Glenn Procedural Requirements

GLPR 7120.5.20A w/C1

Effective Date: June 19, 2018
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COMPLIANCE IS MANDATORY

Responsible Office: Code L/Research and Engineering Directorate

GRC Project Deviation/Waiver Process w/Change 1 (06/20/2023)

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Change History

Rev/Change	Date	Description/Comments
Basic	5/17/2010	This document establishes the requirements at GRC on the implementing organization for performing, supporting, and evaluating deviations or waivers to project requirements in accordance with various Agency and Center directives.
Change 1	6/2/2010	Revised D.1- GRC Deviation/Waiver (DW) Form to reflect title change in Acceptance/Concurrence section
Change 2	5/13/2014	Changed responsible organization from Code DT/Chief Engineers Office to Code L/Research and Engineering Directorate.
Change 3	4/24/2015	Extension granted per GLPR 1410.1 – changed the expiration date from 5/17/2015 to 5/17/2016.
Change 4	4/21/2016	A second extension granted per GLW 1410.1-15 – changed the expiration date from 5/17/2016 – 5/17/2017. Updated appendices numbering in conformance with NPR 1400.1.
Change 5	5/2/2017	A third extension granted per GLW 1410.1-19 – changed the expiration date from 5/17/2017 – 5/17/2018
Rev A	6/19/2018	This revision includes updates to align with the latest Agency and Center policies and boards. The number of "***shall***" statements have been reduced, particularly in areas where "will" statements or expected outcomes were sufficient. The appendix listing specific Mandatory Standards and GRC DLEs was deleted and replaced with references to Agency Endorsed Standards and GRC delegations. The compliance matrix appendix was deleted, as it was not utilized in practice.
Change 1	6/20/2023	Administrative change: Extend expiration date from 6/19/2023 to 6/19/2024 to complete substantive changes. Updated BMS Library links to new site.

Preface

P.1 Purpose

The purpose of this document is to clearly articulate and establish the requirements at the NASA Glenn Research Center (GRC) on the implementing organization for performing, supporting, and evaluating deviations or waivers to project requirements in accordance with NASA Policy Directive (NPD) 7120.4, NASA Engineering and Program/Project Management Policy, NASA Procedural Requirements (NPR) 7120.5, NASA Space Flight Program/Project Management Requirements, NPR 7123.1, NASA Systems Engineering Processes and Requirements, NPR 7150.2, NASA Software Engineering Requirements, and GLPR 7120.5.10, GRC Space Flight Project Management Requirements and Best Practices.

P.2 Applicability

a. The requirements of this GLPR apply to projects or tasks led by GRC, which have been designated NPR 7120.5-compliant by an assigning NASA Mission Directorate and/or Program Office, or by GRC Center Management, or by SFS Directorate Management. This includes when the effort is contracted (i.e. “buy” approach), when the effort is a shared responsibility of GRC and a partner, or when the effort is implemented in an “in-house” (i.e. “make” approach) mode.

b. This GLPR may be used or tailored for NPR 7120.8 designated projects or as required by GRC Center Management. Usage or tailoring of this GLPR for NPR 7120.8 projects should be defined in the project’s Systems Engineering Management Plan (SEMP).

c. For existing projects and tasks, the requirements of this document are applicable to the project’s current phase as of the effective date of this GLPR and to phases yet to be completed.

d. Exceptions to this GLPR include deviations or waivers that address manufacturing non-conforming product issues. These deviations/waivers will utilize the GLP-FF-8072.1, Hardware Fabrication Process.

e. In this directive, all mandatory actions (i.e., requirements) are denoted by statements containing the term "*shall*." The terms "may" or "can" denote discretionary privilege or permission, "should" denotes a good practice and is recommended but not required, "will" denotes expected outcome, and "are/is" denotes descriptive material.

f. In this directive, all document citations are assumed to be the latest version unless otherwise noted.

P.3 Authority

a. NPD 7120.4, NASA Engineering and Program/Project Management Policy

b. NPR 7120.5, NASA Space Flight Program/Project Management Requirements

c. NPR 7120.8, NASA Research and Technology Program and Project Management Requirements

d. NPR 7120.10, Technical Standards for NASA Programs and Projects

e. NPR 7123.1, NASA Systems Engineering Processes and Requirements

f. NPR 7150.2, NASA Software Engineering Requirements

P.4 Applicable Documents

a. GLPLN 1120.1, GRC Technical Authority Implementation Plan

b. GLPR 1280.1, Glenn Research Center Quality Manual

c. GLPR 1410.1, Glenn Directives Management

d. GLPR 7120.5.10, GRC Space Flight Project Management Requirements and Best Practices

e. GLPR 7120.5.30, Space Assurance Requirements

f. GLPR 7123.36, Engineering Review Board Procedure

P.5 Measurement/Verification

a. The GRC Chief Engineer Office may conduct annual assessments of projects or tasks to verify compliance with this document. Compliance will be determined by reviewing the archived artifacts required by this procedure.

b. Independent internal and external audits of this procedure may also be performed as defined in the GLPR 1280.1, Glenn Research Center Quality Manual.

P.6 Cancellation

This procedure cancels, GLPR 7120.5.20, GRC Project Deviation/Waiver Process, dated May 17, 2010.

Signature on file

Janet L. Watkins
Associate Director

Chapter 1. Introduction

1.1 Procedure Introduction

1.1.1 Rationale and Benefit

a. As described in the NPD 1000.0, NASA Governance and Strategic Management Handbook, it is NASA policy that all prescribed requirements are complied with unless relief is formally granted. It is also recognized that tailoring of prescribed requirements is an essential part of balancing cost with mission success risk posture. Tailoring is the process used to adjust or seek relief from prescribed requirements. The request for relief is referred to as a "deviation" or "waiver" depending on the timing. Deviations apply before a requirement is put under configuration control, at the level the requirement will be implemented, and waivers apply after. Deviations and waivers (DW) are documented agreements affecting specific requirements that intentionally allow a modification to a requirement or release a project from meeting that requirement. The DW request will be formally reviewed by technical and programmatic organizations to gain concurrence prior to formal approval by the approving authority. These reviews will allow the appropriate participants to review the DW for impact and acceptability and may be as formal as necessary to perform an adequate review for concurrence. After this review, the approving authority will formally make the decision to approve or disapprove the requested DW.

b. Because of the potential impacts a deviation or waiver may have on a project, the dissenting opinion process, as described in GLPLN 1120.1, Technical Authority Implementation Plan, may be used at any time during this process.

c. Requirements are defined at various levels of the organization and documented in the following types of documents.

(1) NPRs - Requirements originating at NASA Headquarters (HQ) or higher that are documented in a NPR.

(2) Technical Standards - Products such as NASA developed technical standards, other governmental standards, voluntary consensus standards, and Center developed technical standards that form part of the Technical Authority (TA) requirements to be specified in project documentation. See Appendix C for additional information on technical standards sources and responsible organizations.

(3) Glenn Procedural Requirement (GLPR) - Institutional and technical requirements, which are applicable to projects at GRC. The GLPRs represent the decomposition of the NPRs into GRC-specific requirements.

(4) Project Requirements - The set of requirements established by the project that document all requirements to be applied to the project. These include program requirements, interface requirements, derived requirements arising from constraints, consideration of institutional requirements, factors introduced by the selected architecture, and the design. These requirements are finalized through requirements analysis as part of the overall systems engineering process, as defined in the project SEMP, and become part of the project requirements baseline. Derived non-technical requirements are established by, and are the responsibility of, the Programmatic Authority. Derived technical requirements are the responsibility of the Institutional Technical Authorities. This

GLPR is not applicable to non-technical Programmatic Authority requirement deviations and waivers.

1.1.2 Procedure Overview

a. In general, the DW process is governed by the following principles:

(1) Project requirement deviations and waivers will follow this procedure.

(2) Institutional (non-project) deviations and waivers to NPR or GLPR requirements not identified in a formulation agreement, project plan, SEMP, or Safety and Mission Assurance Plan (SMAP) will follow GLPR 1410.1, Glenn Directives Management.

(3) The DWs can be initiated by any member of a project team or participant in an institutional process or formal review. The DW can also be initiated as a disposition from the Corrective and Preventive Action Reporting (CPAR) System.

(4) Technical and programmatic reviews are performed on the DW request; Engineering Review Boards (ERBs), Safety and Mission Assurance Directorate Engineering Review Boards (SERBs), and the Projects Control Board (PCB) should be used as the primary DW request review forums prior to submission to higher levels of approval.

b. The process to document a DW pertaining to a project requirement consists of requesting, reviewing, concurrence, and approval. For NPRs that provide methods of streamlined DW tailoring, the process in the NPR or associated GLPR should be used. For example, GLPR 7120.5.10, defines a simplified method and tools for tailoring of most NPR 7120.5 procedural requirements. For streamlined approaches the requirement owner responsible authorities are still required to formally approve the tailoring.

(1) When a DW is identified as necessary, the initiator will document and submit a request for deviation or waiver.

(2) The DW request will be formally reviewed by both project and Technical Authorities for concurrence. If concurrence cannot be reached the dissenting opinion process may be invoked.

(3) To expedite the request and approval, the technical and project (ERB or SERB, and PCB) reviews and approval may occur concurrently.

(4) Once the DW request has been reviewed and concurred by project and Technical Authorities, the DW request will be forwarded to the approving authority.

(5) The approving authority may reside at GRC or an outside organization which owns the requirement, such as another NASA Center or HQ.

(6) Finally, the approved DW will be routed per the configuration plan and the policy of the requirement owner and project. A copy of the final approved or disapproved DW will be forwarded to the GRC Chief Engineer Office.

c. When programs levy TA requirements or decompositions of TA requirements on projects, those requirements may be utilized, if approved by GRC TAs, to specify all or a portion of GRC TA requirements. For example, the International Space Station Program levies a number of technical derived requirements that are decompositions NASA Endorsed Engineering or Safety Standards. These often meet specific engineering discipline TA requirements, such as those levied in in GLPR 7120.5.30.

(1) When used as the basis for GRC TA requirements, tailoring (i.e. deviations) of the initial set of programmatic levied TA requirements, ***shall*** be approved by the associated GRC Technical Authority (e.g. Engineering TA or Safety and Mission Assurance (SMA) TA) prior to submission for programmatic approval.

(2) Changes to these baselines of programmatic levied TA requirements (e.g. modifications or waivers) ***shall*** require GRC TA approval, in addition to any programmatic approval.

1.2 Records

1.2.1 Records Management

a. Each project is required to establish and maintain a repository of project records and products accessible by project staff and other appropriate stakeholders. Each project ***shall*** include the following DW artifacts in this repository:

(1) Completed DW form indicating disposition

(2) Documented approval or disapproval of the DW request

(3) If applicable, DW request submitted to non-GRC organization

(4) Updated configuration and data management files

1.2.2 Inputs

a. Inputs to the DW activities will come from other program documentation and project processes. These inputs include, but are not limited to, the following:

(1) Specified requirements document(s)

(2) Problem identification

(3) CPAR System dispositions

(4) Contractor DW requests

1.2.3 Outputs

a. Outputs from the DW process include, but are not limited to, the following:

(1) Completed and approved or disapproved DW documented using the appropriate DW form

(2) Updated configuration and data management files

Chapter 2. Responsibilities

2.1 Initiator

a. Initiator is anyone requesting a deviation/waiver (DW) to a documented requirement.

(1) Initiator facilitates the flow of the DW request through this procedure, and where available, recommends the consolidation of the reviews to reduce the overall cycle time of this process.

(2) Initiator obtains the appropriate DW form and completes the form including identifying the responsible organization and approving authority. Due to the multi-level nature derived technical requirements, it can sometimes be difficult to identify the responsible GRC organization and approving authority. When there is uncertainty in the responsible organization or approving authority, the initiator will consult with the GRC Chief Engineer Office for resolution.

(3) Initiator will identify the type of requirement being deviated or waived.

(4) Initiator will review the DW request with the responsible organization prior to GRC review and concurrence cycle.

(5) Initiator updates or withdraws DW requests; Dissenting Opinion process may be invoked if concurrence cannot be reached.

2.2 Approving Authority

a. Approving authority has ultimate responsibility for controlling the requirement being deviated or waived. This role can reside inside or outside of GRC depending on where the requirement is held. A project applies many types of requirements that can have different approving authorities, such as project and technical. The approving authority will be defined by who owns the requirement rather than the overall project. The initiator will identify and document the approving authority on the DW form.

(1) Approving authority reviews the DW request including the specific details and concurrences that have been documented during the review cycles.

(2) Approving authority will approve and forward to the Project Manager (PM), or disapprove and forward to the initiator.

2.3 Project Review Board (PRB)

a. The GRC uses the PRB to ensure consistent application of policies, guidelines, processes, standards, and requirements as part of the management review processes.

(1) The PM will present results of project review to PRB for concurrence.

(2) The PRB chair approves and signs the DW request form or disapproves and returns it to initiator.

2.4 Project Manager (PM)

a. The PM is responsible for the formulation and implementation of the project per the governing agreement with the program manager. The PM is responsible for the safety, technical integrity, performance, and mission success of the project while meeting programmatic (cost and schedule) commitments.

(1) The PM may assign an initiator to document the DW request.

(2) The PM will review the DW request for any impacts to the programmatic (cost and schedule) commitments and documents them.

(3) The PM approves and signs the DW request form or disapproves and returns it to the initiator. If approved, the PM will continue processing the DW as indicated in the Chapter 3 process flow.

(4) If the DW is approved, the PM will define the appropriate path for the DW approved request to follow by either submitting it to the Project Configuration Management Officer, or including the DW in the Systems Engineering Management Plan or project plan.

(5) If the requirement affects an institutional requirement, such as a NPR or GLPR, the PM will forward it to the Center Document Manager (CDM) for Center processing and approval per GLPR 1410.1.

2.5 Engineering Management Board / SMA Management Board (EMB/SMB)

a. The GRC uses the Engineering Management Board (EMB) to address Engineering TA scope, and the SMA Management Board (SMB) to address SMA TA scope. These boards ensure consistent application of policies, guidelines, processes, standards, and requirements as part of the management review processes.

(1) Based on the Technical Authority requirement owner (Engineering or SMA), either the EMB or SMB chair approves and signs the DW request form or disapproves and returns it to the initiator (Note: the term "EMB/SMB" in this document means EMB or SMB). All project DWs should be presented to both the EMB and SMB for management awareness regardless of the requirement owner.

2.6 Project Chief Engineer (PCE)

a. Serves as project level Engineering Technical Authority. Ensures that the project and technical planning is consistent with Agency and Center engineering design processes, specifications, rules, best practices, etc., necessary to fulfill mission performance requirements for the project. In cases where a PCE is not assigned to a project, a delegated Engineering Technical Authority will perform the PCE responsibilities identified in this GLPR. For instance, if a Product Lead Engineer (PLE) is assigned to lead a project technical effort, the PLE's Branch Chief will serve as the Engineering Technical Authority and perform the PCE responsibilities in this GLPR. An Engineering Technical Authority may approve a request for relief from a technical derived requirement if he/she ensures that the appropriate independent Institutional Authority subject matter expert, who is the steward for the involved technology, has concurred in the decision to approve the requirement relief.

(1) The PCE may assign an initiator to document the DW request.

(2) The PCE will review the DW request for any impacts to the technical commitments and documents them. The type and rigor of the review is left to the discretion of the PCE and may range from a cursory review to an Engineering Review Board (ERB).

(3) The PCE approves and signs the DW request form or disapproves and returns it to the initiator.

(4) For Engineering TA scope, the PCE will present results of technical review to EMB for concurrence.

2.7 Chief Safety and Mission Assurance Officer (CSO)

a. Serves as the project level Safety and Mission Assurance Technical Authority. Ensures that project and technical planning and implementation is consistent with Agency and Center SMA

design processes, specifications, rules, and best practices as necessary to fulfill the mission and technical performance requirements of the project. In cases where a CSO is not assigned to a project, the delegated SMA Technical Authority will perform the CSO responsibilities identified in this GLPR.

(1) The CSO may assign an initiator to document the DW request.

(2) The CSO will review the DW request for any impacts to the technical commitments and documents them. The type and rigor of the review is left to the discretion of the CSO and may range from a cursory review to a SERB.

(3) The CSO approves and signs the DW request form or disapproves and returns it to the initiator.

(4) For SMA TA scope, the CSO will present results of technical review to SMB for concurrence.

2.8 Discipline Lead Engineer (DLE)

a. Works through and with the PCE to ensure proper application and management of discipline-specific engineering requirements and Agency standards.

b. Specifically, for DWs, the DLE:

(1) Reviews the deviation/waiver request with the PCE to determine if a technical review is required.

(2) Responsible for validating the feasibility of the DW, establishing an engineering position, and documenting a recommendation. The DLE should review all applicable materials including design and construction standards, engineering requirements, best practices, and lessons learned to form their recommendation.

(3) Performs technical review to validate the feasibility of the requested DW.

2.9 Center Documentation Manager (CDM)

a. The CDM manages the GRC Business Management Systems (BMS), which includes configuration management of the GLPRs and the interface with NASA HQ for the NPRs.

(1) The CDM will follow GLPR 1410.1, to document and receive GRC Center DW approval on the institutional requirements.

2.10 Responsible Organization

a. The responsible organization is the organization that has been given responsibility of writing and maintaining that requirement being deviated or waived. This responsibility can be identified in the following ways:

(1) The NASA Procedural Requirement (NPR) - The requirement owner is identified on the title page as the responsible office or as delegated by the responsible office by identifying requirements owners in an included Compliance Matrix or equivalent.

(2) Technical Standards - See Appendix C for identification of responsible GRC organizations.

(3) Glenn Procedural Requirement (GLPR) - The GRC requirement owner is identified on the title page as the responsible office. However, in some cases the Technical Authority responsible for stewardship and approving deviations and waivers may reside in a different organization (e.g. Chapter 3 Engineering TA requirements in GLPR 7120.5.30). If the initiator is unable to ascertain which approving authority owns a TA requirement, they should consult with both the PCE and CSO for resolution.

(4) Project System and Interface Requirements - The project assigns GRC requirement ownership per the project SEMP. Derived non-technical requirements are established by, and are the responsibility of, the Programmatic Authority. Derived technical requirements are the responsibility of the Institutional Technical Authorities.

b. The responsible organization reviews the DW request and provides initial agreement to the DW request prior to organizational review.

Chapter 3. Deviation/Waiver (DW) Procedure

3.1 Project DW Disposition/Approval

Figure 3.1–1 describes the DW process flow through the various levels of GRC governing authorities. Review/concurrence/approval at all levels is not required when approval authority has been formally delegated to lower levels. Review among Programmatic Authority and Technical Authorities should be kept at commensurate levels to the lowest level of formally delegated authority. For example if the PCE signs for the Director of Research and Engineering, then the CSO would sign for the Director of SMA, and the PM would sign for the Director of SFS. Delegated review/concurrence/approval authorities are responsible for ensuring the next higher level of authority is informed of DW requests and decisions.

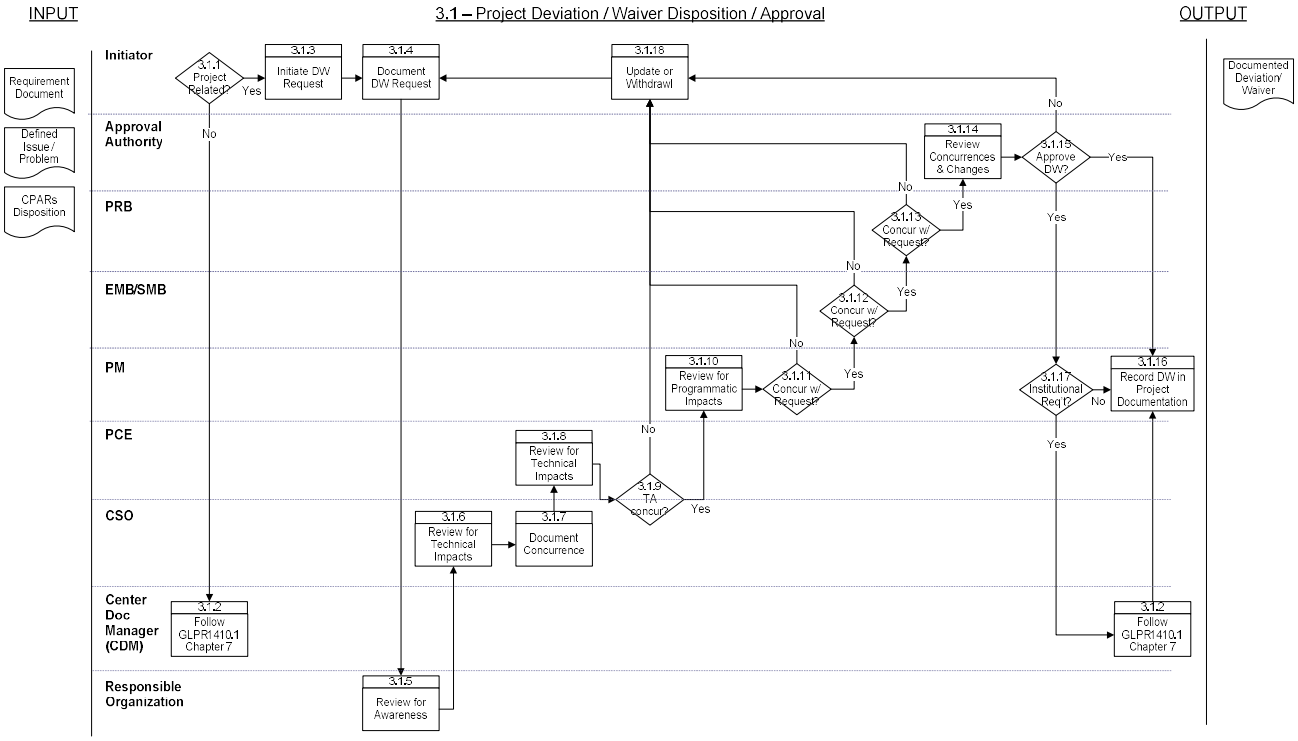

Figure 3.1–1—Deviation/Waiver Request Activity and Tasks

3.1.1 Is the DW Related to a Project?

The initiator will identify if the DW is related to a project that includes using EMB/SMB and Projects Review Board (PRB) to review and approve project specific decisions as appropriate. If the initiator is unable to ascertain governance oversight, the initiator will consult with the PCE, CSO, and PM for resolution.

3.1.2 Non-project Related DW will follow GLPR 1410.1 for Disposition

Initiator will forward the non-project related DW to the CDM and follow GLPR 1410.1.

3.1.3 Initiate DW

a. A DW can be initiated by anyone (initiator) associated with a project that identifies the need to deviate or waive a requirement imposed on that project. The DW triggers can include, but are not limited to:

(1) Requirements may not apply to the project subject (e.g., facility requirements).

(2) Project needs to document how requirements are consolidated.

(3) CPAR identifies a requirement not being met by the project.

b. The initiator can be assigned by the PM, PCE, CSO, or Lead Systems Engineer (LSE) to address an issue or problem identified by the project, including CPARs.

c. The initiator will analyze the issue or problem and begin to gather information about the requirement(s).

3.1.4 Document DW Request

a. Initiator obtains the appropriate DW forms.

(1) The initiator will analyze the requirement and define which Center/organization has the approving authority of DW for this requirement. This will help the initiator identify the correct DW form to use. If the initiator is unable to determine the approving authority, responsible organization, or proper form, the initiator will consult with both the PCE and CSO for resolution.

(2) If the requirement approving authority is the responsibility of GRC, the initiator will use the GRC DW form indicated in Appendix D.

(3) If the requirement approving authority is the responsibility of another Center/organization, the initiator will obtain the appropriate project DW form as described by the project.

b. The initiator completes a DW form for each request.

(1) The PM, PCE, or CSO may determine that multiple requests may be grouped onto one form, if the nature of the request is similar enough to warrant grouping.

c. Using the appropriate form, the initiator will document the details necessary for GRC to make an informed decision.

d. Initiator will identify the GRC responsible organization.

e. If appropriate, the initiator obtains DW request number from Project Configuration Management Office (PCMO).

f. Initiator will identify the approving authority of the DW; this authority should be documented in the requirements document. The approval will reside in one of the following organizations:

(1) Delegation from NASA Headquarters

(2) The GRC Directorate Offices

(3) Program/Project Office (including offices external to GRC)

g. The initiator will identify the type of requirement(s) being deviated/waived.

(1) Programmatic Requirements - Requirements set by the Mission Directorate, program, project, and Principal Investigator, if applicable. These include strategic scientific and exploration

requirements, system performance requirements, schedule, cost, and similar nontechnical constraints.

(2) Technical Requirements - Requirements that pertain to the technical aspects that the program/project must fulfill, such as performance-related issues, reliability issues, and availability issues.

(3) Institutional Requirements - Requirements that are defined at HQ or the Center level that impose requirements necessary to formulate and implement programs/projects. Examples of these would include NASA Procedural Requirements (NPRs), Glenn Procedural Procedures (GLPRs), and Technical Standards.

h. All deviations and waivers will be classified as critical, major, or minor as follows. The classification will be noted on the deviation/waiver submittal.

(1) Critical-Involves safety or health

(2) Major-Affects any of the items listed below:

(a) Performance

(b) Interchangeability, reliability, survivability, maintainability, or durability of the item or its repair parts

(c) Effective use or operation

(d) Weight, balance, moment of inertia

(e) Appearance (when a factor)

(3) Minor–Does not involve any of the criteria of critical or major classifications

3.1.5 Review DW Request with Responsible Organization

a. Initiator will review the documented DW request with the responsible organization for understanding and completeness. The responsible organizations are identified in the following ways:

(1) Institutional requirement (NPR and GLPR) responsibilities are documented as the responsible office on the front cover of the specific NPR and GLPR document.

(2) Technical Standard responsibilities are described in Appendix C.

(3) Programmatic requirement responsibilities are identified by the PM.

b. The initiator should meet with a representative from the responsible organization to review the initial reasons for the DW request and then forward to the PCE and CSO.

3.1.6 CSO Reviews for Technical Impacts

a. The CSO should review the DW request and determine if a formal technical review is necessary.

(1) This review should include analyzing how this DW impacts the project including the cumulative effect from existing DWs.

b. If the CSO determines that a formal technical review is required, a SERB will be conducted per GLP-Q-8700.1, Safety and Mission Assurance Directorate Engineering Review Board Procedure, on the requested DW to determine the technical impacts.

(1) The results of the SERB will be documented per GLP-Q-8700.1; this will include the position the SERB recommends to take with the DW.

3.1.7 CSO Document Concurrence

a. If the CSO concurs with the DW request, the CSO will document any artifacts and sign the DW request form in the appropriate place.

b. If the CSO determines that they do not concur with the DW, the CSO will document any artifacts and note reasons for the non-concurrence on the DW request form.

c. The CSO will forward DW request to PCE for review and concurrence.

3.1.8 PCE Review for Technical Impacts

a. The PCE reviews the DW request and determine if a formal technical review is necessary.

(1) This review should include analyzing how this DW impacts the project including the cumulative effect from existing DWs.

b. The PCE will determine the responsible Discipline Lead Engineer (DLE) for the topic area of the DW. The PCE is responsible for ensuring the DLE is involved in evaluating and providing concurrence to disposition the DW request.

c. If the PCE determines that a formal technical review is required, an ERB will be conducted per GLPR 7123.36 on the requested DW to determine the technical impacts.

(1) The results of the ERB will be documented per GLPR 7123.36; this will include the position the ERB recommends to take with the DW.

3.1.9 Technical Authority Concurrence

a. If the PCE concurs with the DW request, the PCE will document any artifacts and sign the DW request form in the appropriate place.

b. If the PCE determines that they do not concur with the DW, the PCE will document any artifacts and note reasons for the non-concurrence on the DW request form.

c. Combining the disposition of the CSO and PCE will represent the Technical Authority decision on the DW. If both Engineering and SMA Technical Authorities concur with the DW, the PCE forwards the DW request to PM for review and concurrence.

d. If the Technical Authorities determine that they do not concur with the DW, document any artifacts and note reasons for the non-concurrence on the DW request form. The PCE returns the DW request to the initiator.

e. If the PCE and CSO have differing concurrence dispositions, the PCE and CSO will jointly determine whether to return to the initiator or forward to the PM. Final authority for forwarding to PM rests with the CSO for SMA TA requirements and the PCE for Engineering TA requirements.

3.1.10 Review for Programmatic Impacts

a. The PM reviews the DW request for impacts to the project.

(1) The PM will determine how formal of a review is necessary.

(2) If appropriate, the PM should conduct a PCB to include all interested project personnel. If a DW involves a science requirement, the associated Principal Investigator or Project Scientist is required to concur with the DW.

(3) This review should include analyzing how this DW impacts the project including the cumulative effect from existing DW.

(4) The PM will document artifacts and materials used to make disposition.

3.1.11 PM Concurrence

a. If PM concurs with the DW request, document any artifacts and sign the DW request form in the appropriate place.

b. The PM will forward the DW request to the EMB/SMB for review and concurrence.

c. If the PM does not concur with the DW, document any artifacts and note reasons for the non-concurrence on the DW request form and return the DW request to the initiator.

3.1.12 EMB/SMB Concurrence

a. The PCE/CSO presents the DW request to the EMB/SMB with background information and artifacts for concurrence.

b. The EMB/SMB will review for concurrence. The rigor of this review may vary depending on the type and impacts of the DW.

(1) The majority of the EMB/SMB reviews will include the reviewing the process the PCE/CSO used to render their concurrence; this includes understanding the participants, review process, issues raised, and any dissenting opinions.

(2) The EMB/SMB may request the PCE/CSO to provide a more rigorous review if appropriate.

c. If the EMB/SMB concurs with the DW request, document any additional artifacts, and the EMB/SMB chair signs the DW request form in the appropriate place.

d. The PCE/CSO will forward the DW request to the PM for PRB review and concurrence.

e. If the EMB/SMB does not concur with the DW, document any additional artifacts, note reasons for the non-concurrence on the DW request form, and return the DW request to the initiator.

3.1.13 PRB Concurrence

a. The PM presents the DW request to the PRB with background information and artifacts for concurrence.

b. The PRB will review for concurrence. The rigor of this review may vary depending on the type and impacts of the DW.

(1) The majority of the PRB reviews will include reviewing the process the PM used to render their concurrence; this includes understanding the participants, review process, issues raised, and any dissenting opinions.

(2) The PRB may request the PM to provide a more rigorous review if appropriate.

c. If the PRB concurs with the DW request, document any additional artifacts, the PRB chair signs the DW request form in the appropriate place, and forward to the approving authority.

d. If the PRB does not concur with the DW, document any additional artifacts and note reasons for the non-concurrence on the DW request form. Return the DW request to the initiator.

3.1.14 Review DW Concurrences and Changes

a. The approving authority ***shall*** review the DW request and the signatures form to validate that the required concurrences have been obtained.

b. Approving authority will review the artifacts and supporting materials as appropriate to confirm the accuracy of the request.

3.1.15 DW Approval

a. Once the concurrences are obtained and the review is complete, the approving authority will approve the DW by signing the DW form.

b. The completed form will be forwarded to the PM for proper records management activity.

c. If the approving authority does not approve the request, document any additional artifacts, note reasons for the not approving the DW request form, and return the DW request to the initiator.

3.1.16 Record DW in Project Documentation

a. If the DW affects the Systems Engineering activity of the project, the DW will be recorded in the SEMP.

(1) If the SEMP is baselined, the PM will submit the approved DW request and all related DW materials to the PCMO.

(2) If the SEMP is not baselined, the approved DW request will be forwarded to the LSE. The LSE will update the SEMP document, and any other effected documents, to include approved DW request.

b. If the DW affects the project planning activity of the project, the DW will be recorded in the project plan.

(1) If the project plan is baselined, the PM will submit the approved DW request and all related DW materials to the PCMO.

(2) If the project plan is not baselined, the approved DW request will be recorded in the project plan. The PM will update the project plan document, and any other effected documents, to include the approved DW request.

c. The PCMO will forward a copy of the final approved or disapproved DW to the GRC Chief Engineer Office for use in measurement/verification and process improvement of this GLPR.

3.1.17 Route Institutional Requirements to the Center Documentation Manager

a. If the DW affects either an NPR or GLPR the DW request ***shall*** be submitted to the Center Documentation Manager (CDM) for proper approval at the strategic and executive levels of GRC.

3.1.18 Update or Withdraw the DW Request

a. If the DW request does not receive concurrence or approval from the project and technical reviewers, the initiator will review the comments and either modify or withdraw the request.

b. If concurrence cannot be reached, the Dissenting Opinion process may be invoked.

Chapter 4. Process Tailoring

4.1 General

a. Projects that anticipate tailoring of the activities in this procedure ***shall*** specify the tailored approach in the project's SEMP, for approval by the Designated Governing Authority as defined in NPR 7123.1, NASA Systems Engineering Processes and Requirements.

b. Additionally, see NASA/SP-2014-3705, NASA Space Flight Program and Project Management Handbook, Chapter 5.4 Tailoring Requirements, and NASA/SP-2016-6105, NASA Systems Engineering Handbook, for guidance on tailoring considerations.

Chapter 5. Process Improvement

5.1 General

All users of this GLPR should assess the activities and resulting products to determine if any improvements are warranted. Process improvement suggestions should be forwarded to the BMS point of contact for this GLPR for consideration in future updates. Project lessons learned sessions or other knowledge capture activities may also be used to identify improvements to this process.

Appendix A. Definitions

Approval Authority. An approval authority for a deviation or waiver is the individual that has been formally delegated responsibility and oversight for the requirements being waived or deviated. Delegations must be documented.

Change (a.k.a., Change Request). A permanent change to a documented requirement for all future efforts to satisfy the requirement. Change requests are outside the scope of this document and will be addressed using a separate configuration management procedural document.

Designated Governing Authority. The individual who specifically maintains technical responsibility over establishment of, changes to, and waivers of requirements in a designated area. At GRC, this is the Director of Engineering or the Director's designee.

Deviation. A documented authorization releasing a program or project from meeting a requirement before the requirement is put under configuration control at the level the requirement will be implemented.

Discipline Lead Engineer (DLE). The subject matter expert in a specific discipline or related discipline who executes the technical authority with respect to those discipline principles that are applied to any specific project.

Dissenting Opinion. A substantive disagreement with a decision or action that an individual judges is not in the best interest of NASA and is of sufficient importance that it warrants a review and decision by higher level management. A dissenting opinion must be supportable and based on sound rationale (not on unyielding opposition). The individual must specifically request that the dissent be recorded and resolved by the Dissenting Opinion process as defined in the GRC Technical Authority Implementation Plan.

Engineering Management Board (EMB). Chaired by the Director of Research and Engineering, the purpose of this board is to resolve engineering and technical issues that fall under the responsibility of the Research and Engineering Directorate including, but not limited to, those issues related to implementation of the Center's Space Flight Projects, Aeronautics Projects, and Engineering Technical Authority. See the GRC BMS for the official charter.

Institutional Authority. Institutional Authority encompasses all those organizations and authorities not in the Programmatic Authority. This includes Engineering, Safety and Mission Assurance, and Health and Medical organizations; Mission Support organizations; and Center Directors.

Institutional Requirements. Requirements that focus on how NASA does business that are independent of the particular program or project. There are five types: Engineering, program/project management, safety and mission assurance, health and medical, and Mission Support Office functional requirements.

Programmatic Authority. Programmatic Authority includes the Mission Directorates and their respective program and project managers. Individuals in these organizations are the official voices for their respective areas. Programmatic Authority sets, oversees, and ensures conformance to applicable programmatic requirements.

Project. A specific investment having defined requirements, a life cycle cost, a beginning, and an end. A project yields new or revised products that directly address NASA's strategic needs.

Project Chief Engineer (PCE). The subject matter expert in a specific system or related family of systems. The PCE executes the Technical Authority for the assigned program, project, or element at the Center. The PCE will serve as the single point of contact for the execution of the Technical Authority process.

Project Review Board (PRB). Chaired by the Director of Space Flight Systems, the purpose of this board is to provide top-level programmatic review of key products that fall under the responsibility of the Space Flight Systems Directorate. See the GRC BMS for the official charter, responsibilities, and membership.

Project Lead Engineer (PLE). At GRC the title of PLE might be substituted for PCE within lower level projects or elements that are considered significant enough to require a designated lower level equivalent of the PCE. Organizationally, PCEs will be part of the GRC Chief Engineers Office whereas PLEs will reside in their home organization.

Requirement Baseline. A requirement baseline is established when the project has formally adopted the requirement through board action and/or change request. This could be individual requirements (line by line) or the whole document.

Requirements, Derived. Requirements arising from constraints, consideration of issues implied but not explicitly stated in the high-level direction provided by NASA Headquarters and Center institutional requirements, factors introduced by the selected architecture, and the design. These requirements are finalized through requirements analysis as part of the overall systems engineering process and become part of the program/project requirements baseline. Derived non-technical requirements are established by, and are the responsibility of, the Programmatic Authority. Derived technical requirements are the responsibility of the Institutional Technical Authorities.

Requirements, Institutional. Requirements that focus on how NASA does business that are independent of the particular program or project. There are five types: Engineering, program/project management, safety and mission assurance, health and medical, and Mission Support Office functional requirements.

Requirements, Programmatic. Requirements Set by the Mission Directorate, program, project, and Principal Investigator, if applicable. These include strategic scientific and exploration requirements, system performance requirements, safety requirements, and schedule, cost, and similar nontechnical constraints.

Requirements, Technical Authority. A subset of institutional requirements invoked by the Office of Chief Engineer, Office of Safety and Mission Assurance, and Office of the Chief Health and Medical Officer documents (e.g., NPRs or technical standards cited as program or project requirements) or contained in Center institutional documents. These requirements are the responsibility of the office or organization that established the requirement unless delegated elsewhere.

Safety and Mission Assurance Management Board (SMB). Chaired by the Director of Safety and Mission Assurance, the purpose of this board is for ensuring sound Safety and Mission Assurance and Occupational Health practices, standards, policies, and procedures are implemented for GRC programs and projects, and for assuring safe operations and a healthy work environment. The SMB is responsible for facilitating resolution of issues, including, but not limited to, implementing and overseeing SMA Technical Authority. See the GRC BMS for the official charter.

Tailor. Prior to execution of a project, project management anticipates the need to perform a requirement at less than the maximum scope, frequency, or detail level indicated. Approval for this performance level is obtained before proceeding with project plans.

Tailoring. The process used to adjust or seek relief from a prescribed requirement to accommodate the needs of a specific activity or task for a project. The tailoring process results in the generation of deviations, waivers, or changes depending on requirement applicability, the risk involved, and the timing of the request.

Technical Authority. Part of NASA's system of checks and balances that provides independent oversight of programs and projects in support of safety and mission success through the selection of individuals at delegated levels of authority. These individuals are the Technical Authorities. Technical Authority delegations are formal and traceable to the Administrator. Technical Authorities are responsible for controlling technical requirements and approving any deviations, waivers, or changes from such requirements at the level commensurate with their authority.

Technical Standard. Common and repeated use of rules, conditions, guidelines, or characteristics for products or related processes and production methods and related management systems practices; the definition of terms, classification of components; delineation of procedures; specification of dimensions, materials, performance, designs, or operations; measurement of quality and quantity in describing materials, processes, products, systems, services, or practices; test methods and sampling procedures; or descriptions of fit and measurements of size or strength. (Source: OMB Circular No. A-119, Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities.) (See NPR 7120.10, Technical Standards for NASA Programs and Projects.)

Waiver. A documented authorization releasing a program or project from meeting a requirement after the requirement is put under configuration control at the level the requirement will be implemented.

Appendix B. Acronyms

BMS	Business Management System
CDM	Center Documentation Manager
CPAR	Corrective and Preventive Action Reporting
CSO	Chief Safety and Mission Assurance Officer
DLE	Discipline Lead Engineer
DW	Deviation/Waiver
EMB	Engineering Management Board
ERB	Engineering Review Board
GLPR	Glenn Procedural Requirement
GRC	Glenn Research Center
HQ	Headquarters
LSE	Lead Systems Engineer
NPD	NASA Policy Directive
NPR	NASA Procedural Requirement
NTSS	NASA Technical Standards System
PCB	Project Control Board
PCE	Project Chief Engineer
PCMO	Project Configuration Management Office
PLE	Project Lead Engineer
PM	Project Manager
PRB	Project Review Board
SEMP	Systems Engineering Management Plan
SERB	Safety and Mission Assurance Directorate Engineering Review Board
SMA	Safety and Mission Assurance
SMAP	Safety and Mission Assurance Plan
SMB	Safety and Mission Assurance Management Board
TA	Technical Authority

Appendix C. Technical Standards

C.1 One of the functions of Engineering and Safety Technical Authority is to establish and ensure proper application of technical standards in the design, development, test, verification, and qualification of programs and project products. Tailoring application of these technical standards is an essential part of Technical Authority and involves consideration of multiple factors, such as safety hazards, technical performance, and project mission success risk posture. GRC delegated Technical Authorities are responsible for specifying the minimum required set of technical standards for programs and projects and approving or disapproving deviations and waivers for those standards applied to programs and projects.

C.2 The core set of engineering standards for spaceflight projects begins with the Agency level Office of Chief Engineer Endorsed Standards. Likewise the core set of safety standards begins with the Agency level Office of Safety and Mission Assurance Endorsed Standards. These standards include a combination of NASA developed standards (e.g., NASA-STD, NASA-SPEC documents), military standards (e.g., MIL-STD), and voluntary consensus standards (e.g. AIAA, IEEE, SAE). The endorsed standards are available at https://standards.nasa.gov/endorsed_standards. These and other technical standards are available from the NASA Technical Standards System (NTSS) website at https://standards.nasa.gov/. The most current version of standard should be used. In addition to Agency endorsed standards, Center specific standards are identified by GRC Technical Authorities based on the type of work being done at the GRC.

C.3 At the GRC, certain Discipline Lead Engineers (DLEs) are delegated responsibility for engineering technical standard oversight. DLEs are senior technical engineers in specific disciplines at the center. DLEs assist the program/project through direct involvement with working-level engineers to identify engineering requirements, and develop solutions that comply with the requirements. DLEs works through and with Project Chief Engineers and Project Lead Engineers to ensure the proper application and management of discipline-specific Engineering TA requirements and Agency standards. Responsible organization and delegation of specific standards to DLEs is maintained at https://codel.grc.nasa.gov/directorate/la/engineering-standards/.

Appendix D. Forms

GRC Deviation/Waiver (DW) Form

D.1 A GRC Project Deviation/Waiver form, GRC2000, will be maintained by the GRC Chief Engineer Office and updated on an as needed basis.

D.2 This form is available on the NASA Electronic Forms site at https://nef.nasa.gov/ by entering "GRC2000" in the search box.

D.3 Projects may tailor this form suit project needs provided the equivalent minimum information on GRC2000 is included in the project tailored form.