



- Non-insurance features such as government oversight, disaster relief, preventative maintenance or measures, and improvement suggestions or requirements (the non-insurance features of your program are not limited to these non-insurance features and are not required to include all or any of these particular non-insurance features)

The Earthen Dam Commission Actuarial Task Force has asked your team of actuaries to produce a report that includes the following details of your proposal for a national insurance program, as well as its impacts on Tarrodan stakeholders.

- Objectives
- Program Design
- Financial Results
- Assumptions
- Risk and Risk Mitigation Strategies
- Data and Data Limitations

## Parameters

Tarrodan's Earthen Dam Commission Actuarial Task Force consists of the Chief Actuary of the Earthen Dam Commission, Rivera Shore, Tarrodan's Insurance Minister, a member of Tarrodan's Economic Advisory Council, Tarrodan's Environmental Minister, one of Tarrodan's Domestic Community Coordinators, and selected other members of the Earthen Dam Commission, including actuaries. The Actuarial Task Force will evaluate your and other actuarial teams' proposed national insurance programs. The Actuarial Task Force asks that you incorporate the following in your proposed program's design and your analysis of the program:

- How much each region will contribute to a national pool; offering suggestions for how each region will generate its contributions is optional
- Coverage for damage caused by earthen dam failure
- Preventative maintenance or measures and even improvements for earthen dams
- Optionally, at each team's discretion: government subsidies

## Data

The Actuarial Task Force has provided your team of actuaries with the following data:

- Online encyclopedia page outlining geography, history, culture, and leisure activities in Tarrodan. The page also includes:
  - Economic data, including GDP distribution by region and by industry
  - Population data, including density and geographic distribution
  - Housing statistics
- Dam data, including a data dictionary which describes the information provided in the dam dataset
- Historical inflation and interest rates

All data files are available on the [2025 SOA Research Institute Student Research Case Study Challenge webpage](https://www.soa.org/research/opportunities/2025-student-research-case-study-challenge/), URL: <https://www.soa.org/research/opportunities/2025-student-research-case-study-challenge/>.

## Deliverables

### REPORT

The Actuarial Task Force requires that your team of actuaries deliver a high-level report, informed by your research and analysis, that addresses all the following items:

1. Objectives
  - a. Background, including summary statistics and the need for action regarding a national insurance program for earthen dams
  - b. The main objectives of your proposed program
  - c. Key metrics to be reported and a schedule (frequency) of such reporting that includes at least the following:
    - i) what each metric evaluates
    - ii) those metrics needed to monitor the proposed program's success over the selected timeframe
2. Program Design
  - a. A description of insurance and non-insurance features and requirements of your proposed national insurance program for earthen dams
  - b. A timeline for implementing the program
  - c. How to prevent adverse selection
  - d. The potential for the program to drive improvements in the infrastructure
  - e. Any other key program features or requirements
  - f. Quantitative and qualitative justification for the features or requirements of your proposed program
  - g. Short and long-term time periods over which the program will be evaluated
3. Financial Results
  - a. A projection (forward-looking financial information) of the inflows and outflows of resources of the program resulting each year over the short and long-term time periods over which the program will be evaluated. Identify, describe, and quantify the components of the inflows and outflows.
    - i. Inflows would generally include amounts associated with contributions or premiums and other sources of funding due to the proposed program
    - ii. Outflows would generally include amounts associated with payments for damages, preventative maintenance, improvements, and other expenses due to the proposed program
    - iii. Inflows and Outflows should be assigned to each year based on events and eligibility criteria that are met in that year including the present value of amounts related to the events and eligibility criteria of that year in all future years
    - iv. The projection should be prepared based on the proposed program and assumptions about future economic and other conditions
  - b. An assessment of the long-term fiscal sustainability of the proposed programs expressed as a present value of the program over the short and long-term time periods over which the program will be evaluated
    - i. A projection (forward-looking financial information) of relevant national economic measures to judge the magnitude of the program within the context of the nation's economy
    - ii. The amount of money needed for the proposed program to remain solvent with a high degree of certainty, including, if appropriate, ranges for the amount and probability of solvency
  - c. A projection (forward-looking financial information) of the amounts associated with payments for damages, preventative maintenance, improvements, and other expenses without the proposed program
  - d. Summary of analysis of how the cash inflows and outflows vary by region, age of the dam, dam condition, dam maintenance status, and other relevant parameters. Cash outflows include preventative maintenance and improvements as well as those caused by damages.

#### 4. Assumptions

- a. In the body of the report, a list of the assumptions that have the most significant impact on costs and economic capital of your proposed national insurance program, along with a rationale for each assumption, including a description of your analysis for developing the assumption
- b. In an appendix (included, if needed, at your team’s discretion), list other assumptions whose impact is less significant

#### 5. Risk and Risk Mitigation Considerations

- a. A risk analysis of potential risks and unforeseen events that may have a material impact on your proposed national insurance program for earthen dams, this may include but is not limited to:
  - i) Quantifiable key risks
  - ii) Qualitative key risks
  - iii) Ranking of key risks and any metrics used for the rankings, such as, but not limited to likelihood and severity estimates for the quantifiable risks
  - iv) Suggestions of possible risk mitigation techniques for identified key risks
  - v) Sensitivity (both favorable and unfavorable) analysis of the financial impact should actual experience differ from key assumptions which may include for each quantitative assumption, a recommended range to achieve desired results
- b. Discussion of how your analysis considers climate change risks

#### 6. Data and Data Limitations

- a. Identify all data sources used in addition to the data provided with the case study
- b. Identify any data limitations and the impact of any such limitations on your analyses

### REPORT EVALUATION CRITERIA

The Actuarial Task Force will evaluate your team’s report using the following criteria:

- Organization, form, clarity, and cohesiveness of your report are appropriate for the task force audience, which includes busy, high-level officials who represent a wide variety of disciplines, many of whom are not quantitative specialists.
- Clear, concise, and complete responses to all items listed in the “Deliverables” section of this *A Dam Challenge Case Study* are provided.
- Any detailed mathematical analysis applying the concepts of probability, probability distributions, and time value of money (with explanations of any formulas, models, and other aspects of your analysis) are discussed in a way that technically minded individuals in the task force can easily understand them.
- Recommendations are creative and strategic.
- Secondary research is evident, including a bibliography showing a list of all sources cited throughout your report.
- Analysis and recommendations clearly consider the provided data, including documentation of data limitations.
- All assumptions are documented.
- All items discussed in the “Submission Requirements” subsection of this *A Dam Challenge Case Study* are adhered to.

### SUBMISSION REQUIREMENTS

Your team’s submission must contain a written report that meets all the criteria outlined under the subsections below titled “Written Report Criteria,” “Supporting Analysis,” and “When and Where to Submit.” For further information, please refer to the 2025 Student Research Case Study Challenge Official Rules, which are available on the [2025 Student Research Case Study Challenge Official Rules](https://www.soa.org/research/opportunities/2025-student-research-case-study-challenge/), which are available on the [2025 Student Research Case Study Challenge webpage](https://www.soa.org/research/opportunities/2025-student-research-case-study-challenge/), URL <https://www.soa.org/research/opportunities/2025-student-research-case-study-challenge/>.

## WRITTEN REPORT CRITERIA

Your written report should be addressed to the Tarrodan Earthen Dams Commission Actuarial Task Force.

The report format must meet all the following criteria. If your team fails to meet items 1 through 3 below, the task force will not accept your report and will not pay your fees.

1. The report must be in a single Microsoft Word (docx or doc) or Adobe (pdf) format, must not be password protected, and must be smaller than 25 MB. The submission form cannot accept files larger than 25 MB.
2. Your report must be written in English.
3. On the top page of your report (cover page, if you are using a cover page, or the first page of your report if you are not using a cover page), state your team's name, university affiliation, and each team member's name. Do *not* include any email information or phone numbers for any team member.<sup>1</sup>

The task force also expects your report to meet the following criteria numbered 4 through 10 below. If your team fails to meet the items numbered 4 through 10 below, the task force will be disappointed, may disregard your report, and may not pay your fees in full.

4. Your report should be readable and formatted to professional standards.
5. The filename of your report must be your team's name and a brief description of the content for quick identification (for example: "Team Name Report.docx" or "Team Name Report.pdf").
6. For material addressing an item under the section header "Deliverables" in this *A Dam Challenge Case Study* to be considered during judging, it must appear in the body of your report.
7. You must reference in a bibliography all elements of your report that are not original with full citations. This requirement applies to all written material, tables, graphs, charts, images, and data other than data provided by the task force for this *A Dam Challenge Case Study*.
8. Your report and its supporting calculations must be the original work of your team specifically for this *A Dam Challenge Case Study*. Previously prepared or published work should not be repurposed or submitted.
9. Any generative Artificial Intelligence (AI) tools used in developing a submission shall be acknowledged and documented responsibly and appropriately. If you use AI tools, you are accountable for the originality and integrity of the content of your research and work and for ensuring that any AI-generated output, citations, or references have been validated.
10. The body of the report's length cannot exceed 10 pages with 1-inch (2.5-cm) margins and a 12-point font size. If the body of your report exceeds 10 pages, the task force will consider only the first 10 pages. Reports with narrower margins or smaller font sizes will be downgraded during judging. The following items will not count toward the 10-page limit:
  - a. Cover page, if using (cover page is optional)
  - b. Table of contents, if using (table of contents is optional)
  - c. Bibliography containing cited sources
  - d. Appendix or appendices, if any. Information in appendices should be supplemental with the intent of providing additional detail to support the deliverables discussed in the body of your report for the more technically focused task force members. Material in the appendices will not be considered in the evaluation of whether deliverables were met. Consequently, it is good practice to provide summarizing sentences in the body of the report for any appendix referred to. Appendices may contain:
    - i. Supporting formulas, calculations, or data,
    - ii. Further elaboration or amplification on any item in the body of the report,
    - iii. Program code, or
    - iv. Direct citations of external research.

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<sup>1</sup> Winning reports will be posted on the Society of Actuaries Research Institute website. For privacy reasons, the Society of Actuaries Research Institute does not recommend providing email addresses.

## SUPPORTING ANALYSIS

As noted, your team's report must be submitted in Microsoft Word without macros (.docx or .doc) or Adobe (.pdf) format. You may optionally support your project with up to three additional files, for example, detailed appendix or appendices, or calculations done in any programming language. However, any supporting files must be submitted in Microsoft Word without macros (.docx or .doc), Microsoft Excel without macros (.xlsx or .xls), or Adobe (.pdf) formats. Other formats will not be considered. The maximum size of each supporting file is 25 MB.

## INTENT TO SUBMIT

The judges ask that if you intend to submit an entry, please complete the online [Intention to Submit Form](https://soa.wufoo.com/forms/z1eojtcg0du2rem/), URL: <https://soa.wufoo.com/forms/z1eojtcg0du2rem/>, by Sunday, March 9, 2025.

## WHEN AND WHERE TO SUBMIT

Complete the [online submission form](https://soa.wufoo.com/forms/zworvny1s0mck9/), URL: <https://soa.wufoo.com/forms/zworvny1s0mck9/>, including attaching your final submission. **Submissions must be received by 3:00 p.m. U.S. Daylight Standard Time on March 21, 2025.** Please include the names and email addresses of all team members and your faculty advisor, as well as your university affiliation. Your team's name and student names should be written as you would like them to appear on your certificate of participation. Please ensure the email addresses you enter are correct because they will be used for communicating advancement during judging and providing certificates of participation or completion after judging. The online submission form will accept up to four (4) files, each with a maximum size of 25,000 KB (25 MB). Note that the online submission form may not be available until mid-March 2025.

Soon after submission, the first team member identified on the form will receive email confirmation of the submission. If the first team member does not receive an email confirmation of your submission form within 15 minutes after clicking the "Submit" button, either the first team member's email address was incorrect, or your submission was not accepted. Please resubmit only after double-checking all email addresses and file sizes.

If submission fails a second time, please email your submission to [research@soa.org](mailto:research@soa.org), copy all team members and your faculty advisor, and include in the body of your email the names and email addresses of all team members and your faculty advisor. The maximum size of email that SOA can accept is 50,000 KB (50 MB). Please do not submit via email unless your submission via the form has failed twice.

## Questions or Comments

Please direct any questions or clarifications on the rules to the SOA Research Institute via email at [research@soa.org](mailto:research@soa.org). The SOA Research Institute will not respond to questions about the content of the case study or data.

Society of Actuaries Research Institute  
8770 Bryn Mawr Ave, Suite 1000  
Chicago, IL 60631  
[www.SOA.org](http://www.SOA.org)