

# **Appendix A: Master Agreement between PADEP and the University**

Attachment 1

The University of Pittsburgh Master Agreement  
Contract No. 4400004037  
Project Template

**Project Name:**

The Effects of Subsidence Resulting from Underground Bituminous Coal Mining on Surface Structures and Features and on Water Resources: Fourth Act 54 Five-year Report

**Objective:**

The objective of the project is to prepare a report that summarizes all structure damage, land damage, stream impacts, and water supply impacts that have occurred during from the period of August 21, 2008 through August 21, 2013. The information contained in the report is derived from various sources including permit applications, map records, inspectors' observations, investigation files, mine subsidence insurance records, geographic data layers, and surveys of mine operators and property owners.

**Problem Statement:**

In 1994, the Pennsylvania General Assembly amended the Bituminous Mine Subsidence and Land Conservation Act by removing the absolute protection afforded to dwellings in place on April 27, 1966 and by adding new requirements relating to the repair of subsidence damage and the replacement of water supplies affected by underground mining operations. The amendments provided remedies for damages to more types of structures than the previous law and introduced, for the first time in Pennsylvania, remedies for effects on private water supplies. Recognizing that the amendments represented a major change in the way structures and water supplies were protected, the General Assembly included a statutory section requiring the PADEP to compile information regarding the effects of underground mining on surface structures and features and on water resources, including sources of public and private water supplies. The General Assembly further directed the PADEP to utilize the service of professionals or institutions recognized in the field in preparing this assessment.

**Performance Site (please list location where work will be performed):**

University of Pittsburgh  
Swanson School of Engineering  
Department of Civil & Environmental Engineering  
949 Benedum Hall  
Pittsburgh, PA 15261

**Will the University be accessing any state facilities or computer systems to complete any tasks? If so, please describe:**

Pennsylvania Department of Environmental Protection  
California District Mining Office  
25 Technology Drive  
California Technology Park  
Coal Center, PA 15423  
Rev. 7 15 2011

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The information the University will be accessing at the California District Mining Office is as follows:

1. The University shall make the maximum use of information contained in the PADEP's Bituminous Mine Information System (BUMIS) database. The BUMIS contains information on mines that operated during the assessment period; properties, structures and water supplies undermined during the assessment period, land, structure, and water supply impacts that occurred during the assessment period, claim resolutions, and the observations of PADEP field agents.
2. The University shall make the maximum use of information contained in relevant data layers maintained on the PADEP's geographic information systems. The California District Office maintains GIS data layers containing mine boundaries, longwall panels developed during the assessment period, and stream attributes. The PADEP's Emap system contains various data layers that may be useful in gathering supplemental details.

#### **Tasks:**

##### **Task 1: Review of Information**

- 1.1 The University will collect basic information from the Bituminous Underground Mine Impact System (BUMIS) and the permit applications on structures, wells, streams, wetlands, etc. undermined during the fourth assessment period. They will then provide an inventory of land, structures, wells, streams, and wetlands undermined that are pertinent to the report. The PADEP will supply a (Excel or Access) database with the BUMIS information.
- 1.2 The University will assemble 6-month mining maps and enter them into a GIS data base to obtain mine permit boundary's, water supplies, spring's, and structures locations and other pertinent surface information in relationship to the mine company's mining operations. Construct a GIS database containing the limits of the undermined area during the fourth assessment period and the location of structures, wells, streams, wetlands, etc. as located on 6-month mining maps or collected from BUMIS and permit files. The PADEP will supply digital copies of all 6-month mining maps active during the fourth assessment period. The PADEP will supply all electronic permit files that were submitted during the fourth assessment period.

##### **Task 2: Statistical Data**

- 2.1 The University will determine the total acreage of coal mined by mine name and mining method and submit to the PADEP a table with the acreage of coal mined sorted by mining method, mine name, and county.
- 2.2 The University is to consolidate all electronic relevant data used during the fourth assessment period. The University is to provide this information to the PADEP in ArcGIS, and Microsoft 10 format. The University will also provide the PADEP a copy of

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all publications, theses, and conference presentations that contain information gathered in conjunction with the fourth assessment period.

#### **Task: 3.0 Stream Impacts**

- 3.1 Identify the location of each reported incident of stream flow loss. Provide a GIS Layer of each mine showing the location of all reported incidents of stream flow loss that was longer than two-weeks or required augmentation and a table that lists the latitude and longitude of the center of the flow loss and the minimum and maximum lengths.
- 3.2 Identify the location of each reported incident of pooling. Provide a GIS Layer of each mine showing the location of all reported incidents of stream pooling and a table that lists the latitude and longitude of the center of the pooling and the minimum and maximum lengths.
- 3.3 Calculate the lengths of undermined streams (organized by mining method) that fall within one of the following categories: a) streams with no reported effects; b) streams affected by mining induced pooling; and c) streams affected by mining induced flow loss. Tables and maps listing the lengths of streams undermined (organized by mining method) that fall within one of the following categories: a) streams with no reported effects; b) streams affected by mining induced pooling; and c) streams affected by mining induced flow loss. Totals for each category as well as a cumulative total for all categories should be included with the tables. Data shall be made available to the PADEP in ArcGIS, and Microsoft 10 formats.

#### **Task: 4.0 Hydrologic Impacts**

- 4.1 The University will examine the hydrological monitoring data, the stream flow measurements and piezometer data, submitted to the PADEP to determine the adequacy of information submitted concerning stream impacts. They will then provide the PADEP an evaluation of the submitted hydrological monitoring data, stream flow measurements, and piezometer data for stream impacts for accuracy, quality, quantity, and sufficiency.
- 4.2 The University will review the methods and frequency of collecting flow measurements and piezometer data. They will then provide the PADEP with an evaluation of the methods and frequencies being used to collect the flow measurements and piezometer data, and whether the submitted data is adequate to assess stream impacts from flow loss and pooling.
- 4.3 The University will determine if any “affected” water supplies within the five (5) pre-selected streams were due to the lowering of the water table. The evaluation for each stream section should include information on stream flow, piezometer and pump test data, geological conditions, overburden thicknesses, topography, stream morphology and any other relevant geological characteristics.
- 4.4 The University will review the pre - and post-mining stream hydrology conditions of five (5) selected streams that lost flow, including at least two (2) streams where flow loss has exceeded the predicted recovery period (two to three years) as outlined in the Technical Guidance Document 560-2000-655. The evaluation for each stream section should

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include information on stream flow, piezometer and pump test data, geological conditions, overburden thicknesses, topography, stream morphology and any other relevant geological characteristics. The University will provide an evaluation on the potential causes of the changes in hydrologic conditions between the pre- and post-mining stream flow conditions. Emphasis should be placed on streams with long-term flow loss (greater than three years) with the goals of assessing the likelihood of near-term flow recovery and identifying any mitigating factors that are preventing or delaying recovery.

#### **Task: 5.0 Stream Impacts – Flow Loss**

- 5.1 The University will include an assessment of the pre- and post-mining “total biological scores” for segments of five (5) streams that experienced flow loss in accordance PADEP Technical Guidance 563-2000-655. Provide an assessment of the pre- and post-mining “total biological scores” for selected reported incident of stream flow loss.
- 5.2 The University will review and evaluate five (5) selected sections of streams that were undermined prior to the implementation of the Technical Guidance Document 560-2000-655. Provide an evaluation of the existing conditions of streams that were undermined prior to the implementation of the guidance document. The evaluation should include information areas of pooling, stream loss, and biological assessments.

#### **Task: 6.0 Stream Impacts – Pooling**

- 6.1 The University will conduct an evaluation five (5) selected sections of streams that had stream mitigation work completed during the fourth assessment period. The evaluation for each pooled section should include information on stream flow, piezometer and pump test data, geological conditions, overburden thicknesses, topography, stream morphology and any other relevant geological characteristics. They will provide to the PADEP a written section that evaluates the effectiveness how well the stream pooling mitigation is working, (ex. have the pooling issues been resolved, were there access issues, and are the biological scores returning after the pooling area was removed.) during the fourth assessment period in terms of flow restoration and biological community changes. The evaluation of each pooled section should include information on stream flow, piezometer and pump test data, geological conditions, overburden thicknesses, topography, stream morphology and any other relevant geological characteristics.
- 6.2 The University will determine the status of five (5) selected reported incidents of pooling and include an assessment of the pre- and post-mining “total biological score” calculated in accordance PADEP Technical Guidance 563-2000-655. Provide a section listing the locations and status of five (5) selected reported occurrences of stream pooling. The section should include an assessment of the pre- and post-mining “total biological scores” submitted to and collected by the PADEP as well as any recent fieldwork conducted by the University. The PADEP will supply the existing pre- and post-mining “total biological scores” for evaluation.

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#### **Task: 7.0 Wetland Impacts**

- 7.1 The University will determine the number of wetlands (identified in permit applications and renewals, and the NWI database) by type (e.g., vernal, emergent, palustrine, etc.) that were exposed to the effects of underground mining operations. Include information on whether these wetlands are in areas of planned subsidence and the depth of cover for wetlands. Provide a table listing the number of wetlands (identified in permit applications and renewals after the adoption of the TGS in 2007/2008, and the NWI database) by type (e.g., vernal, emergent, palustrine, etc.) that were exposed to the effects of underground mining operations. Provide tables or other means to show effects of mining on wetlands in areas of planned subsidence and depth to mining.
- 7.2 The University will determine the number and acreage of the wetlands that were restored or replaced during the fourth assessment period. A table and or other means (charts, graphs, etc.,) listing the number and acreage of wetlands restored or replaced during the fourth assessment period and after adoption of the TGS in 2007/2008.
- 7.3 The University will calculate the net gain or loss in wetland area resulting from mining-induced changes from existing data. A table and or other means (charts, graphs, etc.,) listing the net gain or loss in wetland area resulting from mining induced changes will be developed and provided to the PADEP.
- 7.4 The University will evaluate the effectiveness of the wetland replacements and provide a written section that includes the information on the effectiveness of restoring species, diversity, and hydrology.

#### **Task: 8.0 Water Supply Impacts**

- 8.1 The University needs to determine within 35-degrees (angle of influence) of the mine permit boundary the number of water supplies undermined and affected by the underground mining operations. A table or other means (charts, graphs, etc.,) identifying the number of water supplies undermined during the fourth assessment period must be submitted sorted by the following information:
  - a) Supply type (i.e. well, springs, or public water connection);
  - b) Use (i.e. domestic, agricultural, industrial);
  - c) Mining type (i.e. longwall, room & pillar and pillar retreat); and
  - d) Type of impact (i.e. contamination, diminution, or damage to physical components)
- 8.2 The University will evaluate and outline the processes involved with water supply replacements and the amount of time that is required to resolve the permanent water replacement.
- 8.3 The University will evaluate the resolution times and status of water supply replacements that occurred during the fourth assessment period. The University will submit to the PADEP a table that is based on the PADEP water supply replacement process that evaluates the amount of time required to resolve the impacts.

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#### **Task: 9.0 Structure Impacts**

- 9.1 The University will determine the overburden thicknesses for longwall mining operations that were active during the fourth assessment period and provide a GIS layer with 100-ft overburden contours.
- 9.2 The University will determine where available data exists, the overburden thickness for room and pillar mining operations that were active during the fourth assessment period, and provide a GIS layer with 100-ft overburden contours for any room and pillar mining operations that were active during the fourth assessment period and has existing overburden thickness data.
- 9.3 The University will define within a 200-foot buffer from the edge of the edge of the mining operations the total number of impacts to structures during the fourth assessment period due to undermining. Provide a table or other means (charts, graphs, etc.,) identifying the number of structures undermined during the fourth assessment period sorted by: a) structure type, (i.e. residential, public etc.), b) mining type (i.e. longwall, room & pillar and pillar retreat), and c) type of impact.
- 9.4 The University will determine the status and resolution times of structure repairs that occurred during the fourth assessment period. Provide a table or other means (charts, graphs, etc.,) that evaluates the status and resolution times of the structure impacts that occurred during the fourth assessment period.
- 9.5 The University will review the processes involved with structure repairs and the amount of time that is required to resolve the damage issues. A description of the structure repair process and the time required to resolve the structure repairs will be provided to the PADEP.

#### **Task: 10.0 Recommendations / Conclusions**

- 10.1 The University will submit an evaluation of the compiled data with conclusions concerning the effectiveness of PADEP's implementation of Act 54, and policies.
- 10.2 The University will provide recommendations based on the analysis of the data to the on how to improve the implementation of Act 54s.

#### **Task: 11.0 Draft of Report**

- 11.1 The University will write a draft report and submit it to the PADEP for comments by April 30, 2014.

#### **Task: 12.0 Final Report**

- 12.1 The University will address the PADEP comments on the draft report and deliver a final report on August 31, 2014. The University will provide the PADEP ten (10) printed copies of the final report, and one (1) electronic copy of the final report in Microsoft Word format.

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#### **Task: 13.0 Additional Deliverables**

13.1 The University will provide the PADEP with all relevant data used in the report. Provide the PADEP with all raw, manipulated, and computed data used in the, evaluations, interpretation and conclusions used in the assembly of the report in Word, Excel and ArcGIS format.

#### **Confidential Information:**

The following confidential information of the Agency will be part of the scope of work.

The UNIVERSITY agrees to protect the confidentiality of the COMMONWEALTH'S information. The COMMONWEALTH agrees to protect the confidentiality of UNIVERSITY'S confidential information. In order for information to be deemed confidential, the party claiming confidentiality must designate the information as "confidential" in such a way as to give notice to the other party. The parties agree that such confidential information shall not be copied, in whole or in part, except when essential for authorized use under this Contract. Each copy of such confidential information shall be marked by the party making the copy with all notices appearing in the original. Upon termination or cancellation of this Contract or any license granted hereunder, the receiving party will return to the disclosing party all copies of the confidential information in the receiving party's possession, (other than one copy of copyrighted works, which may be maintained for archival purposes only). Both parties agree that a material breach of these requirements may, after failure to cure within the period specified in this Contract, and at the discretion of the non-breaching party, result in termination for default.

#### **Project Meeting Requirements:**

A project meeting will be held face to face or electronically among the Principal Investigator and Agency project manager, or their designees, within ten working days of the issuance of the Purchase Order, to discuss the scope of implementation for the completion of the project. Subsequent project meetings will be held at the request of the Principal Investigator and Agency project manager, or their designees. Written minutes of, and action items resulting from, project meetings will be provided electronically by the Principal Investigator to the Agency project manager and all meeting participants within 10 working days of the meeting.

#### **Communications and Reporting:**

Oral or written communications that may affect the scope of the research project or services, budget, or period of the project shall be documented and relayed to the Agency project manager by telephone, e-mail, or memo for the Agency's consideration. Any changes shall only be effective through approval of the Agency and execution of a modification to the purchase order. If the increase totals the project to be greater than \$100,000, Department of General Services approval shall be received.



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The Principal Investigator will provide the following information to the Agency as shown in the chart below:

Task	Description	Due Date
11	Draft Report	April 30, 2014
12	Final Report	August 31, 2014
13	Additional Deliverables	August 31, 2014

**Management Plan and Staffing:**

**Biology Personal Services:**

Steven Tonsor, PhD (PI)

Post-doctoral Researcher

Graduate Student Researcher

Research Specialist

Undergraduate Student

**Engineering Personal Services:**

Anthony Iannachione, PhD (PI)

Graduate Student Researcher

Graduate Student Researcher

Undergraduate Student Researcher

**Geological Personal Services:**

Daniel Bain, PhD (PI)

Graduate Student Researcher

Work team members who have not yet been named shall be identified when they join the team. When a new team member is named, the Principal Investigator will notify the Agency in writing prior to charging the person's time to the project.

**Overall Performance Time Frame: (For The University of Pittsburgh to fill out)**

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This research project or services will be completed 24 months from the date of issuance of the Purchase Order.

September 01, 2012 – Project begins

March 12, 2013 – Progress meeting

September 18, 2013 – Progress meeting

February 11, 2014 - Progress meeting

April 30, 2014 – Draft of final report submitted to the Department

May 31, 2014 – Department returns comments on final report to the University

August 31, 2014 – Final report provided to Department