The following checklist summarizes QAPP requirements for projects involving application of existing software tools (models, web-based applications, etc.) that have been previously verified and validated. More comprehensive guidance on developing QAPPs for modeling projects is provided in the EPA/240/R-02/007 report titled “Guidance for Quality Assurance Project Plans for Modeling ([EPA QA/G-5M](https://www.epa.gov/quality/agency-wide-quality-system-documents#guidance)).” The completed checklist will be entered into QA Track with the approved QAPP by the QA Manager when final.

## B.1 MODEL SPECIFICATION

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Yes** | **No** | **N/A** | **Requirement** | **Notes** |
|  |  |  | Describe the conceptual model, including key processes, system compartments, system boundaries, temporal and spatial scales, and fluxes into and out of the problem domain. |  |
|  |  |  | Describe how the modeling analysis fits into a larger project and its relationship to other efforts with separate QAPPs (if applicable). |  |

## B.2 MODEL SELECTION

| **Yes** | **No** | **N/A** | **Requirement** | **Notes** |
| --- | --- | --- | --- | --- |
|  |  |  | Identify requirements for model functionality, e.g., accuracy, spatial and/or temporal discretization, run time, linkage to other models, etc. |  |
|  |  |  | Specify computer hardware and operating system requirements, if applicable. |  |
|  |  |  | Describe model evaluation procedures, such as comparisons to other available models, assessment of previous applications of the model, and any validation/verification activities. |  |
|  |  |  | Employ more than one model loosely coupled together (i.e., output from one or more models serving as input to another model), provide an overview of the system design, including a diagram showing transfer of data between models. (For projects that involve model integration (e.g., embedding one model within another or tight coupling of two or more models), see “Requirements for Model Development Projects” for additional guidance.) |  |
|  |  |  | Discuss the appropriateness of model assumptions in the context of the project objectives. |  |

## 

## B.3 MODEL PARAMETERIZATION AND CALIBRATION

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Yes** | **No** | **N/A** | **Requirement** | **Notes** |
|  |  |  | List or describe the model input parameters that are needed for the analysis. |  |
|  |  |  | Identify potential data sources of measured/observed values for model parameters that will be obtained from secondary sources. |  |
|  |  |  | State the criteria that will be used to assess whether or not the reported data are of sufficient quality. |  |
|  |  |  | Describe procedures for identifying outliers and handling outliers or missing data (imputation procedures). (See “Requirements for Projects Using Existing Data” for additional guidance.) |  |
|  |  |  | Identify the tools or algorithms that will be used to estimate the parameter values, or model parameters that will be computationally estimated. |  |
|  |  |  | Discuss the rationale for using the selected estimation approaches and characterize the range of applicability of these estimation approaches. |  |
|  |  |  | Identify potential sources for a calibration dataset for model parameters that will be estimated through model calibration. |  |
|  |  |  | State the criteria that will be used to assess whether or not the dataset is of sufficient quality. |  |
|  |  |  | Describe the calibration procedures (e.g., weighting functions, optimization algorithms, etc.). |  |
|  |  |  | State the goodness-of-fit criteria for acceptance of the parameter value. |  |

## 

## B.4 MODEL PERFORMANCE ASSESSMENT

| **Yes** | **No** | **N/A** | **Requirement** | **Notes** |
| --- | --- | --- | --- | --- |
|  |  |  | Describe any procedures that will be used to validate the results of the modeling analysis, e.g. through comparisons of the model predictions against observed data collected in field or laboratory studies. |  |
|  |  |  | Describe any verification procedures that will be used to assess whether these programs are performing as expected, if additional code or scripts are to be developed (e.g., to create model input files, process model output, or couple models together). |  |
|  |  |  | Describe any procedures that will be used for model parameter sensitivity analysis. |  |
|  |  |  | Describe any procedures that will be used to evaluate the impact of parameter uncertainty on model results. |  |
|  |  |  | Describe any procedures that will be used to assess the impact of tuning parameters or spatial/temporal discretization on model results. |  |

## B.5 INTERPRETATION OF MODEL RESULTS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Yes** | **No** | **N/A** | **Requirement** | **Notes** |
|  |  |  | Describe any statistical procedures that will be used to summarize the model output. |  |
|  |  |  | Describe any data transformations that will be applied to the model output (e.g., for scaling or bias adjustment) |  |

## B.6 DOCUMENTATION

| **Yes** | **No** | **N/A** | **Requirement** | **Notes** |
| --- | --- | --- | --- | --- |
|  |  |  | Specify the requirements for project documentation (e.g., model input/output files; results of model performance assessment; scripts or source code; post-processed model output). |  |
|  |  |  | Identify QAPP elements that may need to be updated as the project moves forward and describe the procedures for QAPP amendment and distribution. |  |

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