**Data Management Plan**

*Roles and Responsibilities*

PI Moon will ultimately be responsible for ensuring full compliance with the Data Management Plan, while additional Project Team personnel will play significant roles in data management, particularly the Scientific Programmer. The QGreenland Project Team will also include additional National Snow and Ice Data Center (NSIDC) personnel experienced in data management. All QGreenland data development, archiving, and dissemination practices will follow standard guidelines that are shared with and taught to all project personnel. These guidelines will also be documented on the QGreenland website for full transparency and to support other researchers in contributing data to QGreenland. The NSF Arctic Data Center will provide data archival, preservation, access, and metadata authoring services for the project.

*Data Types*

QGreenland will not be creating new data sets, per se, but will create reformatted or reprocessed data sets to fit the data needs of QGIS and the QGreenland data package. QGreenland data will be formatted in data types that are compatible and useable within QGIS: raster data (e.g., GeoTIFF) or vector (point, line, polygon) data (e.g., ESRI Shapefile). Each data set/layer will include a .QLR (layer definition) file that will maintain layer styles, labels, and metadata.

QGreenland will be developed to be compatible with QGIS3.0 (or the most current version upon project start) and updated for subsequent QGIS versions through the lifetime of the project. Version compatibility updates beyond the life of the project may occur through community effort (all software and data are open source) or separate follow-on activities.

We expect the full offline QGreenland package to be less than 10 GB (e.g, Quantarctica v.3 is 5 GB). Additional archived data available for add-on or web served layers may be larger, but we expect full data archive needs to be less than 1 TB.

*Data Standards*

All QGreenland data will follow clearly outlined data standards that are developed or references by QGreenland and published on the QGreenland website. These standards will be followed in reformatted data for inclusion in QGreenland (i.e. using a common projection/CRS) and available as guidelines for researchers to properly format data to be included in QGreenland directly or to be compatible with QGreenland as added data layers. All QGreenland data will maintain metadata from the original data set, required citation information (including, to the extent possible, ORCiDs for data creators), and full information on data modifications made for QGreenland.

QGreenland metadata will follow guidelines in the Research Data Alliance Directory of Metadata Standards. The NSF Arctic Data Center uses the Ecological Metadata Language (EML) for storing metadata. We will aim to also incorporate metadata language recommendations from EarthCube Project 418 and schema.org to optimize data discovery. Project Team members and NSF Arctic Data Center data experts will help QGreenland implement these practices.

We do not expect that QGreenland data will require any exceptions from Arctic Sciences archiving requirements. If, however, important original data layers are identified that include special provisions (e.g., for confidentiality, security, or privacy), QGreenland will maintain those provisions from the originally archived data.

Data quality will be approved and maintained through combined effort and knowledge of the QGreenland Editorial Board, Project Team, and NSF Data Archive Center.

*Data Archiving and Preservation*

Some datasets included in QGreenland will not need reformatting/restructuring from the originally published data. We will require that these data are available and additionally accessible from an established data archive center (e.g., the NSF Arctic Data Center, NSIDC), with complete metadata and formats that follow FAIR (Findable, Accessible, Interoperable, Reusable) guidelines. For all data requiring additional metadata, reformatted, resampling, or any other changes before inclusion in QGreenland, we will archive the transformed data set at the NSF Arctic Data Center. These data will include complete metadata and assigned DOI. All data will be archived and available on or before release/distribution of the QGreenland package. This further facilitates download and access for individual QGreenland data layers.

The Project Team will follow the NSF Arctic Data Center guidelines to provide accurate and complete documentation for data preservation. The NSF Arctic Data Center will ensure that the data are curated in a relevant long-term archive and ensure data will be available after project funding has ended.

*Data and Code Access*

The primary QGreenland package, designed to support offline use, will be downloadable from the main QGreenland website, with server support from NSIDC. We also expect to have download mirrors available from 3-5 national and international partners to facilitate faster download around the world (Quantarctica developers found these mirrors valuable and we will seek to establish mirrors at the same host institutions). All mirrors will follow the same update schedule, and allow for full download of the complete QGreenland package and of individual data layers. The QGreenland website will also facilitate connection to web-served data sets that can be added to individual QGreenland GIS environments. This can include, for example, data that are too large for offline access (e.g., a high-resolution Greenland digital elevation model) or that provide temporal/spatial resolution that is not appropriate for the stand-alone QGreenland package.

All data will be accessible to the public and subject to usage and dissemination restrictions under the CC-0 Public Domain Dedication License.

Code/software for the data production and analysis will be open source and released to GitHub under the MIT software license with acknowledgement of the NSF award number. In addition, by linking the GitHub repository to Zenodo, a DOI will be generated for the code as well.