); the monthly cost and annual costs are listed in the table below. State Data Center and Quincy Data Center	Daily Rates	Maximum Monthly	# Units	Monthly Cost	Annual Cost
vCPU (Core/Hour)	$1.4333333	$43.00	2	$86.00	$1,032
Memory (GB/Hour)	$0.3000	$9.00	68	$612.00	$7,344
Storage (GB/Hour)	$0.0033333	$0.10	2,000	$200.00	$2,400
				$898.00	$10,776

Note:
(1) This "standard" configuration is what cloud vendors use in their comparative pricing models. While other configurations can be found, this one seems to be used most frequently. Comparative annual costs at Amazon Web Services (AWS) or Microsoft Azure are at $1,163 and $876, respectively. The AWS and Azure models are not an exact comparison but based on those numbers and research the WaTech costs will be five to ten times the costs of AWS or Azure. Google and IBM cloud pricing were also researched, and their annual pricing was similar to AWS and Azure.

Appendix A – Cost Estimates

The following cost estimation chart is an aggregation of information from the Peer and Market Research, and Treinen's consulting experience in planning and estimating. Hourly Rate Project Cost Estimates (also included in each vendor's section above) are utilized instead of the Comparable Cost Estimates for consistency. Other costs described above, and a 25% reserve are added to generate the Overall Cost for each vendor.

Year One Cost Estimates:

Vendor	Hourly Rate (Blended)	Estimated # of Vendor Staff on Project	Monthly Hours Per Person	Estimated Duration in Months	Hourly Rate Project Cost Estimate	Licensing Costs Estimate	Online Payment and e-Signature Software (100 License count) (1)	Annual Cost for Two DNR Staff	Annual Hosting Cost Estimate From WaTech or another Cloud provider	Overall Cost (the Hourly Rate Estimate) plus 25%) (2)
eightCloud	$144	2	166	12	$573,696	$62,232	$48,000	$451,500	Included (5)	$1,419,285
ESRI	$200	6	166	12	$2,390,400	Included (3)	$48,000	$451,500	$10,776	$3,625,845
Sitka	$144	6	166	12	$1,721,088	Included (3)	$48,000	$451,500	$10,776	$2,789,205
Timmons	$175	6	166	12	$2,091,600	Included (3)	$48,000	$451,500	$10,776	$3,252,345
Trimble	$150	6	166	12	$1,792,800	Included (3)	$48,000	$451,500	$10,776	$2,878,845
Vestra	$125	6	166	12	$1,494,000	Included (3)	$48,000	$451,500	$10,776	$2,505,345
Windsor	$144	4	166	12	$1,147,392	$72,000	Included (4)	$451,500	$10,776	$2,102,085

Notes:

(1) DocuSign Business Pro or Adobe Sign for Business are two products that can provide this functionality as a SaaS. Both provide eSignature, form customization and have EFT payment options. Each product has a $480 annually per seat cost.

(2) The cost (estimate) plus 25% column is provided as it is standard practice to include a certain percentage of reserve funding at this stage of the project and is based on the Project Management Institutes (PMI) guidelines.

(3) The proposed solution from ESRI, Sitka, Timmons, Trimble and Vestra would have no licensing costs as it is custom software, and DNR would officially own the licenses.

(4) The proposed solution from Windsor would include online payment/permitting and e-Signature.

(5) The hosting of Salesforce will be included in the licensing costs.

Annual Cost Estimates for Maintenance and Operations (M&O)[(1)]:

Vendor	M&O Cost is derived from 20% of Hourly Rate Project Cost Estimate column (see table above) [(2)]	Licensing costs estimate	Online payment and e-Signature Software (100 license count) [(3)]	Annual Base Cost for One DNR Staff After Year One	Annual Hosting Cost Estimate from WaTech or another Cloud provider	Overall Annual Cost (estimate) of M&O
eightCloud	$114,739	$62,232	$48,000	$216,100	Included [(6)]	$441,071
ESRI	$478,080	Included [(4)]	$48,000	$216,100	$10,776	$752,956
Sitka	$344,218	Included [(4)]	$48,000	$216,100	$10,776	$619,094
Timmons	$418,320	Included [(4)]	$48,000	$216,100	$10,776	$693,196
Trimble	$358,560	Included [(4)]	$48,000	$216,100	$10,776	$633,436
Vestra	$298,800	Included [(4)]	$48,000	$216,100	$10,776	$573,676
Windsor	$229,478	$72,000	Included [(5)]	$216,100	$10,776	$528,354

Notes:

(1) See Appendix C for a list of proposed M&O tasks for the FP Online application.

(2) The estimate to derive M&O costs is based on project costs. For this M&O estimate, we used the project cost estimate we created in the previous table's "Year One Cost Estimates" column, "Hourly Rate Project Cost Estimate". This provides a number to be used for an M&O estimate. We do only use the project costs though, as the licensing, FTE's and Hosting costs should not be included to estimate the M&O costs.

(3) DocuSign Business Pro or Adobe Sign for Business are two products that can provide this functionality as a SaaS. Both provide eSignature, form customization and have EFT payment options. Each product has a $480 annually per seat cost.

(4) The proposed solution from ESRI, Sitka, Timmons, Trimble and Vestra would have no licensing costs as it is custom software, and DNR would officially own the licenses.

(5) The proposed solution from Windsor would include online payment/permitting and e-Signature.

(6) The hosting of Salesforce will be included in the licensing costs.

Assumptions:

1. The Project Team will include approximately eight full-time positions.
2. DNR employees will fill two positions of the eight total positions.
3. Team will be comprised of a quality assurance manager, project manager, programmers, analysts, testers and trainers.
4. The project length will not exceed twelve months.
5. Organizational Change Management (OCM) is not included in this costing model.

Appendix B – Project Roles

Primary Project Role	Responsibility	Proposed Percent of FTE Committed to Project
Executive Sponsor	Person ultimately responsible for project, approves scope and deliverables, provides funding	5%
Steering Committee	Group leadership for project, resolves issues brought forward by Project Sponsor	Not billed on project time
Project Sponsor	Person who makes business decisions for project, is a major champion and resolves issues and changes, makes user resources available	5%
Project Manager	Person responsible for overall delivery of the project	100%
Quality Assurance Manager	Person responsible for defining the QA strategy, implement reviews, reports results	20%
Organizational Change Management Analyst	Person responsible for identifying skills match, need for training, communicating readiness for change activity	20%

Training Team Manager	Person responsible for training approach, oversight of development of training materials, oversight of training delivery and effectiveness	20%
Trainer	Person responsible for performing the training delivery for the new features as defined in the training plan	20%
Technology Resources Manager	Person responsible for identifying technical resources, monitoring availability of technical resources, escalating technical resource issues to Project Manager	Not billed on project time
Lead Developer	Person responsible for overseeing assigned developers and code meets standards	100%
Developer	Person involved in the configuration and coding of the system	100% (There may be multiple developers on project)
Test Lead	Person responsible for oversight of assigned testers, creation of test scenarios, validation of test results to requirements	20%
Tester	Person responsible for creating and executing test scenarios, validates results to requirements	50%
Business Analyst	Person responsible for providing business analysis of processes, develops business requirements/user stories, active participant in unit, system and regression testing	50%

Secondary Project Role	Responsibility	Percent of FTE Committed to Project
Contracts Manager	Person responsible for managing all contracts relative to the project, report contract performance and resolve contract issues	Not billed on project time

Budget Manager	Person responsible for managing all aspects of project budget, reporting on budget status	Not billed on project time
Implementation Project Manager	Person responsible for developing implementation strategy, directing and report implementation status and results	33% (Note: This role might also be combined with the Project Manager role)
Lead Data Engineer	Person responsible for leading data engineers and approves database and/or other data repository architectures	10% (Note: This role might also be combined with the Lead Developer role)
Data Engineer	Person responsible for developing, constructing, testing and maintaining architectures such as databases and large-scale data processing systems	20% (Note: This role might also be combined with a Developer role)
Solution Architect	Person responsible for defining service architecture of project, align technology to enterprise architecture	10% (Note: This role might also be combined with the Lead Developer role)

Appendix C – Maintenance & Operations Tasks Proposed for FP Online application

Developer/Programmer

- Design, develop, test and deploy application/system modifications to meet business requirements using established development standards for the purpose of system defect resolution or agreed enhancements;
- Analyzed system problems to determine cause and make required software changes to resolve problem(s);
- Understand underlying database structures to apply changes;

- Analyze, review, and alter the application/system to increase operating efficiency or adapt to new requirements;
- Provide knowledge transfer and training to persons identified by DNR for the ongoing support and maintenance of FP Online;

Tester

- Coordinate testing through all cycles for new functionality, updates, fixes and/or upgrades;
- Assist with the Quality Assurance of new functionality and system enhancements;
- Assist with documentation of the system;
- Collaborate with technical staff to monitor change requests and their prioritization;
- Coordinate communication of changes to ensure the correct information is distributed;
- Provide knowledge transfer and training to persons identified by DNR for the ongoing support and maintenance of FP Online;