Project Management Plan (PMP) for the HEX Beamline Project to be Built as a Partnership Between NYSERDA and NSLS-II

Brookhaven National Laboratory

Upton, New York

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Version History Log

Version	Effective Date	Description / Summary of Change
1	27 Sept 2017	First Draft
2	26 March 2019	Second Version, various updates.

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ACRONYMS

ALD	Associate Laboratory Director
ANSI	American National Standards Institute
BAT	Beamline Advisory Team
BES	Basic Energy Science
BNL	Brookhaven National Laboratory
BSL	Biological Safety Level
CCB	Change Control Board
DOE	Department of Energy
EA	Environmental Assessment
ES&H	Environment, Safety, and Health
EVMS	Earned Vale Management System
FONSI	Finding of No Significant Impact
FY	Fiscal Year
HEX	High-energy Engineering X-ray (Beamline)
IPT	Integrated Project Team
ISM	Integrated Safety Management
NEPA	National Environmental Protection Act
NSLS	National Synchrotron Light Source
NSLS-II	National Synchrotron Light Source II
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration
PCR	Project Change Request
PMP	Project Management Plan
QA	Quality Assurance
SAC	Science Advisory Committee
SBMS	Standards-Based Management System
TPC	Total Project Cost
TPW	Three Pole Wiggler
WBS	Work Breakdown Structure

1. INTRODUCTION

The HEX beamline was initially proposed by a team led by Mark Croft from Rutgers University in the course of the NSLS-II 2010 call for proposals. This proposal was accepted and the beamline was assigned port 27-ID. Since the acceptance of the Beamline Development Proposal an agreement has been reached with NYSERDA to provide the funding and much initial work has been completed; NSLS-II now seeks to formalize the working arrangement in this Project Management Plan (PMP).

This PMP describes the management and project execution processes that are used to ensure that the HEX Beamline is completed on time and within budget. The beamline is part of the overall Partner Beamline Portfolio. The PMP defines the project scope; and outlines the cost and schedule as well as the organizational framework and overall management systems for the project. Further, it identifies roles and responsibilities of the project participants. It also describes the formal change control process by which the project scope, cost, schedule, and PMP may be revised.

Since much of the content of a standard PMP is covered in the NSLS-II / NYSERDA contract, this is referenced in Appendix B to avoid unnecessary duplication. Extensive use will be made of the referenced documents; these are documents expected to change regularly through the life of the project (eg risk register) and are kept as separate documents in order to avoid frequent changes (and re-signing) of this PMP.

Although the NSLS-II supplied portion of this project (oversight and management) is funded through NSLS-II operating budgets, the full set of NSLS-II project management tools and documentation will be deployed as a best practice for delivering the project scope on time and within budget. Another important reason for utilizing the full suite of scheduling tools is the tight coordination that will be required for provision of BNL staffing at the required time, as well as access to the NSLS-II ring for installation of the superconducting wiggler source, front end, and protection systems.

All beamline construction and modification at NSLS-II is subject to the requirements outlined in the document "NSLS-II Process Description: Review Process for Facility Additions and Modification".

2. PROJECT ELEMENTS

The goal of this Partner Beamline Project is to develop a complete beamline, High-energy Engineering X-ray (HEX), comprising a single independent branch that is ready for commissioning on the NSLS-II storage ring. Development of the source and beamline consists of the design, engineering, fabrication/procurement, assembly, testing, and installation in the NSLS-II facility. This section of the Project Management Plan outlines the Work Breakdown Structure, provides a high level description of the project scope, gives a detailed list of the labor required from NSLS-II, outlines who will provide funding, gives the Performance Measurement Baseline Schedule, as well as the Budget and Funding requirements, to meet the proposed scope and schedule.

2.1 WORK BREAKDOWN STRUCTURE

The Partner Beamlines Portfolio has been organized into a Work Breakdown Structure (See Figure 2A (high level) and Figure 2B (for details relevant for this beamline)) for planning, managing, and reporting project activities. Individual beamlines are considered to be separate projects due to the differing completion schedules, funding sources, etc. The WBS contains a complete definition of the project's scope and forms the basis for planning, executing, and controlling project activities. WBS elements are defined to be consistent with discrete increments of project work and the planned method of accomplishment. Those which apply to HEX are outlined below. **The Level 4 WBS Dictionary is a Reference Document**.

7.0 Partner Beamlines

At the time of writing, the Partner Beamline Portfolio project has completed the construction of 5 beamlines; these are now in commissioning or operational.
These beamlines have been selected through an open "Beamline Development Proposal" process which has included a review of the scientific mission, feasibility, and proposal teams. NSLS-II has made no commitments over funding other than to assist Partners secure the necessary funds.
The HEX beamline will join this portfolio as the sixth such beamline.

7.05 HEX Beamline

The WBS contains all of the scope of work necessary to design, procure, assemble, install and commission (without x-rays) the HEX beamline ready to commence commissioning. The source for the beamline will be a superconducting wiggler device.

Design documents at the Conceptual, Preliminary and Final Design stages will be available which document the evolution of the beamline design. These will be added to the Reference Document listing as they become available.

2.2 SCOPE DESCRIPTION

The goal of this Project is the development of the superconducting wiggler source, front end, beamline, and end-station, including the satellite building, with necessary supporting infrastructure at NSLS-II to support the research program envisioned in the Beamline Development Proposal for HEX. Development of this source and beamline consists of the design, engineering, fabrication/procurement, assembly, testing, and installation on the NSLS-II experimental floor.

The optical layout of the base scope beamline is relatively simple, comprising;

- A superconducting wiggler source located in straight 27-ID of the NSLS-II storage ring,
- A "front-end" able to safely extract the high power x-ray beam from the storage ring, and provide a means for adjusting the beam sizes, and also switching the beams on and off (the "off" state prevents x-rays from leaving the storage ring tunnel and entering the First Optics Enclosure (FOE).
- A Laue (double crystal) monochromator able to pass the required x-ray energies whilst stopping all other energies.
- Additional components within the FOE are included for visualizing the beam, defining the size and shape of the beam, collimating the very high energy "Bremsstrahlung" radiation, and providing an additional shutter to allow/prevent the x-ray beam from passing further down the beamline, to the "end stations" where the scientific experiments are performed.
- Lead shielded beam transport pipe linking the various optics and experimental enclosures in such a way as to completely enclose the beam. Part of this pipe will be located outdoors between the main NSLS-II experimental floor and the HEX satellite building.

The initial scope, as outlined above calls for a single beamline branch taking beam from the center of the wiggler fan to an End Station in the satellite building.

It is anticipated that the full build out of the beamline will include two additional branches utilizing beams taken from the edge of the wiggler fan. This is outside the scope of the current project. The current project includes affordances required to integrate these branches with a minimum of disruption.

2.3 BASELINE

2.3.1 Cost Baseline

The HEX Beamline is being constructed according to a fixed Total Project Cost (TPC) which comprises elements funded by NYSERDA, and the oversight which is funded by NSLS-II. The TPC for the HEX Beamline Project is shown in Table 2.3.1A and 2.3.1B.

The breakdown of the TPC among the Work Breakdown Structure (WBS) elements is derived from knowledge of the component systems that comprise the beamline and the associated installation, and management costs. The cost estimate was prepared by the Beamline Project team based on engineering estimates of similar beamlines, professional judgement as well as vendor quotes. The estimates and supporting data are captured in the Cost Estimating Book (CEB). Most of the estimate is supported by vendor catalogue prices or quotes, or by historical costs and past experience.

There is confidence in the ability to deliver the project scope within the fixed TPC because the HEX beamline has great similarity to completed NSLS-II beamlines, and the wealth of available and detailed historical experience related to their construction.

Table 2.3.1A: HEX Beamline Base Cost Estimate Summary.

WBS	Description	M&S [$]	Labor [$]	Total [$]
7.05.01	NSLS-II activities funded by NSLSII	***$19k***	***$4,981k***	***$5,000k***
7.05.02 – 7.05.07	NSLS-II activities funded by NYSERDA	***$16,351k***	***$8,649k***	***$25,000k***
Total Project Cost [$]		***$16,370k***	***$13,630k***	***$30,000k***

Table 2.3.1B: HEX Beamline Base Cost Estimate by Year and Level 3 WBS.

L3 WBS	Description	FY18	FY19	FY20	FY21	FY22	Budgeted Cost
7.05.01	HEX Management	$732,646	$1,101,691	$1,301,226	$1,359,633	$504,805	$5,000,000
7.05.02	HEX Design	$290,357	$175,984				$466,341
7.05.03	HEX Construction		$765,111	$4,561,619	$1,227,372	$53,123	$6,607,224
7.05.04	HEX Beamline Infrastructure	$9,550	$910,455	$2,607,037	$623,353	$8,920	$4,159,317
7.05.05	HEX Accelerator Infrastructure	$361,964	$2,220,391	$2,706,240	$1,596,197		$6,884,791
7.05.06	HEX Controls		$346,935	$753,668	$225,187		$1,325,790
7.05.07	HEX Conventional Facilities	$280,884	$1,981,619	$3,294,030			$5,556,537
Grand Total		**$1,675,401**	**$7,502,186**	**$15,223,820**	**$5,031,742**	**$566,848**	**$30,000,000**

2.3.2 Schedule Baseline

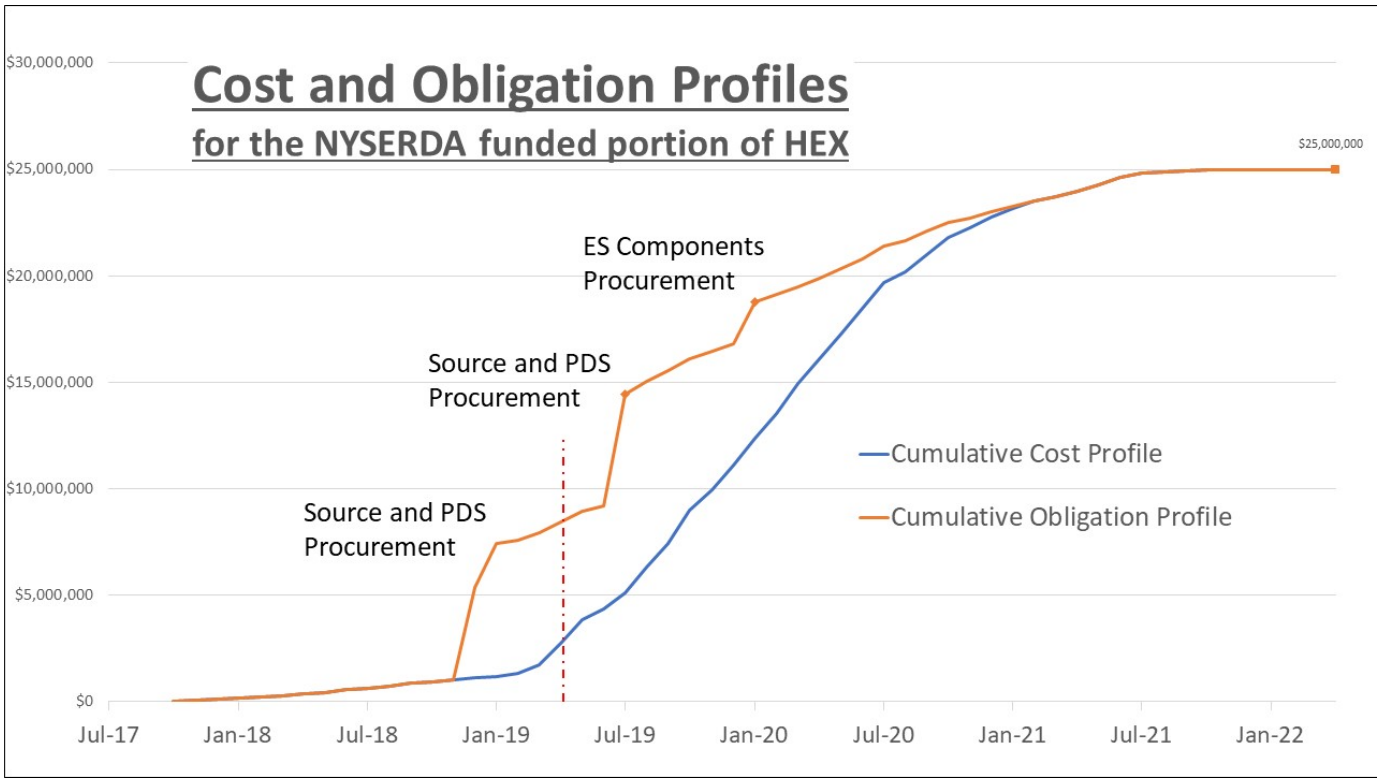
Table 2.3.2: Anticipated Milestone Dates.

	Contract	Scheduled
Project Start	Aug-17	Sep-17
HEX Beamline CDR	Nov-17	Oct-17
HEX Beamline PDR	Apr-18	Apr-18
SCW Procure / Make Decision	Aug-18	Aug-18
Front End Design Review	Oct-18	Sep-18
Hutches Procured	Mar-19	Jan-19
HEX Beamline FDR	May-19	Apr-19
Satellite Building Contract Placed	Jul-19	Dec-18
Optical Components Procured	Sep-19	Jul-19
HEX Beamline Hutch Complete	Apr-20	Feb-20
HEX Beamline Satellite Building Beneficial Occupancy	Jul-20	Jul-20
End Station Components Procured	Sep-20	Jan-20
Optical Components Installed	Sep-21	Mar-21
HEX Beamline Utilities Complete		Feb-21
HEX Beamline Components Testing Complete		Mar-21
SCW Installation Complete	Apr-22	May-21
HEX Beamline Project Complete		Nov-21
IRR	Jun-22	Nov-21

2.4 BUDGET AND FUNDING PROFILE

The NYSERDA / NSLS-II contract agreed the overall budget and the time-phased funding profile, however this was subsequently relaxed and funding is now available without restrictions on timing (Modification #1 to agreement 110960, dated 19 March 2018).

The profile below shows the expected cost profile (blue) and the obligation profile (orange). The large steps in the obligation profile are covered by a number of advance payments agreed in the contract designed to meet DOE regulations when the laboratory makes contractual commitments.



2.5 RISK AND CONTINGENCY

A considerable amount of planning has been done over a number of years for the construction of this beamline. In addition, there is a great deal of recent execution and cost experience with similar activities. As a result, the overall risk level is considered to be reasonably low. However, the cost contingency is extremely low. In reality, any significant cost overruns will have to be dealt with through a reduction in scope, specifically in the area of the Experimental Station fit-out. This is in contrast to DOE projects which are normally expected to carry a 30-40% cost contingency at the start of a project. A list of scope contingency items have been identified. The total funding ($25M) from NYSERDA is fixed.

It should also be noted that the level of complexity is reasonably low, and the experience of the team from working with similar beamlines at NSLS and NSLS-II means that the uncertainties are small, thus this level of contingency is deemed sufficient *with careful cost management*. In summary, we believe that the base scope can be completed as described on time and on budget.

Risks for the Project will be estimated and quantified in several ways as noted in the Assumptions document (see reference document list). See the Contingency Analysis Report and the Risk Register (Reference Documents):

- Risk Register (compiled at CDR and updated regularly),
- Top down WBS level risk assessment (compiled at CDR) and
- Bottoms up resource level uncertainty assessment (compiled at PDR).

2.6 LIFE CYCLE COSTS

The beamline (HEX) would be expected to have the following life cycle costs;

Table 2.6: Projected Life Cycle Costs

Costs	Expected Costs and Anticipated Source of Funds		
	NSLS-II	NYSERDA	Total
Initial Capital cost	$5,000k	$25,000k	$30,000k
Annual operating costs (1)	$1,500k	$0K	$1,500k
Annual capital costs	$0	$0k	$0k
Decommissioning costs	<$1,000k	$0k	<$1,000k
Total costs over 25 years	$43.5M	$25M	$68.5M

Note 1: This does not include the cost of producing x-ray photons, safety oversight, User administration, training and badging, utilities costs, costs of repairs of equipment inside the Storage Ring tunnel, maintenance and testing of the PPS, EPS and Area Radiation Monitors (ARMs) etc. These costs are to be covered by NSLS-II.

Notes:

- The operational service lifetime of the beamline instruments is expected to be about 25 years.
- The project includes affordances for two additional branches estimated to cost ~$10M to build out, these are not included in the projected life cycle costs.
- Decommissioning costs are anticipated to be modest (<$1 million per beamline), and will take into account salvage and recycling of components wherever feasible and proper disposal of those items which cannot be repurposed.

2.7 STAFFING

The staffing requirements for the project can be met by existing NSLS-II staff, with the exception of a beamline scientist who will be recruited through normal BNL recruitment methods. We anticipate using a local construction company for the satellite building, and commercial contractors for the supply of the hutches (including installation) and the beamline components, augmented by existing staff for the completion of the Infrastructure from NSLS-II.

One key scientist for the project, is already on the NSLS-II team at BNL (Dr Zhong Zhong); an additional scientist (Michael Drakopoulos) taking the lead role, has now been recruited (March 2019), and the lead engineer role will be covered by Michael Lucas, project management responsibility is covered by Andrew Broadbent.

It is not expected that any additional hiring will be required to meet the project needs. Experienced Designers are available from the NSLS-II pool for the creation of drawings and solid models.

Mechanical and Electrical Technicians, Surveyors, Riggers, Carpenters, and Engineers are expected to be used from the existing NSLS-II staff for short periods, as needed.

The projected Staffing Requirements by FY are shown overleaf in Table 2.7.

Resource ID	Resource Name	Sum of FY19	Sum of FY20	Sum of FY21	Sum of FY22
BTAC_HEX3	Building Trades Carpenter - Assigned	0.00	0.01	0.02	0.00
BTAE_HEX3	Building Trades Electrician - Assigned	0.01	1.72	0.20	0.00
BTAP_HEX3	Building Trades Plumber - Assigned	0.00	0.20	0.06	0.00
BTAR_HEX3	Building Trades Riggers - Assigned	0.05	0.07	0.43	0.00
BTU_HEX3	Building Trades Unassigned	0.00	0.09	0.12	0.00
BTUC_HEX3	Building Trades Carpenter - Unassigned	0.00	0.01	0.07	0.00
BTUP_HEX3	Building Trades Plumber - Unassigned	0.00	0.02	0.00	0.00
BTUR_HEX3	Building Trades Riggers - Unassigned	0.00	0.01	0.13	0.00
MO1_HEX3	ME - Survey Engineer	0.09	0.11	0.18	0.00
MO2_HEX3	ME - Survey Technician	0.15	0.17	0.39	0.00
MO3_HEX3	ME - Utility Engineer	0.17	0.20	0.25	0.00
MO4_HEX3	ME - Utility Technician	0.01	0.48	0.33	0.00
MO5_HEX3	ME - Vacuum Engineer	0.40	0.29	0.31	0.00
MO6_HEX3	ME - Vacuum Technician	0.18	0.47	0.74	0.00
MO7_HEX3	Project Engineer	0.11	0.25	0.31	0.08
MPO_ADM_HEX3	MPO Administrative	0.00	0.01	0.00	0.00
MPO_ARC_HEX3	MPO Architect	0.09	0.14	0.00	0.00
MPO_CAM_HEX3	MPO CAM	0.02	0.03	0.00	0.00
MPO_EEP_HEX3	MPO Project Electrical Engineer	0.01	0.02	0.00	0.00
MPO_EI_HEX3	MPO Electrical Inspector	0.03	0.04	0.00	0.00
MPO_MEP_HEX3	MPO Project Mechanical Engineer	0.03	0.06	0.00	0.00
MPO_MGR_HEX3	MPO Manager	0.00	0.01	0.00	0.00
MPO_MI_HEX3	MPO Mechanical Inspector	0.05	0.09	0.00	0.00
MPO_OTH_HEX3	MPO Other Professional	0.00	0.18	0.00	0.00
MPO_SAF_HEX3	MPO Safety Engineer	0.06	0.11	0.00	0.00
MPO_SE_HEX3	MPO Structural Engineer	0.21	0.35	0.00	0.00
MPO_SI_HEX3	MPO Structural Inspector	0.26	0.43	0.00	0.00
NA1_HEX3	Manager	0.48	0.80	0.80	0.51
NA2_HEX3	Administrative	0.07	0.11	0.11	0.03
NA4_HEX3	ES&H Professional	0.20	0.34	0.34	0.08
NA5_HEX3	QA Professional	0.07	0.11	0.17	0.04
NA7_HEX3	IT Professional (Software)	0.02	0.52	1.00	0.00
NB1_HEX3	Project Controls	0.48	0.57	0.57	0.22
NB2_HEX3	Business Ops	0.07	0.11	0.11	0.03
NE1_HEX3	Electrical Engineer	0.56	1.14	0.91	0.00
NE2_HEX3	Electrical Designer	0.28	0.35	0.54	0.01
NE3_HEX3	Electrical Technician	0.21	1.19	1.48	0.00
NE4_HEX3	Controls Engineer	0.52	2.02	0.20	0.01
NO1_HEX3	Mechanical Engineer	1.09	1.19	0.98	0.07
NO2_HEX3	Mechanical Designer	0.62	0.13	0.26	0.00
NO3_HEX3	Mechanical Technician	0.44	1.05	1.23	0.20
NO6_HEX3	ME - D&I Engineer	0.23	0.06	0.05	0.00
NO8_HEX3	ME - Insertion Device Engineer	0.11	0.13	0.35	0.00
NO9_HEX3	ME - Insertion Device Technician	0.11	0.19	0.60	0.00
NS1_HEX3	Scientist	1.18	2.00	2.00	0.51
NS2_HEX3	Assistant/Associate Scientist	0.34	0.23	0.24	0.00
SE5_HEX3	EL - Vacuum Engineer	0.15	0.12	0.11	0.00
TE1_HEX3	EL - D&I Engineer	0.20	0.10	0.12	0.00
TE2_HEX3	EL - D&I Technician	0.15	0.13	0.19	0.00
TE4_HEX3	EL - Insertion Device Engineer	0.21	0.21	0.32	0.00
Grand Total		**9.72**	**18.36**	**16.23**	**1.79**

Table 2.7 Projected Staffing Requirements by FY (compiled March 2019)

2.8 ACQUISITION APPROACH

Acquisition strategies will be chosen to obtain the best value based on the assessment of technical, cost, and schedule risks on a case-by-case basis.

This project has a number of significant procurements (>$200k). These will be handled by the NSLS-II, procurement team (see table below).

The procurement of the Infrastructure will follow the models developed for beamlines at NSLS-II. This mainly constitutes standard off-the-shelf equipment for routine applications (electrical, plumbing, some controls equipment including computers and equipment racks, industrial PLC-based interlocks, and furniture, etc.), available purchasing techniques include price competition among technically qualified suppliers and use of competitively awarded blanket purchase agreements.

Projected Procurements are shown in the Reference Documents: Large Procurements Listing, Table 2.8.

Item	Scheduled contract placement date	Budgeted Procurement Value
Laue monochromator, beamline components, safety components, transport pipes, shutters, diagnostics etc.	July 2019	$3,000,000
F-station KB mirrors	Jan 2020	$400,000
F-station tables	Jan 2020	$307,000
F-station sample stack and table	Jan 2020	$275,000
F-station Imaging detectors	Jan 2020	$310,000
F-station flat panel detector	Jan 2020	$112,000
Furniture and office equipment	Sept 2020	$60,000
Hutches	Jan 2019	$1,915,000
LN2 distribution system	May 2020	$103,000
Superconducting wiggler	July 2019	$1,500,000
Superconducting wiggler controls	Aug 2019	$100,000
Satellite building construction	Dec 2018	$3,190,000
Smaller standard procurements – multiple suppliers.		
Network and computer hardware	Aug 2019	$172,000
Motor controller hardware	Aug 2019	$150,000 + $73,000
EPS hardware	Apr 2021	$63,000

PPS hardware	Jul 2019	$123,000
Electrical utilities hardware	Dec 2019	$67,000
Mechanical utilities hardware	Dec 2019	$170,000
Equipment racks	Oct 2019	$50,000
Vacuum hardware	July 2020	$200,000

Table 2.8 Projected Procurements are shown in the Reference Documents: Large Procurements Listing.

3. MANAGEMENT STRUCTURE

This section of the Project Management Plan describes the project team organization structure and responsibilities, and project management systems that will be used to control day-to-day activities of the project in order to manage the cost and schedule performance and technical accomplishments. As conditions change during the evolution of the project, the systems will be modified appropriately to remain responsive to the needs for project control and reporting.

The project management, measurement, planning, and control systems employed by this Project will be similar to those which have been already developed and implemented for the NSLS-II Experimental Tools (NEXT) Project. For Environmental, Safety and Health (ES&H) issues, Quality Assurance (QA), project controls, and configuration management, this Project will be in compliance with the manuals, management plans, and processes which were already developed and implemented for previous beamline projects at NSLS-II.

BNL is organized into Directorates. Among them, the Energy Sciences Directorate is responsible for operating and developing NSLS-II. The NSLS-II Director appointed the Partner Beamline Portfolio Manager.

An integrated project team (IPT) comprised of Partner and BNL personnel has been established to accomplish this project. See Section 3.1.

The BNL Partner Beamline Portfolio Management Team will be responsible for coordinating the design, fabrication, installation, of the activities undertaken by BNL staff (whatever the funding source) and overall day-to-day management of the project. This section outlines the project's organization and management approach. A schematic representation of the management arrangement is shown in Figure 3A and the roles and responsibilities of project participants are summarized in the following subsections.

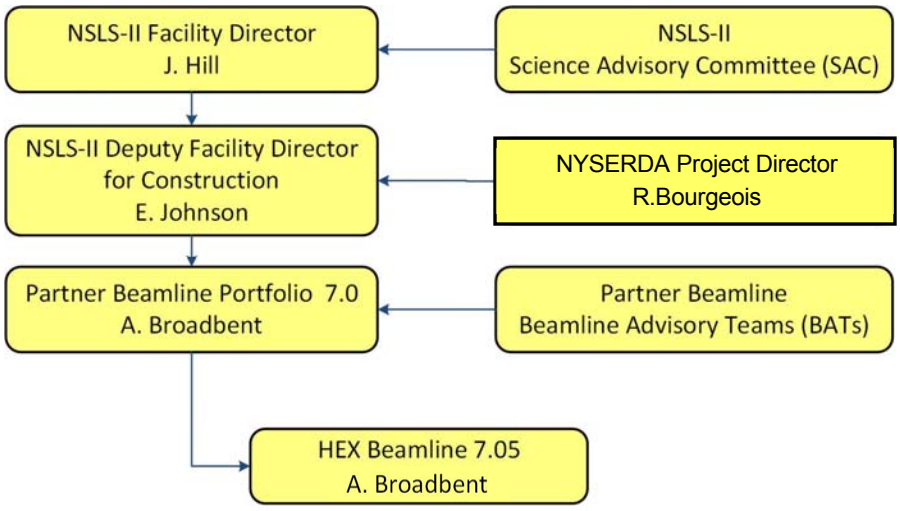


Figure 3A Partner Portfolio Project Management Team.

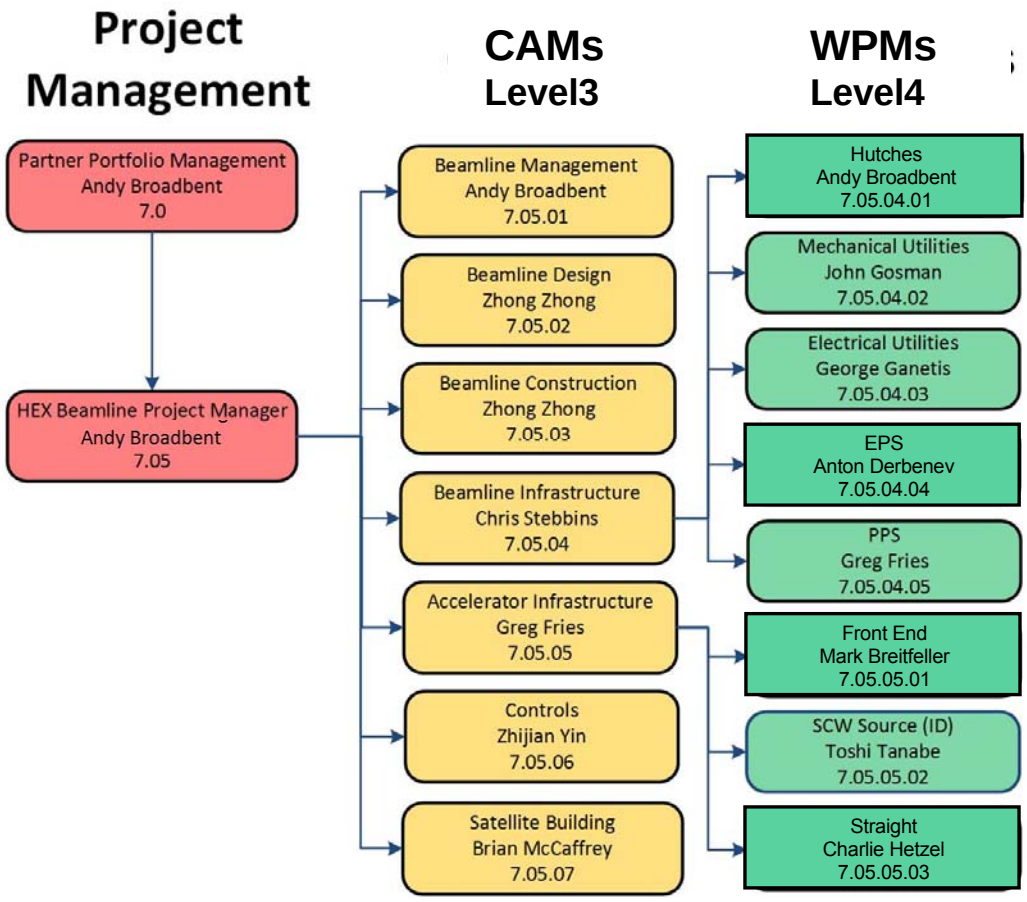


Figure 3B HEX Beamline Control Account Managers.

3.1 INTEGRATED PROJECT TEAM

The purpose of the Integrated Project Team is to support the HEX Beamline Project Manager during the design and construction process. The IPT Charter, as stated in Appendix A, identifies the team members and their roles and responsibilities for the oversight and management of the HEX Beamline project. The team size and membership will change as a project progresses throughout the life time of the project. The responsibilities of the IPT members include:

- develop and/or participate in project planning, baseline development and contracting;
- ensure all project interfaces are identified, completely defined, and managed to completion;
- identify and define appropriate and adequate scope, schedule and cost parameters;
- support the preparation, review, and approval of project documentation;
- review and assess project performance and status against established performance parameters, the baseline, milestones and deliverables;
- identify and resolve issues;
- plan and participate in project reviews, assessments, and appraisals as necessary;
- review and evaluate baseline and funding change requests and support the Change Control Boards as requested;
- plan and participate in operational readiness assessments; and support the preparation, review, and approval of project completion and closeout documentation.

Table 3.1: HEX Beamline IPT Membership

Executive IPT Members	Facility Director Deputy Director for Construction	John Hill, Erik Johnson
Core Project Team members	Partner Beamlines Portfolio Manager HEX Lead Beamline Scientist HEX Beamline Scientist HEX Beamline Lead Engineer	Andy Broadbent Michael Drakopoulos Zhong Zhong, Mike Lucas.
Support IPT Members	Project Controls Infrastructure Control Account Managers Business Operations Controls Construction ES&H QA	Raj Gutta, Chris Stebbins and Greg Fries, Heather Turbush, Zijian Yin Brian McCaffrey Lori Stiegler Joe Zipper.

Additional information on the organization of the project personnel and their specific roles can be found in the IPT charter (Appendix A).

3.2 ROLES AND RESPONSIBILITIES OF PROJECT PARTICIPANTS

3.2.1 NSLS-II Facility Director & NSLS-II Deputy Director for Construction

The NSLS-II Facility Director & NSLS-II Deputy Director for Construction are responsible for ensuring that all Beamline development activities and related photon sciences activities at BNL, including those within the Partner Portfolio, achieve all mission requirements and are operated and/or executed within scope, cost, and schedule in a safe, cost efficient, and environmentally responsible manner. In order to carry out the Partner Beamline Projects, the NSLS-II Facility Director has established a Project team within NSLS-II, led by the Partner Beamlines Portfolio Manager. Specific responsibilities of the NSLS-II Facility Director & NSLS-II Deputy Director for Construction, for the HEX Beamline Project includes:

- ensure that the NSLS-II facility and the HEX Beamline Project is fully integrated so as to maximize the scientific capabilities of the overall NSLS-II user facility and to minimize potential conflicts among different projects;
- provide access to the resources, systems, and capabilities of the NSLS-II facility that are required to support execution of the HEX Beamline Project;
- conduct internal and external peer reviews of the HEX Beamline Project; and
- approve Level 1 HEX Beamline Project Change Requests (PCRs).

3.2.2 Partner Beamlines Portfolio Manager

The Partner Beamlines Portfolio Manager has been tasked by the NSLS-II Facility Director & Deputy NSLS-II Director for Construction with management responsibility and authority for the overall successful execution of the specific beamline projects in a manner consistent with this PMP. Specific responsibilities of the Partner Beamlines Portfolio Manager include:

- manage the execution of the portfolio of projects to ensure that the project is completed within approved cost, schedule, and technical scope;
- ensure that project activities are conducted in a safe and environmentally sound manner;
- ensure that ES&H responsibilities and requirements are integrated into the project;
- ensure that effective project management systems, cost controls, and milestone schedules are developed, documented, and implemented to assess project performance;
- oversee design, fabrication, installation, and commissioning;
- manage the interface and coordination of requirements with other projects and activities;
- identify and manage project risks;
- chair the risk management committee;
- chair the project Change Control Board (CCB);
- approve Level 2 change control proposals;
- prepare and provide recommendations to the NSLS-II Facility Director for Level 1 change control proposals;
- represent the project in interactions with stakeholders;
- conduct monthly or quarterly project reporting/meeting;
- lead the IPT and delegate appropriate decision-making authority to the IPT members;
- ensure development and implementation of key project documentation; and
- request and coordinate internal and external peer reviews of project.

3.2.3 Environment, Safety, and Health (ES&H) Manager

A member of the NSLS-II ES&H group will serve in the capacity of Partner Beamlines ES&H Manager. The ES&H Manager is responsible and accountable to the Partner Beamlines Portfolio Manager for guiding the organizational elements in their respective safety efforts and for ensuring that work is performed in a safe and environmentally responsible manner. Specific responsibilities include:

- provide overall policy and guidance on ES&H issues;
- work with the line organizations to make available necessary input from ES&H professionals and other support;
- ensure integration of ES&H factors into design, installation, commissioning, and operations;
- regularly assess the effectiveness with which Integrated Safety Management is being applied;
- coordinate the ES&H assessments conducted by others;
- assure compliance with BNL SBMS Requirements including Occupational Safety and Health, Environmental, Radiological and Safety Engineering subject areas and external regulations including OSHA, EPA, NYSDEC, NFPA and DOE;
- after an event, oversee and coordinate adherence to required procedures in reporting abnormal events or conditions following the BNL Standards-Based Management System (SBMS) subject area “Occurrence Reporting and Processing Systems (ORPS)” or for lower level events the PS Events and Issues Management procedure; and
- generate and/or obtain appropriate approvals for safety documentation.

3.2.4 Quality Assurance Manager

The Partner Beamlines Quality Assurance Manager is responsible and accountable to the Partner Beamline Portfolio Manager for providing support to the Partner Beamlines Portfolio in the area of quality assurance. Specific responsibilities include:

- plan, generate, and obtain approval for QA requirements and documentation;
- provide consultation to system managers to implement QA-related activities;
- provide project-specific QA training to system managers on this QA Plan and other topics that may be of interest to the project personnel;
- provide training to project members on Traveler System and Discrepancy Reporting System.

- review completion of QA-related milestones as provided in project schedules, and report results to project management;
- review and approve equipment acceptance documentation
- perform QA surveillance and/or audits;
- work with the Partner Beamlines Project Manager to prevent situations where completion of critical planned QA activities are compromised due to cost, schedule, or other constraints;
- make recommendations to the Project Manager when work should be stopped based on an investigation indicating that quality is inadequate as defined in the QA Plan; and
- participate individually or as part of a team in vendor surveys, vendor qualifications, and source inspections.
- review and approve BNL SOW's, Spec's, drawings, and requisitions
- participate in design reviews
- participate in the evaluation of proposals submitted to BNL
- provide support for the project's IRR; and
- track recommendations to closure from project reviews

3.2.5 Project Controls Lead

The Partner Beamlines Portfolio Project Controls Manager is responsible and accountable to the Partner Beamlines Portfolio Manager for project control functions. Specific responsibilities include:

- develop cost plan and Project schedule;
- implement and maintain the Performance Baseline and Earned Value Management System (EVMS);
- coordinate, review, and maintain the baseline change control process, and project progress reporting; and
- provide earned value data reporting.

3.2.6 NSLS-II Beamline Lead Scientist for the HEX Beamline

The NSLS-II Beamline Lead Scientist for the HEX Beamline is responsible and accountable to the Partner Beamlines Portfolio manager. Responsibilities of the Level 2 manager include:

- interact with the Partner Beamlines Portfolio Manager for the HEX Beamline, and the wider user community, including the beamline advisory team;

3.2.7 Project Manager for the HEX Beamline

The NSLS-II Beamline Project Manager for the HEX Beamline is responsible and accountable to the Partner Beamlines Portfolio manager. Responsibilities of the Level 2 manager include:

- manage BNL staff working on this project to deliver design and construction of the beamlines and instruments in accord with specifications and requirements, including cost, technical, schedule, quality, and safety objectives.;
- coordinate work plans and verifying progress of the tasks which are assigned to the group;
- organize and prioritize the work load and task assignments among the group staff members in order to meet the objectives of the cost plan and the schedule of the project; and
- coordinate BNL staff working on this project.

3.2.8 Level 3 Managers for Beamline and Accelerator Infrastructure, Controls and Conventional Facilities

The Level 3 Managers for the Beamline and Accelerator Infrastructure, Satellite Building construction, and Controls will coordinate with the various groups at NSLS-II providing the infrastructure including the hutches, mechanical utilities, electrical utilities, EPS, PPS, the equipment within the straight (where applicable), the source, and the beamline Front End. Specific responsibilities include:

- coordinate the required groups at NSLS-II to ensure that the needs of the HEX Beamline project are met;
- identify and resolve scheduling and coordination issues;
- bring any matters of concern to the relevant beamline Project Managers;
- update the Partner Beamlines Project Manager on progress and seek concurrence on design and procurement decisions.

3.2.9 Level 4 Managers

The Partner Beamlines Portfolio Level 4 Managers have specific responsibility for the following;

- Hutches,
- Mechanical Utilities,
- Electrical Utilities,
- EPS,
- PPS,
- Equipment within the Straight,
- Source,
- Beamline Front End
- Conventional Facility design and Construction

These managers are responsible and accountable to the relevant Level 3 Infrastructure Managers. Responsibilities of these Level 4 managers are to:

- manage group members to deliver design and construct the above systems, in accord with specifications and requirements, including cost, technical, schedule, quality, and safety objectives;
- coordinate work plans and verifying progress of the tasks which are assigned to the group;
- organize and prioritize the work load and task assignments among the group staff members to meet the objectives of the cost plan and the schedule of the project; and
- supervise the group staff members.

3.3 ADVISORY COMMITTEES

Advisory committees, represented on Figure 3A, have the following roles.

3.3.1 Science Advisory Committee (SAC)

The Science Advisory Committee reports to the NSLS-II Facility Director and is charged to provide recommendations on all scientific and policy issues that bear on the full and effective utilization of BNL Energy Sciences Directorate facilities and on future developments required to maintain the scientific productivity of NSLS-II programs at the highest possible level. The SAC reviews and provides advice on planning for current and future scientific facilities and programs that will best meet the needs of the scientific community.

3.3.2 Beamline Advisory Team (BAT)

The HEX BAT reports to the Partner Beamlines Portfolio Manager and is charged to provide advice on the scientific mission and technical requirements for the HEX Beamline Project. They represent a particular user community and possess extensive scientific and technical expertise in designing, constructing, and operating synchrotron beamlines and/or instrumentation and in conducting experiments.

The membership of the BAT can be found in Reference Documents: BAT Membership List

4. BASELINE CHANGE CONTROL

4.1 APPROVAL AND NOTIFICATION LEVELS FOR BASELINE CHANGE CONTROL

The Project will be baselined at the time of the FDR for measuring performance. Any changes after baselining will require the Baseline Change Control process to be utilized. The levels listed in Table 4.1B control the project baseline change approvals. Project Change Requests (PCRs) will be generated by Control Account Managers in coordination with Project Controls as outlined in the Project Controls Manual. Any Baseline Deviation PCRs with sufficient Schedule and Cost backups will be reviewed by the project's Change Control Board prior to submittal to the Director of NSLS-II and the NYSERDA HEX Project Director (if needed) for approval. Once PCR is approved, baseline changes are incorporated into the baseline and current working project schedule. Future status updates and performances are compared to the revised baseline. All baseline changes are documented in a Baseline Change Log and Contingency Tracking Log (these may be combined) on a monthly basis by Project Controls once the change has been approved and implemented. The CCB membership is shown in Table 4.1A, and will include the Partner Beamline Portfolio Manager and a subset of IPT members appointed by the Partner Beamline Portfolio Manager.

Table 4.1A: CCB Membership

CCB Membership	IPT Core Members, Project Controls Specialist. Other IPT members as appropriate, selected by the Partner Beamlines Portfolio Manager for any specific change.

Table 4.1B: Change Approval Levels.

Level	Baseline Deviation	Routine Project Changes	
		Level 1	Level 2
Approvers	NSLS-II Facility Director NYSERDA Project Director	Partner Beamlines Portfolio Manager	NSLS-II HEX Project Manager and relevant CAM
Scope	Any change affecting the HEX Project scope.	Major changes affecting the HEX Beamline Project technology or approach to Level 2 WBS components.	Minor changes only. *See note 1*
Cost	A cumulative change (or de-scoping) of ≥ $250k.	The cumulative change (or de-scoping) of ≥ $100K.	Cumulative change (or de-scoping) <$100k
Schedule	Any delay in a NYSERDA (Level 1) schedule milestone.	Any delay in a schedule milestone ≥ 1 month.	Delay to a schedule milestone of <1 month.

Note 1: For example, errors in scope statement, CAM change, organizational change, reconfiguration of procurements, minor change of budget or schedule providing below level 2 threshold. Needs no reissue of the PMP.

4.2 TECHNICAL SPECIFICATIONS CHANGE CONTROL

The technical documents for this project are controlled as follows;

Document	Control / Authorization
NYSERDA contract	Signed
Drawings	NSLS-II Vault process with normal change approval procedures
Project Management Plan (this document) Procurement specifications and SOW Project Assumptions Risk Register	NSLS-II document control procedures
Design Reports	Signed by HEX team and reviewed by expert reviewers.
Requirements, Specifications and Interfaces (RSI) documents	NSLS-II document control procedures

4.3 SCOPE CONTINGENCY MANAGEMENT

As described in section 2.2, a portion of the total project scope has been identified as potential scope contingency to allow for possible increases in costs for the base scope that may result from incomplete design and uncertainties associated with market conditions, technical difficulties, schedule delays, and other circumstances commonly encountered during project execution. Every effort will be made to deliver the entire project scope. However, it may not be possible to deliver some or all of the scope contingency while staying within the fixed TPC.

The use of the scope contingency and management reserve, if established, is controlled in accordance with the baseline change control process. Formal baseline changes will normally be made following a project-wide estimate at completion process or on individual elements when the existing baseline no longer provides a reasonable basis for performance measurement..

Management of cost, schedule, and technical risks is integral to contingency management. Partner Beamline Portfolio management evaluates project risk issues on a continuing basis during project execution. The NSLS-II Deputy Director for Construction will review this subject on at least a semi-annual basis as part of the Energy Sciences Directorate oversight reviews or through the BNL Project Oversight Board process.

4.4 ESTIMATE AT COMPLETION

Along with Baseline at Completion (BAC), the project will maintain Estimate at Completion using various techniques detailed below.

Default EAC - These values will be same as BAC during the initial stages of the project. It will be changed when detailed bottom-up ETC exercise is performed either at an individual Work Package/Control Account or at the project level. Changes to this default EAC values requires approval of Portfolio Manager upon which the details will be entered into EAC change log and then reported in the monthly reports. A detailed EAC Change log will be maintained to assist project team make informed decisions.

Statistical EAC (s) - These values will be updated every month. The two main factors that will affect these values are the actual costs and status (percent complete) of each activity. There are several ways of calculating statistical EAC's. The HEX project will use two methods that have proven to be very useful in other projects.

- Assuming the future performance will be as per baseline (PF=1)

  EAC = Cumulative Actual Costs + Baseline cost of remaining work

  = AC+ (BAC-BCWP)

  This is the EAC values that will be reported to Business ops and

- Assuming the future performance will be like the current performance

  EAC = AC + (BAC-BCWP)/CPI

5. PROJECT MANAGEMENT/OVERSIGHT

5.1 RISK MANAGEMENT

Risk assessments are conducted throughout the project lifecycle and the identified risks will be monitored, assessed, and dispositioned during the project. The Partner Beamlines Portfolio Projects will implement the Risk Management Plan which has been already established for the NEXT project and develop its own risk identification and management approach and associated risk registry. The project risk registry will be reviewed and updated regularly.

Risk management will be based on a graded approach in which levels of risk are assessed for project activities and elements. The assessment is based upon the potential consequences of activity or element failure, as well as the probability of occurrence. Risk minimization is implemented by prototyping components, long lead procurements, and planning alternatives.

5.2 EARNED VALUE MANAGEMENT SYSTEM

Brookhaven National Laboratory has a certified EVMS and this project will work to the intent of the ANSI/EIA-748 Standard. The project EVMS that should be implemented prior to project baseline approval will be consistent with the site EVMS description document and will provide an objective measure of actual costs and schedule performance against the Performance Measurement Baseline.

Account numbers for all activities will be issued at level 4 and for large APPs as deemed to be necessary; monthly statusing will be performed at this level.

The monthly EVMS reporting and analysis will be performed at level 3.

5.3 PROJECT REPORTING AND COMMUNICATION MANAGEMENT PLAN

All Level 3 managers (CAMs) will provide monthly status information via IPD for the Partner Beamline Portfolio Manager and the HEX Beamline Project Manager. This monthly report will include cost and schedule performance information consistent with EVMS requirements and it will be compiled into a progress report, and/or used for reporting to NYSERDA, DOE and/or other beamline and facility stakeholders.

Monthly and quarterly reports will be produced and submitted to NYSERDA according to the BNL/NYSERDA contract for HEX.

5.4 PROJECT REVIEWS

The project will perform Conceptual, Preliminary, and Final Design reviews by internal/external teams that are appointed and charged by the NSLS-II Facility Director. Additional external and independent technical reviews, as applicable, may be performed.

5.5 ENGINEERING AND TECHNOLOGY READINESS

The HEX Beamline is being developed in ways that are very similar to others recently built worldwide, including the 28 already in service at NSLS-II. Although refinement in design concepts and technological advances throughout the life of the project will be explored in order to provide the best state-of-the-art beamlines, the key parameter requirements for the HEX Beamline Project are achievable with current technical capabilities. The project will assess engineering and technology readiness through design reviews and other independent technical reviews.

5.6 STANDARDIZATION OF DESIGN

The document "NSLS-II Process Description: Review Process for Facility Additions and Modification", Section 7, lists a number of internal design standard documents that shall be used in the development of the HEX beamline. If the beamline design does not comply with these documents this shall be documented in the PDR and FDR reports, along with a brief explanation for the non-compliance.

5.7 SYSTEMS ENGINEERING, VALUE MANAGEMENT AND VALUE ENGINEERING

The project will use a systems engineering approach to execute and manage the project including performing value management analysis and value engineering studies; specification and design development, verification, and reviews; risk analysis and management; and coordination of fabrication and installation of equipment and systems, and other interface management activities.

Value engineering studies will be conducted throughout the design phase of the project, and will continue during the final design and construction phases of the project.

5.8 CONFIGURATION MANAGEMENT/DOCUMENT CONTROL

Configuration of the HEX Beamline Project baseline and associated documents will be maintained using the formal change control processes described herein. Baseline documents for the project consist of the following:

- Project Management Plan
- Work Breakdown Structure, WBS
- WBS Dictionary
- Requirements, Specifications and Interface Documents
- Drawings and Specifications
- Approved Project Change Requests

5.9 ENVIRONMENT, SAFETY AND HEALTH

A member of the NSLS-II ESH group will serve in the capacity of the Partner Beamlines ESH Manager. The Partner Beamlines ES&H manager is responsible for ensuring that each beamline project complies with all applicable NSLS-II and BNL ES&H requirements. Requirements include, but are not limited to, external regulations (e.g., EPA, NYSDEC, OSHA, DOE), SBMS subject areas, and PS policies and procedures. Institutional and directorate level Environmental Management/Occupational Health and Safety Systems have been established to develop, implement, achieve, and maintain a successful ES&H program. An ESS&H Policy is in place which declares BNL's commitment to the safety and health of staff and the surrounding community, security of our facilities, compliance with ESH requirements and to continuously improve ESH performance. Expectations for ES&H performance have been established and documented in contractual agreements with DOE. Partner beamline staff, contractors and sub-contractors are responsible for adhering to these requirements and expectations. The following subset of subject areas has been identified as relevant to the design and installation of beamlines:

Aerial Lifts
Beryllium
Chemical Safety
Compressed Gas
Construction Safety
Cryogenic safety
Electrical Safety
Engineering Design
Environmental Aspects and Impacts
Exhaust and Ventilation
Fall protection
Forklift Safety
Laser Safety
Lead
Lifting Safety
Lock Out/ Tag Out
Movement by Vehicle of Hazardous and Radiological Materials On-Site
Noise and Hearing Conservation
OHSAS 18001 Program
Oxygen Deficiency Classifications and Controls
Personal Protective Equipment and Respirators
Pressure Safety
Signs, Placards and Labels for Environmental, Safety and Health (ESH) Hazard
Spill Response
Static Magnetic Fields
Training and Qualifications
Transportation of Hazardous and Radiological Materials Off-site
Walking and Working Surfaces
Work Planning and Control for Experiments and Operations

Additional requirements will be based upon the scope of the beamline and the hazards associated with beamline construction or operation. The full text of the subject areas are found at https://sbms.bnl.gov/ .

Design and installation of new beamlines is also subject to PS procedures and processes especially PS-C-CMD-PLN-001 *NSLS-II Process Description: Review Process for Facility Additions and Modifications.* This document prescribes the process the Photon Sciences Department will use to implement a comprehensive review process for new beamline additions. https://ps.bnl.gov/docs/Documents/PS-C-CMD-PLN-001.docx

It is a requirement that the NSLS-II standard requirements are included in contract documentation where on-site installation work is to be performed by the Contractor. This includes the Contractors installing equipment such as beamline optics and end station equipment (sample documentation is available on request). These requirements include, but are not limited to the following;

- Training: Job descriptions for all staff shall be provided and, working with the NSLS-II training staff, Job Training Assessments will be prepared. Training requirements will be maintained at all times by beamline staff. While a portfolio of training is available through BNL and PS, outside coursework may be required (e.g., 10-hour OSHA construction safety) to meet these requirements.
- Design Reviews: In accordance with PS-C-CMD-PLN-001 design reviews will be coordinated at several stages of the project. NSLS-II representatives will be in attendance at these design reviews. NSLS-II safety staff will review all design documentation and approval is required before continuing.
- Health and Safety Plan (HASP): A HASP for all conventional construction work at the beamline (e.g. satellite building and hutches) will be prepared. In addition a HASP or Job Safety Analysis/Work Plan will be provided by each Contractor (this will detail the who / what / how / when, etc of all work to be performed under the specific contract as well as the items to be brought onto site). A HASP template is available on request. Work will not be allowed until the HASP or JSA/Work Plan for each contractor is completed and approved by BNL staff.
- A Safety Assessment Document (SAD) for NSLS-II for all beamlines has been prepared to detail all the hazards anticipated for beamline construction and operation. All hazards identified for the HEX beamline are similar in nature and magnitude to those already found in the NSLS-II facility. The Unidentified Safety Issue (USI) process will be used to ensure hazards specific to the HEX Beamline are included. A comprehensive program of work planning and experimental review is in place for the NSLS-II facility that will evaluate all experiments (both during commissioning and operation).

Radiation safety will be a key part of each design review, as well as the Instrument Readiness Review (IRR) prior to the start of commissioning. Beamline designs shall follow the *Guidelines for the NSLS-II Beamline Radiation Shielding Design (LT-C-ESH-STD-001).* A member of the Radiation Physicist group will attend design reviews at the discretion of the ESH manager. Detailed calculations of expected radiation dose will be performed by an NSLS-II staff member, between the FDR and the IRR to validate the adequacy of the shielding provided and to verify conformance to the PS Shielding Policy. Beamline design and shielding will be subject to review by the PS Radiation Safety Committee.

A Safety Assessment Document (SAD) for NSLS-II (including the project beamlines) has been prepared to detail all the hazards anticipated for beamline construction and operation. All hazards identified for the HEX beamline are similar in nature and magnitude to those already found in the NSLS-II Project. The Hazard Analyses in the SAD will be evaluated as the project matures, to ensure hazards specific to any Partner Beamline are included. A comprehensive program of work planning and experimental review is in place for the NSLS-II facility that will evaluate all experiments (both during commissioning and operation).

The HEX Beamline is bounded by the National Environmental Protection Act (NEPA) Environmental Assessment that was prepared for the NSLS-II in 2006. To ensure the beamline fits within the bounds of the EA and the NSLS-II Safety Assessment Document, each beamline constructed at NSLS-II will be subject to an Unreviewed Safety Issue (USI) evaluation by the Photon Sciences Authorization Basis Manager. A short description of the partner beamlines must be provided *prior to the beamline PDR* which will be used in the USI evaluation and will subsequently be forwarded to the BHSO for their review and for documenting the inclusion of the beamline in the NSLS-II EA scope. The BHSO Site Manager approved a Finding of No Significant Impact (FONSI) for the NSLS-II Project that includes all potential environmental impacts of the project and associated beamlines.

5.10 QUALITY ASSURANCE, TESTING AND EVALUATION

Quality Assurance is an integral part of effective project management and will be employed throughout the design, procurement, and construction of the project. The Quality Assurance manager for the Projects within the Partner Beamlines Portfolio is assigned to ensure that each beamline project complies with all applicable Quality Assurance requirements. The project's quality management shall be consistent with the BNL QA program and Standards Based Management System (SBMS), which addresses the 10 Criteria of DOE O 414.1 D, and is implemented by NSLS-II quality assurance procedures. In addition, national codes and standards will be followed throughout as applicable. Quality requirements shall be flowed down to sub-contractors performing work for the project. Refer to the design and procurement documents for specific QA, testing and evaluation, and acceptance requirements.

The resource-loaded schedule includes major QA and Testing and Evaluation activities as well as the durations and responsible resources.

5.11 INSTRUMENT READINESS REVIEW AND TRANSITION TO OPERATIONS

Following the completion of the beamline equipment installation and component testing, and Instrument Readiness Review will be held. This is designed to ensure that the beamline is safe for operation. There are three important aspects to this review:

- Documentation (is everything correctly documented and archived securely?)
- Equipment (is everything installed correctly, and safe for operation?)
- Personnel (are all the personnel correctly trained to use the equipment?).

Following successful completion of the IRR, and close-out of all pre-start conditions, the beamline is ready to commence commissioning with x-rays.

Transition to Operations will be accomplished in phases and is expected to start approximately 6 months prior to the completion of the project. All transition to operations activities (personnel transition or changes, operations and maintenance manuals development, training requirements, and other activities) will be identified, resourced, assigned, and included in the resource-loaded schedule.

A Start-Up Test Plan, describing the plans for check-out and commissioning will be developed. The Start-Up Test Plan will support the development of the Checkout, Testing, and Commissioning Plan.

5.12 PROJECT CLOSEOUT

When the project nears completion, a project close-out plan will be developed and implemented by the Partner Beamlines Portfolio Manager. The following activities will be discussed in the close-out plan:

- Project lessons learned.
- How all contract obligations, products, services, and deliverables have been completed and accepted.
- How excess equipment and associated components will be properly dispositioned.
- How project team members will be informed that the work is complete and that they are no longer authorized to charge to project charge codes.

- How subcontractors/vendors are notified of the close out, and how a formal request is submitted to NSLS-II Business Division to de-obligate balances and/or accrue outstanding costs and resolve/de-obligate outstanding balances. De-obligation and contract close out requires formal concurrence of vendors.
- How costs associated with closed charge codes will be cleared.

A Draft Project Closeout Report will be developed prior to approval of project completion. The completion report will contain the final cost of the project, project lessons learned, and performance achieved at project completion. The Project Closeout Report will be finalized and submitted 120 days after completion of the project.

6. APPENDICES

APPENDIX A IPT CHARTER

APPENDIX B REFERENCE DOCUMENTS LISTING

APPENDIX A – INTEGRATED PROJECT TEAM (IPT) CHARTER

A.1 Purpose

This IPT Charter identifies the team members and their roles and responsibilities for the oversight and management of each Partner Beamline Project. This Charter constitutes the agreement among the IPT members as to how the project baseline will be managed, the coordination and cooperation that will be afforded all team members and the dedication of each team member to bring the project success. The charter will be in effect until officially rescinded and will be updated as needed to reflect any changes.

A.2 Roles

The Integrated Project Team, organized and led by the Partner Beamline Portfolio Manager, is used during all phases of the project's life cycle. The team consists of professionals representing diverse disciplines with the specific knowledge, skills, and abilities to support the Project Manager in successfully executing the project. The team membership will change as the project progresses from initiation to closeout to ensure the necessary skills are always represented to meet project needs. The IPT will:

- support the Project Manager;
- develop and/or participate in project planning, baseline development and contracting;
- ensure all project interfaces are identified, completely defined, and managed to completion;
- identify and define appropriate and adequate scope, schedule and cost parameters;
- support the preparation, review, and approval of project documentation;
- review and assess project performance and status against established performance parameters, the baseline, milestones and deliverables;
- identify and resolve issues;
- plan and participate in project reviews, assessments, and appraisals as necessary;
- review and evaluate baseline and funding change requests and support the Change Control Board as requested;
- plan and participate in operational readiness assessments; and
- support the preparation, review, and approval of project completion and closeout documentation.

A.3 Membership

The IPT is grouped into three areas (Executive, Core and Support), with specific expectations for their responsibilities. Each member is responsible for supporting project performance, scope, schedule, cost, safety, and quality objectives; for identifying and meeting project and contract commitments; and for maintaining communication with other IPT members.

Executive Members

The Executive members provide executive leadership to the Partner Beamline Project and champion its success. These members are responsible for ensuring that necessary resources and support are provided and that needed approvals are provided in a timely manner. The Executive Members of the IPT consist of the following;

- NSLS-II Facility Director,
- A representative from the Partner organization (eg Project Director) for the relevant beamline.
- The NSLS-II Deputy Director for Construction.

Core Members

The Core Team provides the day-to-day leadership for the specific Beamline Project and consists of the following:

- NSLS-II Partner Beamlines Portfolio Manager
- NSLS-II Project Manager for the HEX Beamline
- HEX Beamline Scientists
- Partner Beamlines Portfolio Manager
- Beamline Lead Engineer for the HEX beamline

The Project Manager is responsible and accountable for overall successful execution of the project scope of work, including overall project management and ensuring that the project's objectives in terms of technical parameters, cost, and schedule are achieved in a safe and environmentally compliant manner.

The Project Managers' responsibilities involve:

- lead the Integrated Project Team;
- prepare and maintain the Integrated Project Team Charter and operating guidance, with IPT support;
- keep the IPT and upper management informed;
- schedule and hold regular meetings;
- initiate the development and implementation of key project documentation (e.g., Project Management Plan);
- serve as the single point of contact for all matters relating to the project and its performance;
- define the project cost, schedule, performance, and scope baseline;
- assure that design, construction, environmental, safety, security, health, and quality efforts performed comply with the contract, public law, and regulations;
- report timely, reliable, and accurate performance data;
- evaluate and verify reported progress;
- make projections of progress and identifying trends;
- approve changes in compliance with the approved change control process documented in the Project Management Plan;
- ensure that the Project's ES&H and QA goals are achieved;
- identify and manage project risks

The responsibilities of the Partner Beamline Portfolio Manager involves:

- overseeing development of project definition, technical scope, and budget for the project;
- monitoring and evaluating project performance throughout the projects life cycle;
- Coordinating with other Photon Sciences activities as needed to facilitate project performance.

Support Members

The Support members are involved in the daily activities of the HEX beamline Project and have functions in project management, project controls, field execution, safety oversight, and/or business operations. Because of the progressive and dynamic nature of a project, the personnel skill and knowledge mix will change throughout the project's lifecycle. Unexpected events and requirements

may arise that require resources beyond that of the core IPT. As such, the type and amount of personnel support will vary and the IPT membership may change to incorporate the necessary skills and expertise. This flexibility allows the Partner Beamlines Portfolio Manager to adapt the team to meet specific needs. The Project Manager and Core Members will identify those resource gaps and determine the timing and level of support needed. The Executive Members are responsible for ensuring that needed support is provided for the project.

A.4 Communications

Communications Internal to IPT and Meetings

The Partner Beamlines Portfolio Manager will communicate to the team the goals and purpose of the team; each team member's expected level of contribution to meeting goals and expectations; and all issues related to successful team performance. The Partner Beamlines Portfolio Manager will ensure that summaries and appropriate meeting documentation are created, maintained, and distributed. Any IPT member is authorized to communicate with any other IPT member, or support staff, as necessary to accomplish and fulfill his or her roles and responsibilities.

The IPT will participate in the Quarterly Performance Review meeting. This meeting will be chaired by the Partner Beamlines Portfolio Manager and will focus on scope, cost, and schedule performance to aid the Project Manager in his/her project monitoring and reporting duties. The basis for the meeting will be the Monthly Project Reports submitted by the Beamline Project Managers. This meeting may occur as a part of the monthly NSLS-II PMOG meeting.

Communications External to IPT

Communications external to the IPT are the responsibility of the Executive Members. The Project Manager, with support from the Partner Beamlines Portfolio Manager will ensure that adequate and frequent communication regarding project progress and status is provided to all stake holders, and the user community, in a timely manner.

APPENDIX B – REFERENCE DOCUMENT LISTING

Project Documents Listing: HEX Project.

		Specific /	When is document needed?							
Topic	**Document**	**Generic**	**CD-0**	**CD-1**	**CD-2**	**CD-3**	**IRR**	**CD-4**	**CD-5**	**#**
DOE/Facility/Client documents	Project Management Plan	Specific		X						0
	Acquisition Strategy / Mission Need Statement		X							
	Configuration Management Plan	Generic								
	Commissioning Plan	Specific				X				
	Transition to Operations Plan	Specific				X				
	NYSERDA Contract	Specific		X						1
Environmental Safety and Health	ES&H Plan	Generic								
	Preliminary Hazard Analysis	If needed	X							
	USI screening / evaluation	Specific		X						2
	Security Vulnerability Assessment	Specific		X						
	NEPA certification approval letter	Specific		X						3A
	SEQRA Memo	Specific		X						3B
	Sector Assignment document	Specific		X						4
Interface Management	RSI documents for satellite building	Specific		X						5
	RSI documents for SCW/FE	Specific		X						6
Scope Management	HEX Beamline WBS Dictionary	Specific		X						7
	Engineering Design Plan	Specific			X					
	Conceptual Design Report	Specific		X						8
	Preliminary Design Report	Specific			X					9
	Final Design Report	Specific				X				10
Schedule Management	Monthly P6 Poster	Specific		M	M	M	M	M		11
	Milestones listing	Specific		X						12
Cost Management	Account Code Listing	Specific		X						13
	Monthly calendar for status / costs	Specific		X						14
	Total Project Cost Breakdown	Specific		X	M	M	M	M		15
	Contingency Analysis Report	Specific			X					16
	Project Assumptions	Specific		X						17
	Cost Performance Report (EVMS report)	Specific			M	M	M	M		
QA Management	QA Plan	Generic			X					
Human Resources Management	Staffing requirements table by FY	Specific		X	M	M	M	M		18
	Responsibility Assignment Matrix	Specific			X					
Communications Management	Communications Plan	Generic								
	IPT Charter	Generic			X					
	BAT Membership List	Specific		X						19
	BAT Charter	Generic		X						20
	Monthly report (include contingency status)	Specific		M	M	M	M	M	M	
Risk Management	Risk Management Plan	Generic		X						
	Risk Assessment	Specific		X						21
	Risk register	Specific		X	Q	Q	Q	Q	Q	22
Procurement Management	Procurement Management Plan	Generic			X					
	Large Procurements Listing	Specific		X	U	U				23
Stakeholder Management	Stakeholder listing and communications plan	Specific		X	Q	Q	Q	Q	Q	24
	KPP Listing	Specific			X					25
	Beamline Development Proposal (BDP)	Specific	X							26
	Annual report of usage and attainment of goals	Specific							X	
Reference documents list	This document	Specific		X						27

Key for DOE Critical Decisions	
Approve Mission Need	CD0
Conceptual Design	CD1
Preliminary Design	CD2
Final Design	CD3
Project Completion	CD4
Feedback - required annually per HEX contract.	CD5

Key for Timing Marks	
Document to be produced at this time	X
Update document as needed	U
Normal updates done quarterly	Q
Normal updates done monthly	M