VERA C. RUBIN OBSERVATORY

Vera C. Rubin Observatory
Software Test Report

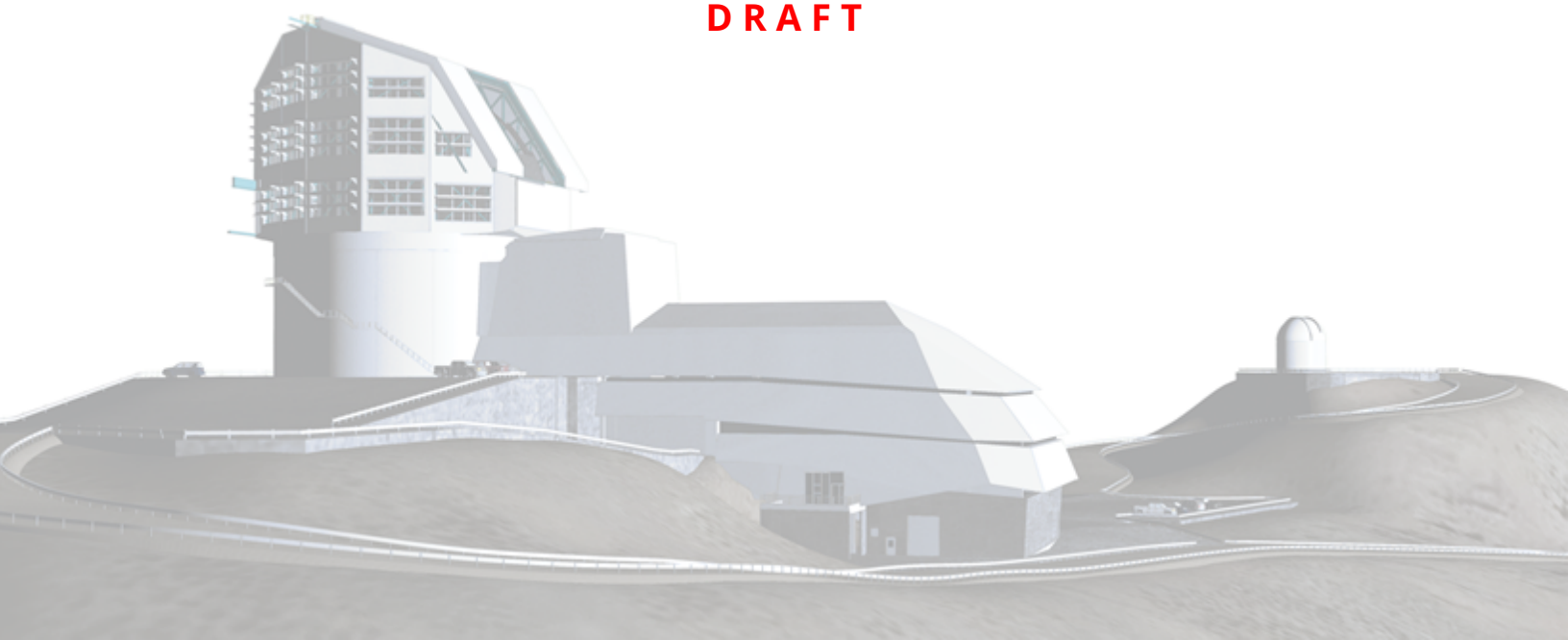
LVV-P105: Survey Strategy Acceptance Test Campaign Test Plan

Lynne Jones

PSTR-001

Latest Revision: 2024-10-23

DRAFT



Abstract

This is the test plan for **Survey Strategy Acceptance Test Campaign**, an LSST milestone pertaining to the Project System Engineering and Commissioning.
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LVV-P105: Survey Strategy Acceptance Test Campaign Test Plan

1 Introduction

1.1 Objectives

The primary goal of this acceptance test campaign is to verify those requirements pertaining to the survey design.

1.2 System Overview

This test campaign is intended to verify that the Survey Strategy satisfies the requirements on the design of survey outlined in the LSST Science Requirements Document (SRD), ensuring that the survey strategy will deliver the science goals of LSST.

1.3 Document Overview

This document was generated from Jira, obtaining the relevant information from the LVV-P105 Jira Test Plan and related Test Cycles (LVV-C259).

Section 1 provides an overview of the test campaign, the system under test (Survey Strategy), the applicable documentation, and explains how this document is organized. Section 2 provides additional information about the test plan, like for example the configuration used for this test or related documentation. Section 3 describes the necessary roles and lists the individuals assigned to them.

Section 4 provides a summary of the test results, including an overview in Table 2, an overall assessment statement and suggestions for possible improvements. Section **??** provides detailed results for each step in each test case.

The current status of test plan LVV-P105 in Jira is **Completed** .

1.4 References

[1] **[DMTN-140]**, Comoretto, G., 2021, Documentation Automation for the Verification and Validation of Rubin Observatory Software, URL https://dmtn-140.lsst.io/, Vera C. Rubin Observatory Data Management Technical Note DMTN-140

[2] **[DMTN-178]**, Comoretto, G., 2021, Docsteady Usecases for Rubin Observatory Constructions, URL https://dmtn-178.lsst.io/, Vera C. Rubin Observatory Data Management Technical Note DMTN-178

[3] **[LSE-160]**, Selvy, B., 2013, Verification and Validation Process, URL https://ls.st/LSE-160, Vera C. Rubin Observatory LSE-160

2 Test Plan Details

2.1 Data Collection

Observing is not required for this test campaign.

2.2 Verification Environment

Verification will be performed using the V3.2 simulations of the survey cadence.

2.3 Entry Criteria

Availability of simulations for baseline survey v3.2, availability of rubin_sim v1.3 or better.

2.4 Related Documentation

2.5 PMCS Activity

Primavera milestones related to the test campaign:

- None

3 Personnel

The personnel involved in the test campaign is shown in the following table.

	T. Plan LVV-P105 owner:	**Lynne Jones**	
	T. Cycle LVV-C259 owner:	**Lynne Jones**	
Test Cases	**Assigned to**	**Executed by**	**Additional Test Personnel**
LVV-T2846	Lynne Jones	Lynne Jones	
LVV-T2847	Lynne Jones	Lynne Jones	
LVV-T2848	Lynne Jones	Lynne Jones	
LVV-T2851	Lynne Jones	Lynne Jones	
LVV-T2850	Lynne Jones	Lynne Jones	
LVV-T2849	Lynne Jones	Lynne Jones	

4 Test Campaign Overview

4.1 Summary

T. Plan LVV-P105:	**Survey Strategy Acceptance Test Campaign**	Completed
T. Cycle LVV-C259:	**Survey Strategy Acceptance Test Campaign**	Done

Test Cases	**Ver.**
LVV-T2846	1
LVV-T2847	1
LVV-T2848	1
LVV-T2851	1
LVV-T2850	1
LVV-T2849	1

Table 2: Test Campaign Summary

4.2 Overall Assessment

Not yet available.

4.3 Recommended Improvements

5 Detailed Tests

5.1 Test Cycle LVV-C259

Open test cycle *Survey Strategy Acceptance Test Campaign* in Jira.

Test Cycle name: Survey Strategy Acceptance Test Campaign
Status: Done

This test cycle comprises all the test cases for the verification of the survey strategy

5.1.1 Software Version/Baseline

rubin_sims version 1.3 or newer

5.1.2 Configuration

Not provided.

5.1.3 Test Cases in LVV-C259 Test Cycle

5.1.3.1 LVV-T2846 - Verify survey will cover Asky = 18000 square degrees to a median number of Nv1Sum = 825 visits per pointing.

Version **1**. Open *LVV-T2846* test case in Jira.

Verify that the planned survey strategy will result in sky coverage meeting Asky area to a median number of Nv1Sum visits.
The values of Asky and Nv1Sum used in LVV-308 are the design goals for the survey.
The median number of visits refers to the median number of visits per pointing, when calculated across Asky area and is reported via MAF as fO_Nv Median.
The area on sky are which the minimum (although not median) number of visits per pointing is Nv1Sum can also be calculated, and is reported via MAF as fO_Area.

Preconditions:

Final comment:

Detailed steps :

5.1.3.2 LVV-T2847 - Verify survey will cover RVA1 = 2000 square degrees at timescales between fastRevisitMin = 40s to fastRevisitMax = 1800 seconds nearly uniformly.

Version **1**. Open *LVV-T2847* test case in Jira.

Verify that the survey strategy will result in coverage of RVA1 at timescales between fastRevisitMin and fastRevisitMax in a satisfactory manner.
The original statement of ”near uniformity” over this time span does not account for the peak in this timescale caused by standard pairs of visits; (40s to 1800s=30 minutes; current pairs are acquired at between 20-30 minutes). The intent was to make sure that there was sufficient coverage at timescales below the pair timing, rather than strictly providing ”uniform” coverage. The metrics in rubin_sim.maf have been written to account for the intent of the requirement -- that there are a significant fraction of visits in the timespan 40s - 20 minutes, as well as visits between 20 - 30 minutes.

Preconditions:

Final comment:

Detailed steps :

5.1.3.3 LVV-T2848 - Verify that the survey strategy distributes observations such that the median proper motion accuracy per coordinate across the main survey area will be at least SIGpm = 1.0 mas for sources r<24.

Version **1**. Open *LVV-T2848* test case in Jira.

Verify the survey strategy distributes observations such that the median proper motion accuracy per coordinate across the main survey area will be at least SIGpm = 1.0 mas for sources r<24.
Survey simulations can estimate astrometric accuracy at r=24.0 for each visit, and then estimate the accuracy of a fit for proper motion (accounting for the the parallax factor) using the time distribution of the visits at each point in the main survey.

Preconditions:

Final comment:

Detailed steps :

5.1.3.4 LVV-T2851 - Verify the average time between successive visits over the full set of survey observations, through a survey simulation.

Version **1**. Open *LVV-T2851* test case in Jira.

Verify the average expected time between successive visits, as predicted by survey simulations.

Survey simulations use a model of the telescope to estimate slew times (including filter change times), coupled with scheduler choices for each successive visit. The times between successive visits can be evaluated from these simulations.

Preconditions:

Final comment:

Detailed steps :

5.1.3.5 LVV-T2850 - Verify the median expected time between successive visits, as predicted by survey simulations.

Version **1**. Open *LVV-T2850* test case in Jira.

Verify the median expected time between successive visits, as predicted by survey simulations.

Survey simulations use a model of the telescope to estimate slew times (including filter change times), coupled with scheduler choices for each successive visit. The times between successive visits can be evaluated from these simulations.

Preconditions:

Final comment:

Detailed steps :

5.1.3.6 LVV-T2849 - Verify the survey strategy distributes observations such that the parallax uncertainty across the main survey area will be no more than SIGpar = 3.0 mas, or SIGparRed = 6.0 mas in y band for sources r<24.

Version **1**. Open *LVV-T2849* test case in Jira.

Verify the survey strategy distributes observations such that the parallax uncertainty across the main survey area will be no more than SIGpar = 3.0 mas, or SIGparRed = 6.0 mas in y band for sources r<24.
Survey simulations can estimate astrometric accuracy at r=24.0 for each visit, and then estimate the uncertainty in resulting parallax fits using the time distribution of the visits at each point in the main survey.

Preconditions:

Final comment:

Detailed steps :

A Documentation

The verification process is defined in LSE-160. The use of Docsteady to format Jira information in various test and planing documents is described in DMTN-140 and practical commands are given in DMTN-178.

B Acronyms used in this document

Acronym	Description
DMTN	DM Technical Note
LSE	LSST Systems Engineering (Document Handle)
LSST	Legacy Survey of Space and Time (formerly Large Synoptic Survey Telescope)
LVV	LSST Verification and Validation
MAF	Metric Analysis Framework
PMCS	Project Management Controls System
PSE	Project Systems Engineering
SNR	Signal to Noise Ratio
SRD	LSST Science Requirements; LPM-17
WFD	Wide Fast Deep