# Risk MAP CDS

# Hazus 4.2 SP1

## User Release Notes

Version 1.0

May 29, 2018

# Document Management History

## Revision History

| Version Number | Date | Summary of Changes | Team/Author |
|:---:|:---:|:---|:---:|
| 1.0 | 05/29/2018 | Initial version | Risk MAP CDS |

# Table of Contents

# PLEASE READ BEFORE CONTINUING WITH PATCH INSTALLATION

Hazus 4.2 SP1 contains a number of database changes, detailed in the table below. You will be prompted to apply some of these changes to your existing Hazus 4.2 study regions during patch installation. You may decline the changes to existing study regions if preferred, or select a subset of study regions to update. Please note, if you do not update your study regions at this time, they cannot be updated at a later time. Study regions without the update will work in Hazus 4.2 SP1, but will not reflect the SP1 data changes in the table below. None of the database changes will be automatically applied – you must apply them using the steps detailed in the table below, depending on data type.

| Data Change Type | How to Apply |
|---|---|
| Database schema changes for Earthquake, Hurricane, and Flood Models only | - When prompted during patch installation, select the existing Hazus 4.2 study regions to be updated with these changes<br>- Any 4.2 study regions you do not select will not be updated<br>- Any new 4.2 SP1 study regions you create will contain these changes |
| Defect fixes which may impact results data | Open an existing 4.2 study region after patch installation and re-run analysis to see updated results data |
| 2018 RS Means Valuation Updates for General Building Stock (U.S. States and Puerto Rico only) | Download the new state databases(s) you wish to work with from the Map Service Center, and aggregate a new study region on a machine installed with the patch. |

# 1. Introduction

Hazus Release 4.2 SP1 is a service pack release, implementing State database updates as well as defect fixes and major enhancements, detailed below. Hazus 4.2 SP1 is compatible with ArcGIS 10.5.1 and is supported for 64-bit Windows 7 and Windows 8.1, as well as Windows 10 operating systems.

Hazus 4.2 SP1 will be released via the automatic update tool in the Hazus software. Users will be prompted to download the patch upon opening the Hazus application. A copy of the patch will also be made available at: FEMA Flood Map Service Center (MSC) Hazus download webpage for free public download. Updated state databases will also be available for download. The scheduled release date is May 29, 2018.

The purpose of this document is to describe the functional changes and known issues found in the Hazus 4.2 SP1 release package and associated data updates.

# 2. Contents of the Release

**Shell and Utility Items:**

- Users familiar with the HazusExport.py script in C:\Program Files (x86)\Hazus-MH\BIN\Tools can now find the script updated and integrated with the ArcToolbox within Hazus study regions
- Hazus is undergoing a brand refresh including updated logos removing the–MH suffix in as many software components, documentation, and outreach material as possible. Crystal Reports logos have been updated to reflect this change in this release

**Flood Model:**

- **The USGS DEM import process is now automated such that users can download and extract all required DEM files as determined by Hazus in a single batch process. FLT and IMG file formats are also supported.**
  - The user can now select the "Download and Unzip All" button after the DEM list populates from USGS. A progress bar will appear while the files are extracting
  - Once extraction is complete, the files will be viewable and searchable at C:\HazusData\HazardInput\Flood\<study region name>
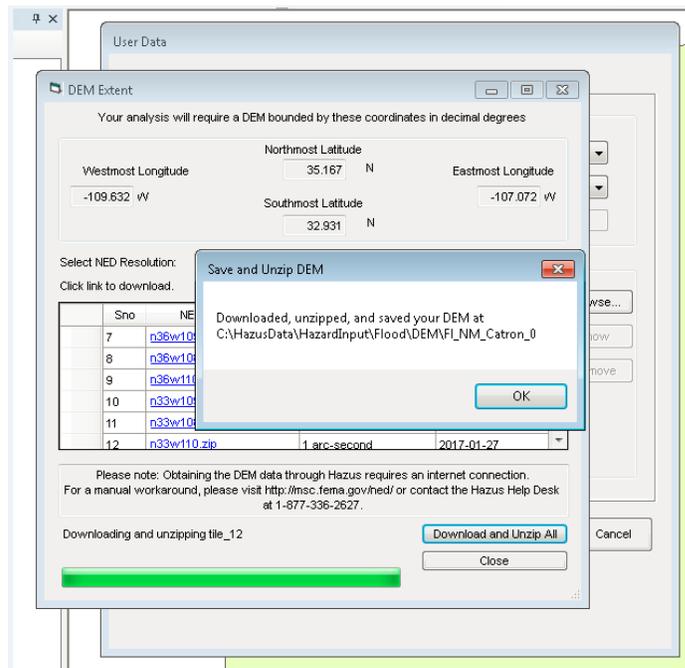


- Depth damage functions can now be assigned for Essential Facilities Content and

Inventory. If no valid DDF is specified or available, the EF analysis will default to the DDF for the facility's Specific Occupancy class
- A defect was fixed where losses exceeded exposure in cases of extreme flooding. Losses are now calculated correctly for these scenarios

## Earthquake Model:

- Shelter parameters were updated to match those changes made in Hazus 4.2 for flood shelter parameters, including:
    - Any editable field within the Shelter Parameter menu that does not impact results is now disabled to avoid confusion
    - Notification is provided to the user if incorrect values are entered into editable fields, or if the entered values sum to a total exceeding what is permitted
- New options for site soil characterization data based on USGS Vs30 are now available for probabilistic scenarios (see FEMA P-366 USGS NEIC methodology https://www.fema.gov/media-library/assets/documents/132305).  This data can be found in C:\ProgramFiles(x86)\Hazus-MH\Data\EQ\USGS_wsoilamp.mdb and used as needed. Users providing their own soil data from a different source can continue to do so. Instructions for working with the USGS data can be found in Appendix A.
- Performance speed was improved for analysis of probabilistic scenarios containing User Defined Facilities (UDF) and Advanced Engineering Building Module (AEBM) data; users will notice faster performance unless using their own multi-polygon soil data in combination with UDF
- Any unnecessary remnants of Average Annualized Loss (AAL) analysis which remained in SQL Management Studio are now properly deleted
- A defect was fixed where AEBM, UDF and Essential Facilities (EF) was overestimating losses due to ground deformation
- A defect where ArcMap crashed after clicking on 'OK' following AAL analysis completion is now fixed
- A defect was fixed where older versions of ShakeMap files caused the Fire Following Earthquake (FFE) Analysis to crash
- AEBM data entered manually to the study region via Add New Record will now include a correct shape attribute

## Hurricane Model:

- Hurricanes Sandy (2012), Harvey (2017), Irma (2017), Maria (2017), and Nate (2017) are now included in the historic hurricane database for use in analyses. Please note, surge analysis in Hazus is not recommended for these storms. Authoritative, observed surge data for these storms is already available from FEMA National Hazards Risk Assessment Program (NHRAP) at: https://data.femadata.com/FIMA/NHRAP/  and https://data.femadata.com/NationalDisasters/MOTF/Hurricane_Sandy/ and may be integrated into the coastal flood model as a user-defined flood depth grid, as such, wind and surge loss analysis should be considered separately for these storms.
- Probabilistic analysis is now working for Hawaii

- A new view was created allowing users to view the total number of buildings damaged, by count
- Results for individuals seeking shelter now display in units of population, not households
- Users can now develop and correctly assign mapping schemes to Essential Facilities
- Hazus no longer freezes when attempting to map wastewater facilities in hurricane
- Users can now bring UDF data into State Databases via the Comprehensive Data Management System (CDMS), aggregate study regions and perform UDF loss analysis. See the CDMS section below for additional details

## Tsunami Model:

- Combined losses due to moderate earthquake events are no longer underestimated

## Comprehensive Data Management System (CDMS) and Data Changes:

- Capability was enabled in CDMS to allow import of, aggregation with, and losses based on UDF for hurricane, specifically the huUserDefinedFlty table
- This is intended as the first phase in an ongoing upgrade of hurricane UDF capability; users will find that hazard application to the UDF is still based on tract level data within hurricane and is not impacted by this change
- CDMS no longer sets incorrect default values for point data fields being imported when target state database records are empty
- Building economic loss parameters used by all models have been updated to 2018 values
- In the latest Hazus 4.2 SP-1 release, valuations for all Hazus State databases (except Territories) have been updated from 2014 using the latest 2018 RS Means data. In addition, a more refined and accurate approach that utilized RS Means 2018 County adjustment factors for residential and non-residential, as well as income ratios for adjusting single-family residential home valuations were included. As a result, significant changes in some
- States are noted:

| % DIFF of Total | State | % DIFF of Total | State | % DIFF of Total | State | % DIFF of Total | State |
|---|---|---|---|---|---|---|---|
| 35.22% | AK | 10.34% | WI | 0.80% | DC | -6.73% | WY |
| 34.08% | NJ | 9.66% | OR | -0.12% | ID | -7.21% | LA |
| 32.84% | HI | 8.72% | NV | -0.14% | ME | -7.66% | SD |
| 29.88% | CA | 7.77% | MO | -0.24% | MD | -8.09% | UT |
| 29.85% | NY | 7.53% | VA | -0.51% | KS | -8.26% | NM |
| 29.24% | IL | 6.79% | NH | -0.74% | IA | -8.66% | AL |
| 25.51% | MA | 5.99% | VT | -1.81% | NE | -10.15% | TX |
| 23.24% | CT | 3.74% | MI | -2.21% | ND | -10.57% | TN |
| 18.81% | RI | 3.48% | SC | -4.14% | CO | -10.59% | OK |
| 13.39% | MN | 3.05% | NC | -4.60% | KY | -11.17% | FL |
| 13.17% | PA | 2.30% | WV | -4.62% | AZ | -12.80% | MS |
| 12.98% | WA | 2.02% | OH | -4.87% | GA | -14.35% | AR |
| 12.43% | DE | 1.68% | IN | -6.24% | MT | | |

# 3. Known Issues

In addition to items listed above, this section outlines issues that are known to occur in Hazus 4.2 SP1, but were present prior to 4.2 SP1 development. Workarounds are provided where applicable.

- Occasionally, running historic storms in hurricane with the surge option enabled will cause an error during analysis. This is believed to be caused by incomplete SLOSH basin data, however a more thorough investigation is needed
- In the data updates described above, please note that U.S. Territory data other than manufactured housing for Puerto Rico are not updated
- Opening a layer attribute table through the Table of Contents within Hazus has occasionally caused Hazus to crash in previous versions. With the upgrade to ArcGIS 10.4, Esri identified a bug where the attribute table crashes became much more frequent. A patch was provided by Esri for use in Hazus 3.2, and is now incorporated into the software. However, users should be aware that this issue may continue to occur on rare occasion. If the attribute table data is needed, a manual export of the data to a program outside of ArcMap or Hazus may be necessary.
- When mapping Hazus inventory and results, the layer which is generated by Hazus can't be queried.  To get around this issue, right click and export the layer.  This new layer can be queried.
- CDMS users at the FEMA's Emergency Management Institute (EMI) and users with similar workstation security settings may be unable to export to Excel. Please contact the Hazus Help Desk for a workaround: hazus-support@riskmapcds.com
- Windows Enterprise users may need to install MS Office in order for Hazus to work correctly.
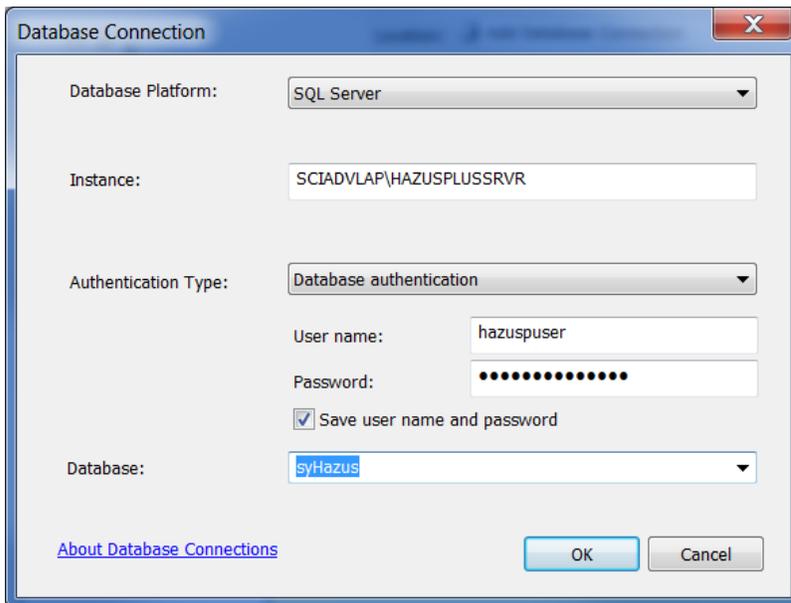
# Appendix A – Updating USGS Ground Motions for Probabilistic Earthquake with Site Amplification

Steps:

Open ArcCatalog and select add a Database Connection:
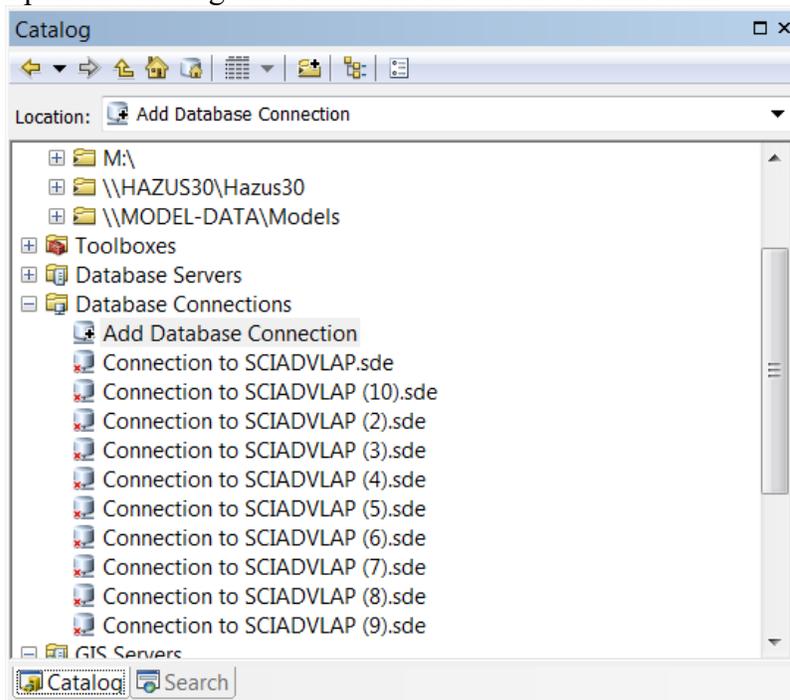


Complete GUI as shown below, using your local computer name as instance (<your computer name>\HAZUSPLUSSERVER). **For the username and password, please contact the Hazus Help Desk:** hazus-support@riskmapcds.com

Open the new syHazus connection—this is the underlying SQL database for the Hazus program, each state dataset, as well as each study region will also be a database that you can connect to in this way. These backend tables are often more comprehensive than available in the Hazus GUI but are a challenge to navigate.

The second to last table is the syHazus.dbo.USGS table we need to truncate all existing fields and load in the new data.

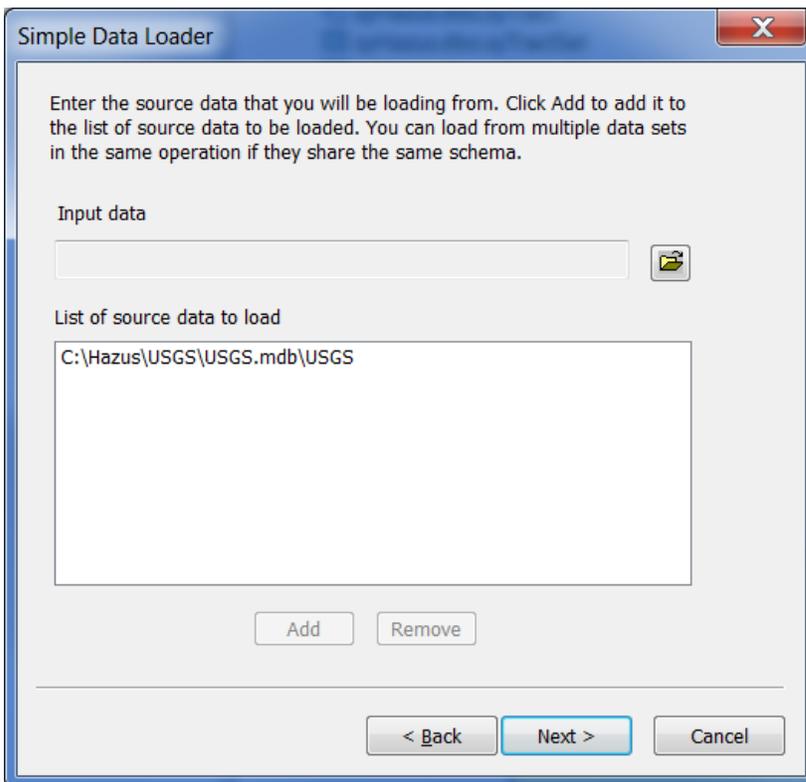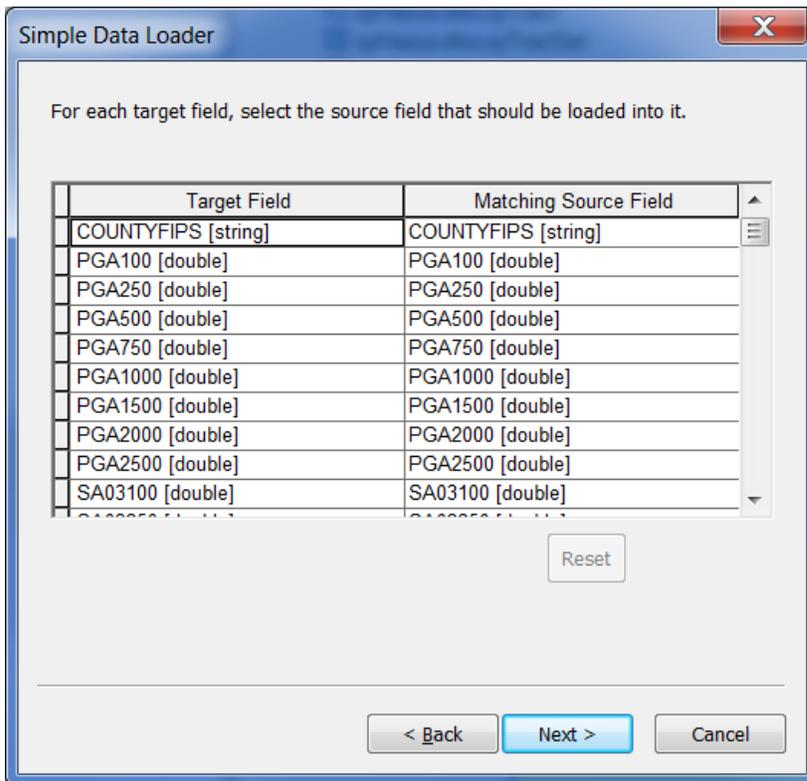Find and open the Truncate Table Tool:
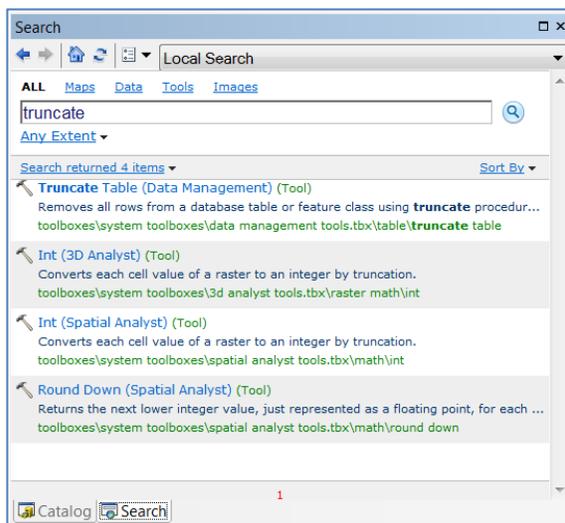
Truncate USGS table:
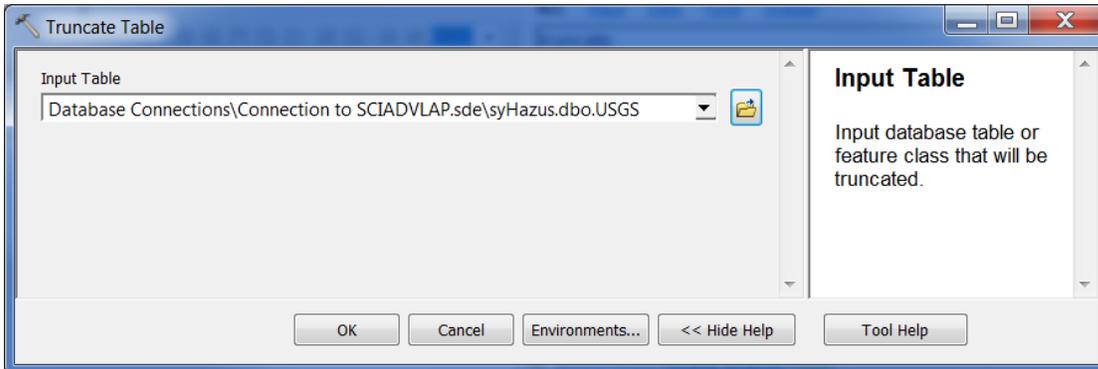


Go back to ArcCatalog and right click the now empty USGS table and select "Load Data…"

Browse to new USGS.mdb from the USGS at :\ProgramFiles(x86)\Hazus-MH\Data\EQ\USGS_wsoilamp.mdb and select Add:



Click Next and make sure fields match up:

Click Next two more times and Finish. This should take a few minutes to load and now all the data are newly replaced and new study regions will be built using the new USGS values.

When running a **Probabilistic Scenario**, Hazus will use Site Class D and apply amplification by default. However, since the updated values already include amplification, the user will need to ensure Hazus does not assign additional amplification to the values. First set Site Class soil maps to B using the **Scenario➔Define Hazard Map** feature:
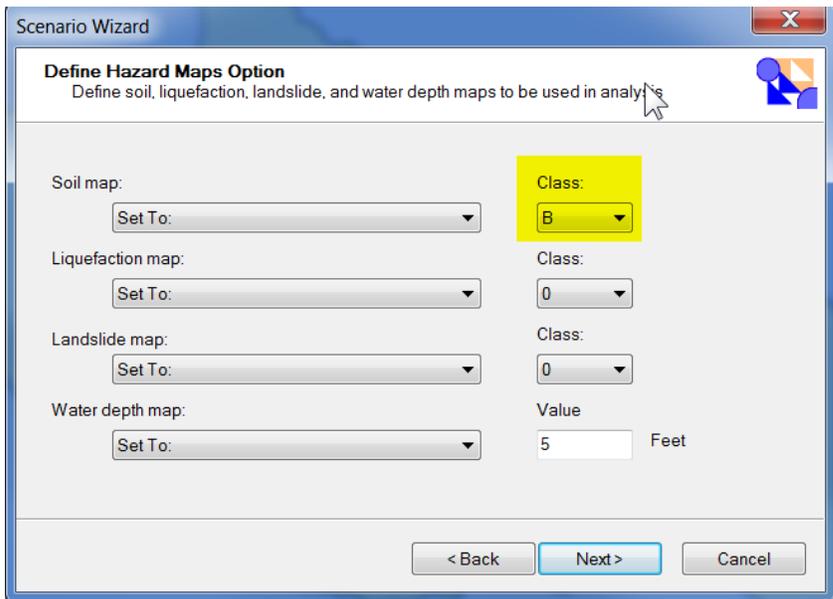
Set site class B amplification factors to 1.0 under Analysis→Parameters→Hazard, right click and select Start Editing (complete for PGA, 0.3 and 1.0 factors) and save: