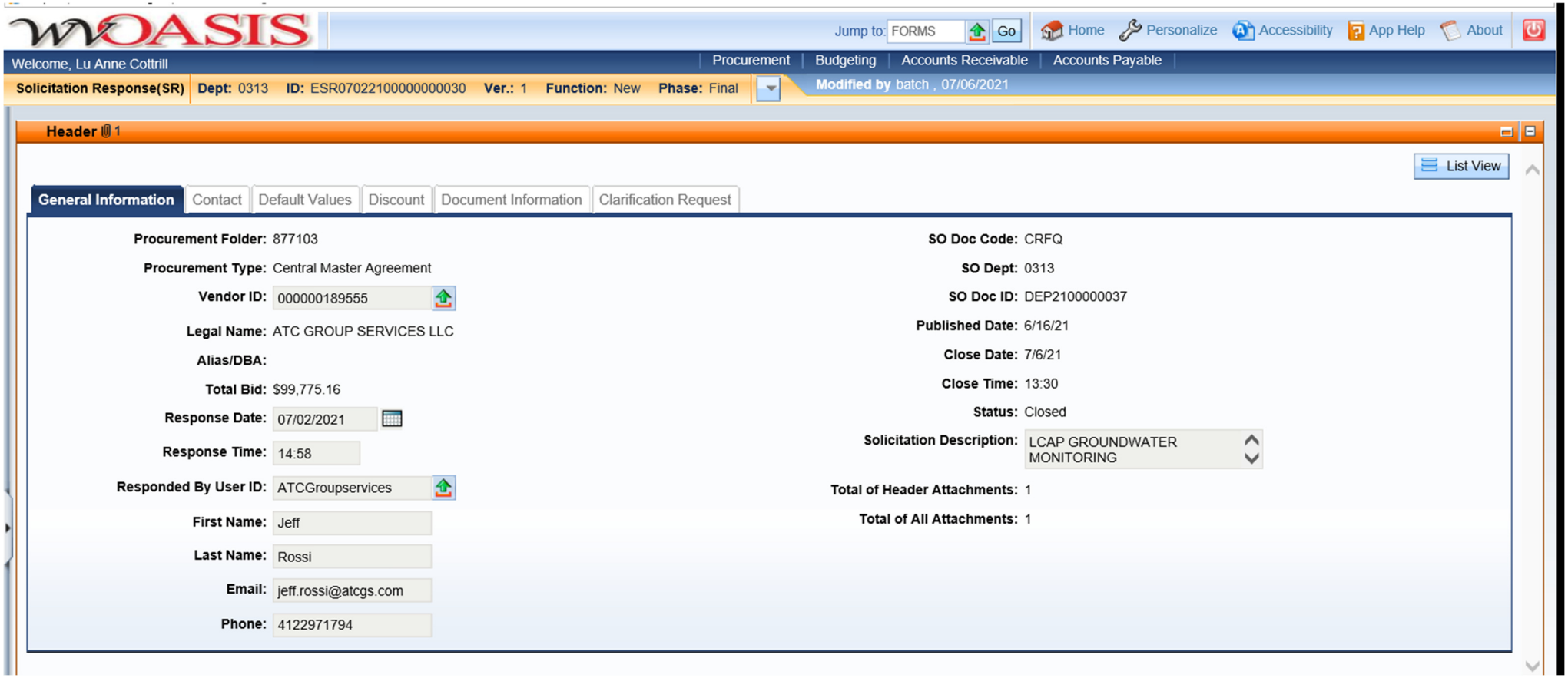
The following documentation is an electronically-submitted vendor response to an advertised solicitation from the *West Virginia Purchasing Bulletin* within the Vendor Self-Service portal at ***wvOASIS.gov***. As part of the State of West Virginia's procurement process, and to maintain the transparency of the bid-opening process, this documentation submitted online is publicly posted by the West Virginia Purchasing Division at ***WVPurchasing.gov*** with any other vendor responses to this solicitation submitted to the Purchasing Division in hard copy format.


wvOASIS
Jump to: FORMS Go
Home
Personalize
Accessibility
App Help
About
Welcome, Lu Anne Cottrill
Procurement | Budgeting | Accounts Receivable | Accounts Payable
Solicitation Response(SR) Dept: 0313 ID: ESR07022100000000030 Ver.: 1 Function: New Phase: Final
Modified by batch , 07/06/2021
Header 1
List View
General Information
Contact
Default Values
Discount
Document Information
Clarification Request
Procurement Folder: 877103
Procurement Type: Central Master Agreement
Vendor ID: 000000189555
Legal Name: ATC GROUP SERVICES LLC
Alias/DBA:
Total Bid: $99,775.16
Response Date: 07/02/2021
Response Time: 14:58
Responded By User ID: ATCGroupservices
First Name: Jeff
Last Name: Rossi
Email: jeff.rossi@atcgs.com
Phone: 4122971794
SO Doc Code: CRFQ
SO Dept: 0313
SO Doc ID: DEP2100000037
Published Date: 6/16/21
Close Date: 7/6/21
Close Time: 13:30
Status: Closed
Solicitation Description: LCAP GROUNDWATER MONITORING
Total of Header Attachments: 1
Total of All Attachments: 1

Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Solicitation Response

Proc Folder:	877103
Solicitation Description:	LCAP GROUNDWATER MONITORING
Proc Type:	Central Master Agreement

Solicitation Closes	Solicitation Response	Version
2021-07-06 13:30	SR 0313 ESR07022100000000030	1

VENDOR

000000189555
ATC GROUP SERVICES LLC

Solicitation Number: CRFQ 0313 DEP2100000037

Total Bid: 99775.160000000000349245965480 **Response Date:** 2021-07-02 **Response Time:** 14:58:36

Comments:

FOR INFORMATION CONTACT THE BUYER
Joseph E Hager III
(304) 558-2306
joseph.e.hageriii@wv.gov

Vendor
Signature X **FEIN#** **DATE**

All offers subject to all terms and conditions contained in this solicitation

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	Field Services - East Region Landfill	102.00000	EA	148.700000	15167.40

Comm Code	Manufacturer	Specification	Model #
71122800			

Commodity Line Comments:

Extended Description:

Twice per year, all labor, equipment, materials, transportation, and incidentals to gauge, purge, sample, preserve and transport samples to laboratory from 46 monitoring wells located at the East Region Landfills (See Attachments A, B and C). Quantity includes 10% duplicates.

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
2	Field Services - North Region Landfill	88.00000	EA	179.590000	15803.92

Comm Code	Manufacturer	Specification	Model #
71122800			

Commodity Line Comments:

Extended Description:

Twice per year, all labor, equipment, materials, transportation, and incidentals to gauge, purge, sample, preserve and transport to laboratory for analysis from 40 monitoring wells located at the North Region Landfills (See Attachments A, B and C). Quantity includes 10% duplicates.

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
3	Field Services - South Region Landfill	80.00000	EA	180.890000	14471.20

Comm Code	Manufacturer	Specification	Model #
71122800			

Commodity Line Comments:

Extended Description:

Twice per year, all labor, equipment, materials, transportation, and incidentals to gauge, purge, sample, preserve and transport samples to laboratory for analysis from 36 monitoring wells located at the South Region Landfills (See Attachments A, B and C). Quantity includes 10% duplicates.

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
4	Field Services - West Region Landfill	66.00000	EA	205.040000	13532.64

Comm Code	Manufacturer	Specification	Model #
71122800			

Commodity Line Comments:

Extended Description:

Twice per year, all labor, equipment, materials, transportation, and incidentals to gauge, purge, sample, preserve and transport samples to laboratory for analysis from 30 monitoring wells located at the West Region Landfills (See Attachments A, B and C). Quantity includes 10% duplicates.

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
5	Statistical Analysis Setup	30.00000	EA	100.000000	3000.00

Comm Code	Manufacturer	Specification	Model #
71122800			

Commodity Line Comments:

Extended Description:

Once per year, all labor, equipment, materials, transportation and incidentals to collect, compile and construct data base for statistical evaluations of information obtained in field services and laboratory analysis.

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
6	Statistical Analysis and Reporting	60.00000	EA	630.000000	37800.00

Comm Code	Manufacturer	Specification	Model #
71122800			

Commodity Line Comments:

Extended Description:

Twice per year, all labor (including clerical), printing, binding, copying, shipping, etc., and incidentals to evaluate data and report findings to WVDEP.

Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Centralized Request for Quote
Service - Misc

Proc Folder: 877103			**Reason for Modification:**
Doc Description: LCAP GROUNDWATER MONITORING			
Proc Type: Central Master Agreement			
Date Issued	**Solicitation Closes**	**Solicitation No**	**Version**
2021-06-16	2021-07-06 13:30	CRFQ 0313 DEP2100000037	1

BID RECEIVING LOCATION

BID CLERK
DEPARTMENT OF ADMINISTRATION
PURCHASING DIVISION
2019 WASHINGTON ST E
CHARLESTON WV 25305
US

VENDOR

Vendor Customer Code:

Vendor Name : ATC Group Services LLC

Address : 1000 Technology Drive, Suite 1330

Street :

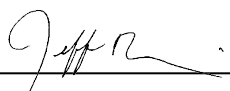
City : Fairmont

State : WV **Country :** USA **Zip :** 26554

Principal Contact : Jeff Rossi

Vendor Contact Phone: 412-297-1794 **Extension:**

FOR INFORMATION CONTACT THE BUYER
Joseph E Hager III
(304) 558-2306
joseph.e.hageriii@wv.gov

Vendor Signature X  **FEIN#** 46-0399408 **DATE** 6/30/21

All offers subject to all terms and conditions contained in this solicitation

ADDITIONAL INFORMATION
The West Virginia Purchasing Division is soliciting bids on behalf of the West Virginia Department of Environmental Protection to establish an open-end contract for groundwater monitoring at thirty (30) Landfills. The Landfills under this contract are divided into four (4) Regions: East, North, South, and West per the specifications and terms and conditions attached hereto.

INVOICE TO		SHIP TO	
ENVIRONMENTAL PROTECTION		ENVIRONMENTAL PROTECTION	
LANDFILL CLOSURE ASSISTANCE PROGRAM		LANDFILL CLOSURE ASSISTANCE PROGRAM	
601 57TH ST SE		601 57TH ST SE	
CHARLESTON	WV	CHARLESTON	WV
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
1	Field Services - East Region Landfill	102.00000	EA		

Comm Code	Manufacturer	Specification	Model #
71122800			

Extended Description:

Twice per year, all labor, equipment, materials, transportation, and incidentals to gauge, purge, sample, preserve and transport samples to laboratory from 46 monitoring wells located at the East Region Landfills (See Attachments A, B and C). Quantity includes 10% duplicates.

INVOICE TO		SHIP TO	
ENVIRONMENTAL PROTECTION		ENVIRONMENTAL PROTECTION	
LANDFILL CLOSURE ASSISTANCE PROGRAM		LANDFILL CLOSURE ASSISTANCE PROGRAM	
601 57TH ST SE		601 57TH ST SE	
CHARLESTON	WV	CHARLESTON	WV
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
2	Field Services - North Region Landfill	88.00000	EA		

Comm Code	Manufacturer	Specification	Model #
71122800			

Extended Description:

Twice per year, all labor, equipment, materials, transportation, and incidentals to gauge, purge, sample, preserve and transport to laboratory for analysis from 40 monitoring wells located at the North Region Landfills (See Attachments A, B and C). Quantity includes 10% duplicates.

INVOICE TO		SHIP TO	
ENVIRONMENTAL PROTECTION		ENVIRONMENTAL PROTECTION	
LANDFILL CLOSURE ASSISTANCE PROGRAM		LANDFILL CLOSURE ASSISTANCE PROGRAM	
601 57TH ST SE		601 57TH ST SE	
CHARLESTON	WV	CHARLESTON	WV
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
3	Field Services - South Region Landfill	80.00000	EA		

Comm Code	Manufacturer	Specification	Model #
71122800			

Extended Description:

Twice per year, all labor, equipment, materials, transportation, and incidentals to gauge, purge, sample, preserve and transport samples to laboratory for analysis from 36 monitoring wells located at the South Region Landfills (See Attachments A, B and C). Quantity includes 10% duplicates.

INVOICE TO		SHIP TO	
ENVIRONMENTAL PROTECTION		ENVIRONMENTAL PROTECTION	
LANDFILL CLOSURE ASSISTANCE PROGRAM		LANDFILL CLOSURE ASSISTANCE PROGRAM	
601 57TH ST SE		601 57TH ST SE	
CHARLESTON	WV	CHARLESTON	WV
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
4	Field Services - West Region Landfill	66.00000	EA		

Comm Code	Manufacturer	Specification	Model #
71122800			

Extended Description:

Twice per year, all labor, equipment, materials, transportation, and incidentals to gauge, purge, sample, preserve and transport samples to laboratory for analysis from 30 monitoring wells located at the West Region Landfills (See Attachments A, B and C). Quantity includes 10% duplicates.

INVOICE TO		SHIP TO	
ENVIRONMENTAL PROTECTION		ENVIRONMENTAL PROTECTION	
LANDFILL CLOSURE ASSISTANCE PROGRAM		LANDFILL CLOSURE ASSISTANCE PROGRAM	
601 57TH ST SE		601 57TH ST SE	
CHARLESTON	WV	CHARLESTON	WV
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
5	Statistical Analysis Setup	30.00000	EA		

Comm Code	Manufacturer	Specification	Model #
71122800			

Extended Description:

Once per year, all labor, equipment, materials, transportation and incidentals to collect, compile and construct data base for statistical evaluations of information obtained in field services and laboratory analysis.

INVOICE TO		SHIP TO	
ENVIRONMENTAL PROTECTION		ENVIRONMENTAL PROTECTION	
LANDFILL CLOSURE ASSISTANCE PROGRAM		LANDFILL CLOSURE ASSISTANCE PROGRAM	
601 57TH ST SE		601 57TH ST SE	
CHARLESTON	WV	CHARLESTON	WV
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
6	Statistical Analysis and Reporting	60.00000	EA		

Comm Code	Manufacturer	Specification	Model #
71122800			

Extended Description:

Twice per year, all labor (including clerical), printing, binding, copying, shipping, etc., and incidentals to evaluate data and report findings to WVDEP.

SCHEDULE OF EVENTS

Line	Event	Event Date

INSTRUCTIONS TO VENDORS SUBMITTING BIDS

1. REVIEW DOCUMENTS THOROUGHLY: The attached documents contain a solicitation for bids. Please read these instructions and all documents attached in their entirety. These instructions provide critical information about requirements that if overlooked could lead to disqualification of a Vendor's bid. All bids must be submitted in accordance with the provisions contained in these instructions and the Solicitation. Failure to do so may result in disqualification of Vendor's bid.

2. MANDATORY TERMS: The Solicitation may contain mandatory provisions identified by the use of the words "must," "will," and "shall." Failure to comply with a mandatory term in the Solicitation will result in bid disqualification.

3. PREBID MEETING: The item identified below shall apply to this Solicitation.

☑ A pre-bid meeting will not be held prior to bid opening

☐ A **MANDATORY PRE-BID** meeting will be held at the following place and time:

All Vendors submitting a bid must attend the mandatory pre-bid meeting. Failure to attend the mandatory pre-bid meeting shall result in disqualification of the Vendor's bid. No one individual is permitted to represent more than one vendor at the pre-bid meeting. Any individual that does attempt to represent two or more vendors will be required to select one vendor to which the individual's attendance will be attributed. The vendors not selected will be deemed to have not attended the pre-bid meeting unless another individual attended on their behalf.

An attendance sheet provided at the pre-bid meeting shall serve as the official document verifying attendance. Any person attending the pre-bid meeting on behalf of a Vendor must list on the attendance sheet his or her name and the name of the Vendor he or she is representing.

Additionally, the person attending the pre-bid meeting should include the Vendor's E-Mail address, phone number, and Fax number on the attendance sheet. It is the Vendor's responsibility to locate the attendance sheet and provide the required information. Failure to complete the attendance sheet as required may result in disqualification of Vendor's bid.

All Vendors should arrive prior to the starting time for the pre-bid. Vendors who arrive after the starting time but prior to the end of the pre-bid will be permitted to sign in but are charged with knowing all matters discussed at the pre-bid.

Questions submitted at least five business days prior to a scheduled pre-bid will be discussed at the pre-bid meeting if possible. Any discussions or answers to questions at the pre-bid meeting

are preliminary in nature and are non-binding. Official and binding answers to questions will be published in a written addendum to the Solicitation prior to bid opening.

4. VENDOR QUESTION DEADLINE: Vendors may submit questions relating to this Solicitation to the Purchasing Division. Questions must be submitted in writing. All questions must be submitted on or before the date listed below and to the address listed below in order to be considered. A written response will be published in a Solicitation addendum if a response is possible and appropriate. Non-written discussions, conversations, or questions and answers regarding this Solicitation are preliminary in nature and are nonbinding.

Submitted e-mails should have solicitation number in the subject line.

Question Submission Deadline: 06/24/2021 @ 4:00 PM ET

Submit Questions to: Josh Hager
2019 Washington Street, East
Charleston, WV 25305
Fax: (304) 558-3970 Vendors should not use this fax number for bid submission)
Email: Joseph.E.HagerIII@wv.gov

5. VERBAL COMMUNICATION: Any verbal communication between the Vendor and any State personnel is not binding, including verbal communication at the mandatory pre-bid conference. Only information issued in writing and added to the Solicitation by an official written addendum by the Purchasing Division is binding.

6. BID SUBMISSION: All bids must be submitted electronically through wvOASIS or signed and delivered by the Vendor to the Purchasing Division at the address listed below on or before the date and time of the bid opening. Any bid received by the Purchasing Division staff is considered to be in the possession of the Purchasing Division and will not be returned for any reason. The Purchasing Division will not accept bids, modification of bids, or addendum acknowledgment forms via e-mail. Acceptable delivery methods include electronic submission via wvOASIS, hand delivery, delivery by courier, or facsimile.

The bid delivery address is:
Department of Administration, Purchasing Division
2019 Washington Street East
Charleston, WV 25305-0130

A bid that is not submitted electronically through wvOASIS should contain the information listed below on the face of the envelope or the bid may be rejected by the Purchasing Division.:

SEALED BID: LCAP Groundwater Monitoring
BUYER: Josh Hager (same person as Joseph Hager)
SOLICITATION NO.: CRFQ 0313 DEP2100000037
BID OPENING DATE: See next page
BID OPENING TIME: See next page
FAX NUMBER: 304-558-3970

The Purchasing Division may prohibit the submission of bids electronically through wvOASIS at its sole discretion. Such a prohibition will be contained and communicated in the wvOASIS system resulting in the Vendor's inability to submit bids through wvOASIS. Submission of a response to a Request for Proposal is not permitted in wvOASIS.

For Request For Proposal ("RFP") Responses Only: In the event that Vendor is responding to a request for proposal, the Vendor shall submit one original technical and one original cost proposal plus NA convenience copies of each to the Purchasing Division at the address shown above. Additionally, the Vendor should identify the bid type as either a technical or cost proposal on the face of each bid envelope submitted in response to a request for proposal as follows:

BID TYPE: (This only applies to CRFP)
☐ Technical
☐ Cost

7. BID OPENING: Bids submitted in response to this Solicitation will be opened at the location identified below on the date and time listed below. Delivery of a bid after the bid opening date and time will result in bid disqualification. For purposes of this Solicitation, a bid is considered delivered when confirmation of delivery is provided by wvOASIS (in the case of electronic submission) or when the bid is time stamped by the official Purchasing Division time clock (in the case of hand delivery).

Bid Opening Date and Time: 07/06/2021 @ 1:30 PM ET

Bid Opening Location: Department of Administration, Purchasing Division
2019 Washington Street East
Charleston, WV 25305-0130

8. ADDENDUM ACKNOWLEDGEMENT: Changes or revisions to this Solicitation will be made by an official written addendum issued by the Purchasing Division. Vendor should acknowledge receipt of all addenda issued with this Solicitation by completing an Addendum Acknowledgment Form, a copy of which is included herewith. Failure to acknowledge addenda may result in bid disqualification. The addendum acknowledgement should be submitted with the bid to expedite document processing.

9. BID FORMATTING: Vendor should type or electronically enter the information onto its bid to prevent errors in the evaluation. Failure to type or electronically enter the information may result in bid disqualification.

10. ALTERNATE MODEL OR BRAND: Unless the box below is checked, any model, brand, or specification listed in this Solicitation establishes the acceptable level of quality only and is not intended to reflect a preference for, or in any way favor, a particular brand or vendor. Vendors may bid alternates to a listed model or brand provided that the alternate is at least equal to the model or brand and complies with the required specifications. The equality of any alternate being bid shall be determined by the State at its sole discretion. Any Vendor bidding an alternate model or brand should clearly identify the alternate items in its bid and should include manufacturer's specifications, industry literature, and/or any other relevant documentation demonstrating the

equality of the alternate items. Failure to provide information for alternate items may be grounds for rejection of a Vendor's bid.

☐ This Solicitation is based upon a standardized commodity established under W. Va. Code § 5A-3-61. Vendors are expected to bid the standardized commodity identified. Failure to bid the standardized commodity will result in your firm's bid being rejected.

11. EXCEPTIONS AND CLARIFICATIONS: The Solicitation contains the specifications that shall form the basis of a contractual agreement. Vendor shall clearly mark any exceptions, clarifications, or other proposed modifications in its bid. Exceptions to, clarifications of, or modifications of a requirement or term and condition of the Solicitation may result in bid disqualification.

12. COMMUNICATION LIMITATIONS: In accordance with West Virginia Code of State Rules §148-1-6.6, communication with the State of West Virginia or any of its employees regarding this Solicitation during the solicitation, bid, evaluation or award periods, except through the Purchasing Division, is strictly prohibited without prior Purchasing Division approval. Purchasing Division approval for such communication is implied for all agency delegated and exempt purchases.

13. REGISTRATION: Prior to Contract award, the apparent successful Vendor must be properly registered with the West Virginia Purchasing Division and must have paid the $125 fee, if applicable.

14. UNIT PRICE: Unit prices shall prevail in cases of a discrepancy in the Vendor's bid.

15. PREFERENCE: Vendor Preference may be requested in purchases of motor vehicles or construction and maintenance equipment and machinery used in highway and other infrastructure projects. Any request for preference must be submitted in writing with the bid, must specifically identify the preference requested with reference to the applicable subsection of West Virginia Code § 5A-3-37, and must include with the bid any information necessary to evaluate and confirm the applicability of the requested preference. A request form to help facilitate the request can be found at:
http://www.state.wv.us/admin/purchase/vrc/Venpref.pdf.

15A. RECIPROCAL PREFERENCE: The State of West Virginia applies a reciprocal preference to all solicitations for commodities and printing in accordance with W. Va. Code § 5A-3-37(b). In effect, non-resident vendors receiving a preference in their home states, will see that same preference granted to West Virginia resident vendors bidding against them in West Virginia. Any request for reciprocal preference must include with the bid any information necessary to evaluate and confirm the applicability of the preference. A request form to help facilitate the request can be found at: http://www.state.wv.us/admin/purchase/vrc/Venpref.pdf.

16. SMALL, WOMEN-OWNED, OR MINORITY-OWNED BUSINESSES: For any solicitations publicly advertised for bid, in accordance with West Virginia Code §5A-3-37(a)(7) and W. Va. CSR § 148-22-9, any non-resident vendor certified as a small, women-owned, or minority-owned business under W. Va. CSR § 148-22-9 shall be provided the same preference made available to any resident vendor. Any non-resident small, women-owned, or

minority-owned business must identify itself as such in writing, must submit that writing to the Purchasing Division with its bid, and must be properly certified under W. Va. CSR § 148-22-9 prior to contract award to receive the preferences made available to resident vendors. Preference for a non-resident small, women-owned, or minority owned business shall be applied in accordance with W. Va. CSR § 148-22-9.

17. WAIVER OF MINOR IRREGULARITIES: The Director reserves the right to waive minor irregularities in bids or specifications in accordance with West Virginia Code of State Rules § 148-1-4.6.

18. ELECTRONIC FILE ACCESS RESTRICTIONS: Vendor must ensure that its submission in wvOASIS can be accessed and viewed by the Purchasing Division staff immediately upon bid opening. The Purchasing Division will consider any file that cannot be immediately accessed and viewed at the time of the bid opening (such as, encrypted files, password protected files, or incompatible files) to be blank or incomplete as context requires, and are therefore unacceptable. A vendor will not be permitted to unencrypt files, remove password protections, or resubmit documents after bid opening to make a file viewable if those documents are required with the bid. A Vendor may be required to provide document passwords or remove access restrictions to allow the Purchasing Division to print or electronically save documents provided that those documents are viewable by the Purchasing Division prior to obtaining the password or removing the access restriction.

19. NON-RESPONSIBLE: The Purchasing Division Director reserves the right to reject the bid of any vendor as Non-Responsible in accordance with W. Va. Code of State Rules § 148-1-5.3, when the Director determines that the vendor submitting the bid does not have the capability to fully perform, or lacks the integrity and reliability to assure good-faith performance."

20. ACCEPTANCE/REJECTION: The State may accept or reject any bid in whole, or in part in accordance with W. Va. Code of State Rules § 148-1-4.5. and § 148-1-6.4.b."

21. YOUR SUBMISSION IS A PUBLIC DOCUMENT: Vendor's entire response to the Solicitation and the resulting Contract are public documents. As public documents, they will be disclosed to the public following the bid/proposal opening or award of the contract, as required by the competitive bidding laws of West Virginia Code §§ 5A-3-1 et seq., 5-22-1 et seq., and 5G-1-1 et seq. and the Freedom of Information Act West Virginia Code §§ 29B-1-1 et seq.

DO NOT SUBMIT MATERIAL YOU CONSIDER TO BE CONFIDENTIAL, A TRADE SECRET, OR OTHERWISE NOT SUBJECT TO PUBLIC DISCLOSURE.

Submission of any bid, proposal, or other document to the Purchasing Division constitutes your explicit consent to the subsequent public disclosure of the bid, proposal, or document. The Purchasing Division will disclose any document labeled "confidential," "proprietary," "trade secret," "private," or labeled with any other claim against public disclosure of the documents, to include any "trade secrets" as defined by West Virginia Code § 47-22-1 et seq. All submissions are subject to public disclosure without notice.

22. INTERESTED PARTY DISCLOSURE: West Virginia Code § 6D-1-2 requires that the vendor submit to the Purchasing Division a disclosure of interested parties to the contract for all contracts with an actual or estimated value of at least $1 Million. That disclosure must occur on the form prescribed and approved by the WV Ethics Commission prior to contract award. A copy of that form is included with this solicitation or can be obtained from the WV Ethics Commission. This requirement does not apply to publicly traded companies listed on a national or international stock exchange. A more detailed definition of interested parties can be obtained from the form referenced above.

23. WITH THE BID REQUIREMENTS: In instances where these specifications require documentation or other information with the bid, and a vendor fails to provide it with the bid, the Director of the Purchasing Division reserves the right to request those items after bid opening and prior to contract award pursuant to the authority to waive minor irregularities in bids or specifications under W. Va. CSR § 148-1-4.6. This authority does not apply to instances where state law mandates receipt with the bid.

24. E-MAIL NOTIFICATION OF AWARD: The Purchasing Division will attempt to provide bidders with e-mail notification of contract award when a solicitation that the bidder participated in has been awarded. For notification purposes, bidders must provide the Purchasing Division with a valid email address in the bid response. Bidders may also monitor wvOASIS or the Purchasing Division's website to determine when a contract has been awarded.

GENERAL TERMS AND CONDITIONS:

1. CONTRACTUAL AGREEMENT: Issuance of an Award Document signed by the Purchasing Division Director, or his designee, and approved as to form by the Attorney General's office constitutes acceptance by the State of this Contract made by and between the State of West Virginia and the Vendor. Vendor's signature on its bid, or on the Contract if the Contract is not the result of a bid solicitation, signifies Vendor's agreement to be bound by and accept the terms and conditions contained in this Contract.

2. DEFINITIONS: As used in this Solicitation/Contract, the following terms shall have the meanings attributed to them below. Additional definitions may be found in the specifications included with this Solicitation/Contract.

2.1. "Agency" or **"Agencies"** means the agency, board, commission, or other entity of the State of West Virginia that is identified on the first page of the Solicitation or any other public entity seeking to procure goods or services under this Contract.

2.2. "Bid" or **"Proposal"** means the vendors submitted response to this solicitation.

2.3. "Contract" means the binding agreement that is entered into between the State and the Vendor to provide the goods or services requested in the Solicitation.

2.4. "Director" means the Director of the West Virginia Department of Administration, Purchasing Division.

2.5. "Purchasing Division" means the West Virginia Department of Administration, Purchasing Division.

2.6. "Award Document" means the document signed by the Agency and the Purchasing Division, and approved as to form by the Attorney General, that identifies the Vendor as the contract holder.

2.7. "Solicitation" means the official notice of an opportunity to supply the State with goods or services that is published by the Purchasing Division.

2.8. "State" means the State of West Virginia and/or any of its agencies, commissions, boards, etc. as context requires.

2.9. "Vendor" or **"Vendors"** means any entity submitting a bid in response to the Solicitation, the entity that has been selected as the lowest responsible bidder, or the entity that has been awarded the Contract as context requires.

3. CONTRACT TERM; RENEWAL; EXTENSION: The term of this Contract shall be determined in accordance with the category that has been identified as applicable to this Contract below:

☑ **Term Contract**

Initial Contract Term: This Contract becomes effective on upon award and the initial contract term extends until one (1).

Renewal Term: This Contract may be renewed upon the mutual written consent of the Agency, and the Vendor, with approval of the Purchasing Division and the Attorney General's office (Attorney General approval is as to form only). Any request for renewal should be delivered to the Agency and then submitted to the Purchasing Division thirty (30) days prior to the expiration date of the initial contract term or appropriate renewal term. A Contract renewal shall be in accordance with the terms and conditions of the original contract. Unless otherwise specified below, renewal of this Contract is limited to three (3) successive one (1) year periods or multiple renewal periods of less than one year, provided that the multiple renewal periods do not exceed the total number of months available in all renewal years combined. Automatic renewal of this Contract is prohibited. Renewals must be approved by the Vendor, Agency, Purchasing Division and Attorney General's office (Attorney General approval is as to form only)

☐ **Alternate Renewal Term** – This contract may be renewed for _____ successive _____ year periods or shorter periods provided that they do not exceed the total number of months contained in all available renewals. Automatic renewal of this Contract is prohibited. Renewals must be approved by the Vendor, Agency, Purchasing Division and Attorney General's office (Attorney General approval is as to form only)

Delivery Order Limitations: In the event that this contract permits delivery orders, a delivery order may only be issued during the time this Contract is in effect. Any delivery order issued within one year of the expiration of this Contract shall be effective for one year from the date the delivery order is issued. No delivery order may be extended beyond one year after this Contract has expired.

☐ **Fixed Period Contract:** This Contract becomes effective upon Vendor's receipt of the notice to proceed and must be completed within _____days.

☐ **Fixed Period Contract with Renewals:** This Contract becomes effective upon Vendor's receipt of the notice to proceed and part of the Contract more fully described in the attached specifications must be completed within _____ days. Upon completion of the work covered by the preceding sentence, the vendor agrees that maintenance, monitoring, or warranty services will be provided for _____ year(s) thereafter.

☐ **One Time Purchase:** The term of this Contract shall run from the issuance of the Award Document until all of the goods contracted for have been delivered, but in no event will this Contract extend for more than one fiscal year.

☐ **Other:** See attached _____

4. AUTHORITY TO PROCEED: Vendor is authorized to begin performance of this contract on the date of encumbrance listed on the front page of the Award Document unless either the box for "Fixed Period Contract" or "Fixed Period Contract with Renewals" has been checked in Section 3 above. If either "Fixed Period Contract" or "Fixed Period Contract with Renewals" has been checked, Vendor must not begin work until it receives a separate notice to proceed from the State. The notice to proceed will then be incorporated into the Contract via change order to memorialize the official date that work commenced.

5. QUANTITIES: The quantities required under this Contract shall be determined in accordance with the category that has been identified as applicable to this Contract below.

☑ **Open End Contract:** Quantities listed in this Solicitation/Award Document are approximations only, based on estimates supplied by the Agency. It is understood and agreed that the Contract shall cover the quantities actually ordered for delivery during the term of the Contract, whether more or less than the quantities shown.

☐ **Service:** The scope of the service to be provided will be more clearly defined in the specifications included herewith.

☐ **Combined Service and Goods:** The scope of the service and deliverable goods to be provided will be more clearly defined in the specifications included herewith.

☐ **One Time Purchase:** This Contract is for the purchase of a set quantity of goods that are identified in the specifications included herewith. Once those items have been delivered, no additional goods may be procured under this Contract without an appropriate change order approved by the Vendor, Agency, Purchasing Division, and Attorney General's office.

6. EMERGENCY PURCHASES: The Purchasing Division Director may authorize the Agency to purchase goods or services in the open market that Vendor would otherwise provide under this Contract if those goods or services are for immediate or expedited delivery in an emergency. Emergencies shall include, but are not limited to, delays in transportation or an unanticipated increase in the volume of work. An emergency purchase in the open market, approved by the Purchasing Division Director, shall not constitute of breach of this Contract and shall not entitle the Vendor to any form of compensation or damages. This provision does not excuse the State from fulfilling its obligations under a One Time Purchase contract.

7. REQUIRED DOCUMENTS: All of the items checked below must be provided to the Purchasing Division by the Vendor as specified below.

☐ **BID BOND (Construction Only):** Pursuant to the requirements contained in W. Va. Code § 5-22-1(c), All Vendors submitting a bid on a construction project shall furnish a valid bid bond in the amount of five percent (5%) of the total amount of the bid protecting the State of West Virginia. The bid bond must be submitted with the bid.

☐ **PERFORMANCE BOND:** The apparent successful Vendor shall provide a performance bond in the amount of 100% of the contract. The performance bond must be received by the Purchasing Division prior to Contract award.

☐ **LABOR/MATERIAL PAYMENT BOND:** The apparent successful Vendor shall provide a labor/material payment bond in the amount of 100% of the Contract value. The labor/material payment bond must be delivered to the Purchasing Division prior to Contract award.

In lieu of the Bid Bond, Performance Bond, and Labor/Material Payment Bond, the Vendor may provide certified checks, cashier's checks, or irrevocable letters of credit. Any certified check, cashier's check, or irrevocable letter of credit provided in lieu of a bond must be of the same amount and delivered on the same schedule as the bond it replaces. A letter of credit submitted in lieu of a performance and labor/material payment bond will only be allowed for projects under $100,000. Personal or business checks are not acceptable. Notwithstanding the foregoing, West Virginia Code § 5-22-1 (d) mandates that a vendor provide a performance and labor/material payment bond for construction projects. Accordingly, substitutions for the performance and labor/material payment bonds for construction projects is not permitted.

☐ **MAINTENANCE BOND:** The apparent successful Vendor shall provide a two (2) year maintenance bond covering the roofing system. The maintenance bond must be issued and delivered to the Purchasing Division prior to Contract award.

☐ **LICENSE(S) / CERTIFICATIONS / PERMITS:** In addition to anything required under the Section of the General Terms and Conditions entitled Licensing, the apparent successful Vendor shall furnish proof of the following licenses, certifications, and/or permits upon request and in a form acceptable to the State. The request may be prior to or after contract award at the State's sole discretion.

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The apparent successful Vendor shall also furnish proof of any additional licenses or certifications contained in the specifications regardless of whether or not that requirement is listed above.

8. INSURANCE: The apparent successful Vendor shall furnish proof of the insurance identified by a checkmark below and must include the State as an additional insured on each policy prior to Contract award. The insurance coverages identified below must be maintained throughout the life of this contract. Thirty (30) days prior to the expiration of the insurance policies, Vendor shall provide the Agency with proof that the insurance mandated herein has been continued. Vendor must also provide Agency with immediate notice of any changes in its insurance policies, including but not limited to, policy cancelation, policy reduction, or change in insurers. The apparent successful Vendor shall also furnish proof of any additional insurance requirements contained in the specifications prior to Contract award regardless of whether or not that insurance requirement is listed in this section.

Vendor must maintain:

☑ **Commercial General Liability Insurance** in at least an amount of: 1,000,000 per occurrence.

☑ **Automobile Liability Insurance** in at least an amount of: 1,000,000 per occurrence.

☐ **Professional/Malpractice/Errors and Omission Insurance** in at least an amount of: _____ per occurrence. Notwithstanding the forgoing, Vendor's are not required to list the State as an additional insured for this type of policy.

☐ **Commercial Crime and Third Party Fidelity Insurance** in an amount of: _____ per occurrence.

☐ **Cyber Liability Insurance** in an amount of: _____ per occurrence.

☐ **Builders Risk Insurance** in an amount equal to 100% of the amount of the Contract.

☐ **Pollution Insurance** in an amount of: _____ per occurrence.

☐ **Aircraft Liability** in an amount of: _____ per occurrence.

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Notwithstanding anything contained in this section to the contrary, the Director of the Purchasing Division reserves the right to waive the requirement that the State be named as an additional insured on one or more of the Vendor's insurance policies if the Director finds that doing so is in the State's best interest.

9. WORKERS' COMPENSATION INSURANCE: Vendor shall comply with laws relating to workers compensation, shall maintain workers' compensation insurance when required, and shall furnish proof of workers' compensation insurance upon request.

10. [Reserved]

11. LIQUIDATED DAMAGES: This clause shall in no way be considered exclusive and shall not limit the State or Agency's right to pursue any other available remedy. Vendor shall pay liquidated damages in the amount specified below or as described in the specifications:

☐ _____ for _____.

☐ Liquidated Damages Contained in the Specifications.

☐ Liquidated Damages Are Not Included in this Contract.

12. ACCEPTANCE: Vendor's signature on its bid, or on the certification and signature page, constitutes an offer to the State that cannot be unilaterally withdrawn, signifies that the product or service proposed by vendor meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise indicated, and signifies acceptance of the terms and conditions contained in the Solicitation unless otherwise indicated.

13. PRICING: The pricing set forth herein is firm for the life of the Contract, unless specified elsewhere within this Solicitation/Contract by the State. A Vendor's inclusion of price adjustment provisions in its bid, without an express authorization from the State in the Solicitation to do so, may result in bid disqualification. Notwithstanding the foregoing, Vendor must extend any publicly advertised sale price to the State and invoice at the lower of the contract price or the publicly advertised sale price.

14. PAYMENT IN ARREARS: Payments for goods/services will be made in arrears only upon receipt of a proper invoice, detailing the goods/services provided or receipt of the goods/services, whichever is later. Notwithstanding the foregoing, payments for software maintenance, licenses, or subscriptions may be paid annually in advance.

15. PAYMENT METHODS: Vendor must accept payment by electronic funds transfer and P-Card. (The State of West Virginia's Purchasing Card program, administered under contract by a banking institution, processes payment for goods and services through state designated credit cards.)

16. TAXES: The Vendor shall pay any applicable sales, use, personal property or any other taxes arising out of this Contract and the transactions contemplated thereby. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.

17. ADDITIONAL FEES: Vendor is not permitted to charge additional fees or assess additional charges that were not either expressly provided for in the solicitation published by the State of West Virginia, included in the Contract, or included in the unit price or lump sum bid amount that Vendor is required by the solicitation to provide. Including such fees or charges as notes to the solicitation may result in rejection of vendor's bid. Requesting such fees or charges be paid after the contract has been awarded may result in cancellation of the contract.

18. FUNDING: This Contract shall continue for the term stated herein, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise made available, this Contract becomes void and of no effect beginning on July 1 of the fiscal year for which funding has not been appropriated or otherwise made available. If that occurs, the State may notify the Vendor that an alternative source of funding has been obtained and thereby avoid the automatic termination. Non-appropriation or non-funding shall not be considered an event of default.

19. CANCELLATION: The Purchasing Division Director reserves the right to cancel this Contract immediately upon written notice to the vendor if the materials or workmanship supplied do not conform to the specifications contained in the Contract. The Purchasing Division Director may also cancel any purchase or Contract upon 30 days written notice to the Vendor in accordance with West Virginia Code of State Rules § 148-1-5.2.b.

20. TIME: Time is of the essence with regard to all matters of time and performance in this Contract.

21. APPLICABLE LAW: This Contract is governed by and interpreted under West Virginia law without giving effect to its choice of law principles. Any information provided in specification manuals, or any other source, verbal or written, which contradicts or violates the West Virginia Constitution, West Virginia Code, or West Virginia Code of State Rules is void and of no effect.

22. COMPLIANCE WITH LAWS: Vendor shall comply with all applicable federal, state, and local laws, regulations and ordinances. By submitting a bid, Vendor acknowledges that it has reviewed, understands, and will comply with all applicable laws, regulations, and ordinances.

> **SUBCONTRACTOR COMPLIANCE:** Vendor shall notify all subcontractors providing commodities or services related to this Contract that as subcontractors, they too are required to comply with all applicable laws, regulations, and ordinances. Notification under this provision must occur prior to the performance of any work under the contract by the subcontractor.

23. ARBITRATION: Any references made to arbitration contained in this Contract, Vendor's bid, or in any American Institute of Architects documents pertaining to this Contract are hereby deleted, void, and of no effect.

24. MODIFICATIONS: This writing is the parties' final expression of intent. Notwithstanding anything contained in this Contract to the contrary no modification of this Contract shall be binding without mutual written consent of the Agency, and the Vendor, with approval of the Purchasing Division and the Attorney General's office (Attorney General approval is as to form only). Any change to existing contracts that adds work or changes contract cost, and were not included in the original contract, must be approved by the Purchasing Division and the Attorney General's Office (as to form) prior to the implementation of the change or commencement of work affected by the change.

25. WAIVER: The failure of either party to insist upon a strict performance of any of the terms or provision of this Contract, or to exercise any option, right, or remedy herein contained, shall not be construed as a waiver or a relinquishment for the future of such term, provision, option, right, or remedy, but the same shall continue in full force and effect. Any waiver must be expressly stated in writing and signed by the waiving party.

26. SUBSEQUENT FORMS: The terms and conditions contained in this Contract shall supersede any and all subsequent terms and conditions which may appear on any form documents submitted by Vendor to the Agency or Purchasing Division such as price lists, order forms, invoices, sales agreements, or maintenance agreements, and includes internet websites or other electronic documents. Acceptance or use of Vendor's forms does not constitute acceptance of the terms and conditions contained thereon.

27. ASSIGNMENT: Neither this Contract nor any monies due, or to become due hereunder, may be assigned by the Vendor without the express written consent of the Agency, the Purchasing Division, the Attorney General's office (as to form only), and any other government agency or office that may be required to approve such assignments.

28. WARRANTY: The Vendor expressly warrants that the goods and/or services covered by this Contract will: (a) conform to the specifications, drawings, samples, or other description furnished or specified by the Agency; (b) be merchantable and fit for the purpose intended; and (c) be free from defect in material and workmanship.

29. STATE EMPLOYEES: State employees are not permitted to utilize this Contract for personal use and the Vendor is prohibited from permitting or facilitating the same.

30. PRIVACY, SECURITY, AND CONFIDENTIALITY: The Vendor agrees that it will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the Agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the Agency's policies, procedures, and rules. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in http://www.state.wv.us/admin/purchase/privacy/default.html.

31. YOUR SUBMISSION IS A PUBLIC DOCUMENT: Vendor's entire response to the Solicitation and the resulting Contract are public documents. As public documents, they will be disclosed to the public following the bid/proposal opening or award of the contract, as required by the competitive bidding laws of West Virginia Code §§ 5A-3-1 et seq., 5-22-1 et seq., and 5G-1-1 et seq. and the Freedom of Information Act West Virginia Code §§ 29B-1-1 et seq.

DO NOT SUBMIT MATERIAL YOU CONSIDER TO BE CONFIDENTIAL, A TRADE SECRET, OR OTHERWISE NOT SUBJECT TO PUBLIC DISCLOSURE.

Submission of any bid, proposal, or other document to the Purchasing Division constitutes your explicit consent to the subsequent public disclosure of the bid, proposal, or document. The Purchasing Division will disclose any document labeled "confidential," "proprietary," "trade secret," "private," or labeled with any other claim against public disclosure of the documents, to include any "trade secrets" as defined by West Virginia Code § 47-22-1 et seq. All submissions are subject to public disclosure without notice.

32. LICENSING: In accordance with West Virginia Code of State Rules § 148-1-6.1.e, Vendor must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, West Virginia Insurance Commission, or any other state agency or political subdivision. Obligations related to political subdivisions may include, but are not limited to, business licensing, business and occupation taxes, inspection compliance, permitting, etc. Upon request, the Vendor must provide all necessary releases to obtain information to enable the Purchasing Division Director or the Agency to verify that the Vendor is licensed and in good standing with the above entities.

SUBCONTRACTOR COMPLIANCE: Vendor shall notify all subcontractors providing commodities or services related to this Contract that as subcontractors, they too are required to be licensed, in good standing, and up-to-date on all state and local obligations as described in this section. Obligations related to political subdivisions may include, but are not limited to, business licensing, business and occupation taxes, inspection compliance, permitting, etc. Notification under this provision must occur prior to the performance of any work under the contract by the subcontractor.

33. ANTITRUST: In submitting a bid to, signing a contract with, or accepting a Award Document from any agency of the State of West Virginia, the Vendor agrees to convey, sell, assign, or transfer to the State of West Virginia all rights, title, and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the State of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the State of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to Vendor.

34. VENDOR CERTIFICATIONS: By signing its bid or entering into this Contract, Vendor certifies (1) that its bid or offer was made without prior understanding, agreement, or connection with any corporation, firm, limited liability company, partnership, person or entity submitting a bid or offer for the same material, supplies, equipment or services; (2) that its bid or offer is in all respects fair and without collusion or fraud; (3) that this Contract is accepted or entered into without any prior understanding, agreement, or connection to any other entity that could be considered a violation of law; and (4) that it has reviewed this Solicitation in its entirety; understands the requirements, terms and conditions, and other information contained herein.

Vendor's signature on its bid or offer also affirms that neither it nor its representatives have any interest, nor shall acquire any interest, direct or indirect, which would compromise the performance of its services hereunder. Any such interests shall be promptly presented in detail to the Agency. The individual signing this bid or offer on behalf of Vendor certifies that he or she is authorized by the Vendor to execute this bid or offer or any documents related thereto on Vendor's behalf; that he or she is authorized to bind the Vendor in a contractual relationship; and that, to the best of his or her knowledge, the Vendor has properly registered with any State agency that may require registration.

35. VENDOR RELATIONSHIP: The relationship of the Vendor to the State shall be that of an independent contractor and no principal-agent relationship or employer-employee relationship is contemplated or created by this Contract. The Vendor as an independent contractor is solely liable for the acts and omissions of its employees and agents. Vendor shall be responsible for selecting, supervising, and compensating any and all individuals employed pursuant to the terms of this Solicitation and resulting contract. Neither the Vendor, nor any employees or subcontractors of the Vendor, shall be deemed to be employees of the State for any purpose whatsoever. Vendor shall be exclusively responsible for payment of employees and contractors for all wages and salaries, taxes, withholding payments, penalties, fees, fringe benefits, professional liability insurance premiums, contributions to insurance and pension, or other deferred compensation plans, including but not limited to, Workers' Compensation and Social Security obligations, licensing fees, etc. and the filing of all necessary documents, forms, and returns pertinent to all of the foregoing.

Vendor shall hold harmless the State, and shall provide the State and Agency with a defense against any and all claims including, but not limited to, the foregoing payments, withholdings, contributions, taxes, Social Security taxes, and employer income tax returns.

36. INDEMNIFICATION: The Vendor agrees to indemnify, defend, and hold harmless the State and the Agency, their officers, and employees from and against: (1) Any claims or losses for services rendered by any subcontractor, person, or firm performing or supplying services, materials, or supplies in connection with the performance of the Contract; (2) Any claims or losses resulting to any person or entity injured or damaged by the Vendor, its officers, employees, or subcontractors by the publication, translation, reproduction, delivery, performance, use, or disposition of any data used under the Contract in a manner not authorized by the Contract, or by Federal or State statutes or regulations; and (3) Any failure of the Vendor, its officers, employees, or subcontractors to observe State and Federal laws including, but not limited to, labor and wage and hour laws.

37. PURCHASING AFFIDAVIT: In accordance with West Virginia Code §§ 5A-3-10a and 5-22-1(i), the State is prohibited from awarding a contract to any bidder that owes a debt to the State or a political subdivision of the State, Vendors are required to sign, notarize, and submit the Purchasing Affidavit to the Purchasing Division affirming under oath that it is not in default on any monetary obligation owed to the state or a political subdivision of the state.

38. CONFLICT OF INTEREST: Vendor, its officers or members or employees, shall not presently have or acquire an interest, direct or indirect, which would conflict with or compromise the performance of its obligations hereunder. Vendor shall periodically inquire of its officers, members and employees to ensure that a conflict of interest does not arise. Any conflict of interest discovered shall be promptly presented in detail to the Agency.

39. REPORTS: Vendor shall provide the Agency and/or the Purchasing Division with the following reports identified by a checked box below:

☐ Such reports as the Agency and/or the Purchasing Division may request. Requested reports may include, but are not limited to, quantities purchased, agencies utilizing the contract, total contract expenditures by agency, etc.

☐ Quarterly reports detailing the total quantity of purchases in units and dollars, along with a listing of purchases by agency. Quarterly reports should be delivered to the Purchasing Division via email at purchasing.division@wv.gov.

40. BACKGROUND CHECK: In accordance with W. Va. Code § 15-2D-3, the State reserves the right to prohibit a service provider's employees from accessing sensitive or critical information or to be present at the Capitol complex based upon results addressed from a criminal background check. Service providers should contact the West Virginia Division of Protective Services by phone at (304) 558-9911 for more information.

41. PREFERENCE FOR USE OF DOMESTIC STEEL PRODUCTS: Except when authorized by the Director of the Purchasing Division pursuant to W. Va. Code § 5A-3-56, no contractor may use or supply steel products for a State Contract Project other than those steel products made in the United States. A contractor who uses steel products in violation of this section may be subject to civil penalties pursuant to W. Va. Code § 5A-3-56. As used in this section:

a. "State Contract Project" means any erection or construction of, or any addition to, alteration of or other improvement to any building or structure, including, but not limited to, roads or highways, or the installation of any heating or cooling or ventilating plants or other equipment, or the supply of and materials for such projects, pursuant to a contract with the State of West Virginia for which bids were solicited on or after June 6, 2001.

b. "Steel Products" means products rolled, formed, shaped, drawn, extruded, forged, cast, fabricated or otherwise similarly processed, or processed by a combination of two or more or such operations, from steel made by the open heath, basic oxygen, electric furnace, Bessemer or other steel making process. The Purchasing Division Director may, in writing, authorize the use of foreign steel products if:

c. The cost for each contract item used does not exceed one tenth of one percent (.1%)

of the total contract cost or two thousand five hundred dollars ($2,500.00), whichever is greater. For the purposes of this section, the cost is the value of the steel product as delivered to the project; or

d. The Director of the Purchasing Division determines that specified steel materials are not produced in the United States in sufficient quantity or otherwise are not reasonably available to meet contract requirements.

42. PREFERENCE FOR USE OF DOMESTIC ALUMINUM, GLASS, AND STEEL: In Accordance with W. Va. Code § 5-19-1 et seq., and W. Va. CSR § 148-10-1 et seq., for every contract or subcontract, subject to the limitations contained herein, for the construction, reconstruction, alteration, repair, improvement or maintenance of public works or for the purchase of any item of machinery or equipment to be used at sites of public works, only domestic aluminum, glass or steel products shall be supplied unless the spending officer determines, in writing, after the receipt of offers or bids, (1) that the cost of domestic aluminum, glass or steel products is unreasonable or inconsistent with the public interest of the State of West Virginia, (2) that domestic aluminum, glass or steel products are not produced in sufficient quantities to meet the contract requirements, or (3) the available domestic aluminum, glass, or steel do not meet the contract specifications. This provision only applies to public works contracts awarded in an amount more than fifty thousand dollars ($50,000) or public works contracts that require more than ten thousand pounds of steel products.

The cost of domestic aluminum, glass, or steel products may be unreasonable if the cost is more than twenty percent (20%) of the bid or offered price for foreign made aluminum, glass, or steel products. If the domestic aluminum, glass or steel products to be supplied or produced in a "substantial labor surplus area", as defined by the United States Department of Labor, the cost of domestic aluminum, glass, or steel products may be unreasonable if the cost is more than thirty percent (30%) of the bid or offered price for foreign made aluminum, glass, or steel products. This preference shall be applied to an item of machinery or equipment, as indicated above, when the item is a single unit of equipment or machinery manufactured primarily of aluminum, glass or steel, is part of a public works contract and has the sole purpose or of being a permanent part of a single public works project. This provision does not apply to equipment or machinery purchased by a spending unit for use by that spending unit and not as part of a single public works project.

All bids and offers including domestic aluminum, glass or steel products that exceed bid or offer prices including foreign aluminum, glass or steel products after application of the preferences provided in this provision may be reduced to a price equal to or lower than the lowest bid or offer price for foreign aluminum, glass or steel products plus the applicable preference. If the reduced bid or offer prices are made in writing and supersede the prior bid or offer prices, all bids or offers, including the reduced bid or offer prices, will be reevaluated in accordance with this rule.

43. INTERESTED PARTY SUPPLEMENTAL DISCLOSURE: W. Va. Code § 6D-1-2 requires that for contracts with an actual or estimated value of at least $1 million, the vendor must submit to the Agency a supplemental disclosure of interested parties reflecting any new or differing interested parties to the contract, which were not included in the original pre-award interested party disclosure, within 30 days following the completion or termination of the contract. A copy of that form is included with this solicitation or can be obtained from the

WV Ethics Commission. This requirement does not apply to publicly traded companies listed on a national or international stock exchange. A more detailed definition of interested parties can be obtained from the form referenced above.

44. PROHIBITION AGAINST USED OR REFURBISHED: Unless expressly permitted in the solicitation published by the State, Vendor must provide new, unused commodities, and is prohibited from supplying used or refurbished commodities, in fulfilling its responsibilities under this Contract.

45. VOID CONTRACT CLAUSES – This Contract is subject to the provisions of West Virginia Code § 5A-3-62, which automatically voids certain contract clauses that violate State law.

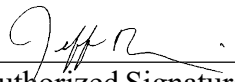
DESIGNATED CONTACT: Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

Jeff Rossi
(Name, Title)
Business Development Manager
(Printed Name and Title)
1000 Technology Drive, Suite 1330, Fairmont, WV 26554
(Address)
304-694-9085
(Phone Number) / (Fax Number)
jeff.rossi@atcgs.com
(email address)

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through wvOASIS, I certify that: I have reviewed this Solicitation in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that I am authorized by the vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

By signing below, I further certify that I understand this Contract is subject to the provisions of West Virginia Code § 5A-3-62, which automatically voids certain contract clauses that violate State law.

ATC Group Services LLC
(Company)


(Authorized Signature) (Representative Name, Title)

Jeff Rossi, Business Development Manager
(Printed Name and Title of Authorized Representative)

7/1/21
(Date)

304-694-9085
(Phone Number) (Fax Number)

ADDENDUM ACKNOWLEDGEMENT FORM
SOLICITATION NO.:

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

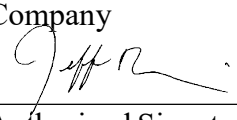
Addendum Numbers Received:
(Check the box next to each addendum received)

☐ Addendum No. 1	☐ Addendum No. 6
☐ Addendum No. 2	☐ Addendum No. 7
☐ Addendum No. 3	☐ Addendum No. 8
☐ Addendum No. 4	☐ Addendum No. 9
☐ Addendum No. 5	☐ Addendum No. 10

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

ATC Group Services LLC

Company



Authorized Signature

7/1/21

Date

NOTE: This addendum acknowledgement should be submitted with the bid to expedite document processing.

SPECIFICATIONS

1. PURPOSE AND SCOPE: The West Virginia Purchasing Division is soliciting bids on behalf of the West Virginia Department of Environmental Protection to establish an open-end contract for groundwater monitoring at thirty (30) Landfills. The Landfills under this contract are divided into four (4) Regions: East, North, South, and West. The list of Landfills and the number of groundwater monitoring wells per landfill can be found in **Attachments A, B and C**.

Vendors are encouraged to review specifications and requirements closely as specifications most likely have changed since last solicitation. This solicitation was previously advertised as CRFQ DEP2000000028 and solicitation opened on 5/18/2020. Bid results may be viewed at: http://www.state.wv.us/admin/purchase/Bids/FY2020/BO20200518.html.

2. DEFINITIONS: The terms listed below shall have the meanings assigned to them below. Additional definitions can be found in section 2 of the General Terms and Conditions.

2.1 **"Contract Item"** or **"Contract Items"** means the list of items identified below and on the Pricing Pages. "

2.2 **"Landfill"** means a Landfill within the WVDEP Landfill Closure Assistance Program.

2.3 **"Pricing Pages"** means the schedule of prices, estimated order quantity, and totals contained in WV OASIS used to evaluate the Solicitation responses.

2.3 **"Solicitation"** means the official notice of an opportunity to supply the State with goods or services that is published by the Purchasing Division.

3. GENERAL REQUIREMENTS:

3.1 **Contract Items and Mandatory Requirements:** Vendor shall provide Agency with the Contract Items listed below. Contract Items must meet or exceed the mandatory requirements as shown below.

3.1.1 **Groundwater Sampling:** The Vendor shall furnish all personnel, labor, tools, transportation, equipment, incidentals, and supplies to obtain groundwater samples from the groundwater monitoring wells.

3.1.1.1 The Vendor shall perform semi-annual monitoring starting the month of the Purchase Order effective date, and extending for one full year, resulting in two semiannual reporting periods. The semi-annual monitoring schedule will be determined upon award of Purchase Order.

3.1.1.2 A list of the thirty (30) LCAP Landfills and the number of wells at

each landfill is included in **Attachments A**. It is the responsibility of the Vendor to obtain any other background information necessary to complete the services. Additional information may be obtained from the WVDEP via https://dep.wv.gov/pio/Pages/FOIA.aspx.

3.1.1.3 Sampling parameters can be found in **Attachment E**. Vendor should familiarize themselves with the sampling parameters to ensure the correct sampling supplies are used and the Chain-of-Custody(s) are filled out correctly.

3.1.1.4 All groundwater sampling shall be in accordance with WVDEP, Division of Water and Waste Management (DWWM) Quality Assurance / Quality Control (QA/QC) Plan & Standard Operating Procedures for Groundwater Sampling. This information can be found at the web address below and in **Attachment F**:
http://www.dep.wv.gov/wwe/programs/gw/documents/17812_groundwater_sampling_procedures.pdf

3.1.1.5 Within ten (10) calendar days after the Notice to Proceed has been issued, Vendor shall submit training certifications for field sampling staff to WVDEP.

3.1.1.4 Within fifteen calendar days after the Notice to Proceed has been issued, Vendor shall submit to WVDEP, electronically or via CD (preferred), the Vendor-authored standard operating procedures (SOPs) below. There is no line-item expense for the SOPs since Vendor should already have SOPs in place**.**

- Monitoring Well Purging
- Groundwater Sampling Procedures
- Decontaminating Sampling Equipment
- Sample Handling/Shipping and Chain of Custody Procedures

3.1.1.5 All groundwater monitoring wells shall be purged by using the low flow purging method or using hand-bailers. If it is not possible to purge any given well to field parameter stabilization using low flow purging, Vendor shall purge until “dry” (i.e., purge to silt level), allow for needed recharge volume, then sample well. The field parameters pH, temperature and specific conductance shall be obtained with an appropriate water quality monitor for each sample. The costs associated with well purging equipment shall be included in the unit (“per well”) cost for field sampling.

3.1.1.6 The Vendor shall provide for all labor, materials, transportation, tools, equipment, supplies, and incidentals to manage and dispose of purge water at an approved facility. The costs associated with purge

water management shall be included in the unit (per well) cost for field sampling and laboratory analysis.

3.1.1.7 All sampling equipment will be properly decontaminated before and after sampling. A separate area will be designated for decontaminating the sampling equipment and storing investigative derived waste (IDW). The water used for decontaminating equipment must be containerized before disposal; the IDW can be stored in the same container as the purge water. The costs associated with decontaminating field equipment and disposal of IDW shall be included in the unit cost for field sampling.

3.1.1.8 The Unit Cost for the Field Services Per Well shall include all labor, equipment, materials, transportation, and incidentals to gauge and purge groundwater monitoring wells, obtain groundwater samples, preserve and transport/ship groundwater samples to Laboratory for analysis.

3.1.1.8.1 "Per Well" is defined as an event in which an actual sample was collected from the monitoring well. A dry well cannot be defined as a sampling event.

3.1.1.8.2 Payment will only be made for groundwater monitoring wells that have been sampled. (Note: A shorter bailer may be necessary if the longer bailer will not pass through a bend in the well.)

3.1.2 Statistical Analysis Setup: Vendor shall determine if there is a statistical increase over the background values for each parameter according to ASTM Standard D 6312-98 (http://www.astm.org) except that any re-sampling of implementing Phase II sampling will be at the discretion of the WVDEP.

3.1.2.1 Any landfill that has two years of data either acquired or historical shall receive a semi-annual statistical analysis in accordance with Solid Waste Management Rule §33-1-4.11 Groundwater Monitoring and Corrective Action Program, which can be found using this link https://www.state.wv.us/swmb/Code/33CSR1.pdf.

3.1.2.2 The Vendor will be paid a one-time statistical analysis setup fee. This fee will include all labor, materials, and incidentals required for the Vendor to prepare a DEP approved statistical analysis database.

3.1.2.3 The Unit Cost for the Statistical Analysis Setup shall be measured as the "per Landfill" unit price including all labor, equipment, materials, transportation and incidentals to collect, compile and construct the facility data base for statistical evaluations of

information obtained in field services and laboratory analysis.

3.1.3 Statistical Analysis and Reporting: The Vendor shall develop and submit reports for groundwater monitoring events in accordance with 33CSR1 Section 4.11 https://www.state.wv.us/swmb/Code/33CSR1.pdf.

3.1.3.1 There must be no less than one hundred and twenty (120) days between the sampling events. Reports shall be submitted within sixty (60) days of each sampling event. The Vendor shall submit reports including test results to the Project Manager, the WVDEP Division of Water and Waste Management, and the Permittee of the Landfill.

3.1.3.2 The results of the groundwater analysis from each monitoring well shall be provided in a format acceptable to the WVDEP and both MDL's (method detection limits) and PQL's (practical quantitation limit) shall be specified for all laboratory analyses. Electronic copies of analyses and reports will be required.

3.1.3.3 The Unit Price for the Statistical Analysis and Reporting shall be measured per Landfill, and includes all labor (including clerical), printing, binding, copying, shipping, etc., and incidentals to evaluate data and report findings to WVDEP. An example of the Statistical Analysis and Reporting is provided below.

3.2 Supplement Requirements

3.2.1 The Vendor's field sampling team shall have the following abilities, training and knowledge:

- Ability to work in varying weather and site conditions where steep slopes and rugged terrain may be present and where access to some wells by vehicle is not available.
- Training and knowledge of sampling methods for collecting groundwater samples, labeling of sample containers, sample shipping procedures and completing a chain of custody.
- Ability to use GPS (global positioning system) or other site locating methods
- Training and knowledge of the maintenance and calibration of field sampling and measuring equipment.
- Attended a 40-hour health and safety training course, with annual refresher, in accordance with the requirements of the Occupational Safety and Health Administration 29CFR 1910.120.
- Knowledge of first aid and safety procedures.

3.2.2 Vendor employees are expected to conduct themselves in a professional manner and cooperate with all WVDEP staff to ensure efficient and productive operations. WVDEP reserves the right to request any Vendor employee be removed from field sampling activities.

3.2.3 Any modifications to the wells must be requested in writing and shall be approved or disapproved in writing by the Program Manager. Should Vendor desire to modify wells to achieve a certain procedure for monitoring, such as a dedicated well pump, etc., Vendor shall provide justification to WVDEP for the well modification.

3.2.4 The Vendor shall be responsible for locking the monitoring wells while not in use. The wells shall remain locked when not in use to prevent unauthorized access. The Vendor shall be provided a key to the common keyed locks that have been installed. The Contractor shall immediately notify WVDEP of any missing or broken well locks or covers.

3.2.5 Not all groundwater monitoring wells are accessible by vehicle; walking to and from some of the groundwater monitoring wells will be required. The WVDEP will be responsible for maintaining reasonable access to well heads to allow for field sampling. Maintenance may include removal of brush, lubrication of hinges, etc.

3.2.6 For those groundwater monitoring wells that are accessible by vehicle, the Vendor will immediately report excessive deterioration of the access road or roads to the Project Manager. This will allow for the repair of the access road or roads to be scheduled and completed in a timely manner. If the Vendor cannot access a well, they must notify WVDEP immediately.

3.2.7 The Vendor must make a reasonable effort to sample all wells approved by WVDEP. A sampling event shall be defined as an event in which an actual sample was collected. A dry well cannot be defined as a sampling event. Vendor shall report any damaged or obstructed groundwater monitoring wells to the WVDEP.

3.2.8 The Project Manager will be onsite during each sampling event; the list of Project Managers and assigned landfills can be found in **Attachment D**.

3.2.8.1 Vendor shall notify the Project Manager no less than five (5) calendar days before each sampling event. If Vendor fails to adhere to the sampling schedule provided to the Project Manager and does not provide a revised sampling schedule in advance, processing of invoices shall be delayed until Vendor provides justification for the unannounced schedule change.

3.2.9 Prior to sampling, the Vendor's sampling equipment shall be subject to inspection. If the Project Manager deems the sampling equipment unacceptable, the Vendor shall immediately obtain replacement sampling equipment. There is no line item for the cost to obtain acceptable sampling equipment and cost shall not be included in the unit cost for field sampling.

3.2.10 Additional Supplemental Specifications can be found in **Attachment G**.

3.3 Analysis of Groundwater Samples

3.3.1 All groundwater samples shall be delivered to a third-party DWWM Quality Assurance Program-certified Laboratory for analysis. **To ensure unbiased analytical testing and reporting, the Vendor collecting the groundwater samples cannot be the same Vendor analyzing the groundwater samples**.

3.3.2 Vendor shall utilize WVDEP's issued ***Inorganic Analysis of Water and Soil*** contracts and ***Organic Analysis of Water and Soil*** contracts to determine the closest geographically located and the most cost-effective Laboratory to analyze the groundwater samples.

3.3.3 Do not include cost of lab analysis; cost for analysis will be the responsibility of WVDEP. Sample collection, sample containers and delivery to a specified lab will be the responsibility of contractor.

4. CONTRACT AWARD:

4.1 Contract Award: The Contract is intended to provide Agencies with a purchase price for the Contract Items. The Contract shall be awarded to the Vendor that provides the Contract Items meeting the required specifications for the lowest overall Total Bid Amount as shown on the Pricing Pages.

4.2 Pricing Page: Vendor should complete the Pricing Page by multiplying the estimated quantity by the unit price. Add your line item totals to determine the total amount of your bid. Vendor should complete the Pricing Page in their entirety as failure to complete in its entirety may result in Vendor's bid being disqualified.

The Pricing Pages contain a list of the Contract Items and estimated purchase volume. The estimated purchase volume for each item represents the approximate volume of anticipated purchases only. No future use of the Contract or any individual item is guaranteed or implied. Vendor should electronically enter the information into the Pricing Pages through wvOASIS, if available, or as an electronic document.

5. ORDERING AND PAYMENT

5.1. Ordering: Vendor shall accept orders through wvOASIS, regular mail, facsimile, e-mail, or any other written form of communication. Vendor may, but is not required to, accept on-line orders through a secure internet ordering portal/website. If Vendor has the ability to accept on-line orders, it should include in its response a brief description of how Agencies may utilize the on-line ordering system. Vendor shall ensure that its on-line ordering system is properly secured prior to processing Agency orders on-line.

5.2. Payment: Vendor **s**hall accept payment in accordance with the payment procedures of the State of West Virginia.

5.3. Invoicing: Invoices are to be submitted upon completion of each event or a combination of two or more events. Invoices must be submitted via hard copy or electronically to the regional office listed below.

WVDEP-DLR-LCAP
601 57th Street S.E.
Charleston, WV 25304
Attn: Catherine Guynn, LCAP Program Manager
Email at catherine.n.guynn@wv.gov.

6. DELIVERY AND RETURN:

6.1. Delivery Time: Vendor shall deliver standard orders within 10 days working days after orders are received. Vendor shall deliver emergency orders within 5 working day(s) after orders are received. Vendor shall ship all orders in accordance with the above schedule and shall not hold orders until a minimum delivery quantity is met.

6.2. Late Delivery: The Agency placing the order under this Contract must be notified in writing if orders will be delayed for any reason. Any delay in delivery that could cause harm to an Agency will be grounds for cancellation of the delayed order, and/or obtaining the items ordered from a third party.

Any Agency seeking to obtain items from a third party under this provision must first obtain approval of the Purchasing Division.

6.3. Delivery Payment/Risk of Loss: Standard order delivery shall be F.O.B. destination to the Agency's location. Vendor shall include the cost of standard order delivery charges in its bid pricing/discount and is not permitted to charge the Agency separately for such delivery. The Agency will pay delivery charges on all emergency orders provided that Vendor invoices those delivery costs as a separate charge with the original freight bill attached to the invoice.

6.4. Return of Unacceptable Items: If the Agency deems the Contract Items to be unacceptable, the Contract Items shall be returned to Vendor at Vendor's expense

and with no restocking charge. Vendor shall either make arrangements for the return within five (5) days of being notified that items are unacceptable or permit the Agency to arrange for the return and reimburse Agency for delivery expenses. If the original packaging cannot be utilized for the return, Vendor will supply the Agency with appropriate return packaging upon request. All returns of unacceptable items shall be F.O.B. the Agency's location. The returned product shall either be replaced, or the Agency shall receive a full credit or refund for the purchase price, at the Agency's discretion.

6.5. **Return Due to Agency Error**: Items ordered in error by the Agency will be returned for credit within 30 days of receipt, F.O.B. Vendor's location. Vendor shall not charge a restocking fee if returned products are in a resalable condition. Items shall be deemed to be in a resalable condition if they are unused and in the original packaging. Any restocking fee for items not in a resalable condition shall be the lower of the Vendor's customary restocking fee or 5% of the total invoiced value of the returned items.

7. **TRAVEL:** Vendor shall be responsible for all mileage and travel costs, including travel time, associated with performance of this Contract.

8. **FACILITIES ACCESS:** Performance of Contract Services may require access cards and/or keys to gain entrance to Agency's facilities. If access cards and/or keys are required:

8.1. Vendor must identify principal service personnel which will be issued access cards and/or keys to perform service.

8.2. Vendor will be responsible for controlling cards and keys and will pay replacement fee, if the cards or keys become lost or stolen.

8.3. Vendor shall notify Agency immediately of any lost, stolen, or missing card or key.

8.4. Anyone performing under this Contract will be subject to Agency's security protocol and procedures.\

9. **VENDOR DEFAULT**

9.1. The following shall be considered a vendor default under this Contract.

9.1.1. Failure to perform Contract Services in accordance with the requirements contained herein.

9.1.2. Failure to comply with other specifications and requirements contained herein.

9.1.3. Failure to comply with any laws, rules, and ordinances applicable to the Contract Services provided under this Contract.

9.1.4. Failure to remedy deficient performance upon request.

9.2. The following remedies shall be available to Agency upon default.

9.2.1. Immediate cancellation of the Contract.

9.2.2. Immediate cancellation of one or more release orders issued under this Contract.

9.2.3. Any other remedies available in law or equity.

10. MISCELLANEOUS:

10.1 No Substitutions: Vendor shall supply only Contract Items submitted in response to the Solicitation unless a contract modification is approved in accordance with the provisions contained in this Contract.

10.2 Vendor Supply: Vendor must carry sufficient inventory of the Contract Items being offered to fulfill its obligations under this Contract. By signing its bid, Vendor certifies that it can supply the Contract Items contained in its bid response.

10.3 Reports: Vendor shall provide quarterly reports and annual summaries to the Agency showing the Agency's items purchased, quantities of items purchased, and total dollar value of the items purchased. Vendor shall also provide reports, upon request, showing the items purchased during the term of this Contract, the quantity purchased for each of those items, and the total value of purchases for each of those items. Failure to supply such reports may be grounds for cancellation of this Contract

10.4 Contract Manager: During its performance of this Contract, Vendor must designate and maintain a primary contract manager responsible for overseeing Vendor's responsibilities under this Contract. The Contract manager must be available during normal business hours to address any customer service or other issues related to this Contract. Vendor should list its Contract manager and his or her contact information below.

Contract Manager: Jeff Rossi

Telephone Number: 412-297-1794

Fax Number:

Email Address: jeff.rossi@atcgs.com

ATTACHMENT A
LIST OF LCAP LANDFILLS

East Region Landfills – 46 Wells

Berkeley County Landfill	8 wells
Capon Springs Landfill	4 wells
Elkins Landfill	8 wells
Hampshire County Landfill	5 wells
Jefferson County Landfill	13 wells
Morgan County Landfill	4 wells
Petersburg Landfill	4 wells

North Region Landfills – 40 Wells

Buckhannon Landfill	4 wells
Clarksburg Landfill	4 wells
Kingwood Landfill	4 wells
Marion County Landfill	4 wells
Monongalia County Landfill	5 wells
Morgantown Landfill	7 wells
Moundsville Landfill	4 wells
Preston County Landfill	4 wells
Wheeling Landfill	4 wells

South Region Landfills – 36 Wells

Central WV Refuse Landfill	3 wells
Fayette County Landfill	4 wells
McDowell County Landfill	6 wells
Midwest Landfill	11 wells
Montgomery Landfill	4 wells
Webster County Landfill	4 wells
Wyoming County Landfill	4 well

West Region Landfills – 30 Wells

Don’s Disposal Landfill	4 wells
Fleming Landfill	6 wells
Jackson County Landfill	4 wells
Kanawha Western Landfill	4 wells
Mingo County Landfill	4 wells
Pine Creek Omar Landfill	4 wells
South Charleston Landfill	4 wells

ATTACHMENT B
MONITORING WELL SPECIFICS

Landfill	Well #	Diameter	Protective Pipe Diameter	Total Depth	Static Water Level	Water Column	Latitude	Longitude	Approximate Elevation Above msl
BERKELEY COUNTY	MW-1B	2"	4”	25.20'	5.93’	19.27’	39.438450°	-77.936692°	370’
	MW-2A	2"	4”	27.70'	8.20’	19.50’	39.437738°	-77.935888°	381’
	MW-3A	2"	4”	27.73'	5.50'	22.23’	39.436590°	-77.935642°	384’
	MW-4A	2"	4”	61.92'	14.50'	47.42’	39.436360°	-77.938658°	391’
	MW-5	2"	4”	168.80'	41.70'	127.10’	39.440015°	-77.942133°	499’
	MW-7	2"	4”	32.40'	20.70'	11.70’	39.435798°	-77.940495°	418’
	MW-9	2"	4”	73.56'	32.85'	40.71’	39.438941°	-77.938372°	459’
	MW-11	2"	4”	27.20'	14.43'	12.77’	39.436068°	-77.942128°	403’
BUCKHANNON	MW-1	2"	6”	169.50'	157.15'	12.35’	39.035506°	-80.251819°	1615’
	MW-2	2"	6”	179.30'	163.73’	15.57’	39.035062°	-80.254043°	1621’
	MW-4	2"	6”	27.80'	14.07'	13.73’	39.033111°	-80.252142°	1502’
	MW-5	2"	4”	162.33'	157.20'	5.13’	39.033730°	-80.255675°	1628’
CAPON SPRINGS	MW-1	2"	6”	60.20'	9.05'	51.15’	39.150218°	-78.481247°	1354’
	MW-2	2"	6”	69.70'	44.24'	25.46’	39.149054°	-78.480897°	1383’
	MW-3	2"	6”	59.60'	12.76'	46.84’	39.149570°	-78.482103°	1360’
	MW-4	2"	4”	64.05'	6.30’	57.75’	39.149938°	78.480832°	1344’
CENTRAL WV	MW-3D	2"	6”	82.70'	36.40'	46.30’	38.660645°	-80.825783°	953’
	MW-5D	2"	4”	163.10'	117.77'	45.33’	38.662823°	-80.824305°	1004’
	MW-7	2"	4”	314.39'	132.45'	181.94’	38.663118°	-80.826438°	1109’
CLARKSBURG	PW-A	2"	4”	100.00'	81.50'	18.50’	39.295534°	-80.336740°	1162’
	PW-B	2"	4”	78.10'	27.35’	50.75’	39.294056°	-80.333424°	1085’
	PW-C	2"	4”	161.31'	155.51'	5.80’	39.297796°	-80.336671°	1232’
	MW-7	2"	4”	44.13'	16.67'	27.46’	39.292600°	-80.335908°	1086°
DON'S DISPOSAL	GW-3A	2"	4”	52.05'	25.60'	36.17’	38.428738°	-81.631462°	1013’
	GW-5C	2"	4”	86.50'	44.23'	42.27’	38.421909°	-81.637620°	770’
	PWA	2"	4”	177.55'	141.38'	31.40’	38.426136°	-81.630732°	980’
	PWB	2"	4”	85.90'	54.50'	26.45’	38.422574°	-81.634215°	947’

Monitoring Wells (MW) Specifics denoted with * were obtained from most recent groundwater monitoring reports.
Total Depth, Static Water Level, Latitude, Longitude and Approximate Elevation Above Mean Sea Level (msl) from 2015 Monitoring Well Inventory Inspection

ATTACHMENT B
MONITORING WELL SPECIFICS

Landfill	Well #	Diameter	Protective Pipe Diameter	Total Depth	Static Water Level	Water Column	Latitude	Longitude	Approximate Elevation Above msl
ELKINS LANDFILL	MW-1	2"	6”	56.84’	38.25’	19.73’	38.933810°	-79.981590°	2071’
	MW-2	2"	6”	54.18’	73.13’	18.95’	38.934071°	-79.982506	2080’
	MW-3	2"	6”	36.15’	12.17’	23.98’	38.933281°	-79.981448°	2074’
	MW-4	2"	6”	104.20’	94.67’	9.53’	38.926621°	-79.985789°	2155’
	MW-5	2"	6”	150.60’	117.70’	32.90’	38.927514°	-79.983217°	2181’
	MW-6	2"	6”	169.40’	137.55’	31.85’	38.929197°	-79.982519°	2180’
	MW-7*	2"	6”	216.90’	146.99’	Unavailable	Unavailable	Unavailable	Unavailable
	MW-8*	2"	6”	230.00’	146.53’	Unavailable	Unavailable	Unavailable	Unavailable
FAYETTE COUNTY	MW-1	2"	4”	37.50’	31.40’	6.10’	37.978030°	-81.041894°	1090’
	MW-2	2"	4”	67.20'	65.11’	32.10’	37.977817°	-81.040692°	1895’
	MW-3	2"	6”	87.05'	86.80’	0.25’	37.977101°	-81.040789°	1914’
	MW-4	2"	6”	203.40'	Dry	0.00’	37.973862°	-81.038047°	2037’
FLEMING	MW-1A	2”	6”	276.00’	269.91’	6.09’	38.454943°	-81.681445°	1053’
	MW-3A	2"	6”	221.49'	110.96'	110.53’	38.457080°	-81.680144°	982’
	MW-3B	2"	6”	48.25'	27.83'	20.42’	38.457085°	-81.680118°	982’
	MW-4A	2"	6”	127.76'	92.95'	34.81’	38.456771°	-81.677546°	857’
	MW-4B	2"	4”	36.90'	20.63'	16.27’	38.456757°	-81.677535°	857”
	MW-5A	2"	4”	29.44'	15.49'	13.95’	38.456444°	-81.676154°	827’
HAMPSHIRE COUNTY	MW-1	2"	6”	50.65'	20.87'	29.78’	39.361245°	-78.747305°	773’
	MW-2	2"	6”	52.85’	18.59'	34.26’	39.360976°	-78.746640°	782’
	MW-3	2"	6”	137.5'	66.75'	70.75’	39.363638°	-78.745196°	858’
	MW-4	2"	6”	69.13'	29.17'	39.20’	39.361235°	-78.744611°	855’
	MW-5	2”	4”	58.00’	10.97’	47.03’	39.361794°	-78.747488°	772’
JACKSON COUNTY	MW-2	2"	4”	159.46'	38.00'	121.46’	38.843722°	-81.725519°	708’
	MW-2A	2"	4”	164.50'	42.05'	122.45’	38.843751°	-81.725560°	726’
	MW-3	2"	4”	148.30'	24.70'	123.60’	38.843070°	-81.725990°	662’
	MW-4	2"	4”	177.42'	63.20'	114.22’	38.842760°	-81.726590°	704’
JEFFERSON COUNTY	MW-11	2"	8”	46.55'	26.49'	20.06’	39.339578	-77.911544°	524’
	MW-104	2"	8”	75.40'	50.95'	24.45’	39.339416°	-77.906040°	548’
	SMW-2	2"	4”	27.35'	18.80'	8.55’	39.339384°	-77.906060°	548’

Monitoring Wells (MW) Specifics denoted with * were obtained from most recent groundwater monitoring reports.
Total Depth, Static Water Level, Latitude, Longitude and Approximate Elevation Above Mean Sea Level (msl) from 2015 Monitoring Well Inventory Inspection

ATTACHMENT B
MONITORING WELL SPECIFICS

Landfill	Well #	Diameter	Protective Pipe Diameter	Total Depth	Static Water Level	Water Column	Latitude	Longitude	Approximate Elevation Above msl
JEFFERSON COUNTY	MW-103R	2"	8”	79.90'	26.55'	53.35’	39.340106°	-77.907165°	539’
(cont.)	SMW-3	2"	4”	33.50'	28.03'	5.47’	39.339925°	-77.907241°	542’
	MW-4	2"	8”	38.01'	29.90'	8.11’	39.341018°	-77.910343°	535’
	MW-101UG	2"	8’	66.50'	56.38'	10.12’	39.335755°	-77.906447°	593’
	MW-106	2"	8”	53.15'	44.50'	8.65’	39.335751°	-77.910442°	574’
	MW-6B	2"	8”	95.05'	67.57'	27.48’	39.337092°	-77.911610°	564’
	MW-6A	2"	8”	62.83'	58.77'	4.06’	39.337163°	-77.911579°	572’
	SMW-4	2"	8”	34.10'	24.98'	9.12’	39.341354°	-77.910607°	542’
	MW-102	2"	8”	105.50'	23.63'	81.87’	39.341382°	-77.910600°	543’
	MW-105DG	2"	8”	264.85'	244.94'	19.91’	39.340522°	-77.908255°	565’
KANAWHA	MW-S1	2"	4”	38.45'	6.83'	31.62’	38.417523°	-81.759134°	879’
WESTERN	MW-1A	2"	4”	77.10'	52.35'	24.75’	38.418674°	-81.759001°	858’
	MW-2	2"	4”	103.51'	12.60'	90.91’	38.418219°	-81.758150°	872’
	MW-3A	2"	4”	287.29'	109.35'	177.94’	38.415010°	-81.756993°	1086’
KINGWOOD	MW-1	2"	4”	55.50'	22.65'	32.85’	39.492901°	-79.686294°	1861’
	MW-2	2"	4”	60.00'	29.25'	30.75’	39.496106°	-79.683866°	1867’
	MW-3	2"	4”	71.45'	46.05'	25.40’	39.496745°	-79.684665°	1822’
	MW-4	2"	4”	76.06'	53.60'	22.46’	39.495913°	-79.685686°	1821’
MARION COUNTY	MW-1	2"	8”	264.85'	244.94'	19.91’	39.504445°	-80.247624°	1369’
	MW-4B	2"	4”	74.00'	53.25'	20.75’	39.506434°	-80.241087°	1152’
	MW-5B	2"	4”	65.60'	50.27'	15.33’	39.507503°	-80.242624°	1173’
	MW-6	2"	4”	65.09'	49.13'	15.96’	39.502923°	-80.244058°	1167’
MCDOWELL COUNTY	MW-1	2"	4”	59.20’	42.43’	16.77’	37.458447°	-81.675585°	1792’
	MW-2	2"	4”	88.60’	85.20’	3.40’	37.461751°	-81.679647°	1501’
	MW-3	2"	4”	92.00’	58.10’	33.90’	37.464891°	-81.677362°	1378’
	MW-6A	2"	4”	28.01’	Dry	Dry	37.465920°	-81.678011°	1306’
	MW-4	2"	4”	81.70’	39.65’	42.05’	37.463153°	-81.678153°	1360’
	MW-5	2"	4”	23.00’	Dry	Dry	37.463827°	-81.677518°	1371’

Monitoring Wells (MW) Specifics denoted with * were obtained from most recent groundwater monitoring reports.
Total Depth, Static Water Level, Latitude, Longitude and Approximate Elevation Above Mean Sea Level (msl) from 2015 Monitoring Well Inventory Inspection

ATTACHMENT B
MONITORING WELL SPECIFICS

Landfill	Well #	Diameter	Protective Pipe Diameter	Total Depth	Static Water Level	Water Column	Latitude	Longitude	Approximate Elevation Above msl
MID-WEST	MN-01	2"	6”	60.20’	9.05’	51.15’	37.849349°	-80.790305°	3033’
	MN-02	2"	6”	33.01’	25.80’	7.21’	37.849013°	-80.787548°	2960’
	MN-03	2"	6”	37.20’	20.79’	16.41’	37.847658°	-80.786241°	2934’
	MN-04	2"	6”	34.50’	24.85’	9.65’	37.846614°	-80.785972°	2934’
	MN-07	2"	6”	37.00’	28.53’	8.47’	37.844212°	-80.787692°	2965’
	MN-08	2"	6”	50.61’	32.79’	17.82’	37.844306°	-80.789664°	2950’
	MN-09	2"	4”	88.00’	51.61’	36.69’	37.844863°	-80.790909°	3033’
	MN-10A	2"	6”	114.30’	74.30’	40.00’	37.848026°	-80.791454°	3029’
	MN-10B	2"	6”	46.81’	28.61’	18.20’	37.848026°	-80.791454°	3029’
	MN-11A	2"	6”	58.37	42.00’	16.37’	37.849460°	-80.790291°	3028’
	MN-11B	2"	6”	16.00‘	12.54’	3.46’	37.849460°	-80.790291°	3028’
MINGO	MW-2A	2"	4”	52.23’	14.50’	37.73’	37.694991°	-82.217260°	1073’
COUNTY	MW-3B	2"	4”	54.20’	14.50’	39.70’	37.694843°	-82.216293°	1097’
	MW-4	2"	4”	158.90’	118.27’	40.63’	37.693732°	-82.218164°	1186’
	MW-4A	2"	4”	265.75’	209.50’	56.25’	37.691345°	-82.218373°	1244’
MONONGALIA	MW-1A	2"	4”	155.45’	149.79’	5.66’	39.504445°	-80.064451°	1171’
COUNTY	MW-3C	2"	4”	58.00’	45.75’	12.25’	39.597567°	-80.068899°	1090’
	MW-4A	2"	4”	58.43’	31.87’	26.56’	39.596744°	-80.068120°	1041’
	MW-6	2"	4”	142.50’	105.10’	37.40’	39.597999°	-80.063686°	1142’
	MW-7	2"	4”	102.40’	63.57’	38.83’	39.599095°	-80.065695°	1124’
MONTGOMERY	MW-1A	2"	4”	55.76’	28.55’	28.55’	38.156072°	-81.316828°	974’
	MW-2	2"	4”	47.55’	28.60’	28.60’	38.158298°	-81.321229°	935’
	MW-3	2"	4”	49.45’	29.10’	29.10’	38.157848°	-81.321677°	912’
	MW-4	2"	4”	34.55’	25.50’	25.50’	38.158363°	-81.323267°	894’
MORGAN COUNTY	MW-5	2"	4”	47.00’	42.75’	4.25’	39.575942°	-78.355894°	987’
	MW-6	2"	4”	85.00’	Unavailable	Unavailable	39.574717°	-78.354423°	972’
	MW-1A	2"	4”	244.40’	99.35’	145.05’	39.576831°	-78.358323°	1057’
	MW-7	2"	4”	84.00’	65.75’	18.25’	39.573835°	-78.357255°	992’

Monitoring Wells (MW) Specifics denoted with * were obtained from most recent groundwater monitoring reports.
Total Depth, Static Water Level, Latitude, Longitude and Approximate Elevation Above Mean Sea Level (msl) from 2015 Monitoring Well Inventory Inspection

ATTACHMENT B
MONITORING WELL SPECIFICS

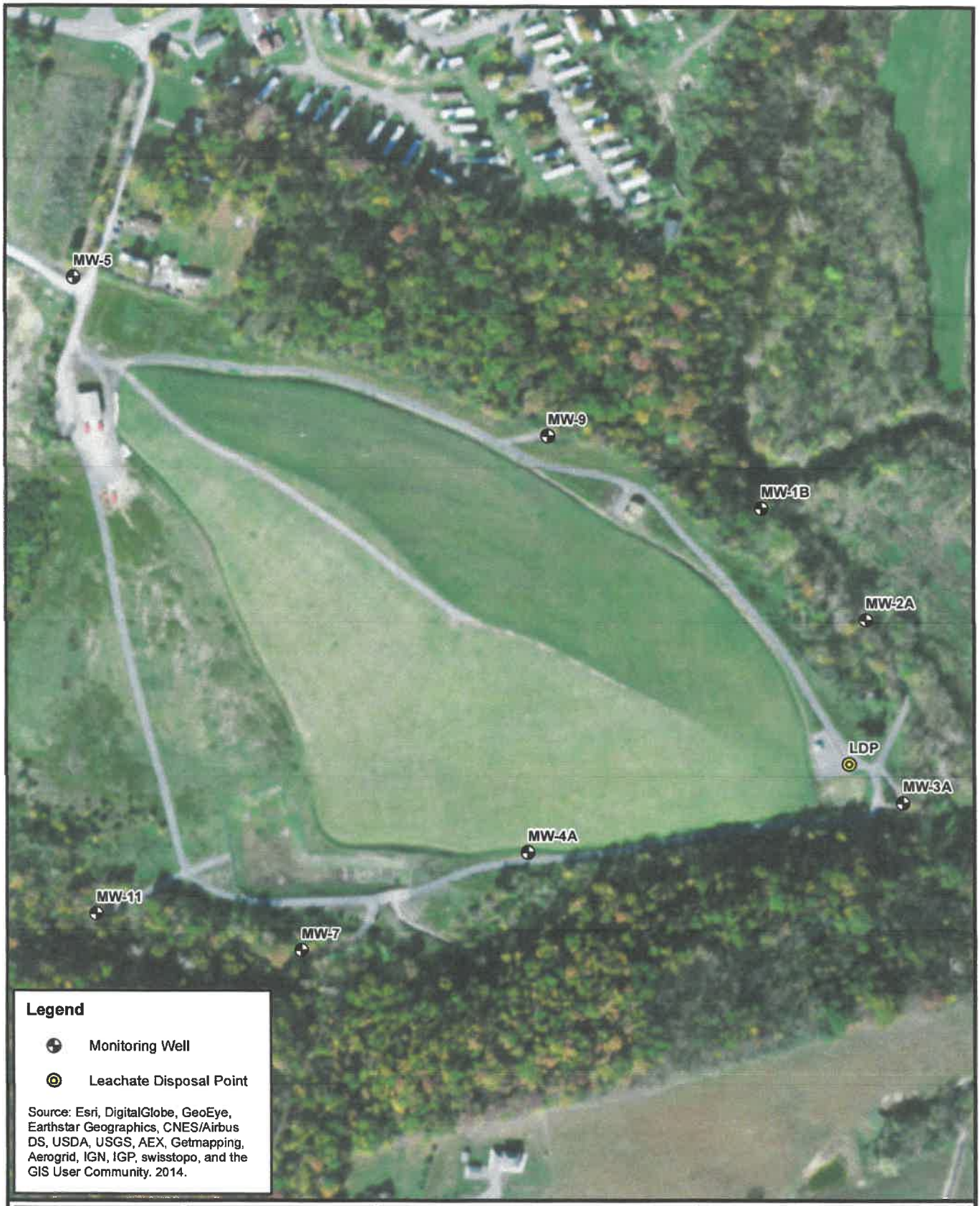
Landfill	Well #	Diameter	Protective Pipe Diameter	Total Depth	Static Water Level	Water Column	Latitude	Longitude	Approximate Elevation Above msl
MORGANTOWN	MW-101BG	2"	6”	153.54’	124.20’	29.34’	39.635336°	-79.918088°	1125’
	MW-102DG	2"	6”	34.15’	14.30’’	19.85’	39.636868°	-79.923400°	1043’
	MW-103DG	2"	6”	28.35’	13.98’	14.37’	39.637188°	-79.923280°	1039’
	MW-4	2"	6”	47.45’	21.10’	26.35’	39.636667°	-79.923055°	1036’
	SMW-1	2"	4”	20.20’	8.03’	12.17’	39.638161°	-79.922187°	1067’
	SMW-2	2"	4”	16.36’	9.23’	7.12’	39.638313°	-79.921816°	1079’
	SMW-3	2"	4”	15.25’	8.87’	6.38’	39.636847°	-79.923418°	1043’
MOUNDSVILLE	MW-A2	2"	4”	114.00’	94.35’	22.35’	39.857242°	-80.722894°	837’
	MW-E	2"	6”	64.50’	42.15’	21.30’	39.857517°	-80.724449°	734’
	MW-F	2"	4”	116.10’	137.40’	14.40’	39.856172°	-80.720537°	865’
	MW-G	2"	4”	25.55’	11.15’	19.65’	39.855688°	-80.723827°	739’
PETERSBURG	MW-2A	2"	4”	49.20’	25.70’	23.50	38.976800°	-79.151268°	1191’
(GRANT COUNTY)	MW-3A	2"	4”	143.73’	66.25’	77.48’	38.979504°	-79.151055°	1272’
	MW-4	2"	4”	51.25’	29.85’	21.40’	38.977255°	-79.152669°	1223’
	MW-7	2"	6”	51.50’	22.29’	29.21’	38.976919°	-79.150094°	1222’
PINE CREEK OMAR	MW-1*	2"	4”	214.00’	213.9’	Dry	37.764852°	-82.020752°	1064’
	MW-2	2"	4”	247.21’	44.90’	202.31	37.764012°	-82.020878°	1062’
	MW-3B	2"	4”	203.43’	172.18’	31.25’	37.764163°	-82.020128°	1040’
	MW-4	2"	6”	110.15’	73.25’	36.90’	37.760424°	-82.016982°	927’
REHE	MW-1U*	2"	4”	39.20’	18.50’	Unavailable	39.499932°	-79.793733°	1792’
(PRESTON COUNTY)	MW-2D	2"	4”	41.90’	26.50’	15.40’	39.499404°	-79.795702°	1766’
	MW-3D	2"	4”	53.00’	38.46’	14.54’	39.498606°	-79.995420°	1784’
	MW-4D	2"	4”	41.25’	17.20’	24.05’	39.496831°	-79.796697°	1754’
SOUTH CHARLESTON	NW-2	2"	4”	381.80’	158.90’	222.90’	38.352749°	-81.767937°	1010’
	NW-3	2"	4”	339.01’	273.43’	65.58’	38.353709°	-81.763590°	927’
	MW-1	2"	4”	66.25’	24.65’	41.60’	38.352255°	-81.761969°	687’
	NW-1	2"	4”	320.69’	300.25’	20.44’	38.351267°	-81.765179°	2"

Monitoring Wells (MW) Specifics denoted with * were obtained from most recent groundwater monitoring reports.
Total Depth, Static Water Level, Latitude, Longitude and Approximate Elevation Above Mean Sea Level (msl) from 2015 Monitoring Well Inventory Inspection

ATTACHMENT B
MONITORING WELL SPECIFICS

Landfill	Well #	Diameter	Protective Pipe Diameter	Total Depth	Static Water Level	Water Column	Latitude	Longitude	Approximate Elevation Above msl
WEBSTER COUNTY	MW-1	2"	6”	61.00’	44.25’	15.75’	38.444360°	-80.462980°	2531’
	MW-2	2"	6”	57.30’	42.63’	14.67’	38.444845°	-80.462541°	2535’
	MW-3	2"	6”	253.70’	220.38’	33.32’	38.444789°	-80.458139°	2819’
	MW-4	2"	6”	213.00’	200.63’	12.37’	38.442680°	-80.457090°	2765’
WHEELING	MW-1	2"	4”	113.00’	83.70’	29.30’	40.085951°	-80.707833°	951’
	MW-4R	2"	4”	17.90’	32.00’	14.10’	40.086198°	-80.707417°	873’
	MW-5	2"	3”	18.03’	26.80’	8.77’	40.086765°	-80.706872°	869’
	MW-6R	2"	4”	188.83’	199.41’	10.58’	40.093123°	-80.707905°	1068’
WYOMING COUNTY	MW-2	2"	4”	164.70’	87.88’	76.82’	37.603660°	-81.547937°	1835’
	MW-4	2"	4”	75.35’	24.67’	50.68’	37.603660°	-81.547937°	1745’
	MW-6	2"	4”	28.10’	18.35’	9.75’	37.602636°	-81.549937°	1770’
	MW-8	2"	4”	17.75’	7.85’	9.90’	37.601671°	-81.552515°	1779’

Monitoring Wells (MW) Specifics denoted with * were obtained from most recent groundwater monitoring reports.
Total Depth, Static Water Level, Latitude, Longitude and Approximate Elevation Above Mean Sea Level (msl) from 2015 Monitoring Well Inventory Inspection



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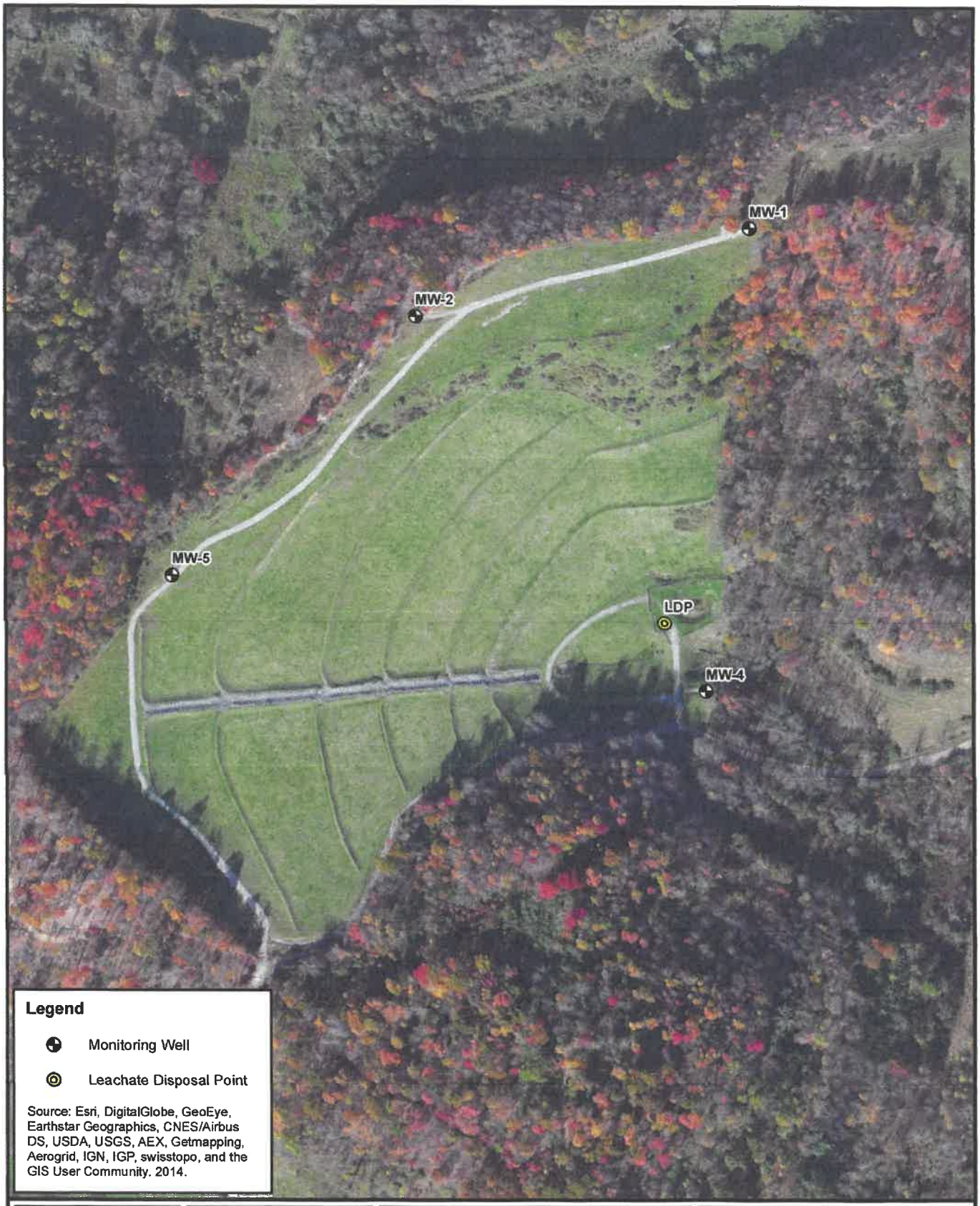
LCAP Report
DEP-15908A-50

Berkeley County Landfill
Monitoring Well Location Map
November 2015

File: Berkeley_LCAP_MWloc Date: 12/2/2015



e2C EnviroCheck

LCAP Report
DEP-15908A-50

Buckhannon Landfill
Monitoring Well Location Map
November 2015

File: Buckhannon_LCAP_MWloc Date: 12/2/2015

e2C EnviroCheck

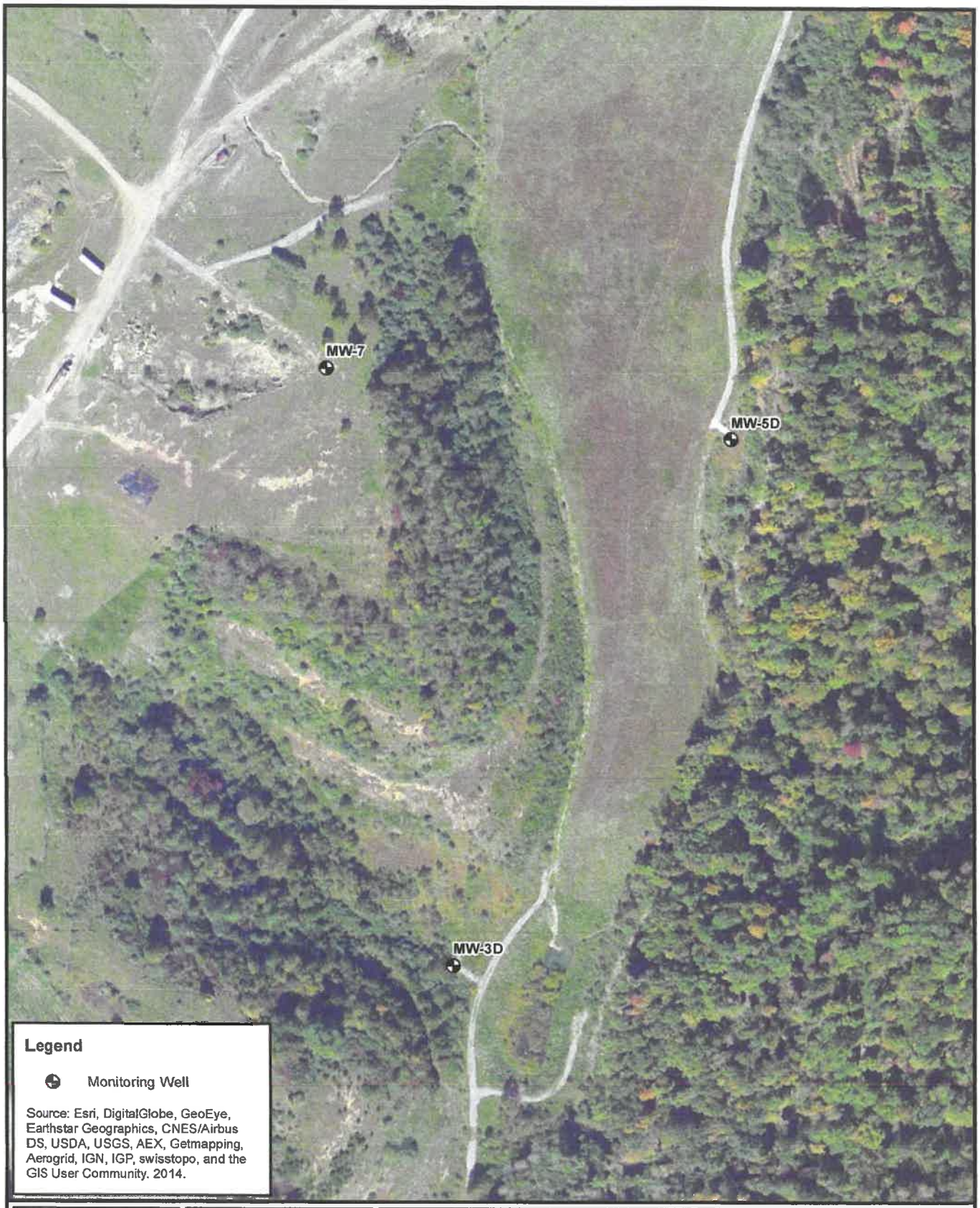
N W E S

0 50 100 Feet

LCAP Report
DEP-15908A-50

Capon Springs Landfill
Monitoring Well Location Map
November 2015

File: CaponSprings_LCAP_MWloc Date: 12/2/2015



e2C EnviroCheck

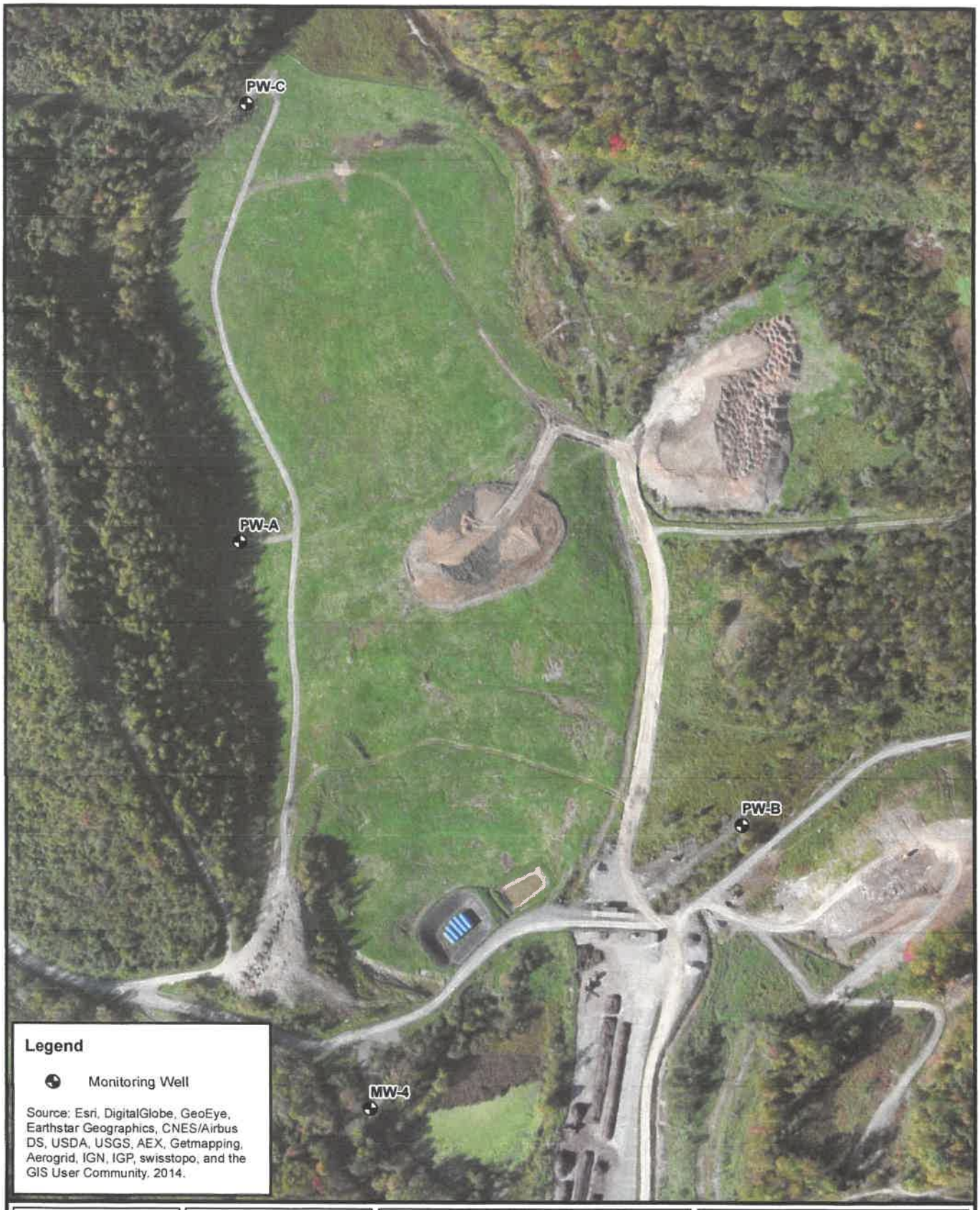
N W E S

0 100 200 Feet

LCAP Report
DEP-15908A-50

Central WV Refuse Landfill
Monitoring Well Location Map
November 2015

File: Central_LCAP_MWloc Date: 11/30/2015



e2C EnviroCheck

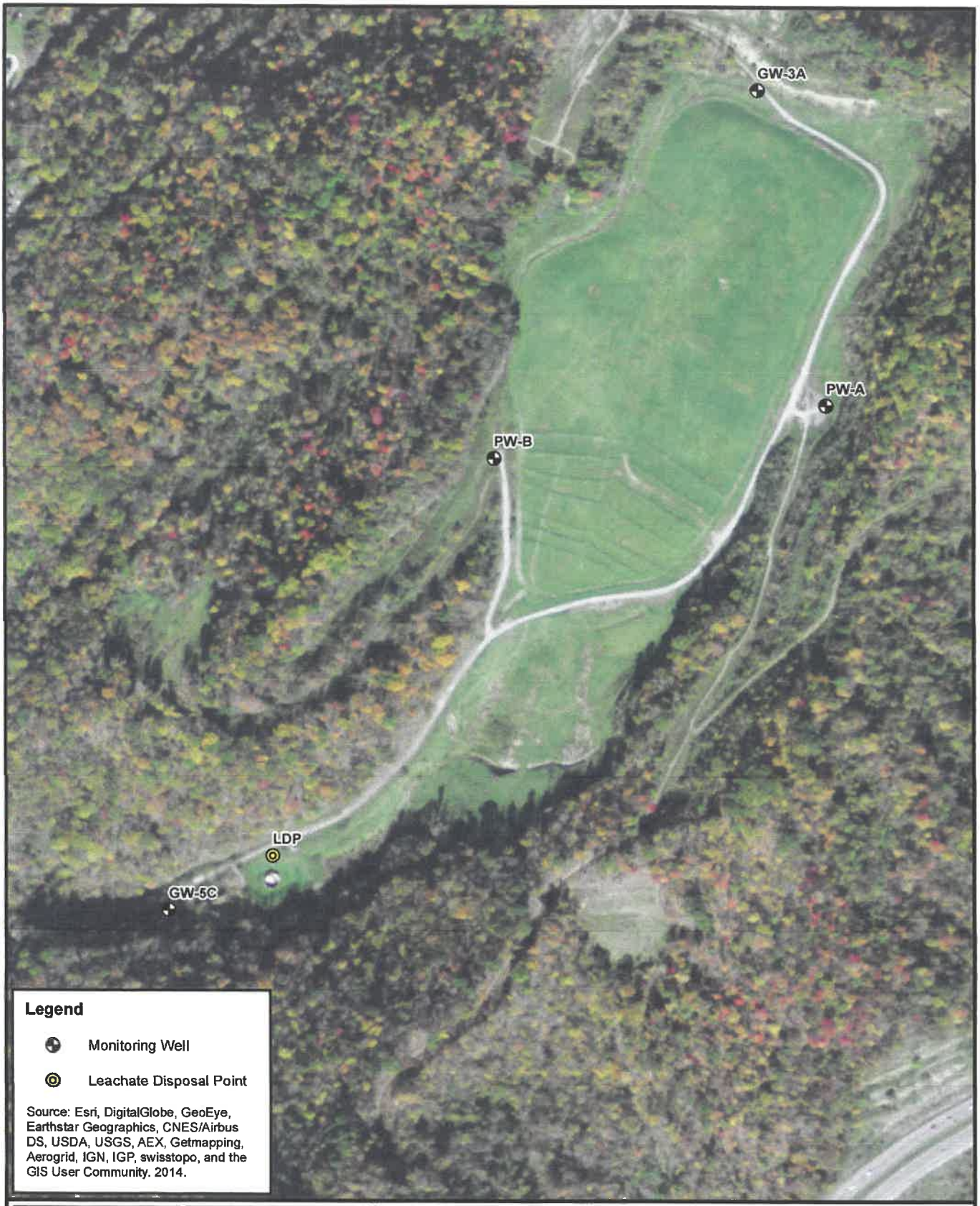
N W E S

0 125 250 Feet

LCAP Report
DEP-15908A-50

City of Clarksburg Landfill
Monitoring Well Location Map
November 2015

File: Clarksburg_LCAP_MWloc Date: 11/30/2015



e2C EnviroCheck

LCAP Report
DEP-15908A-50

Don's Disposal Landfill
Monitoring Well Location Map
November 2015

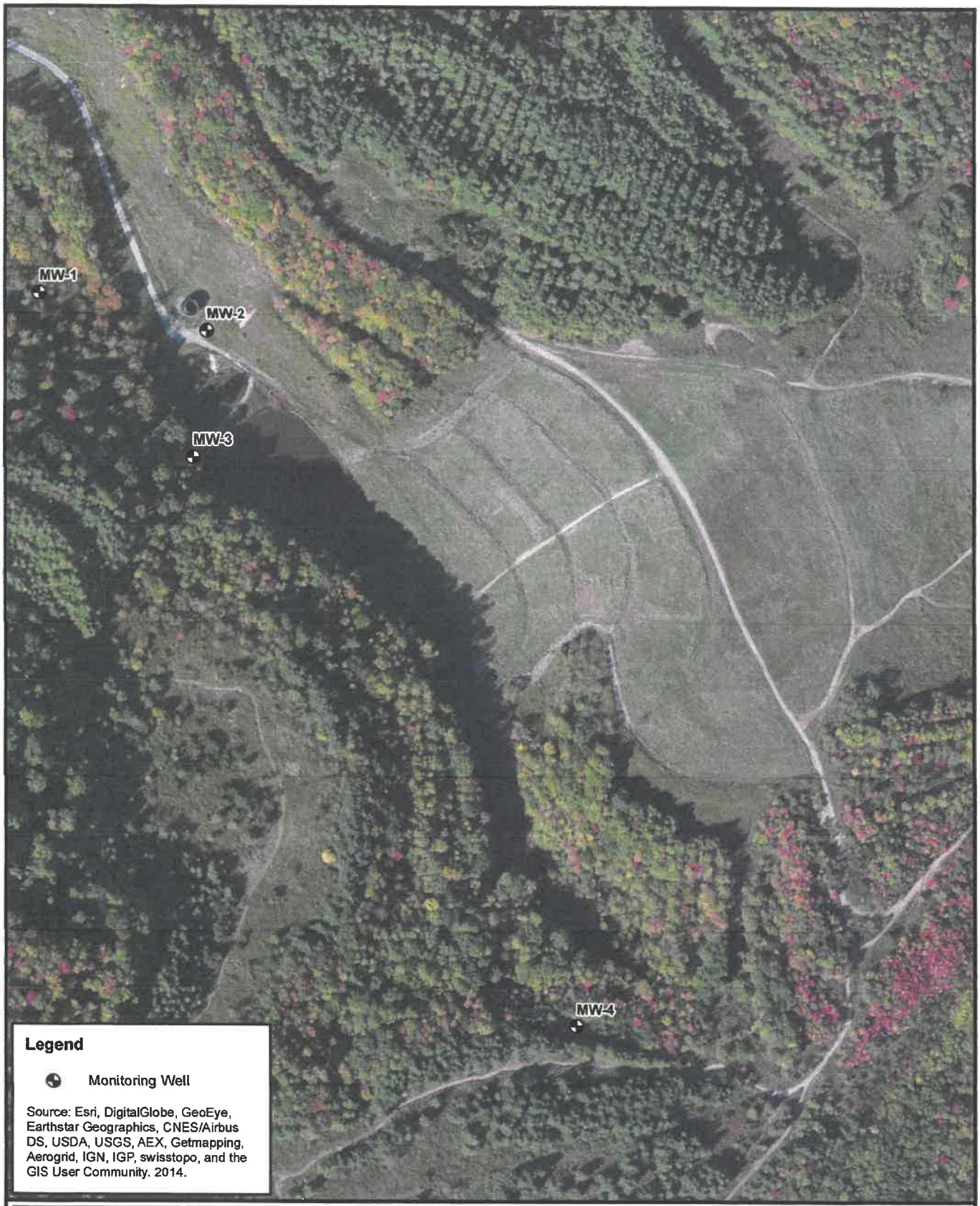
File: Don'sDisposal_LCAP_MWloc Date: 12/2/2015

e2C EnviroCheck

LCAP Report
DEP-15908A-50

City of Elkins Landfill
Monitoring Well Location Map
November 2015

File: Elkins_LCAP_MWloc Date: 11/30/2015

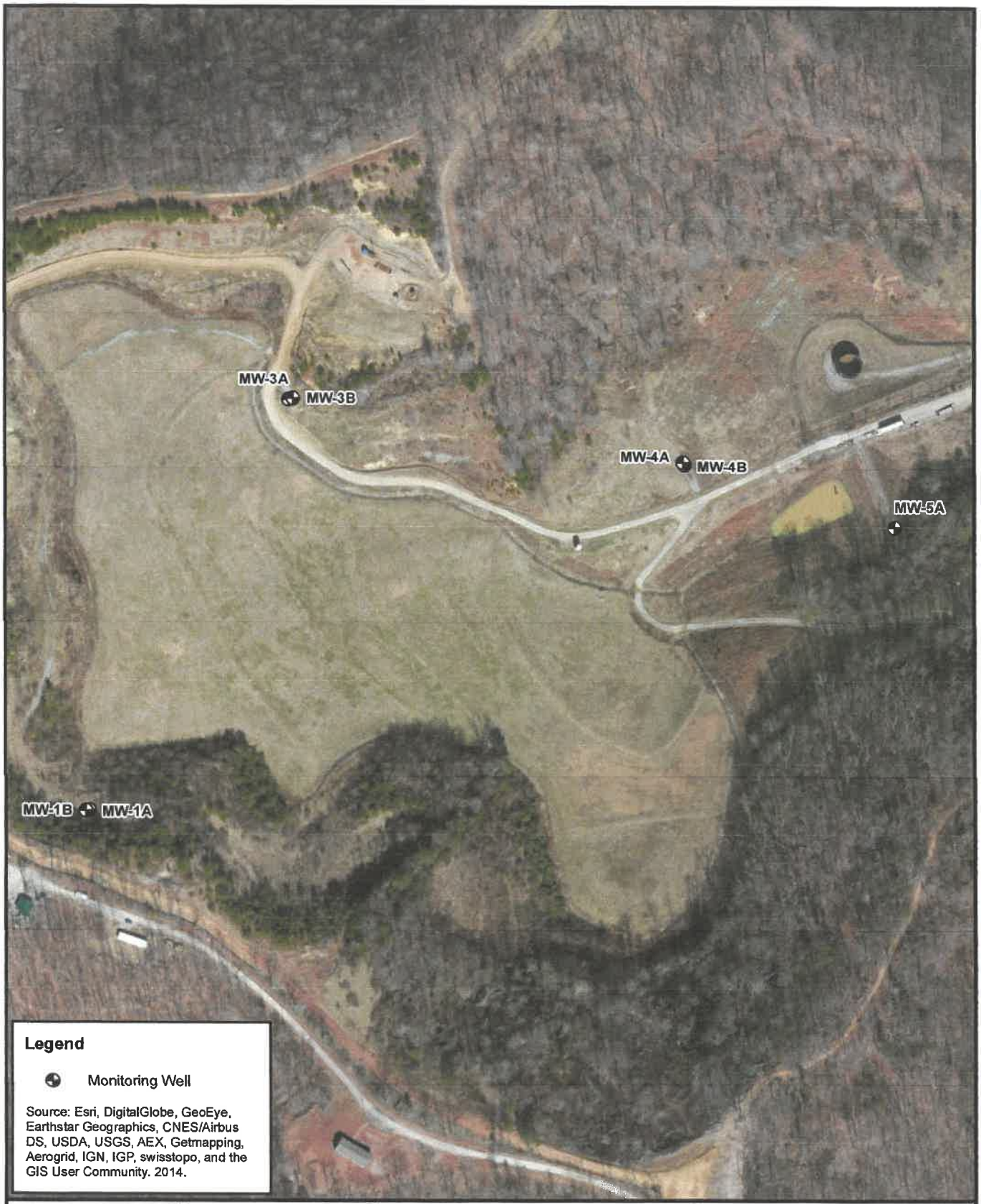


e²C EnviroCheck

LCAP Report
DEP-15908A-50

Fayette County Landfill
Monitoring Well Location Map
November 2015

File: Fayette_LCAP_MWloc Date: 11/20/2015



e2C EnviroCheck

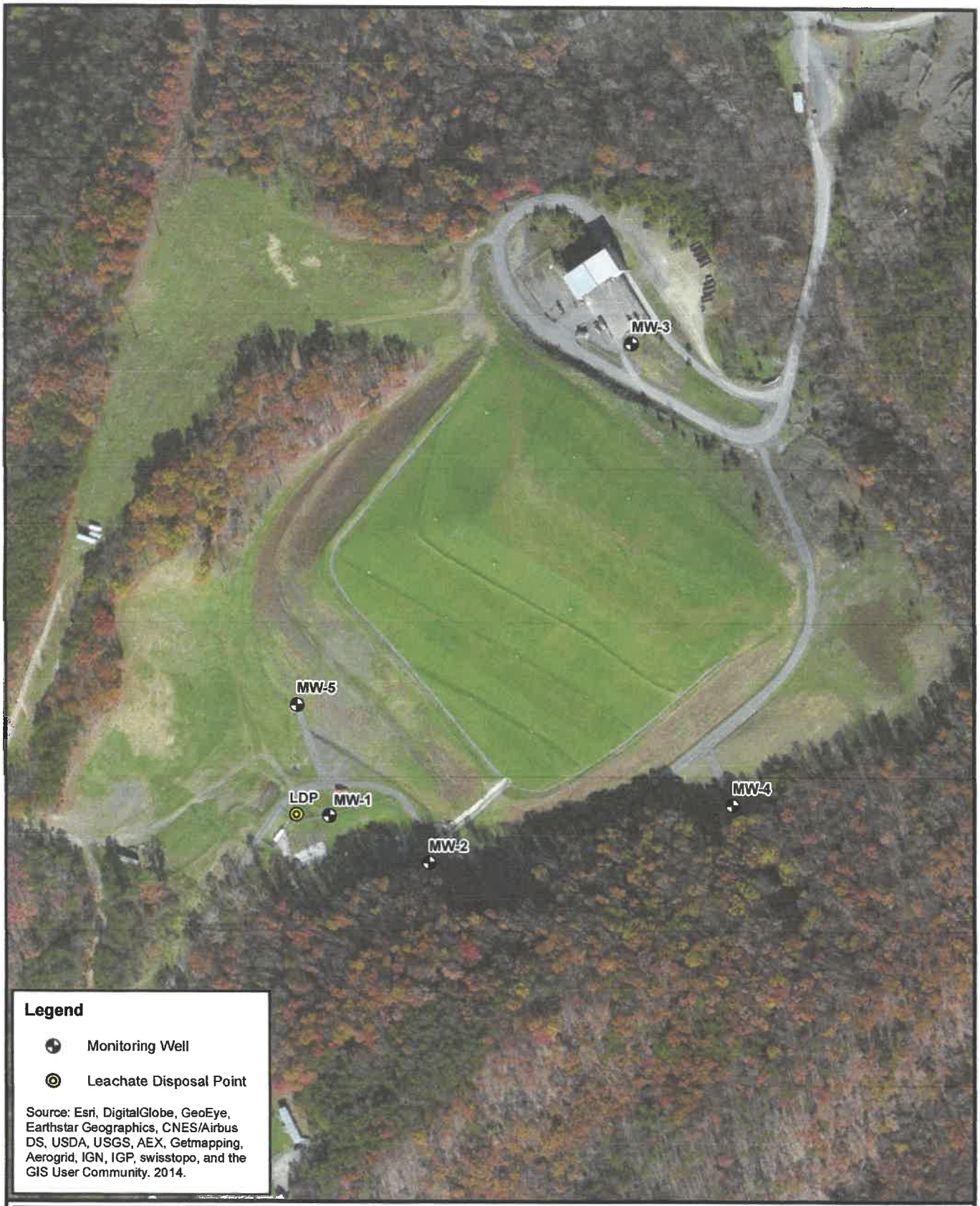
N W E S

0 125 250 Feet

LCAP Report
DEP-15908A-50

Fleming Landfill
Monitoring Well Location Map
November 2015

File: Fleming_LCAP_MWloc Date: 11/30/2015



e2C EnviroCheck

LCAP Report
DEP-15908A-50

Hampshire County Landfill
Monitoring Well Location Map
November 2015

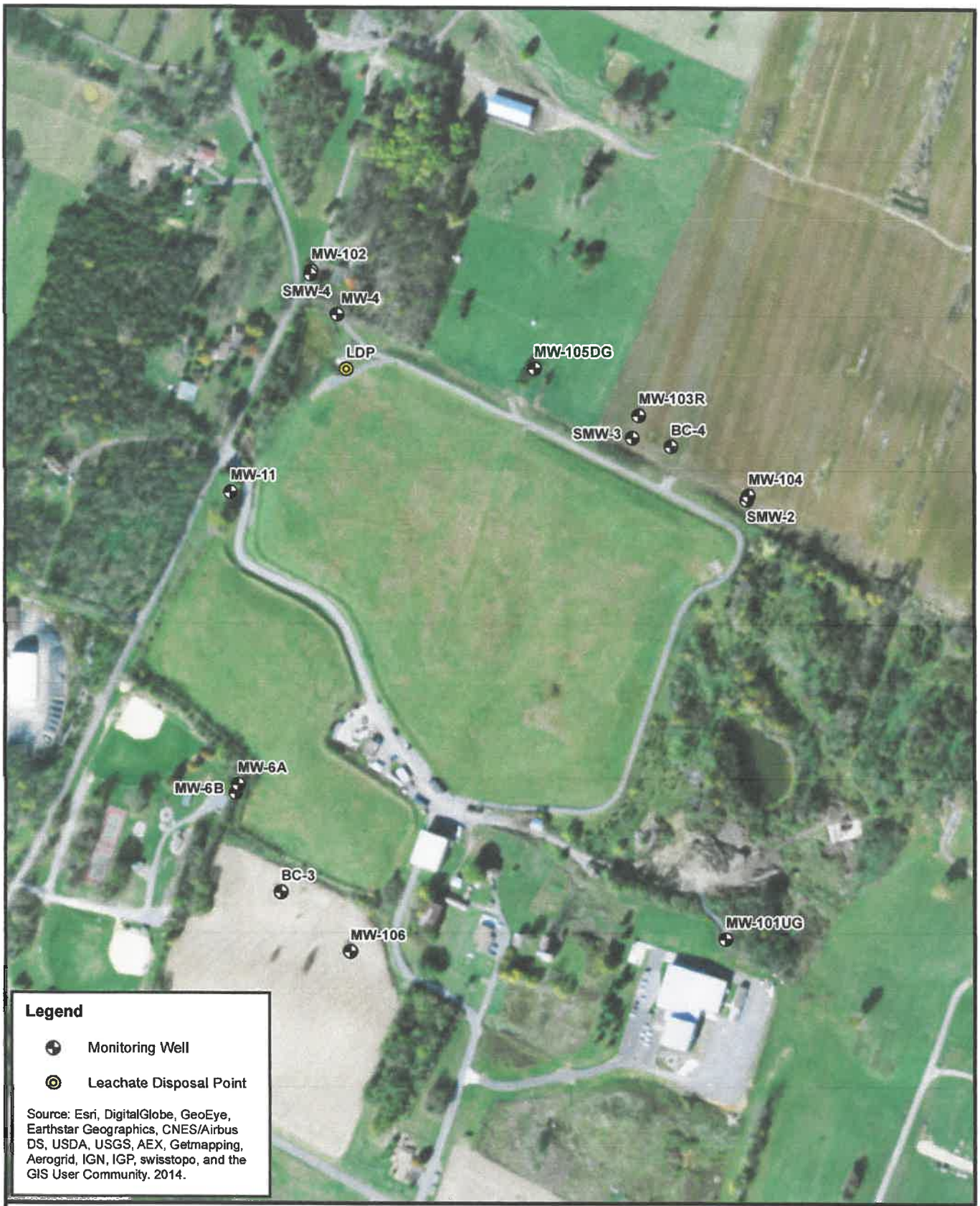
File: Hampshire_LCAP_MWloc Date: 11/20/2015

e2C EnviroCheck

LCAP Report
DEP-15908A-50

Jackson County Landfill
Monitoring Well Location Map
November 2015

File: Jackson_LCAP_MWloc Date: 12/2/2015



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LCAP Report
DEP-15908A-50

Jefferson County Landfill
Monitoring Well Location Map
November 2015

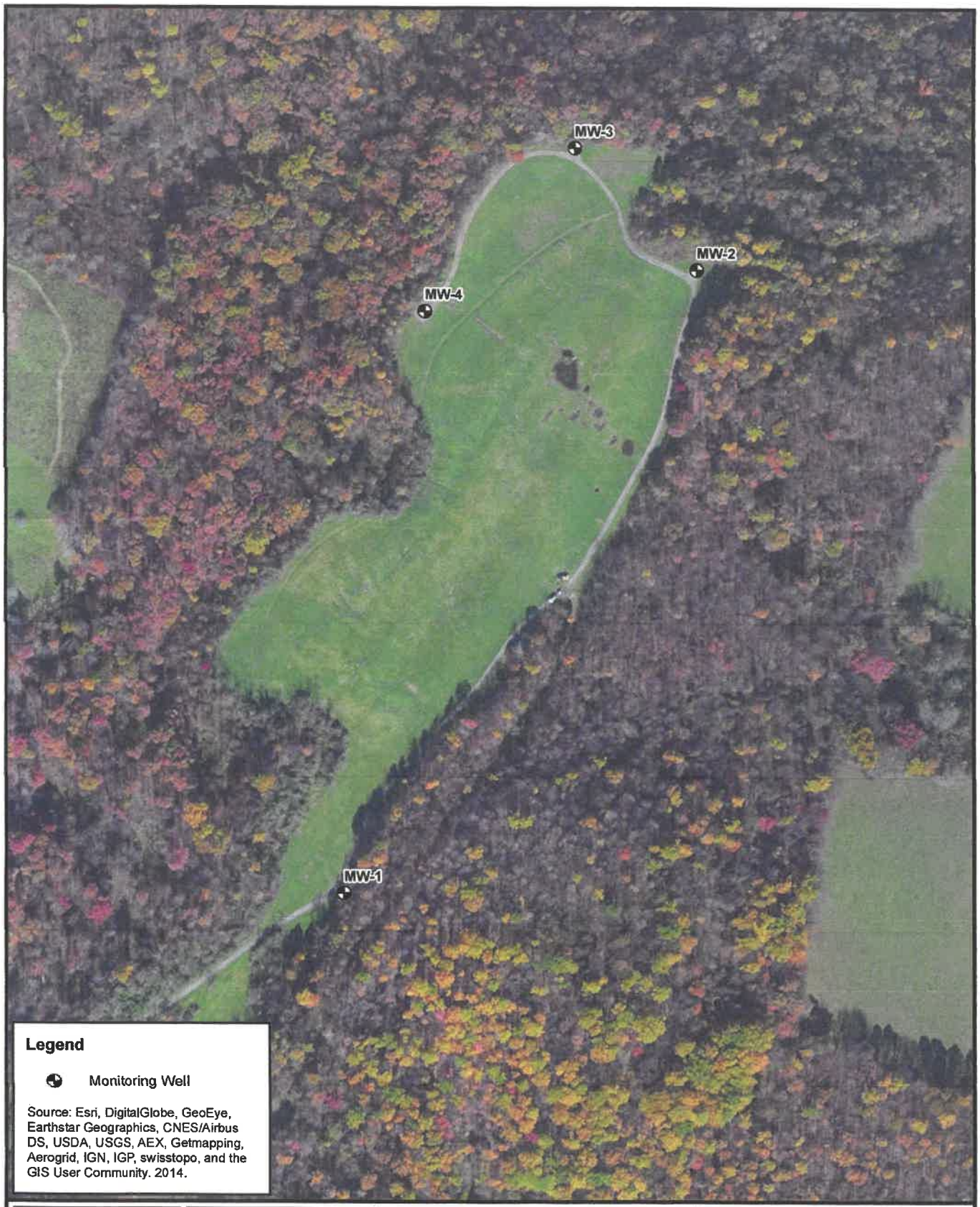
File: Jefferson_LCAP_MWloc Date: 11/20/2015

e²C EnviroCheck

LCAP Report
DEP-15908A-50

Kanawha Western Landfill
Monitoring Well Location Map
November 2015

File: KanawhaWestern_LCAP_MWloc Date: 12/2/2015

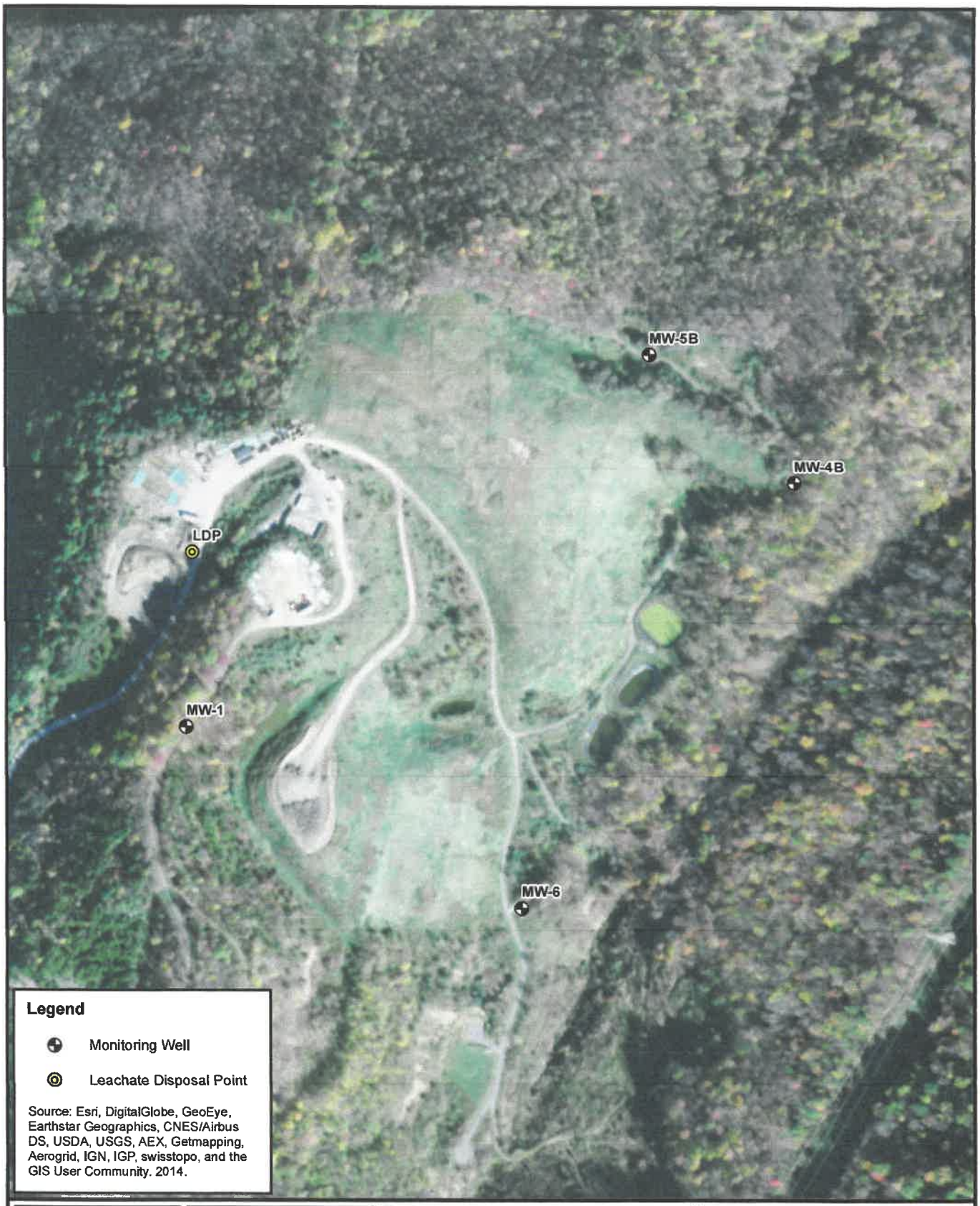


e2C EnviroCheck

LCAP Report
DEP-15908A-50

City of Kingwood Landfill
Monitoring Well Location Map
November 2015

File: Kingwood_LCAP_MWloc Date: 11/20/2015

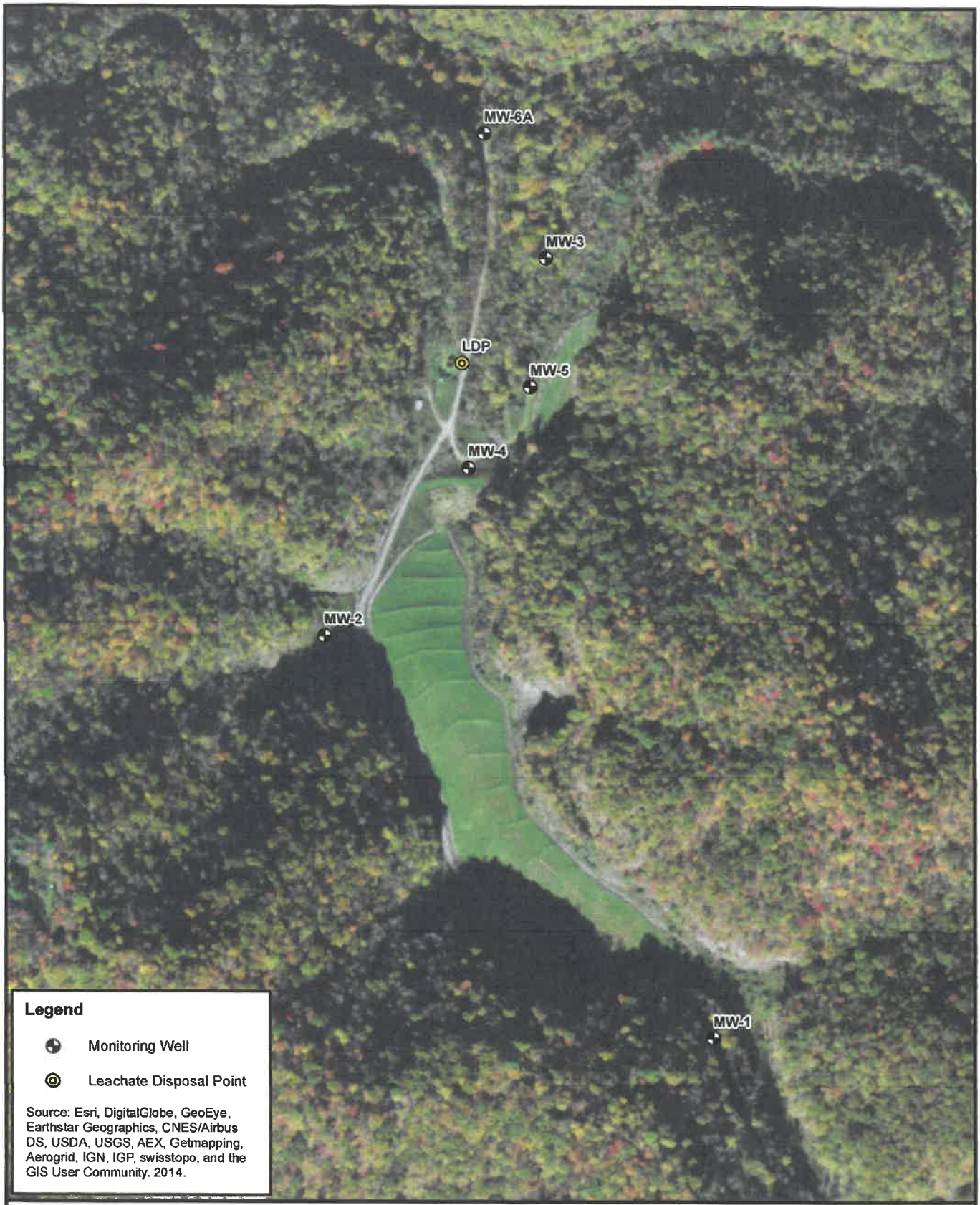


e2C EnviroCheck

LCAP Report
DEP-15908A-50

Marion County Landfill
Monitoring Well Location Map
November 2015

File: Marion_LCAP_MWloc Date: 11/20/2015

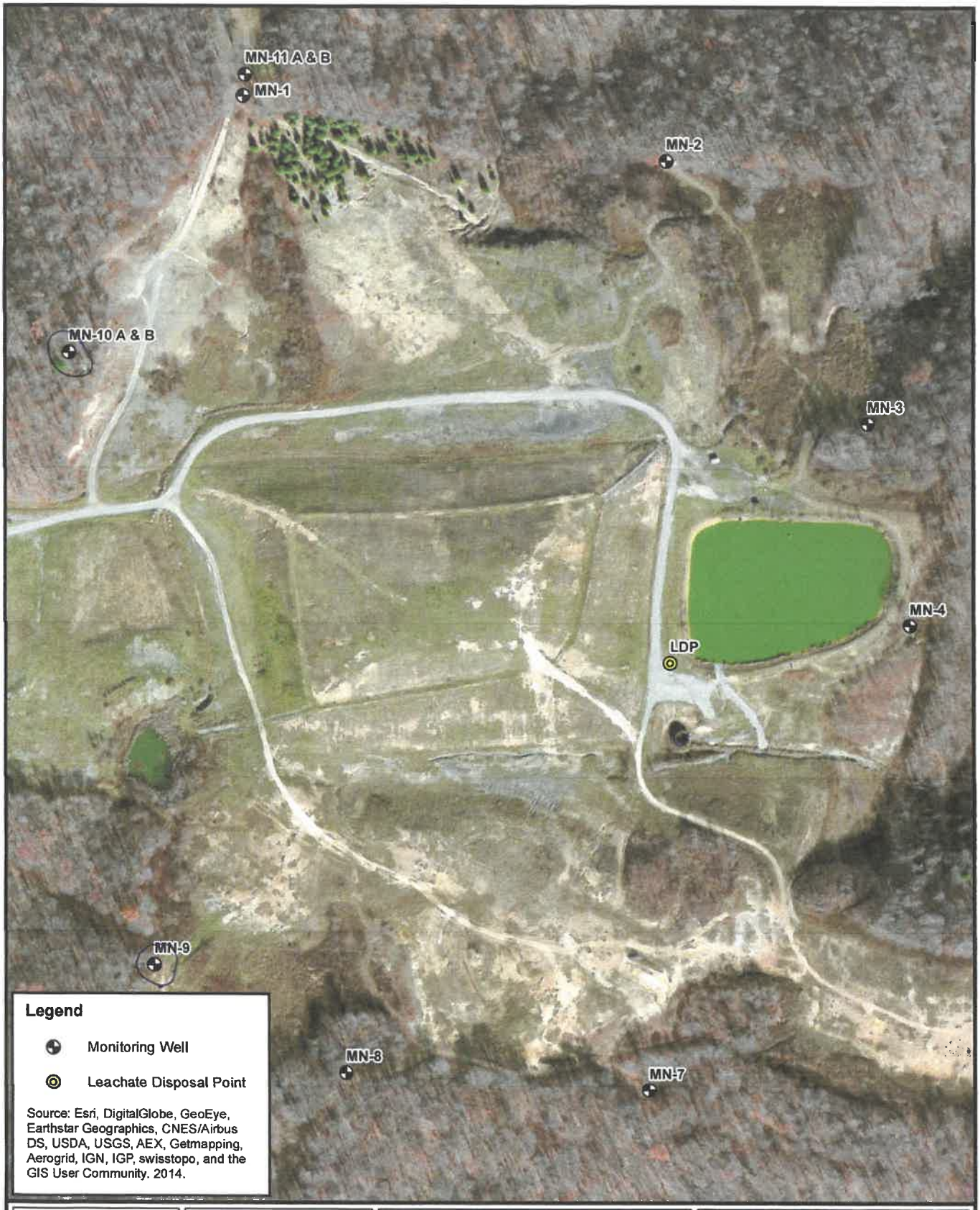


e²C EnviroCheck

LCAP Report
DEP-15908A-50

McDowell County Landfill
Monitoring Well Location Map
November 2015

File: McDowell_LCAP_MWloc Date: 11/20/2015



e2C EnviroCheck

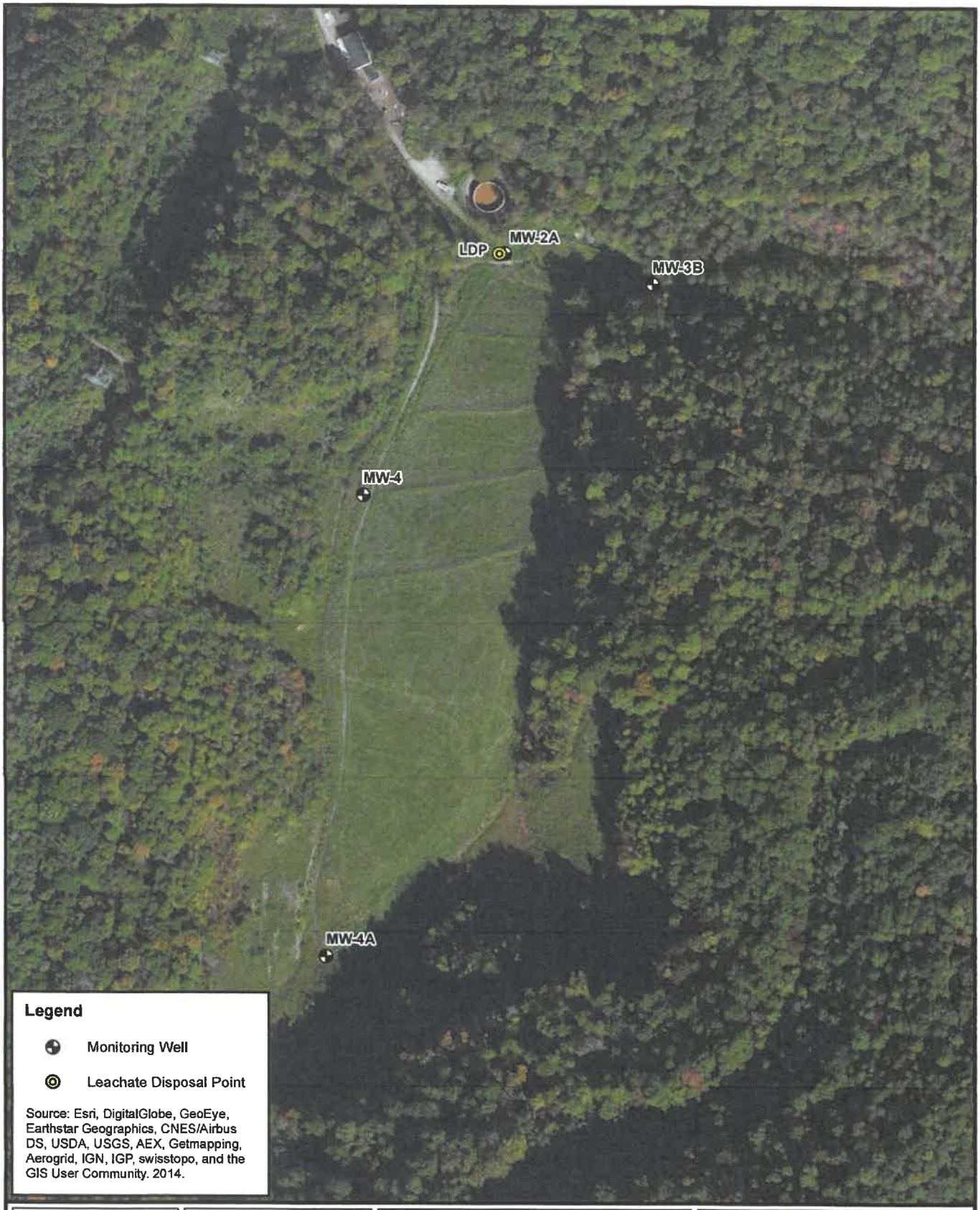
N W E S

0 125 250 Feet

LCAP Report
DEP-15908A-50

Midwest Landfill
Monitoring Well Location Map
November 2015

File: Midwest_LCAP_MWloc Date: 12/2/2015



e2C EnviroCheck

LCAP Report
DEP-15908A-50

Mingo County Landfill
Monitoring Well Location Map
November 2015

File: Mingo_LCAP_MWloc Date: 11/20/2015

e2C EnviroCheck

N W E S

0 125 250 Feet

LCAP Report
DEP-15908A-50

Monongalia County Landfill
Monitoring Well Location Map
November 2015

File: Monongalia_LCAP_MWloc Date: 11/20/2015

e2C EnviroCheck

LCAP Report
DEP-15908A-50

City of Montgomery Landfill
Monitoring Well Location Map
November 2015

File: Montgomery_LCAP_MWloc Date: 11/20/2015

e²C EnviroCheck

LCAP Report
DEP-15908A-50

Morgan County Landfill
Monitoring Well Location Map
November 2015

File: Morgan_LCAP_MWloc Date: 11/20/2015

e2C EnviroCheck

N W E S

0 125 250 Feet

LCAP Report
DEP-15908A-50

City of Morgantown Landfill
Monitoring Well Location Map
November 2015

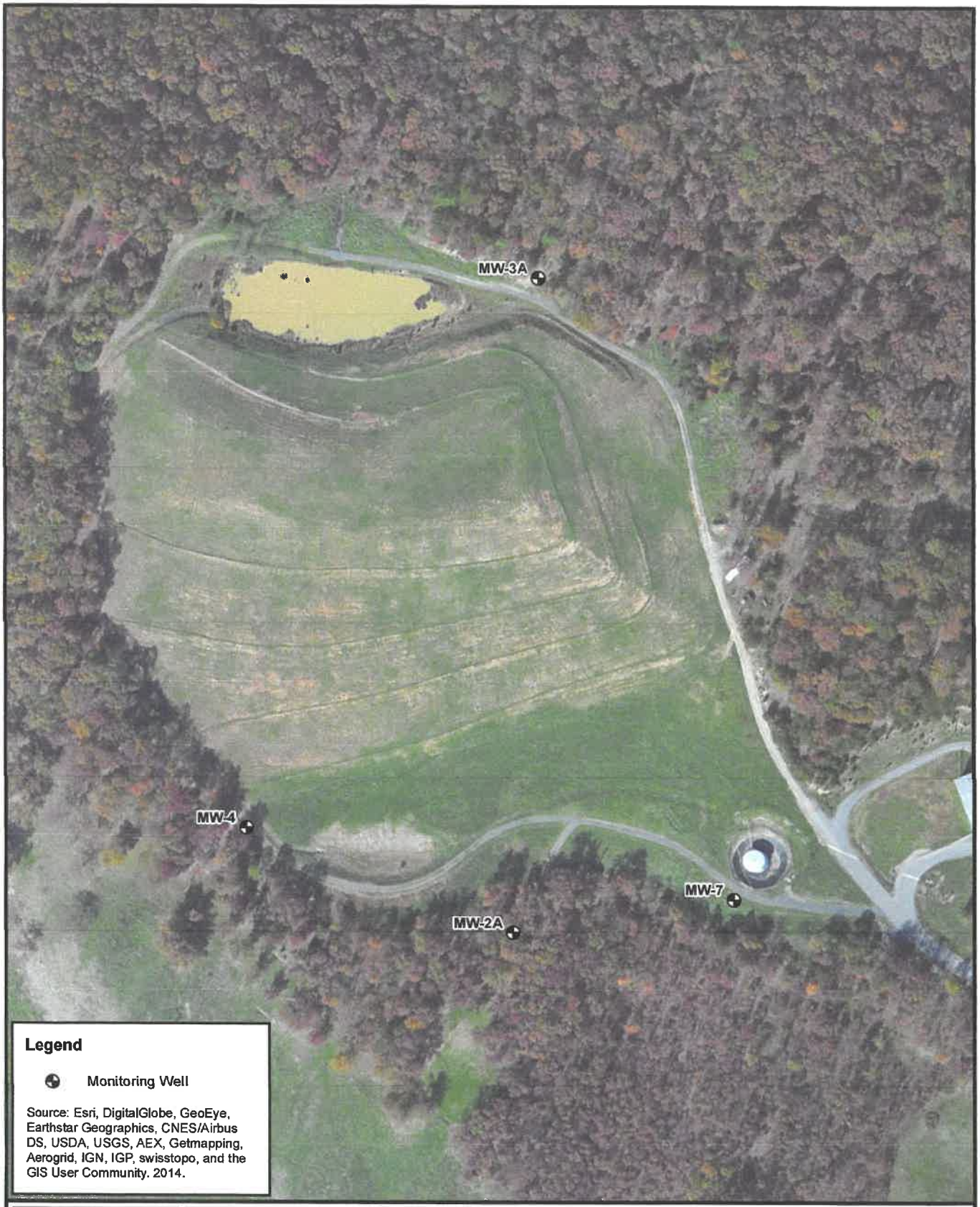
File: Morgantown_LCAP_MWloc Date: 11/30/2015

e2C EnviroCheck

LCAP Report
DEP-15908A-50

City of Moundsville Landfill
Monitoring Well Location Map
November 2015

File: Moundsville_LCAP_MWloc Date: 11/30/2015



e2C EnviroCheck

LCAP Report
DEP-15908A-50

Grant County -
Petersburg Landfill
Monitoring Well Location Map
November 2015

File: GrantCounty_LCAP_MWloc Date: 12/2/2015

e2C EnviroCheck

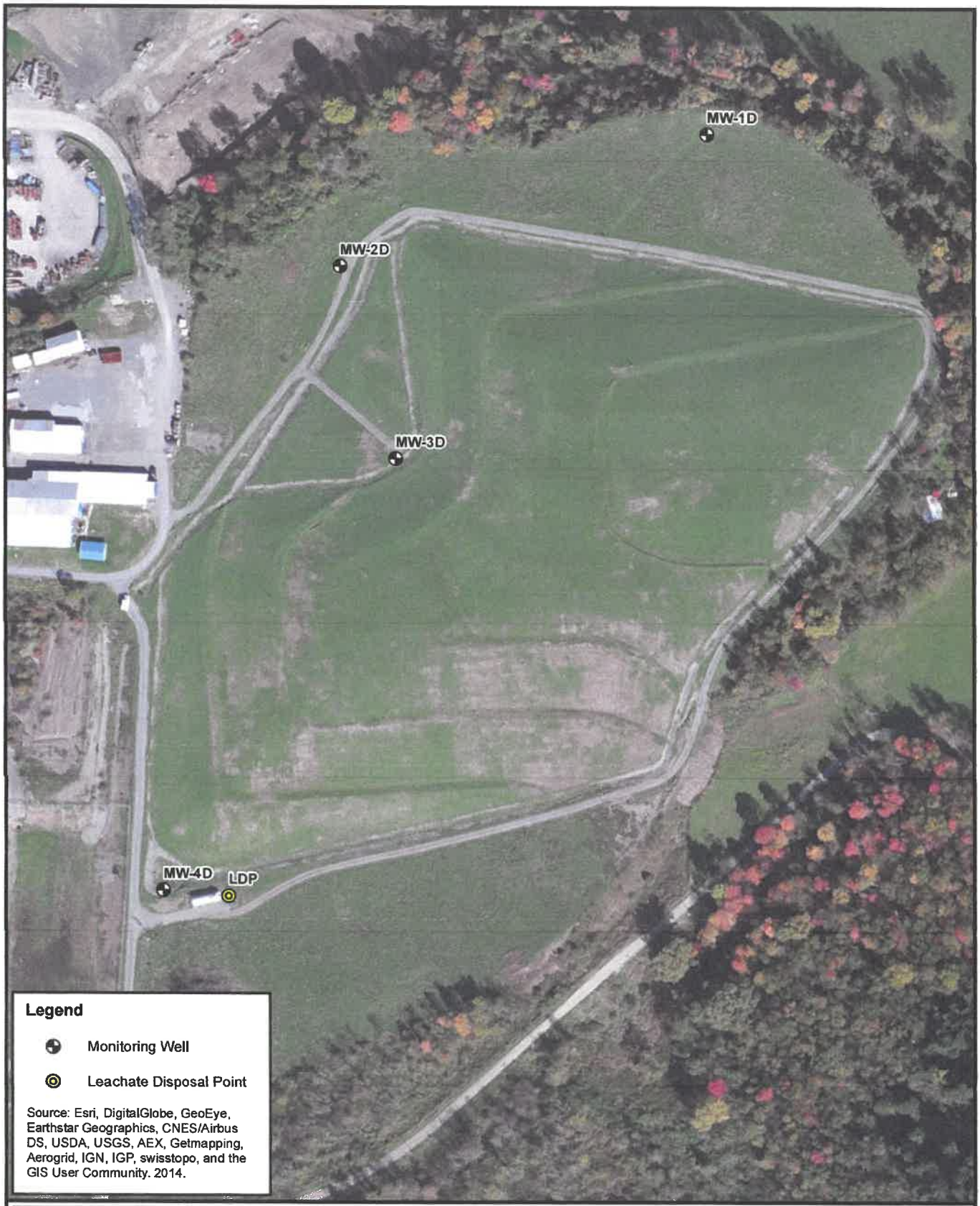
N W E S

0 100 200 Feet

LCAP Report
DEP-15908A-50

Pinecreek Omar Landfill
Monitoring Well Location Map
November 2015

File: PinecreekOmar_LCAP_MWloc Date: 11/30/2015

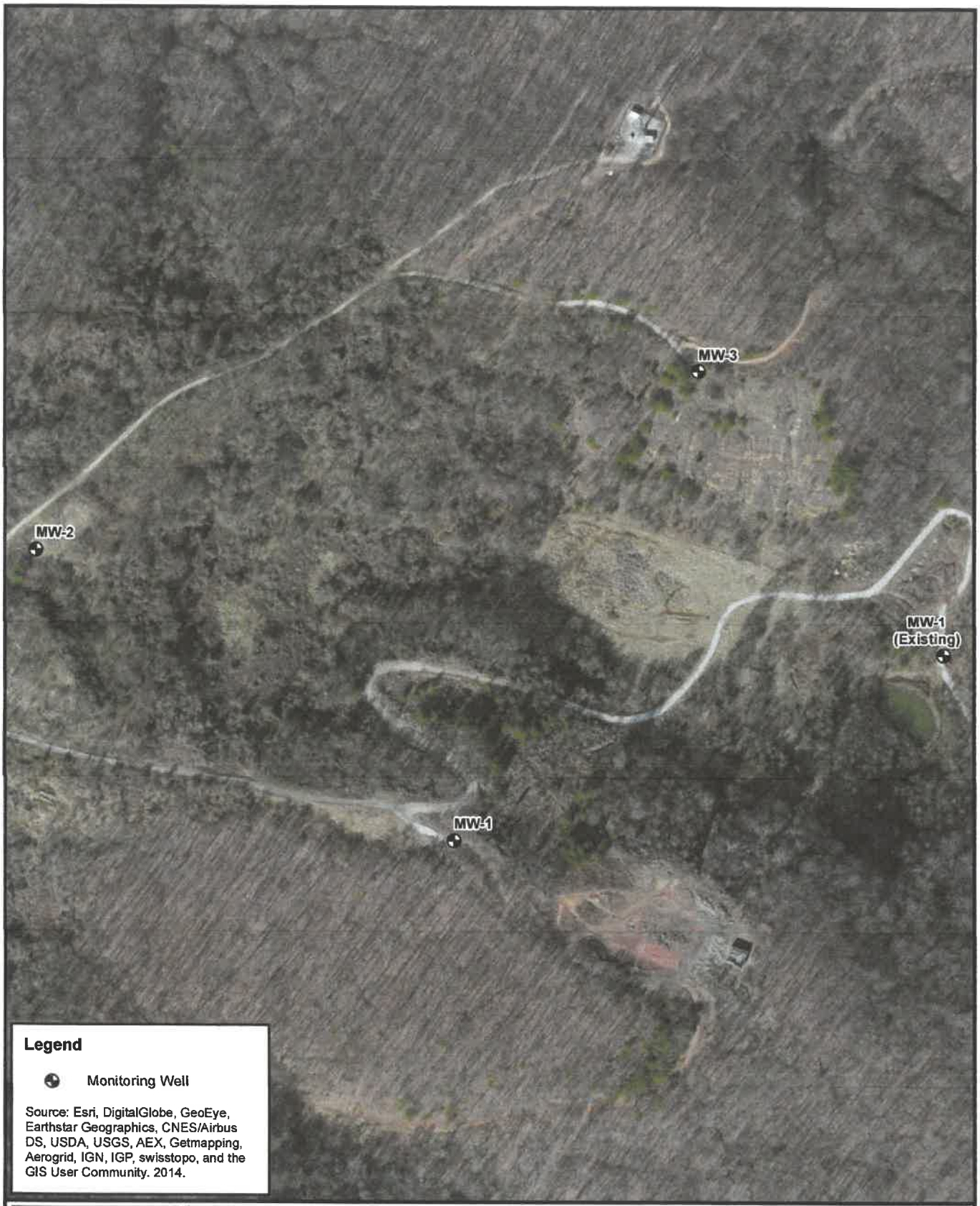


e2C EnviroCheck

LCAP Report
DEP-15908A-50

Preston County Landfill
Monitoring Well Location Map
November 2015

File: Preston_LCAP_MWloc Date: 12/2/2015



e2C EnviroCheck

LCAP Report
DEP-15908A-50

South Charleston Landfill
Monitoring Well Location Map
November 2015

File: SouthCharleston_LCAP_MWloc Date: 12/2/2015

e2C EnviroCheck

N W E S

0 125 250 Feet

LCAP Report
DEP-15908A-50

Webster County Landfill
Monitoring Well Location Map
November 2015

File: Webster_LCAP_MWloc Date: 11/30/2015

e2C EnviroCheck

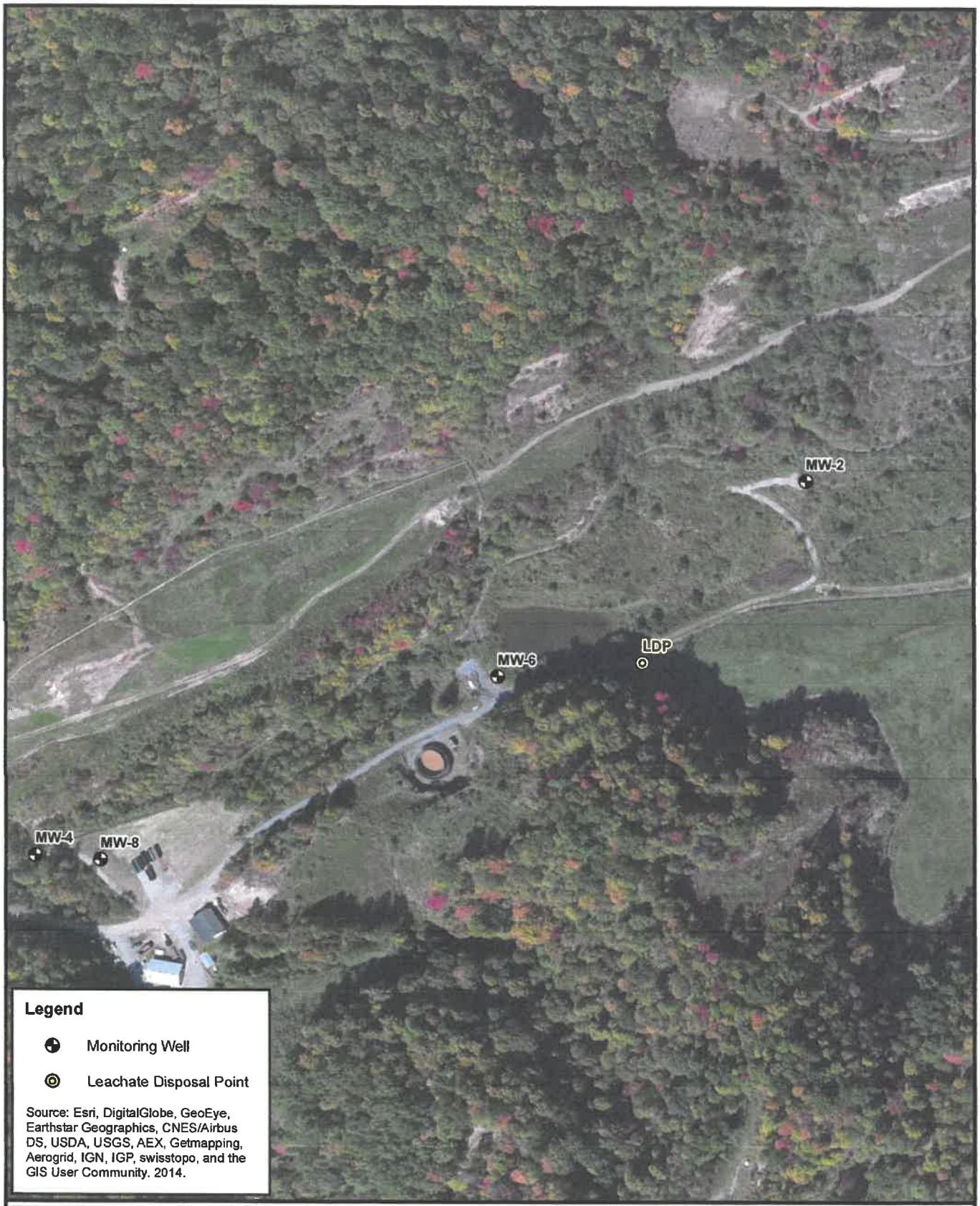
N W E S

0 200 400 Feet

LCAP Report
DEP-15908A-50

City of Wheeling Landfill
Monitoring Well Location Map
November 2015

File: Wheeling_LCAP_MWloc Date: 11/20/2015



e2C EnviroCheck

LCAP Report
DEP-15908A-50

Wyoming County Landfill
Monitoring Well Location Map
November 2015

File: Wyoming_LCAP_MWloc Date: 11/30/2015

LCAP Staff				
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[1]Sheena and Doug share the closure construction oversight duties at Kingwood.

ATTACHMETN E

CONSTITUENTS FOR PHASE I DETECTION MONITORING[1]

GROUP A:
Inorganic Constituents:

COMMON NAME[2]	**CAS RN[3]**
Acidity	(Total)
Aluminum	(Total)
Alkalinity	(Total)
Ammonia Nitrogen	(Total)
Antimony	(Total)
Arsenic	(Total)
Barium	(Total)
Beryllium	(Total)
Bicarbonates	(mg/l)
Boron	(Total)
Cadmium	(Total)
Chlorides	(Total)
Chromium	(Total)
Cobalt	(Total)
COD	(mg/l)
Copper	(Total)
Dissolved Manganese	(Total)
Iron	(Total)
Lead	(Total)
Magnesium	(Total)
Mercury	(Total)
Molybdenum	(Total)
Nickel	(Total)
Nitrate	(Total)
pH	(Std. Units)
Potassium	(Total)
Selenium	(Total)
Silver	(Total)
Sodium	(Total)
Specific Conductance	(µmhos/cm)
Sulfate	(Total)
TDS	(mg/l)
Thallium	(Total)
TOC	(mg/l)
Total Phenolic Materials	(Total)
TSS	(Total)
Turbidity	(Total)
Vanadium	(Total)
Zinc	(Total)

In addition to the above, the following parameters should be analyzed:
Temperature, (BOD-5day), flouride and calcium.

GROUP B:

Gg
Organic Constituents:

COMMON NAME[2]	CAS RN[3]
Acetone	67-64-1
Acrylonitrile	107-13-1
Benzene	71-43-2
Bromochloromethane	74-97-5
Bromodichloromethane	75-27-4
Bromoform; Tribromomethane	75-25-2
Carbon disulfide	75-15-0
Carbon tetrachloride	56-23-5
Chlorobenzene	108-90-7
Chloroethane; Ethyl chloride	75-00-3
Chloroform; Trichloromethane	67-66-3
Dibromochloromethane; Chlorodibromomethane	124-48-1
1,2-Dibromo-3-chloropropane; DBCP	96-12-8
1,2,-Dibromoethane; Ethylene dibromide; EDB	106-93-4
o-Dichlorobenzene; 1,2-Dichlorobenzene	95-50-1
p-Dichlorobenzene; 1,4-Dichlorobenzene	106-46-7
trans-1,4-Dichloro-2-butene	110-57-6
1,1-Dichloroethane; Ethylidene chloride	75-34-3
1,2-Dichlorethanel Ethylene dichloride	107-06-2
1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride	75-35-4
cis-1,2-Dichlorethylene; cis-1,2-Dichloroethene	156-59-2
trans-1,2-Dichloroethylene; trans-1,2-Dichloroethene	156-60-5
1,2-Dichloropropane; Propylene dichloride	78-87-5
cis-1,3-Dichloropropene	10061-01-5
trans-1,3-Dichloropropene	10061-02-6
Ethylbenzene	100-41-4
2-Hexanone; Methyl butyl ketone	591-78-6
Methyl bromide; Bromomethane	74-83-9
Methyl chloride; Chloromethane	74-87-3
Methylene bromide; Dibromomethane	74-95-3
Methylene chloride; Dichloromethane	75-09-2
Methyl ethyl ketone; MEK; 2-Butanone	78-93-3
Methyl iodide; Iodomethane	74-88-4
4-Methyl-2-pentanone; Methyl isobutyl ketone	108-10-1
Styrene	100-42-5
1,1,1,2-Tetrachloroethane	630-20-6
1,1,2,2-Tetrachloroethane	79-34-5
Tetrachloroethylene; Perchloroethylene	127-18-4
Toluene	108-88-3
1,1,1-Trichloroethane; Methyichloroform	71-55-6
1,1,2-Trichloroethane	79-00-5
Trichloroethylene; Trichloroethene	79-01-6
Trichlorofluoromethane; CFC-11	75-69-4
1,2,3-Trichloropropane	96-18-4
Vinyl acetate	108-05-4
Vinyl chloride	75-01-4

Xylenes 1330-20-7

1. This list contains volatile organics for which possible analytical procedures provided in EPA Report SW-846 "Test Methods for Evaluating Solid Waste," third edition, November 1986, as revised December 1987, includes Method 8260 and 8011; and metals for which SW-846 provides either Method 6010 or a method from the 7000 series of methods.

2. Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

3. Chemical Abstracts Service registry number. Where "Total" is entered, all species in the groundwater that contain this element are included.

QUALITY ASSURANCE / QUALITY CONTROL PLAN

&

STANDARD OPERATING PROCEDURES

for

GROUNDWATER SAMPLING

Developed By:

Department of Environmental Protection
Division of Water and Waste Management

Submitted by:

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Reviewed & Approved by:

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Reviewed & Approved by:

William Timmermeyer
GW/UIC Prog. Manager

Reviewed & Approved by:

Scott Mandirola
Director, DWWM

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SECTION 1.0

APPLICABILITY OF INSTRUCTIONS

This document provides guidelines for quality assurance / quality control procedures and Standard Operating Procedures for groundwater sampling for the regulated community, consultants, laboratories and WVDEP regulatory agencies responsible for sampling ground water in West Virginia. This document is limited to groundwater sampling and procedures for monitoring wells and the vadose zone. No other types of sampling or monitoring are included or subject to the conditions of this document.

This document stresses the importance of protection to human health and the environment, thorough pre-sampling preparation, consistent sampling procedures and detailed documentation. The goal of this document is to provide a guide for consistent sampling techniques that will ensure groundwater data collected is representative of actual groundwater quality and can be used to reliably evaluate the groundwater quality of a site.

SECTION 2.0

INTRODUCTION

The West Virginia Department of Environmental Protection (WVDEP) / Division of Water and Waste Management (DWWM) is the lead agency that regulates surface and groundwater quality in the State. DWWM has, for most of its existence, been engaged in surface water quality and biological monitoring for a variety of reasons.

In recent years DWWM began the Ambient Groundwater Quality Monitoring Network to determine the status of ground water quality in West Virginia. This network is now being monitored by the U.S. Geological Survey. The network provides ground water quality data for 26 sites that have received very little human-induced impact.

The data obtained by the Ambient Groundwater Quality Monitoring Network will be used to extrapolate quality over large areas. The background data acquired from this network will be invaluable in the future, prior to development of these areas.

A number of programs within WVDEP and other state agencies require permittees to monitor groundwater quality at up-gradient and down-gradient points from the permitted facility. Due to variations in sampling technique and protocol, however, the results are difficult to compare on any level. While this data may never be directly comparable, using standard operating procedures will allow existing and proposed facilities to determine the general groundwater quality of an area.

DWWM has recognized the need to develop standard operating procedures and a quality assurance / quality control program for groundwater sampling in West Virginia. This document is intended to fill that need by providing agencies and people sampling groundwater within West Virginia with the minimal standards acceptable for groundwater sampling.

While laboratory QA/QC, sampling, monitoring, assessment, and implementation of surface water quality protection activities are similar to those for groundwater sampling, this document does not directly address these subjects.

DWWM defines Quality Assurance (QA) as the measures taken to confirm that a sampling Quality Control plan is operating effectively. The QA portion of this document describes the assessment measures that should be used and describes the actions to be taken to correct deviations from the Quality Control (QC) plan.

Quality Control is defined as the development, implementation, and maintenance of Standard Operating Procedures (SOPs) and of good sampling practices. The QC program also addresses the means of acquiring immediate information about sampling performance, defining acceptable performance, and describing actions to be taken when unacceptable performance occurs.

This document should reduce errors in sample collection and field data collection by establishing consistent techniques. It is acknowledged that no QA/QC program can eliminate all errors that may occur during collection activities. Therefore, this document also addresses procedures for correcting errors that do occur.

SECTION 3.0

AUTHORITY AND RESPONSIBILITY

Implementing an effective QA/QC program where a variety of organizations, agencies, facilities, and individuals play major roles demands the commitment and attention of both management and field collection team staff. All personnel directly or indirectly involved in collecting groundwater data and samples should read this document and be fully aware of their duties and responsibilities under the QA/QC plan.

3.1 WVDEP STAFF DUTIES

3.1.1 Quality Assurance Officer:

- Develops and implements a QA program that ensures all field data and samples collected are legally defensible and of known precision and accuracy.
- Monitors the QA program to ensure compliance with QA/QC objectives.
- Develops and implements new QA procedures to improve sample quality.
- Applies corrective actions as needed to ensure compliance with the QA plan.
- Addresses routine questions from sample collectors or analytical staff concerning the reliability of specific analytical data.

3.1.2 WVDEP Supervisory Personnel:

- Assist in the development and implementation of a QA program that ensures all field data and samples collected are legally defensible and of known precision and accuracy.
- Review reports of field data collection and sample collection activities to ensure Standard Operating Procedures are followed and that all data received is legally defensible and of known precision and accuracy. .
- Monitor the QA program to ensure compliance with QA/QC objectives.
- Provide proper training for all DEP inspectors, field collection personnel, and other staff involved with sampling.

WVDEP environmental inspectors and staff should observe at least one sampling event per year to ensure that:

- Proper and complete records of data and sample collection activities are obtained.

- Proper documentation of changes and repairs made to field data and sample collection equipment. Documentation should also include maintenance and calibration records for field equipment.

- Data and sample collection and preservation activities are performed in accordance with SOPs.

- Work areas and equipment are maintained in a manner that is protective of human health and the environment.

- Required trip blanks, equipment blanks, field blanks, and other sample blanks are prepared according to the SOPs as required. Sample blanks should be labeled as such, so that laboratory personnel can identify them.

3.1.3 WVDEP Permit Writers, Enforcement Staff, and Supervisors:

- Review data submitted by the regulated community to ensure early detection of leaks from potential sources such as: underground storage tanks, impoundments, outdoor non-containerized storage or disposal of raw materials, products, or waste, ditch lines, pipelines, sumps, or municipal or industrial solid waste facilities.

- Review data submitted by the regulated community to ensure compliance with discharge limitations and groundwater quality standards.

- Review reports of field data and sample collection activities to ensure SOPs are followed and that data received is of known precision and accuracy.

The following categories apply to the regulated community as well as those within WVDEP.

3.1.4 Field Collection Supervisors Should:

- Provide proper field training for all Field Collection Personnel.

- Ensure that proper and complete records of data and sample collection activities are maintained and stored for at least five years.

- Ensure proper documentation of changes and repairs made to field data and sample collection equipment including calibration and maintenance records.

- Ensure data and sample collection and preservation activities are performed in accordance with established SOPs.

- Ensure work areas and equipment are maintained in a manner that is protective of human health and the environment.

- Ensure required trip blanks, equipment blanks, field blanks, and other sample blanks are prepared according to the SOPs as required. Sample blanks should be labeled as such, so that laboratory personnel can identify them.

3.1.5 Field Collection Staff Should:

- Keep complete records of all data and sample collection activities.

- Document all changes and repairs made to field data and sample collection equipment. All equipment repairs and calibrations should be performed according to the manufacturer's directions.

- Perform all data and sample collection and preservation activities in accordance with SOPs.

- Maintain work areas and equipment in a manner that is protective of human health and the environment.

- Prepare all required trip blanks, equipment blanks, field blanks, and other sample blanks as required. Sample blanks must not be labeled so that laboratory personnel can identify them as such.

SECTION 4.0

GENERAL OPERATIONS

The generation of good quality data begins with pre-planning and an understanding of specific site conditions and tendencies related to field data collection, sampling methods and equipment.

4.1 Sample Containers

Samples should be collected in approved containers as specified in 40 CFR 136. Generally, glass containers are used for organic parameters and polyethylene for inorganic and metals. Sample containers should be of proper size to allow enough sample for analysis and QC testing. They should be filled based on container type and analyses requested. These sample containers should be purchased new and be pre-cleaned to EPA standards.

Consumable materials, such as preservatives, sample bottles, jars, etc., should be examined upon receipt from the supplier to assure the order has been filled accurately. It is important to check the expiration date of any chemicals received to ensure they will be used prior to this date. Any supplies not meeting the specifications should be replaced. Each batch of water sample preservatives and sample bottles should be tested with blanks to assure that these items have not been contaminated.

4.2 Preservation and Holding Times

Samples should be preserved to minimize loss of materials of interest due to adsorption on the container walls, chemical or biological degradation, or volatilization.

The U.S. Environmental Protection Agency has established preservation methods and holding times for some analytes. These are listed in 40 CFR 136 Table II. These preservation methods and holding times should be adhered to by laboratories certified by West Virginia.

If a preservation method is not employed during sample collection, or a holding time is exceeded, this should be noted on the Chain of Custody (COC) form. Any sample where the proper preservation method is not employed or a holding time is exceeded can only be analyzed for "informational screening test only" and the final report of the analysis so marked.

Samples (except metals) should be delivered to the laboratory packed in ice. Synthetic ice packs and similar products are not acceptable because they do not reduce sample temperature fast enough and they allow variable temperature zones to occur inside the shipping container.

Laboratories are required to initiate sample preparation and/or analysis within the accepted holding times. Samples should be delivered to the laboratory as soon as possible after collection to ensure adequate time for analysis.

Occasionally, a sample must be re-analyzed to comply with field or laboratory QC programs. These re-tests are normally conducted within the sample holding times. If this re-test is outside of the holding times, the laboratory is considered to have fulfilled its obligation of meeting the holding time. The re-test results are considered an "informational screening test" only, and the report form must be marked accordingly.

4.3 Samples Received and Documentation

Upon receipt by a laboratory, samples should proceed through an orderly processing sequence specifically designed to ensure the integrity of the sample, as well as the documentation.

While the laboratory is responsible for all aspects of logging in the sample, the field collection team should ensure the proper forms are complete and accurate. The sample bottle identifications should be clearly labeled and correlate with the COC for all analyses requested.

Samples are usually received in the laboratory in one of two ways:

- ∇ Delivered to the lab by the field collection team, or
- ∇ Shipped and delivered to the lab by a commercial delivery service.

Upon receipt, the samples are examined by the receiving laboratory and any problems are noted on the Chain of Custody sheet. Typical problems with samples include:

- o Missing Chain of Custody form(s),
- o Unlabeled sample containers,
- o Sample containers do not conform to the descriptions on the accompanying documentation,
- o Sample containers are broken or spilled,
- o Sample size is insufficient for the requested analyses,
- o The sample was incorrectly preserved,
- o Samples are warm (not packed in ice),
- o Samples not received within the specified EPA holding time,
- o The requested analyses information is unclear or missing, or
- o Air bubbles are present in VOC sample vials.

Details of the volume requirements, type of container, and permissible holding times for selected parameters are provided in **Table 4.1**.

TABLE 4.1
Common Containers, Preservation Techniques and Holding Times
(Adapted from 40 CFR 136)

PRESERVATION TECHNIQUES

A Sulfuric Acid to pH of 2	F Hydrochloric Acid to pH < 2
B 0.008% Sodium Thiosulfate	G Nitric Acid to pH < 2
C Cool to 4 degrees C	H Sulfuric Acid to pH between 4 and 5
D Sodium Hydroxide to pH 12	X None Required
E Zinc Acetate + Sodium Hydroxide to pH > 9	

PARAMETER NAME	CONTAINER	VOLUME	PRESERVATION TECHNIQUES	HOLDING TIME
Fecal Coliform	Polyethylene, Glass	100 ml	B & C	6 hours
Total Coliform	Polyethylene, Glass	100 ml	B & C	6 hours
Fecal Streptococci	Polyethylene, Glass	100 ml	B & C	6 hours
Acidity	Polyethylene, Glass	100 ml	C	14 days
Alkalinity	Polyethylene, Glass	100 ml	C	14 days
BOD	Polyethylene, Glass	1 liter	C	48 hours
COD	Polyethylene, Glass	50 ml	A & C	28 days
Chlorides	Polyethylene, Glass	50 ml	X	28 days
Chlorine, Residual	Polyethylene, Glass	200 ml	X	Immediately
Color	Polyethylene, Glass	50 ml	C	48 hours
Conductivity	Polyethylene, Glass	100 ml	C	28 days
Cyanides	Polyethylene, Glass	500 ml	C & D	14 days
Fluorides	Polyethylene, Glass	300 ml	X	28 days
Hardness	Polyethylene, Glass	250 ml	G & C	6 months
MBAS	Polyethylene, Glass	250 ml	C	48 hours

Metals (Except Mercury and Chrome VI)	Polyethylene, Glass	250 ml	G	6 months
Mercury	Polyethylene, Glass	100 ml	G	28 days
Chrome VI	Polyethylene, Glass	200 ml	C	24 hours
Chrome III	Polyethylene, Glass	50 ml	G	6 months
Ammonia Nitrogen	Polyethylene, Glass	400 ml	A & C	28 days
Kjeldahl Nitrogen	Polyethylene, Glass	500 ml	A & C	28 days
Nitrate	Polyethylene, Glass	100 ml	C	48 hours
Nitrate – Nitrite	Polyethylene, Glass	100 ml	A & C	28 days
Nitrite	Polyethylene, Glass	50 ml	C	48 hours
Oil & Grease	Glass	1 liter	A & C, or F & C	28 days
Organic Carbon (TOC)	Polyethylene, Glass, Amber	25 ml	A & C, or F	28 days
Oxygen, Dissolved	Glass	300 ml	X (electrode)	Immediately
pH (Potential for Hydrogen)	Polyethylene, Glass	25 ml	X	Immediately
Phenolics	Glass, Amber	1 liter	A & C	28 days
Phosphorus, Elemental	Glass	50 ml	A & C	48 hours
Phosphorus, Ortho	Polyethylene, Glass	50 ml	C & Filter	48 hours
Phosphorus, Total	Polyethylene, Glass	50 ml	A & C	28 days
Solids, Dissolved	Polyethylene, Glass	100 ml	C	7 days
Solids, Suspended	Polyethylene, Glass	100 ml	C	7 days
Solids, Settleable	Polyethylene, Glass	1 liter	C	48 hours
Solids, Total	Polyethylene, Glass	100 ml	C	7 days
Silica	Polyethylene	50 ml	C	28 days
Sulfate	Polyethylene,	100 ml	C	28 days

	Glass			
Sulfide	Polyethylene, Glass	500 ml	C & E	7 days
Sulfite	Polyethylene, Glass	50 ml	X	Immediately
Temperature	Polyethylene, Glass	1 liter	X	Immediately
Turbidity	Polyethylene, Glass	100 ml	C	48 hours
Purgeable Halocarbons	Glass	5 ml	B & C (if Chlorine is present)	14 days
Purgeable Aromatic Hydrocarbons	Glass	5 ml	B, C, & F (if Chlorine is present)	14 days
Acrolein & Acrylonitrile	Glass	5 ml	B, C, & H	14 days
Phenol	Glass, Amber	1 liter	B & C	7 days to extraction, then 40 days.
Benzidine	Glass, Amber	1 liter	B & C (pH=4 and dark)	
Phthalate Esters	Glass, Amber	1 liter	C	
Nitrosamine	Glass, Amber	1 liter	B & C (pH 7-10)	
PCBs, Acrylonitrile	Glass, Amber	1 liter	C	
Nitroaromatics and Isophorone	Glass, Amber	1 liter	C	
Polynuclear Aromatic Hydrocarbons	Glass, Amber	1 liter	B (if Chlorine is present) & C	
Haloethers	Glass, Amber	1 liter	B (if Chlorine is present) & C	
Chlorinated Hydrocarbons	Glass, Amber	1 liter	B & C	
TCDD	Glass	1 liter	B (if Chlorine is present) & C	
Pesticides	Glass, Amber	1 liter	C & pH between 5 and 9	

4.4 Quality Objectives for Measurement Data

Once the samples are received by the laboratory the Quality Assurance and Quality Control issues are the concern of the laboratory and subject to the laboratory's QA/QC plan. The primary users of groundwater data are individual permittees required to monitor the impact of

their facilities on groundwater and the permit writers who establish acceptable discharges for the permittees. The Department of Health regulates drinking water in West Virginia.

An "Analysis Request Form" or similar document should be completed for each set of groundwater samples and submitted to the laboratory when the samples are delivered. In addition to providing COC information, the form also reminds the sample collector of proper sample preservation for the selected parameters. Replicate water samples should be collected for 5% of samples collected.

Table 4.2
Objectives for Water Quality Samples

Parameter	Minimum Detection Limit (MDL) Required	Estimated Accuracy	Estimated Precision
Sulfates	N/A	80-120% Recovery	<20% Relative Percent Difference (RPD)
Iron	0.5 mg/l		
Manganese	1 mg/l		
Aluminum	87 ug/l		
Total Phosphorus	N/A		
Nitrate-Nitrite	0.06 mg/l		
Ammonia	50 ug/l		

The formula to determine the Accuracy of an analytical procedure is given below:

$$RPD = \frac{(A - B)}{((A + B) / 2)} \times 100$$

Where : A = Sample Result
B = Duplicate Sample Result

$$Accuracy = \frac{A-B}{C} \times 100$$

Where: A = Spiked Sample Concentration
B = Unspiked Sample Concentration
C = Amount of Spike Added

Water quality samples must be tested at West Virginia certified laboratories (47CSR32). The certification process assures that laboratories are maintaining proper quality assurance / quality control protocols and records. Water quality measurement objectives for the most commonly requested analyses are presented in **Table 4.2** above.

4.5 Special Training Requirements

Members of the field collection team should have proper training in groundwater sample collection and preservation, proper labeling of sample containers, sample shipping procedures, chain-of-custody, use of GPS and other site location methods, maintenance and calibration of field equipment and safety procedures. Members of the field collection team should also have basic first aid training. Sample collection team members should have training that meets OSHA requirements, because of the potential to be exposed to hazardous materials during any sampling activity.

4.6 Documentation and Records

Sample collection personnel should produce detailed reports on the information collected. Information in these reports should include: 1) Sample site location (County, Stream Basin, Latitude and Longitude, physical description, monitoring well registration numbers as required by 47 CSR 60.6.3. et. seq. – *monitoring wells installed prior to May 1, 1996 may not have a registration number*), 2) a narrative describing the site and any known impacts to groundwater quality, 3) monitoring well design details (After May 1, 1996, monitoring well design information will be maintained by the Groundwater Program of the Office of Water Resources), 4) water quality and condition, and 5) sampling purpose or rationale.

Raw data sheets, voucher specimens, final reports, forms and other pertinent information should be retained a minimum of five years.

4.7 Field Sampling Method Requirements

4.7.1 Latitude and Longitude

Latitude and longitude should be determined for each sample location to the nearest second using Global Positioning System (GPS) instruments, standard surveying practices, or USGS topographic maps. Coordinates obtained from topographic maps should be checked later by GPS. If the position of a groundwater monitoring well has been previously determined and reported to the Cabinet Secretary of the Department of Environmental Protection, in accordance with Section 6.2.3. of 47 CSR 60 (Monitoring Well Design Standards), the location information may be taken from this document. The method of obtaining the latitude and longitude must be included on the cover page of any sampling report for the well.

Coordinates collected by GPS units should be differentially corrected to increase the accuracy of the readings. A base station stores time-tagged data in a computer file. Data collected from a field unit will be transferred to a PC. The two data sets are processed using appropriate software to obtain a file of differentially corrected coordinates. Accuracy of corrected coordinates can range from sub-meter to five meters.

4.7.2 Water Chemistry

Instruments used to determine pH, conductivity, dissolved oxygen, and temperature at the sampling site should be properly calibrated according to the manufacturer's instructions prior to each sampling activity. Records of the calibrations should be kept on file which includes: standards used, date, time and analyst who performed the calibration.

Collection for analysis of other parameters should be performed according to the requirements of the program regulating the facility. Protocols for sample collection and handling are presented in **Sections 7.0 and 8.0**. Samples must be analyzed by state-certified laboratories. Analytical methodology should be conducted in accordance with 40 CFR 136 or SW 846.

4.7.3 Frequency

Monitoring frequency should be detailed in the facility permit or specified in the regulations. Common monitoring frequencies include: annual, semi-annual, quarterly or monthly.

4.7.4 Chain-of-Custody

COC records for groundwater quality samples should be retained by the analytical laboratory for a minimum of five years. Failure to provide COC records or to ensure adequate security for groundwater samples may result in complications for use in enforcement proceedings.

4.7.5 Water Quality Sample Processing

Groundwater quality samples should be analyzed in accordance with the Code of Federal Regulations, Title 40, Part 136 (40 CFR 136) or SW 846. Please be aware of the requirements for inorganic analyses when sampling under the WV State Groundwater Standards, 46CSR12, Section 3.5.

4.8 Quality Control

Quality control checks should be performed for 5% of samples collected. These samples should be randomly selected and include both up-gradient and down-gradient wells. QC checks include replication of water quality samples.

Laboratories should run various types of analyses to determine accuracy, precision, comparability and completeness as part of their QA/QC program.

Three of these analyses involve field collection personnel. The field collection teams are responsible for preparing duplicate samples, equipment blanks and/or field blanks. Trip blanks are normally provided with the bottle kit from the laboratory.

Duplicates are independent samples that are collected as close as possible to the same time. Two separate samples are taken from the same source, stored in separate containers, and analyzed independently. Duplicates are useful in documenting the precision of the sampling process.

An equipment blank is deionized water that is poured through the sample collection equipment to check decontamination procedure adequacy. Where a collection device is not used, deionized water is poured into a second sampling container to check for contamination picked up in transporting the sample container to the sample site. This sample is commonly called the "Field Blank". Equipment and field blanks should be collected with each set of samples submitted for analyses.

A trip blank is deionized water that is transported to the sample site and then returned to the laboratory. It remains unopened until it reaches the laboratory. The purpose of the trip blank is to assess the effect of field handling and shipping conditions on the sample. There is one trip blank per shipment. A trip blank is used when volatile organic compounds are included in the analyte list.

Data analyses should be reviewed by peers throughout the process. Analytical results which lie outside the expected or normal range and other anomalies should be examined to determine their statistical significance. Statistical significance can be determined by using the OWR/Groundwater Program's Ground Water Protection Standard (GWPS) statistical model.

4.9 Assessment and Response Actions

4.9.1 Audits

Work performed in sampling groundwater quality should be performed according to established standard protocols. It is the responsibility of the individual collecting the sample to adhere to these protocols. Upon occasion, WVDEP representatives will observe sample collection and preservation to verify that these protocols are being used by other WVDEP personnel and private sample collectors.

4.9.2 Corrective Action

There are several indications that corrective action is necessary. Some are easily determined through the laboratory QA/QC program. Corrective action is necessary when:

- QC data are outside acceptable control limits for Precision or Accuracy.
- Blanks and/or standards contain contaminants above acceptable limits.
- Spike recoveries are beyond acceptable levels.
- Duplicate samples are beyond acceptable values.
- Deficiencies are detected by the Quality Assurance Officer, a supervisor, or another auditor.

If QC problems are detected in the field, work should be suspended until the source of the error is corrected. Failure to follow Standard Operating Procedures, deviation from approved methods, and failure to complete all required documentation in the field are examples of conditions that require corrective action.

It is the responsibility of the entire sample collection team to define the problem and take corrective action. A supervisor or project manager should establish the effectiveness of the corrective action and verify that the problem has been eliminated.

4.10 Reports to Management

QA reports should be prepared by the field supervisors for sampling projects. A written report is submitted to the appropriate regulatory agency annually (if necessary). The contents of these reports and the type/frequency of reporting are summarized in **Table 4.3**.

TABLE 4.3
Reports to Management

Contents	Type	Frequency
Project Status	Oral	Weekly
Performance Evaluation Audits	Written or Oral	Quarterly or as needed
QA/QC Problems	Written or Oral	As problems become evident
Summary of QA/QC program	Written	Annually
Uncertainty Estimates	Written	Annually
Data Quality Assessments	Written	Annually
Attainment of QA objectives	Written	Annually

SECTION 5.0

COLLECTION EQUIPMENT

Measurement devices used in the field for data collection should be calibrated according to the manufacturer's directions prior to each sampling event. Any instrument failing to meet the appropriate calibration standards after proper maintenance should be taken out of service until repairs can be made. Repairs should be made by the manufacturer or the manufacturers designated repair service if repairs cannot be performed in-house according to manufacturer's instructions. Detailed log books should be used to document calibration, maintenance, and repairs.

Sampling equipment should be examined once each month for intactness, compliance with standards and proper operation. Any equipment not meeting the specifications should be returned to the supplier and replaced. Adequate tubing, valves, decontamination supplies, replacement batteries for each electronic instrument, rope, and other equipment necessary to ensure proper sample collection should be carried by each field team. A check list should be maintained to assure that each field team has all supplies and equipment required for the assigned sites.

Several devices are available for obtaining samples from monitoring wells. Obtaining the most representative samples with one of these devices depends on choosing the appropriate sampling device for a particular sampling situation and using it properly. This requires consideration of a number of factors. Some devices are more suitable for purging a well than for obtaining a sample. No one device is appropriate for all situations. The field collection team must use good judgment and consider all sampling requirements before selecting the equipment needed for a given collection effort. The following discussion provides an overview of the most common data and sample collection devices.

5.1 Sampling the Vadose Zone

The vadose zone, also known as the unsaturated zone, is the subsurface profile between the ground surface and the top of the saturated zone. In the vadose zone not all of the voids in the geologic materials are filled with water. Perched "water tables" may exist above the saturated zone.

Some facilities are required to monitor the vadose zone to provide early detection of contaminants before they reach the saturated zone. A variety of equipment may be used to obtain information regarding water quality, water content, and rate of water movement in this zone. Suction (or vacuum) and collection basin lysimeters are the most commonly used devices. Suction lysimeters are devices that extract soil water in the vadose zone by applying a vacuum to the lysimeter.

Collection basin lysimeters consist of a trough of synthetic material placed horizontally in the soil beneath the liner of a facility. Water, which may penetrate the liner, travels down to the synthetic liner and drains to a collection port.

Tensiometers are used to measure the negative hydraulic heads which occur in the vadose zone. A tensiometer consists of a porous ceramic tip which is connected by various lengths of tubing to a vacuum gauge and a sealed reservoir at the surface. The tensiometer is filled with water and is inserted into the soil. Water will flow into or out of the ceramic tip until equilibrium between the matrix potential of the water in the tensiometer and the water in the soil has been reached. This matrix potential is then measured with a vacuum gauge. The water content of a particular soil can be determined by a variety of field or laboratory techniques.

5.2 Location Equipment

Global Position System (GPS) receivers should be checked prior to going into the field to ensure accuracy and reliability. Check the power source (rechargeable power packs are recommended over disposable batteries) for the GPS unit and verify that the unit is set to the correct date, time, and datum. The GPS should be checked against a known position and altitude at least monthly to ensure it is functioning properly.

Surveying equipment should be checked prior to use to ensure it is functioning properly. Only certified surveyors should determine geographic coordinates using surveying equipment.

5.3 Static Water Level (SWL) and Total Depth

The depth to water is or SWL is typically measured by lowering a measuring tape or electronic device into the well until first contact with water is reached. The total depth is taken by lowering the device to the bottom of the well and recording the measurement.

5.3.1 Coated Tapes

A weighted metal tape coated with an indicator substance (usually chalk or paste) gives the most accurate and consistent results. Water in the well either changes the appearance of the substance on the tape or washes it off the submerged portion. The tape reading at the reference point (usually the top of the well casing) minus the wetted length of tape gives depth to water (dtw). Care should be taken since the tape sometimes clings to the well casing, particularly in a deep well. This method is generally impractical where repeated measurements are necessary, such as during pumping hydraulic conductivity tests, because of the time required to obtain each measurement.

If the chalk or paste used to coat the tape could interfere with the chemical characteristics of the groundwater samples, this method must be rejected. Great care should be taken in examining the substance's potential to alter groundwater chemistry before selecting this method. If any uncertainty exists, choose a different method.

5.3.2 Poppers

A popper is a solid metal cylinder with a concave lower surface and an attachment loop on top. A thin membrane or metal disk is stretched over the concave surface. When the membrane meets the water surface it is compressed upward and creates a distinct popping sound. Practice is required to determine at what point the popper makes contact.

A correction factor for the length of the popper should be applied to the length of the tape attached to it. This factor is simply added to the tape reading at the top of the well casing or other reference point to obtain the depth to water. The elevation of the water surface is the elevation at the reference point, minus the depth to water.

Although convenient, poppers have their drawbacks. When the water surface intersects the well screen, it is difficult to hear the "pop". Gas in the well can also make it hard to hear the pop. Deep wells or wells in noisy areas also present problems. Like the weighted tapes, wet tapes can stick to the well casing and prevent accurate location of the water surface. The field collection team should have at least one alternate method available to record the SWL.

5.3.3 Electrical Tapes

Electrical water level indicators locate the water surface by completing a circuit between two electrodes on a probe lowered down the well. When the electrodes contact water, a circuit is completed and activates a light, a buzzer, and/or an amperage gauge at the surface. The depth to water is obtained by a tape connected to the probe.

These instruments are subject to false readings due to moist air in the wells or electrical problems. The accuracy is also affected by wire kinking. They do make repeated measurements over a short time much easier. These probes should be calibrated for length at least quarterly.

A more sophisticated electrical tape (Interface Meter) distinguishes between water and floating petroleum products. In this meter, the current is carried by a plastic coated steel tape.

5.3.4 Airlines or Bubble Tubes

These installations are most common on wells where static and pumping water levels must be frequently observed, such as on water supply wells. A rigid or weighted tube is lowered down the well casing to a known depth so that the open end is submerged. The pressure required to fill the tube with air or another gas gives the tube's depth of submergence. These tubes can be installed to directly calculate the depth of water so the field collection team does not have to calculate it. This method is generally not precise and is not typically used in monitoring wells. Permanent installations often include an airline and pressure gauge for depth to water measurements.

5.3.5 Pressure Transducers

Pressure transducers, like airlines, provide depth of submergence through pressure readout. Methods of calibration and elevation calculation vary from one manufacturer to another. The manufacturer's calibration and usage procedures should be closely followed. These devices can be very accurate and best used to observe changes in water levels over short periods of time such as during in-field hydraulic conductivity tests.

5.3.6 Water Level Recorders

Floats, airlines, and pressure transducers lend themselves to dedicated water level recording devices. The configurations of specific systems vary widely and depend on the specifics of the application and well design. Use of these devices should be considered on a well-by-well basis.

5.4 Well Purging and Sample Collection

Most groundwater quality monitoring wells are constructed with small diameter casing, usually two inches inside diameter. The following discussion is limited to devices suited for small diameter wells.

Since groundwater is generally under different pressure, temperature, gas content, and reduction-oxidation potential (redox) conditions than surface water, the field collection team should take precautions to ensure that the sampling devices faithfully transport representative samples to the appropriate storage containers. Devices which introduce air or other gas into a sample, or cause a sample to undergo significant pressure changes, might affect the chemical quality of the sample. Choose the method which minimizes sample disturbance.

Sampling systems which have constrictions in the water flow path (valves, nozzles, or similar constrictions) produce an "orifice effect" and can change the pH of the water by degassing some of the dissolved carbon dioxide. Systems that allow the sample to be agitated with air can also affect the pH of the water through iron hydrolysis reactions. This can have a significant effect on both organic and inorganic chemical constituents.

Turbidity and depressurization during purging or sample withdrawal can result in significant changes in the dissolved oxygen, volatile organic compounds, and carbon dioxide of the sample. These effects should be minimized in order to preserve the integrity of a representative sample. Turbidity problems associated with various withdrawal techniques are discussed below.

Just as the physical process of extracting water from a well may alter sample properties, the material contacted by the sample during withdrawal may add or remove contaminants. Construction materials and chemical parameters of interest should be carefully considered in selecting sampling devices. Although guidelines call for the use of "inert" materials in sampling devices, no materials are completely inert. The relative inertness of a material depends upon

what chemical parameters are of interest. For instance, PVC may significantly influence levels of organic compounds in a sample while the same material may have no appreciable influence on some inorganic parameters.

Organic compounds are sensitive to the materials in sampling devices. Tubing used in sampling equipment may have a significant effect on levels of chlorinated organic compounds in samples collected. Flexible materials can absorb chlorinated organic compounds and act as a sink for them.

Nielson and Yeates ranked the most common flexible and rigid materials from most to least inert. Glass, one of the most inert materials, is not included due to its fragility. These rankings are reproduced below in **Table 5.1**.

TABLE 5.1
Materials Used in Groundwater Sampling

	RIGID	FLEXIBLE
MOST INERT	Teflon	Teflon
	Stainless Steel 316	Polypropylene
	Stainless Steel 304	Flexible PVC/Linear Polyethylene
	Polyvinyl Chloride (PVC)	Vitron
	Low Carbon Steel	Conventional Polyethylene
	Galvanized Steel	Tygon
LEAST INERT	Carbon Steel	Silicon/Neoprene

Samples may be obtained with suction or non-suction devices. When using a suction device, the sample is obtained directly (the sample flows through the pump) or indirectly (the vacuum flask method). In the vacuum flask method, a vacuum is applied to a glass collection flask and a sample line down the well draws water into the flask. Although this method avoids contact between the sample and the pump, the sample is subjected to turbulence and head space at less than atmospheric pressure. Volatile compounds are especially susceptible to loss in the vacuum flask method. **WVDEP does not recommend the vacuum flask method because there are few parameters that are not likely to be altered by exposure to vacuum, turbulence, and the atmosphere.**

Since the sample is pushed to the surface by atmospheric pressure in the vacuum flask method, it follows that the sample can only be raised approximately 34 feet. In reality, the limit is generally about 25 feet due to a less-than-perfect vacuum, and the energy losses associated with fluid flow and mechanical friction. This limitation must be taken into consideration when considering the vacuum flask method.

5.5 Suction Sampling Devices

5.5.1 Manual Diaphragm Pumps

Manual Diaphragm pumps, also known as "guzzler" pumps, generally consist of a lever actuated flexible diaphragm between two check valves. These pumps are often self priming to heights over 20 feet and capable of rapidly moving considerable volumes of water. This device is a poor choice for sampling because of the various materials that would contact the sample, but it may be very good for purging small diameter shallow wells prior to sampling. These pumps are frequently used as manual bilge pumps in ocean going boats.

5.5.2 Manual Pitcher Pumps

Pitcher pumps have been extensively used on shallow water supply wells. They apply suction to the well casing by means of a lever-operated piston and barrel mechanism. Although capable of moving large quantities of water, the variety of materials used in construction, difficulty in cleaning, and turbulent action of the pump make it an inappropriate sampling tool where micro-contaminants are a concern. **WVDEP does not recommend using pitcher pumps except when looking for gross contamination.**

5.5.3 Centrifugal Pumps

Centrifugal pumps are common in many applications and can also be used for sampling monitoring wells. The impellers and volutes of these pumps are made of a variety of materials and in many configurations. Some flexible vane impellers are capable of self priming to a limited height but in general these pumps should be primed in order to establish suction. The need for priming is a significant problem as foreign constituents may be introduced to the well. **If this type of pump is chosen, use reagent grade distilled water for priming.**

Other drawbacks of centrifugal pumps include: sample contact with pump parts, sample agitation, and in the case of internal combustion powered pumps, potential sample contamination by fuel or combustion products. The relatively high capacity of these pumps makes them practical devices for purging wells in formations of high permeability.

5.5.4 Peristaltic Pumps

Peristaltic pumps induce a vacuum through progressive squeezing of a section of flexible tubing within the pump. These low-capacity pumps can self prime to a height of approximately 25 feet. These pumps cause minimal sample agitation and do not bring the sample into contact with any pump part other than the tubing. In-line filtering is also possible with peristaltic pumps.

Peristaltic pumps have drawbacks for both purging and sampling. Their low capacity makes them impractical for purging wells in high permeability formations. Because the tubing used in the pump must be very flexible, Teflon cannot be used and silicon is usually recommended. As indicated in **Table 5.1**, silicon is the least inert of the flexible materials and

presents problems in organic compound sampling. A Teflon-lined silicon tube is available which will minimize the organic sorption problems. To minimize the risk of sample contamination, the sample collection team should use medical grade silicon tubing instead of food grade tubing.

5.6 Non-Suction Devices

5.6.1 Bailers

The simplest and most widely used small diameter monitoring well sampling device may be constructed of any rigid material. PVC, Teflon, and stainless steel are the most common. Water enters the bailer through a check valve at the bottom.

Bailers have several advantages. They are comparatively inexpensive, portable, relatively easy to decontaminate, usable at almost any depth, and may be used to observe the depth of floating immiscible contaminants in a well. They do require careful use to minimize sample agitation.

Disadvantages include: removing several well volumes from a deep well can be very time consuming and laborious; sample agitation during collection or transfer to the sample container may cause aeration or degassing. The latter disadvantage can be overcome by using a bottom filling bailer which can be emptied through the controllable valve at the bottom. This helps reduce agitation and loss of VOCs. A bailer which is properly selected and carefully used can yield representative ground water samples.

5.6.2 Syringe Samplers and Pumps

Syringe samplers function much like a medical syringe. They are lowered below the water surface in the well and a plunger is moved mechanically or pneumatically to draw the sample in.

The syringe sampler can be modified into a syringe pump. Alternating vacuum and pressure drive the syringe plunger. The intake orifice may face upward to allow release of collected gases. In the syringe pump, a pair of check valves allows a sample to be drawn in under vacuum and delivered to the surface through a separate tube under pressure.

Syringe samplers and pumps have many advantages. Samples can be collected without coming into contact with the atmosphere. The body of the syringe can be used as the sample container which eliminates the need for a sample transfer after collection. Syringe samplers are relatively inexpensive and are easily portable. Various materials can be used in their construction to minimize absorption and leaching potential. Syringe pumps allow in-line sample filtration.

The major drawback of syringe samplers is their low capacity. They are impractical for well purging or collection of large volume samples. Suspended solids in the sample can cause

the check valves and seals to leak. Using syringe samplers can affect volatile organic compound concentrations. Also, oxygen has been observed to diffuse through plastic syringe bodies.

5.6.3 Gas Displacement Pumps

Gas displacement pumps operate like a mechanical bailer. Water flows under hydrostatic pressure into a collection chamber through a check valve at the bottom of the pump. When full, gas from a pressurized source is applied to the chamber driving the sample into a line near the bottom of the collection chamber. A check valve prevents the sample from flowing back into the chamber when the pressure is released.

Most of the problems with gas displacement pumps have to do with the gas/water interface. Using these devices can change the levels of dissolved gases and volatile organic compounds in a sample. These changes can, in turn, alter the sample's chemical characteristics. Increasing or decreasing the dissolved carbon dioxide causes a change in the pH. Oxidation, aeration, and the effects of pressure changes can alter other parameters. Use of an inert gas, such as nitrogen, can minimize oxidation but does not avoid changes in sample pH as carbon dioxide can still be stripped from the sample. Determining the proper time for pressurizing and venting a gas displacement pump can be tedious and must be redone when the depth is changed.

Gas displacement pumps are portable, low cost, and provide minimal sample agitation. They can be constructed of almost any inert material. **Due to the problems associated with pressure changes and the resulting effects on sample chemical characteristics, WVDEP does not recommend use of gas displacement pumps for ground water sample collection.**

5.6.4 Bladder or Gas Squeeze Pumps

Bladder pumps work much like a gas displacement pump except a flexible membrane separates the driving gas from the water sample. This approach minimizes the gas exchange problems found with gas displacement pumps. The membrane in bladder pumps can be made from flexible Teflon making these pumps suitable for use in chemically sensitive sampling situations. The need for gas cylinders or a compressor make transportation of these pumps a problem and, like the gas displacement pump, determining the best pressurization/venting cycle can be difficult. Dedicated bladder pumps are ideal for sampling a single well.

5.6.5 Submersible Electric Pumps

Electric submersible pumps provide smooth uninterrupted water flow during ground water sampling or conducting aquifer tests to depths of 280 feet. Both high-flow rates needed for purging and low flows recommended for sampling are achieved with the same pump. Submersible pumps consist of a series of centrifugal pump stages or a helical rotor.

The major drawbacks of this kind of pump are its expense and difficulty in transporting the pump and power supply. In some cases the expense might be offset by the speed of the pump and the resulting savings in sampling time.

The advantages of the submersible electric pump include: potential construction of highly inert materials, absence of negative gauge pressures and the ability to pump water from considerable depths.

5.6.6 Jet or Eductor Pumps

Jet or eductor pumps are commonly used for pumping water supply wells. They are able to fit small diameter well casings. In addition to the problems associated with the transport of bulky hoses and a large circulation pump, jet pumps require an outside water supply to prime the system and start the eductor. This presents potential sample contamination along with the logistical problem of obtaining the water. The water drawn into a jet pump is also subjected to suction and severe turbulence. Jet pumps are not a good choice for well sampling but they are sometimes used for purging deep wells.

5.6.7 Air Lift Pumps

Air lift pumps bring water to the surface through a narrow tube by bubbling gas into it at depth. This method can drastically alter the chemistry of water samples. Stripping the carbon dioxide from the water sample changes the pH and levels of sensitive metals. **WVDEP does not recommend using air lift pumps for sample collection or purging of monitoring wells.**

5.6.8 Dedicated Sampling Equipment

One way to minimize the potential for cross contamination between wells and the amount of decontamination required between wells is through the use of dedicated sampling equipment. Dedicated sampling equipment is used to sample one well exclusively. Some wells have dedicated sampling equipment installed in the well; another method is to use disposable bailers and cord for each well.

While the expense of purchasing one set of sampling equipment for each well is much greater than purchasing one set for all site wells, the savings in time and money spent decontaminating equipment can be greatly reduced by using dedicated sampling equipment. Below is **Table 5.2** comparing the common sampling devices.

TABLE 5.2
Comparison of Sampling Devices for Small Diameter Wells
2008

Device	Suction Lift Pumps	Bailers	Syringe Samplers and Pumps	Gas Displacement Samplers	Bladder Pumps	Electric Submersible Pumps
Min. Well Diameter	½ inch	½ inch	1 ½ inch	1 inch	1 ½ inch	2 inch
Max. Practical Sampling Depth	26 feet	200 feet	200 feet	300 feet	400 feet	280 feet
Typical Sample Delivery Rate at Max. Depth	Highly Variable	Variable	0.2 gallon	0.2 gpm	0.5 gpm	0.5 gpm
Flow Control	Good	Not Applicable	Not Applicable	Fair	Good	Good
Materials	Highly Variable	Any	Stainless 316, Teflon, or Polyethylene/Glass	Teflon, PVC, Polyethylene	Stainless 316, Teflon, Viton, PVC, Silicone	Stainless 304, EPDM, Teflon, Viton
Chemical Alteration Potential	High to Moderate	Slight to Moderate	Minimum to Slight	Moderate to High	Minimum to Slight	Minimum to Slight
Ease of Operation, Cleaning, and Maintenance	Easy	Easy	Easy	Easy	Easy	Easy

5.7 Passive Samplers

A passive sampler is able to acquire a sample from a discrete location without the active media transport induced by pumping or purge technologies. These passive technologies rely on the sampling device being exposed to media in ambient equilibrium during the sampler deployment period.

5.7.1 Grab Samplers

These samplers recover a grab well water sample. Samples are an instantaneous representation of conditions at the sampling point at the moment of sample collection.

- HydraSleeve™ Samplers
- Snap Sampler™

5.7.2 Diffusion

These devices rely on diffusion of the analytes for the sampler to reach and maintain equilibrium with the sampled medium. Samples are time-weighted toward conditions at the sampling point during the latter portion of the deployment period. The degree of weighting depends on the analyte and device-specific diffusion rates. Typically, conditions during the last few days of sampler deployment are represented.

- Regenerated-Cellulose Dialysis Membrane Samplers
- Nylon-Screen Passive Diffusion Samplers (NSPDS)
- Passive Vapor Diffusion Samplers (PVDs)
- Peeper Samplers
- Polyethylene Diffusion Bag Samplers (PDBs)
- Rigid Porous Polyethylene Samplers (RPPS)

5.7.3 Diffusion and Sorption

These devices rely on diffusion and sorption to accumulate analytes in the sampler. Samples are a time-integrated representation of conditions at the sampling point over the entire deployment period. The accumulated mass and duration of deployment are used to calculate analyte concentrations in the sampled medium.

- Semi-Permeable Membrane Devices (SPMDs)
- GORE™ Sorber Module
- Polar Organic Chemical Integrative Samplers (POCIS)
- Passive In-Situ Concentration Extraction Sampler (PISCES)

Selection of a sampling technique should be based on a detailed and explicit formulation of the data quality objectives and end use of the data, together with a thorough understanding of the characteristics inherent to each sampling technology. Sampling methods best able to meet the specific objectives at the lowest cost can then be identified. The general statement "to obtain a representative sample" is often too broad. It should be further refined to tailor the sampling approach and obtain the highest quality and most informative data. Passive sampler technology matrices are included in **Appendix A**.

5.8 Sample Filtration

If a sample is to be analyzed for dissolved metals, it should be filtered by the field collection team shortly after collection in the field and before preservation. Positive or negative (vacuum) pressure can be used to pass the sample through the filter membrane. Vacuum filtration sometimes causes problems with pressure sensitive samples, and brings the sample into contact with the atmosphere. A variety of vacuum sources can be used with this method of filtration.

In line positive pressure filters are generally the most convenient and reliable as they can filter the sample without significant atmospheric contact. A peristaltic or bladder pump works well with this type of filter. Disposable syringe filters with a 0.45 micron filter are easy to use and require no decontamination procedure. This method helps cut sampling time unless the samples are very turbid.

A 0.45 micron membrane filter is generally accepted as the standard in groundwater monitoring. Membrane filters are usually made of one of the following materials: an organic nitrocellulose, cellulose acetate, or an inorganic polycarbonate material. Nitrocellulose membranes absorb organic constituents from the sample being filtered and can contaminate samples with Nitrogen, Phosphorus, Zinc, or Molybdenum.

Disposable syringe filters with 0.45 micron filters may be used. This filter system has several advantages:

- Disposable – No cleaning between wells which eliminates the potential for cross contamination between wells.
- Good for small volume sampling such as dissolved metals.
- Saves time.

Disposable syringe filters work well with relatively clear water. Larger diameter filtering devices should be considered if the water is turbid.

NOTE: This section does not apply to RCRA groundwater samples taken pursuant to 40 CFR 264.94 and the EPA Technical Enforcement Guidance Document.

SECTION 6.0

STANDARD OPERATING PROCEDURES FOR FIELD DATA COLLECTION

6.1 Measuring the Static Water Level

The depth to water and the height of the water column in the well should be determined before purging the well. Measurements should be made to the nearest .01 foot or 1/8 inch. The height of the water column is used to determine the volume of water standing in the well which is consequently used to determine the quantity of water to be removed during well purging. The water elevations may be used to determine the direction of groundwater flow.

6.1.1 Coated Tape Method

The equipment includes a steel tape calibrated in feet or meters, a weight for the end of the tape, carpenter's chalk (or water indicating gel/paste), and wiping towels. The following are standard operating procedures for this method:

- Coat approximately two feet of the end of a steel tape.
- Lower the tape into the well until the tape reaches the water surface. Lower the tape into the water a few inches.
- Read the tape measurement at the top of the casing to the nearest .01 foot or 1/8 inch.
- Withdraw the tape from the well and record the measurement where the wetted portion of the tape becomes dry.
- Subtract the measurement where the wetted portion becomes dry from the top of casing value. The difference is the water surface depth.
- Subtract the water surface depth from the top of casing elevation to calculate the water surface elevation. The casing elevation must be determined from a known surveyed elevation or relative to a fixed point at the site.

6.1.2 The Popper Method

The popper method uses sound to help locate the water surface. It is difficult to use a popper in deep wells or in noisy environments. The following are standard operating procedures for this method:

- Lower the popper into the well.

- Listen for the "pop" sound. Repeated raising and lowering of the popper may be necessary to obtain the true water level.

- Read the tape measurement at the top of the casing to the nearest .01 foot or 1/8 inch.

- Subtract the depth to water from the elevation at the top of the casing to calculate the water level elevation. The casing elevation must be determined from a known surveyed elevation or relative to a fixed point at the site.

6.1.3 Electric Tape Method

This method consists of a contact electrode or probe suspended from an insulated cable on a reel, an ammeter, small light and/or buzzer. The following are standard operating procedures for this method:

- Lower the electrode into the well by pulling the cable from the reel. An electrical circuit is completed when the electrode comes into contact with the water.

- Continue lowering until completion of the circuit is indicated by illumination of the small light, sounding of the buzzer, or by deflection of the ammeter needle.

- Measure the length of the cable in the well from the top of the casing or other measuring point to the probe to obtain the depth to water.

- Subtract the depth to water from the top of casing elevation to calculate the water level elevation. The casing elevation must be determined from a known surveyed elevation or relative to a fixed point at the site.

For some wells, especially drinking water wells, it is not possible to measure the depth to water or height of the water column. In these cases the depth to water must always be recorded as "UNKNOWN".

6.2 Water Quality Parameters

Several water quality parameters are subject to rapid change caused by aeration, oxidation, or degassing of a sample when the ground water is removed from the formation and exposed to the atmosphere. These parameters, particularly temperature, pH, and specific conductance must be measured on an unfiltered sample at the time of collection. Ideally, all in-field measurements should be taken "down hole" or by using a flow-through closed cell meter so the sample is not exposed to the atmosphere.

While Alkalinity should also be measured in the field, WVDEP does not currently recognize a reliable field method for this parameter. This section is limited to discussion of temperature, pH, specific conductance and turbidity, the four parameters most commonly used to indicate a change in ground water quality. Please consult the latest USEPA approved edition of Standard Methods (as per 40 CFR 136) for information about the less frequently taken field measurements.

6.2.1 Temperature

Temperature is an important measurement because it affects many chemical and biological reaction rates. Temperature measurements are often the easiest of all the field measurements but they are still subject to error. It is important to measure temperature at the same time as conductivity because conductivity is affected by temperature. The following are common standard operating procedures for this method:

- Rinse the thermometer or probe with reagent grade water.
- Immerse the thermometer or probe in the sample.
- Wait for the temperature to stabilize.
- Read and correct the temperature to the nearest one-half degree Centigrade while the thermometer or probe is still immersed in the sample. Do not pull the thermometer or probe out and take the reading while it is in the air.
- Rinse the thermometer or probe with reagent grade water and place it in a safe location (such as its storage case) for future use.

According to West Virginia 47CSR32, 4.2.7.c:

"Liquid column in glass and electronic type thermometers without a current manufacturer's certificate of accuracy must be verified as accurate annually. All other types, to include Automatic Temperature Compensation (ATC) devices, must be verified as accurate quarterly. Verification must be accomplished by comparison to a certified thermometer traceable to a National Institute for Standards Testing thermometer. See also paragraph 5.2.2.g for additional thermometer requirements."

West Virginia 47CSR32, 4.2.7.d:

"Each temperature measuring device must be uniquely identified. The results of accuracy verifications must be documented. The corrected temperature must be recorded whenever temperatures are required to be recorded."

West Virginia 47CSR32, 5.2.2.g:

"The accuracy of all thermometers used to monitor temperatures will be verified by comparing the readings of such thermometers with the readings of a certified thermometer. Refer to paragraphs 4.2.7.c and 4.2.7.d."

6.2.2 Specific Conductance

Conductance (this document uses conductance, specific conductance, electrical conductance and conductivity interchangeably) is the ability of a sample to conduct an electrical current. This parameter is frequently used as an indicator of ground water contamination. It is directly related to the presence of charged ionic particles in solution and is affected by the concentration of ions, their velocity, and the temperature of the sample. Because conductance is temperature dependent, it is necessary to standardize its measurement (to 25 degrees C) so that reported values can be compared. The temperature of the sample should be taken at the same time as conductance in order to obtain an accurate measurement that can be corrected to 25 degrees C or use a probe equipped with ATC.

Since conductivity is a direct function of the activities of ionic species in solution, physical or chemical changes caused by exposure of the sample to the atmosphere will affect this parameter. This necessitates taking conductivity measurements in the field. The following are common operating procedures for a conductivity meter:

- Familiarize yourself with the methodology in the latest USEPA-approved edition of Standard Methods and the manufacturer's instructions.
- Set up and calibrate the conductivity meter according to the manufacturer's instructions. Use the standard solution range specific to the desired application.
- Measure the temperature of the sample with a thermometer or temperature meter. Some pH, conductivity and temperature meters are combined in one unit. Set the temperature on the conductivity meter to the measured temperature.
- Rinse the cell and probe with reagent grade water.
- Place the conductivity sensor in the sample and move it up and down several times to facilitate a reading. Use two sample aliquots for rinsing the probe, and then take the measurement with a third aliquot. Rotate the sensor slowly in the sample until the reading stabilizes. Always follow the manufacturer's procedures.
- Record the conductivity measurement, units and the temperature.
- Rinse the probe with reagent grade water.
- Correct the measurement to the 25° C standard (unless automatically corrected by the meter) as outlined by the latest USEPA-approved edition of Standard Methods and the manufacturer's instructions.

6.2.3 pH

pH is the measurement of the concentration of hydrogen ions in solution. It is one of the most important parameters affecting the chemical composition of ground water. Anything that changes the pH will affect other constituents of interest. Aeration, oxidation, and/or degassing of a sample can significantly alter the pH. The following are common standard operating procedures for this method:

- Familiarize yourself with the methodology in the latest USEPA-approved edition of Standard Methods and the manufacturer's instructions.
- Set up and calibrate the pH meter using buffer solutions according to the manufacturer's instructions.
- Rinse the electrodes and probe thoroughly with reagent grade water.
- Immerse the electrodes in the sample until the reading stabilizes. This usually takes no longer than 60 seconds.
- Record the pH measurement to the nearest 0.1 unit.
- Remove the electrodes from the sample and rinse with reagent grade water.
- Store the electrode in the buffer solution (or manufacturer recommended solution) between sample measurements.

6.2.4 Turbidity

Turbidity is a measure of the degree to which water loses its transparency due to the presence of suspended or dissolved particulates. The more total suspended or dissolved solids in the water, the murkier it seems and the higher the turbidity. The following are common standard operating procedures for turbidity measurements:

- Familiarize yourself with the methodology in the latest USEPA-approved edition of Standard Methods and the manufacturer's instructions.
- Set up and calibrate the turbidity meter using standard solutions according to the manufacturer's instructions.
- Collect a representative sample in a clean container.
- Wipe the container with a cloth to remove water spots and fingerprints.
- Insert vial into meter and press "Read".

- Record Result

6.2.5 Color and Odor

The color and odor of a sample should be noted in the field. Although these are only a crude measure of water quality, they can serve as warning indicators of groundwater contamination. These parameters may begin to change as a result of contamination before quantified parameters change.

Note the color of the sample after filtration by holding a clear bottle of the sample against a white background. Wave your hand over the open top of the sample bottle, wafting any odor to your nose. **DO NOT** directly smell the sample.

SECTION 7.0

STANDARD OPERATING PROCEDURES FOR PURGING WELLS

Water which has been standing in or around the well casing for an extended period of time is not representative of the water in the formation. Its quality can be affected by a number of processes such as:

- Leaching or adsorption of constituents from or onto the well casing or screen.
- Depletion of heavy metal species precipitated by sulfide (produced by the action of sulfate-reducing bacteria commonly found in the stored water).
- Precipitation or dissolution of certain metals due to changes in the concentration of certain dissolved gases such as oxygen and/or carbon dioxide.
- Addition of foreign materials through the top of the well.

Therefore the water standing in and directly adjacent to the well should be removed (purged) prior to sampling to ensure that samples are representative of groundwater quality. Various methods for purging wells have been developed and cited in the literature. No single method of purging wells is appropriate for all wells in all situations. Formation properties, particularly permeability, will affect the decision when choosing the proper purging technique.

7.1 Low Permeability Wells

The most efficient method for removing the stagnant water in a well is to pump or bail the well dry. Although this procedure allows atmospheric conditions to contact the formation immediately around the well screen, it is the best way to ensure that the greatest volume of stagnant water has been exchanged with fresh water from the formation.

- Pump or bail the well until dry. Purge water should be stored in an appropriate container until analytical results have been received. **Note: A discussion on purge water disposal will be included at the conclusion of this section.**
- Allow the well to recover and purge the well until dry a second time if time allows. If time does not allow, then the well should be sampled when it recharges after the first purging.
- Collect samples as soon as there is sufficient volume of water for the intended analyses. The water does not have to recharge to the static water level. At NO TIME should there be more than 24 hours between purging and sampling of a well.

7.2 High Permeability

7.2.1 Well Volume Approach

Pumping wells dry in high permeability formations is not always possible or desirable. These wells require a different purging method. WVDEP recommends purging a well until temperature, pH, conductivity and turbidity stabilize.

- Determine the depth to water and calculate the volume of water in the well casing and filter pack using the following formula:

$$V = [3.142 \times (D/2)^2 \times H]$$

Where,

V = Total volume of water to be purged (in cubic feet)
D = Inside well diameter (in feet)
H = Height of water column (in feet)

- For monitoring wells where the water level is above the screens, the pump should be set near the top of the water column, and slowly lowered during the purging process.

- For water columns within the well screen, the pump should be set at a sufficient depth below the water level where drawdown during pumping does not allow air to enter the pump.

- The pump should not be allowed to touch or draw sediments from the bottom of the well, especially when sampling for parameters that may be impacted by turbidity.

- The well-purging rate should not be great enough to produce excessive turbulence in the well, commonly no greater than one gallon per minute (3.8 liters per minute) in a 2-inch well.

- The parameters (temperature, pH, conductivity, turbidity) should be recorded approximately every well volume; when three successive readings have reached stabilization (within 10%), the sample(s) should be taken.

7.2.2 Low Stress Approach (Micropurge)

The low stress approach requires the use of a variable-speed, low-flow sampling pump. This method offers the advantage that the amount of water to be containerized, treated, or stored will be minimized. The low-stress method is based on the assumption that pumping at a low rate within the screened zone will not draw stagnant water down, as long as drawdown is minimized during pumping. Drawdown should not exceed 0.33 feet (0.1 meters).

- The pump is turned on at a low flow rate approximating the estimated recovery rate (based on the drawdown within the monitoring well during sampling).

- This method requires the location of the pump intake to be within the saturated-screened interval during purging and sampling.

- The water-quality-indicator parameters (purge parameters), pH, specific electrical conductance, temperature and turbidity, are monitored at specific intervals. The specific intervals will depend on the volume within the tubing (include pump and flow-through cell volumes), pump rate and drawdown; commonly every three to five minutes.

- These parameters should be recorded after a minimum of one tubing volume (include pump and flow-through-cell volumes) has been purged from the well.

- These water-quality-indicator parameters should be collected by a method or device which prevents air from contacting the sample prior to the reading, such as a flow-through cell.

- During purging, water-level measurements should be taken regularly at 30-second to 5-minute intervals (depending on the hydraulic conductivity of the aquifer, diameter of the well, and pumping rate) to document the amount of drawdown during purging. The water-level measurements will allow the sampler to control pumping rates to minimize drawdown in the well.

- Once three successive readings of the water-quality-indicator parameters have stabilized (within 10%), sampling may begin.

7.3 Liquid Investigation Derived Waste (IDW) – Purge Water

The following guidelines pertain to any investigatory activities, which generate liquid (IDW); including, but not limited to, groundwater monitoring, well development and sampling, and decontamination procedures.

- Liquid IDW, which has been extracted from a site, should be stored in a secure container suitable for off-site disposal (i.e. 55-gallon drum or holding tank), and its contents properly characterized by West Virginia certified laboratory analysis methods for all contaminants of concern at the site to determine the appropriate treatment or disposal method.

- Storage of all liquid IDW should be in a segregated manner (liquid which has been taken from the site, by area of concern, from decontamination liquid).

- **All non-decontamination liquid IDW that meets the groundwater quality standards for the State of West Virginia may be disposed of on-site. Liquid, which exceeds these criteria, shall be taken to a treatment facility specific to the constituents exceeding the ground water criteria or handled as hazardous waste and disposed of as such.**

SECTION 8.0

STANDARD OPERATING PROCEDURES FOR COLLECTING GROUNDWATER SAMPLES

Regardless of the contaminants of concern, the actual collection of the sample is probably the most critical step in the sampling process. Physical or chemical alteration of the sample can occur at several stages in the process through the use of inappropriate sampling devices or by improper collection techniques.

Aeration of the sample caused by turbulence can alter the chemical characteristics of the sample by oxygen saturation. If proper care is not taken, the equilibrium of reduced state metals can be shifted to the more oxidized state. Precipitation of metal oxides can lead to adsorption and/or precipitation of other dissolved cations and anions. This will cause a decrease in the concentration of dissolved metals in the sample.

Pressure changes of the water sample as it is brought to the surface and exposed to the atmosphere can alter the sample's quality by decreasing the carbon dioxide concentration. Carbon dioxide forms a weak acid in solution; therefore, its loss from a sample will raise the pH as much as one standard unit. This can lead to various chemical changes such as the continued precipitation of metals discussed above.

Equal concern should be given to the potential to alter the level of Volatile Organic Compounds (VOCs) in groundwater by inappropriate sampling. Contaminants could be added to the sample by leaching from improper sampling materials (PVC well casing with solvent welded joints) or by cross contamination from other wells by using sample equipment which is not adequately decontaminated between wells.

Contaminants can be lost from a sample by adsorption of VOCs onto incompatible materials (silicon tubing) during sample collection. Turbidity during sample collection can cause the loss of VOCs and increase in metals. Dropping a bailer into a well and letting it free fall to the water surface causes unnecessary volatilization when the bailer strikes the water. Turning the bailer upside down to pour out a sample also causes turbulence and subsequent volatilization. WVDEP does not recommend the use of transfer bottles during sample collection. WVDEP does recommend the use of in-line collection and filtering to minimize the exposure of samples to the atmosphere.

8.1 Pre-Sampling Suggestions

- Determine the type of sample bottle, volume of samples, and preservation required based on the constituents of interest and the laboratory analytical techniques. Contact the laboratory in advance of the planned sampling date so they can provide the correct sample containers and confirm sample volumes and preservation methods required.

- Choose a sampling device which minimizes the potential for altering the quality of the sample.
- Measure the water level in the well and purge the well to ensure the sample is representative of the formation water. Samples should be withdrawn as soon as possible after purging so that any possible well casing or other influences are minimized. AT NO TIME should there be more than 24 hours between purging and sampling.

- Sample the least contaminated wells first and the most contaminated wells last to minimize the possibility of cross contamination. If contamination levels are unknown, sample the up gradient wells first and the down gradient wells last.

8.2 Collecting Samples with a Bailer

Sample integrity and subsequent value of the data is highly dependent upon operator skill and familiarity with proper sampling techniques when a bailer is used because of the potential for sample agitation.

Use a bailer with a drain spigot, or bottom emptying device which pushes the ball valve open from the bottom, allowing the bailer to be emptied slowly without being inverted. This is particularly important when collecting samples for volatile organic analyses. Bottom emptying devices may be retrofitted by attaching a clamp to the discharge tube. This will allow better flow control when emptying the bailer into sample bottles.

- Rope or cord should be disposed of unless used in a dedicated manner on the well.

- Place a large plastic bag or cloth on the ground around the well to prevent the bailer rope from touching the ground. A clean garbage can lined with a clean plastic bag may also be used to keep the bailer rope off the ground.

- Lower the bailer slowly and gently into contact with the water in the well. Do not allow the bailer to free fall into the well while holding the bailer cord. Do not allow the bailer to touch the well bottom to minimize sediment in the sample.

- Lower the bailer to the same depth in the well each time, preferably within or just above the screened section.

- Retrieve the bailer smoothly, coil the cord on the cloth or plastic bag, and do not allow the cord to touch the ground. Empty the bailer and fill the sample bottles slowly to avoid sample turbulence. If the bailer is not fitted with an in-line filtering system, empty the water in a slow steady stream using the following steps:

    - Discard the first six inches of water in the bailer to minimize the oxidized portion of the sample.

- Pour an unfiltered portion into a sample container for the required in-field analyses. One member of the sample collection team should perform these analyses immediately while the other team members continue sample collection for other analyses. For dissolved metals samples that contain significant sediment, the sample can be allowed to settle and the clearer water can then be filtered.

- Pour an unfiltered portion into sample containers for volatile organics analyses if necessary. To minimize volatile loss, fill the sample bottle so it is slightly overflowing and a positive meniscus is formed and cap the bottle immediately. Check the bottle for bubbles before storing. Discard a sample with bubbles and refill with sample water. Depending on protocol, preservative may be present. Make sure to represerve or obtain a new pre-preserved bottle. Samples for VOCs should always be collected from a newly filled bailer as soon as it has been brought to the surface.

- Pour a portion of the sample into containers for all other unfiltered analyses. Preserve the samples as required and cap as soon as possible.

- Pour a portion of the sample into a transfer bottle for analyses requiring field filtering. Draw the sample through the filter into the collection bottles. Preserve the samples as required and cap as soon as possible. If the bailer has been fitted with an in-line filtering system, transfer the sample water directly into the sample bottles. Do not use a transfer bottle.

- Discard the last six inches of water in the bailer.

➢ Discard the cord and decontaminate the bailer prior to sampling a new well.

8.3 Collecting Samples with a Pump

➢ Decontaminate the pump and hose.

➢ Lower the pump inlet slowly and gently into contact with the water in the well. Do not allow the hose to free fall into the well. To ensure that sediment sitting on the well bottom is not pulled into the sample, do not allow the pump inlet to touch the bottom of the well.

➢ Position the pump inlet in the well such that water is removed from the same portion of the well each time, preferably at the top of the screened interval in a piezometer, or about 2 feet below the water surface in a water table observation well. Set the discharge of the pump at a slow rate to minimize agitation of the sample. If the pump is not fitted with an in-line filtering system, empty the water in a slow steady stream in the following order:

- Pump an unfiltered portion into a sample container for the required in-field analyses. One member of the field collection team should perform these analyses immediately while the other team members continue collecting samples for other analyses.

- Pump an unfiltered portion into sample containers for volatile organics analyses if necessary. Fill the sample bottle until a positive meniscus is formed and cap immediately to minimize volatile loss. Check the bottle for bubbles before storing. Discard a sample with bubbles and refill with sample water. Depending on protocol, preservative may be present. Make sure to re-preserve or obtain a new pre-preserved bottle.

- Pump a portion into the sample containers for all other unfiltered analyses as necessary. Preserve the samples as required and cap as soon as possible.

- Pump a portion of the sample into a transfer bottle for analyses requiring field filtering. Draw the sample through the filter into the collection bottles. Preserve the samples as required and cap as soon as possible. If the pump has an in-line filtering system, pump the sample water directly into the sample bottle.

➢ Decontaminate the pump and hose.

8.4 Passive Sampling Devices

As previously discussed in section 5.7, there are numerous passive sampling devices available. For the purposes of this document, one device will be discussed per sections 5.7.1, 5.7.2 and 5.7.3. For information regarding the other devices please see the manufacturer's instructions or visit http://ds.itrcweb.org (DSIC – Diffusion Sampler Information Center).

8.4.1 HydraSleeve™ Samplers

Collecting a sample with the HydraSleeve™ is a one-person operation. The sampler is deployed attaching a suspension cord to the top and a weight to the bottom and lowering the empty sampler into the well. During installation, hydrostatic pressure causes the sampler to retain its flat and empty profile for an indefinite period prior to sample collection. After lowering the sampler to the desired sample depth, the water column is allowed to equilibrate. Its slim cross section minimizes the disturbance to the water column during placement, reducing the time needed for the well to return to equilibrium.

➢ Sampler placement - Reusable weight is attached and the HydraSleeve™ is lowered and placed at the desired position in the well screen. In-situ water pressure keeps the reed valve closed, preventing water from entering the sampler. The well is then allowed to return to equilibrium.

- Sample collection - The reed valve opens to allow filling when the sampler is moved upward faster than 1 foot per second, either in one continuous upward pull or by cycling the sampler up and down to sample a shorter interval. There is no change in water level and only minimal agitation during collection.

- Sample retrieval - When the flexible sleeve is full, the reed valve closes and the sampler can be recovered without entry of extraneous overlying fluids. Samples are removed by puncturing the sleeve with the pointed discharge tube and draining the contents into sample containers or field filtration equipment.

8.4.2 Passive Vapor Diffusion (PVD) Samplers

The primary use of PVD samplers is to identify locations where VOC contaminated groundwater is discharging into surface water. PVD samplers also have been used as passive-soil-gas samplers in the unsaturated zone.

PVD samplers consist of an uncapped, empty 20 or 40 mL glass crimp-top or VOA vial enclosed in two layers of low-density polyethylene (LDPE) tubing or two zip lock bags. The crimp-top vials are preferred because of the thicker septum and better seal. Typically, samplers are attached to wire surveyor flags and buried 0.5 to 1.5 feet deep in bottom sediments of areas where groundwater is discharging to streams, rivers, or lakes. VOCs dissolved in pore water will diffuse through the LDPE until air concentrations in the vial equilibrate with dissolved concentrations outside the LDPE membrane. In general, it is estimated that it takes one to three weeks for a PVD sampler to equilibrate with pore water. If the samplers are being used to locate a plume, it may not be necessary for the samplers to reach equilibrium with pore water. However, the samplers do have to remain in place long enough for detectable concentrations of VOCs to diffuse across the LDPE membrane into the sampler.

PVD samplers are most commonly installed in sediments beneath rivers or streams, wetlands, lakes, or coastal zones to determine if and where VOC contaminated groundwater is discharging to surface water. PVD samplers also have been used to measure VOCs in soil gas. In both cases, results are reported as vapor phase concentrations.

8.4.3 GORE™ Samplers

The GORE™ Sorber Module is a device that relies on diffusion and sorption to accumulate analytes in the sampler. These modules yield a total mass of analytes that can be correlated with analyte concentrations in water or air. This device can be utilized to sample soil/gas in the vadose zone and dissolved organic analytes in water saturated soils or in groundwater monitoring wells. This device has been used in both fresh and saltwater environments, including sampling sediments in marshes, streams, river embankments, and coastal settings. In addition, these devices have been used in vapor intrusion studies and indoor and outdoor air monitoring investigations.

For groundwater monitoring applications, the module is suspended in a monitoring well on a length of line with a stainless steel weight attached to the bottom. The narrow diameter of the module facilitates deployment in piezometers and small diameter wells (1/2 inch ID and larger). Each module is clean when it comes from the manufacturer and is contained in a sealed glass vial. After removing the module from the vial, it is placed at the desired depth in the screened interval, or several modules can be placed at multiple depths within the screened interval. After the exposure period of 15 minutes to four hours, the module is retrieved, and returned to its glass vial and shipping container. The glass vials containing the exposed modules, along with trip blanks and Chain-of-Custody (COC) forms, are shipped.

8.5 Sampling for VOC's

Prior to sample collection; evaluate the area around the sampling point for possible air contamination by VOCs. For example, a loosely sealed gasoline can, in the area, could give off Benzene, Toluene, Ethyl Benzene, Xylenes, and other VOCs. Benzene levels in the air around service stations are much higher than ambient levels in urban areas. Check for recent use of solvents, cleaners, and degreasers which could contaminate a sample. If such a situation is present, particularly if there is any odor in the area, try to sample at another nearby well or ventilate the area. In any case, keep the caps off the VOC sampling vials as short a time as possible.

Other products release VOCs and may contaminate samples. These include, but are not limited to: perfumes, cosmetics, skin-applied pharmaceuticals, sun screen, insect repellent, automotive starting fluid, windshield deicers, carburetor cleaners, upholstery cleaners, gasoline, and kerosene. Avoid exposure to these products while collecting samples. Keep the VOC sample bottles and vials and the containers used for mailing the samples tightly sealed to prevent possible contamination.

SECTION 9.0

STANDARD OPERATING PROCEDURES FOR FIELD FILTERING GROUNDWATER SAMPLES

Field filtering is an essential part of any sampling program when one is interested in the concentration of dissolved inorganic constituents (dissolved metals) in a sample. Suspended sediment contained in the sample can react with the sample and change the concentration of some of the dissolved constituents, causing the sample to be misrepresentative of ground water quality. Suspended silt, clay, or organic material should be filtered out of the sample so that dissolved constituents in the sample are not adsorbed onto these particles. Samples should be filtered before adding acid preservatives to prevent absorbed ions from being released into solution and producing artificially high concentrations of clay-related and other colloidal constituents. Filtering of samples should always be performed in the field and not at the laboratory. **NOTE: RCRA samples should not be filtered as per the Technical Enforcement Guidance Document (TEGD).**

The key to collecting representative filtered samples is to minimize agitation and subjecting the samples to changes in pressure. Pressure loss promotes degassing of carbon dioxide. Pressure increases will cause gasses to dissolve into a sample. Agitation will cause both carbon dioxide to be released and other gasses to be dissolved into the sample. The use of in-line filtering can decrease sample agitation and subsequent constituent concentration changes.

9.1 Inorganic Compounds

Dissolved metals samples should be field filtered immediately after collection. Samples collected for other inorganic analyses should also be field filtered unless the colloidal constituents or adsorbed materials are of interest.

It is important to avoid aerating the sample and consequent precipitation of dissolved metals from the sample. WVDEP recommends in-line filtering to limit sample exposure to the atmosphere. If in-line filtering is not possible, the sample collection and filtering system should be designed and operated to minimize atmospheric exposure and agitation. While a transfer container can be used where in-line filtering is not possible, WVDEP recommends that the use of these containers be kept to a minimum to reduce the disruption to the sample. The following procedures should allow collection of field filtered samples which are accurate and representative of ground water quality.

- Set up the filtering apparatus according to the manufacturer's instructions.
- Use a 0.45 micron membrane filter. If the sample has a lot of sediment (very turbid), you may use a "pre-filter" to prevent clogging the 0.45 micron membrane.
- Flush at least 500 ml of reagent grade water through the filtering apparatus prior to filtering the sample. This will minimize the risk of changing the chemical

composition of the sample by the filtering process. Only appropriate filter membrane material as specified by Standard Methods should be used.

- Pump the sample through the filter. If there is sufficient volume, discard the first 100 to 200 ml of sample liquid.
- Collect the required sample volume in the appropriate sample bottles.
- Remove and discard the filter membrane and "pre-filter" after the sample is collected. Do not reuse filter paper.
- Flush the filtering apparatus and all tubing with at least 500 ml of reagent grade water.
- Collect an equipment/filter blank to illustrate there is no bias introduced by the filter or apparatus.
- Reassemble the filtering apparatus for the next sample.

9.2 Volatile Organic Compounds

Samples should not be filtered for VOC analyses. Filtering samples collected for VOCs would likely alter the concentration of the VOCs in the sample. The VOCs could be adsorbed onto particulate matter in suspension or onto the filter as the sample passes through the filter system. VOCs can also be lost to volatilization if filtered.

SECTION 10.0

STANDARD OPERATING PROCEDURES FOR PRESERVATION OF GROUNDWATER SAMPLES

Samples are preserved to stabilize the constituents of interest and stop or retard any chemical or biological change. Improper preservation or exceeding holding times can affect the quality of the final analyses. Proper preservation will help ensure that the sample analyzed is representative of its quality at the time of collection. Each analyte has its own holding time varying from a few minutes to several months.

Preserve samples immediately after sampling and filtering (if required). Preserve the sample by lowering the pH (with sulfuric acid, hydrochloric acid, ascorbic acid, or nitric acid), cooling, neutralizing residual chlorine, or making the sample alkaline. The type of sample preservation will depend upon the analytical methodology used. Check with 40CFR136, Table II to determine the appropriate preservation technique for each sample. See **Table 4.1** for a list of preservatives, containers, and volumes for various constituents.

The following procedures should be followed to test the pH of a sample after preserving it with acid:

- Remove the container lid.
- Tip the container gently onto its side in order to pour some of the sample into the lid.
- Touch a pH paper strip to sample in the container lid. DO NOT PUT pH paper directly into the sample container.
- Compare the pH paper to the standard to determine sample pH.
- Adjust the pH if necessary and repeat steps 1 through 4.

SECTION 11.0

STANDARD OPERATING PROCEDURES FOR SAMPLING WATER SUPPLY WELLS

Water supply wells are frequently sampled to determine groundwater quality. An existing well may be sampled to avoid the cost of installing a new monitoring well during the initial assessment of a site. A water supply well may be used as part of an ambient groundwater quality network or sampled because of reported contamination.

Water supply wells do not have standardized construction and physical locations like monitoring wells and so require different sampling procedures. Water supply wells are frequently screened at the submersible pump depth. It is often difficult or impossible to measure water depth in these wells. Well construction details and drilling records (boring logs) are often unknown or incomplete.

11.1 Sampling Water Supply Wells

- Contact the well owner in advance to obtain permission to sample the well. Inform the well owner of any disinfection procedures to be used. Do not sample the well if the owner rejects chlorination as a disinfection method (this is only necessary if sampling devices are placed in the well). Specify the sampling date and time with the well owner and tell them the amount of water that will be withdrawn to collect the sample.

- Contact the well owner the day before sampling the well and confirm that their permission is granted.

- Prior to departure, disinfect all equipment that might be used in the well.

- After arriving at the well site, remove the well cap if possible and turn off the pump if the well cap can be removed.

- Take a series of water level measurements to determine if the well is still recovering from a prior use.

- Collect a sample from the well or from the tap nearest the well for coliform bacteria analysis.

- Purge the well. Drinking water wells should be purged for the same reasons as monitoring wells. It is important to obtain samples from the formation and not stagnant water that has been in prolonged contact with the plumbing system.

11.1.1 Large Water Supply Systems

Large water supply systems should be purged by locating the closest tap to the well. This tap should be between the well and any storage, treatment, or pressure device. If it is not possible to collect a sample before any storage, treatment, or pressure device, note this on the sample sheet. Allow the tap to run at full volume for at least five minutes prior to obtaining a sample.

11.1.2 Small Water Supply Systems

Small water supply systems should be purged by locating the tap closest to the well. This tap should be between the well and any storage, treatment, or pressure device. If it is not possible to collect a sample before any storage, treatment, or pressure device, note this on the sample sheet. There is usually a tap just before the pressure tank. Remove any aerators, filters, hoses, or other devices from the tap prior to obtaining the sample.

If the sample is collected BEFORE any storage, treatment, or pressure device, allow the tap to run at full volume for at least five minutes prior to obtaining a sample.

If the sample is collected AFTER any storage, treatment, or pressure device, allow the tap to run at full volume for at least 10 minutes prior to obtaining a sample. If the tank is larger than 50 gallons it should be purged for at least 20 minutes prior to obtaining a sample.

If it is difficult to purge the well from the closest tap since one or more taps farther down the system may be opened to purge the well. The sample should still be collected from the tap closest to the well.

- Field measurements (pH, temperature, specific conductance) should all be obtained by placing a probe in a sampling container that receives the direct, unfiltered flow from the tap closest to the well. Allow the direct flow to fill the container and overflow until the pH, temperature, and specific conductivity stabilize. Record the readings immediately.

- Collecting the samples is the single most critical step in the sampling process. The sample collection team should make every effort possible to ensure samples are representative of ground water. The two major points to keep in mind are minimizing aeration and turbulence. The following discussion assumes that the well has been properly purged.

  Note: Do not filter any samples taken at water supply wells. Collect all samples (other than VOCs and pesticides) as specified earlier in this document.

11.1.3 VOCs and/or Pesticides

- Prior to collecting samples for VOCs and pesticides, the area around the sampling point must be checked for possible air contamination by these compounds.

- Reduce the water flow to a thin stream to reduce aeration and splashing.

- Remove the cap ring from the sample vial, making sure the teflon liner does not fall out. If the liner falls out, discard the entire cap and liner and replace.

- Fill the sample vial immediately by allowing the water stream to strike the inner wall of the vial to minimize air bubble formation. Do not rinse the sample vial. Fill the sample vial until the water forms a positive meniscus. Allow the vial to overflow slightly.

- Replace the cap by gently setting it on the meniscus. Tighten the cap firmly, but do not over-tighten. It is easy to break the cap or neck of the vial by twisting too hard.

- Invert the vial and look for air bubbles. If present, discard vial and collect a new sample.

- Preserve and ship samples in the prescribed manner.

11.1.4 Disinfection

Water supply wells are frequently used for drinking water. If the well cap or any other part of the well casing has been disturbed, or if the possibility that the well has been contaminated exists, the well should be disinfected after sampling is complete.

There are no formal standards for the concentration of chlorine solution to be used in disinfecting a drinking water supply well as a preventive measure. Most standards address chlorination of unsafe wells. However, 50 ppm should be adequate. One gallon of 5% liquid chlorine bleach to 1,000 gallons of water is approximately a 50 ppm chlorine solution.

The amount of chlorine to be used is dependent upon the amount of water in the well, as well as, the amount of water disturbed by sampling procedures. One cup of liquid chlorine bleach should be adequate to disinfect a six-inch column of water 20 feet high. The action of the pump should provide sufficient mixing to ensure the chlorine solution disinfects all parts of the well and associated piping.

Deeper wells, or wells which have had a greater portion of the water column disturbed during sampling procedures, will need a greater quantity of liquid chlorine bleach to ensure

adequate disinfection. One cup of liquid chlorine bleach (or the equivalent in dry tablets) for every 20 feet of water column is sufficient.

Once the chlorine solution is in the well, operate the pump until the water coming from the tap has a distinct chlorine odor. Allow the chlorine solution to stand in the well and piping for at least one half hour. After this time period, advise the well owner that the water may have a slight chlorine odor and taste. Tell the well owner to use as little water as necessary until the next day and then flush the system until the chlorine odor and taste are not present.

Advise the well owner that there are few good discharge choices for the chlorine solution. The solution may kill plants if applied directly to a lawn or garden, or kill the bacteria in a septic tank. Discharge to a stream may kill aquatic plants and animals. The following are two acceptable discharge methods:

- Use the solution for laundry and dish washing over the course of several days.
- Drain onto a street or driveway to allow dissipation of the chlorine and gradual discharge to the environment.

APPENDIX A

Passive Sampler Technologies

PASSIVE SAMPLER TECHNOLOGY MATRIX
Media and Common Analytes Addressed by Technology
APPENDIX A
Table 1*

Technology	Media	Common Analytes								
		VOC's	SVOC's	Metals	Anions	Field Parameters	Explosives	Perchlorate	Hex Cr	Oxygenates (MtBE)
HydraSleeve™	Fluid, GW, SW, tanks	All	All	All	All	All	All	All	All	All
SNAP Sampler™	GW, SW	All	All	All	All	All	All	All	All	All
Dialysis Membrane	GW	All		Most	All	Some	Most			All
Nylon-Screen										
Passive Vapor Diffusion (PVD)	GW, pore water, soil vapor	Most								
Peeper Samplers (membrane dependent)	GW, pore water	Most		Some	Most	Some		Most		
Polyethylene Diffusion Bag (PDB)	GW	Most								
Rigid Porous Polyethylene	GW	Most	Some	Most	Most			Most	Most	
Semi-Permeable Membrane Device (SPMD)	GW, SW, soil, sediment, air	Some	Most; hydrophoics			Many		None		
GORE™ Sampler	Water, air, soil, gas, sediment	All	Most				Most			All
Polar Organic Chemical Integrative Sampler (POCIS)	GW, SW, sediment	Some	Most; hydrophoics			Many	Many			
Passive In-Situ Concentration Extraction Sampler (PISCES)	SW	Some	Most							

Notes:
1. GW = Ground Water
2. SW = Surface Water
3. * = Table adapted from ITRC - Technical Overview of Passive Sampler Technologies
4. Field Parameters = pH, temperature, dissolved oxygen, specific conductivity, oxidation-reduction potential, turbidity.

PASSIVE SAMPLER TECHNOLOGY MATRIX

APPENDIX A
Table 2*

Technology	Advantages	Limitations	Deployment Considerations	Sample Volume
HydraSleeve™	Sample all analytes, Inexpensive, disposable. No purging. Effective in low yield wells. Collect samples from discrete intervals in wells and surface water		Easy to use, one person operation	Typical sampler hold 1-2 Liters. Other sizes available
SNAP Sampler™	No purging. Sample sealed in-situ. No sample transfer required. All analytes recovered.	Small sample volume	Some assemly and disassembly is required. Some training required. Some decontamination required unless dedicated.	40ml and 125ml bottles are available
Dialysis Membrane	Inorganic and organic analytes. No purging. Excludes turbidity. Equilibration time of 1-7 days. Disposable.	Two trips to the site are needed (deploy/retrieve). Sampler prep required. Sampler must be kept wet. Limited life (biodegrades).	Some technical training needed to prep samplers. Samplers are easy to deploy and retrieve.	1.25 in. diameter membrane by 1 ft. long = 155 mLs. 2.5 in. diameter membrane by 1 ft. long = 969 mLs.
Nylon Screen	Sample most analytes. No purging. Disposable.	Ratio of membrane area to the volume/height of sampler bottle. Wells greater than 4 in. in diameter are optimal	Orientation of membrane is critical.	Vols up to 1 liter possible with stack of 200 ml samplers.

Technology	Advantages	Limitations	Deployment Considerations	Sample Volume
Passive Vapor Diffusion (PVD)	Identifies VOC contaminated groundwater discharge areas. No purging. Rapid screening analysis can be done in the field.	Provides qualitative data, does not provide actual water concentration. Only for certain VOCs.	Easy to use in water depths less than 4 ft.	20 or 40 ml gas
Peeper Sampler	Measures pore water concentration. No purging. In-situ monitoring of trace elements.	Small sample volume. Analytes are specific to the membrane material.	Easy and quick installation. Equilibration time minimal.	Typically 1-20 mL.
Polyethylene Diffusion Bag (PDB)	No purging. Technical guidance available. Saturated sediments, surface and groundwater. Permanganate, turbidity and alkalinity are excluded. No well diameter limitation.	Only selected VOC compounds.	Easy to use.	Typical Sampler holds 220-350 mL, Other sizes available.
Rigid Porous Polyethylene	No purging. Organic and inorganic analytes.	Small sample volumes. Semivolatiles (hydrophylic) are unconfirmed. Additional testing is needed.	Easy to use. Sampler pores must be purged of air prior to deployment	~ 175 mL.

Technology	Advantages	Limitations	Deployment Considerations	Sample Volume
Semipermeable Membrane Device (SPMD)	No purging required. Exposure period can be several months, which enables determination of time-integrated ambient chemical concentrations. Mimics bioconcentration of organic contaminants in fatty tissues of organism. Unaffected by many environmental conditions or stressors that affect biomonitoring organisms. Provides semi-quantitative data.	Exposed SPMDs require processing and cleanup prior to analysis. Biofouling (water) may occur with extended exposures, but corrections for reduction in sampling rates can be made.	Exposure to sunlight should be minimized to prevent photolysis of certain analytes. A typical 1-mL (92 cm long, 5 mL volume) triolein SPMD can be shipped in a 1 pint air-tight can. Potential for vandalism should be assessed at field sites, especially for long-term exposures.	A typical 1-mL triolein SPMD (5-mL volume) will extract from as much as 5 to 160 liters (water) or cubic meters (air) after a 30-day exposure.
GORE™ Sampler	VOC, SVOC's, PAH, CWM/ABP's, Explosive breakdown products, Hg. No purging. Water, soil, gas, air and sediments. Residence time 15 minutes to 4 hours. Allows extrapolation for low detection limits (ppb-ppt).	Must correlate total mass with measured concentrations in the groundwater. Not a direct concentration.	All material to deploy is supplied. Ten minutes to deploy with non-skilled labor.	N/A

Technology	Advantages	Limitations	Deployment Considerations	Sample Volume
Polar Organic Chemical Integrative Sampler (POCIS)	Easy to deploy and recover. Mimics respiratory exposure of aquatic organisms to organic chemicals. Unaffected by environmental conditions or stressors that affect biomonitoring organisms. Sorbent can be changed to target certain chemicals or chemical classes. The membrane used is highly resistant to biofouling. Qualitative concentration data.	Field samples require special processing prior to laboratory analysis.	Exposure to sunlight should be minimized. Potential for vandalism should be assessed at field sites, especially for long term exposures. A set of four POCIS disks (typical sample size) can be shipped in a 3.85 L container.	A typical set of four POCIS disks (4.7 cm diameter) will extract from 1.5-10 L of water after a 30-day exposure.
Passive in-situ Concentration Extraction Sampler (PISCES)	Measures dissolved concentrations of organic compounds in surface water. Capable of low detection limits. Preserves relative concentrations of analytes. Time-integrated sample. Minimal biofouling. Sample from field is in a solvent compatible with trace organic analytical protocols.	Semi-quantitative in streams and rivers because of uncertainty in sampling rates. Analytical methnod must be able to separate analytes from solvent (hexane or isooctane).	Must remain submerged in water, but not in sediment.	PISCES contain 200 mL of hexane or isooctane. Samplers deployed in lakes typically will extract analytes from 1-4 liters of water per day.

Notes:
1. * = Table adapted from ITRC - Technical Overview of Passive Sampler Technologies

PASSIVE SAMPLER TECHNOLOGY MATRIX
Technology Advantages and Limitation
APPENDIX A
Table 3*

Technology	Nature of Sample	Decon Required?	Sample Shipping Requirements	Commercial Available	Commercial Costs
HydraSleeve™	Grab	No: Disposable	Samples must be transferred to standard sample bottles and shipped per standard practices	Yes	Reusable - SS weight $10-25. Expendable-Sample Sleeve $20-25 depending on sampler size
SNAP Sampler™	Grab	Yes: unless Dedicated. No: disposable bottles	Samples collected in ready-to-ship bottles. Use standard shipping practices.	Yes	Reusable Equipment $400 to $700 per well. Lease available; Expendable bottles $16
Dialysis Membrane	Equilibrium concentration by diffusion	No: Disposable	Samples must be transferred to standard sample bottles and shipped per standard practices	Ready-made samplers are not commercially available. Components are commercially available	Unknown
Nylon Screen Sampler	Equilibrium concentration by diffusion	No: Disposable	Samples must be transferred to standard sample bottles and shipped per standard practices	Limited Availability	Approximately $40 to $50 each.
Passive Diffusion Sampler (PVD)	Equilibrium concentration by diffusion. Vapor Sample	No: Disposable	Ship to laboratory unchilled for analysis within 5 days, if GC analysis not done in field.	Yes	PVD samplers can be purchased for less than $10
Peeper Sampler	Equilibrium concentration by diffusion	No: Unless Dedicated Skeleton. No: disposable membrane	Samples must be transferred to small sample bottles and shipped per standard practices	Traditional Peeper is available. Polysulfone Membrane Sampler (PsMS) is not.	Peeper plate consisting of membrane and skeleton is approx. $312 per sampler. Cost uncertain for PsMS.

Technology	Nature of Sample	Decon Required?	Sample Shipping Requirements	Commercial Available	Commercial Costs
Polyethylene Diffusion Bag (PDB)	Equilibrium concentration by diffusion	No: Disposable	Samples must be transferred to standard sample bottles and shipped per standard practices	Yes	Expendable = $25 Resusable Weight = $10-$25
Rigid Porous Polyethylene	Equilibrium concentration by diffusion	No: Disposable	Samples must be transferred to standard sample bottles and shipped per standard practices	Limited Availability	Approximately $40 to $50 each.
Semipermeable Membrane Device (SPMD)	Accumulated mass by diffusion and sorption	Yes: reusable container. No: disposable membrane	Ship frozen in gas-tight metal container.	Yes	A 92 cm commercially available SPMD is about $100, includes analyte recovery from the device.
GORE™ Sampler	Accumulated mass by diffusion and sorption	No: Disposable	Ship to lab unchilled	Yes	Expendable Equipment = $185-$285 each including analysis.
Polar Organic Chemical Integrative Sampler (POCIS)	Accumulated mass by diffusion and sorption	Yes: Sampler body. No: dedicated membrane disposable	Ship cold in gas-tight metal container.	Yes	Reusable disk in holder = $60. Membrane-sorbent disk for chemical sequestration is disposable.
Passive in-situ Concentration Extraction Sampler (PISCES)	Accumulated mass by diffusion and sorption	Yes: Sampler body. No: dedicated membrane disposable	Sample transfer to container is required. Ship as flammable liquid.	No	Unknown

Notes:

1. * = Table adapted from ITRC - Technical Overview of Passive Sampler Technologies

APPENDIX B

Definitions

APPENDIX B DEFINITIONS AND ABBREVIATIONS	
Abandonment	The sealing of a monitoring well or borehole in accordance with Section 19 of **47CSR60 – Monitoring Well Design Standards** in order to restore the original hydrogeologic conditions and/or to prevent contamination.
Accuracy	The determination of how close the measurement is to the true value. Accuracy is assessed using matrix spikes. The determination of Accuracy requires knowledge of the true value for the analyte being measured.
Analyte	That element, ion, or compound of interest to the analyst.
Appropriate Ground Water Regulatory Agency	The ground water regulatory agency which has primary regulatory oversight of a particular facility or activity. Where primary regulatory oversight is unassigned or shared, the Director shall determine which ground water regulatory agency is to be the appropriate agency. See **Appendix C** for a complete list of ground water regulatory agencies.
Aquifer	A geologic formation, group of formations, or portion of a formation which can yield a useable quantity of water to a well or spring.
Aquifer Test Well	A monitoring well installed to provide information on the hydraulic conductivity, transmissivity, storage coefficient, specific capacity, radius of influence or other physical parameters of any aquifer, defined geologic unit, or water bearing formation.
Borehole	A circular hole deeper than it is wide, constructed in earthen material or bedrock for the purpose of obtaining geologic related data. Boreholes are also referred to as drill holes.
Clustered Monitoring Well	Individual monitoring wells situated close together, but not in the same borehole. Clustered wells are most often used for monitoring ground water conditions at various depths in roughly the same area.
Comparability	An expression of the confidence with which one data set can be compared to another data set measuring the same analyte. Comparability can be ensured through the use of established and approved analytical methods, and consistency of analysis and reporting.
Completeness	A measure of the amount of valid data obtained from a measurement system compared with the amount that was expected to be obtained. In order to be considered complete, the data set must contain all QC check analyses verifying Precision and Accuracy for the analytical method.

Constituent	Any chemical, biological, or radiological substance found in ground water due to either natural or man made conditions.
Contaminant 47CSR58, 2.1	Any material in a solid, liquid, or gaseous state that has the potential to cause contamination.
Contamination 47CSR58, 2.2	Any man-made or man-induced alteration of the chemical, physical, biological, or radiological integrity of the groundwater resulting from activities regulated under the West Virginia Groundwater Protection Act (or RCRA), in excess of existing groundwater quality, unless that site has been granted a deviation or variance from existing quality as provided for in the West Virginia Groundwater Protection Act, or is subject to an order, permit, or other regulatory action that requires restoration or maintenance of groundwater quality to a different concentration or level.
Decontamination	A variety of procedures used to clean equipment that has contacted formation material or groundwater that is known to be or is suspected of being contaminated.
Downgradient Well	A well that has been installed downgradient from the assessment area to test groundwater quality which may have been affected by the assessment area.
Duplicate Sample	See Replicate Sample
Excavated Well 47CSR60, 3.24.	Any monitoring well which is constructed by backfilling appropriately sized unconsolidated material around the well screen. Excavated wells include, but are not limited to, any tank pit observation well.
Groundwater Observation Well	Any monitoring well in which the screened interval intersects the water table.
Ground Surface Seal and Flush-Mounted Protective Cover	A flush-to-ground surface monitoring well completion that has a watertight ground surface seal and watertight metal casing with an inside diameter at least 2 inches greater than the inside diameter of the monitoring well riser which has been cut off below grade. The protective cover must have a locking mechanism. This type of ground surface seal is generally used in high traffic areas.
Ground Surface Seal and Protective Cover Pipe	Above ground surface completion of a monitoring well that has approximately half of the watertight well casing anchored into the surface seal and the other half extending above the surface seal to protect the well riser. The watertight casing inside diameter is at least 2 inches greater than the inside of the monitoring well riser. The outer well casing must have a locking cap.

Holding Time	The period of time a sample can be stored after collection and preservation without significantly affecting the accuracy of the analysis. Holding time begins when the lid is placed on the sample bottle (which should be noted on the chain-of-custody form), not when the sample is delivered to the lab.
Monitoring Well	Any cased excavation or opening into the ground made by digging, boring, drilling, driving, jetting, or other method for the purpose of determining the physical, chemical, biological, or radiological properties of groundwater. The term "monitoring well" includes piezometers and observation wells that are installed for purposes other than those listed above; but does not include wells whose primary purpose is to provide a supply of drinking water.
Nested Monitoring Wells	Two or more casing strings within the same borehole or in immediately adjacent boreholes. The screened interval of each casing string is designed to monitor water from different formation zones.
Phreatic Zone (Saturated Zone)	The zone in which the voids in the rock or soil are filled with water at a pressure greater than atmospheric. The water table is the top of the phreatic zone in an unconfined aquifer.
Piezometer	A monitoring well sealed below the water table and which is installed to measure the elevation of the water table or potentiometric surface. A piezometer generally has a small diameter and short well screen. Piezometers may also be used to determine the physical, chemical, biological, and radiological properties of groundwater.
Potential Receptors	Any potential living organism, structure, utility, surface water body, or groundwater source that may be affected by contaminated groundwater (i.e. humans, animals, buildings, homes, schools, sewers, electrical conduits, vaults, streams, wells, springs, lakes, ponds, or other water bodies). A groundwater zone that may be affected by off-site migration from a contaminated site is considered a potential receptor.
Potentiometric or Piezometric Surface	A surface that represents the level to which water will rise in tightly cased wells. If the head varies significantly with depth in the aquifer, there may be more than one potentiometric surface.
Precision	The degree to which a measurement is reproducible. It is assessed by replicate sample measurements.
Preventive Action Limit	A numerical value expressing the concentration of a substance in groundwater that, if exceeded, will cause action to be taken to assure that standards of purity and quality are not violated

	(46CSR12).
Quality Assurance (QA)	A system of activities that assures the producer or user of a product or service that defined standards of quality with a stated level of confidence are met. QA is the management system that ensures an effective QC system is in place and working as intended.
Quality Control (QC)	An overall system of activities that controls the quality of a product or service so that it satisfies the requirements of the user. The day to day activities used to control and assess the quality of the measurements.
Quality Assurance Program Plan (QAPP)	An assemblage of management policies, objectives, principles, and general procedures that outline the techniques by which field collection of samples with known and accepted quality is accomplished.
Quality Assurance Project Plan (QAPjP)	An assemblage of detailed procedures describing how the field collection process will produce samples that meet the data quality objectives of a specific project. All the procedures and techniques used for site characterization, monitoring well installation and development, sample collection, sample preservation and shipment, analytical procedures, chain-of-custody, and implementation of other monitoring programs (e.g. vadose zone monitoring or monitoring of springs in karst terrain). A proposed schedule, including dates anticipated for project initiation, project milestones, monitoring schedule, and projected completion dates is also included.
Recovery Well	A well intended and designed to capture and remove contaminants from groundwater.
Replicate Sample	A sample prepared by dividing a homogeneous sample into separate parts so that each part is also homogeneous and representative of the original sample.
Reporting Limits (RL) also called Practical Quantitative Limit (PQL)	A term defining the lowest concentration of an analyte that can consistently be measured with reliability. The RL may or may not be the Minimum Detection Limit (MDL) possible under ideal conditions and using an ideal sample with no possible interferences present. The RL should be set at a level above which the user is confident the laboratory can detect and quantify the analyte consistently. Using this procedure the RLs are generally two to five times greater than the laboratory MDL or Instrument Detection Limit (IDL).
Representativeness	The degree to which data accurately and precisely represents a characteristic of a population, process condition, or environmental

	condition. Analytical data should represent the sample regardless of the heterogeneity of the original sample matrix. Some samples may require analysis of multiple phases to obtain representative results.
Sample Delivery Acceptance	The time at which the laboratory representative determines that it can proceed with the analytical work. Sample Delivery Acceptance follows receipt and inspection of the samples and includes a complete definition of the analyses required.
Standard Operating Procedure (SOP)	A detailed written description of a procedure designed to systematize and standardize the performance of an activity.
Tank Pit Observation Well	Any vapor detection well or groundwater observation well or both installed in an underground storage tank excavation for release detection purposes.
Upgradient Well	A well that has been installed upgradient from the assessment area to test groundwater quality prior to any effect from a contaminated area.
Vadose Zone (Unsaturated Zone)	The zone between the land surface and the water table. The pore spaces contain water at less than atmospheric pressure, as well as air and other gases. Saturated bodies, such as perched groundwater, may exist in the vadose zone.
Vapor Detection Well	Any excavated well in which the screened interval intersects sufficiently porous backfill or unconsolidated material to allow diffusion of vapors into the well.
Volatile Organic	A liquid or solid organic compound with a tendency to pass into the vapor state.
Water Table	The surface in an unconfined aquifer or groundwater zone at which the pore water pressure is atmospheric.
Water Table Observation Well	Any monitoring well in which the screen or open borehole intersects the water table and is used for determining the water table elevation or the physical, chemical, biological, or radiological properties of the groundwater.

APPENDIX C

Regulatory Agency Information

APPENDIX C

REGULATORY AGENCIES

Below is a link to a list of updated Regulatory Agencies, useful information and contact numbers.

http://www.wvdep.org/Docs/15448_DEP2008CitizensGuide.pdf

ATTACHMENT G
SUPPLEMENTAL INFORMATION

1. The LCAP Landfills listed below have active shooting ranges located on or close to the Landfill; extra precautions may be needed if active shooting is being conducted.

Clarksburg Landfill
Elkins Landfill
Jackson County Landfill
Marion County Landfill
Montgomery Landfill
Moundsville Landfill

2. The LCAP Landfills listed below are either in closure design or closure construction. The number of monitoring wells and/or monitoring well locations are subject to change.

Elkins Landfill – Closure Construction
Webster County Landfill – Closure Construction
Wheeling Landfill – Closure Design

3. LCAP is working with DWWM Solid Waste Permitting to potentially close excess monitoring wells; close damaged monitoring wells and installing new ones; and, to remove some constituents from the sampling requirements. The Vendor will be notified of any adjustments to the sampling procedures.

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

CONSTRUCTION CONTRACTS: Under W. Va. Code § 5-22-1(i), the contracting public entity shall not award a construction contract to any bidder that is known to be in default on any monetary obligation owed to the state or a political subdivision of the state, including, but not limited to, obligations related to payroll taxes, property taxes, sales and use taxes, fire service fees, or other fines or fees.

ALL CONTRACTS: Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

EXCEPTION: The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Employer default" means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

"Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceed five percent of the total contract amount.

AFFIRMATION: By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (*W. Va. Code* §61-5-3) that: (1) for construction contracts, the vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

WITNESS THE FOLLOWING SIGNATURE:

Vendor's Name: ATC Group Services LLC

Authorized Signature: _____ Date: 7/1/21 7/2/21

State of COMMONWEALTH OF PENNSYLVANIA

County of COUNTY OF ALLEGHENY, to-wit:

Taken, subscribed, and sworn to before me this 2nd day of July, 2021.

My Commission expires July 13, 2024.

AFFIX SEAL HERE

Commonwealth of Pennsylvania - Notary Seal
Harry M. Ruben, Notary Public
Allegheny County
My commission expires July 13, 2024
Commission number 1141945
Member, Pennsylvania Association of Notaries

NOTARY PUBLIC _____