

Guidance for Flood Risk Analysis and Mapping

Geospatial Data Coordination

May 2016



FEMA

Requirements for the Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) Program are specified separately by statute, regulation, or FEMA policy (primarily the Standards for Flood Risk Analysis and Mapping). This document provides guidance to support the requirements and recommends approaches for effective and efficient implementation. The guidance, context, and other information in this document is not required unless it is codified separately in the aforementioned statute, regulation, or policy. Alternate approaches that comply with all requirements are acceptable.

For more information, please visit the FEMA Guidelines and Standards for Flood Risk Analysis and Mapping webpage (www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping), which presents the policy, related guidance, technical references, and other information about the guidelines and standards development process.

Document History

Affected Section or Subsection	Date	Description
First Publication	May 2016	Initial version of new transformed guidance. The content was derived from the Guidelines and Specifications for Flood Hazard Mapping Partners, Procedure Memoranda, and/or Operating Guidance documents. It has been reorganized and is being published separately from the standards.

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1.0 GDC Overview

The Department of Homeland Security's (DHS's) Federal Emergency Management Agency (FEMA) has developed Geospatial Data Coordination (GDC) standards and guidance that establishes the principles for coordinating, communicating, documenting, and reporting existing and proposed geospatial data collected, produced, or manipulated under FEMA's Risk MAP Program. The purpose is to facilitate data sharing and secondary data use. The primary goals of GDC are to ensure that the Risk MAP Program will:

- Protect its investments in geospatial data by requiring data to be documented, standard compliant, and easily accessible to the general public when appropriate and release of the data does not pose a security risk;
- Maximize the use of partnerships, including Federal, State and local partners, for the acquisition and production of geospatial data;
- Minimize duplicative requests from Federal agencies to State and local data stewards;
- Recognize the value of existing coordination efforts at the State and local levels; and
- Comply with all Federal requirements for coordination and reporting of geospatial activities.

Access to the GDC SharePoint site is available through FEMA's Risk Management Portal or the Mapping Information Platform (MIP).

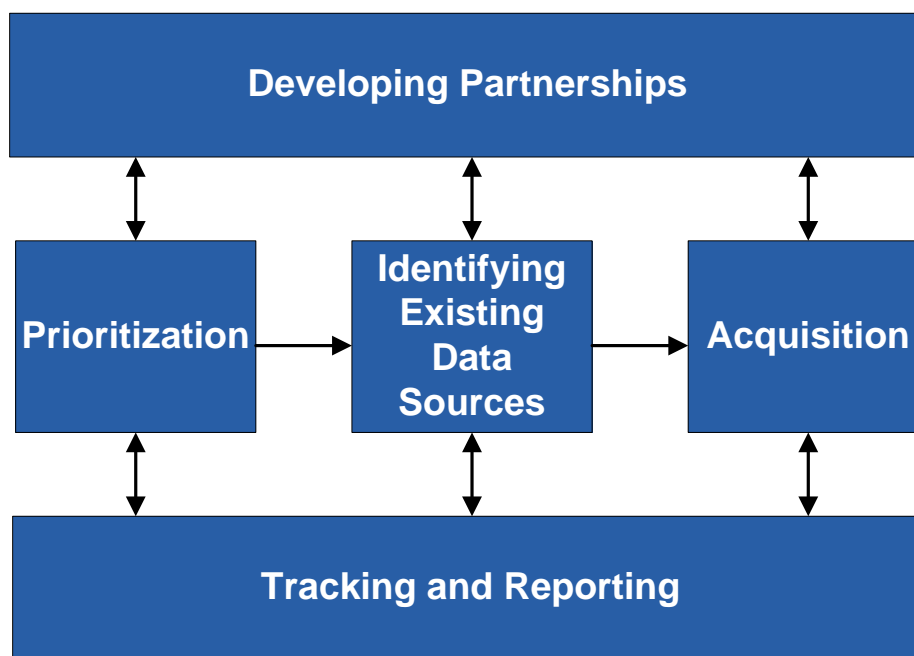
Risk MAP standards 152, 153, 154, and 155 require efforts to obtain necessary geospatial data for Flood Risk Projects be well organized, leverage existing Federal, State and local geospatial data coordination efforts, and respect the limited resources of organizations and individuals involved in coordination. Mapping Partners must report changes in state processes and points of contact to FEMA to help keep processes current. Project teams must comply with reporting requirements for all projects, documenting data sets, reporting leverage value for significant data sets used on Flood Risk Projects, and reporting information about Light Detection and Ranging (LiDAR) priorities, planned LiDAR acquisitions, and completed LiDAR projects.

2.0 GDC Coordination

The coordination process begins with prioritization and planning of elevation data needs, consistent with Regional multi-year plans for Risk MAP. FEMA should work regularly with state partners and other Federal agencies to understand state mapping plans, particularly state LiDAR plans. FEMA should share future mapping priorities on a regular basis and engage in discussion with potential partners about future projects. As projects move through Project Planning, Discovery and Data Development phases of a Flood Risk Project, FEMA Regions or their designees must keep the Project Planning and Purchasing Portal (P4) information up-to-date with project plans or create new records as necessary. Project work that is in progress must be tracked in the MIP. Leverage related to geospatial data provided by Federal, state, and local partners, is recorded in Scoping (Discovery) or data development MIP workflow tasks.

The input geospatial data sets and final versions used on the project are then submitted to the MIP for data management purposes and are archived at the completion of these MIP tasks.

Figure 1: Procurement coordination activities and relationships



2.1 During Project Planning

FEMA Regions should maintain current year and possible future year LiDAR purchases in the P4 tool, including geographic footprints. The project areas will be shared through the 3D Elevation Program (3DEP) online coordination system. Future year projects will be listed as possible areas of interest and do not represent any commitment from FEMA. Current year projects will be listed as likely FEMA purchases. Once funding has been allocated and the purchase is under contract any assigned MIP tasks must be updated by project teams to report budget, progress and any partner leverage.

2.2 During Discovery

Project teams should be diligent in finding geospatial data during a project's Discovery phase. This identification and collection process should be well organized to leverage previous Federal, state and local geospatial data coordination efforts and avoid placing unnecessary burden on partners providing data. Project Teams should take the following steps in finding geospatial data during Discovery:

- Start with applicable State Geospatial Data Coordination Procedure documents for details on state-wide data coverages as listed for Flood Insurance Rate Map (FIRM) and Discovery purposes.
- Get additional details on National coverages from the National Discovery Data Coordination Procedure document and the inventories and resources identified there.

- Some of these data sets are available for easy download from the Discovery Data Repository on MIP File Explorer.
- Engage with local, state, and state or regional Federal offices on the available data identified in the prior steps to see if they are aware of additional resources you have not identified.

One of the key Risk MAP strategies to improve the effectiveness of geospatial coordination efforts is to maintain the National and State Data Coordination Procedure documents. FEMA maintains documented coordination procedures for each State. The goal is to work within the existing State coordination mechanisms to the maximum extent possible and to work closely with other Federal agencies at the state level to reduce redundant Federal requests to the states. These documents provide instructions on the most appropriate data available nationally and describe key data resources, data providing organizations, and processes for each state. These documents, found on the MIP under Tools & Links, are intended to help reduce the level of effort needed to find appropriate data. Project Teams should ensure the geospatial data search is adequate in order to avoid purchasing new data where suitable information already exists.

Initial data collection should be followed by research for local data sets, including coordination with local community sponsors. For most types of data, local data sets are preferable to state and National coverages, if obtainable. The Project Team should share the results of their initial searches of national and state data resources with local, state and state or regional Federal offices. This allows these engagements to focus on identifying available data missed during the initial search rather than putting the burden of gathering information from well-known public sources or partners FEMA coordinates with. Contact information for geospatial coordination at the state level is available on the MIP under Tools & Links.

The leverage value of significant data sets used for a project must be reported accordingly. If the need for, or scope of, planned elevation data purchases is impacted by the outcomes of Discovery, then the information in P4 must be updated.

For detailed procedures regarding geospatial data identification and collection see the GDC SharePoint site.

2.3 During Topographic Data Development

To comply with the standards for geospatial data tracking and reporting, purchases involving topographic data development (terrain, LiDAR, etc.) must be entered into the P4 tool and reflect an accurate project footprint. The work must be tracked in a MIP Develop Topographic Data task to report accurate budget, progress and any partner leverage. Topographic data deliverables must comply with FEMA data capture standards and comply with Federal Geographic Data Committee (FGDC) metadata requirements.

For topographic data capture standards see the following FEMA guidance documents: [Data Capture Technical Reference](#), [Elevation Guidance](#), [Data Capture – Workflow Details](#), and [Data Capture – General](#).

Table 1: Key Data Elements in each System

P4 (LiDAR Purchase)	MIP (Develop Topographic Data Task)
Accurate spatial footprint for LiDAR purchases - It is critical that a final, accurate footprint is submitted to avoid future overlaps or slivers in coverage with adjacent LiDAR.	Budgeted Cost
Any elevation purchases that are not new LiDAR acquisition should have Tier 2 scope for “elevation data integration” or similar elevation processing scope to avoid the appearance of a new LiDAR purchase.	Leverage
The purchase status must be up-to-date (planned, funded, completed)	Scheduled start / end date
Fiscal year	Actual start / end date
MIP Case Number	Project status

3.0 GDC Partnerships

FEMA seeks to develop relationships that support the immediate Risk MAP program and continual, longer-term maintenance of the data. FEMA seeks these partners to defray the costs of new data collection and provide opportunities to expand the areas of data acquisition and areas processed. These partners might be organizations that are participating in the project, or organizations that have other business reasons for needing data in addition to the area identified for the project. Partnerships provide awareness to stakeholders of where FEMA plans to use resources for collecting high quality elevation data and to identify potential partners that want to work with FEMA to collect new data. The development of new elevation data by other organizations in the middle of a flood risk project generally creates a difficult situation where the new information cannot be incorporated into the project without significant cost and schedule impacts, but stakeholder expectations are that the latest information should be incorporated into the updated flood hazards information. The best way to avoid this situation is ongoing coordination with Federal, state, and local partners.

Lists of Federal and State GDC points of contact are maintained on the MIP by State and are updated on a semi-annual basis. Mapping Partners must report changes in state processes and points of contact to FEMA to help keep processes current.

4.0 GDC Communications

In addition to the project based geospatial coordination activities described in Section 2, there are also regular monitoring and communication activities. The GDC National Team produces

monthly monitoring reports that highlight GDC reporting needs, distribute the semi-annual GDC report for Regional review, and publish the finished report.

Communications will be distributed on multiple channels throughout the year as needed. There may be an annual stakeholder meeting to give an overview of the GDC processes, distribute work instructions, communicate the annual and monthly schedule, and demonstrate the use of additional resources included on the GDC site. Routine monthly communications and quarterly meetings may also be carried out by the GDC National Team as needed.

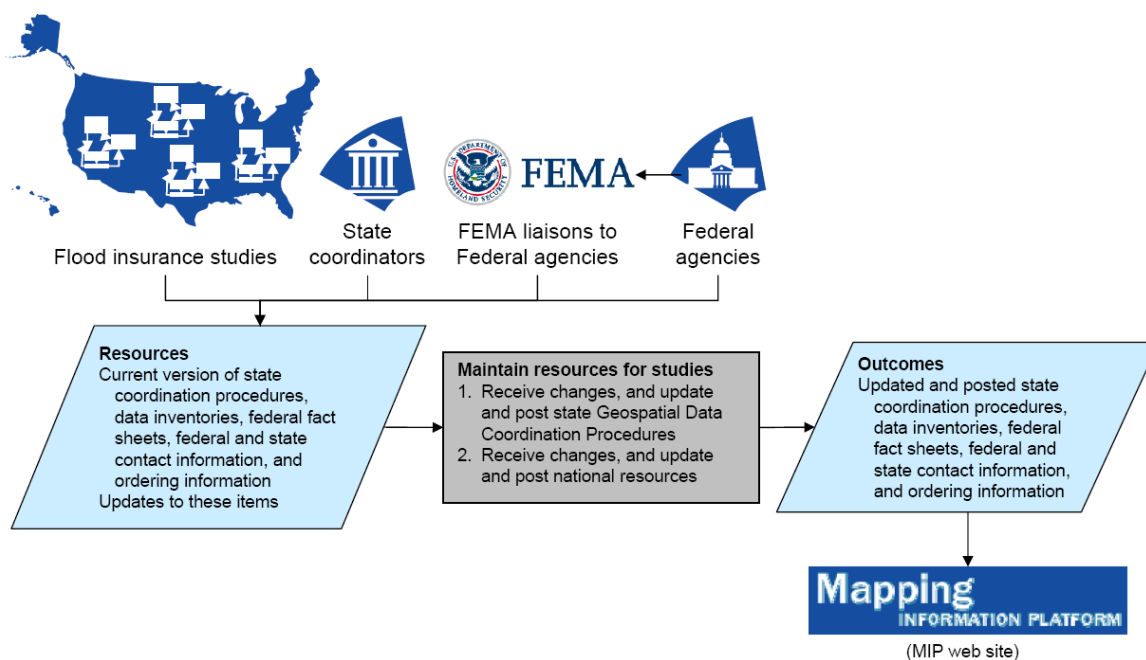
5.0 GDC Documentation

GDC efforts are documented in two primary ways, at the state level through Standard Operating Procedures which were created in coordination with each State and at the project level when Project Teams are capturing leverage information in the MIP.

5.1 State Standard Operating Procedures

FEMA has documented a Geospatial Data Coordination Procedure, sometimes called the “State SOP” (standard operating procedure), for each state. Prepared in cooperation with each state’s geospatial data coordinator, the procedures outline sources of the best available geospatial data and contact information, preferences for base map data and state geospatial participation in projects, and other useful information. They also provide reminders about unique needs for states, such as the need to coordinate with special district governments (such as regional planning commissions and councils of governments as well as flood control, levee, and water districts), use of the Public Land Survey System in the state, or to consider extra-territorial jurisdictions for projects. Mapping partners performing projects must provide feedback to FEMA on the procedure as a means to continually improve this resource. State SOP documents are posted to FEMA’s MIP. These documents are regularly reviewed and revised if necessary.

Figure 2: Process to maintain resources for Flood Risk Projects



5.2 Creating Leverage Entries

5.2.1 Leverage Defined

Leverage, per GDC requirements, is defined as any data funded in whole or in part outside of FEMA that is used as the base map or elevation data for a FEMA Flood Risk Project and should be reported, provided it has not been used by FEMA on a previous project. For datasets that span multiple project areas, leverage should only be claimed for the portion of the data used, when it is used. If the mapping partner does not know whether the data has been used previously or not, they should go by the date the data was created. If it was created prior to last FEMA map revision, it should not be counted.

GDC classifies leverage as being produced or gathered and base map or topographic based. These definitions are important in understanding the relationship between leverage entries and the subsequent reporting that occurs to account for entered leverage.

- **Produced Topographic Leverage:** Instances where the cost of the production of new elevation data is being shared with a partner other than FEMA, meeting the GDC definition of leverage. In GDC context, the term elevation data refers to datasets which identify the height of the ground at specific locations. These datasets are a component of the models that determine where water flows and what the water surface elevation will be for specific floods. The density of points in the collection may vary based on the needs of the data collector. LiDAR is the most common technique for FEMA's elevation data acquisition. (Also referred to as "Topographic Data" or "Topo")
- **Gathered Topographic Leverage:** Instances where the use of existing geospatial data meets the GDC definition of leverage. In GDC context, the term elevation data refers to datasets which identify the height of the ground at specific locations. These datasets are a component of the models that determine where water flows and what the water surface elevation will be for specific floods. The density of points in the collection may vary based on the needs of the data collector. LiDAR is the most common technique for FEMA's elevation data acquisition. (Also referred to as "Topographic Data" or "Topo")
- **Gathered Base Map Leverage:** Instances where the use of existing geospatial data meets the GDC definition of leverage. Base map data is a spatially accurate map that shows the georeferenced location of geographic features. These features include roads and railroads, streams and lakes, boundaries, other geographic features, and related names and labels. Most base maps are created today using orthoimagery, which are aerial photographs processed to have the spatial accuracy of a map.

5.2.2 Entering Leverage in the MIP

The MIP is used to store leverage information in order to increase the efficiency of the leverage collection and calculation processes. A leverage entry is information specific to the Scoping (Discovery) or Data Development tasks that occur during the production of Flood Risk Projects and is intended to show any contribution towards the making of FIRMs. The leveraging of existing, or gathered, data is typically entered during the Scoping (Discovery) task, while any leverage to be counted towards the production of new data should be entered into the

appropriate data development task. There are other situations, however, in which certain leverage contributions have not yet been captured in the MIP because the contribution was not known when the project began or the leverage entry window closed prior to a leverage entry being made. In these situations, work with your Regional GDC Lead to enter the necessary information into the MIP or GDC SharePoint site.

In order to enter leverage information in the MIP the leverage screen within the Scoping (Discovery) or Manage Data Development task must be opened by the Project Manager. To access the leverage screen the Project Manager must update required status fields for each funded task including Actual Start Date, Actual Cost to Date, Percent Complete, and the As Of date. Once this information is entered for each funded task the leverage entry window is considered open and the Project Manager is able to enter leverage information for each funded task. There are leverage screens in different locations within the MIP project workflow including Scoping (Discovery) and Manage Data Development. The Project Manager is required to fill in the four fields for each funded task for which there is leverage information to be entered. The four required fields are marked in the leverage screen with a red asterisk, and include: Quantity, Type, Contributed By, and Federal Fiscal Year, see Figure 3 below. If no leverage information is relevant for a particular task then the fields can be left blank.

Figure 3: MIP Leverage Screen

The screenshot shows the 'MIP Leverage Screen' for 'Project # 08-01-0500S'. The page title is 'Work Item List - auto_modrnc_1 - May 21, 2008'. The main heading is 'Work Item Details - Project # 08-01-0500S'. The task status is 'Leverage'. The page contains a form for 'Manage Data Development : Leverage'. The form includes a 'Task Name' section with a red box around the 'Develop DFIRM Database - Leverage included' entry. Below this, there are four required fields marked with a red asterisk: 'Quantity', 'Type (Blue Book Units or Dollars)', 'Contributed By', and 'Federal Fiscal Year'. A 'Comments' section is also present. At the bottom, there is a table titled 'Added Task Leverage' with columns for 'Quantity', 'Type (Blue Book Units or Dollars)', 'Contributed By', 'Federal Fiscal Year', and 'Comments'. The table contains one row with the following data: Quantity: 23, Type: Dollars, Contributed By: Charlotte-Mecklenburg Storm Water Services, NC, Federal Fiscal Year: 2006. The page also includes navigation buttons like '< Back', 'Save and Close', and 'Continue >'.

A leverage entry as described above should not be confused with the actual leverage data. Leverage entry information represents the quantities (e.g. dollars, panels, or square miles) and types of leverage data being collected. Leverage data will ultimately be captured during their respective data development tasks, such as Develop Topographic Data, Acquire Base Map, and Develop Hydrologic Data or is uploaded during Discovery (Scoping). See the data capture guidance and technical reference for more information.

For a step-by-step guide for MIP users on entering leverage see the GDC SharePoint site. It describes how to enter information into the MIP leverage screens and provides guidelines for those responsible for reporting leverage.

6.0 GDC Reporting

Regional GDC Leads monitor compliance to geospatial data coordination requirements at the Discovery and data development project phases by acting on the GDC reconciliation reports, described below. Regional GDC Leads should provide reconciliation results to the mapping partner to ensure adherence to FEMA's GDC requirements. Regional GDC Leads will facilitate monthly reconciliation, analyze compliance data, and report unresolved issues to the FEMA Regional offices. National issues will be elevated to the GDC National Team for review and recommend solutions to the FEMA GDC Lead.

The GDC National Team will provide regular updates and notifications about geospatial coordination resources and activities to the Regional GDC Leads and other interested parties. Internally, the quarterly GDC National Team conference call can be used as a forum to review reconciliation summaries and draft geospatial coordination reports and gather feedback and guidance from the FEMA GDC lead. Summaries of the reconciliation results may also be shared at the National level through the main Risk MAP Conference call and/or other mechanisms to emphasize the importance and allow the Regional Management staff to see how their performance compares with others.

6.1 Monthly Reporting

The GDC status reports contain graphs and tables showing GDC compliance by region and leverage type. The reports are used to determine which FEMA mapping projects need attention in order to be compliant with GDC requirements. The reports are run monthly, sent to the GDC User Community and posted on the GDC SharePoint site. Regional GDC Leads review the reports and coordinate with their regional teams to update to the MIP, add project Exceptions, or create Leverage Entries to resolve non-compliant issues.

For complete instructions on reconciling monthly status reports see the [Geospatial Data Coordination Requirements for Risk MAP Projects](#) document or the GDC SharePoint site.

Table 2: GDC reports and related MIP tasks

GDC Status Report	Related MIP data activities	Related MIP tasks with leverage entry screens
Topographic Production Leverage	Develop Topographic Data	Manage Data Development
Topographic Gathered Leverage	Scoping	Scoping
	Develop Topographic Data	Manage Data Development
Base Map Gathered Leverage	Scoping	Scoping
	Acquire Base Map	Manage Data Development

6.1.1 Report Reconciliation Statuses

Reconciliation reports will list one of five statuses for each Flood Risk Project. Non-compliant projects should be made compliant through either a leverage entry or an exception entry.

- Compliant-entered (a valid leverage entry exists)
- Compliant-exception (a leverage exception entry exists)
- Incomplete-window pending (no leverage entry nor exception entry exists and the Manage Data Development leverage window is not yet available)
- Incomplete-window/task open (no leverage entry nor exception entry exists and the Data Development/Scoping leverage window is available)
- Non-compliant-window closed (no leverage entry nor exception entry exists and the Manage Data Development leverage window is no longer available)

6.1.1.1 Status Report – Topographic Production Leverage

This status report looks at Flood Risk Projects that are identified in the MIP as having a Develop Topographic Data task and ensures that there is either a produced topographic data leverage entry in the MIP or an exception entry.

- **Leverage Entry** – Created in the MIP if the topographic data to be used in a Flood Risk project was funded in whole or part outside of FEMA, meeting the GDC definition of leverage.
- **Exception Entry** – Created if the data being produced is wholly funded by FEMA as part of a Flood Risk Project or if no leverage data exists. Any project with a Develop Topographic Data task must have a produced leverage entry or an exception entry.

The production of topographic data as leverage typically includes the contribution of money or other similar resources by states, local communities, or others. This type of leverage is

recorded when the Project Team produces new geospatial data such as flying, collecting, and/or processing LiDAR data. The associated leverage information for this new geospatial data should be recorded in the MIP under the Manage Data Development task for each applicable Develop Topographic Data activity. If leverage does not occur, a project exception entry should be made to positively acknowledge this on the GDC SharePoint site by the Regional GDC Lead.

6.1.1.2 Status Report – Topographic Gathered Leverage

This report looks at Flood Risk Projects that are identified in the MIP as requiring the use of topographic data and ensures that there is either a gathered topographic leverage entry in the MIP or an exception entry.

- **Leverage Entry** – Created if topographic data to be used in a Flood Risk Project was identified during Scoping (Discovery) or data development and fits FEMA’s definition of leverage.
- **Exception Entry** – Created if the topographic data identified will be wholly funded by FEMA as part of a Flood Risk Project or it is determined that the project will not proceed to data development. Any project with a Scoping (Discovery) task must have a gathered leverage entry or an exception entry.

Gathered topographic leverage is recorded when the Project Team is using existing topographic data, data that was not created specifically to support the current Flood Risk Project. If the data has been used on a previous Flood Risk Project, it is not counted as leverage. If the mapping partner does not know whether the data has been used on a flood risk project previously, they should go by the date the data was created. If it was created prior to last FEMA map revision, it should not be counted as leverage.

6.1.1.3 Status Report – Base Map Gathered Leverage

This report looks at Flood Risk Projects that are identified in the MIP as requiring the use of base map data and ensures that there is either a gathered base map leverage entry or an exception entry.

- **Leverage Entry** – Created if base map data to be used in a Flood Risk Project was identified during Scoping (Discovery) or data development and fits FEMA’s definition of leverage.
- **Exception Entry** – Created if the base map data identified will be wholly funded by FEMA as part of a Flood Risk Project or it is determined that the project will not proceed to data development. Any project with a Scoping (Discovery) task must have a gathered leverage entry or an exception entry.

Gathered base map leverage is recorded when the Project Team is using existing base map data, data that was not created specifically to support the current Flood Risk Project. If the data has been used on a previous Flood Risk Project, it is not counted as leverage. If the mapping partner does not know whether the data has been used on a flood risk project previously, they should go by the date the data was created. If it was created prior to last FEMA map revision, it should not be counted as leverage.

6.1.2 Resolving Issues

If a project is incomplete or non-compliant in a GDC status report, the Project Team should first determine whether the data being used in the Flood Risk Project fits FEMA's leverage definition. If the data being produced or gathered does fit FEMA's leverage definition then the leverage quantity should be entered into the MIP. The ability to do this is dependent on the availability of the leverage entry screen in the MIP, either through the Scoping (Discovery) or Manage Data Development task. If the data being used does fit FEMA's leverage definition and related MIP task is closed then the Project Team should work with their Regional GDC Lead to enter the necessary leverage information into the GDC SharePoint site.

If a leverage entry is not required and the Project Team does not have access to the Exception Tracker on the GDC SharePoint site, they should request their Regional GDC Lead create an appropriate project exception entry for that MIP Case Number.

6.2 Semi-Annual Reporting

This reporting activity highlights successful / beneficial geospatial data coordination activities on the Risk MAP Program. This activity primarily occurs twice-annually, in the semi-annual Geospatial Data Coordination Report. The activity could also occur on an ad-hoc basis, triggered by Congressional, Office of Management and Budget, or other federal oversight. Reporting benefits may include costs avoided by taking advantage of available data and partnering in the collection of new data, and benefits provided to other organizations that take advantage of data used in projects.

The semi-annual Geospatial Data Coordination Report uses the same data as the monthly reconciliation process but also includes P4 data to report LiDAR investments. The report has three sections. The first section includes two tables that show FEMA's investments in elevation data acquisition and partner contributions related to elevation data and base map data by FEMA Region and by fiscal year of the Risk MAP program. The second section provides a detailed listing of Risk MAP project tasks funded utilizing gathered leverage. The third section provides potential users with a summary of FEMA's elevation data sets produced with FEMA funding. The report is documented on the GDC SharePoint site.