Summer 6-25-2021

Butte Priority Soils Operable Unit (BPSOU) 2021 Final Reclaimed Areas Maintenance and Monitoring Quality Assurance Project Plan (QAPP) – 2021

Mike McAnulty

Eric Hassler

Atlantic Richfield Company

317 Anaconda Road
Butte MT 59701

Mike Mc Anulty
Liability Manager

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June 25, 2021

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Helena, Montana 59620-0901

Jonathan Morgan, Esq.
DEQ, Legal Counsel
P.O. Box 200901
Helena, Montana 59620-0901

RE: Butte Priority Soils Operable Unit (BPSOU) 2021 Final Reclaimed Areas Maintenance and Monitoring Quality Assurance Project Plan (QAPP) – 2021

Agency Representatives:

I am writing to you on behalf of Atlantic Richfield Company to submit the 2021 revision to the Butte Priority Soils Operable Unit (BPSOU) Final Reclaimed Areas Maintenance and Monitoring Quality Assurance Project Plan (QAPP). Agency approval to the Final version of the plan was provided in October 2018. Current revisions to the plan being submitted for Agency approval consist of minor formatting and project personnel changes shown on Figure 2. Organization and Communication Chart and updated distribution lists.

Attachments 3.1 and 3.2 were revised to include updated versions of procedures (SMP-10) and validation checklists. The Product Documentation and User Guide for the Butte Reclamation Evaluation System (BRES) was submitted November 5, 2018, with the BRES Field Manual for Agency review and approval. The guide was included as an attachment to the QAPP as requested in the Agency approval letter dated October 1, 2018.

A summary of the updates is included in Attachment 4 of the QAPP. Technical elements of the QAPP are expected to remain applicable for field work to be conducted in 2021, and no additional changes were made. Included with this letter are pages that changed from Revision 0 to Revision 1.

The full report may be downloaded at the following link:
https://pioneertechnicalservices.sharepoint.com/:f:/s/submitted/Euh3xNtwhsFIjWopWTcXmVUBCv8QyfGFa4m4HdkFqAI3nA.

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If you have any questions or comments, please contact either Josh Bryson or Eric Hassler via phone or email.

Sincerely,

Mike McAnulty

Mike Mc Anulty
Liability Manager
Remediation Management Services Company
An affiliate of **Atlantic Richfield Company**

Eric Hassler
Superfund Program Manager
Butte-Silver Bow

Attachment: 2021 Final Reclaimed Areas Maintenance and Monitoring QAPP - Pages that Changed from 2018 Version

Cc: Patricia Gallery / Atlantic Richfield - email
Chris Greco / Atlantic Richfield – email
Mike Mc Anulty / Atlantic Richfield - email
Loren Burmeister / Atlantic Richfield – email
Dave Griffis / Atlantic Richfield - email
Jean Martin / Atlantic Richfield - email
Irene Montero / Atlantic Richfield - email
David A. Gratson / CEAC / email
Mave Gasaway / DGS - email
John Davis / PRR - email
Joe Vranka / EPA - email
David Shanight / CDM - email
Curt Coover / CDM - email
James Freeman / DOJ - email
John Sither / DOJ - email
Jenny Chambers / DEQ - email
Dave Bowers / DEQ - email
Carolina Balliew / DEQ - email
Matthew Dorrington / DEQ - email
Jim Ford / NRDP - email
Ray Vinkey / NRDP - email
Harley Harris / NRDP - email
Katherine Hausrath / NRDP - email
Meranda Flugge / NRDP - email

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John Gilmour / Kelley Drye - email
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Robert Lowry / BNSF - email
Brooke Kuhl / BNSF - email
Jeremie Maehr / Kennedy Jenks - email
Annika Silverman / Kennedy Jenks - email
Matthew Mavrinac / RARUS - email
Harrison Roughton / RARUS - email
Brad Gordon / RARUS - email
Mark Neary / BSB - email
Eric Hassler / BSB - email
Julia Crain / BSB - email
Chad Anderson / BSB - email
Brandon Warner / BSB – email
Abigail Peltomaa / BSB - email
Molly Maffei / BSB - email
Gordon Hart / BSB – email
Jeremy Grotbo / BSB – email
Josh Vincent / WET - email
Craig Deeney / TREC - email
Scott Bradshaw / TREC - email
Brad Archibald / Pioneer - email
Pat Sampson / Pioneer - email
Mike Borduin / Pioneer - email
Joe McElroy / Pioneer – email
Andy Dare / Pioneer – email
Karen Helfrich / Pioneer - email
Leesla Jonart / Pioneer - email
Connie Logan/ Pioneer – email
Ian Magruder/ CTEC- email
CTEC of Butte – email
Scott Juskiewicz / Montana Tech – email

File: MiningSharePoint@bp.com - email
BPSOU SharePoint - upload

Attachment:
2021 Final Reclaimed Areas Maintenance and Monitoring QAPP - Pages that Changed from 2018 Version

SILVER BOW CREEK/BUTTE AREA NPL SITE
BUTTE PRIORITY SOILS OPERABLE UNIT

2021

Final

Reclaimed Areas
Maintenance and Monitoring
Quality Assurance Project Plan (QAPP)

Butte Silver Bow

and

Atlantic Richfield Company

Revision 1. February 2021

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8, MONTANA OFFICE
FEDERAL BUILDING, 10 West 15TH Street, Suite 3200
Helena, MT 59626-0096
Phone 866-457-2690
www.epa.gov/region8

Ref: 8MO

October 1, 2018

Mr. Josh Bryson
Operations Project Manager
Atlantic Richfield Company
317 Anaconda Road
Butte, Montana 59701

Re: Approval letter for the Butte Priority Soils Operable Unit (BPSOU) Revised Draft Final Reclaimed Areas Maintenance and Monitoring Quality Assurance Project Plan and EPA Crosswalk Table (dated 8/22/18)

Dear Josh:

The U. S. Environmental Protection Agency (EPA), in consultation with the Montana Department of Environmental Quality (DEQ), is approving the *Revised Draft Final Reclaimed Areas Maintenance and Monitoring Quality Assurance Project Plan and EPA Crosswalk Table (dated 8/22/18),* with the following comments:

- If the content or the technical approach provided in the plan has changed or requires modification, please submit the revised plan to EPA and DEQ. Changes that require a revision to the QAPP include changes made to the sampling strategy, sample quantities and analysis, and modifications to the reclaimed areas site list (Attachment 1).

- Please submit the approval page with signatures from Atlantic Richfield Company (AR) and Butte Silver Bow County (BSB) staff for EPA and DEQ signatures/approval. EPA will return the signed signature page prior to AR and BSB distributing the Final version of the plan.

- Prior to the implementation of field data collection activities, please submit to the EPA a user's guide that incorporates appropriate procedures to ensure integrity of data and information collected "on a field-capable device" (i.e., iPad). Upon EPA review and approval of the user's guide, this user guide shall be attached to the plan as an attachment.

If you have any questions or concerns, please call me at (406) 457-5019.

Sincerely,

Nikia Greene
Remedial Project Manager

Attachments:
EPA crosswalk

cc: (email only)
Butte File
Jenny Chambers; DEQ
Daryl Reed; DEQ
Jon Morgan; DEQ counsel
Tom Stoops; DEQ
Carolina Balliew; DEQ
Pat Cunneen; State NRD Program
Jim Ford; State NRD Program
Harley Harris; State NRD Program
Mary Capdeville; NRD Program counsel
Dave Palmer; BSBC
Jon Sesso; BSBC
Mollie Maffei; BSBC
David Schultz; BSBC
Eric Hassler; BSBC
Brandon Warner; BSBC
Karen Sullivan; BSBC
Julia Crain; BSBC
Anne Walsh; UP
Robert Bylsma; UP counsel
John Gilmour, UP counsel
Leo Berry; BNSF and UP counsel
Yueh Chuang; BNSF
Brooke Kuhl; BNSF counsel
Jeremie Maehr; Kennedy Jenks for BNSF and UP
Bob Andreoli; Patroit/RARUS
R. Schellig; counsel for Patriot/RARUS
Becky Summerville; counsel for Inland Properties Inc.
Dawn Maack; counsel Inland Properties Inc.
Robert Lowry, BNSF counsel
John Ashworth, BNSF counsel
Cord Harris; AR/BP
Loren Burmeister; AR/BP
Jean Martin; Counsel AR/BP
William Duffy; attorney for AR/BP

Mave Gasaway; attorney for AR/BP
Pat Sampson; Pioneer for AR/BP
Craig Deeney; TREC
Scott Bradshaw; TREC
Mike Borduin; Pioneer for AR/BP
Karen Helfrich; Pioneer for AR/BP
Brad Archibald; Pioneer for AR/BP
Don Booth; AR consultant
Ted Duaime; MBMG
Gary Icopini; MBMG
David Shanight, CDM Smith
Curt Coover, CDM Smith
Chapin Storrar; CDM Smith
Henry Elsen, EPA
Jim Freeman, US DOJ
Joe Vranka; EPA
Chris Wardell; EPA
Jean Belille; EPA
Janice Hogan; CTEC

EPA REGION 8 QA DOCUMENT REVIEW CROSSWALK

QAPP/FSP/SAP for: *(check appropriate box)* **GRANTEE** **CONTRACTOR** **EPA** **Other**	**Entity** *(grantee, contract, EPA AO, EPA Program, Other)* AR and BSB County	**Regulatory Authority** **and/or** **Funding Mechanism**	**___ 2 CFR 1500 for Grantee/Cooperative Agreements** **___ 48 CFR 46 for Contracts** **___ Interagency Agreement** **___ EPA/Court Order** **___ EPA Program Funding** **___ EPA Program Regulation** **___ EPA CIO 2105**
Document Title *[Note: Title will be repeated in Header]*	BPSOU Draft Final Reclaimed Areas Maintenance and Monitoring QAPP (6/29/17)		
QAPP/FSP/SAP Preparer	AR and BSB County		
Period of Performance *(of QAPP/FSP/SAP)*	**2017-2018**	**Date Submitted for Review**	6/29/17
EPA Project Officer **EPA Project Manager**	Nikia Greene	**PO Phone #** **PM Phone #**	
QA Program Reviewer or Approving Official	Nikia Greene	**Date of Review**	7/20/17

Documents Submitted for QAPP Review **(QA Reviewer must complete)*:***

1. QA Document(s) submitted for review:

QA Document	Document Date	Document Stand-alone	Document with QAPP
QAPP	**6/29/17**	**Yes** / No	
FSP		Yes / No	Yes / No
SAP		Yes / No	Yes / No
SOP(s)	**(attached)**		**Yes** / No

2. WP/SOW/TO/PP/RP Date _____
WP/SOW/TO/RP Performance Period _____

3. QA document consistent with the:
WP/SOW/PP for grants? Yes / No
SOW/TO for contracts? Yes / No

4. QARF signed by R8 QAM Yes / No / NA
Funding Mechanism IA / contract / grant / NA
Amount _____

Notes for Document Submittals:

1. A QAPP written by a Grantee, EPA, or Federal Partner must include for review: Work Plan(WP) / Statement of Work (SOW) / Program Plan (PP) / Research Proposal (RP) and funding mechanism

2. A QAPP written by Contractor must include for review:
- **a)** Copy of Task Order Work Assignment/SOW
- **b)** Reference to a hard or electronic copy of the contractor's approved QMP
- **c)** Copy of Contract SOW if no QMP has been approved
- **d)** Copy of EPA/Court Order, if applicable
- **e)** The QA Review must determine (with the EPA CO or PO) if a QARF was completed for the environmental data activity described in the QAPP.

3. a. Field Sampling Plan (FSP) and/or Sampling & Analyses Plan (SAP) must include the Project QAPP ***or*** must be a stand-alone QA document that contain all QAPP required elements (Project Management, Data Generation/Acquisition, Assessment and Oversight, and Data Validation and Usability).

c. SOPs must be submitted with a QA document that contains all QAPP required elements.

Summary of Comments *(highlight significant concerns/issues)*:

1. A QAPP is a formal document describing in comprehensive detail the necessary QA, QC, and other technical activities that must be implemented to ensure the results of the work performed will satisfy the stated performance criteria. The QAPP must provide sufficient detail to demonstrate that the project's technical and quality objectives are identified and that the intended measurements, data generation, and data acquisition methods are appropriate for achieving project objectives.

Implementation of the BRES is a complex task and Atlantic Richfield Company (AR)/Butte Silver Bow (BSB) County have devised new methods, mostly positive, to meet the BRES program objectives originally outlined in the 2006 ROD. This M&M QAPP is a good first attempt at adding the technological improvements that have developed since the mid-2000s. However, the M&M QAPP falls short on explaining how some elements of the BRES will be executed in the field and documented. The specific comments in this crosswalk mostly pertain to addressing these deficiencies.

Response: Comment noted. AR/BSB have prepared the revised QAPP to address deficiencies to meet Agency approval.

2. Recent discussions with BSB County established that the BRES Evaluation Field Form in Attachment 1 is no longer being used, although the information on the form is being applied and populated in an iPad app. The use of tablet computers in the field is a significant advancement over the paper and pen system originally envisioned by the BRES document attached to the ROD. However, this M&M QAPP provides little information describing the program database and input of site data and information into the tablet computers. The new process for BRES data gathering should be described in more detail in several places in the document. EPA also suggests that a user guide be developed and included in Attachment 1. A sample of a user guide accompanies this crosswalk.

Response: The User's Guide will be developed by BSB to describe use of the field tablet device as an evaluation and data collection tool utilized during annual field evaluations, routine maintenance, and opportunistic field evaluations. The Guide will be reviewed annually with field personnel during annual field evaluation training, and after any updates are made to the Guide.

3. As a critical component of the ROD, documenting all BRES activities, noting site deficiencies, preparing corrective actions, and tracking site progress and changes are all critical to EPA's ability assess whether remedial action objectives are being met. While it may seem burdensome, EPA must be able at any given time to understand the status of any site without having to request this information first from AR/BSB County.

Response: Access to the ArcGIS Online program which is used to store and display reclaimed areas data is available to the Agencies. Site access and log-in information has been provided to Agency personnel. Access will also be provided to the Access Databases containing all tabular data as well.

4. AR/BSB County should expect that annual revisions to the M&M QAPP will be necessary on an annual basis. EPA anticipates that the effort to produce the updated M&M QAPP will be reduced as refinements are made each year.

Response: Annual revisions to the QAPP are anticipated to address and appropriately document changes to the program. Annual updates will include reference to annual field evaluations and annual operations and maintenance report(s).

5. The AR and BSB County must address the comments in the Summary of Comments, as well as those identified in the Comment section(s) that includes a "Response (date)" and Resolved (date)".

Response: Comments provided in this Summary of Comments section and those identified in the Comments sections below are presented with the response date provided in the attached cover letter. The resolved date is anticipated to coincide with the date of Final Agency approval.

Element	Acceptable *Yes/No/NA*	Page/ Section	Comments
A. Project Management			
A1. Title and Approval Sheet			

a. Contains project title	Yes	Title page and page i	EPA: No comments.
b. Date and revision number line (for when needed)	No	Title page and page i	EPA: Add a revision number line to the title and approval pages. **Response: The Revision number line has been added to the title and approval page (i) as requested.**
c. Indicates organization's name	Yes	Title page	EPA: No comments.
d. Date and signature line for organization's project manager	Yes	Page i	EPA: No comments.
e. Date and signature line for organization's QA manager	No	Page i	EPA: Add "Quality Assurance Approval Official" to Nikia Greene's signature line. **Response: "Quality Assurance Approval Official" has been added the EPA Project Manager approval line, page i, as requested.**
f. Other date and signatures lines, as needed	Yes	Page i	EPA: No comments.
A2. Table of Contents			
a. Lists QA Project Plan information sections	Yes	Pages v to vii	EPA: No comments.
b. Document control information indicated	Yes	Page vii	EPA: No comments.
A3. Distribution List			
Includes all individuals who are to receive a copy of the QA Project Plan and identifies their organization	Yes	Pages ii to iv	EPA: No comments.
A4. Project/Task Organization			
a. Identifies key individuals involved in all major aspects of the project, including contractors	Yes	Sections 2.0 through 2.3	EPA: No comments.
b. Discusses their responsibilities	Yes	Sections 2.0 through 2.3	EPA: No comments.
c. Project QA Manager position indicates independence from unit generating data	No	Section 2.2, Figure 2	EPA: Terry Moore is listed as the QAM on Figure 2, however, the text within the document does not reflect or discuss this. **Response: Section 2.2 has been revised to reflect the role of the AR QAM.**
d. Identifies individual responsible for maintaining the official, approved QA Project Plan	Yes	Section 2.3	EPA: No comments.
e. Organizational chart shows lines of authority and reporting responsibilities	Yes	Figure 2	EPA: No comments.

A5. Problem Definition/Background			
a. States decision(s) to be made, actions to be taken, or outcomes expected from the information to be obtained	No	Sections 1.0 and 2.4	EPA: In Section 1.1, remove the two references to the Uniform Federal Policy for QAPPs (i.e., EPA 2005). This document is not in the format of a UFP-QAPP. Edit the reference section accordingly. Replace the second to last sentience of the first paragraph of Section 1.1 with: "This QAPP has been developed in accordance with the *EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5* (EPA 2001), the *Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G4* (EPA 2006), and the *EPA Region 8 Quality Assurance Document Review Crosswalk* checklist (EPA 2016)." **Response: Section 1.1 has been modified as requested.**
b. Clearly explains the reason (site background or historical context) for initiating this project	Yes	Sections 2.4 and 2.5	EPA: No comments.
c. Identifies regulatory information, applicable criteria, action limits, etc. necessary to the project	Yes	Sections 2.4 and 2.5	EPA: No comments.
A6. Project/Task Description			
a. Summarizes work to be performed, for example, measurements to be made, data files to be obtained, etc., that support the project=s goals	Yes	Section 2.5	EPA: No comments.
b. Provides work schedule indicating critical project points, e.g., start and completion dates for activities such as sampling, analysis, data or file reviews, and assessments	Yes	Section 2.5	EPA: No comments.
c. Details geographical locations to be studied, including maps where possible	No	Section 2.5	EPA: The quadrants discussed in Section 2.5.1 should be depicted in Figure 1. Additionally, a list of the sites included in the M&M program should be included. EPA understands that the list of sites in the M&M program is subject to modification and update. These modifications and updates can be incorporated as part of the annual QAPP revision. **Response: Figure 1 has been revised to illustrate the reclaimed areas included in the scope of this QAPP, and potential areas that may be included. Table 1 has been added to list areas by BRES Quadrant and cross reference site identification numbers to BRES Site ID. Additional sites will be added to revisions as necessary.**

d. Discusses resource and time constraints, if applicable	No	Section 2.5	EPA: Please expand on the time constraints of the BRES program, e.g., the window for conducting the site evaluations, the appropriate times for seeding, the optimal time for herbicide application, etc. EPA suggests that a table showing the acceptable timeframes for various tasks be prepared. **Response: The text has been revised to include Table 2 in Section 2.5.2 which provides acceptable application dates.**
A7. Quality Objectives and Criteria			
a. Identifies - performance/measurement criteria for all information to be collected and acceptance criteria for information obtained from previous studies, - including project action limits and laboratory detection limits and - range of anticipated concentrations of each parameter of interest	No	Section 2.6	EPA: In Step 1, please modify the second sentence of the indented text to read "…maintained to achieve the performance standards described by EPA in the Butte Reclamation Evaluation System (BRES), which is attached to the ROD as Appendix E." In Step 3, again the BRES form is no longer the method used by BSB County to document site data and conditions. The current documentation method should be described. In Step 4, after the first sentence of the indented text, as the sentence: "The BRES evaluation does not include residential yards or playgrounds." In Step 5, reword the second sentence of the indented text to read: "The field evaluations identify specific trigger items with deficiencies that require corrective action and monitoring." Also towards the end of Step 5, reference is made to soil sampling being "performed following accordance with procedures listed in the 2005 BPSOU Source Area SAP (BP, 2005)." However, QAPPs are intended to be self-contained documents that generally should not reference external sampling procedure documents; therefore, incorporate the needed content into the M&M QAPP and remove the external reference (i.e., to BP 2005). In the second to last paragraph of Step 5, please include an explanation for the 6-18-inch sampling depth. **Response: The text in Step 1 has been modified as requested.** **Step 3 has been revised to include "Results for each site are entered into the BRES Evaluation database form (Attachment 1) on a field-capable device, provided electronically a the BRES Evaluation Field database form (Attachment 1) and uploaded to the project database as described in the BPSOU Reclaimed Areas User's Guide (scheduled to be published in 2018)." The field form is included to represent what data is recorded during the evaluation process.** **Steps 4 and 5 have been revised as requested. Reference to external sampling procedures were removed from the text. Sampling procedures are described in the QAPP. Per BHRS 18-inches is considered the minimum thickness required for long-**

			term cap success. Sampling to this depth may be required to confirm remediation meets BHRS, and support decisions related to soil quality to promote vegetative growth.
b. Discusses precision	No	Section 2.6.2	EPA: The text here covers the essential concept of precision, but more information on how this relates to the BRES evaluations is needed. For example, separate BRES assessment teams need to produce reproducible data. **Response: Section 2.6.2 has been revised to include additional information related to the concept of precision of field evaluation teams. Field evaluation teams annually undergo a mandatory training session describing vegetative cover identification, vegetative cover estimation method, erosional assessment, identification of trigger items, and use of iPads to record and report data. Field evaluation teams are trained to visually estimate vegetation cover using a modified point intercept method which utilizes frames of 0.25 square meters (m^2) with a 10-point grid system to quantitatively measure cover. Laser pointers are used in conjunction with a grid of 10 points on a frame. The type of material intercepted by the lasers is identified and recorded to determine percent live plant cover, litter, rocks, and bare ground. The field crew's experience is tested by making a visual estimate of cover on an area, then quantitatively measuring cover on the same area. Vegetation training is complete once the field crew can reliably estimate vegetation cover to within ±10 percent.**
c. Addresses bias	No	Section 2.6.2	EPA: The text here covers the essential concept of accuracy/bias, but more information on how this relates to the BRES evaluations is needed. For example, separate BRES assessment teams need to be very close on their estimates of live cover. **Response: Section 2.6.2 has been revised to address bias related to field evaluations. Field teams receive annual training to identify and estimate vegetative cover. Field teams calibrate live cover estimates within through an iterative process of individual estimates and comparisons with other evaluators. Calibration is complete once estimates are within +/- 10 percent of each other. Up to 10 percent of the sites evaluated each week are randomly chosen to be quantitatively measured using the modified point intercept method. Evaluator bias is addressed through application of the random selection of vegetative evaluation. Evaluators employ a process which involves a random number generator and blindly tossing an object to determine placement of**

			the evaluation grid.
d. Discusses representativeness	No	Section 2.6.2	EPA: As with precision and accuracy above, the text needs to be modified to how representativeness applies to BRES parameters. **Response: Section 2.6.2 has been revised to address representativeness related to field evaluations. Representative vegetation evaluation samples are obtained across sites by utilizing specific methodology (point intercept grid) randomly across the site. Multiple samples are evaluated to generate an overall site score.**
e. Identifies the need for completeness	Yes	Section 2.6.2	EPA: No comments.
f. Describes the need for comparability	Yes	Section 2.6.2	EPA: No comments.
g. Discusses desired method sensitivity	No	NA	EPA: Please add a discussion on sensitivity. **Response: Section 2.6.2 has been to include "Sensitivity describes how the uncertainty in an output can be apportioned to sources of uncertainty in its inputs. Sensitivity of BRES evaluations can be attributed to variability in environmental and site conditions. Evaluations are constrained to be completed annually immediately after evaluators training is complete. Evaluations will be completed annually within the same month each year."**
A8. Special Training/Certifications			
a. Identifies any project personnel specialized training or certifications	No	Section 2.7	EPA: In the first paragraph, please make sure that it is clear this is BRES training. Also, site personnel should have HAZWOPER training. **Response: Section 2.7 was revised to reflect training evaluation personnel will receive annually. Evaluators are not required to complete HAZWOPER training. Evaluations are performed on areas that have been reclaimed. Personnel performing field evaluations are not required to perform sampling activities that would create a potential to come in direct contact with waste material.** **Section 2.7.2 has been revised to include HAZWOPER training for field personnel performing sampling activities.**
b. Discusses how this training will be provided	Yes	Section 2.7	EPA: No comments.

c. Indicates personnel responsible for assuring training/certifications are satisfied	No	Section 2.7	EPA: The personnel responsible for this element need to be identified. **Response: Section 2.7 has been revised to include "The BSB Superfund Manager will verify training has been completed by all personnel prior to conducting field evaluations and collecting samples. All training records will be maintained by the BSB Superfund Program Data Administrator and summarized in the annual completion report."**
d. identifies where this information is documented	Yes	Section 2.7	EPA: No comments.
A9. Documentation and Records			
a. Identifies report format and summarizes all data report package information	Yes	Section 2.8	EPA: No comments.
b. Lists all other project documents, records, and electronic files that will be produced	Yes	Section 2.8	EPA: No comments.
c. Identifies where project information should be kept and for how long	No	Section 2.8	EPA: Please add text on how the project information described in Section 2.8 can be obtained, where it is being stored, and for how long. **Response: Section 2.8 has been revised to include all non-geospatial data is stored in a MS Office Access database.**
d. Discusses back up plans for records stored electronically	No	Section 2.8	EPA: Please add more detail on how the data and information is backed up. **Response: Section 2.9 Data Storage and Backup has been added to the revised document.**
e. States how individuals identified in A3 will receive the most current copy of the approved QA Project Plan, identifying the individual responsible for this	No	Section 2.8	EPA: Please clarify how the QAPP will be distributed and identify the individual responsible for this. **Response: Section 2.8.7 has been revised to include "…this QAPP will be maintained in the project database and updated annually, at a minimum. The BSB Superfund Operations Manager will maintain the document and perform updates as necessary. Hard copies distributed will be to field team leaders and the information accessible using field devices.** **Any addendums or revisions to this QAPP will be electronically distributed to all parties identified on the distribution list by the BSB Superfund Operations Manager. All records will be maintained and archived electronically for future reference. Updates will be provided, communicated, and implemented in a manner consistent with BSB Superfund internal protocol."**

B. Data Generation/Acquisition			
B1. Sampling Process Design (Experimental Design)			
a. Describes and justifies design strategy, indicating size of the area, volume, or time period to be represented by a sample	No	Section 3.3	EPA: It is unclear the soil types and purpose of the sampling described in Section 3.3. In other words, is this sampling being applied to areas already reclaimed, to unreclaimed areas, to barren areas, to potential topsoil sources? Please clarify. **Response: Section 3.3 has been revised to include "Sampling performed in reclaimed areas to address specific trigger items (i.e. exposed mine waste, barren areas, etc.) or support related maintenance tasks (cover soil characterization)."**
b. Details the type and total number of sample types/matrix or test runs/trials expected and needed	No	Section 3.3	EPA: The use of tablet computers in the field is a significant advancement over the paper and pen system originally envisioned by the BRES document attached to the ROD. However, this M&M QAPP provides little information describing the program database and input of site data and information into the tablet computers. EPA suggests that the BRES field form provided in Attachment 1 be augmented with a user guide. **Response: Atlantic Richfield and BSB concur development of a User's guide as to supplement use of the BRES field device tablet will be beneficial. The field form is provided in the QAPP to illustrate the data obtained through the field evaluation process. This field form has been incorporated into digital form and utilized in field evaluations. The user's guide will describe using this form electronically to record field evaluations.**
c. Indicates where samples should be taken, how sites will be identified/located	No	Section 3.3.1, Attachment 1	EPA: As noted above in B1a, it is not clear the solid media type that is being sampled. Please clarify. **Response: Section 3.3.1 title has been revised to Soil Sample Collection. The text has been revised to include "the collection of soil samples performed under this QAPP will be completed as described in the steps provided below".** **Section 3.3 provides additional information referencing site-specific sampling and analysis plans (SAPs) SAPs which will provide detailed sampling requirements (specific site maps, sample collection locations, and depth of sample collection).**
d. Discusses what to do if sampling sites become inaccessible	NA	NA	EPA: This is not an anticipated issue.
e. Identifies project activity schedules such as each sampling event, times samples should be sent to the laboratory, etc.	Yes	Section 2.5.1 and 2.5.2.1	EPA: No comments.

f. Specifies what information is critical and what is for informational purposes only	Yes	Section 3.2	EPA: No comments.
g. Identifies sources of variability and how this variability should be reconciled with project information	Yes	Step 6	EPA: The sources of variability are well covered in the BRES document in the ROD. A note to the effect should be added to the QAPP in Step 6 or other appropriate location. **Response: Site baseline conditions were documented in the development of original site boundaries, and sources of variability are described in the ROD, Appendix E (BRES) has been added to Step 6.**
B2. Sampling Methods			
a. Identifies all sampling SOPs by number, date, and regulatory citation, indicating sampling options or modifications to be taken	Yes	Section 3.3	EPA: Please note that the CFRSSI SOPs cited are out of date and need updating. This will become a part of the annual revision as new SOPs are developed and approved. **Response: Comment noted, obsolete SOPs will be updated, and included with annual revisions.**
b. Indicates how each sample/matrix type should be collected	Yes	Section 3.3.1	EPA: No comments.
c. If in situ monitoring, indicates how instruments should be deployed and operated to avoid contamination and ensure maintenance of proper data	NA	NA	EPA: No in-situ instruments will be deployed.
d. If continuous monitoring, indicates averaging time and how instruments should store and maintain raw data, or data averages	NA	NA	EPA: No continuous monitoring instruments will be deployed.
e. Indicates how samples are to be homogenized, composited, split, or filtered, if needed	No	Section 3.4.1	EPA: EPA recommends that all soil-like materials be sieved (No. 10) prior to lab or XRF analysis. In addition, more consistent results will be obtained if XRF samples are analyzed using XRF cups as opposed to analyzing the samples in the plastic sample bags. Please revise. **Response: Comment noted, samples will be sieved using a No. 10 sieve.** **Case studies have shown portable XRF analysis of samples through a plastic bag yield reliable data that can be used to make timely decisions in the field. Results within the specified threshold can be confirmed through laboratory analysis.**
f. Indicates what sample containers and sample volumes should be used	No	Section 3.3.1 and 3.6.1	EPA: In Section 3.6.1, please add the container type and sample volume requirement for the non-metals analysis. **Response: Section 3.6.1 has been updated to include sample volume, and size and type of sample container. "Approximately 500 to 800 grams of material will be collected in a single resealable (ZipLoc® type), quart-sized plastic bag"**

g. Identifies whether samples should be preserved and indicates methods that should be followed	Yes	Section 3.3.1	EPA: No comments.
h. Indicates whether sampling equipment and samplers should be cleaned and/or decontaminated, identifying how this should be done and by-products disposed of	No	Section 3.4.1	EPA: Please specify the process for decontaminating the sieves. **Response: Section 3.4.4 has been added to describe decontamination procedures. Sampling equipment will be decontaminated using the procedure below (and any related SOPs). All equipment will also be decontaminated before leaving the site to prevent off-site transport of contaminants.** • **Rinse with water.** • **Wash with non-phosphate detergent.** • **Rinse three times with deionized water.** • **Air dry.** **Equipment decontamination SOP is also provided in Attachment 2.**
i. Identifies any equipment and support facilities needed	No	TBD Revised to Section 3.5.1	EPA: Please specify in the document where the sample preparation and XRF analytical work will be performed. **Response: Section 3.5.1 has been revised. XRF samples are prepared and analyzed in a dedicated sample preparation area within the offices of the BSB Reclamation Division.**
j. Addresses actions to be taken when problems occur, identifying individual(s) responsible for corrective action and how this should be documented	Yes	Section 3.11	EPA: No comments.
B3. Sample Handling and Custody			
a. States maximum holding times allowed from sample collection to extraction and/or analysis for each sample type and, for in-situ or continuous monitoring, the maximum time before retrieval of information	No	Section 3.4.2	EPA: The holding times for metals and non-metals samples were not specified. Of course, soil-like samples for metals are generally insensitive to a holding time, but the non-metal analytes should have holding times and preservative (e.g., ice) specified. **Response: Section 3.4.2 has been revised. Sample analysis will be performed prior to expiration of the 28-day holding time.**
b. Identifies how samples or information should be physically handled, transported, and then received and held in the laboratory or office (including temperature upon receipt)	Yes	Section 3.4.2	EPA: No comments.
c. Indicates how sample or information handling and custody information should be documented, such as in field notebooks and forms, identifying individual responsible	Yes	Section 3.4.2	EPA: No comments.

d. Discusses system for identifying samples, for example, numbering system, sample tags and labels, and attaches forms to the plan	No	Section 3.4	EPA: Please provide further details on the sample identification scheme and provide examples. EPA believes a consistent sample identification scheme from year to year will be beneficial. **Response: The alphanumeric sample identification system is described in Section 3.4. An example of the system is provided in the text.**
e. Identifies chain-of-custody procedures and includes form to track custody	Yes	Section 3.4.2	EPA: No comments.
B4. Analytical Methods			
a. Identifies all analytical SOPs (field, laboratory and/or office) that should be followed by number, date, and regulatory citation, indicating options or modifications to be taken, such as sub-sampling and extraction procedures	No	Section 3.3.1 and 3.5	EPA: The manual for the Niton XL3t XRF is included with the document, but is not referenced in the text nor is it specified where and when the manual should be used. Please reference and specify. **Response: The document has been revised to include reference to the Niton XL3t XRF manual provided in Attachment 2.**
b. Identifies equipment or instrumentation needed	Yes	Section 3.3.2	EPA: No comments.
c. Specifies any specific method performance criteria	No	Section ~~3.4.3 and~~ 3.5	EPA: While the action levels specified in Table 1 are appropriate, the uncertainty in the XRF data is not being considered. An XRF sample result that is slightly or somewhat below an action level could have a true value that exceeds the action level. For example, the method outlined for analyzing samples through the sample bag are likely to be biased low. To prevent errors regarding the true value of a sample, XRF sample results near but below the action level should also be submitted for laboratory analysis. After a series of samples have been submitted, a cutoff below the action level can be calculated; however, as a starting point, EPA recommends that XRF samples within 25% of the action level also be submitted for confirmatory analysis. **Response: Comment noted. Section 3.5.2 has been updated to include the recommended threshold of action level to be submitted for laboratory analysis. Field XRF samples within 25% of the action level can be submitted for confirmation analysis, or simply remediated to meet BHRS at the discretion of BSB Superfund Manager. Field XRF is useful to verify the presence of COCs near threshold limits to determine remediation requirements. Precise quantification of contaminants will likely be obtained from analytical laboratory samples as appropriate.**

d. Identifies procedures to follow when failures occur, identifying individual responsible for corrective action and appropriate documentation	No	Section 3.5	EPA: While the answer to this item is alluded to in Section 3.11 and in Section 4.0 for laboratory analyses, it was not readily evident the individual responsible for corrective action and appropriate documentation for the XRF analyses. **Response: Text from Section 4.1 "Corrective action in the laboratory may occur prior to, during, and after initial analyses. A number of conditions such as broken sample containers, preservation or holding-time issues, and potentially high-concentration samples may be identified during sample log-in or just prior to analyses. ...All corrective actions taken by the laboratory will be documented in writing by the laboratory project manager and reported to the BSB QA Officer and Atlantic Richfield Operations Project Manager. In the event that corrective action requests are not in complete accordance with approved project planning documents, the EPA will be consulted, and concurrence will be obtained before the change is implemented. "**
e. Identifies sample disposal procedures	Yes	Section 3.4.3	EPA: No comments.
f. Specifies laboratory turnaround times needed	No	Section 3.5	EPA: Please specify the laboratory turnaround times needed. Standard turnaround time would likely be sufficient. **Response: Sections 3.5 & 3.6 have been revised to include 28-day laboratory turnaround time.**
g. Provides method validation information and SOPs for nonstandard methods	Yes	Section 5.0	EPA: No comments.
B5. Quality Control			
a. For each type of sampling, analysis, or measurement technique, identifies QC activities which should be used, for example, blanks, spikes, duplicates, etc., and at what frequency	No	Section 3.3.1 and 3.7	EPA: A similar description of the XRF QC samples and measures as that described in Section 3.7 is needed. Presently, the QC elements for the XRF analysis are presented in dispersed sections. For example, at what frequency will standards (e.g., NIST) be run? Also, standards that encompass a range of concentration (i.e., low, medium, high) should be analyzed to verify the function of the XRF unit. **Response: Section 3.7.5 has been added to include Field XRF Field Quality Control Samples. Field XRF devices will undergo calibration prior to use. The device will be calibrated, and Standard Reference material tests conducted as described in the manufacturer's recommendations and presented in field SOPs. Field XRF quality control samples will include blanks, calibration verification check samples, and replicate samples.**

b. Details what should be done when control limits are exceeded, and how effectiveness of control actions will be determined and documented	Yes	Section 3.7.2	EPA: A similar discussion as that presented in Section 3.7.2 should be provided for XRF analysis. The process for identifying and correcting XRF function issues is needed. **Response: Section 3.7 has been revised to include Section 3.7.5 Field XRF Quality Control Samples.**
c. Identifies procedures and formulas for calculating applicable QC statistics, for example, for precision, bias, outliers and missing data	Yes	Section 2.8.7	EPA: Please add to the final bullet "XRF correlative statistics". **Response: XRF correlative statistics has been added to the bulleted list.**
B6. Instrument/Equipment Testing, Inspection, and Maintenance			
a. Identifies field and laboratory equipment needing periodic maintenance, and the schedule for this	Yes	Section 3.8	EPA: No comments.
b. Identifies testing criteria	Yes	Section 3.8	EPA: No comments.
c. Notes availability and location of spare parts	Yes	Section 3.8	EPA: No comments.
d. Indicates procedures in place for inspecting equipment before usage	Yes	Section 3.8	EPA: No comments.
e. Identifies individual(s) responsible for testing, inspection and maintenance	Yes	Section 3.8	EPA: No comments.
f. Indicates how deficiencies found should be resolved, re-inspections performed, and effectiveness of corrective action determined and documented	Yes	Section 3.8	EPA: No comments.
B7. Instrument/Equipment Calibration and Frequency			
a. Identifies equipment, tools, and instruments that should be calibrated and the frequency for this calibration	No	Section 3.7.5	EPA: See comment for B5a. XRF unit function needs to be routinely verified against standards (e.g., NIST). **Response: Section 3.7 has been revised. Field XRF devices will undergo calibration prior to use. The device will be calibrated, and Standard Reference material tests conducted as described in the manufacturer's recommendations and presented in field SOPs. Section 3.7.5 describes Field XRF Quality Control Samples and the routine tasks for quality assurance are included in the XRF SOP (Attachment 2).**
b. Describes how calibrations should be performed and documented, indicating test criteria and standards or certified equipment	No	Section 3.7	EPA: See comment for B5a. XRF unit function needs to be routinely verified against standards (e.g., NIST). **Response: Section 3.7 has been revised, and the XRF SOP includes routine tasks for quality assurance. Field personnel will analyze this sample at the beginning of each day, once per every 20 samples, and at the end of each day's analysis.**

c. Identifies how deficiencies should be resolved and documented	No	Section 3.7.2	EPA: See comment for B5b. **Response: Section 3.7 has been revised. Section 3.7.5.2 Calibration Verification Check Samples has been added to describe protocol if value falls outside of expected results. "The measured values of a standard will be compared to the expected results, and if a measured value falls outside this range then the check sample will be reanalyzed. If the value continues to fall outside the acceptance range, this information will be noted on the XRF log. If any of the check sample results indicate that the XRF is not analyzing accurately, the XRF will be turned off, cleaned, and the energy calibration rerun. This information will be noted in the logbook and on the XRF field data sheet."**
B8. Inspection/Acceptance for Supplies and Consumables			
a. Identifies critical supplies and consumables for field and laboratory, noting supply source, acceptance criteria, and procedures for tracking, storing and retrieving these materials	Yes	Section 3.9	EPA: No comments.
b. Identifies the individual(s) responsible for this	Yes	Section 3.9	EPA: No comments.
B9. Use of Existing Data (Non-direct Measurements)			
a. Identifies data sources, for example, computer databases or literature files, or models that should be accessed and used	Yes	Section 3.10	EPA: No comments.
b. Describes the intended use of this information and the rationale for their selection, i.e., its relevance to project	Yes	Section 3.10	EPA: No comments.
c. Indicates the acceptance criteria for these data sources and/or models	Yes	Section 3.10	EPA: No comments.
d. Identifies key resources/support facilities needed	Yes	Section 3.10	EPA: No comments.
e. Describes how limits to validity and operating conditions should be determined, for example, internal checks of the program and Beta testing	Yes	Section 3.10	EPA: No comments.
B10. Data Management			
a. Describes data management scheme from field to final use and storage	Yes	Section 3.11	EPA: No comments.
b. Discusses standard record-keeping and tracking practices, and the document control system or cites other written documentation such as SOPs	No	Section 3.11, Attachment 1	EPA: See comment for B1b. Please include standard record-keeping and tracking practices in the user guide for Attachment 1. **Response: Comment noted, a User's guide will be developed and incorporate appropriate procedures to ensure integrity of data.**

c. Identifies data handling equipment/procedures that should be used to process, compile, analyze, and transmit data reliably and accurately	No	Section 3.11, Attachment 1	EPA: See comment for B1b. Please include data handling equipment/procedures that should be used to process, compile, analyze, and transmit data reliably and accurately in the user guide for Attachment 1. **Response: Comment noted, a User's guide will be developed and incorporate appropriate procedures to ensure integrity of data.**
d. Identifies individual(s) responsible for this	No	Section 3.11	EPA: Please add the individuals responsible for data management and/or add text clarifying this in Section 2.3. **Response: The Superfund Data Administrator is responsible for maintaining program data. This role has been described in Section 2.3.**
e. Describes the process for data archival and retrieval	No	Section 3.11, Attachment 1	EPA: See comment for B1b. Please include data archival and retrieval practices here or in the user guide for Attachment 1. **Response: Comment noted, as User's Guide will be developed and incorporate appropriate procedures to ensure integrity of data.**
f. Describes procedures to demonstrate acceptability of hardware and software configurations	Yes	Section 3.11	EPA: No comments.
g. Attaches checklists and forms that should be used	Yes	Section 3.11, Attachment 1	EPA: No comments.
C. Assessment and Oversight			
C1. Assessments and Response Actions			
a. Lists the number, frequency, and type of assessment activities that should be conducted, with the approximate dates	Yes	Section 4.0	EPA: No comments at this time.
b. Identifies individual(s) responsible for conducting assessments, indicating their authority to issue stop work orders, and any other possible participants in the assessment process	Yes	Section 4.0	EPA: No comments at this time.
c. Describes how and to whom assessment information should be reported	Yes	Section 4.1 and 4.2	EPA: No comments at this time.
d. Identifies how corrective actions should be addressed and by whom, and how they should be verified and documented	Yes	Section 4.1 and 4.2	EPA: No comments at this time.
C2. Reports to Management			
a. Identifies what project QA status reports are needed and how frequently	Yes	Section 4.3	EPA: No comments at this time.
b. Identifies who should write these reports and who should receive this information	Yes	Section 4.3	EPA: No comments at this time.

D. Data Validation and Usability			
D1. Data Review, Verification, and Validation			
Describes criteria that should be used for accepting, rejecting, or qualifying project data	Yes	Section 5.0	EPA: No comments at this time.
D2. Verification and Validation Methods			
a. Describes process for data verification and validation, providing SOPs and indicating what data validation software should be used, if any	Yes	Section 5.0	EPA: No comments at this time.
b. Identifies who is responsible for verifying and validating different components of the project data/information, for example, chain-of-custody forms, receipt logs, calibration information, etc.	Yes	Section 5.0	EPA: No comments at this time.
c. Identifies issue resolution process, and method and individual responsible for conveying these results to data users	Yes	Section 5.0	EPA: No comments at this time.
d. Attaches checklists, forms, and calculations	Yes	Section 5.0	EPA: No comments at this time.
D3. Reconciliation with User Requirements			
a. Describes procedures to evaluate the uncertainty of the validated data	Yes	Section 5.0	EPA: No comments at this time.
b. Describes how limitations on data use should be reported to the data users	Yes	Section 5.0	EPA: No comments at this time.

SILVER BOW CREEK/BUTTE AREA NPL SITE
BUTTE PRIORITY SOILS OPERABLE UNIT

2021

Final

Reclaimed Areas
Maintenance and Monitoring
Quality Assurance Project Plan (QAPP)

Prepared for:

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and

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Revision 1. February 2021

APPROVAL PAGE

BPSOU Reclaimed Areas Maintenance and Monitoring
Quality Assurance Project Plan
Butte Area NPL Site

Approved: _____ Date: _____
Nikia Greene, Site Project Manager, EPA, Region 8

Approved: _____ Date: _____
Daryl Reed, Project Officer, Montana DEQ

Approved: Mike McAnulty Date: 6/25/2021
Mike Mc Anulty, Liability Manager
Atlantic Richfield Company

Approved: Laura Moon Date: 6/25/2021
Laura Moon, Quality Assurance Manager
Pioneer Technical Services
for Atlantic Richfield Company

2021
Plan is effective on date of approval.

DOCUMENT REVISION SUMMARY

Revision No.	Author	Description	Date
	Pioneer Technical Services, Inc.	Annual Update	June 2021

DISTRIBUTION LIST
BPSOU Reclaimed Areas Monitoring and Maintenance
Quality Assurance Project Plan
Butte Area NPL Site

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LIST OF ACRONYMS

Acronym	Definition	Acronym	Definition
°C	degrees Celsius	**MS**	matrix spike
ASA	American Society of Agronomy	**MSD**	matrix spike duplicate
bgs	Below Ground Surface	**NIST**	National Institute of Standards and Testing
BPSOU	BPSOU Butte Priority Soils Operable Unit	**NPL**	National Priorities List
BHRS	Butte Hill Revegetation Specifications	**O&M**	Operation and Maintenance
BRES	Butte Reclamation Evaluation System	**PDF**	Portable Document Format
BSB	Butte-Silver Bow	**QA**	Quality Assurance
CAP	Corrective action plan	**QAM**	Quality Assurance Manager
CAR	Corrective Action Report	**QAO**	Quality Assurance Officer
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	**QAPP**	Quality Assurance Project Plan
CLP	Contract Laboratory Program	**QC**	Quality Control
CoC	Chain of custody	**QMP**	Quality Management Plan
DEQ	Montana Department of Environmental Quality	**RCRA**	Resource Conservation and Recovery Act
DMP	Data Management Plan	**RI**	Reclamation improvement
DQO	Data Quality Objectives	**ROD**	Record of Decision
EC	Electrical conductivity	**RPD**	relative percent difference
EDD	Electronic Data Deliverable		
EPA	U.S. Environmental Protection Agency	**SAR**	Sodium adsorption ratio
FSP	Field Sampling Plan	**SOP**	Standard Operating Procedure
ESD	Explanation of Significant Differences	**SOW**	Statement of Work
GIS	Geographical Information System	**SMP**	standard maintenance procedure
GPS	Global Positioning System	**SRM**	standard reference material
HAZWOPER	Hazardous Waste Operations and Emergency Response	**SSHASP**	Site-Specific Health and Safety Plan
ICP-MS	Inducted Coupled Plasma-Mass Spectrometry	**SSSA**	Soil Science Society of America
LAP	laboratory analytical protocol	**VI**	vegetative improvements
LCS	laboratory control spike	**USDA**	United States Department of Agriculture
M&M	Maintenance and Monitoring	**USGS**	U.S. Geological Survey
mg/kg	milligram per kilogram	**XRF**	X-ray fluorescence

1.0 INTRODUCTION

To ensure performance standards achieved through remedial action are upheld, reclaimed areas (shown in Figure 1 and listed in Attachment 1) are monitored according to the Butte Reclamation Evaluation System (BRES), which is attached to the U.S. Environmental Protection Agency (EPA) Record of Decision (ROD) as Appendix E (EPA, 2006a), and referred to in this document as BRES; and maintained as described in the Butte Priority Soils Operable Unit (BPSOU) Reclaimed Areas Maintenance and Monitoring (M&M) Plan (M&M Plan). The BRES is the governing guidance document that all reclaimed areas in the BPSOU must follow as described in the EPA ROD. The BRES sets the methodology for evaluating the reclaimed areas and provides guidelines for corrective actions. The M&M Plan details the means and methods necessary to maintain reclaimed areas consistently to ensure the stability and integrity of those areas. Standard maintenance procedures (SMPs) provided in the M&M Plan provide assurance that maintenance performed on reclaimed areas is completed to a sufficient level that will continue to protect human health and the environment over the long term.

Individual site monitoring is performed by an independent third party in accordance with BRES, and the corresponding report provided to Butte-Silver Bow (BSB) (Appendix E) for review. As appropriate, BSB will initiate corrective action if necessary. Institutional control programs related to remedial activities are described in the latest version of the Atlantic Richfield BPSOU *Institutional Controls Implementation and Assurance Plan* (Atlantic Richfield, 2019).

1.1 Purpose

The BPSOU *Quality Management Plan* (QMP) (Atlantic Richfield, 2016) provides the overarching guidance to ensure collection of environmental data for the BPSOU meets requirements mandated by the EPA. This Quality Assurance Project Plan (QAPP) provides guidance for monitoring and maintenance activities and limited sampling and analyses and describes the quality assurance/quality control (QA/QC) policies and procedures to be implemented during routine data collection and analyses specific to BRES evaluations and maintenance of reclaimed areas. This QAPP has been developed in accordance with the EPA Requirements for QAPPs, EPA QA/R-5 (EPA, 2001), and the *Guidance on Systematic Planning Using the Data Quality Objectives (DQO) Process*, EPA QA/G4 (EPA, 2006b). This QAPP includes the following four key elements:

- Program management and objectives (Section 2.0).
- Measurement and data acquisition (Section 3.0).
- Assessment and oversight (Section 4.0). and
- Data review and usability (Section 5.0).

The sections below describe these key elements and detail any required planning, monitoring, sampling, and analyses. Sections in this QAPP expand on or reference information in other site-wide documents to comply with the Uniform Federal Policy for QAPPs (EPA, 2005) and to present project-specific requirements.

1.2 Databases

Within the program, there are a variety of databases that store reclaimed area information, Geographical Information System (GIS) locations, soil sample results, and other project data. Various individuals, from field personnel to operations personnel to data administrators, enter and manage the data (details are listed in sections 3-6). The database names used in this report are generalized as the program or project database, GIS database, reclamation database, or soils database. For specific information on the databases, refer to the current BPSOU Data Management Plan (DMP) (Atlantic Richfield, 2018), referred to in this report as the BPSOU DMP.

2.0 PROGRAM MANAGEMENT

This section addresses the BPSOU reclaimed areas program (Program) and project administrative functions as well as project background, objectives, and documentation requirements for maintenance, monitoring, sampling, and analysis activities on each project site. Figure 2 shows the program organization and communication structure.

2.1 Agency Oversight

The EPA and Montana Department of Environmental Quality (DEQ) (the *Agencies*) are responsible for project oversight, review, and approval of site-specific remediation plans. The Agencies also review sampling results and review and approve project reports described in Section 2.5.3.

2.2 Atlantic Richfield Company

Atlantic Richfield Company (Atlantic Richfield) confirms conformance to the BRES and Reclaimed Areas M&M Plan (Figure 2).

Atlantic Richfield Operations Liability Manager
The Atlantic Richfield Liability Manager, Mike Mc Anulty, monitors the performance of the contractor(s), consults with the Contractor Project Manager(s) and QA officer(s) on deficiencies and aids in finalizing resolution actions, and reviews all reclamation activities under the Program. An Atlantic Richfield project representative, or designated alternate, can perform a site walk-through and assist with preparation of a site-specific work plan prior to implementation, or provide confirmation of all reclamation performed.

Atlantic Richfield Operations Quality Assurance Manager
The Atlantic Richfield QA Manager, David Gratson, (QAM) interfaces with the Liability Manager on company policies regarding quality. The QAM has the authority and responsibility to approve specific QA documents including this QAPP.

2.3 Butte Silver Bow Department of Reclamation and Environmental Services Organization and Responsibilities

The BSB Department of Reclamation and Environmental Services performs all associated maintenance and monitoring required to ensure reclaimed areas in BPSOU remain protective of human health and the environment. Key individuals comprising the BSB Department of Reclamation and Environmental Services are shown on Figure 2 and responsibilities are described below.

Program Director
The Program Director, Eric Hassler, oversees all activities and implementation of remedial actions throughout the department related to Superfund.

Assistant Program Director
The Assistant Program Director, Julia Crain, assumes the role of QAM and is responsible for assuring the quality of all field data, completing QC activities, reviewing and maintaining laboratory data packages, compiling an Annual Summary Report, maintaining quality records and managing program data (as described in Section 2.8.7), and reporting final remediated property requirements to the Agencies. The Annual Summary Report will include figures displaying site sample location, analytical results, and copies of all field data.

Environmental and Operation and Maintenance Manager
The Environmental and Operation and Maintenance (O&M) Division Manager (O&M Manager), Brandon Warner, assumes the role of Project Manager for reclaimed areas monitoring, maintenance, and end-use compliance. The Project Manager is responsible for maintaining the official approved QAPP, scheduling all work to be completed, and ensuring that the work is performed in accordance with the requirements contained herein. The O&M Manager/Project Manager is also responsible for consulting with the BSB Program Director and/or Assistant Program Director regarding any project deficiencies and resolutions.

Data Management Division Manager
The Data Management Division Manager, Abby Peltomaa, assumes the role of QA Officer (QAO) and ensures data quality, verification, and validation is completed per the project QAPP. The QAO may also be part of the review team for project final reports. The QAO is responsible for evaluating information from instances of nonconformance, inspection reports, surveillance reports, audit and assessment reports, quality system reviews (QSRs), corrective action reports (CARs), and other sources. The QAO, in support of the QAM, may review assigned project QAPPs and associated Standard Operating Procedure (SOPs) annually and verify that the current project QAPP and SOPs are available.

GIS Data Specialist
The GIS Data Specialist, Jeremy Grotbo, will coordinate with the QAM to ensure up to date GIS data are verified and maintained in the project database. The GIS Data Specialist will be responsible for maintaining GIS data such as site boundaries, updating proposed changes to site boundaries as described within standard procedures, and providing notification of updates to team members.

Site Maintenance
Maintenance performed as a result of annual field evaluations may include additional sampling, standard maintenance procedures, or implementation of site-specific corrective action plans (CAPs) to address trigger items. Personnel from BSB will perform or oversee all maintenance activities for reclaimed areas. Maintenance is typically completed within one year of the evaluation, as site accessibility and weather conditions allow.

2.5.3 Project Reporting

Personnel from BSB will perform all reporting activities described in this QAPP, and compile and submit the reports listed below to the Agencies by the dates listed in Table 2.

Table 2. Project Reporting Periods.

Reporting Periods	BSB Preparation	Review - Final Approval
Summary Report	May 1 - September 30	October 1 – April 30
Site-Specific Sampling and Analysis Plan	May 1 - September 30	October 1 – April 30
Corrective Actions Plan	September 1 - December 30	February 1 - March 1
Annual Operation and Maintenance Report	December 1 - March 30	March 30

Recommendations Summary Report – *Submitted by September 30*
A recommendation summary report will provide a summary of the annual BRES field evaluations and identify additional site-specific engineering evaluation or site sampling and analysis requirements. The report will provide a data summary of trigger items identified, erosion and vegetation scores, and proposed type of corrective action for each site evaluated and identify additional sampling or engineering evaluations as applicable. Summary reports will be in a tabular format for ease of review and quantification of findings. The reports will be submitted to the Agencies for review, comment, and approval.

Site-Specific Field Sampling Plan – *Submitted by September 30*
A site-specific field sampling plan (FSP) will be prepared to identify the sampling locations and required analysis. The specific FSP will be submitted to the Agencies for review, comment, and approval prior to commencement of field activities.

Corrective Action Plan – *Submitted by December 30*
The CAP will provide a detailed approach to correct trigger items identified in the field evaluation reports for sites requiring vegetative improvements (VIs), or reclamation improvements (RIs). The reports should also provide additional monitoring requirements to verify the effectiveness of the recommended corrective measures. Site-specific data and sampling results (historic and current data) will be included with report to support proposed corrective action. The reports will be submitted to the Agencies for review, comment, and approval.

Table 3. Solid Media Action Levels

Contaminant	Solid Media	Action Levels	Land Use
Lead [1]	Soil	2,300 mg/kg	Commercial
	Soil	2,300 mg/kg	Recreational
Arsenic [1]	Soil	500 mg/kg	Commercial
	Soil	1,000 mg/kg	Recreational
Cadmium [2]	Soil	20 mg/kg	Recreational
Copper [2]	Soil	1,000 mg/kg	Recreational
Zinc [2]	Soil	1,000 mg/kg	Recreational

1 From ROD Solid Media, Table D-1 (EPA, 2006a).
2 From Stream Side Tailings Operable Unit removal action levels.
mg/kg: milligrams per kilograms

The proposed location and depth of the samples will be provided in the site-specific FSP, verified in the field, and locations saved by the sampling team. All sample locations will be saved using a Global Positioning System (GPS). Additional samples may be collected if determined necessary. Samples will be labeled and handled according to the labeling and custody procedures described in this QAPP.

The M&M Plan contains SMPs that describe specific instructions to perform routine tasks to address triggers items.

Step 6: Specify Tolerable Limits on Decision Error - *The purpose of this step is to identify baseline conditions, limits, and ranges for decisions and consequences of decision errors.*

Site baseline conditions were documented in the development of original site boundaries, and sources of variability are described in the BRES.

Decision errors occur when information misleads the site managers into choosing an inappropriate response, including no action. The potential for decision errors exists because field evaluations are conducted by personnel who can be subjective in scoring performance criteria or may inadvertently enter information incorrectly into the database. Additionally, all analytical measurements inherently contain sampling and measurement errors. Sampling design errors occur when the data collection scheme does not adequately address the inherent variability of the matrix being sampled (e.g., discrete versus composite samples).

Field evaluation errors will be minimized by 1) ensuring field evaluators receive assessment training annually prior to conducting field evaluations, 2) ensuring all personnel use standard forms maintained in a cloud-based database, and 3) ensuring all data are downloaded to a dedicated computer to allow real-time QA processing by the BSB Data Management Division Manager.

evaluator training also ensure field evaluations are representative to the site. Field crews will obtain representative samples from a site using the point intercept grid method randomly across the site. Multiple samples will be evaluated to generate an overall site score.

Comparability
Data comparability is defined as the measure of the confidence with which one data set can be compared to another. Comparability is a qualitative parameter but must be considered in the design of the sampling plan and selection of analytical methods, QC protocols, and data reporting requirements. Comparability will be achieved by analyzing samples obtained in accordance with this QAPP and applicable contract laboratory SOPs, as well as the Program SOPs, which are comparable to the sampling methods used during previous investigations at the site. All data will be reported in units consistent with standard reporting procedures so that the results of the analyses can be compared with results from previous investigations.

Completeness
Completeness refers to the amount of usable data produced during field evaluations and a site-specific sampling and analysis program. The procedures established in this QAPP are designed to ensure, to the extent possible, that data will be valid and usable. The procedures also ensure that appropriate corrective action can be implemented. To achieve this objective, every effort will be made to ensure site evaluations are completed per this QAPP and as described in the BRES, and that the required samples are collected (avoiding sample loss) as described in site-specific sampling plans.

Sensitivity
Sensitivity describes how the uncertainty in an output can be apportioned to sources of uncertainty in its inputs. Sensitivity of BRES evaluations can be attributed to variability in environmental and site conditions. Evaluations will be constrained to be completed annually in the month of May, after evaluators complete standard training.

2.7 Special Training

Various training requirements are required depending on the task being completed. This section describes the training required to complete site evaluations, field sampling and analysis, and analytical laboratory tasks.

The BSB Environmental and Operations Division Manager will verify training has been completed by all personnel prior to conducting field evaluations and collecting samples. All training records will be maintained by the BSB Data Management Division Manager and summarized in the annual completion report.

2.7.1 Site Evaluation Training

All field personnel conducting site evaluations will be trained annually by stakeholder representatives and third-party personnel to perform field evaluations as described in the BRES document. This site evaluation training will provide field personnel with specific instructions related to field evaluation methodology, spatial data tools, calibration techniques, field

evaluation principles, and applying the requirements of this QAPP prior to initiating fieldwork. Site evaluation training in a classroom will include specific instructions related to using a field tablet device (i.e., iPad) to access and populate the evaluation form (Attachment 2) and using the ESRI Collector for ArcGIS application to create geographic shapefiles. Site evaluation training completed in the field will include evaluation procedures and practice sessions to measure percent vegetative cover, classify erosion, and recognize trigger items. Field personnel will use the user's guide included with the ESRI Collector for ArcGIS application to help them use the application.

Evaluators will learn to apply the modified point-intercept QC method and complete QA visual estimates. The entire site evaluation training will encompass a test that includes vegetation measurements, erosion evaluation, trigger item identification, and plant identification pertinent to the BRES classification system, such as identifying acceptable species, undesirable weedy species, noxious weeds, etc., to verify proof of site evaluation training and readiness to conduct BRES evaluations.

2.7.2 Field Sampling and Analysis

For personnel who will collect samples in the field, prior to sampling personnel will review sampling procedures and requirements to ensure sample collection and handling methods follow QAPP requirements. Field sampling personnel will receive Hazardous Waste Operations and Emergency Response (HAZWOPER) training prior to conducting sampling in areas of impacted soils. Personnel will also be trained in proper use of field equipment and procedures according to relevant field data collection SOPs and methods described in any site-specific FSPs.

One hard copy of the current approved version of this QAPP will be maintained for reference in the field vehicle and/or field office. All field team personnel will have access to a portable document format (PDF) version of the complete QAPP. The Field Team Leader will assure that each member of the sampling team is familiar with the QAPP, will maintain signatures of each team member who has read the QAPP (including reviews and addenda, as necessary), and make sure each team member has been trained in the appropriate sample collection methods.

The Field Team Leader will review the site-specific health and safety plan (SSHASP) with all field personnel prior to fieldwork to assess the specific hazards and the control measurements that have been put in place to mitigate these hazards. The SSHASP review will also cover all other safety aspects of the site including personnel responsibilities and contact information, additional safety requirements and procedures, and the emergency response plan.

Field sample analysis will be performed as described in the specific equipment's user manuals. Field team members performing field XRF analysis will review the XRF unit's user manual or guide (Niton XL3 Analyzer User's Guide, or approved equivalent) prior to performing field analysis. The user guide for the Niton XL3 series of analyzers is in Attachment 3.3. At a minimum, field personnel will review the manual annually, before initiating sampling, to become familiar with the device. Personnel will follow the manual and specific SOPs when using the device including initial set-up, calibration, and field analysis. The XRF samples will be prepared

and analyzed in a dedicated sample preparation area within the offices of the BSB Reclamation Division.

2.7.3 Analytical Laboratory

For laboratory analysis related training, required elements of laboratory training and QC are found in the SOPs (Attachment 3) along with laboratory analytical protocol (LAP) for standard wet chemistry analyses and individual contract laboratory protocols for Inducted Coupled Plasma-Mass Spectrometry (ICP-MS) analysis. These documents outline the specific laboratory QC samples, the frequency of analyses, control windows, and corrective action to be taken when windows are exceeded. Within laboratories, analytical instruments are initially calibrated using standards and blanks, and the calibration is routinely verified. The calibration is checked using an independent reference and instrument performance is monitored using method-specified QC check samples. Matrix spikes and laboratory duplicates measure method performance.

2.8 Project Data and Records

Data collection and management requirements for reclaimed areas and BRES sites were initiated in 2007. The information is used specifically to evaluate and maintain cap integrity and is stored within the BPSOU reclamation database maintained by BSB. This section describes procedures for documentation management and record keeping from initial record generation through final data formatting and storage. Geospatial data is stored in a Geodatabase, and non-geospatial data is stored in a Microsoft Access database maintained by BSB that can be accessed via a secure on-line portal. Refer to the BPSOU DMP for additional information on the databases mentioned in this section.

2.8.1 Property Access Agreements

Where applicable, BSB or Atlantic Richfield will request that property owners grant access to their properties to perform site evaluations, sampling, and remedial action as necessary. The Environmental and Operation and Maintenance Manager will manage requests for access, track the status of access requests and maintain copies of completed access agreements received from property owners. Completed access agreements will be photocopied and scanned with the electronic version stored on a server. Photocopied access agreements will also be copied to the project database.

2.8.2 Field Documentation/Data Forms

The reclamation database exists on a web-based server. Field personnel can enter the data and administrative personnel can track site evaluations and maintenance work performed on reclaimed sites. Personnel from BSB maintain the database. Field personnel enter the data into forms on a field tablet connected to the database and linked to ArcGIS Online. The BSB Data Management staff will pull the field data from the database to complete real-time quality checks (refer to Section 3.11).

Field personnel will use a field-capable tablet (i.e., iPad) to record specific real-time field data such as spatial boundaries and locations where evaluations or maintenance work is performed, capture the work with photographs, and document team members on the site, project duration, and equipment used, and material quantities used, removed, and applied to the site. Field documentation must be detailed to provide a description of site conditions during field evaluations and provide a permanent record of all field activities including sampling and maintenance activities.

BRES Evaluation Documentation

The BRES evaluation field documentation will include the data input form, accessed via Microsoft Office 365 through a secure web-based server, and site maps accessed via ArcGis Online. Field personnel will enter data directly to the form and upload the form to the database. Field personnel will take site photographs using the field device (iPad), geotag the photographs to the site, and upload them to the database. Hard copy field forms will not be used.

Documentation for each site will include the information required on the BRES Field Form (Attachment 2) and listed below:

- Site identification – site name, number, and description.
- Evaluation team members.
- Date of evaluation.
- Vegetation score and trigger criteria.
- Erosion score and triggers criteria.
- Additional trigger items scores
    - Site edges
    - Evidence of exposed mine waste
    - Barren areas
- Additional comments.

Reclaimed Areas Sampling Documentation

Additional sampling for any reclaimed areas will be performed as described in an approved CAP/FSP, and this QAPP. The following documentation is typical for any sampling event to be conducted on reclaimed areas in BPSOU. For any field sampling work, the sample container will be marked with the following:

- Sample location and ID number.
- Sample type collected.
- Date and time of sample collection.
- Samples taken by other parties (note the type of sample, sample location, time/date, sampler's name, sampler's company, and any other pertinent information).
- Sampling method, particularly any deviations from the field SOPs (Attachment 3).

- Documentation or reference of preparation procedures for reagents or supplies that will become an integral part of the sample (if any used in the field), specifically if sample bottles/preservatives are not provided by the laboratory and certified as cleaned.
- Sample preservation (if used).

Sufficient information should be recorded to allow the sampling event to be reconstructed without having to rely on the sampler's memory. Samples collected for laboratory analysis will be accompanied with a CoC record described in Section 2.8.4. Sampling data will be saved to the soils database and referenced to the reclaimed database via site field identification number (refer to BPSOU DMP).

Reclaimed Areas Maintenance Documentation
Field personnel will use the field-capable tablet to record maintenance information. The information recorded will be specific to the maintenance performed, but typically will consist of the following:

- Identification of site and date of maintenance performed.
- List of field crew members.
- Description of maintenance performed
- Quantity of material removed.
- Quantity and type of material imported.
- Standard maintenance procedures referenced.
- Equipment used.

The above-listed information will be incorporated into the Annual Summary Report and distributed according to Section 2.5.3.

2.8.3 Field Photographs

Field personnel will use a digital device (iPad or similar phone), with access to the Program database, to take photographs at the site. Field personnel will take photographs of sampling locations, field activities, and anything else to document site conditions, as necessary. Field photographs will be used to chronical the before, during, and after maintenance task activities. Photographs will be geotagged and uploaded to the project database.

2.8.4 Chain of Custody Records

Each sample collected will be assigned a unique sample number (described in Section 3.4) and the sample container labeled with sample number, address, and location. Then the information will be logged into the project sample logbook. The CoC records ensure that samples are traceable from the time of collection until final disposition. After samples have been collected, they will be maintained under strict protocols in accordance with the SOPs (Attachment 3). A CoC record will be initiated by the individual physically in charge of the sample collection. The CoC form may be completed concurrently with the field sampling or before shipping samples to the laboratory. The sampler is personally responsible for the care and custody of the samples

until they are shipped. When transferring the sample possession, the individual relinquishing and receiving the sample will sign and record the date and time of day on the CoC record.

A copy of each as-transmitted form will be scanned and stored on a hard drive and hard copies will be included in project record files (refer to Section 3.11).

2.8.5 Analytical Laboratory Records

Results received from the laboratories will be documented both in report form and in an electronic format. Laboratory documentation will include laboratory confirmation reports such as information on how samples were batched and the analyses requested, data packages containing the laboratory report and the electronic data deliverable (EDD), and any change requests or corrective action requests. Section 5.1.4 lists the laboratory reporting requirements in detail. The deliverable (data package or report) issued by the laboratory must include data necessary to complete validation of laboratory results. Original reports and electronic files received from laboratories will be maintained with the project quality records. Refer to the BPSOU DMP for additional requirements. Sampling data will be forwarded to the Agencies in an annual summary report (refer to Section 2.3).

2.8.6 Project Reports

Required project reports provide a record of site evaluations, allow Agency review and approval, and provide a historical record of the activities at the site. The main required reports include a recommendations summary report, CAP, site-specific FSPs, and annual summary report. Refer to Section 2.5.3 for details on the reports.

2.8.7 Quality Records

Quality records are required to provide objective evidence that activities were performed and documented in a manner consistent with this QAPP and that the data are useful for their intended purpose. Records include legible and complete documentation related to evaluations, sampling, corrective action, and conventional maintenance tasks completed at reclaimed areas. These records will be organized and managed by the BSB Data Management Division Manager (or designee) and will include the following at a minimum:

- This QAPP and any approved revisions or addenda.
- Approved versions of the SSHASP and any addenda.
- Copies of field SMPs for field data collection, with any updates, revisions or addenda to those SMPs.
- Incoming and outgoing project correspondence (letters, telephone conversation records, and faxes).
- Individual property maps including any field drawings and field photographs.
- Field documentation forms.
- Copies of all field data sheets.
- Copies of all sample CoC forms.

- Copies of all laboratory agreements and amendments.
- Laboratory data packages (printed report and electronic version).
- Documentation of field and/or laboratory audit findings and any corrective actions.
- Draft and final delivered versions of all reports and supporting procedures such as statistical analyses, numerical models, etc.
- XRF correlative statistics.

All project information will be maintained indefinitely in the GIS database.

As described throughout this document, this QAPP will be maintained in the project database and updated annually, at a minimum. The BSB Environmental and Operation and Maintenance Manager, or designated alternate as appropriate, will maintain the document and perform updates as necessary. Hard copies will be distributed to field team leaders and the information accessible using field devices.

Any addendums or revisions to this QAPP will be electronically distributed to all parties identified on the distribution list by the BSB Environmental and Operation and Maintenance Manager, or designated alternate as appropriate. All records will be maintained and archived electronically for future reference. Updates will be provided, communicated, and implemented in a manner consistent with BSB Reclamation Division internal protocol.

2.9 Data Storage and Backup

Digital copies of documents will be stored in the appropriate database, as described previously. The document will be assigned a numeric code based on what area the document pertains to followed by a sequential number.

Data storage and backup will be maintained as described in the BPSOU DMP. Generally, a regular backup of component databases provides security against damage or loss of data. The BPSOU reclamation database is the electronic data repository used to store all reclamation data related to source areas that have been reclaimed and evaluated. The BRES data collection and management system was initiated in 2007 and is maintained by BSB. Within the system, electronic data is backed up daily. Daily backups are retained for a minimum of two weeks, weekly backups for two months, monthly backups for one year, and yearly backups for five years. Electronic data are stored long-term in a secure location using appropriate technology. At the discretion of a database administrator/data coordinator, additional backups may be performed after large quantities of data are imported or after significant manipulation or evaluation of the data in the database. Details regarding data management are provided in the BPSOU DMP.

3.0 MEASUREMENT AND DATA ACQUISITION

This section addresses all aspects of generating and acquiring data for a specific site. Adhering to these procedures ensures that the field team uses the appropriate methods to conduct field evaluations, collect samples, handle samples, specific laboratory analyses, complete field and

laboratory QC, inspect/test/calibrate instruments and equipment, maintain equipment, manage data management, and follow established data security protocols.

3.1 Site Access

Reclaimed areas are evaluated on a four-year rotating schedule as prescribed in the BRES. Site access approval to privately owned properties must be obtained prior to performing any site evaluations. Requests for site access that are not granted will require EPA authority intervention to access the site, or the site will be removed from the reclaimed areas evaluation cycle.

3.2 Site Evaluations

Evaluators will use a field-capable tablet with ArcGIS Collector software to record specific real-time field data. The tablet will have access to electronic field evaluation forms that will be pre-populated for each specific site being evaluated. Once an evaluation is complete, the evaluation form will be saved to the cloud-based database (refer to BPSOU DMP).

Field crews will perform site evaluations to review the parameters listed on the evaluation forms and identify trigger items. Percent live cover is considered the most critical performance parameter in the BRES. The vegetative cover will be estimated using the modified point intercept method. A 10-point grid will be used in conjunction with a laser pointer indication system to determine percent live cover, litter, rocks, and bare ground.

3.2.1 Reclaimed Areas Site Identification Numbering

Site identification for all reclaimed areas will include the quadrant number in which the area is located, site reclaimed status, and sequential number within the quadrant. Additional sites may be added to the quadrant after appropriate reclamation within BPSOU is completed to ensure the site remedy is monitored for protectiveness.

3.3 Site Sampling

Sampling performed in reclaimed areas to address specific trigger items (i.e., exposed mine waste, barren areas, etc.) or support related maintenance tasks (cover soil characterization) will follow site-specific FSPs and applicable SOPs. The FSPs will provide detailed sampling requirements such as specific site maps, sample collection locations, and depth of sample collection. Field personnel will use the FSPs to further characterize sites or areas as needed and develop appropriate CAPs. A list of SOPs for sampling and related tasks is provided in Table 4. Attachment 3 contains the SOPs.

Table 4. Standard Operating Procedures

SOP Title	Organization	Date
Project Documentation	BSB	Dec-17
Completing Chain of Custody Forms	BSB	Dec-17
Equipment Decontamination	BSB	Dec-17
Composite Soil Sampling	BSB	Dec-17
Operating XL3 X-Ray Analyzer	BSB	Dec-17
Soil pH Testing	BSB	Dec-17
Personal Decontamination	BSB	Dec-17
Sample Packaging	BSB	May-18
Boundary Revisions	BSB	May-19

The following activities are typical for any sampling event conducted on reclaimed areas in BPSOU to characterize a site or area to address an RI deficiency within reclaimed source areas. Composite soil samples will come from two depth intervals. Composite samples will be collected at a frequency of not less than 1 sample per 5 acres, and no more than 1 sample per 100 square feet (ft^2). One composite sample, comprised of 3 composited subsamples, will be collected from 0 to 6 inches from the top of the surface to be analyzed for organic compounds (Walkley-Black), nitrogen, phosphorus, and potassium. One composite sample, comprised of 3 composited subsamples, will be collected from 6 to 18 inches from the top of the surface to be analyzed for metals (Table 3). Field personnel will use an XRF unit (Niton XL3t XRF Analyzer, or approved equivalent) for the XRF field analysis. A sample stand, which allows the samples to be analyzed in the plastic bags, will be used during analysis to ensure consistent exposure times and position of the XRF aperture for each sample. Results for will be recorded on field data sheets.

A field duplicate sample and field blank will be collected at a minimum frequency of 1 for every 20 samples. Disposable sampling equipment will be used to collect soil samples; therefore, equipment blanks will not be collected.

Field personnel will record all information in the field logbook. The procedures for sampling are summarized below.

3.3.1 Soil Sample Collection

The collection of soil samples performed under this QAPP will be completed as described in the steps provided below. Field personnel/samplers will record all information in the field logbook. The decision to collect additional "opportunistic" samples will be made in the field by the sampling crew personnel and/or Agency personnel during the time of sampling. The BPSOU confirmation soil samples will be shipped to a certified lab for analyses. General collection procedures are listed below and also provided in Composite Soil Sampling procedure in Attachment 3.1.

3.3.2 Sample Collection Equipment

Soil samples will be collected using primarily hand tools, which will be limited to readily available products. If field supplies run out, replacement supplies will be purchased at nearby retailers. Field equipment that could be used for the soil sampling will include the following:

- Copy of the QAPP and FSP.
- Maps of sample locations.
- GPS unit.
- Sharpshooter® type shovels and breaker bars.
- Sterile single-use disposable plastic scoops.
- #10 (2 mm) stainless steel screens, or disposable mesh screen.
- 1-quart resealable plastic bags.
- XRF unit (Niton XL3t XRF analyzer, or approved alternate).
- Equipment and deionized water for decontamination.
- Sample coolers, ice, and tape.

3.4 Sample Identification

An alphanumeric coding system will be used to uniquely identify each sample collected. Sample identifiers will begin with the site ID (which will include the quadrant number) and include composite sample number (1, 2, 3, etc.) from the location, sample date, and depth interval codes.

Depth Intervals: (1) 0 to 6 inches below ground surface (bgs)
(2) 6 to 18 inches bgs

The example sample identification number Q1-RC12-1-08022017-1 indicates Reclaimed Site 12 located in Quadrant 1, composite sample 1 was obtained on August 2, 2017, from a depth interval of 0 to 6 inches below ground surface.

Sample identifiers will be documented in field logbooks and on the CoC forms, as required by the BPSOU field data sheets located in Attachment 3.

3.4.1 Soil Sieving Methods

All soil samples must be sieved using a No. 10 sieve (stainless steel or disposable mesh). Sieved fraction passing the No. 10 sieve will be placed in a new plastic bag labeled with the original sample number and date of sieving. The sieved fraction will be used for XRF analysis, and the coarse fraction will be properly discarded as described in Section 3.4.3.

3.4.2 Sample Handling and Chain of Custody

After collection and labeling, the samples will be maintained under strict CoC protocols, in accordance with SOP-02 (Attachment 3). The field sampling personnel will complete a CoC form for each shipment/delivery (i.e., batch of coolers) of samples to be delivered to the laboratory for analysis prior to expiration of the 28-day holding time. The sampler is responsible

proper disposal. Samples that exceed the action levels listed in Table 3 will be disposed of at the Butte Mine Waste Repository.

3.4.4 Decontamination

Field personnel will decontaminate all non-disposable sampling equipment after use at each sampling location. Disposable equipment and personal protective equipment intended for one-time use will not be decontaminated but will be packaged for appropriate disposal as a solid waste in the local landfill. Additional soil removed from holes during excavation, and not collected as samples, will be returned to the sample holes.

Field personnel will decontaminate reusable sampling equipment within the site boundaries at a centralized location. Sampling equipment will be decontaminated using the procedure below (and any related SOPs). All equipment will also be decontaminated before leaving the site to prevent off-site transport of contaminants.

- Rinse with water.
- Wash with non-phosphate detergent.
- Rinse three times with deionized water.
- Air dry.

For safety, all personnel will undergo decontamination procedures when leaving a contaminated area. Personnel decontamination includes routine practices as well as emergency decontamination. All personnel will take every measure possible to prevent the spread of potentially contaminated materials to clean areas.

3.5 Analytical Methods

This section describes the field and laboratory analytical methods used to analyze soil samples.

3.5.1 Field Analysis

Samples tested for pH in the field will be completed as described in SOP-6 (Attachment 3) using a Hanna Instruments, HI 99121 Soil pH Meter (or approved alternate). Field personnel will collect samples for XRF analysis in the field and take them to a dedicated sample preparation area within the sample site. To perform XRF analysis, field personnel will follow the process described in SOP-05 using an XRF unit (Niton XL3t XRF, or approved alternate). The sampler will place the sample on the XRF unit's sample stand, which allows the samples to be analyzed in plastic bags, during analysis to ensure consistent exposure times and position of the XRF aperture for each sample. The sampler will record the results for the analytes (listed in Table 3) on the field data sheets.

3.5.2 Laboratory Metals Analysis

Field samples within plus or minus 25% of action levels will be submitted for laboratory analysis to confirm and expand on field XRF results. Samples will be prepared for metals analysis

3.10 Boundary Adjustments

Boundary adjustments or additions are anticipated to include newly reclaimed areas, or boundary adjustments to incorporate newly reclaimed land adjacent to previously reclaimed areas at an existing BRES site. Initial boundary adjustment or definition will be made when remediation is complete. Aerial imagery will be reviewed along with completed construction data. Using GIS software, preliminary boundaries will be established on the aerial imagery. Field verification will then be completed by BSB or contractor field personnel. The entire site should be evaluated to note differences in land use, vegetation, slopes, etc. Final site boundaries and individual site polygons will be established accordingly. Specific boundary adjustment protocol is described in SOP SMP-10
(Attachment 3).

Newly reclaimed sites will be assigned a site identification number (site ID) and appropriate quadrant. The site ID, quadrant, remedial status, and attribute information will be saved to the reclamation database and the site included on the BRES evaluation list.

3.11 Data Management Procedures

This section describes how the project information will be managed including field evaluation, corrective actions, maintenance documentation, and laboratory data. The database used to track the site evaluations and maintenance work performed on reclaimed sites is housed on a cloud-based server. Field personnel enter field evaluation information into the field tablet, which populates the database. The BSB Data Management staff pull the information from the database for real-time QA checks (using Microsoft Access). Refer to the BPSOU DMP for specifics about the database.

As the information is used to make decisions specifically related to vegetative cover, BSB personnel will complete quality checks at various stages to verify the transfer of field data. The process includes these main steps:

- Field personnel enter site data directly from the field into a database.
- The BSB Data Management Division Manager reviews and verifies the data in real-time.
- Corrections are made, as necessary, to capture completion of work accurately, minor adjustments to boundary mapping information are made to match existing topography or boundary delineations, and material quantities are reported.

The QAM, see Section 2.3, will make necessary and appropriate corrections to field data and report the changes to the BSB Environmental and Operations Division Manager and field team leader as appropriate. Quality records will be maintained as described in the BPSOU DMP. These records, either electronic or hard copy in form, may include the following:

- Individual property maps (hard copy or scanned field drawings and electronic files).
- Project QAPP, including this QAPP, with any approved modifications, updates, addenda, and corrective or preventative actions.
- Field documentation.

Corrective action in the laboratory may occur prior to, during, and after initial analyses. A number of conditions such as broken sample containers, preservation or holding-time issues, and potentially high-concentration samples may be identified during sample log-in or just prior to analyses. Corrective actions to address these conditions will be taken in consultation with the key project personnel such as BSB Environmental and Operations Division Manager, QAM, and Liability Manager. In the event that corrective action requests are not in complete accordance with approved project planning documents, the Agencies will be consulted and concurrence will be obtained before the change is implemented, or new samples may be obtained.

All corrective actions taken by the laboratory will be documented in writing by the laboratory project manager and reported to the BSB QA Officer and Liability Manager. In the event that corrective action requests are not in complete accordance with approved project planning documents, the EPA will be consulted and concurrence will be obtained before the change is implemented. All corrective action records will be included in the QAPP's quality records.

4.2 Corrective Action During Data Assessment

The need for corrective action may be identified by any member of the project team during data assessment. Potential types of corrective action may include reassessment by the field team, re-analyses of samples by the laboratory, or re-submittal of data packages with corrected clerical errors. The appropriate and feasible corrective actions are dependent on the ability to mobilize the field team and whether the data to be collected is necessary to meet the required QA objectives (e.g., the holding time for samples is not exceeded). If corrective action requests are not in complete accordance with approved project planning documents, the EPA will be consulted and concurrence will be obtained before the change is implemented. Corrective actions of this type will be documented by the BSB QA Officer on a Corrective Action Report (Attachment 3) and will be included in any subsequent reports.

4.3 Reports to Management

Reports will be submitted according to the project schedule in Section 2.5.3. After field evaluations are complete, a recommendation summary report will be prepared to provide a summary of trigger items identified, erosion and vegetation score, and proposed type of corrective action for each site evaluated. Summary reports are provided in a tabular format for ease of review and quantification of findings (Section 2.5.3).

An annual summary report of all maintenance performed to reclaimed areas will be prepared by BSB. As detailed in Section 2.5.3, the report will include summaries of annual BRES evaluations, trigger items identified and implemented on a site, where CAPs are implemented, approved CAPs, and details of work completed at each site. Each annual report will include work completion summaries and typically include documentation of the materials used, their source, quantity, and final site condition. The report will describe specific field activities performed during implementation of the QAPP and the characteristics of the remedial action completed.

4.4 Annual Revision to QAPP

The BSB Environmental and Operations Division Manager, or designated alternate, will review this QAPP annually and make pertinent revisions. Updates will include pertinent data listed below, will be included in Attachment 4, and will be stored in the program database (refer to BPSOU DMP).

- Sample data – sites and specific sample locations and results.
- Field evaluations – completed field evaluations.
- Corrective action – description of construction activities and corrective action implemented to existing sites.
- Reclaimed sites boundary adjustments – any proposed site boundary adjustments to existing sites based on field evaluation data or proposed new boundaries.
- Any deviations from the approved QAPP.

5.0 DATA REVIEW AND USABILITY

This section lists the final project checks conducted after the data collection phase of the project is complete to confirm that the data obtained meet the project objectives and to estimate the effect of any deviations on data usability. The data review/validation process under this QAPP is streamlined to support the post-ROD (EPA, 2006a) decision-making process. Collection, analysis, and validation of data will be completed in accordance with the BPSOU QMP (Atlantic Richfield, 2016) and any project-specific maintenance and monitoring plan.

5.1 Data Review and Verification

This section lists the process to review and verify field data and complete internal laboratory data reporting.

5.1.1 Field Data Review

All GIS field information will be saved to ArcGIS Online as well as the project database to accurately track and manage completion of maintenance work, materials used, equipment, and daily logs. Field personnel will enter raw field data directly to the field tablets linked to the online database, where the data will be reviewed for accuracy and completeness by the BSB Database Manager before the records become final. Refer to the BPSOU DMP for details on the database. The overall quality of the field data from each assessment will be further evaluated during the data reporting. The field data will be reviewed periodically by the QAM, or designated alternate. Database entries will be reviewed for accuracy and completeness. Electronic files of field measurement data will be maintained as part of the project's quality records.

5.1.2 Field Data Quality Control

Personnel from BSB will complete QC check on field data at various stages. The QC process is instituted to ensure integrity of data used to make decisions specifically related to vegetative cover and transfer of field data. Field data QC protocol consists of reviewing field data and comparing quantitative field measurements of ground cover to visual estimates for comparability. Field personnel enter the data directly from the field on field tablets linked to the database. This will allow office staff access to the same data in real time. The information will be reviewed and verified by the database administrator; ensuring field information is reviewed by a person other than the person who entered the data. This step ensures the information is free of transcription errors and allows corrections before the information is finalized. Data from field evaluations will be cross referenced with spatial data collected in the field to ensure field evaluations capture both quantitative findings and specify the precise location where the trigger item occurs on the site.

At the completion of the field evaluation cycle, 10% of the site boundary polygons will be randomly selected for field verification using the modified point intercept method (described in the BRES) by personnel other than the previous evaluator. If the precision target is not met, the sites will be reevaluated.

The QAM will determine whether the DQOs have been met and determine the data completeness for the project. Data quality review related to site evaluations is a process to determine if the data meet project-specific DQOs. The data quality review will include verification of the following:

- Compliance with the QAPP.
- Completeness of field evaluations.
- Completed construction activities in accordance with CAPs.

Corrections may be made to accurately capture completion of work. Corrections may include minor adjustments of boundary mapping information to match existing topography or boundary delineations, and material quantities reported. Corrections will be reported to the BSB Data Management Division Manager and included in the annual reporting (Section 2.5.3).

5.1.3 Laboratory Data Review

Internal laboratory data review procedures will follow each laboratory's quality management plan. At a minimum, paper records will be maintained by the analysts to document sample identification number and the sample tag number with sample results and other details, such as the analytical method used (e.g., method SOP number), name of analyst, the date of analysis, matrix sampled, reagent concentrations, instrument settings and the raw data. These records will be signed and dated by the analyst. Secondary review of these records by the Laboratory Supervisor (or designee) will take place prior to final data reporting. The laboratory is responsible for assigning appropriate flags/qualifiers in accordance with the analytical method and internal laboratory SOPs.

5.1.4 Laboratory Data Reporting Requirements

The laboratory will prepare hard copy data packages for transmittal of results. At a minimum, the data packages will include the case narrative, sample results, units, and QC sample results. Standard data packages will be transmitted to BSB within 14 days of laboratory sample receipt.

The laboratory will prepare electronic data packages for transmittal of results and associated QC information to Atlantic Richfield, or their designee, in general accordance with the EPA CLP SOW (EPA, 2016a). Deviations from these specifications may be acceptable provided the report presents all the requested types of information in an organized, consistent and readily reviewable format.

An additional responsibility of the BSB Data Management Division Manager will be to determine whether the DQOs have been met and determine the data completeness for the project.

The data quality review, to determine if the data meet project-specific DQOs, will include verification of the following:

- Proper sample collection and handling procedures.
- Field QC results.
- Laboratory blank analysis.
- Detection limits.
- Laboratory duplicates.
- Laboratory data package.
- Data completeness and format
- Data qualifiers assigned by the laboratory.

Qualifiers that may be applied to the data include the following:

U The analyte was analyzed for but was not detected above the reporting limit.

J The analyte was positively identified; the associated numerical value is an estimate of the concentration of the analyte in the sample.

5.2 Data Validation

Analytical data will be validated by an independent third-party person not involved with the data generation or sample collection and the validation will follow EPA National Functional Guidelines (EPA, 2016b). Level 2 validation packages will be provided at a rate of 1 data package per every 10 data packages received. Field data will be reviewed and validated using the Level A/B validation checklist (Attachment 3).

6.0 REFERENCES

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EPA, 2006b. U.S. Environmental Protection Agency Guidance on Systematic Planning Using the Data Quality Objectives Process (QA/G-4). Washington DC: EPA, Office of Environmental Information. EPA/240/B-06/001. Available at *http://www.epa.gov/quality/qs-docs/g4-final.pdf*.

EPA, 2005. U.S. Environmental Protection Agency Intergovernmental Data Quality Task Force, Uniform Federal Policy for Quality Assurance Project Plans: Evaluating, Assessing, and Documenting Environmental Data Collection and Use Programs, Final, Version 1. March 2005.

EPA, 2001. U.S. Environmental Protection Agency Requirements for Quality Assurance Project Plans (QA/R-5). Washington DC: EPA, Office of Environmental Information. EPA/240/B-01/003. Available at http://www.epa.gov/quality/qs-docs/r5-final.pdf.

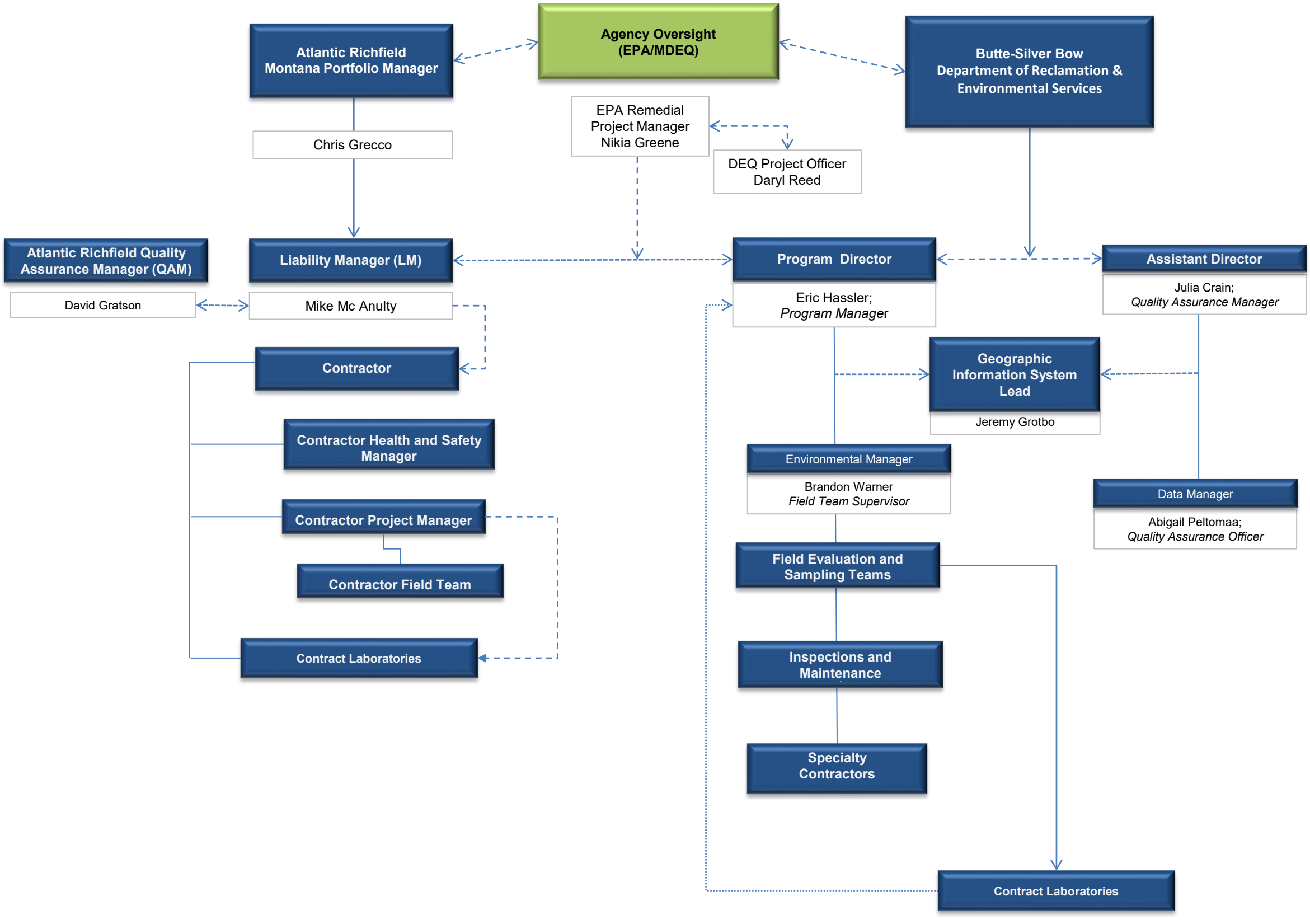
FIGURES

Figure 1. BRES Evaluation Reclaimed, Unreclaimed, and Insufficiently Reclaimed Areas [Boundaries]

Figure 2. BPSOU Reclaimed Areas Program Organization and Communication Structure

Figure 3. Reclaimed Areas Evaluation, Corrective Action, and Reporting Cycle

BPSOU Reclaimed Areas
Program Organization and Communication Structure



Attachment 3.1
Standard Operating Procedures

BPSOU RECLAIMED AREAS M&M SMP-10
BOUNDARY REVISION/CREATION

PURPOSE	To establish a uniform procedure to safely and effectively perform inspection and maintenance tasks at sites listed under the BPSOU Reclaimed Areas.
SCOPE	Work described in this procedure includes review of existing aerial photos and GIS data, site investigations and verification, and final boundary revisions.

WORK INSTRUCTIONS

The following instructions are intended to provide sufficient guidance to perform the task in a safe, accurate, and reliable manner. Should these instructions present information that is inaccurate or unsafe, operations personnel must bring the issue to the attention of the Project Manager and the appropriate revisions made.

TASK	INSTRUCTIONS
1.Aerial Photo Review	a. Evaluate aerial photo documentation to identify obvious areas that do not appear to be remediated, or remediation does not match existing boundaries. b. Review and verify existing boundary .shp files.
2.GIS Data Review	a. Perform verification of .shp boundaries by comparison with relevant documents related to boundary determination, site features, landmarks, etc. b. Make preliminary boundary adjustments as needed.
3. Site Visit	a. Perform field verifications utilizing GPS enabled devices. b. Physically walk the boundary while possessing the GPS enabled device (mobile phone, tablet, computer, etc.) to create log file of the boundary path.
4. Desktop comparison	a. Perform desktop comparison of proposed and field generated boundaries and match discrepancies. Submit boundary revisions to the QAM for review and approval.
5. Polygon and Boundary Revision	a. Finalize boundary delineations, and submit to EPA/DEQ for approval b. After EPA/DEQ approval of the boundary revision, upload BRES Quadrant Boundary to BSB database.
6. New boundary designation	a. Newly reclaimed areas require a newly created boundary. b. Assign new boundaries with a BRES Site Number, and quadrant number. c. Upload the .shp file to the BRES maintenance database and prepare for four-year review cycle.

DRAWINGS, DOCUMENTS, AND TOOLS/EQUIPMENT

The following documents should be referenced to assist in completing the associated task.

DRAWINGS	BRES Quadrant Maps, Aerials

RELATED SOP's / WORK PLANS	
FORMS/CHECKLIST	

APPROVALS/CONCURRENCE By signing this document, all parties acknowledge the completeness and applicability of this SOP for its intended purpose. Also, by signing this document, it serves as acknowledgement that I have received training on the procedure and associated competency testing.	
MANAGER	**DATE**
LEAD OPERATOR	**DATE**
OPERATOR	**DATE**
OTHER	**DATE**
OTHER	**DATE**

Revisions:

Rev.	Description	Date	Approval
1	Updated per Agency comments 4/5/2016	5/15/2019	

Attachment 3.2
Field Data Sheets

BUTTE HILL COVER SOIL APPROVAL SUBMITTAL

6/14/2017

Source:

Sample #:

Description		Specification	Sample	Specification Met Yes	Specification Met No	Other Information Requested
Chemical (mg/kg)						**Organic Matter (%)**
Arsenic (As)	<	97				WB 1.63
Cadmium (Cd)	<	4				
Copper (Cu)	<	250				**Soil Nutrients**
Lead (Pb)	<	100				NO_3 (ug/g) 23.3
Zinc (Zn)	<	250				P (ug/g) 30.3
						K (ug/g) 191
pH (s.u.)	>	5.5				
	<	8.5				
SAR	<	12				
Saturation (%)	<	85				
	>	25				
EC (mmhos/cm)	<	4				
Textural Classification (USDA) <2.0 mm						**Particle Size**
						Sand (%) 80
						Silt (%) 10
						Clay (%) 10
Loam						
Sandy loam						
Sandy clay loam						
Sandy clay						
Clay loam						
Silty clay						
Silty clay loam						
Silt loam						
Silt						
*Per EPA Approval (Loamy sand)						
Rock Content (%) (by volume)	<	45				

Legend:

Value - Criteria met

 # Value - Does not meet Criteria

B-SB Representative _____ Date: _____

EPA Representative: _____ Date: _____

Level 2 Data Validation Checklist for Sample Analysis

Site: **Case No:** **Laboratory:**
Project: **Sample Matrix:** **Analyses:**
Sample Date(s): **Analysis Date(s):**
Data Validator: **Validation Date(s):**

1. Holding Times

Analyte	Laboratory	Matrix	Method	Holding Times	Collection Date(s):	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)

Were any data flagged because of holding time? Y ☐ N ☐
Were any data flagged because of preservation problems? Y ☐ N ☐

Describe Any Actions Taken:

Comments:

2. Blanks

Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch? Y ☐ N ☐
Were MBs within the control window? Y ☐ N ☐
Were any data flagged because of blank problems? Y ☐ N ☐

Describe Any Actions Taken:

Comments:

3. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch? Y ☐ N ☐
Were LCS results within the control window? Y ☐ N ☐
Were any data flagged because of LCS problems? Y ☐ N ☐

Describe Any Actions Taken:

Comments:

4. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch? Y ☐ N ☐
Were LDS results within the control window? Y ☐ N ☐
Were any data flagged because of LDS problems? Y ☐ N ☐

Describe Any Actions Taken:

Comments:

5. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch? Y ☐ N ☐
Were LMS results within the control window? Y ☐ N ☐
Were any data flagged because of LMS problems? Y ☐ N ☐

Describe Any Actions Taken:

Comments:

6. Field Blanks

Were field blanks submitted as specified in the QAPP?	Y		N		N/A	
Were field blanks within the control window?	Y		N		N/A	
Were any data qualified because of field blank problems?	Y		N		N/A	

Describe Any Actions Taken:

Comments:

7. Field Duplicates

Were field duplicates submitted as specified in the QAPP?	Y		N		N/A	
Were results for field duplicates within the control window?	Y		N		N/A	
Were any data qualified because of field duplicate problems?	Y		N		N/A	

Describe Any Actions Taken:

Comments:

8. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y ☐ N ☐

If so, explain:

Comments:

9. Authorization of Data Validation

Data Validator

Name: **Reviewed by:**

Signature: _____ _____

Date: _____ _____

Level 2 Data Validation Checklist XRF Sample Analysis

Site:	**Case No:**	**Laboratory:**
Project:	**Sample Matrix:**	**Analyses:**
Sample Date(s):	**Analysis Date(s):**	
Data Validator:	**Validation Date(s):**	

1. Holding Times

Analyte	Laboratory	Matrix	Method	Holding Times	Collection Date(s)	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)

*Reference for Holding Times –

Were any data flagged because of holding time? Y [ ] N [X]
What sample preparation steps were performed (i.e. drying, sieving etc.)?
Were the samples prepped according to the SAP/QAPP? Y [X] N [ ]

Describe Any Actions Taken:

Comments:

2. Energy Calibration (System Check)

Was the energy calibration performed at the frequency of once per day? Y [ ] N [ ]
Was the energy calibration Resolution below 195? Y [ ] N [ ]
Did the energy calibration run for at least 50 seconds? Y [ ] N [ ]

Describe Any Actions Taken:

Comments:

3. SiO_2 Standards

Was the SiO_2 Standard analyzed at the beginning of analysis? Y [ ] N [ ]
Was the SiO_2 Standard analyzed at the frequency of 1 per 20 natural samples? Y [ ] N [ ]
Were the SiO_2 Standard results within the control limits? Y [ ] N [ ]
Were any data flagged because of the SiO_2 Standard results? Y [ ] N [ ]

Describe Any Actions Taken:

Comments:

4. Calibration Check Samples

Were the appropriate Calibration Check Samples (CCS) analyzed at the beginning of analysis? Y [ ] N [ ]
Were the appropriate CCS analyzed at the frequency of 1 per 20 natural samples? Y [ ] N [ ]
Were CCS results within the control limits? Y [ ] N [ ]
Were any data flagged because of CCS problems? Y [ ] N [ ]

Describe Any Actions Taken:

Comments:

5. Duplicate Sample Results

Were Duplicate Samples analyzed at the frequency of 1 per 20 natural samples?	Y ☐	N ☐
Were Duplicate Sample results within the control window?	Y ☐	N ☐
Were any data flagged because of duplicate sample results?	Y ☐	N ☐

Describe Any Actions Taken:

Comments:

6. Replicate Sample Results

Were Replicate Samples analyzed at the frequency of 1 per 20 natural samples?	Y ☐	N ☐
Were replicate sample results within the control window?	Y ☐	N ☐
Were any data flagged because of replicate sample results?	Y ☐	N ☐

Describe Any Actions Taken:

Comments:

7. Overall Assessment

Are there analytical limitations of the data that users should be aware of?	Y ☐	N ☐

If so, explain:

Comments:

8. Authorization of Data Validation

Data Validator

Name: **Reviewed by:**

Signature: _____ _____

Date: _____ _____

Level A/B Assessment Checklist

1. General Information

Site:
Project:
Client:
Sample Matrix:

2. Screening Result

Data are:

1. Unusable ____
2. Level A ____
3. Level B ____

I. **Level A**

Criteria – The following must be fully documented.	**Yes/No**	**Comments**
1. Sampling date		
2. Sampling team or leader		
3. Physical description of sampling location		
4. Sample depth (soils)		
5. Sample collection technique		
6. Field preparation technique		
7. Sample preservation technique		
8. Sample shipping records		

II**. Level B**

Criteria – The following must be fully documented.	**Yes/No**	**Comments**
1. Field instrumentation methods and standardization complete		
2. Sample container preparation		
3. Collection of field replicates (1/20 minimum)		
4. Proper and decontaminated sampling equipment		
6. Field custody documentation		
7. Shipping custody documentation		
8. Traceable sample designation number		
9. Field notebook(s), custody records in secure repository		
10. Completed field forms		

Attachment 3.5
Product Documentation and User Guide – Butte Reclamation Evaluation System

The City and County of
Butte-Silver Bow Montana

Product Documentation and User Guide

Butte Reclamation Evaluation System (BRES)

Produced By

Butte-Silver Bow County

http://co.silverbow.mt.us/

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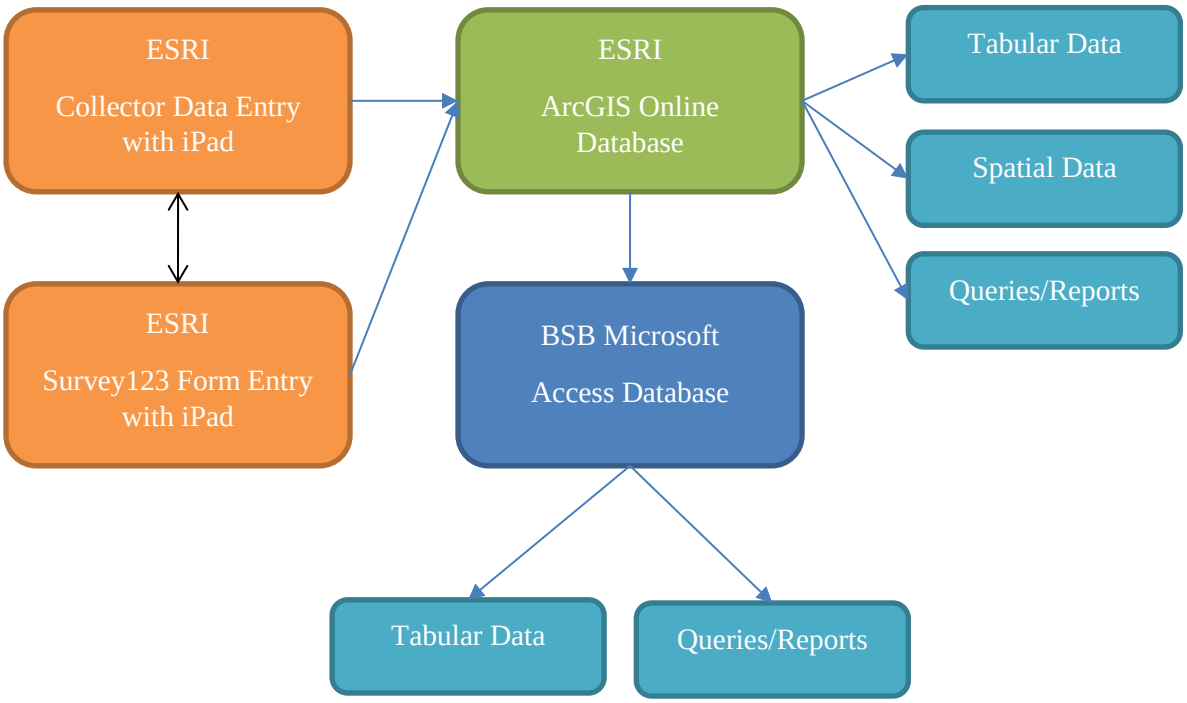
Product Overview

The Butte Reclamation and Evaluation System (BRES) system is an integrated data collection, management and storage system for BRES data. The system utilizes of tablets running ESRI's Survey123 and Collector applications for data collection which is seamlessly stored in BSB's ArcGIS Online database, and a Microsoft Access database front end application for querying and reporting purposes. By leveraging ESRI's ArcGIS online storage, data can be accessed using the ArcGIS Online maps (https://www.arcgis.com/index.html), Survey123's web portal (https://survey123.arcgis.com/) or from a variety of applications by utilizing ESRI's REST API. BSB's Microsoft Access Database utilizes the REST API to sync data from ArcGIS online to a local database. The flowchart below gives an overview of how the system works.



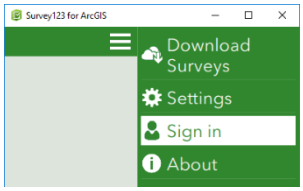
System Requirements

The BRES system requires use of ArcGIS Online, ESRI's Survey123 and ESRI Collector software, this software is included with the counties annual ESRI maintenance. Survey123 and Collector applications can run on IOS or Android devices, the county currently utilizes iPad's for field data collection. Microsoft Access is used as a front-end application for querying and reporting, this software is included with the counties current Microsoft software package. It is also important to note that it's preferable to have a tablet with cellular service for real time updating and collection, BSB utilizes Verizon in their IPad's for this currently.

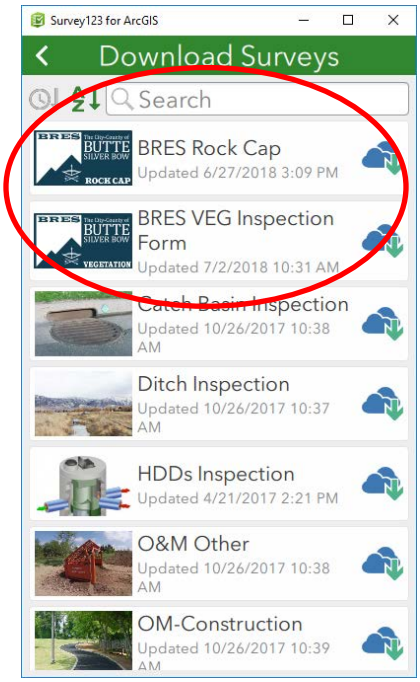
Installation Instructions

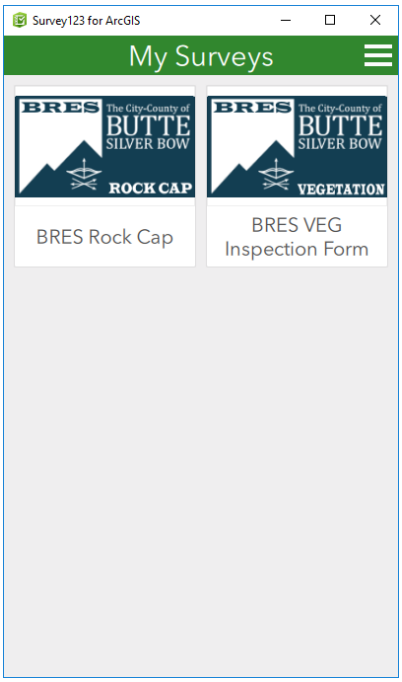
Suvey123 Installation

1. Visit the appropriate app store on your device
    - Google play for Android
    - App store for IOS
2. Search for Survey123 for ArcGIS, click install and launch the app.
    a. In the upper right corner click the three horizontal lines and choose Sign in
        - Sign in credentials are provided by BSB's GIS department through ArcGIS Online



    b. Once signed in, click the three horizontal lines again and choose Download Surveys
    c. Click the Download button to install the BRES Rock Cap and BRES VEG Inspection forms.



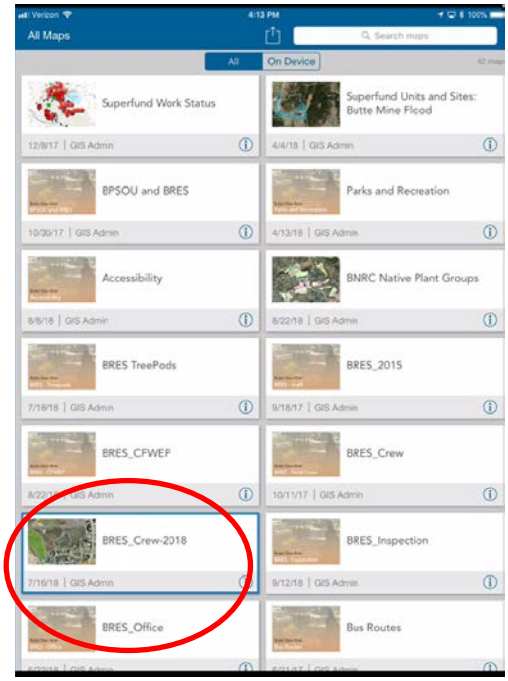


    d. The surveys are now ready to use on the device.

ArcGIS Collector Installation

1. Visit the appropriate app store on your device
    - Google play for Android
    - App store for IOS
2. Search for Collector for ArcGIS, click install and launch the App

3. Choose to sign into ArcGIS Online and enter the sign in credentials provided by BSB GIS
4. Open the appropriate map to collect Data



Microsoft Access Database Installation

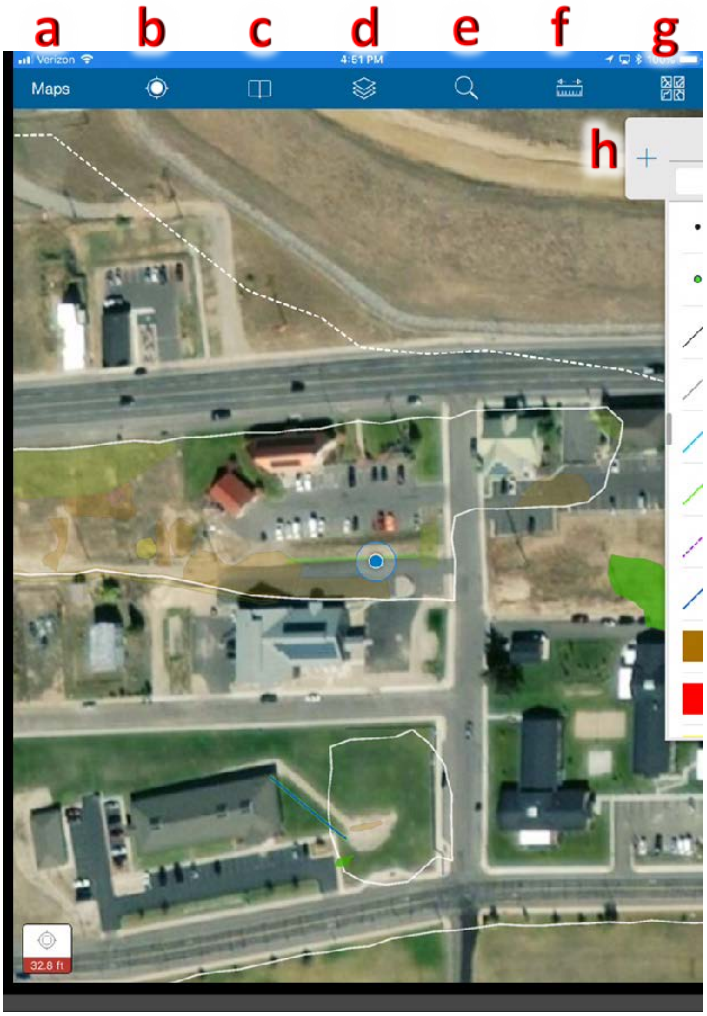
1. The Microsoft Access database requires that Microsoft Access 2013 or greater is installed. The custom database is installed by copying the file to a network or local file directory. Data is automatically synced when the database is open.

Operational Instructions

ESRI Collector Application

Application Overview

1. On the iPad launch the collector application, sign in and open the BRES mapping application. See installation instructions for installing ESRI Collector for information on installing the application.
2. Once opened the application zooms to your current GPS location as indicated by blue dot on the screen as shown below.

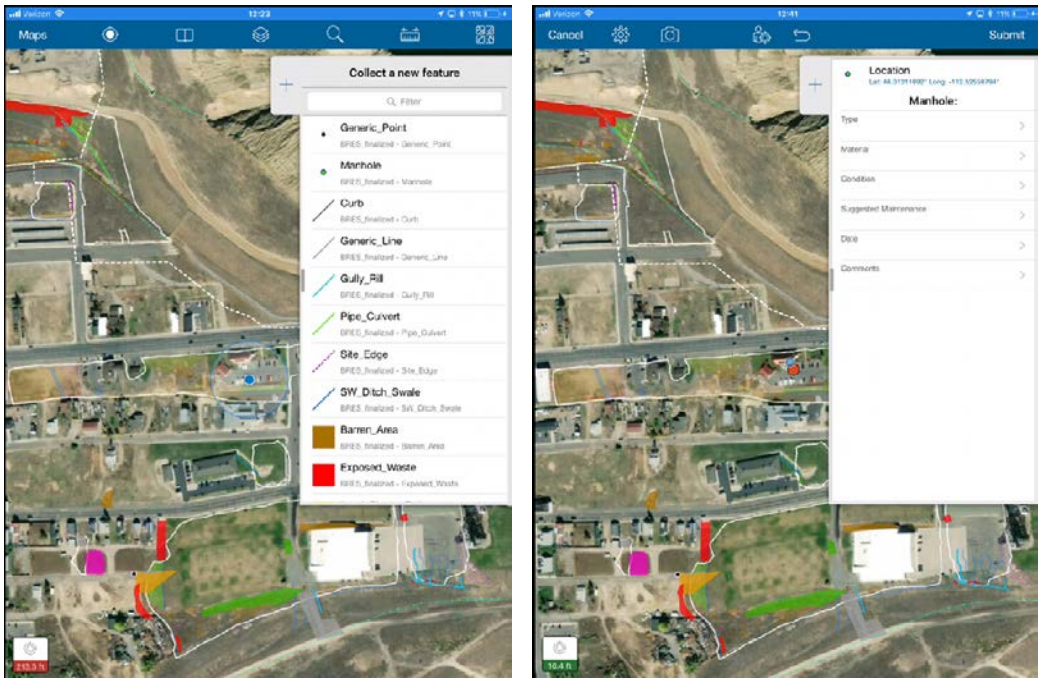


3. Below is a explination of the collector app's icons. Please see coorisponding letter from image above for information on it's use
    a. Tap the Maps icon in collector to select a different map to use for BRES data collection
    b. The location icon turns on or off location services (GPS), when the icon is filled it is using the current GPS location from your device. If it's hollow no location services are being utilized.

c. This is the bookmarks icon which allows the user to bookmark frequent places or map extents.
d. Tap the layers icon to view a list of layers and optionally turn them on and off.
e. The search icon allows you to search for a location and optionally bookmark for later use.
f. The measure icon allows the user to mesaure distance or areas by tapping on the map or using your current GPS location.
g. The basemap icon allows users to choose between several different basemaps, for example aerial or topographic.
h. Tap the plus (+) symbol to open up the data collection menu.

Collecting Feaures

Tap the plus (+) arrow on the upper right-hand side of the screen to open the data collection menu.



Collecting Point Features

1. To collect a point feature, tap the feature type (Manhole in this example)
2. Collector begins collecting a point at your current GPS location. Fill out attribute information in the right-hand menu and hit Submit to create a feature at the current GPS location
3. To digitize a point feature, click on the screen at the desired location, fill out attribute information and tap Submit

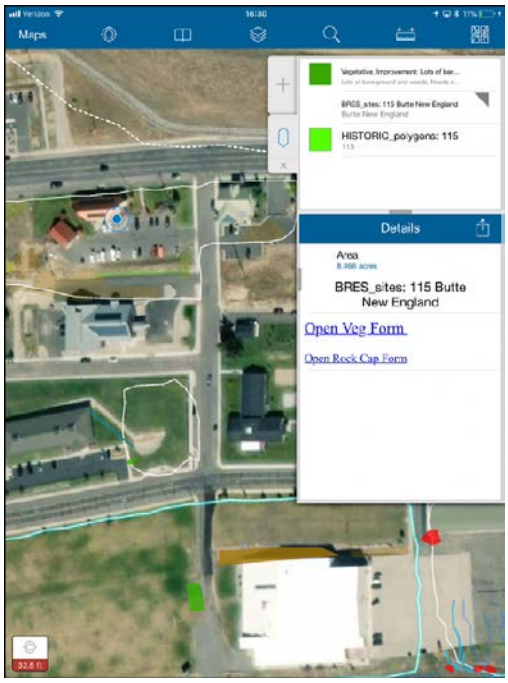
Collecting Line Features

1. To collect a line feature, tap the feature type (Pipe_Cluvert) in this example.

2. To collect using current GPS location tap the Start Streaming button at the top of the screen and start walking the route.
3. Attribute information can be entered before starting streaming or streaming can be paused at any time for data entry.
4. To finish data collection, click the Submit button in the top right corner of the screen. Alternatively tap the Cancel button to discard changes

Identifying Features Launching Survey123 application

1. To identify a feature, make sure the layer is turned on in the Layers menu, zoom to a location and click a feature to display the pop-up menu.



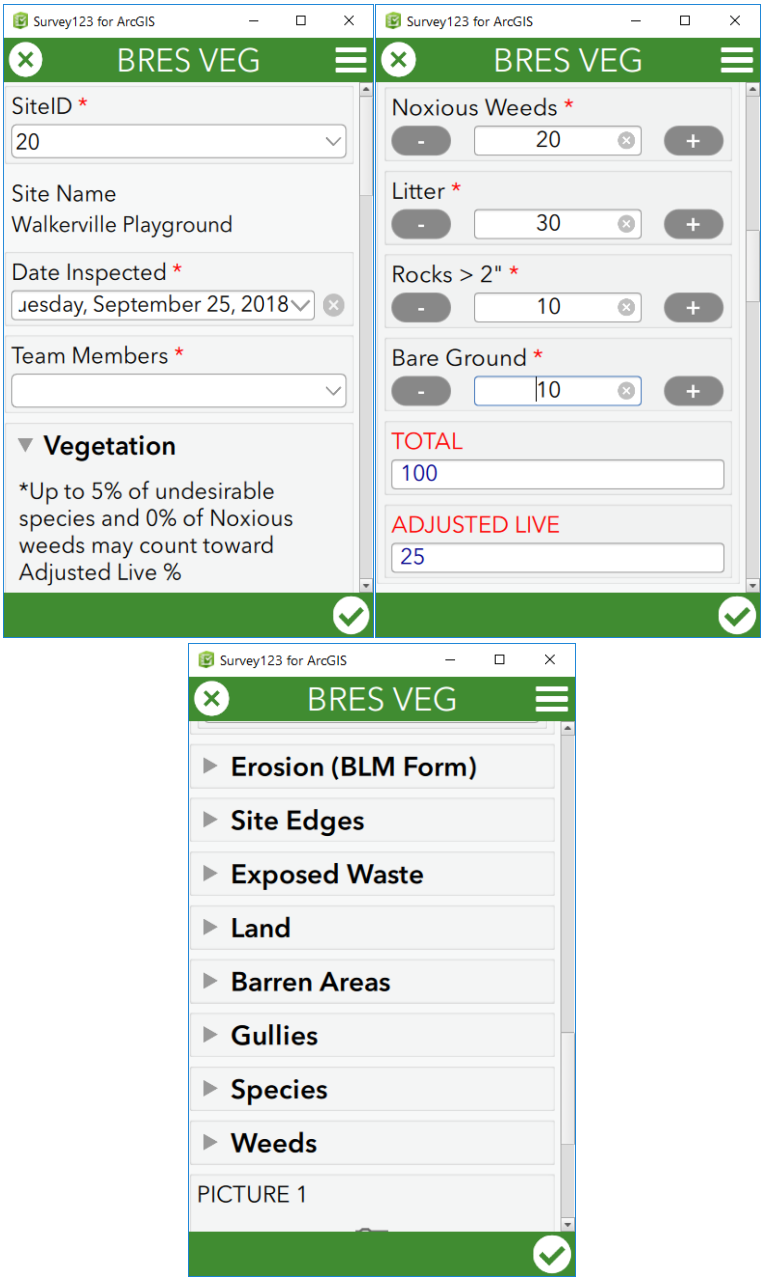
2. The identify menu appears on the upper left portion of the screen, as you can see the top menu shows how many layers have been identified (3 in this example). To switch between layers, tap the layer name.
3. When identifying a BRES polygon feature you will see options to launch the Veg inspection and Rock Cap inspection forms, clicking the appropriate hyperlink launches the appropriate form and links the identified BRES polygon information. For more information on using these forms see ESRI Survey123 Application in this manual.

ESRI Survey123 Application

Vegetation Inspection Form

1. Vegetation Inspection Form can be launched in the following ways:
    a. The preferred way is to launch the program directly from ESRI collector application using the hyperlink by identifying a BRES polygon. This method automatically fills in the location information (SiteID and Site Name) on the Vegetation inspection form.
    b. To launch the application directly tap the Survey123 application on your device.

c. Sign in with credentials provided by BSB GIS department
d. Tap BRES VEG Inspection Form, then tap Collect to start collecting data.



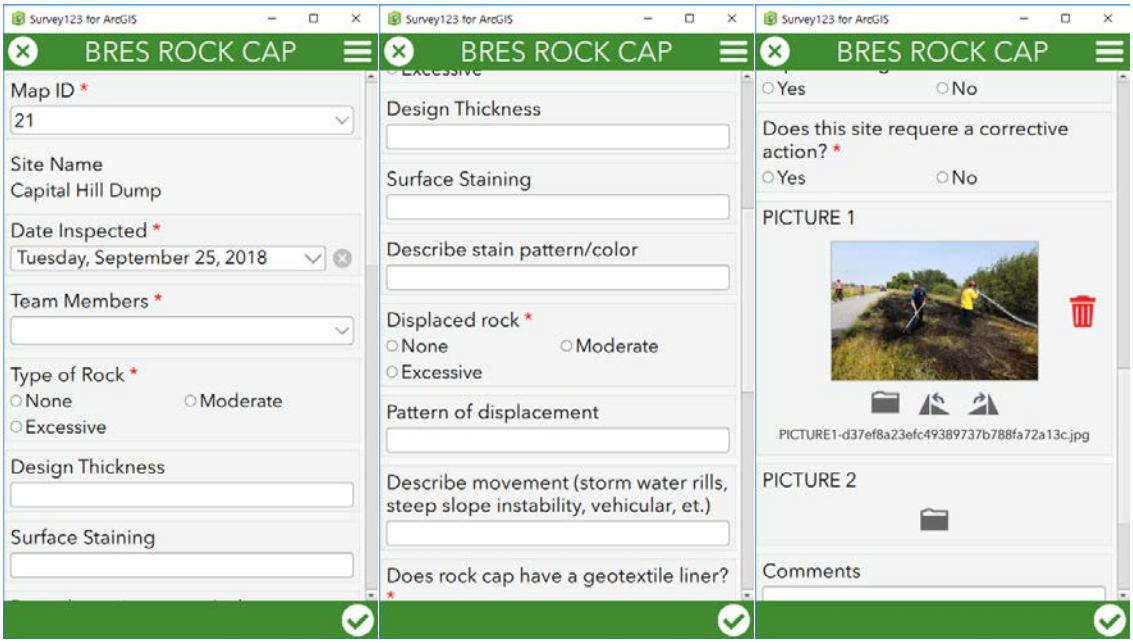
2. If app was launched from ESRI Collector, the SiteID and Site Name are automatically filled in. Selecting a SiteID from the drop-down list automatically selects a site name.
3. Fields with an asterisk (*) beside them are required fields which require an entry. The TOTAL for Vegetation and the Erosion (BLM Form) are automatically calculated. Once the required TOTAL for the Vegetation section equals 100 and the calculated ADJUSTED LIVE score is shown
4. Tapping the arrow next to each section expands it for required data entry.
5. Up to three pictures can be taken with each inspection. To capture a picture, tap the icon in the picture section, take a picture and the app embeds a thumbnail into the form, once

picture 1 has been taken the picture 2 sections becomes visible, picture 3 is visible when pictures 1 and 2 have been taken.

6. When all data has been entered tap the check mark in the bottom right hand corner to submit the data.

Rock Cap Inspection Form

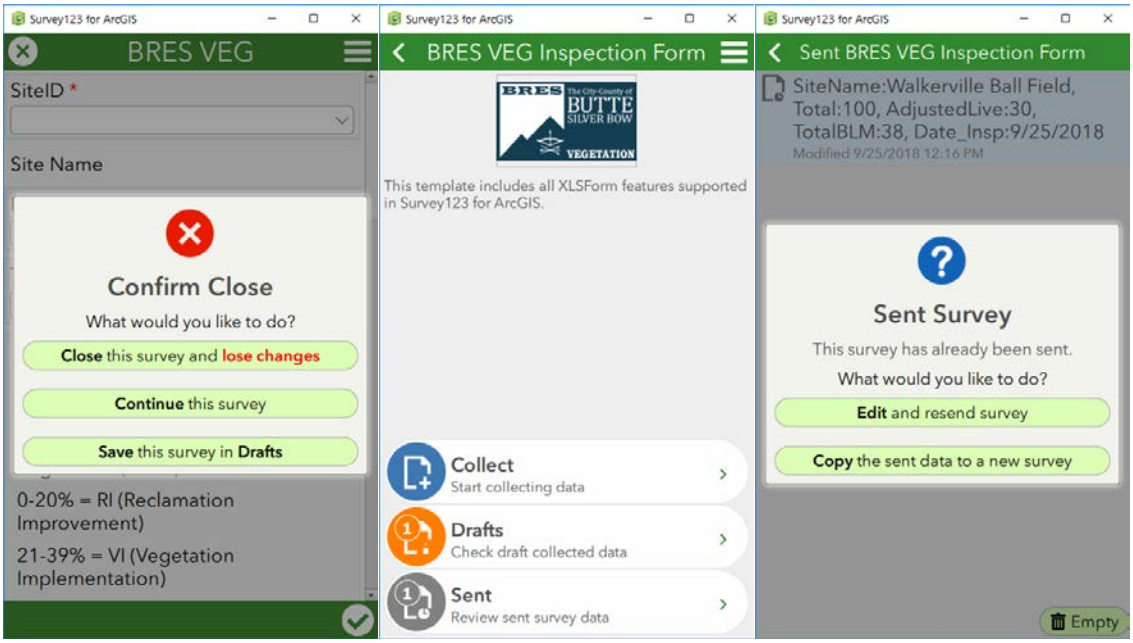
1. The Rock Cap Inspection Form can be launched in the following ways:
    a. The preferred way is to launch the program directly from ESRI collector application using the hyperlink by identifying a BRES polygon. This method automatically fills in the location information (SiteID and Site Name) on the Rock Cap Inspection form.
    b. To launch the application directly tap the Survey123 application on your device.
    c. Sign in with credentials provided by BSB GIS department
    d. Tap Rock Cap Inspection form, then tap Collect to start collecting data.



2. If app was launched from ESRI Collector, the SiteID and Site Name are automatically filled in. Selecting a SiteID from the drop-down list automatically selects a site name.
3. Fields with an asterisk (*) beside them are required fields which require an entry.
4. Up to three pictures can be taken with each inspection. To capture a picture, tap the icon in the picture section, take a picture and the app embeds a thumbnail into the form, once picture 1 has been taken the picture 2 sections becomes visible, picture 3 is visible when pictures 1 and 2 have been taken.
5. When all data has been entered tap the check mark in the bottom right hand corner to submit the data.

Survey123 tips and tricks

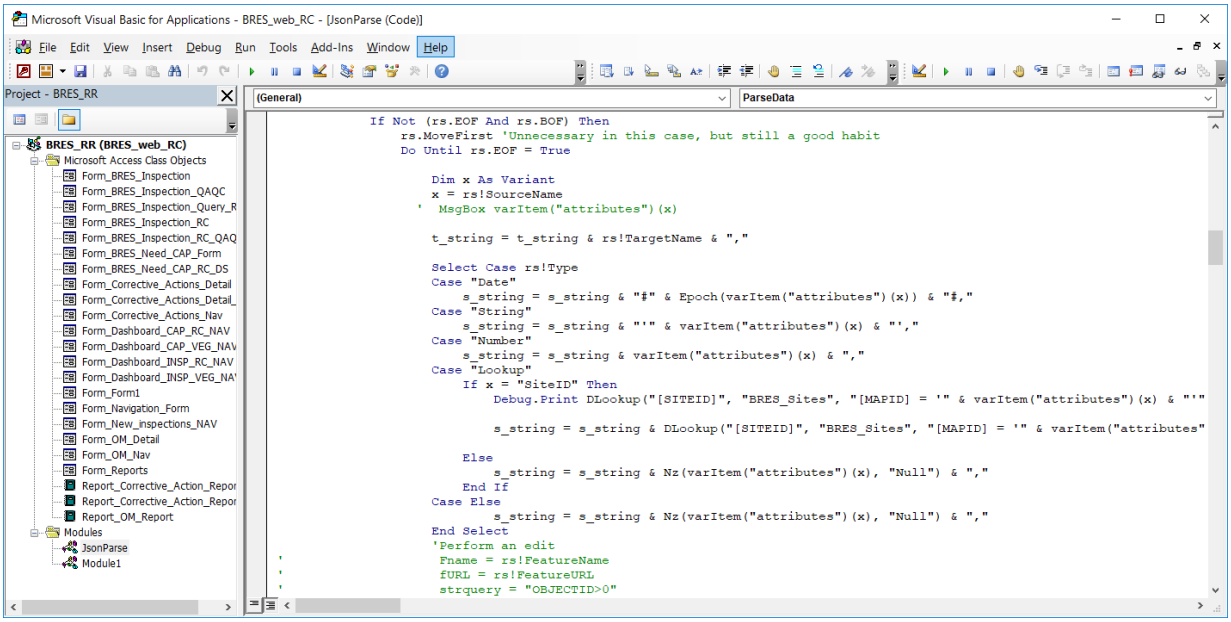
- To update a survey from the My Surveys screen, tap the three horizontal lines in the upper right-hand corner of the app, choose the refresh icon to update the survey.
- Setting favorite answers is an excellent way for speed up data entry. With a survey open fill out all of the information in the survey to save as favorites, tap the three horizontal lines in the top right corner of the screen and choose set as favorite answers. To use favorite answers on a new survey, tap the three horizontal lines and choose paste answers from favorite to fill in the appropriate fields.
- To edit a sent survey tap Sent on the main survey screen to Review sent survey data, this button shows a list of submitted surveys. Tapping as sent survey gives the user the option to edit and resend the survey or copy the sent data to a new survey.
- To cancel a survey, tap the X in the upper left portion of the screen, this gives you the option to save the survey as a draft that can be opened later from the main screen.



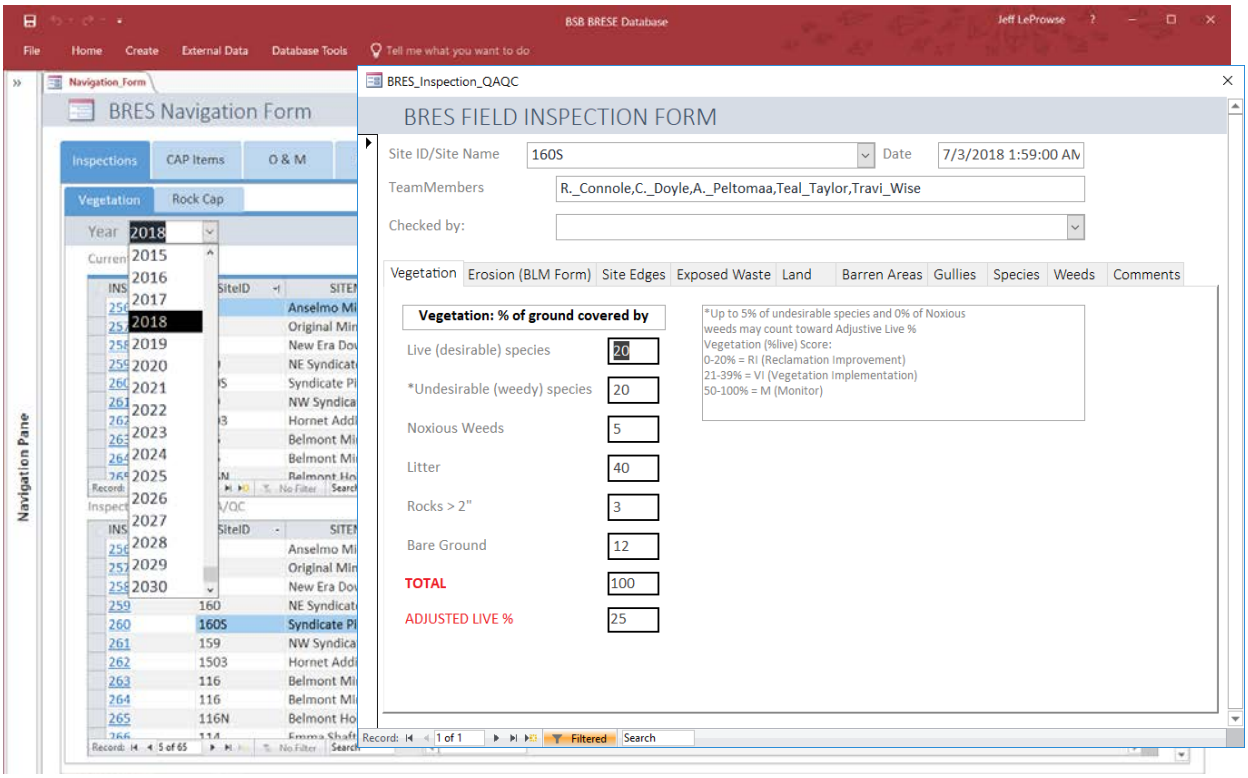
Microsoft Access Application

The Microsoft Access application provides a dashboard style view which automatically syncs with ArcGIS online (AGOL). This application leverages ESRI's REST API to retrieve data from BSB's ArcGIS online server. It's important to note this is a one-way sync from ArcGIS online. If a record is deleted in the Access app but not in AGOL the record will be retrieved again on the load event of the navigation form.

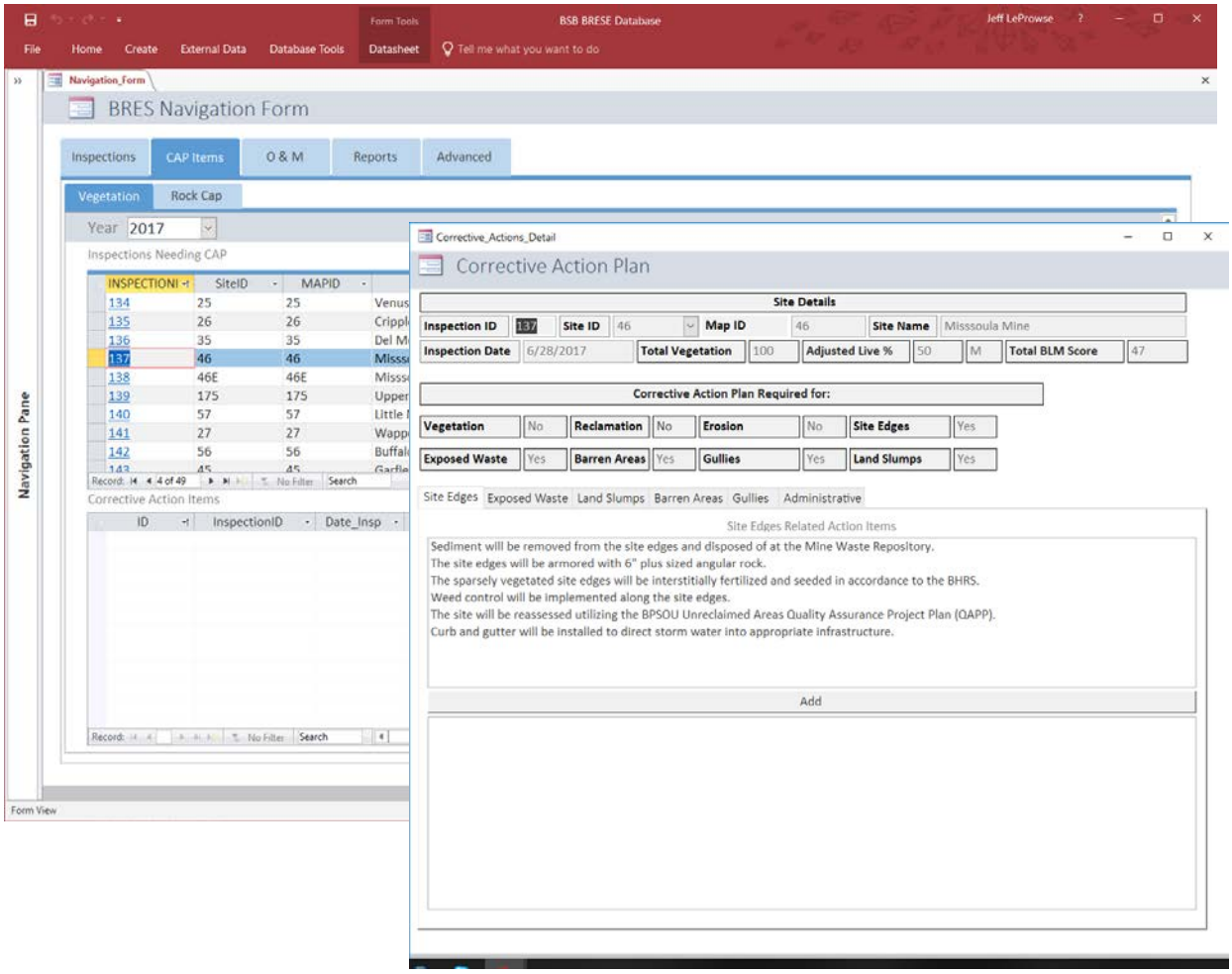
The code uses Visual Basic for Applications and can be viewed and edited from within the application by using the Alt+F11 buttons. A screen snap of the code is shown below.



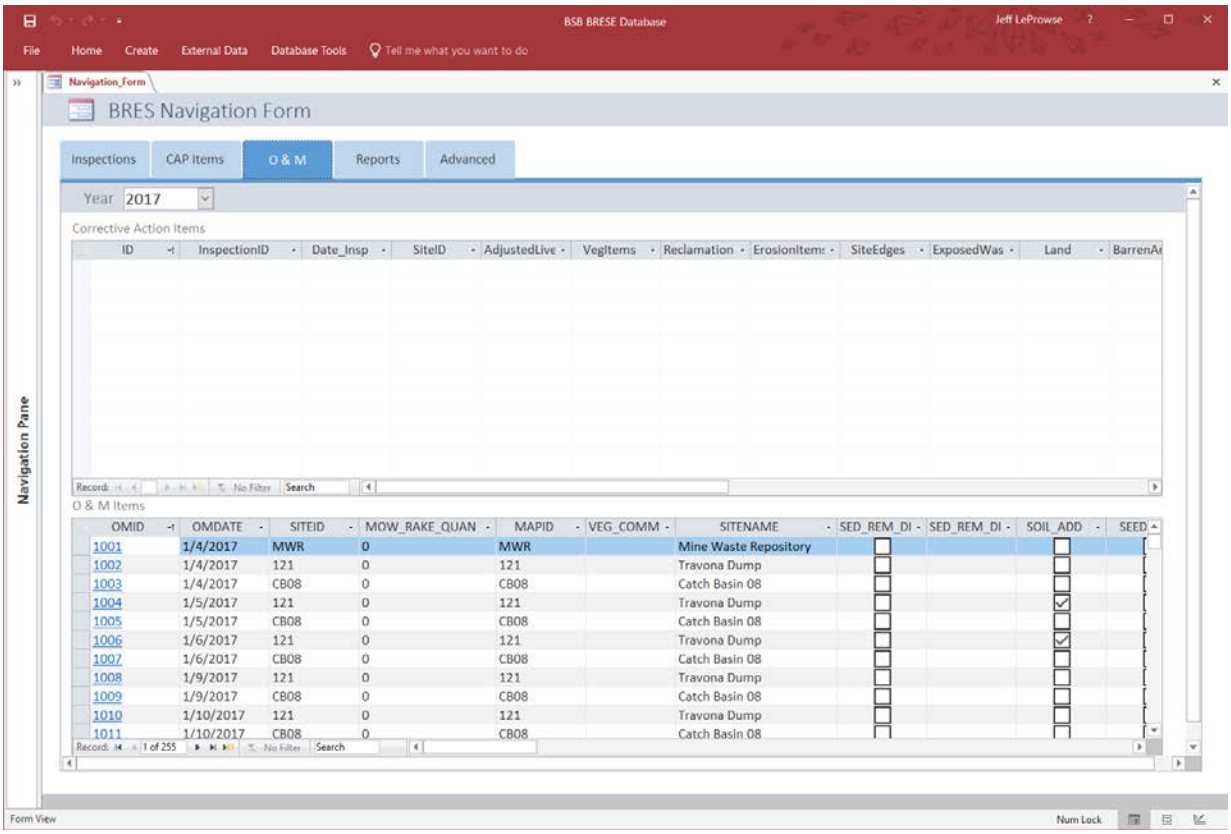
The dashboard style form automatically opens and syncs with AGOL on when the database is opened. As shown in the screen snap below this navigation form allows users to quickly query data by year by selecting a year from the drop-down list and clicking through the Vegetation, Rock Cap inspections or the Corrective Action Plans (CAP Items). Clicking the hyperlink for individual INSPECTIONID displays details about each item. The first tab of the navigation form displays inspections by year and inspections that need to be QA/QC'd in the bottom screen. Once inspections have been QA/QC'd any items requiring a corrective action plan will appear in the CAP Items tab.



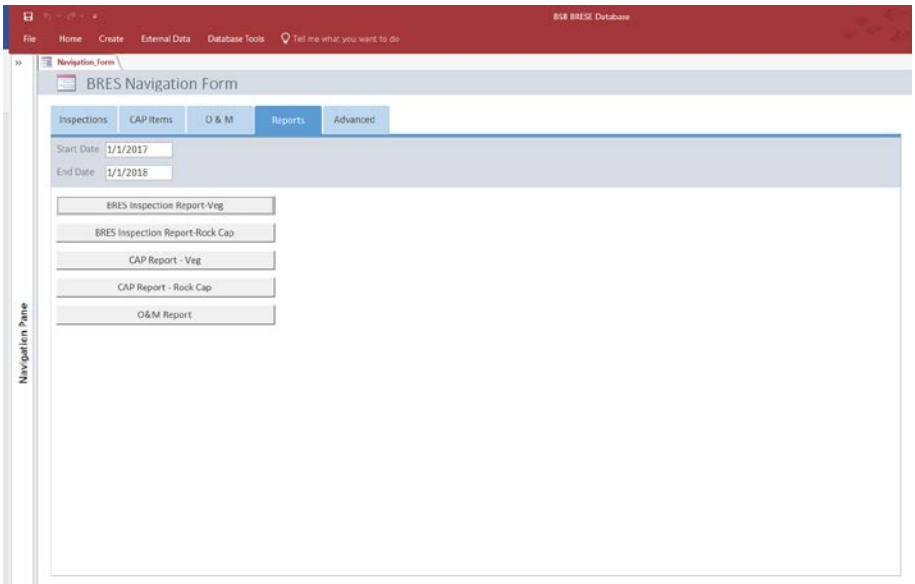
The CAP Items tab shown below displays Inspections needing a corrective action plan (CAP) in the top section of the form, clicking the hyperlink for the INSPECTIONID column displays a pop up form to apply corrective actions for the inspection which moves the item to the corrective Action Items list.



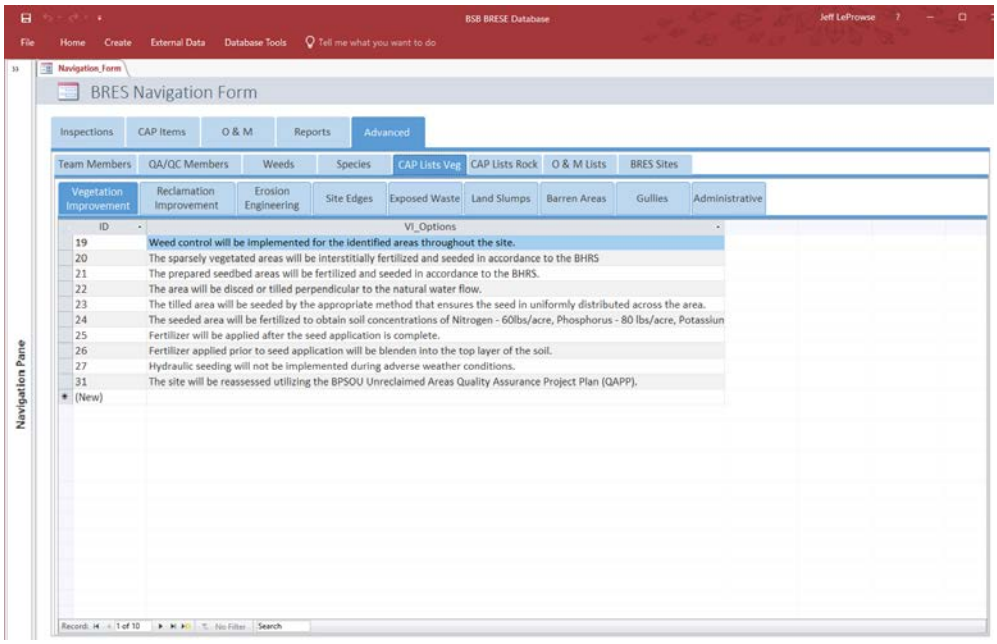
The O&M tab allows for recording Operating and Maintenance activities per year and shows a list of Corrective action items in the top window. The O&M section has been replaced by a different application BSB started utilizing in 2018 to have field crews record this information on iPad's with Survey123.



The reports tab allows easy generation of reports between two dates as shown below. To generate a report, enter start and end date can click the appropriate report to run and print or save as a PDF.



The Advanced tab allows users to add and edit information on the various list that appear in the database.

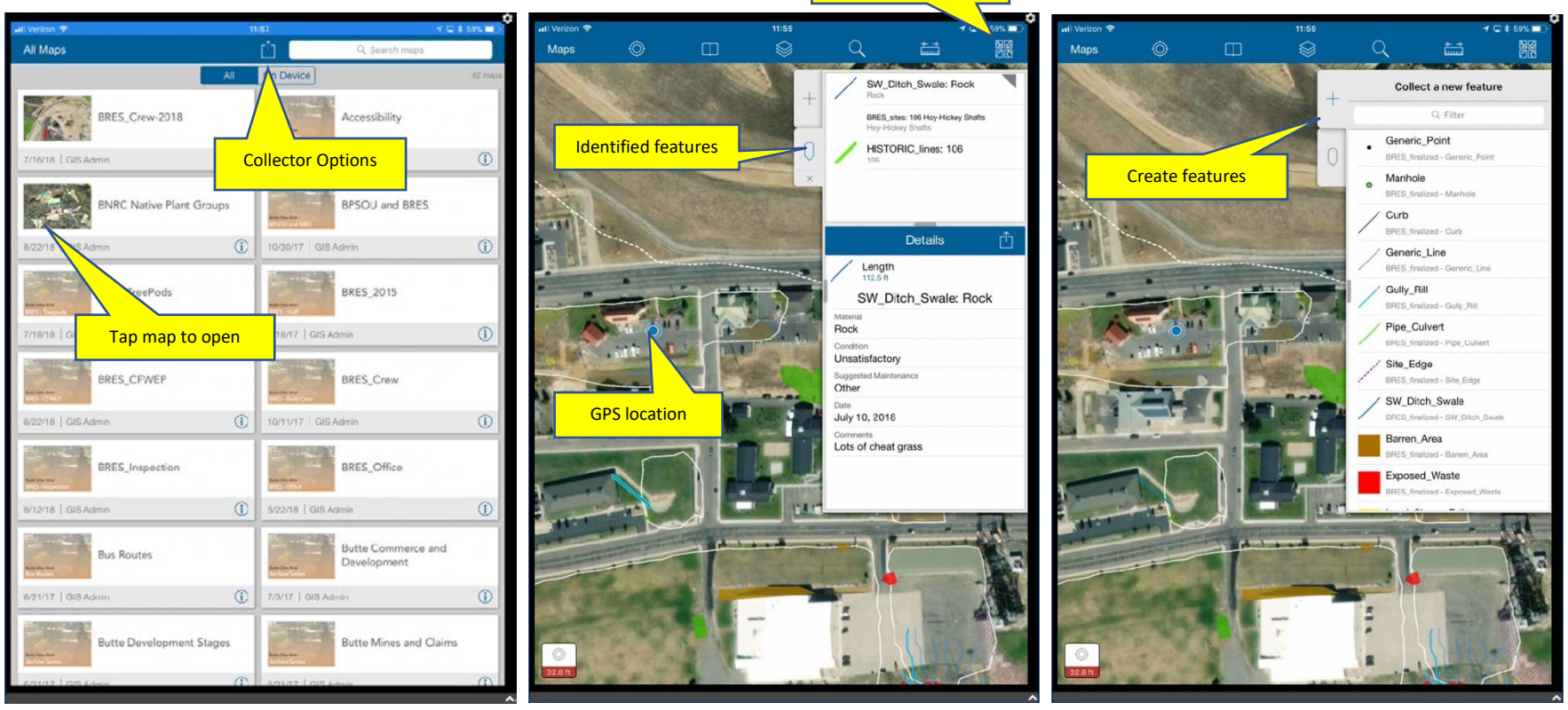

BSB BRESE Database
Jeff LeProwse
File
Home
Create
External Data
Database Tools
Tell me what you want to do
Navigation_Form
BRES Navigation Form
Inspections
CAP Items
O & M
Reports
Advanced
Team Members
QA/QC Members
Weeds
Species
CAP Lists Veg
CAP Lists Rock
O & M Lists
BRES Sites
Vegetation Improvement
Reclamation Improvement
Erosion Engineering
Site Edges
Exposed Waste
Land Slumps
Barren Areas
Gullies
Administrative
ID
VI_Options
19 Weed control will be implemented for the identified areas throughout the site.
20 The sparsely vegetated areas will be interstitially fertilized and seeded in accordance to the BHRS
21 The prepared seedbed areas will be fertilized and seeded in accordance to the BHRS.
22 The area will be disced or tilled perpendicular to the natural water flow.
23 The tilled area will be seeded by the appropriate method that ensures the seed in uniformly distributed across the area.
24 The seeded area will be fertilized to obtain soil concentrations of Nitrogen - 60lbs/acre, Phosphorus - 80 lbs/acre, Potassiun
25 Fertilizer will be applied after the seed application is complete.
26 Fertilizer applied prior to seed application will be blenden into the top layer of the soil.
27 Hydraulic seeding will not be implemented during adverse weather conditions.
31 The site will be reassessed utilizing the BPSOU Unreclaimed Areas Quality Assurance Project Plan (QAPP).
(New)
Record: 1 of 10
No Filter
Search
Navigation Pane

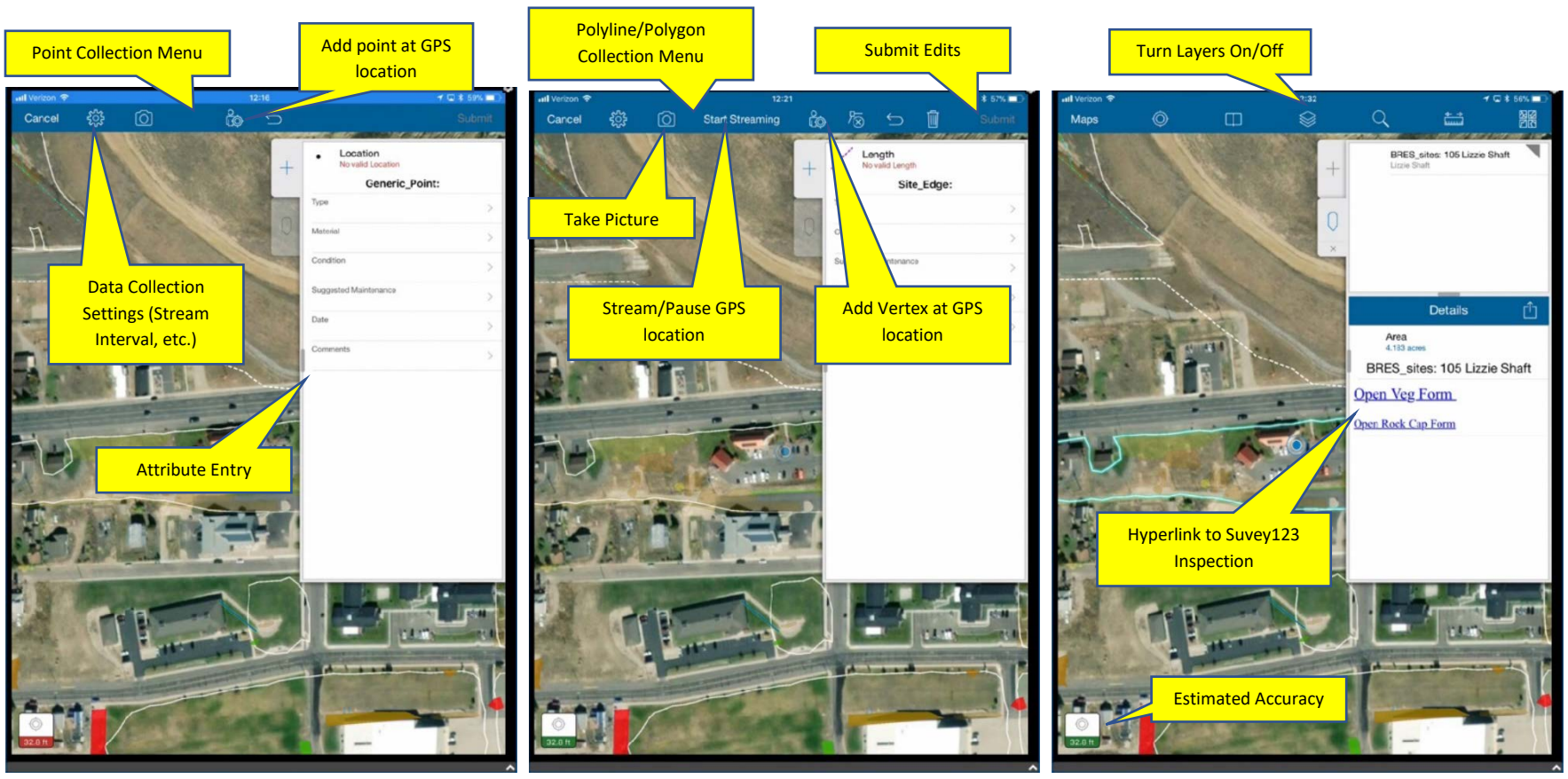
Appendix A

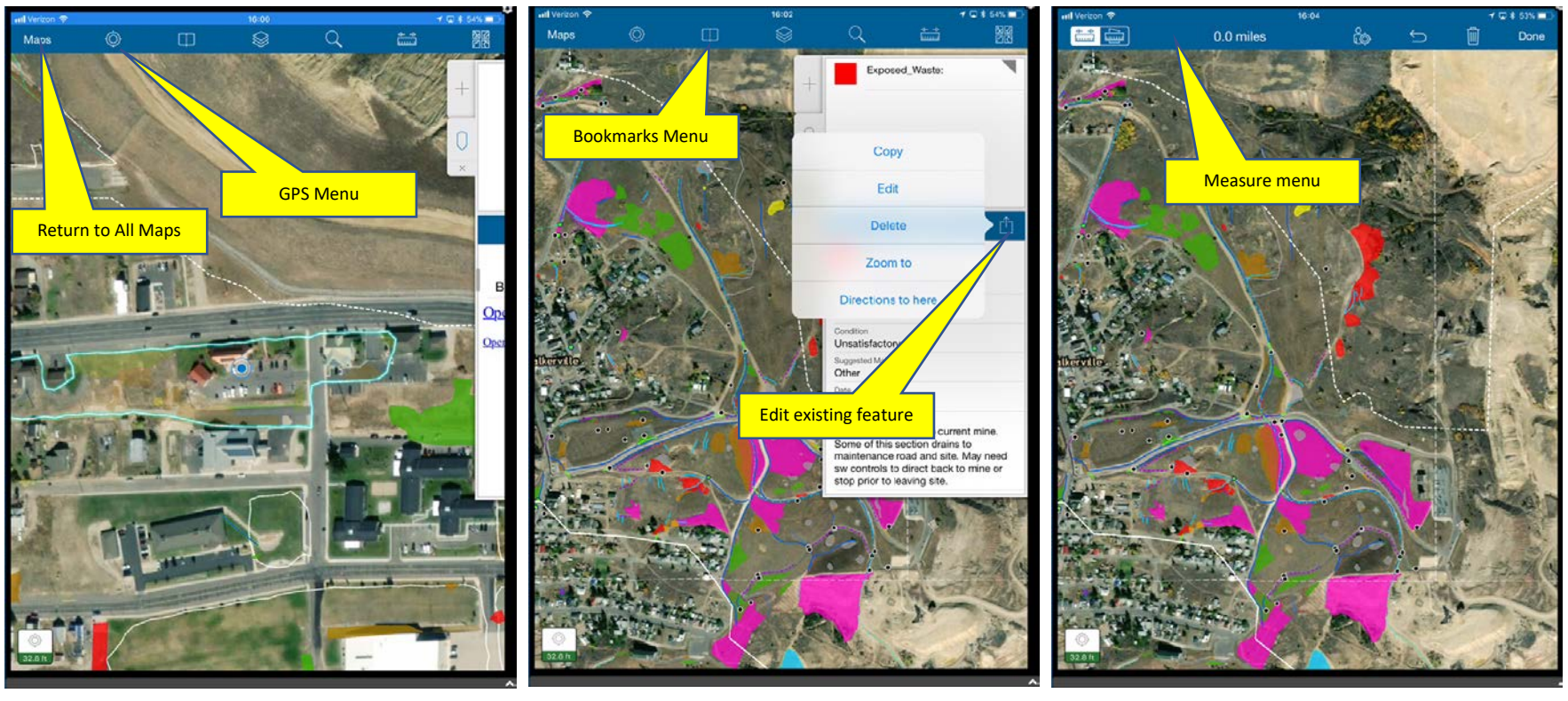
Quick Reference Guides

Appendix A – Quick Reference Guides

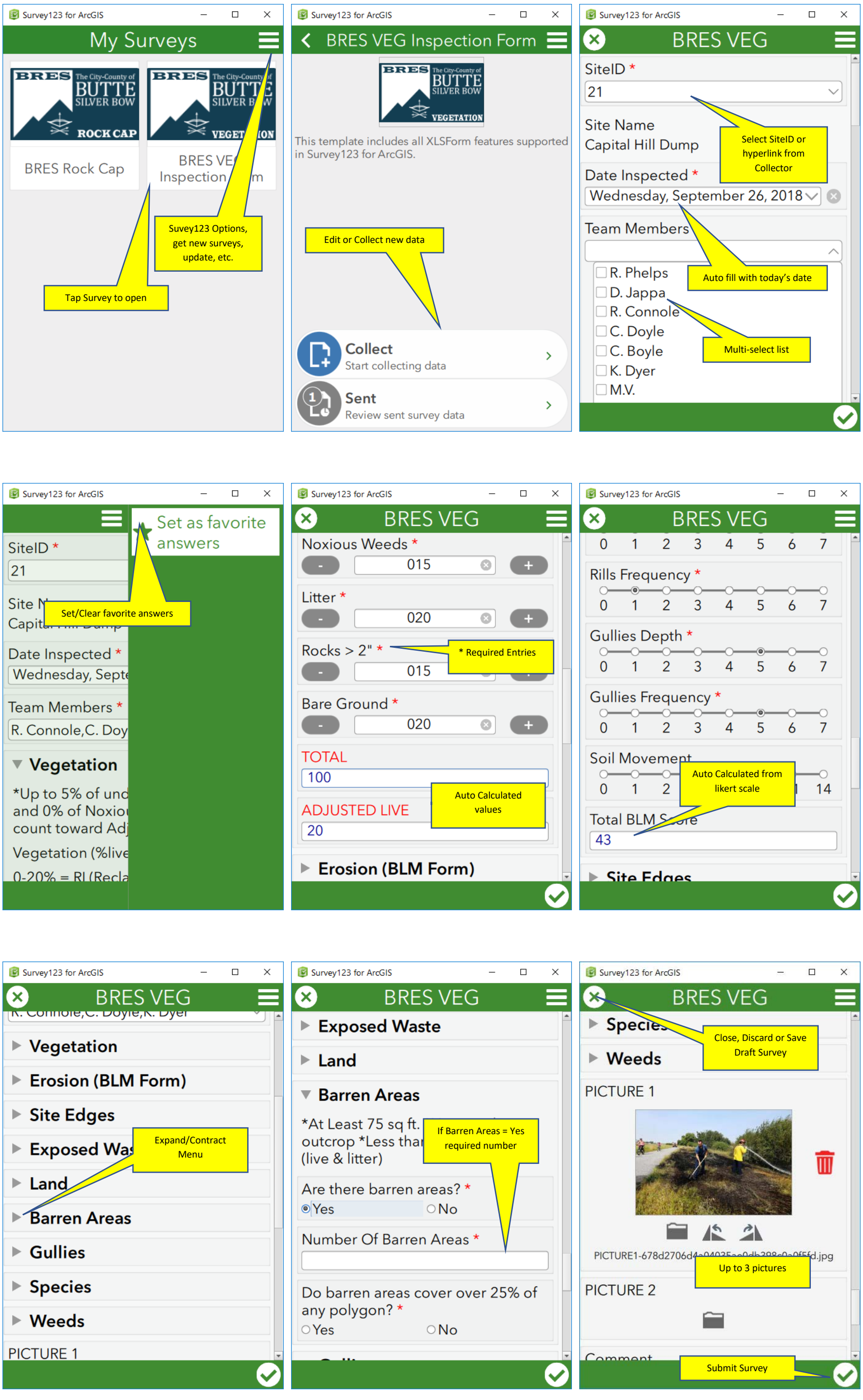
ESRI Collector



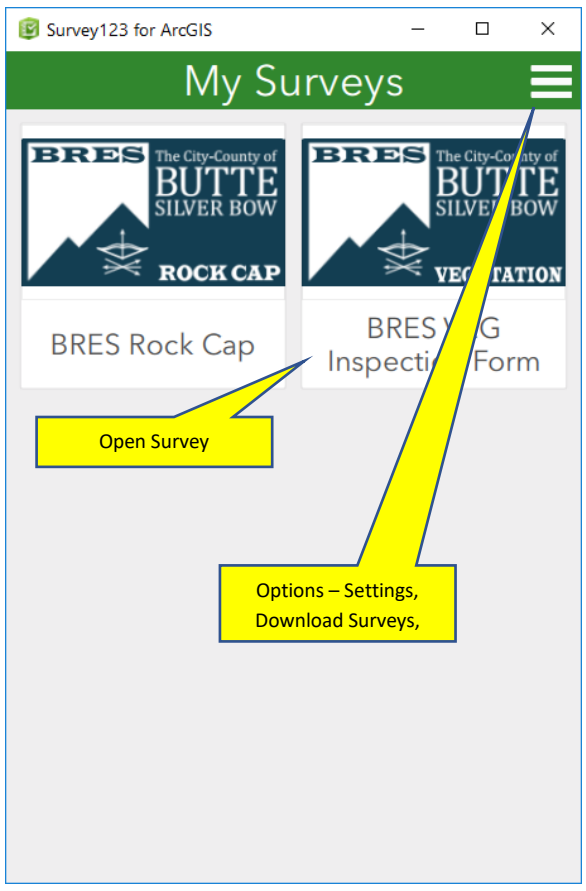


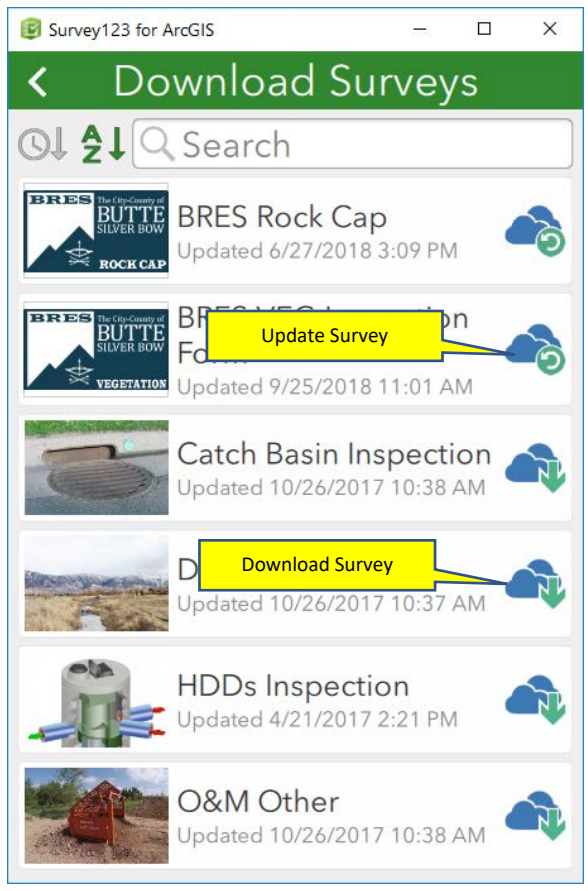


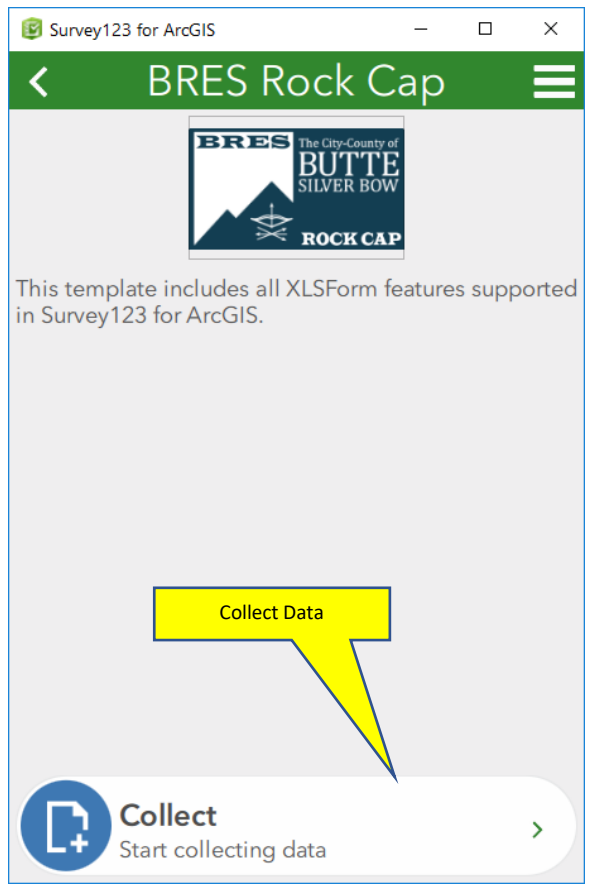
Survey123 Vegetation Inspection

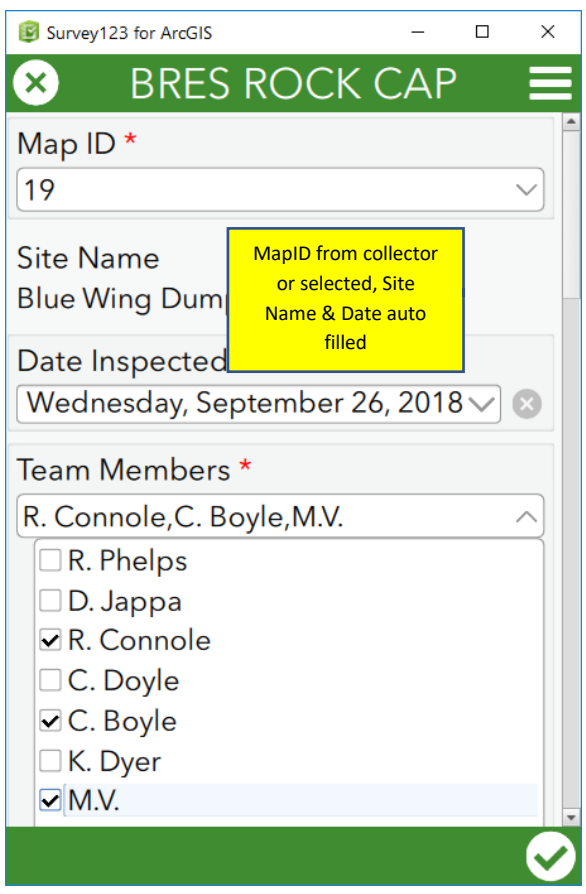


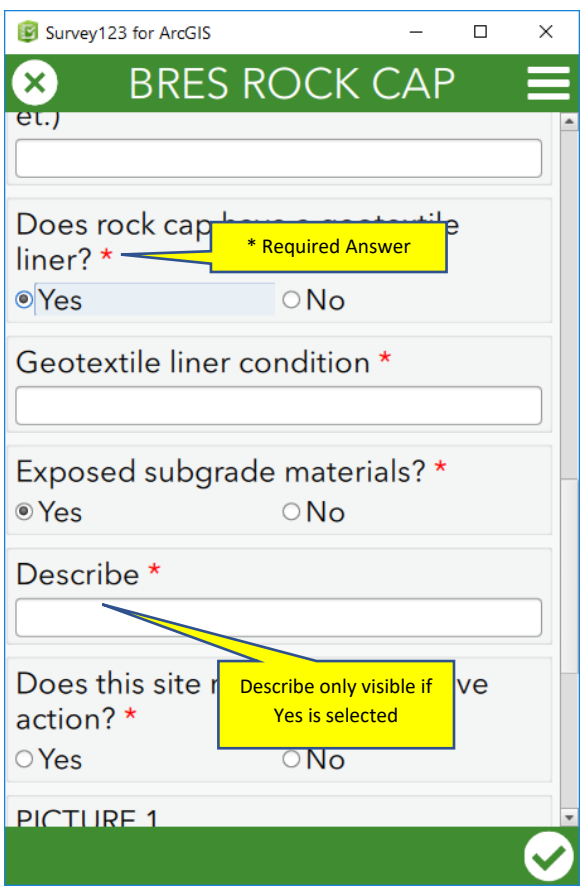
Survey123 Rock Cap Inspection

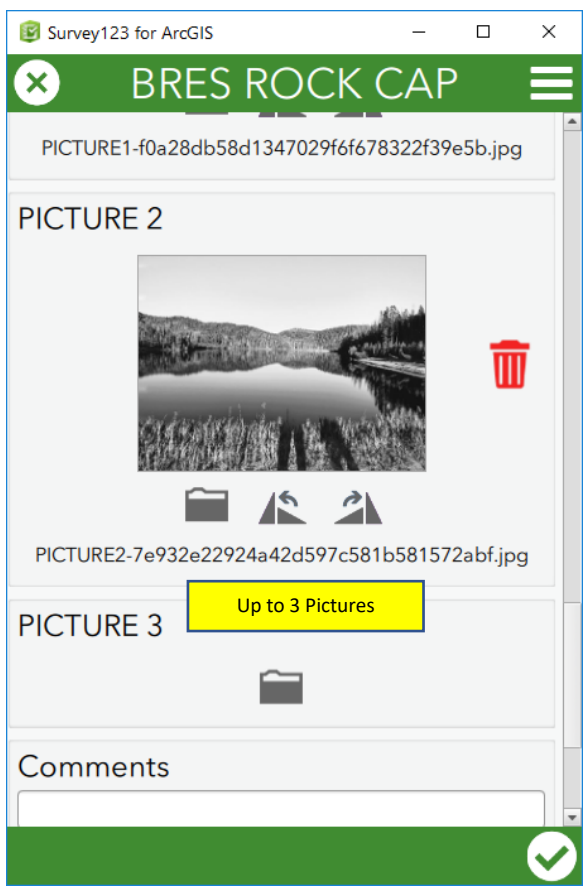


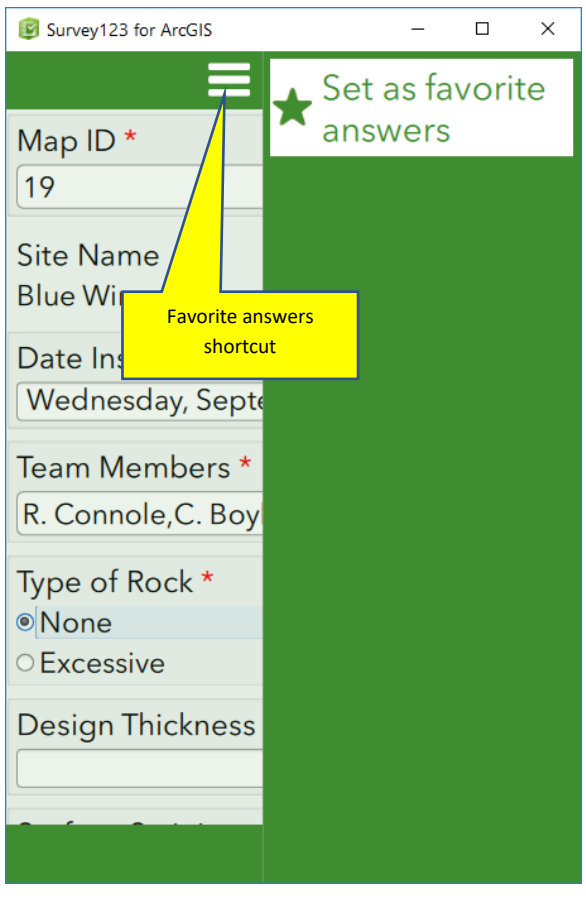


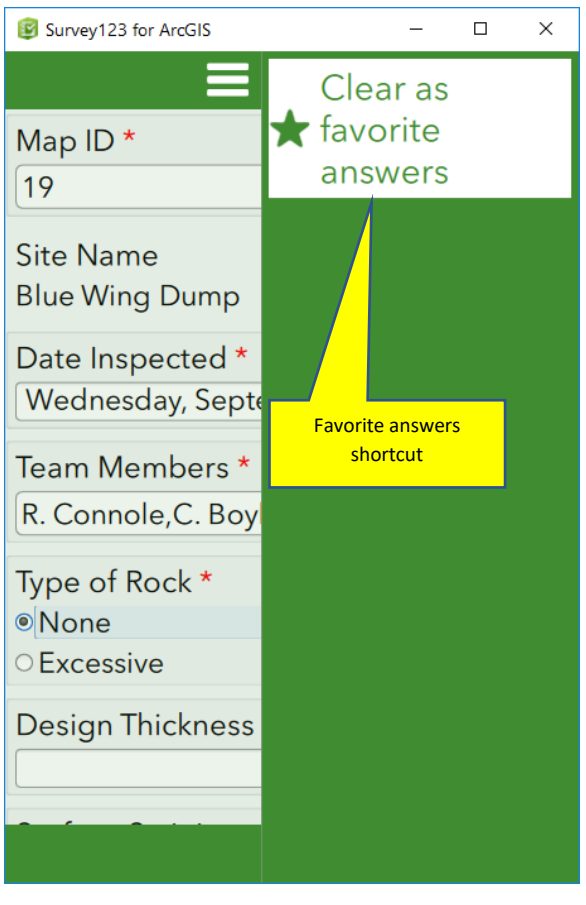


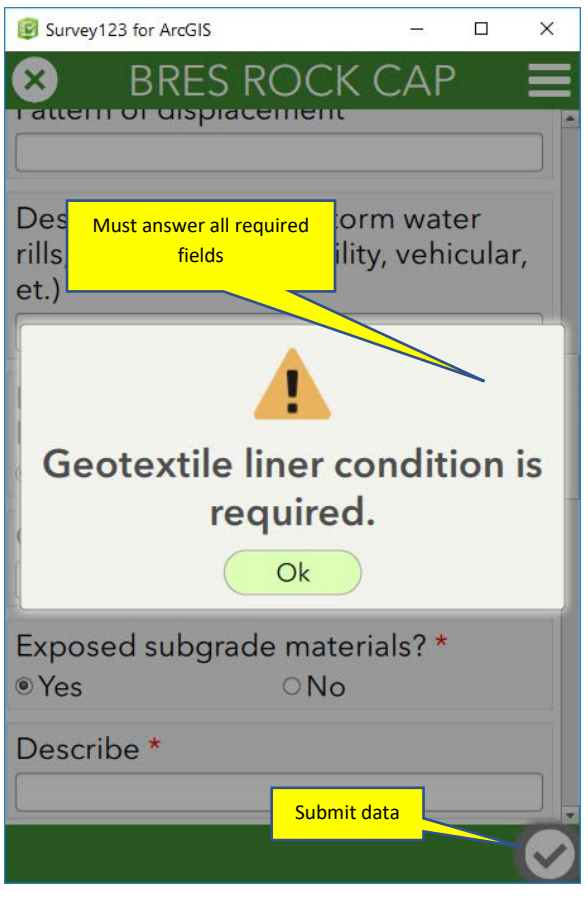












Appendix B

Schema Design of Feature Classes

Feature = Vegetation Inspection			
Name	**Field_Type**	**Alias**	**Length**
objectid	OID	ObjectID	
globalid	GlobalID	GlobalID	38
SiteID	String	SiteID	9
sitecal	String	sitecal	255
SiteName	String	Site Name	255
Date_Insp	Date	Date Inspected	255
TeamM	String	Team Members	255
LiveDesirableSpecies	Integer	Live (desirable species)	
LiveUndesirableWeedySpecies	Integer	Undesirable (weedy species)	
NoxiousWeeds	Integer	Noxious Weeds	
LitterIncMoss	Integer	Litter	
RocksGT2Inches	Integer	Rocks > 2"	
BareGround	Integer	Bare Ground	
Total	Integer	TOTAL	
AdjustedLive	Integer	ADJUSTED LIVE	
blmnote	String	BLM Score 0-55 = M (Monitor) 56-100 = EV (Engineering Evaluation)	255
SurfaceLitter	String	Surface Litter	2
SurfaceRockMovement	String	Surface Rock Movement	2
Pedestalling	String	Pedestalling	2
FlowPatterns	String	Flow Patterns	2
RillsDepth	String	Rills Depth	1
RillsFrequenct	String	Rills Frequency	1
GulliesDepth	String	Gullies Depth	1
GulliesFrequency	String	Gullies Frequency	1
SoilMovement	String	Soil Movement	2
TotalBLM	Integer	Total BLM Score	
SiteEdgesYN	String	Are outer edges of the site significantly different than the remainder of the site?	3
LimeRockBarrier	String	Lime Rock Barrier	3
DepositionalArea	String	Depositional Area	3
MoreWeeds	String	More Weeds	3
SteeperSlope	String	Steeper Slope	3
IncreasedErosion	String	Increased Erosion	3
LessVegetation	String	Less Vegetation	3
Gullies	String	Gullies	3
ExposedWasteMaterial	String	Exposed Waste Material?	3
NumberOfAreasWithExposedWaste	Integer	Number of Areas with Exposed Waste	
BulkSoilFailure	String	Bulk Soil Failure	3
Subsidence	String	Subsidence	3
LandSlumps	String	Land Slumps	3
atleast	String	*At Least 75 sq ft. *Not a rock outcrop *Less than 10% total cover (live & litter	255
BarrenAreasYN	String	Are there barren areas?	3
NumberOfBarrenAreas	Integer	Number Of Barren Areas	
DoBarrenAreasCoverOver25	String	Do barren areas cover over 25% of any polygon?	3
GulliesOver6InchesYN	String	Are there any gullies over 6" in depth	3
AreAnyGulliesActivelyEroding	String	Are any gullies actively eroding	3
DSpecies	String	Dominant	255
FSpecies	String	Frequent	255
ifSpecies	String	Infrequent	255

Dweeds	String	Dominant	255
Fweeds	String	Frequent	255
ifweeds	String	Infrequent	255
Comment	String	Comment	255
CreationDate	Date	CreationDate	8
Creator	String	Creator	128
EditDate	Date	EditDate	8
Editor	String	Editor	128

Feature = Rock Cap Inspection			
Name	**Field_Type**	**Alias**	**Length**
objectid	OID	ObjectID	
globalid	GlobalID	GlobalID	38
SiteID	String	Map ID	9
sitecal	String	sitecal	255
SName	String	Site Name	255
Date_Insp	Date	Date Inspected	255
TeamM	String	Team Members	255
ROCK_TYPE	String	Type of Rock	9
DESIGN_THICK	String	Design Thickness	255
SUR_STAIN	String	Surface Staining	255
SUR_STAIN_COMMENT	String	Describe stain pattern/color	255
DISP_ROCK	String	Displaced rock	9
DISP_ROCK_PATT	String	Pattern of displacement	255
MOVEMENT	String	Describe movement (storm water rills	255
GEOTEX_LINER	String	Does rock cap have a geotextile liner?	3
GEOTEX_LINER_COND	String	Geotextile liner condition	255
EXP_SUBGRADE	String	Exposed subgrade materials?	3
EXP_SUBGRADE_DETAIL	String	Describe	255
REQUIRE_CAP	String	Does this site requere a corrective action?	3
COMMENTS	String	Comments	255
CreationDate	Date	CreationDate	8
Creator	String	Creator	128
EditDate	Date	EditDate	8
Editor	String	Editor	128

Attachment 4
Annual Updates

Rev. No.	Year	Description
1	2021	Updated recipient lists to reflect current distribution list. Updated Section 2 Project Organization and Responsibilities and Figure 2 to reflect Atlantic Richfield roles and title changes. Updated citations to reference the most recent 2018 Atlantic Richfield Company Data Management Plan (DMP) and the 2019 Institutional Controls Implementation and Assurance Plan. Attachment 3.1 Updated SMP-10. Attachment 3.2 Updated data validation checklists. Attachment 3.5 Added Product Documentation and User Guide – Butte Reclamation Evaluation System