**Annex G: Preliminary Design Assessment Criteria**

This Annex presents the minimum accepted acceptance criteria for any Preliminary Design(s) (PD) delivered to UKSA.

The expectation is that the successful organisation will have met a PDR level of maturity who’s exit criteria meet ECSS-M-ST-10C Rev. 1[[1]](#footnote-2) and this will act as a starting point to allow for further refinement during this project.

* 1. **Review Objectives**

The objectives listed below are the fundamental assessment criteria for the PD review. Applicants must be able to demonstrate achievement of all review objectives to achieve a minimally credible PD submission. Compliance to these objectives will underpin technical assessment of the supplied datapack.

1. Demonstrate that the predicted performances of the design at all levels are compliant to UKSA's requirements for all mission phases. Any non-compliance with these requirements shall be highlighted, with an assessment of the impact of said non-compliance. The severity and implications of the non-compliance shall be consideration in the evaluation of the proposal.
2. Confirm the adequacy of the preliminary design down to subsystem level, demonstrating that the maturity required to move into Phase C has been achieved, including consideration of design to an equipment level.
3. Verify the completeness, adequacy and consistency of mission plans (including Design Development and Verification Plan, Product Assurance Plan, Risk Management Plan), and in consistency with the project schedule.
4. Deliver Design, Development and Validation Plan, including model philosophy and verification approach at all levels, and identify GSE and test equipment requirements and test facilities.
5. Verify the completeness and adequacy of the Product Assurance and safety documentation, including the Critical Item List (which may be delivered as part of the risk register) and the Qualification Status List.
6. Verify the completeness of the risk register and that adequate mitigation actions are in place.
7. Verify the adequacy of the performances and resources allocated in the consolidated technical budgets (mass, power, etc).
8. Confirm the compatibility of the servicer with the baseline and proposed backup launchers.
9. Verify that all internal and external interfaces are consolidated and shown to be compatible.
10. Verify that all identified critical technologies and associated development plans are compatible with the mission schedule, with clearly identified TRL levels.
11. Verify the adequacy of the project implementation planning resulting in a consolidated project schedule (Gantt Chart) with clearly identification of the Long Lead Items, key procurements, including software developments, with indication of the critical path and credible with the target launch date presented.
12. Verify the completeness and adequacy of the preparation activities for supporting the Satellite and Payload Operations.
13. Verify the completeness and adequacy of the Space Debris Mitigation and Disposal Plan.

Per standard accepted engineering definitions, a system’s PD submission must encompass the entire mission and system perimeter (i.e. ground, launch and space segments, including all payloads, ancillary equipment, GSE, prototypes, operations).

* 1. **Preliminary Design Documentation**

As stated in the Project Specification, the following documents should be delivered as part of the PD datapack.

Applicants may use ECSS as a basis for understanding of quality expectations and requirements of each document listed below, however UKSA do not mandate compliance to ECSS for technical delivery.

If applicants have submitted a mission requirement compliant preliminary design to UKSA on any previous occasion, please highlight any differences in this submission in a clear and easily indexable way.

|  |
| --- |
| **Deliverable 1-1. Requirements Analysis/Consolidation & Breadboarding** |
| **Outputs:*** + Technical Requirements Specification Documents (TRS) to include:
		- Mission Requirements
		- Space System (Segment) Requirements
		- Ground Segment Requirements
		- Subsystem Requirements (Space and Ground segment, including software specifications)
		- Operational Requirements
		- All Ground Support Equipment (GSE) Requirements
	+ Interface Requirements Documents
	+ Environmental specification (all mission phases)
	+ Breadboarding Report of any tests completed to date
	+ Request for Waiver/Deviation (RfW/RfD) – as necessary
 |
| **Deliverable 1-2. Consolidated Mission Analysis and Operations Definition** |
| **Outputs:*** + Mission Analysis Report
	+ CONOPS Report
	+ Space Debris Mitigation and Disposal Plan
	+ Ground Segment Design Report (to include supporting analyses as annexes)
 |
| **Deliverable 1-3. Design and analysis of payload(s)** |
| **Outputs:*** + Payload(s) systems analysis and design report[[2]](#footnote-3)
 |
| **Deliverable 1-4. Platform analysis and design definition**  |
| **Outputs:*** + Satellite Design Definition File, including:
		- Satellite Design Description (incld. payloads)
		- CONOPS (in summary – detail to be provided in CONOPS Report)
		- Function Tree
		- Product Tree
		- Specification Tree (down to at least subsystem level)
		- Technical Budgets
		- Co-ordinate system
	+ Satellite Interface Control Document, including:
		- Satellite/launcher interfaces
		- Subsystem interfaces
		- Satellite/ground/segment interfaces
	+ Satellite Design Justification File
		- This shall be a summary of the trade-offs/selections/decisions that have resulted in the baseline design. This should be a narrative document refencing other analysis/reports etc that allows the reader to understand the process that has led to the baseline design, it should not be a sum of pre-existing technical (analysis/assessment) documentation but rather a concise summary of them.
	+ All models used for establishing the baseline design (e.g. thermal, mechanical, electrical models) including CAD files of the baseline configuration [[3]](#footnote-4) [[4]](#footnote-5)
 |
| **Deliverable 1-5. Development and Verification Approach**  |
| **Output:** * + Technology Matrix (defining TRL level for each technology, with justification) [[5]](#footnote-6)
	+ Technology Development Plan
	+ Design and Development and Verification Plan
	+ Qualification Status List (QSL)
	+ Critical Item List (CIL)
	+ Project Gantt Chart (from Phase B to Phase F inclusive)
	+ ROM Cost Estimate (from Phase B to Phase F inclusive)
 |
| **Deliverable 1-6. Product assurance and risk.** |
| **Output:*** + Product Assurance Plan
	+ Safety Analysis Report
	+ Risk Management Plan and Report (including risk register)
	+ Proposed Standards Baseline Report
 |

The contract applicant may choose to provide additional documentation to support their submission, and strengthen evidence they meet the review criteria presented in Section 1.1.

1. Note whilst UKSA do not mandate compliance to ECSS throughout this project, this reference document provides an appropriate overview of expected quality and maturity for the Preliminary Design. [↑](#footnote-ref-2)
2. It is expected that if primary and secondary (or even tertiary) payloads are part of the design this report will cover all of them but the applicant may choose to issue separate reports for each payload. In this case the applicant must assure that one or more report provides an overall summary of all the payloads’ accommodation/budgets/operational concept such that overall consistency of the payloads’ design/operations can be easily understood. [↑](#footnote-ref-3)
3. To allow acceptance of all deliverables milestones, the Authority will require access to any document, data, procedure, specification, or equivalent process/ document relied upon to demonstrate completion of the task. Documents will need to be provided to the Authority to allow for assurance to be undertaken and successful acceptance of deliverables. Failure to provide the Authority with access to any document, data etc. relied upon to demonstrate successful completion of a milestone, may result in the deliverable being rejected. [↑](#footnote-ref-4)
4. Format for these deliverables is up to the applicant but must be clear and be easily accessible. [↑](#footnote-ref-5)
5. Contractor’s are encouraged to consult the ECSS TRL guidelines/handbook ECSS-E-HB-11A when performing their TRL assessments [↑](#footnote-ref-6)