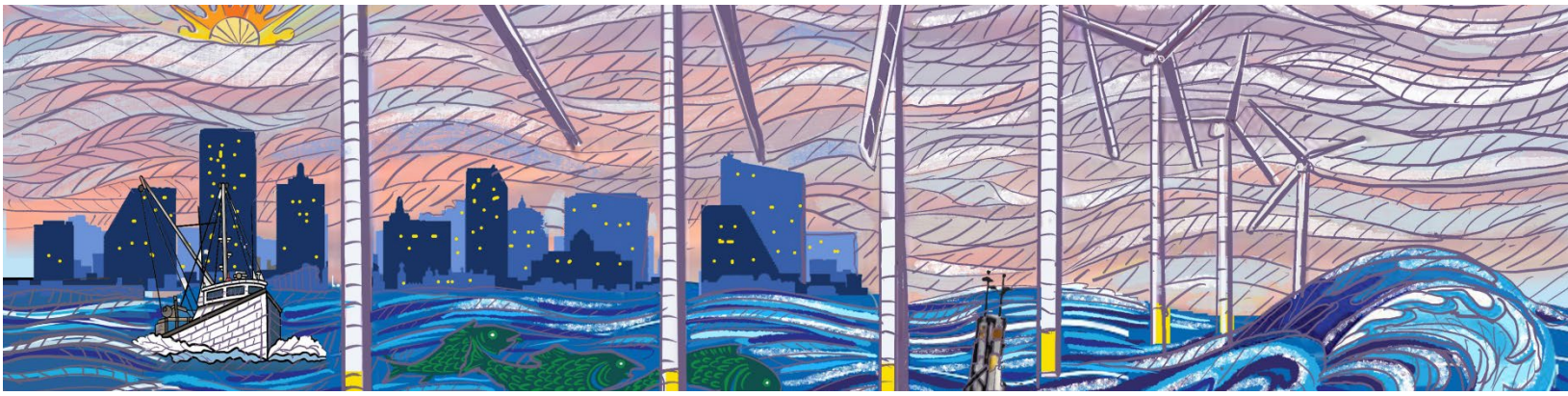

Appendix I-F1

Project 1 CVA Verification Plan

May 2024

CVA Verification Plan

Atlantic Shores Offshore Wind Project 1

Bureau Veritas North America

Revision 9

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PROJECT INFORMATION

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Project name:	Atlantic Shores Offshore Wind Project 1
Project number:	18321-200001
Verification scheme:	CVA
Verification standard:	30 CFR 285

Revision	Date	Author	Reviewer	Approver	Reason for issue
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9	2023/08/15	M.SPOTORNO	A.JACOPIN,	K. GROGAN	Incorporates BSEE/BOEM and ASOW Comments

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ABBREVIATIONS

ACP The American Clean Power Association
ALS Accidental Limit State
ANSI American National Standards Institute
API American Petroleum Institute
BOEM Bureau of Ocean Energy Management
BSEE Bureau of Safety and Environmental Enforcement
CFR U.S. Code of Federal Regulations
COM Commissioning
COP Construction and Operations Plan
CRS Comment Response Sheet
CVA Certified Verification Agent per 30 CFR 285.700
DB Design Basis
DE Design Evaluation
DEL Damage Equivalent Loads
DLC Design Load Cases
EC Export Cable
EPC Engineering Procurement Construction
FAT Factory Acceptance Test
FDR Facility Design Report
FE Finite Element
FEED Front End Engineering Design
FIR Fabrication and Installation Report
FLS Fatigue Limit State
FOU Wind Turbine Foundation
HSE Health Safety and Environment
HV High Voltage
IA Independent Analysis
IAC Inter Array Cables
IEC International Electrotechnical Commission
IECRE IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Applications
ILA Integrated load Analysis

ISO	International Organization for Standardization
ITP	Inspection Testing Plan
ITT	Invitation to Tender
KOM	Kick-Off Meeting
LV	Low Voltage
MAN	Manufacturing
MDR	Master Document Register
MV	Medium Voltage
MWS	Marine Warranty Surveyor
NCR	Non Conformance Report
NDT	Non-Destructive Testing
NSO	New Strudl Offshore
OCRP	Offshore Compliance Recommended Practice
OEM	Original Equipment Manufacturer
OSS	Offshore Substation
OWF	Offshore Wind Farm
PE	Professional Engineer
PQP	Project Quality Plan
QC	Quality Control
QM	Quality Management
RNA	Rotor / Nacelle Assembly
SLS	Service Limit State
SOW	Scope of Work
STR	Structure
SWT	Samcef for Wind Turbines
TC	Type Certification
TI	Transport & Installation
TQ	Technical Query
ULS	Ultimate Limit State
UPS	Uninterrupted Power Supply
WPQR	Welding Procedure Qualification Record
WPS	Welding Procedure Specification
WTG	Wind Turbine Generator

This CVA Verification Plan for the Atlantic Shores Offshore Wind Project 1 includes a detailed description of the verification process, methodology, scope of work, and deliverables, including inspection frequency and extent.

1. PROJECT GENERAL DESCRIPTION

The Project 1 is an approximately 1,510 MW offshore wind project sited within Atlantic Shores' OCS-A 0499 Lease Area, located off the coast of New Jersey between Atlantic City and Barnegat Light. The Project 1 wind turbines and offshore substations will be located in an approximately 102,055-acre (413-square kilometer [km2]) Wind Turbine Area located in the southern portion of the lease area OCS-A 0499 (see Figure 1).

The Project 1 base case includes 105-136 wind turbines mounted on monopile foundations and up to 5 Offshore Substations (OSS). The wind turbines will connect to the OSS via 66-150kV subsea inter-array cables. The inter-array cables will be located at an optimal location to limit electrical losses from transmission and minimize cable length. For each cable circuit, the subsea cables will consist of three cables bundled together in a common shield and armoring and include the fiber optic cable. From the offshore substations, export cables will carry the power produced to the onshore substations. The export cables will make landfall via horizontal directional drill in Atlantic City, New Jersey.

The proposed facility locations for development of the Project have been selected based upon the preliminary environmental and engineering site characterization studies that have been completed to date. The location of Project facilities will be further refined by the final engineering design as well as ongoing and continuing discussions, agency reviews, public input, and the National Environmental Policy Act review process. The anticipated Project 1 major components are described in Table 1.

Activities and Asset Assumptions	Project 1
Water Depths	17-37m range, 25m average
WTG / WTG Foundations	105 – 136
WTG Foundation Type	Piled or Suction Bucket
Offshore Substations (Topsides / Substructures)	up to 5
OSS, detail	Unmanned, AC or DC
OSS Foundation Type	Piled or Suction Bucket
Overall Schedule Duration	March 2021 – June 2028
Inter-Array and Inter-Link Cables	*Inter-array cables:* 66-150 kV HVAC *Inter-link cables:* 66–275 kV HVAC
Export Cables	4x 230–275 kV HVAC cables or 1x 320-525 kV HVDC cable
Marshalling / Construction Port Location	US East Coast
Expected COD	Phase 1 – 2027 Phase 2 – 2028

Table 1 – Project 1 Design Assumptions

Multiple design locations and multiple fabrication locations are planned to accommodate these major components, and those locations are yet to be determined.

The aforementioned project details could be subject to change. For most current project details, please refer to Volume I, Section 4.0 and Table 1.1-1 of the Atlantic Shores Construction and Operations Plan (COP) covering Lease Area OCS-A 0499.

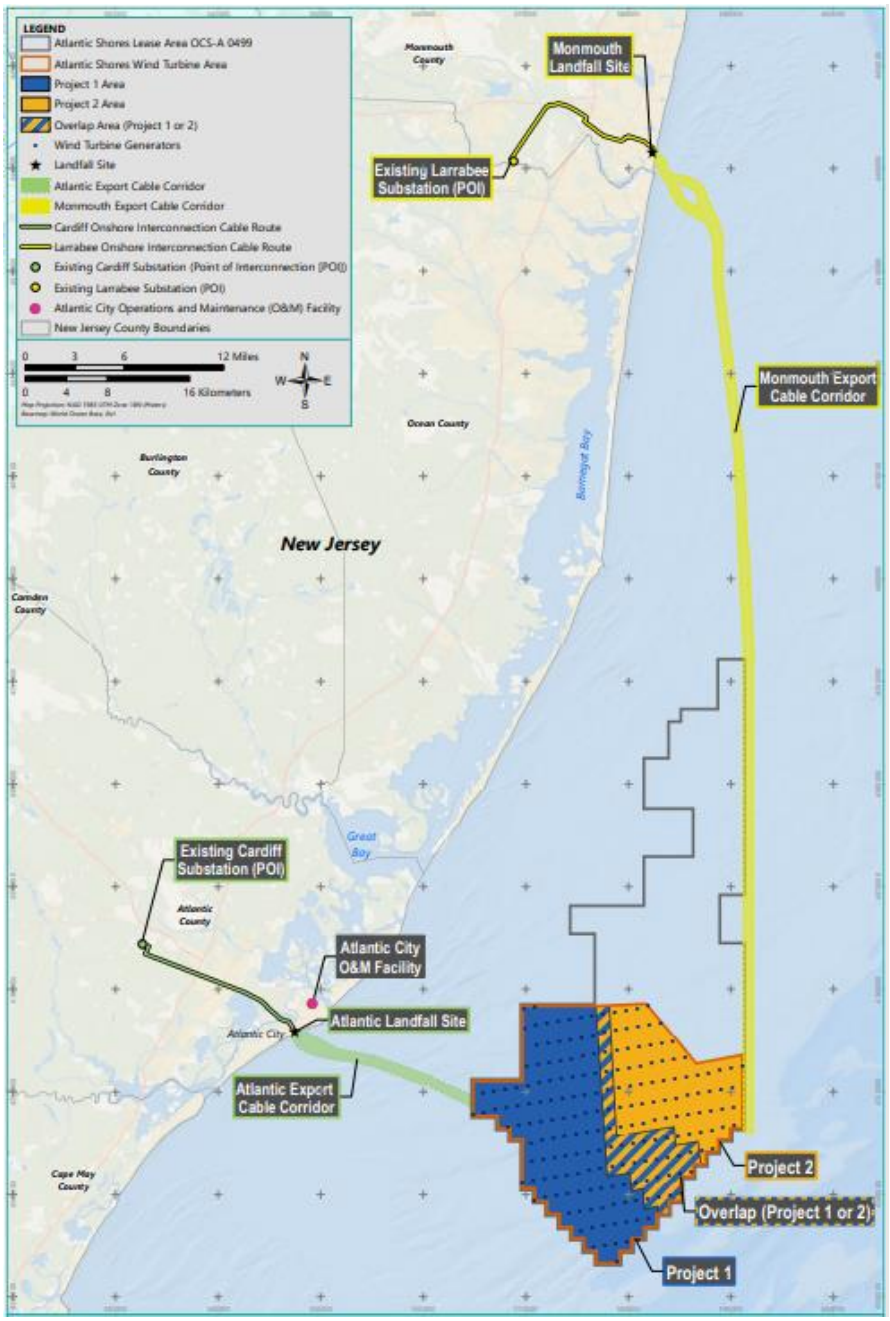

Figure 1 – COP South, Project 1 Area

2. CVA VERIFICATION PLAN

This section summarizes the main information and assumption relevant for the CVA services to be provided. It is based on information extracted from the details submitted by Atlantic Shores.

To get approval for construction and operation of an offshore Wind farm in federal waters, US regulations require that an independent third party be appointed to certify the design, fabrication and installation to the Bureau of Ocean Energy Management (BOEM). The offshore wind facility's developer nominates the Certified Verification Agent (CVA) for approval by the Bureau of Safety and Environmental Enforcement (BSEE), on behalf of which the CVA preforms its activities. The CVA duties outlined in the US Code of Federal Regulations match the systems and schemes applied for the approval of offshore wind farms internationally, though updates to accommodate US specific requirements are adopted. The scope of work described herein is made to outline such work, enabling the CVA to define the detailed scope of work required to cover US requirements and to carry out such work in accordance with the requirements outlined in the U.S. Code of Federal Regulations (CFR), 30 CFR 285.

2.1. Scope of Work

2.1.1. Scope of Work Coverage

The CVA work shall cover the following Project assets:

- Wind Turbine Generator (WTG)
- Wind Turbine Foundation (FOU)
- Offshore Substation(s) (OSS)
- Inner Array Cable (IAC), and
- Export Cable (EC)

The submarine cables in state waters are included in the CVA Verification Plan. The CVA verification of the export cable shall extend to the termination of the export cable at the transition joint vault.

The scope of work for satisfying the CVA requirements as set forth in 30 CFR 285 Subpart G includes:

- Continued evaluation of design interactions from FEED to detailed design in order to ensure final design will meet applicable codes, standards and regulations;
- Technical verification to ensure that the design, fabrication, installation and commissioning are performed in accordance with accepted engineering practices and the approved SAP, GAP, or COP as appropriate and are reported in the Facility Design Report (FDR) and the Fabrication and Installation Report (FIR);

- Certifying that the facilities are designed, fabricated, installed and commissioned in accordance with accepted engineering practices and the above reports;
- Certifying that project components are fabricated and installed in accordance with the approved Construction and Operations Plan (COP), as described in 285.708(5); and
- Providing BSEE with timely reports of all findings affecting the design, fabrication and installation.

It is Bureau Veritas' experience that the CVA Scope of work as defined in the U.S. Code of Federal Regulations (CFR), 30 CFR 285 can be fully addressed and delivered through the proposed technical approach, and associated Verification Tasks outlined in the proposed CVA Scope of Work.
The scope of the evaluation is presented in the sections below.

Note: The term "foundation" is used as synonym of the term "substructure". It also include the secondary structures. It covers the structure below the tower base flange.

2.1.2. Structure of scope in tasks

Prior to BSEE's formal acceptance of CVA nomination and at the request of the Developer, Bureau Veritas will provide early CVA support in order to assist Atlantic Shores in de-risking technical decisions. These early CVA activities are described in section 4 of this document and will include verification of Codes and Standards hierarchy, Design Basis Evaluation and verification of Site Conditions Assessment.

Bureau Veritas has developed a strategy for the CVA activities where the CVA verification scope is divided into a total of 16 tasks plus additional items as needed. The split in tasks is due to the different requirements for competences for each of the assets, but also for the different competences required for design, fabrication inspection and installation inspection.

The tasks are assigned by phases of activities (Design, Fabrication and Installation) and Project assets as shown on figure below:

		Project Assets				
		WTG	**WTG Foundations**	**Offshore Substation**	**Inter Array Cables**	**Export Cables**
Project Phases	**Design**	**Task 1**	**Task 4**	**Task 7**	**Task 10**	**Task 13**
	Fabrication	**Task 2**	**Task 5**	**Task 8**	**Task 11**	**Task 14**
	Installation & Commissioning	**Task 3**	**Task 6**	**Task 9**	**Task 12**	**Task 15**
	Project Management	**Task 16**				

Fig. 2 - Proposed Tasks

The evaluation process and the general approach suggested to fulfil CVA's duties are described in detail in Section 3 of this document. A detailed description of each the 16 tasks is provided in section 5 of this document.

2.1.3. Exclusions

- The CVA verification activities will primarily focus on the structural integrity and human safety.
- It will in particular not cover the availability and power performance of the WTGs and other assets.

3. THE VERIFICATION PROCESS

3.1. General Approach Suggested to Fulfil CVA's Duties

The CVA requirements as set forth in 30 CFR 285 Subpart G, §§ 285.705 – 285.714 outline the duties of the CVA as well as some high-level information about the different tasks to be conducted by the CVA and to be confirmed towards BSEE. With the official approval in June 2022 of the Offshore Compliance Recommended Practices (OCRP) ANSI/ACP OCRP-1-2022 Edition 2, developed by The American Clean Power Association addressing the entire lifecycle of the offshore windfarm, Bureau Veritas understand to be the recommended practice to be complied with. The OCRP provides a roadmap for U.S. offshore wind development in its respective area with a view toward adding transparency and consistency to the regulatory approval process, to the benefit of developers, regulators, and the general public. The OCRP addresses the entire lifecycle of the project from Design to Decommissioning. However, for CVA purpose, only the Design, Manufacturing and Fabrication, Transport, Installation and Commissioning will be verified. Operations and In-Service Inspections as well as Decommissioning are not part of this Verification Plan.

Bureau Veritas shall review and make a recommendation on the acceptability of the standards proposed by Atlantic Shores.

The following sections define how the different deliverables will comply to the CVA requirements of 30 CFR 285 Subpart G, §§ 285.705 – 285.714. This includes discussion of framework for the facility design review and fabrication and installation review of the WTGs, their support structures, and the OSS including support structure as well as the inter-array and export cables.

The Verification Plan will be updated as more information on the project design and planning is received. At the start of each CVA phase, Bureau Veritas will submit a detailed Evaluation Plan to Atlantic Shores. The Evaluation Plan will describe the evaluation process in details, together with the working methods and the primary planning. At the start of each CVA phase, BSEE shall receive at least an overview of the detailed Evaluation Plan for that phase when it is developed.

It is important to mention that the Type Certificate (TC as per IECRE OD-501) documentation of the WTG shall be provided in advance of the Manufacturing surveillance phase.

Depending on the completion of different modules of the WTG TC, different mitigation measures can be foreseen. See Table 2.

The O&M plan for each project asset will be reviewed to verify the suitability of the intended requirements and to ensure consistency with the assumptions for the design.

3.2. WTG TC Risk mitigation

The following table is summarising the risk related to each phase of the WTG TC completion in case the module is not completed and the remedial action plan.

Module	Risk	Impact on	Action Plan
Design Evaluation	High	Substructure Design Evaluation ILA	(1) N/A. Type certificate IECRE.WE.TC.23.0141-R2 and correspondent Design Evaluation Conformity Statement IECRE.WE.CS.22.0166-R2 are available.
Manufacturing	Medium	Manufacturing	In case this module is not fully finalized, (1) A confirmation letter from the type certification body is expected, defining the applicable conditions to the manufacturing surveillance module will be requested by Bureau Veritas. (2) In addition depending on the level of completion, it can be decide to increase the number of inspections in particular to ensure the ability of the facilities to achieve the required quality level
Testing	Medium	Substructure Design Evaluation ILA	In case the validation of the WTG loads by the testing module is not completed. The mitigation measure will be similar to the one described for the Design Evaluation module.
Final evaluation	Low	Substructure Design Evaluation ILA Manufacturing	At this stage it is assumed that Provisional Type Certificates will be available and that most of the outstanding issues will be closed. Based on the review of the provisional TC, Bureau Veritas will analyse the conditions and the remaining outstanding issues. Remedial action will be limited and selected among the here above described mitigation measures.

Table 2 - WTG TC Mitigation Strategy

3.3. Applicable Standards

Early work will also include CVA review of proposed codes and standards hierarchies for the Project. Bureau Veritas has experience with codes and standards hierarchies for U.S. offshore wind farms. For the COP, the key is to have the top-level code and standards hierarchy in place.

Regarding design standards, Bureau Veritas will rely on BOEM document: “Guidelines for Information Requirements for Renewables Energy Construction and Operations Plan (COP)” Version 4.0: May 27, 2020, Attachment C: Design Standards & Environmental Loading for offshore Wind Energy. Here BOEM writes that, *“For offshore wind turbines, BOEM will accept a “design-basis” approach whereby the applicant proposes which criteria and standards to apply, and then justifies why each particular criterion and standard is appropriate.”*

Bureau Veritas will also verify alignment of codes and standards with the Offshore Compliance Recommended Practices (OCRP) ANSI/ACP OCRP-1-2022 Edition 2.

The purpose of standard hierarchy is to define the overarching verification standards scheme and the top-level standards for the design and execution phases. Furthermore, standards considered important to suppliers for the project are also included. The intention is not to provide a full and detailed account of all standards needed for the project.

The objective of the CVA review of the standard hierarchy is to ensure the following:

- Compliance with BOEM Guideline for design standards;
- That the standards are consistent and not in contradiction; and
- That the standards are not mixed so that the overall safety level would be modified from the intended level in the considered systems of standards.

If the design basis lists international codes and standards as a substitute for commonly applied U.S. codes and standards, the designer shall justify that the substitution satisfies the objectives of the U.S. codes and standards, especially with respect to environment, health, and safety.

A CVA verification letter of Standards Hierarchy for the COP is then issued to BSEE to confirm that the “Standards Hierarchy” has been successfully verified by the CVA in accordance with the purpose and objectives mentioned above. Once the COP application is filed, the design work and verification activities can proceed accordingly based on the BSEE approved Standards Hierarchy and CVA scope of work. The codes and standards will be supplemented by standards emerging from the Design Basis Evaluation modules for the WTG/ WTG Support Structure, Offshore Substation (OSS) and Cables.

Atlantic Shores will prepare Design Basis parts, each with a list of applicable standards. BV will review that the proposed codes and standards in the Design Basis are aligned with the codes and standards hierarchies reviewed for the Project. This approach is consistent with 30 CFR 285 and BOEM guidelines.

BOEM’s renewable energy regulations are not prescriptive regarding the design standards used for an offshore wind energy installation. There are various United States, European, and international standards that could be applied to an offshore wind energy installation, but no single standard has yet been determined to be a comprehensive design standard for application in the offshore waters of the United States.

Specific standards to be used on each relevant design aspect will be defined as part of the Design Basis.

Tropical cyclones load cases shall be investigated in accordance with ANSI/ACP OCRP-1-2022 Edition 2, Offshore Compliance Recommended Practices.

It is expected that safety aspects of wind turbines will be addressed as part of the Type certification. ACP OCRP recommends several exceptions and additions to IEC 61400-3-1 to meet US safety standards and best practices. Some safety aspects may not covered under the type certification, for example, tower internals work platforms, guards, access, cranes and lifting beams, etc. In this case, the CVA will review any safety aspects specified in the Design Basis, which are not already covered in the Type certificate.

Bureau Veritas is used to working with all internationally recognized offshore standards and guidelines.

Except otherwise notified, the latest version of the standard shall be applicable.

Safety-related equipment inspections shall be performed by the CVA. Alternatively, PE inspection output will be provided to the CVA for review. A full list of safety related systems and devices shall be developed within future phase Evaluation Plans. Evaluation Plans shall be provided to BSEE at the start of each phase.

3.4. Methodology

3.4.1. Evaluation Plan

The CVA evaluation process is expected to consist of document review, independent analyses and inspections, depending on the module under consideration.

3.4.2. Project Master Document Register

Bureau Veritas will review the Master Document Register (MDR) to be submitted by Atlantic Shores. This MDR will list all documents produced as part of the project and relevant for the CVA verification plan. It will also include target issuance dates for each document in order to be used as a planning tool for the review process.

Based on this MDR, Bureau Veritas will indicate the documentation that shall be submitted for review or for information. The MDR will also be checked for completeness in order to ensure that all required documents are listed in the MDR.

Documents showing material designations must be included per CFR 285.707. This includes metals, welds and post-weld treatments, grouting, concrete material and testing processes, ballast, etc.

The O&M plan for all project assets will be reviewed to verify the suitability of the intended requirements and to ensure consistency with the assumptions for the design.

3.4.3. Document review

A large part of the evaluation consists in reviewing calculation notes, specifications, drawings, data sheets, reports, certificates, etc. The evaluators will verify the completeness of the provided documentation and its conformity to the reference set of standards for the verification. The CVA will verify that the critical design documents including geotechnical, civil, structural, electrical and

mechanical disciplines for the project are PE stamped and accompanied by a report(s) from each designer(s) demonstrating that compliance with applicable standards found in the approved design basis for each asset.

A typical document verification process consists of two successive reviews: one initial review and one review loop, as presented in Figure 3. Upon completing the initial review, Bureau Veritas will issue a list of comments to be considered by Atlantic Shores. A second review is then performed to confirm that all these remarks have been correctly implemented in the updated document. Review cycles will continue until CVA comments are fully addressed and the CVA accepts the document.

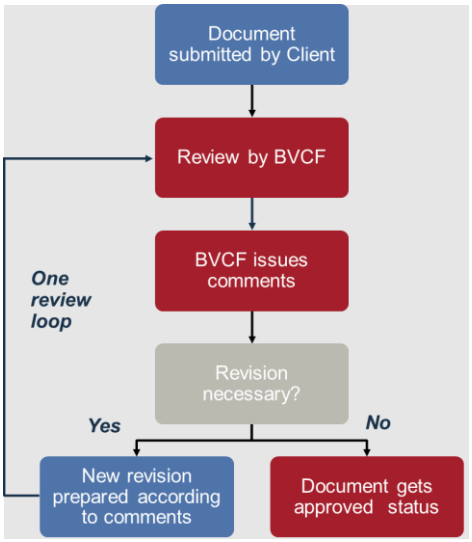

Figure 3 – Overview of the review process

3.4.4. Independent analyses

Bureau Veritas may perform independent calculations based on its own assumptions and methods. The goal of these independent calculations is to verify some key characteristics of the project. They do not prevent Atlantic Shores from performing its own sensitivity analyses.

Independent analyses are usually performed for the most critical cases only and not as a standard basis. They are based on inputs provided by Atlantic Shores.

3.4.5. Review schedule

It is noted that CVA verification activities are closely dependent on actions from other contractors on the project. Bureau Veritas would like to stress that an active collaboration and open communication between all stakeholders are key to a smooth and efficient CVA verification process. In order to keep the turnaround time at a low level, an “in-parallel” approach shall be implemented.

3.4.6. Inspections and surveillance

The evaluation plan will be provided to BSEE at the beginning of each phase for information. The surveillance of a specific process (manufacturing, transportation, installation, etc.) consists of verifying that the implemented procedures meet specified requirements. This verification usually involves several methods:

- Evaluation of the quality system,
- Verification of the compliance of the procedures with the specified requirements,
- Verification of the effective application of the procedures.

The quality system evaluation is normally limited to the verification that the quality systems of the different manufacturers or operators involved are certified according to ISO 9001. This quality system certification shall have been carried out by an accredited certification body operating according to ISO/IEC 17021. If the quality system is not properly certified, Bureau Veritas will have to evaluate that it meets sufficient quality management requirements.

The evaluation of the compliance of the procedures usually consists of reviewing the different documents related to the process under scrutiny (manuals, checklists, reports, etc.) and verifying their compliance to the specified requirements.

Finally, the verification of the correct application of the procedures involves review of records and reports related to the process under scrutiny and several on-site inspections of the process. The exact scope and extent of the inspections depend on the process itself and particularly on its estimated criticality.

A specific scope will be defined for the audits and inspections to be carried out as part of the project. The surveillance activities will be detailed in the Evaluation Plan. This specific scope will be prepared once sufficiently detailed information about the manufacturing and site activities are available, and in any case before the start of the surveillance activities.

Initial audits for fabricators of all Project asset shall be conducted. The key aspects of the initial audit will focus on the review of:

- Valid Quality Management (QM) certificate according to ISO 9001: note Revision and Validity,
- Project Quality Plan (PQP),
- Inspection and Testing Plans (ITPs).

For all the various parts, when non-conformities are found, they must be reported and tracked. Additionally, they must be communicated to BSEE and the CVA should verify the supplier/contractor or OEM identifies the cause and put mitigations in place to prevent the non-conformity from occurring again.

The CVA recommends a minimum baseline inspection frequency of 10% of each asset (WTG, tower, substructure, foundation, OSS (topside and foundation), IAC and export cables) be looked at during fabrication and installation. The baseline inspection frequency for manufacturing and installation of all Project assets can be modified up (more than 10%) but not down (less than 10%) - based on supplier performance, track record, complexity of work, impact of Non Conformance Reports (NCR). The detailed inspection rate for each project asset will be provided in the detailed Evaluation Plan at the beginning of each phase.

Any review of NCR or Technical Queries (TQ) linked to manufacturing scope will be sent to the CVA and dealt with on a case-by-case basis depending on the criticality of each finding.

The Interface between CVA and Marine Warranty Surveyor is discussed in section 5.6.2 of this document. However, the detailed Evaluation Plan for the transportation and installation phases will show more specifics details covering the interface for each asset.

The CVA will review which goods are considered "critical" on a project-specific basis according to manufacturing risk assessment. An incoming good inspection will be carried out:

- During initial audit to ensure that the procedure for reception and storage of the good are well prepared.
- On a regular basis by the inspector to ensure that the product is stored in the proper environment and that the corresponding certificates are well-checked and stored.
- On a project-specific frequency for identified "critical" goods.

4. EARLY CVA ACTIVITIES

Prior to BSEE's formal acceptance of CVA nomination and at the request of the Developer, Bureau Veritas will provide early CVA support in order to assist Atlantic Shores in de-risking technical decisions. This work may include the following:

4.1. Codes and Standards Hierarchy

Early work will also include CVA review of proposed codes and standards hierarchies for the Project as described in 3.3.

4.2. Site Environmental Conditions

Bureau Veritas assumes that all environmental conditions, including the wake effect from neighbouring wind turbines, are based on site investigations or designer's calculations performed as part of the feasibility study of offshore wind farm project.

4.2.1. Site environmental conditions (excluding geotechnical conditions)

This module covers the verification of the assessment of the meteorological, oceanographic and seismic conditions at the site. Meteorological conditions refer to wind, temperature, humidity, pressure, air density, solar radiation, precipitation and salinity. Oceanographic conditions refer to waves, currents, water levels, sea ice (if relevant) and marine growth.

The evaluation consists in the review of the metocean report and associated documents.

Bureau Veritas will verify that the measurements were performed in compliance with the relevant standards in terms of extent, quality and relevance. The hindcast models used to complement the measured data will be verified, in particular regarding their calibration and interpretation. Finally the derivation of site-specific design parameters by the designer on the basis of these measurements and hindcast data will be verified. The correctness and completeness of the submitted reports is checked, with particular attention to the following aspects:

- Quality of the testing laboratories and companies carrying out the measurements (ISO/IEC 17025 accreditation or experience in the selected fields in particular),
- Quality of the testing equipment (instrumentation, calibration, etc.),
- Conformity of the measurements or testing procedures to the relevant codes and standards and to the industry best practices,
- Processing of the measured data (data filtering, correction of inconsistent data, etc.)
- Calculation of the design parameters, in particular extrapolation to determine extreme parameters

- Documentation and reporting

4.2.2. Geotechnical conditions

This module covers the verification of the geophysical and geotechnical investigations and of the derivation of the soil characteristics and geotechnical design parameters for the support structure foundations.

The evaluation is based on the review of the Ground Investigation Report.

This verification covers the following activities:

- Review of the geophysical and geotechnical survey plans (number, type and location of samples; technical specifications; data interpretation; etc.),
- Review of the laboratory tests (test plan; quality; test results; etc.),
- Review of the methodologies for derivation of the geotechnical design parameters,
- Completeness and correctness of the design documentation regarding geotechnical design calculations (design parameters; calculation methods; stability and failure modes; etc.),

4.2.3. Site conditions summary for WTG, Substructure and Foundation

This module covers the review of interpretation documents, in particular the WTG Site Conditions Assessment, the Wind Assessment and the Marine Assessment.

4.2.4. Site condition assessment for OSS

The soil conditions at the OSS location will be reviewed, including in particular:

- Ground investigation report
- Geotechnical design soil profiles
- Cyclic soil properties
- Geotechnical design briefs
- Report for cyclic loads on foundation

The geotechnical interpretation will be reviewed.

Regarding the review of the soil conditions, the review will be based on a selected methodology based on the approved design basis.

4.2.5. Site condition assessment for IAC and Export Cables

The soil conditions at the IAC and Export Cables locations will be reviewed, including in particular:

- Ground investigation report

- Geotechnical design soil profiles along cable routs

4.3. Design Basis Evaluation

The purpose of the design basis evaluation is to verify that the design basis is sufficient for a safe design and execution of the project, i.e. that it is coherent, exhaustive, sufficiently documented and that it meets all requirements related to the CVA verification references.

The evaluation of the Design Basis will cover:

- The Design Basis Part A (Site Conditions and Employer Requirements), including a review of the environmental data used as inputs,
- The Design Basis Part B (RNA and Tower),
- The Design Basis Part C (WTG Substructure and foundation),
- The Design Basis Part D (Inter Array and Export Cable),
- The Design Basis (OSS).

The coherence between the multiple parts of the Design Basis that will be evaluated, as well as the completeness of the combined Design Basis. The coherence of the design methodologies, assumptions and requirements will be evaluated.

A specific review of each part of the Design Basis will be performed as described below.

This evaluation is mostly based on documentation review.

4.3.1. Design Basis Part A Evaluation - Site Conditions

The Design Basis Part A will be reviewed for coherence with the Site Conditions Assessment documentation and conformity with the approved reference standards.

- Review of the codes and standards used as a basis for geotechnical investigation and geotechnical design,
- Review of the design documentation regarding seabed preparation and tolerances.
- Review of the seabed stability and scour assessment will be performed
- Review the proposed methodology for the specific soil and site-specific p-y curves proposed by the designer. These p-y curves may rely on various approaches as determined in the design basis
- Review of the seabed stability along cable routes will be performed

4.3.2. Design Basis Part B Evaluation - WTG (RNA and Tower)

The Design Basis Part B is the responsibility of the WTG Supplier, and typically includes:

- Interpretation of wind and environmental input for design (turbulence, wind shear, etc.),
- Definition of design load cases,
- Design parameters (e.g. damping),
- Partial safety factors for the load simulations,
- Turbine Type certificate and possible deviations from the certificate,
- Tower design methodology

The evaluation will consider the conformity of the Design Load Cases (DLC) to the selected design standards, and the validity of the methodology and assumptions for the load simulation. The determination of the turbulence intensity including the wake effect from neighbouring turbines will be verified.

Bureau Veritas will check that the codes defined as references are appropriate and adapted to the specificities of the project and that the selected codes are compatible. The coherence of the design methodologies and assumptions will be evaluated.

The following issues should be addressed for the review of the tower design:

- Description of the tower design concept,
- Design environmental parameters,
- Applicable codes and standards,
- Design requirements and methodologies for the structural design analyses, including:
    - Natural frequencies analysis,
    - Ultimate Limit State (ULS),
    - Serviceability Limit State (SLS),
    - Fatigue Limit State (FLS),
    - Accidental Limit State (ALS),
    - Robustness check (if required for the site).
- Primary structure design requirements and methodology,
- Secondary structure design requirements and methodology,
- Provisional structures design requirements and methodology (such as casings for installation, if applicable),
- Design requirements and methodologies for bolted connections / grouted connections,
- Interface with WTG Foundation designer, in particular regarding load calculations,

- Corrosion protection strategy,

4.3.3. Design Basis Part C Evaluation - WTG Substructure and Foundation

The Design Basis Part C is generally the responsibility of the support structure designer, and describes the general design requirements, methodology and assumptions for the design of the substructure and foundation. Bureau Veritas will check that the codes defined as references are appropriate and adapted to the specificities of the project and that the selected codes are compatible. The coherence of the design methodologies and assumptions will be evaluated.

The following issues should be addressed (if applicable):

- Description of the substructure and foundation concept,
- Design environmental parameters,
- Geotechnical interpretation of the soil data,
- Applicable codes and standards,
- Design requirements and methodologies for the geotechnical and structural design analyses, including:
    - Natural frequencies analysis,
    - Ultimate Limit State (ULS),
    - Serviceability Limit State (SLS),
    - Fatigue Limit State (FLS),
    - Accidental Limit State (ALS)
    - Robustness check (if required for the site).
- Primary structure design requirements and methodology,
- Secondary structure design requirements and methodology,
- Provisional structures design requirements and methodology (such as casings used for installation, if applicable),
- Design requirements and methodologies for bolted connections / grouted connections,
- Interface with WTG supplier, in particular regarding load calculations,
- Corrosion protection strategy,
- Scour protection strategy,

4.3.4. Design Basis Part D Evaluation – Inter-Array Cables and Export Cables

The Design Basis to be evaluated will cover the following:

- List of applicable standards,
- Meteocean conditions, cable-soil interaction aspects, interface at turbines and substations considered for the design,
- Type of power cables, including a description of the system connection,
- Design criteria including: cross section, on bottom stability, installation loads, mechanical and electrical capability and ultimate strength,
- Methods for transport, installation, commissioning and maintenance strategy,

The above documents will be reconfirmed upon receipt of the MDR, content of documents are expected to be as followed:

- The design basis of the power cable configuration (with ancillary equipment, top and bottom (if any) connections, etc.), the envelope of loadings applied on the power cable (curvature, tension, combined tension and curvature during installation), the conditions of use, the design life, etc.
- A power cable design report covering detailed cross-section (lay angle of components), the termination drawings, the design in the power cable current length (design criteria for the different parts, load sharing, etc.)
- A material selection report of the power cable and its components, including justification of the long-term suitability (effect of ageing, thermal effect, etc.),
- The CVA expects to receive the type approval certificates of the cable or its sub components, as well as EN 10204 Type 3.2 certificates for all sub components of the cables (the cables, the armour, any connector or termination).

4.3.5. Design Basis Evaluation - OSS

Bureau Veritas will review the OSS Design Basis and Design Briefs for issues related to structural, electrical and Fire & Safety design of the OSS topside and support structure with regards to conformity with the agreed applicable standards.

The verification will cover the following aspects:

- Clarification of applicable standards and their hierarchy,
- Review of design parameters,
- Review of design methodology including structural, electrical and Fire & Safety design,

- Review of design load cases,
- External conditions used for the design,
- Transport, installation and commissioning requirements,
- O&M requirements.

5. CVA VERIFICATION PLAN

Upon the acceptance on the CVA nomination, Bureau Veritas shall conduct design verification activities that will include a review of all FDR and FIR materials including the ~~following design~~ evaluation tasks as described in 2.1.2.

5.1. Task 1 - WTG design

5.1.1. Load Calculations

Bureau Veritas will verify the WTG Supplier and WTG Substructure Supplier load calculations. This review will take two forms:

- Review of the calculation methodology,
- Independent calculations based on an integrated model.

Bureau Veritas will verify the calculations by reviewing the load reports, focusing in particular on the comparison of the applied calculation methodology with the Design Basis and the reference standards (wind and wave models used, simulation characteristics, statistical extrapolation of extreme loads, etc.).

Particular care will be addressed to the methodology and assumptions for the transfer of data at the interface between the WTG Supplier and the WTG Substructure Supplier.

5.1.1.1 Independent integrated model

In addition to the documentation review, the largest part of the verification will be based on independent calculations. A complete integrated model will be built including the Rotor-Nacelle-Assembly (RNA), tower, substructure and foundation, and taking into account the specific soil conditions. This independent load analysis will be carried out in two different loops.

The verification will consider the following aspects:

- Correct model representation and implementation of support structure and RNA including control and protection system as well as soil conditions,
- Correct representation and implementation of the hydrodynamic loads used in the integrated load analysis,
- Transfer of data at the Tower / substructure interface,
- Derived extreme and fatigue load levels.

The independent calculation will be performed in parallel to the designer calculations, in order to provide confidence in the results at each step of the iteration process.

Two models representing two different design positions of the wind farm will be built to cover the range of soil conditions across the site. It is assumed that the RNA and Tower will be the same for both models. If needed, different models will be built to cover the range of environmental conditions expected at the site for the selected design positions – e.g. one for Extreme conditions (ULS) and one for redundant loading (FLS).

Note: the selection of the model location can, for instance, cover the softest and the stiffest soil location or any other relevant location that may potentially show an interaction between the rotor harmonics and the natural frequency of the structure.

As a first step, a calibration will be performed on each model, to evaluate the change in the modal shapes and frequencies to variations of the structure properties or various environmental conditions. Based on these initial results, on previous experience and on discussions with the designers, specific DLCs will be selected for load comparison. The loads obtained by independent analysis will be compared with the designer loads, typically at the substructure-tower interface, at a couple of intermediate heights and at the seabed level as a minimum. Loads will also be compared at tower top and along the Tower, as well as at relevant RNA locations, as defined in the WTG Type Certificate.

It should be mentioned that Bureau Veritas would carry out the calculation of the selected DLCs in a similar manner to the requirements from IEC. This means for example running 6 different realisations for the FLS load cases. Also, wind and wave conditions will be generated independently by Bureau Veritas based on the same environmental input conditions as the WTG supplier. This should ensure that the comparison with the WTG Supplier and substructure designer calculations are performed on similar basis.

Bureau Veritas may perform an assessment of the damping level during the calibration phase, based on damped modal analysis or on simple decay tests for the integrated structure. This should ensure that the independent model correlates well with the WTG supplier's model with regards to the damping level, prior to entering into any more detailed load calculation.

In the same respect, power production load cases with misaligned wind and wave are expected to have a large importance for the design, since aerodynamic damping is very low in the cross-wind direction. Such load cases would therefore typically be included in Bureau Veritas independent analysis on a spot-check basis.

If the Project is located on a seismic area, load case deriving from seismic load will be reviewed and taken into account.

Tropical cyclones load cases shall be investigated in accordance with ACP OCRP-1 Offshore Compliance Recommended Practices. Similarly, idling load cases will have to be considered for fatigue loads, since aerodynamic damping is low in idling or parked conditions. Such load cases (e.g. DLC 6.4 or 7.2 of IEC 61400-3-1) would therefore also be included in Bureau Veritas independent analysis on a spot-check basis.

To summarize, for FLS load cases, Bureau Veritas typically runs between 10 and 15 DLCs (with 6 realisations each), aiming to cover about 10% of total probability of occurrence / fatigue damage. This will cover typically DLCs from families 1.2 (normal operation),6.4 and 7.2 (idling / parked configuration).

For ULS load cases, Bureau Veritas typically runs around 10 DLCs (with 6 realisations each), aiming to cover the design driving load cases. This will cover typically DLCs from families 1.6 (Power production in severe sea state), 6.1 and 6.2 (idling in extreme conditions plus grid loss).

Based on the proposed project schedule, the following approach is proposed for a single load iteration:

- In advance to Load iteration :
    - Modelling of the WTG and associated calibration,
    - Modelling of the substructure and foundation and associated calibration,
    - Evaluation of input data (hydrodynamic loads, damping, DLC tables, etc.).
- Load iteration :
    - Calculation of a selection of DLC and comparison with the design loads to verify the plausibility of the design loads,
    - Review of the load documentation packages,
    - Review of the deliverables from the WTG Supplier's certification body, regarding site-specific loads. Site-specific variances of the standard deliverables from the WTG Supplier's certification body shall be verified by the CVA.
    - Upon validation of the module, issue of evaluation reports.

5.1.1.2 Simulation software

For the determination of the loading on the wind turbine and the support structure, Bureau Veritas uses the aero-elastic code Samcef for Wind Turbines (SWT, developed by LMS Samtech) intended for the calculation of the wind turbine response in time domain. This software is part of the SIEMENS PLM software suite (as NX NASTRAN). SWT is able to simulate all load cases required for the integrated load analysis taking into account wind, wave, current and soil external conditions as well as the control system and grid conditions (yaw error, exceedance of cut-out speed, and sensor failure).

The structural part of the code is based on a multi-body approach using beam elements. The turbine is modelled as an assembly of bodies connected with constraint equations (rigid coupling, bearing, prescribed fixed bearing angle, etc.).

The aerodynamic part of the code is based on the blade element momentum theory and on the Kaimal turbulence, capable of handling dynamic inflow, dynamic stall, skew inflow, shear effects on the induction and effects from large deflections.

The soil model is based on non-linear springs modelling the deflection of the foundation with respect to the soil resistance.

The waves are generated based on wave spectra – i.e. Jonswap or other type. In addition, deterministic waves can be implemented for extreme load cases.

5.1.1.3 Documents necessary for the evaluation of loads

Bureau Veritas will need to review the following documentation as a minimum:

- Load reports from the WTG Supplier and WTG Substructure Supplier, including extreme and fatigue loads,
- Time series of loads for the selected DLCs,
- Mode shapes and frequencies analysis,
- Description of the software used for the calculations.

All references not publicly available listed in the documents shall be provided to the CVA upon request. The documentation provided shall address the issues described in the above sections.

For the independent model, Bureau Veritas will require the following data and information from the WTG Supplier:

- General description of the turbine (RNA and tower),
- CoG positions,
- Main dimensions,
- Mass and stiffness distributions,
- Blade aerodynamic properties,
- Description of the Control and Protection philosophy,
- Control and Protection System dll, including a clear description of its inputs and outputs

For the independent model, Bureau Veritas will require the following data and information from the WTG Substructure Supplier:

- General description of the substructure and foundation,
- CoG positions,
- Main dimensions,
- Mass and stiffness distributions,
- Hydrodynamic coefficients,
- Marine growth and corrosion allowance,

- Soil properties (p-y curves).

Bureau Veritas may need to exchange data with LMS Samtech in order to build the independent model. In such a case, this data exchange will be covered by a project-specific Non-Disclosure Agreement.

5.1.2. RNA validation - Site Specific WTG RNA Design Evaluation

5.1.2.1 Verification of Type Certificate

Bureau Veritas will verify that the wind turbine (or as a minimum the RNA) holds a valid type certificate according to IECRE OD 501. The TC conditions and limitations shall be compared to the actual site conditions as given in the design basis and it shall be proven that the site-specific conditions are covered by the TC. These include for example:

- Temperature (cold climate sites would necessitate appropriate mitigation measures),
- Humidity,
- Solar radiation,
- Rain, hail, snow and ice (in particular risk of icing on the rotor blades),
- Chemically active substances,
- Mechanically active particles,
- Salinity,
- Electrical conditions,
- Lightning.

In particular, the risk of corrosion shall be carefully assessed, and appropriate protection measures shall be enforced. Special attention shall be given to the effects of the site specific conditions on electrical components such as generator, converter, transformer, switch gear and enclosures.

It is expected that safety aspects of wind turbines will be addressed as part of the Type certification. All safety features regarding the RNA itself are considered to be part of the Type certification. The CVA shall verify fire and safety aspects of electrical equipment located in the tower sections. The CVA shall also verify escape route and evacuation plans for the RNA and Tower. The CVA will verify that fire hazard analysis, short circuit analysis, and overcurrent protective device coordination studies were conducted in accordance with the applicable standards.

ACP OCRP recommends several exceptions and additions to IEC 61400-3-1 to meet US safety standards and best practices. Also, some safety aspects may not covered under the Type certification. In this case, Bureau Veritas will review any safety aspects specified in the Design Basis which are not already covered in the Type certificate.

The Type Certificate shall ensure that the WTG safely and automatically stops when the rotational speed has increased significantly, or when the functioning of the control equipment for the wind turbine has deteriorated.

5.1.2.2 Verification of load level

As the wind turbine shall already be type-certified, there is no need for a detailed investigation of the stability of each component as long as both the following conditions are satisfied:

- The design of the component to be installed is the same as the design that has been certified.
- The calculated site-specific loads on the component are not higher than the design loads considered in the type certificate.

A comparison of the site-specific loads with the design loads specified in the wind turbine Type Certificate shall be performed by the wind turbine supplier, confirmed by the type certification body and a summary is to be provided to Bureau Veritas for verification.

Any increase in load level or any change in vibration modes or natural frequencies shall be stated and carefully evaluated by the OEM. This evaluation shall consider the relevance and validity of load measurements, functional testing and component tests such as blade test.

Furthermore, the evaluation shall also identify components that will require reinforcement or modifications. Bureau Veritas shall review the evaluation and recommend its acceptability to BSEE.

If the loading on the machine implied by the actual site conditions is higher than the design loads, it shall be demonstrated that the increased loads do not endanger the structural integrity of the wind turbine. A specific approval from the Type Certification body might be required in such a case.

5.1.2.3 Modifications

In case of site-specific modifications that are not covered by the TC, a specific assessment will be made on a case-by-case basis to evaluate the level of additional verification to be performed. The documentation provided shall include a full description of all modifications and reinforcements compared to the original, type-certified design.

Independent analysis shall be carried out by Bureau Veritas on critical structures and components (including nacelle and bearing, hub, nacelle frame, bolting, tower, gearbox, blades, etc.), especially on those which are reinforced or modified compared to the versions certified as part of the wind turbine TC. The dynamical behaviour of the transmission chain may also be investigated. To carry out independent analyses, FE models covering mesh and element information, material properties and boundary conditions shall be made available to Bureau Veritas; they could be exported from commercial software such as ANSYS, ABAQUS, etc.

Independent analyses include modal analysis, extreme & fatigue analysis and stability analysis. The exact scope of the required independent mechanical / structural calculations will be determined on a

case-by-case basis depending on the site conditions, on the TC characteristics and on relevant project specificities.

5.1.3. WTG Tower Design Evaluation

Bureau Veritas will evaluate the conformity of the design of the tower with the design assumptions specified in the Design Basis.

This includes in particular the review of:

- Material properties,
- Tower structure,
- Ultimate strength,
- Fatigue
- Buckling
- Door opening reinforced with frame
- Bolted connections
- Natural frequency
- Manufacturing procedures
- Transportation procedures
- Installation procedures
- Maintenance procedures.

In addition, an independent calculation will be performed and may cover the following aspects depending on the dimensioning criteria (strength, fatigue, stiffness):

- Ultimate strength,
- Fatigue,
- Buckling,
- Bolted connections,
- Natural frequency.

5.1.4. Electrical systems

The CVA may review and evaluate design documentation on WTG electrical systems to include as a minimum:

- Charging equipment for batteries

- Emergency generator(s)
- Transformers
- Converters (if applicable)
- Switch and protection equipment
- Switchgear
- Capacitors
- Transmission equipment
- SCADA

The CVA review will include the lightning protection design of the WTG. Lightning protection of the turbine is covered by the type certificate, so review shall be limited to a holistic review of the turbine and substructure. Lightning protection of the wind turbine will be checked based on IEC 61400-24. Verifications will include lightning protection and the earthing system, especially between interfaces.

The CVA may review the capacity of the WTG power yaw back-up system. Proper corrective action will be taken once the assessment is performed.

Note: Power-yaw back up system is a part of the Type Certificate of the wind turbine. Indeed, if this is not the case, CVA will fully verify the reliability of the power back-up system. CVA will ensure there is no particular conditions/limitations stated in the Type Certificate and if it is the case, CVA will verify the reliability of the power back-up system for the site.

5.2. Task 2 – WTG Fabrication - RNA and Tower

5.2.1. Evaluation

The evaluation plan will be provided to BSEE at the beginning of the fabrication phase for information. This evaluation includes the following elements:

- Quality system evaluation
- Manufacturing inspection and surveillance

The quality system evaluation is limited to the verification that the quality system of the manufacturer is certified according to ISO 9001 by an accredited certification body that operates according to ISO/IEC 17021. As part of the scope, the assumption is made that a valid ISO 9001 certificate will be provided for each manufacturing place involved. If this is not the case, an additional specific evaluation will have to be performed.

As a general rule, the manufacturing inspection and surveillance will include:

- An initial audit to evaluate the ability of the supplier to produce the component under consideration according to the approved design specifications and with the intended quality level.
- Periodical on-site inspections covering all critical phases of the fabrication process, including the non-destructive testing (NDT) when applicable, including:
    - Verification that design specifications are properly documented in workshop drawings, workshop instructions, purchase specifications, fabrication methods and procedures, including in particular special processes, and welding and NDT procedures when applicable
    - Review of manufacturing records
    - Visual inspection of ongoing manufacturing processes for compliance with the approved manufacturing procedures
- Review of Non Conformities all along the manufacturing phase

In any case, Bureau Veritas mission should not be considered as a duplication or substitution of vendor / manufacturer QC nor repetition of EPC contractor work.

The surveillance activities will be detailed in a Manufacturing Evaluation Plan, as part of the global Evaluation plan. This specific plan will be prepared once more detailed information about the manufacturing activities are available, and before the start of the manufacturing surveillance activities.

5.2.2. Inspection and Test Plan Review

Prior to any surveillance activity at a specific supplier, a Pre-Inspection meeting (or Kick-off meeting) will be organized with the supplier to be inspected. During the meeting, Bureau Veritas shall obtain from the manufacturer the manufacturing schedule, clarify all relevant requirements (from quality point of view), receive ITP (Inspection Testing Plan) with manufacturer QC interventions marked up and identify all possible sub-contractors (if applicable).

After the Pre-Inspection Meeting, Bureau Veritas will mark-up the ITP with its own surveillance activities and indicate which surveillance is required for each step of the manufacturing process. The Manufacturing Evaluation Plan will be updated accordingly.

5.2.3. Initial audit

Initial audits will be conducted at manufactures of the support structure to assess the capacity of the manufacturer to perform the production according to the necessary quality requirements. If significant sub-parts are produced at sub-contractors, initial audits may be performed at the subcontractors' facilities as well. The necessary documentation of manufacturing processes, testing procedures, quality control, plans of the fabrication plants, etc., shall be provided to BV beforehand.

Typically, BV expects to meet the person in charge of:

- The production (e.g. : production director),
- The incoming goods,
- The quality (e.g. : quality manager / quality engineer / QSSE Coordinator).

5.2.4. Periodic inspections

The manufacturers involved in the fabrication of the main wind turbine components shall undergo the quality system evaluation described above.

Main Component	Assembly	Sub component
Nacelle	Backend Assembly	Transformer
		Rear End Support Structure
		Bedframe / Mainframe
		Converter
	Generator Assembly	Generator frame / fixed shaft
		Generator
	Hub Assembly	Hub casting
		Pitch System
		Main bearing incl. housings
	Nacelle Assembly	Backend, Generator and Hub Connection
		Electrical Assembly
Blades		Bearings
		Rotor blade
Tower sections (including coating)		Steel plates
		Flanges
		Door frame

Table 3 – Example: List of main WTG components

For CVA verification, additional surveillance activities are included in order to verify that the manufacturing of wind turbines for the specific project is carried out according to the approved design and with the intended quality, in particular with regards to modified components.

The periodicity of the inspection will be established at the beginning of the production based on the selected ITP steps. At the beginning of the production the presence of the inspection will be around 20% of the production time during the first months. During the serial production stage his presence will be reduced to 10% of the time (considering that no critical non conformity has been identified). At the end of the production during delivery stage the inspector will be again increase to cover the final inspection with an inspection rate of 20%. Overall a minimum of 10% inspection sample rate will be achieved.

As seen in the example above, the three main components are to be covered by surveillance: Nacelle (including Backend assembly, Generator assembly, Hub assembly and Nacelle assembly), Blades and Tower. Some of the sub-components are dependent on WTG manufacturer and model.

The other subcomponents will be covered by the surveillance of the incoming good inspections at the hub and nacelle assembly factory. This is based on the assumption that these inspections are sufficiently thorough to ensure that the required quality level is met.

This list is based on the currently available information and may need to be updated once more information about the wind turbine is provided, in particular the CVA verification documentation.

Secondary subcontractors will normally not be subjected to the manufacturing surveillance. However, Bureau Veritas reserves the right to extend the scope of inspection in case critical components, unusual materials or special processes are involved. If a subcontractor is involved in the production of load carrying parts, initial audit and periodical inspection will be mandatory. For secondary load carrying elements, the inspection will be decided on a case by case basis. This may depend on several parameters such as applicability of the quality procedures of the main contractor to his subcontractor, the availability of the material certificate such as 3.2 for steel component, etc. In any case, safety related secondary structures (e.g. escape routes) will be verified by the CVA.

5.2.4.1 *Hub and Nacelle assembly – manufacturing inspections*

The hub and nacelle assembly will also be subjected to inspections based on random sampling. These inspections will cover both the assembly process and the final assembled hub and nacelle. They will focus in particular on the welded and bolted connections and the electrical installations. These inspections will take place at the Hub and Nacelle assembly plant. During these inspections, the incoming good inspections for the other components of the hub and nacelle assembly will be thoroughly verified. The general approach will be as follows:

- Documentation review (for the selected components),
- Initial audit (for the selected components),
- Initial inspections at the beginning of the production,
- Regular inspections for the main components during production to reach the planned inspection rate.

5.2.4.2 *Blades – manufacturing inspections*

With regards to the blades, the manufacturing inspection will comprise:

- Verification that workshop drawing and comparison with the final blade dimension, workshop instruction, purchase specification, etc. are in line with the documentation approved as part of the Type certificate,

- Verification of fabrication method, procedure and qualification of personnel,
- Review of material certificates,
- Random checks on the effectiveness of acceptance procedures for purchased components,
- Random checks of fabrication processes.

It is expected that in particular the following key processes for blade manufacturing will be surveyed:

- The lay-up,
- Infusion,
- Closing and bonding.

Any NCR or TQ linked to manufacturing scope will be sent to the CVA and dealt with on a case-by-case basis depending on the criticality of each finding. In case of severe non-conformities of the manufacturing process, the number of inspection would have to be increased accordingly.

5.2.4.3 Tower – manufacturing inspections

With regards to the tower, the manufacturers involved in the fabrication of the tower shall undergo the quality system evaluation described above.

For tubular or conical steel towers, Bureau Veritas will perform a manufacturing survey at the manufacturer workshop, including the following activities:

- Review of structure fabrication documents:
    - Quality control plans,
    - Construction drawings,
    - Welding procedures specifications and existing qualifications,
    - Existing qualifications of welding operators *,
    - Existing qualifications of NDT operators *,
    - Fabrication procedures,
    - Testing procedures
    - Contractor QA/QC manual
    - Coordination procedure and planning
    - List of sub-contractor and vendors
- Survey of fabrication of structures and sub-assemblies
    - Materials traceability
    - Cuttings and welding preparations
    - Main fit-ups

- Identification of welders
- Preheating
- Welding consumables
- Welding parameters
- Visual random checks
- Identification of NDT operators
- Witnessing of non-destructive testing
- Heat treatment
- Witnessing of dimensional inspection
- Final visual inspection
- Contractor's site queries
- Contractor's non conformity reports

* It is assumed that operators are qualified. The qualifications of welding & NDT operators are not in the scope of work, but only the review of the qualifications. An audit will be performed of the manufacturing site. This will include a review of the quality management system, including their quality program and qualification of personnel.

The CVA will be involved in data book / material test report review for critical bolted connections.

5.3. Task 3 - WTG – Installation & Commissioning

5.3.1. General approach

The evaluation plan will be provided to BSEE at the beginning of the phase for information. The objective of the transport and installation (T&I) surveillance is to make sure that no excessive loading is sustained by the wind turbines, support structure, IAC and export cable during the transportation and the installation, and to prevent any damage on the components.

The surveillance activities will be detailed in a Transportation & Installation Evaluation Plan, as part of the global Evaluation plan. This specific plan will be prepared once more detailed information about the transportation and installation activities will be available, in particular the corresponding ITPs, and before the start of the surveillance activities.

The consistency between the design and the installation operations is verified by:

- the review of the transportation and installation method documentation to verify its conformance with the Design Basis, the reference standards and the assumptions made in the design phase,
- the surveillance of the transportation and installation operations,

- the review of the installation records.

Interface between CVA and Marine Warranty Surveyor is discussed in section 5.6.2 of this document.

5.3.2. Transportation Surveillance

The transportation surveillance covers transport between manufacturing harbour and marshalling harbour as well as the load-out of the WTG on the installation vessel.

Bureau Veritas will verify that the proposed transportation procedures and test plans are documented, adheres to industry specific standards or best practices and comply with the design basis.

The description of the transportation process shall include:

- Technical specifications for the transportation,
- Limiting environmental conditions,
- Safety instructions,
- Transportation arrangement including required fixtures, tooling and equipment,
- Transportation loads and load conditions.

In addition, Bureau Veritas will perform an onshore survey at the harbour with the aim to verify compliance with the design requirements and approved procedures for transportation. The surveillance will cover in particular the following aspects:

- Inspection of stored components at the harbour for damage (transportation damage, corrosion, etc.)
- Inspection of the tower assembly at the base harbour
- Lifting operations during load-out of the installation vessel
- Follow-up procedure on transportation damages and non-conformities

It should be noted that a 10% inspection rate is only a base case. In case of severe non-conformities of the transportation process, the inspection rate would have to be increased accordingly.

5.3.3. Installation Surveillance

The installation surveillance covers the offshore operations during installation. It covers the installation of the WTG components (tower, nacelle and rotor blades).

Bureau Veritas will verify that the proposed installation process is documented, adheres to industry specific standards or best practices and comply with the design basis. Bureau Veritas shall make periodic onsite inspections while installation is in progress and must, as appropriate, verify, witness, survey, or check, the installation items required by this section. This may include heavy lifts, bolting, level and location checks, flange flatness and gap inspection. It should be noted that a 10% inspection

rate is only a base case. In case of severe non-conformities of the installation process, the inspection rate would have to be increased accordingly. Finally, in addition to these inspections, Bureau Veritas will review the installation records, on a spot check basis. Any deviation from the intended procedures shall be justified, and may involve subsequent inspections.

5.3.4. Commissioning Surveillance

The WTG commissioning instructions shall be submitted to Bureau Veritas prior to the commissioning for review and approval. Bureau Veritas will verify that the procedures and test plans are documented and that they comply with the design basis and IEC 61400 series requirements and particularly with the wind turbine type and its type certificate (i.e. the commissioning procedures covered by the type certificate).

Bureau Veritas will perform inspections to verify that the commissioning is performed according to the commissioning procedures. These inspections will focus on:

- Conformity of the main components with the approved FDR
- General appearance of the WTG
- Witnessing of the safety and function tests and verification of safety related systems
- Visual inspection of the corrosion protection
- Check for potential damage

IEC specifies that at least the commissioning of the first turbine has to be witnessed, plus one additional turbine for every fifty turbines in the project. This sampling rate may require higher number than the minimum sampling rate specified by the IEC, depending on the Turbine Supplier and Installer experience.

Finally, Bureau Veritas will in addition to these inspections review the commissioning records and the final commissioning reports on a spot check basis. Any deviation from the intended procedures shall be justified, and may involve subsequent inspections.

For commissioning of critical safety systems, the CVA will be witnessing of at least 1 out of every 50 installations, as expected by BSEE.

Additional tests will be verified as part of commissioning surveillance, this includes:

- Test of the emergency stop buttons,
- Triggering of the brakes and witnessing of turbine’s behavior,
- Test of the yaw system,
- Behavior at grid loss,
- Behaviour at over speed,

- Test of automatic operation.

5.4. Task 4 – WTG Foundation Design

5.4.1. Design – Primary structure and secondary steel

5.4.1.1 Introduction

The evaluation is focussed on the primary steel design (including material designations) and also includes some elements of the secondary steel (including material designations) as described below:

- Primary structure design (steel plates and flanges)
- The secondary structure verification will be limited to its impact on the primary structure and the main structural components. The impact of secondary structure on human safety will be considered in the evaluation. Secondary structure design evaluation will be limited to:
    - External Platform,
    - Boat landing,
    - Rest Platform,
    - Upper Access Ladder,
    - Air-tight deck.
    - Any secondary structure involved in evacuation.

5.4.1.2 Document review

A detailed examination of the documentation produced by the WTG Substructure Supplier will be performed. It will include review of design calculations, drawings, specification of materials, manufacturing specification, etc. During this design review, Bureau Veritas will check compliance of calculations notes with the Design Basis, in particular the engineering codes and specifications referenced therein.

The following design calculations notes will be reviewed for the substructure:

- Natural frequencies,
- Ultimate Limit State (ULS),
- Fatigue Limit State (FLS),
- Ship impact,
- Geotechnical design,
- Driveability and driving-induced fatigue of jacket piles,

- Clustering,
- Primary structure design (steel plates and flanges),
- The secondary structure verification will be limited to its impact on the primary structure, the main structural components and human safety, as mentioned in section 0,
- Bolted connection,
- Wave run-up,
- Vortex-Induced Vibrations,
- FE analysis,
- Corrosion protection,
- Scour protection,
- Transportation and Installation (design of the substructure and foundation during temporary conditions).

Comparisons between the WTG Substructure Supplier calculations and Bureau Veritas analyses (see next section) will be made for the most significant structural elements. The compliance of drawings between calculations, and applicable standards and project specifications will be checked.

Coherence with the load analysis will be verified. This includes the verification that the correct loads have been used for the design of the substructure and that they have been implemented properly. It will also be verified that the final design complies with the assumptions made in the Integrated Load Analysis, in particular regarding stiffness and damping of the substructure.

The design of the corrosion protection system will be investigated, including the calculation of corrosion allowances and sacrificial anodes.

A review of the seabed stability, scour assessment and scour protection system will be performed.

The O&M plan will be reviewed to verify the suitability of the intended requirements and to ensure consistency with the assumptions for the design.

5.4.1.3 Independent analysis for the substructure

Bureau Veritas will perform an independent analysis for one substructure design in order to verify the calculations of the WTG Substructure Supplier. The underlying assumption is that the design of the different substructures is similar and that the external conditions are sufficiently homogeneous over the site (in particular the soil properties). The structural analyses will cover the primary structure of the support structure and foundation, excluding the tower and the RNA. Secondary structures will be modelled as non-structural elements in order to properly define their participation in global hydrodynamic loadings.

An integrated model (substructure and foundation) will be built in order to analyse the in-place configuration and the fatigue configurations. The dynamic analysis and structural response will be performed for the operating and extreme environmental conditions and fatigue conditions. Independent analyses for accidental conditions, pre-service conditions or earthquake are not considered as a “base case”. Nevertheless, if deemed necessary, such analysis can be performed.

The following analyses are typically performed:

- Natural frequency analysis,
- In-place analyses:
    - ULS analysis
    - FLS analysis
- Geotechnical independent analyses:
    - Holding capacity: axial and lateral bearing capacity
    - Drivability analysis: risk of refusal
- Other structural analyses
    - Pile fatigue during driving (*)
    - Lifting
    - Bolted connections

Sensitivity analyses will be performed to cover the worst conditions of the field.

Pile fatigue and its impact on design life will be considered in assessing the results of these load combinations, according to the requirements of the applicable codes.

(*) In case that the soil would have a low bearing capacity, a full integrated soil structure analysis would have to be performed in order not to over optimize the structural design of the foundation. As a base case, the design assessment of the foundation will be performed by using a simplified analysis. In case the criteria are not satisfied, a detailed analysis is required. In any case, this analysis can be used for screening purposes to identify the critical areas that will be further analysed in the next step.

5.5. Task 5 – Substructure and Foundation Fabrication

5.5.1. General

MP/TP manufacturing surveillance will focus on metal fabrication audits including quality, material specifications, cutting, bevelling, rolling, welding, blasting and coating, NDT and all other verifications, etc.

The manufacturing surveillance for the supporting structure will cover the:

- Primary structure design (steel plates and flanges),
- Secondary structure limited to the assembly of the following:
    - External Platform,
    - Boat landing,
    - Rest Platform,
    - Upper Access Ladder,
    - Air-tight deck.

5.5.2. Initial audit

Initial audits will be conducted at manufactures of the support structure to assess the capacity of the manufacturer to perform the production according to the necessary quality requirements. If significant sub-parts are produced at sub-contractors, initial audits may be performed at the subcontractors' facilities as well. The necessary documentation of manufacturing processes, testing procedures, quality control, plans of the fabrication plants, etc., shall be provided to Bureau Veritas beforehand.

The key aspects of the initial audit will focus on the review of:

- Valid Quality Management (QM) certificate according to ISO 9001: note Revision and Validity,
- Project Quality Plan (PQP),
- Inspection and Testing Plans (ITPs),
- For steel production i.e. WPSs, WPQRs, welding sequence schedule, certificates of the supervisory welding staff, welders and NDT personnel, etc.
- For cast components i.e. component specifications, drawing of the raw casting and machining, test drawing, drawing of the surface treatment, post-treatment specifications, etc.

Typically, Bureau Veritas expects to meet the person in charge of:

- The production (eg: production director),
- The incoming goods,
- The quality (eg: quality manager / quality engineer / QSSE Coordinator).

5.5.3. Periodic inspections

The manufacturers involved in the fabrication of the support structure shall undergo the quality system evaluation described above.

For steel structures (jacket, flanges), Bureau Veritas will perform an onshore survey at the construction yard(s) covering the primary structures. The following activities are included:

- Review of structure fabrication documents!
  - Quality control plans
  - Construction drawings
  - Welding procedures specifications and existing qualifications
  - Existing qualifications of welding operators *
  - Existing qualifications of NDT operators *
  - Fabrication procedures
  - Testing procedures
  - Contractor QA/QC manual
  - Coordination procedure and planning
  - List of sub-contractor and vendors
- Survey of fabrication of structures and sub-assemblies:
  - Materials traceability
  - Cuttings and welding preparations
  - Main fit-ups
  - Identification of welders
  - Preheating
  - Welding consumables
  - Welding parameters
  - Visual random checks
  - Identification of NDT operators
  - Witnessing of non-destructive testing
  - Heat treatment
  - Witnessing of dimensional inspection
  - Final visual inspection
  - Contractor's site queries
  - Contractor's non conformity reports

* It is assumed that operators are qualified. The qualifications of welding and NDT operators are not in the scope of work, but only the review of the qualifications.

It should be noted that a 10% sampling rate is only a base case. In case of severe non-conformities of the manufacturing process, the sampling rates would have to be increased accordingly.

5.6. Task 6 – Substructure and Foundation Installation

5.6.1. Project-specific assumptions

The typical MP installations are driving by an impact hammer in soft soils or by drilling and grouting in hard soils. Some hybrid solutions may also be applied based on the geotechnical data. TP will be connected to MP either by grouting or by means of a bolted flange.

The following assumptions have been made for the CVA Verification Plan:

- The installation contractors operate a quality management system certified according ISO 9001 by an accredited certification body.

5.6.2. Project-specific approach

The Marine Warranty Surveyor is not part of the CVA scope of work. The proposed interface matrix shown hereafter describing the activity split between the CVA and the Marine Warranty Surveyor (MWS) will be jointly confirmed between Atlantic Shores and the MWS contractor with respect to the responsibilities and surveillance / review for the project.

- As a CVA, Bureau Veritas intends to conduct transportation and installation surveillance with a minimum 10% sample rate for installation verification and will verify the remaining balance of the installations by reviewing MWS records.
- As the CVA, Bureau Veritas is ultimately responsible for the monitoring of the installation as outlined in 30 CFR 285.708.
- The intention of the split matrix is to define the role of the MWS versus CVA and to avoid duplication of the work. To summarize the principle of the split, Bureau Veritas will carry out the review of the T&I procedures supported by the design documentation and will ensure that all design aspects are correctly defined in the procedures. BV inspector will ensure on site that the T&I procedures are duly implemented so that the T&I operation can be performed on a repetitive manner. Bureau Veritas will have a particular focus on the structural integrity of the asset while the MWS will be more focused on the marine operation itself.
- The boundary between two areas of responsibility is usually defined at the lifting point of the asset. All rigging, lifting tool and cranes are part of the MWS scope.

No.	Task	MWS	CVA
0.	**Audit**		
0.1	Quality management audit of installation provider		X
1.	**Document review**		

No.	Task	MWS	CVA
1.0	Review and approval of method statement/procedures related to load-out, offshore Transportation & Installation of relevance for the structure.		X
1.1	Verification of all load cases related to load-out, offshore Transportation & Installation relevant for the structure (changes to certified design).		X
1.1.1	Review and approval of calculations in method statements/procedures related to load-out, offshore Transportation & Installation to ensure that utilization rates as verified by the Verification of all load cases related to load-out, offshore Transportation & Installation relevant for the structure are not exceeded taking into account the specific environmental conditions (operational limits) and the duration pertaining to the specific operations, in particular: • Pile drivability analysis (for each location taking into account the location-specific soil condition as well as operational limits • Lifting/upending analysis (rigging, winches, cranes, moorings, etc.) when implication/impact to structure cannot be excluded • Transportation analysis (sea-fastening/grillage, stability, bollard pull) and possible implication/impact to structure • On-bottom stability of component with respect to in-place structure and relevant for the specific foundations. Possible interim activities (e.g. vortex strakes, lifting pad eyes etc.) are within CVA scope. CVA scope is to observe that the structure is transported, loaded-out, lifted, installed in compliance with specification given within design.		X
1.2	Review and approval of method statement/procedures related to load-out, offshore Transportation & Installation in relation to vessel, lifting equipment etc.	X	
1.3	Review and approval of calculations in method statements/procedures related to load-out, offshore Transportation & Installation to ensure that utilization rates as verified by the Verification of all load cases related to load-out, offshore Transportation & Installation are not exceeded considering the specific environmental conditions (operational limits) and the duration (weather window) pertaining to the specific operations, in particular: • Lifting/upending analysis (rigging, winches, cranes, moorings, etc.) • Transportation analysis (sea-fastening/grillage, stability, bollard pull) • On-bottom stability of component • Installation procedures (piling/grouting, lifting, mating) • Vessel positioning, jacking, anchoring during installation operations. Note for clarification: CVA approves all load-cases related to load-out, offshore Transportation & Installation, which have relevance for the structure while the MWS checks if: • The vessel and equipment specifications are reflected in the calculations • These engineering calculations are conducted according to guidelines resulting in the operational limits for defined durations (weather windows).	X	

No.	Task	MWS	CVA
	MWS shall ensure that possible load restrictions (e.g. weather window for installations vessels/equipment, limitations to wave, wind) are followed. CVA will solely focus on same with respect to the structure including possible interim components prescribed within design.		
1.6	Provide technical review report as a result of the review of method statements/procedures.	X	
2.	**Suitability surveys of vessels and equipment**		
2.1	All towing vessels, cargo barges and crane vessels/jack-up´s used for the load- out, offshore Transportation & Installation as well as relevant equipment for marine operations will be audited prior to mobilization to ensure that they are fit for purpose and up to standard (e.g. rigging, crane, remote operated vehicles (ROV), hammer, towing equipment, towline recovery equipment, navigation lights, pumping equipment, mooring ropes, fenders).	X	
2.2	Provide a vessel suitability survey report. The suitability surveys will be carried out according to the MWS checklists.	X	
3.	**Load-out Surveillance**		
3.1	Certificate of Approval	X	
3.2	On-site surveillance of lifting, upending skidding operations during loading and unloading.	X	
3.3	On-site surveillance of lifting, upending skidding operations during loading and unloading with respect to structure.		X
3.4	During on-site attendance, verify the conformity of the operations with the approved method statements/procedures, e.g. in respect with the operational limits (wind speed, wave height, etc.) and the duration of operation (weather Window).	X	
3.5	During on-site attendance, verify the conformity of the operations with the approved method statements/procedures with respect to structure.		X
4.	**Transportation Surveillance**		
4.1	Certificate of Approval	X	
4.2	Surveillance of welding of grillage to transported components	X	

No.	Task	MWS	CVA
	• Spot-check surveillance of preparation for welding including correct use of materials, fit up, weather protection • Spot-check surveillance of welding performance including adherence to welding procedures, preheating, tack welding, welding, post weld heat treatment, weld repairs • Spot-check surveillance of non-destructive testing (NDT) activities including performance of NDT and adherence to NDTprocedures, evaluation of results and of the extent of the NDT • Review of NDT reports by level 2 staff.		
4.3	Surveillance of bolted connections (Marine operation tasks should be verified by the MWS. CVA scope will be focus on the structural integrity.) Surveillance of fit-up • Bolt pre-tensioning.		X
4.4	Surveillance of sea fastening according to approved method statements/procedures for all components to be transported.	X	
4.5	During on-site attendance, verify the conformity of the operations with the approved method statements/procedures, e.g. in respect with the operational limits (wind speed, wave height, etc.) and the duration of operation (weather window).	X	
5.	**Installation Surveillance**		
5.1	Certificate of approval	X	
5.2	On-site surveillance of lifting, piling operations during installation incl. surveillance of the structure for damage during or after the cutting of the sea-fastening.	X	
5.6	On-Site surveillance of bolted connections • Surveillance of fit-up • Bolt pre-tensioning.		X
5.8	During on-site attendance, verify the conformity of the operations with the approved method statements/procedures, e.g. in respect with the operational limits (wind speed, wave height, etc.) and the duration of operation (weather window).	X	
6.	**Completion of the Transportation & Installation Surveillance**		
6.1	As-built documentation with respect to the structure • Pile driving records • General deviations from approved design		X
6.2	Issuing of a Conformity Statement for Transportation & Installation Surveillance.		X

Table 4 - Interface Matrix with MWS

The CVA will review transportation and installation procedures in the FIR during the design phase likely before transportation and installation contractors are selected. As more details become available

from the transportation and installation contractors, Bureau Veritas will review detailed transportation and installation procedures to check completeness and plausibility and to get acquainted with the methodology to be implemented as part of the transport and installation. In addition, Bureau Veritas will verify the consistency with the defined loading condition Design Basis.

During the load of the structure at base harbour, Bureau Veritas will witness the operation to inspect potential damages which might occur during handling of the structure. MWS will oversee the on-site surveillance of the lifting, upending skidding operation in particular MWS shall ensure that possible load restrictions are followed.

Bureau Veritas shall make periodic onsite inspections while installation is in progress and must as appropriate, verify, witness, survey, or check, the installation items required by this section. Bureau Veritas shall ensure they have a proper vantage point for all witnessing activities.

Some of these inspections may have to be followed by Bureau Veritas at distance using connected glasses or any other suitable communication means for supervision purposes.

The reports from the MWS shall be provided for Bureau Veritas to be able to follow the installation process and shall clearly describe the CVA related activities. Also, Bureau Veritas shall be able to follow the NCR raised during the transportation and installation process.

The MWS has not been selected for the Project, nor has the scope of work been finalized. The table included was indicative-only, to show the overlap and division of scope between the MWS and CVA. Once the MWS is selected by ASOW, a clarification meeting will be held to discuss the split in scope of service.

The CVA will conduct T&I surveillance at a 10% sampling rate for each asset. The MWS work will be used to verify T&I scope per the agreed scope of work with insurers. The CVA and MWS shall align on scope of work during a clarification meeting and shall collaborate and communicate where applicable.

5.6.3. Initial audit

Initial audits will be conducted at the installation contractors to assess the capacity of the contractors to perform the production according to the necessary quality requirements. The necessary documentation of transportation processes, testing procedures, quality control, etc., shall be provided to Bureau Veritas beforehand.

5.6.4. Transportation Surveillance

The transportation surveillance covers the load-out of the support structures on the installation vessel.

Bureau Veritas will verify that the proposed transportation procedures and test plans are documented in sufficient detail and that they comply with the design basis and the requirements of the reference standards.

The description of the transportation process shall include:

- Technical specifications for the transportation
- Limiting environmental conditions
- Safety instructions
- Transportation arrangement including required fixtures, tooling and equipment
- Transportation loads and load conditions

In addition, Bureau Veritas will perform an onshore survey at the harbour with the aim to verify compliance with the design requirements and approved procedures for transportation. The surveillance will cover in particular the following aspects:

- Inspection of stored components at the harbour for damage (transportation damage, corrosion, etc.),
- Lifting operations during load-out of the installation vessel,
- Follow-up procedure on transportation damages and non-conformities.

5.6.5. Installation Surveillance

The installation surveillance covers the offshore operations during installation. It covers the installation of the support structure.

Bureau Veritas will verify that the proposed installation process is documented in sufficient detail in the installation documentation and that it complies with the design basis and the requirements of the reference standards. Bureau Veritas shall make periodic onsite inspections while installation is in progress and must, as appropriate, verify, witness, survey, or check, the installation items required by this section.

Additionally, Bureau Veritas will, in addition to these inspections, review the installation records, including the pile driving records and the grouting and grout test reports, on a spot check basis. Any deviation from the intended procedures shall be justified, and may involve subsequent inspections

To comply with §285.708(a)(4), the CVA shall make periodic onsite inspections while installation is in progress and must, as appropriate, verify, witness, survey, or check, the installation items required by this section.

- The CVA shall verify, as appropriate, all of the following:
    - Loadout and initial flotation procedures;
    - Towing operation procedures to the specified location, and review the towing records;
    - Launching and uprighting activities;

- Submergence activities;
- Pile or anchor installations; and associated back calculations for pile driving and associated fatigue calculation
- Installation of mooring and tethering systems;
- Final deck and component installations; and
- Installation at the approved location according to the Facility Design Report and the Fabrication and Installation Report.

- For a fixed facility the CVA shall verify that proper procedures were used during the following:
  - The loadout of the jacket, decks, piles, or structures from each fabrication site; and
  - The actual installation of the facility or major modification and the related installation activities.

5.7. Task 7 – Offshore Substation Design

5.7.1. Design of primary design

The following design calculations will be reviewed for the substructure (Jacket):

- Natural frequency assessment,
- Ultimate Limit State (ULS) analysis,
- Service Limit State (SLS) analysis,
- Fatigue Limit State (FLS) analysis,
- Accidental Limit State (ALS) analysis (Ship impact, drop object, etc.),
- Temporary load conditions,
- Wave slam,
- Wave run-up,
- Vortex shedding analysis (also during fabrication and load-out),
- Finite Element analyses,
- Scour protection,
- Driveability.

For transportation and installation, the following analyses will be reviewed:

- Sea-transport,

- Lifting,
- Pile driving for the piles connecting the jacket to the seabed:
    - Pile driving fatigue,
    - Pile upending,
    - Pile sway with/without hammer.

In addition, the design of the corrosion protection system will be verified, including the calculation of corrosion allowances and sacrificial anodes.

The O&M plan will be reviewed to verify the suitability of the intended requirements and to ensure consistency with the assumptions for the design.

A review of the seabed stability, scour assessment and scour protection system will be performed.

The scope of work includes the review and verification of concept load-out, installation and transportation procedure & methodologies.

An independent analysis will be performed to verify the structural design of the OSS support structure.

The structural analyses will be performed using Bureau Veritas's in-house structural analysis tool: NSO (New Strudl Offshore). They will cover the primary structure of the support structure. Secondary structures will be modelled as non-structural elements in order to properly define their participation in global hydrodynamic loadings.

The jacket (up to the connection with the topside) will be modelled using Isymost and NSO software programs. The soil reaction will be modelled by springs (in accordance with API methodology). The wave loads / current loads will be applied all along the structure on relevant portions: the wave may be of Airy, Stoke and other type and the current may be considered as constant or have a specific profile, depending on the approach chosen. The wind loads will be considered as a single force acting at the top of the model.

The analysis will cover the ULS and FLS configurations. The dynamic analysis and structural response will be performed for the operating and extreme environmental conditions and fatigue conditions. Independent analyses for accidental conditions, pre-service conditions or earthquake are not considered as a "base case". Nevertheless, if deemed necessary, such analysis can be performed.

The following analyses are foreseen:

- Geotechnical independent analyses:
    - holding capacity: axial and lateral bearing capacity,
    - driveability analysis: risk of refusal,
- Structural independent analyses:

- driveability fatigue and buckling analysis,
- in-place analysis: ULS, FLS, SLS,
- grouted connections.

Note (1): Accidental load cases such as "Boat impact" and "Dropped object" and temporary load cases such as "Load-out, Lifting, transport, etc." will be verified through documentation review.

Note (2): The structural analysis is performed by considering a single model including the substructure, topsides structures and foundations. The mechanical properties of soil from geotechnical studies are used to represent the boundary conditions of the model.

Note (3): Finite element analyses which are not included as a base case. They can be performed if needed. It may be useful to perform FE analyses for design cases that are close to the design limit. This would have to be defined on a case-by-case basis during the design review.

5.7.2. Design of secondary structure

The secondary structure verification will be limited to its impact on the primary structure and the main structural components. The impact of secondary structure on human safety will be considered in the evaluation. The secondary structure design will be limited to the review of:

- External Platform,
- Boat Landing,
- Rest Platform,
- Upper Access Ladder,
- Air-tight deck.

5.7.3. Topside Structure Design

The Topside structural design appraisal includes design review and independent analysis. It covers the topside primary structure.

5.7.3.1 *Structural Design Review*

- Design Review of following design calculations:
  - In place analysis condition (Operating and storm conditions).
  - Load out, transport and installation phase
  - Dropped object
  - Accidental loads if any

- Review of the corrosion protection system
- Review of topside drawings
- Review of secondary structures

5.7.3.2 Structural Independent Analysis

Independent structural analyses covering Topside primary structure will be performed using Bureau Veritas own tool, called NSO. An integrated model will be built for in-place analysis (static in-place analysis for operating & extreme environmental conditions).

5.7.4. Fire Protection and Human Safety

Bureau Veritas will review all documents (technical specifications, mechanical & process data sheets, calculation notes, safety cause & effects diagrams, drawings, requisition) issued by the OSS designer(s) for safety systems, pressure vessels & mechanical equipment.

5.7.4.1 Safety detection, platform layout, control and protection systems

Bureau Veritas will review all documents issued by Engineering relative to the fire and safety concepts and philosophy of the platforms. Design appraisal will be conducted to ascertain that control engineering is adequate to maintain the level of safety on the platform in case of fire, if they occur, to minimise their adverse consequences. The above two objectives are respectively to be reached by the review of plant safety system and emergency support systems.

The review will be conducted to ascertain that abnormal conditions are rapidly detected and that corrective actions are taken in order that the safety of personnel and installations is not impaired.

The verification of the detection and layout will include the review of the following systems:

- Fire and gas detection systems,
- Ventilation systems (HVAC),
- Emergency shutdown system,
- Classification of hazardous areas,
- Equipment and accommodation layout,
- Equipment handling,
- Passive fire protection.

5.7.4.2 Fire-fighting equipment / active fire protection

The verification of the firefighting equipment would ascertain the following:

- Check of specifications to ascertain that fire-fighting equipment would be engineered and fabricated according to recognized standards and tested by a competent authority,
- Check of layout of protective equipment regarding suitability for use and maintenance,
- Check of suitability of extinguishing medium in relation to class of fires liable to be experienced and also to equipment installed in protected area,
- Check that design arrangements would permit testing in service,
- Check the passive fire protection system and architectural in order to minimize the escalation of a fire on the platform.

Bureau Veritas will review the specifications, drawings, data sheets and calculation notes related to the following systems:

- Fire water system (fire water demand, fire pumps, fire mains, hydrants and hoses),
- Foam systems, Deluge systems,
- Fixed gas fire extinguishing systems ,
- Mobile fire extinguishing systems (fire extinguishers number, location and adequacy),
- Fireman's outfit,
- Safety plan,
- Passive fire protection & Architectural, including fire integrity of walls and decks; insulation material specification and position; deck and surface coverings material specification and positions; fire doors in different types of walls and specification of doors; penetrations of cables and pipes through fire divisions; details of fire dampers; ventilation system layout including dimensions and penetrations of ducts through fire divisions.

5.7.4.3 Evacuation systems / Safety systems with respect to access/egress, evacuation and rescue

The verification will centre upon ascertaining Life Saving Appliances adequacy to meet applicable requirements.

Platform lifesaving crafts:

- Review of number of life-boats, life-rafts, rescue boats,
- Review of above crafts aggregate capacity,
- Review of crafts type, location and launching gears,
- Review of embarkation stations in relation to fire possibilities, emergency shutdown panels and escape routes, platform individual life saving appliances,

- Review to ascertain compliance of number, type and location of life jackets, buoys, survival suits, etc.

5.7.4.4 Safety plan

Review will be conducted of safety plan, from operating manual, to ascertain adequacy and compatibility with escape as well as other casualty control equipment (fire and detection and protection, alarm/P.A. Systems etc.)

5.7.5. Electrical Design

The electrical design of the OSS systems will be reviewed and evaluated against compliance with the reference standards. The anticipated scope of the evaluation includes:

- HV transmission and distribution systems,
- Local power supplies,
- Platform lighting and small power,
- Cable schedule and cable routing,
- Cable glands / MTC,
- UPS,
- Lightning protection,
- Earthing and bonding,
- SCADA,
- Communication system.

The CVA will review reliability and all safety aspects of the power back-up system. Proper corrective action will be taken once the assessment is performed.

The CVA may review and evaluate design documentation on OSS electrical systems to include as a minimum:

- Charging equipment for batteries,
- Emergency generator(s),
- Transformers,
- Converters (if applicable),
- Switch and protection equipment,
- Switchgear,

- Capacitors,
- Transmission equipment,
- SCADA.

Additionally, the CVA will verify that the electrical design documents for the OSS are PE stamped and accompanied by a report(s) from each electric designer(s) demonstrating that compliance with applicable standards. It is assumed that the electrical designer(s) will seek guidance from the published Offshore Wind Electrical Safety Standards Harmonization: Workshop Proceedings.

CVA review will include the lightning protection design of the OSS. Lightning protection of the OSS and any other offshore structures shall be reviewed independently. If deemed insufficient, proper corrective action and reporting will be performed.

The CVA will verify that fire hazard analysis, short circuit analysis, and overcurrent protective device coordination study were conducted in accordance with applicable standards.

5.8. Task 8 - Offshore Substation Fabrication

5.8.1. General

The following activities are included, with a comparable scope as described below:

- Manufacturing Surveillance, Topside Structure,
- Manufacturing Surveillance, Topside Equipment (limited to Fire & Safety equipment),
- Manufacturing Surveillance, Support Structure including piles.

5.8.2. Initial audit

Initial audits will be conducted at manufacturers of topside and support structure to assess the capacity of the manufacturer to perform the production according to the necessary quality requirements. If significant sub-parts are produced at sub-contractors, initial audits may be performed at the subcontractors' facilities as well. The necessary documentation of manufacturing processes, testing procedures, quality control, plans of the fabrication plants, etc., shall be provided to Bureau Veritas beforehand.

The key aspects of the initial audit will focus on the review of:

- Valid Quality Management (QM) certificate according to ISO 9001: note Revision and Validity
- Project Quality Plan (PQP)
- Inspection and Testing Plans (ITPs)
- For steel production i.e. WPSs, WPQRs, welding sequence schedule, certificates of the supervisory welding staff, welders and NDT personnel, etc.

- For cast components i.e. component specifications, drawing of the raw casting and machining, test drawing, drawing of the surface treatment, post-treatment specifications, etc.

5.8.3. Periodical inspections

The manufacturers involved in the fabrication of the topside and support structure shall undergo the quality system evaluation described above.

The CVA will perform an onshore survey at the construction yard(s) covering the primary structures. The following activities are included:

- Review of structure fabrication documentation
  - Quality control plans
  - Construction drawings
  - Welding procedures specifications and existing qualifications
  - Existing qualifications of welding operators *
  - Existing qualifications of NDT operators *
  - Fabrication procedures
  - Testing procedures
  - Contractor QA/QC manual
  - Coordination procedure and planning
  - List of sub-contractor and vendors
- Survey of fabrication of structures and sub-assemblies
  - Materials traceability
  - Cuttings and welding preparations
  - Main fit-ups
  - Identification of welders
  - Preheating
  - Welding consumables
  - Welding parameters
  - Visual random checks
  - Identification of NDT operators
  - Witnessing of non-destructive testing
  - Heat treatment
  - Witnessing of dimensional inspection
  - Final visual inspection
  - Contractor's site queries
  - Contractor's non conformity reports
- For the Fire & Safety equipment:
  - inspection of fire doors and windows

- review fire certificates.

* It is assumed that operators are qualified. The qualifications of welding and NDT operators are not in the scope of work, but only the review of the qualifications.

As part of this CVA verification plan and as a minimum, the following criticalities have been used to determine the sampling rates during the foreseen construction period:

Component	Criticality	Base inspection rate
Support structure and topside (start of production – first month)	H	20%
Support structure and topside (serial production)	M	10%

Table 5 - Criticality and Frequency rate for Support Structure / Topside inspection

For the manufacturing surveillance of the support structure, the sampling rate should be understood as applying to the construction period rather than to the components themselves:

- 20 % means 1 day of inspection per week or 4 days per month (during the first month to audit manufacturer's quality system)
- 10 % means 0.5 day of inspection per week or 2 days per month (during the rest of the fabrication)

It should be noted that these sampling rates are only a base case. In case of severe non-conformities of the manufacturing process, the sampling rates would have to be increased accordingly.

CVA surveyors shall conduct manufacturing surveillance in order to verify compliance between the approved design and the product. In general manufacturing surveillance shall involve evaluation of manufacturing, evaluation of quality management system, product related quality and process audits.

Any NCR or TQ linked to manufacturing scope will be sent to the CVA and dealt with on a case-by-case basis depending on the criticality of each finding. In case of severe non-conformities of the manufacturing process, the number of inspection would have to be increased accordingly.

5.9. Task 9 – Offshore Substation Installation & Commissioning

5.9.1. Transportation Surveillance

Bureau Veritas will assess the transportation procedures documented in the transportation manual. The description of the transportation process shall include:

- Technical specifications for the transportation,

- Limiting environmental conditions,
- Safety instructions,
- Transportation arrangement including required fixtures, tooling and equipment,
- Transportation loads and load conditions.

In addition, Bureau Veritas will witness the handling operations of the topside and support structure in order to verify that these procedures are correctly implemented. The surveillance will cover in particular the load-out, sea-fastening and towage.

5.9.2. Installation Surveillance

Bureau Veritas will verify that the installation process is documented with sufficient details in the installation manual and that it is in compliance with the design basis and design assumptions.

In addition, Bureau Veritas will witness the installation of the support structure and topside to verify that these procedures are correctly implemented. Surveillance will cover in particular the following phases:

- Compliance with the requirements for acceptable weather conditions during sea transportation and installation
- Damage inspection before installation
- Witnessing of lifting operations
- Surveillance of the complete installation process on site, and in particular the grouting, welding and bolting processes as well as non-destructive testing.
- Final visual inspection after installation
- Follow-up procedure on transportation or installation damages

Additionally, Bureau Veritas will in addition to these inspections review the installation records, including the pile driving records and the grouting and grout test reports, on a spot check basis. Any deviation from the intended procedures shall be justified, and may involve subsequent inspections.

To comply with §285.708(a)(4), the CVA shall make periodic onsite inspections while installation is in progress and must, as appropriate, verify, witness, survey, or check, the installation items required by this section.

- The CVA shall verify, as appropriate, all of the following:
    - Loadout and initial flotation procedures;
    - Towing operation procedures to the specified location, and review the towing records;
    - Launching and uprighting activities;

- Submergence activities;
- Pile or anchor installations;
- Installation of mooring and tethering systems;
- Final deck and component installations; and
- Installation at the approved location according to the Facility Design Report and the Fabrication and Installation Report.

- For a fixed facility the CVA shall verify that proper procedures were used during the following:
  - The loadout of the jacket, decks, piles, or structures from each fabrication site; and
  - The actual installation of the facility or major modification and the related installation activities

5.9.3. Commissioning surveillance

The commissioning surveillance is limited to the structure and Fire & Safety systems reviewed as part of the design evaluation.

Regarding the structure, the commissioning surveillance consists mostly in visual inspection to check for potential damages, witness remedial work, verify the bolted connections, etc.

Regarding Fire & Safety systems, the commissioning surveillance will include inspection and witnessing of tests relative to:

- fire control equipment installation (fire detection, fire-fighting, personnel safety equipment, escape routes)
- fire alarm system
- fire-fighting, inert gas
- fire-fighting, CAFS

The intended commissioning instructions shall be submitted to BVCF prior to the commissioning for review and approval. Bureau Veritas will verify that the proposed procedures and test plans are documented in sufficient detail and that they comply with the design basis and approved codes / standards hierarchy.

Bureau Veritas will perform inspections to verify that the commissioning is performed according to the commissioning procedures.

Bureau Veritas will in addition to these inspections review the final commissioning reports. Any deviation from the intended procedures shall be justified, and may involve subsequent inspections.

For the project, 7 days of inspections during onshore commissioning and 3 days of inspections during offshore commissioning have been assumed. This number might need to be adjusted up or down at a later stage of the project based on the final design, installation procedures and on the operational conditions during installation and commissioning.

5.10. Task 10 – Inter Array Cables Design

5.10.1. Inter Array Cables, Design

The verification work proposed will cover the design of array cables.

The purpose of the evaluation is to verify that the design is sufficient for a safe design and execution of the project, i.e. that it is coherent, exhaustive, sufficiently documented and that it meets all requirements related to the CVA verification references.

The following documentation is foreseen to be reviewed during the course of the project:

- Design report of array cables including local cross-section design of the cable (mechanical and electrical aspects). In particular, the review of the cable design will cover the following aspects:
    - Cable data sheets
    - Short circuit and load flow analysis
    - Description of cable protection
    - FAT test specification
    - Interface at substructure and tower
    - Burial assessment and trenching analysis

No independent calculations are included in the present scope. It is expected that detailed input / outputs of calculations will be provided by the engineering reports produced by the designer(s). In case of lack of proper justifications from the engineering, additional independent calculations may need to be conducted.

The O&M plan will be reviewed to verify the suitability of the intended requirements and to ensure consistency with the assumptions for the design.

The following aspects will be typically assessed:

- The power cable design report covering detailed cross -section (lay angle of components), the termination drawings, the design in the power cable current length (design criteria for the different parts, load sharing, etc),
- The material selection report of the power cable and its components , including justification of the long term suitability (effect of ageing, thermal effect, etc),

- The type approval certificate/ 3.2 certificate for all individual components, armour, cables, etc.

5.11. Task 11 - Inter Array Cables Fabrication

The evaluation plan will be provided to BSEE at the beginning of the phase for information.

5.11.1. Project specific assumptions

The extent of inspection and audits to be carried out for CVA verification shall be evaluated for each single project and wind turbine type. For this project, the following points are taken into account as part of the definition of the surveillance scope:

- It is assumed that manufacturing line is already qualified for the power cable lay-up.
- It is assumed that the quality system of the manufacturer is certified according to ISO 9001 by an accredited certification body that operates according to ISO/IEC 17021.
- The CVA will perform inspections to verify Inter Array Cable fabrication as detailed below. It is also understood that Atlantic Shores will carry out its own additional inspections for surveillance of the manufacturing process and that the associated reports and findings will be made available to the CVA for following of the manufacturing process.

5.11.2. Project-specific approach

Based on the assumptions described below, the following approach is proposed for the project:

- An initial audit of the manufacturer is carried out by Bureau Veritas for the assessment of manufacturer's quality system.
- Review of Inspection and Test Plan with mark-up (fill-in hold and witness points required)/ of testing procedure/ of splicing procedure, as per section Atlantic Shores
- Bureau Veritas inspectors will carry out the following Manufacturing surveillance (inspections & review) on the main following steps for IAC in order to check the repeatability and the quality of the process and foreseen as follows:
    - Attendance to manufacturing of IAC current length (no ancillaries considered) cut of the different length sections and mounting of cable terminations
    - Attendance to FATs for all cables
- Review of final manufacturing dossier.

5.11.3. Assumptions

- Attendance to manufacturing of current length, cut to length and mounting of termination will be done on a spot basis. At least 10% of the manufacturing shall be witnessed.

- Attendance to FAT is required.
- Assumptions is made that manufacturing/testing capabilities will allow Bureau Veritas to witness multiple FAT in a day. This may involve carrying out additional inspections if the planning cannot be met.
- The Final Manufacturing dossier is required. .
- To allow an efficient review of this document it will need to be provided compiled with all test/ manufacturing documentation along with the TQ and NCR of the project and sent in one batch to Bureau Veritas. This may involve additional evaluation days if the document is not finalised when submitted to Bureau Veritas.

Apart from the above-mentioned inspections, the manufacturing process will be followed mostly by documentation review of the manufacturing documentation. This includes in particular the findings and inspection reports from Atlantic Shores' own surveillance activities, in addition to the manufacturers' QA/QC documentation. In particular, the non-conformities raised as part of the manufacturing process shall be communicated to Bureau Veritas.

In case the audits, inspections or documentation review indicate quality issues, Bureau Veritas shall be involved in the follow-up and resolution of those issues. This may involve carrying out additional inspections or documentation review as would be necessary to close the corresponding findings.

Any NCR or TQ linked to manufacturing scope will be sent to the CVA and dealt with on a case-by-case basis depending on the criticality of each finding. In case of severe non-conformities of the manufacturing process, the number of inspection would have to be increased accordingly.

5.11.4. Initial audit

Initial audits will be conducted at the main manufacturer's premises to assess the capacity of the manufacturer to perform the production according to the necessary quality requirements. If significant sub-parts are produced at sub-contractors, initial audits may be performed at the subcontractors' facilities as well. The necessary documentation of manufacturing processes, testing procedures, quality control, plans of the fabrication plants, etc., shall be provided to Bureau Veritas beforehand.

As a general rule, all requirement referring to quality described in section 5.5.2 also apply to initial audit for cable factories.

The key aspects of the initial audit will focus on the review of:

- Valid Quality Management (QM) certificate according to ISO 9001: note Revision and Validity,
- Project Quality Plan (PQP),
- Inspection and Testing Plans (ITPs).

5.11.5. Periodical inspections

The manufacturers involved in the fabrication shall undergo the quality system evaluation described above.

Manufacturing surveillance (inspections & review) typically covers the main following steps:

- Attendance to manufacturing of IAC current length (no ancillaries considered)
- Cut of the different length sections
- Mounting of cable terminations
- Review of FAT procedures and attendance to FATs
- Review of FAT reports + final manufacturing dossier.

The CVA recommends a minimum baseline inspection frequency of 10% to be looked at during fabrication.

5.12. Task 12 – Inter Array Cables Installation

The objective of the transport and installation (T&I) surveillance is to make sure that no excessive loading is sustained by the IAC during the transportation and the installation, and to prevent any damage on the components.

The consistency between the design and the installation operations is verified by:

- The review of the transportation and installation method documentation to verify its conformance with the Design Basis, the reference standards and the assumptions made in the design phase
- The surveillance of the installation operations (by random sampling)

The review of the installation documentation includes:

- Verification of detailed seabed route engineering
- Verification of construction planning including preparatory construction measures (e.g. pre-lay grapnel run/route clearance operations, seabed preparation and cable burial) and final method statement review
- Review of test and termination procedure
- Review of Project Execution Plan
- Review of installation analysis

Bureau Veritas will perform a technical review of the cable transportation and installation documents including method statements and manuals. This review is designed to identify potential risks

associated with the transportation and installation of the cables so that these may be mitigated to minimise material damage and time delays, hence reducing potential financial implications. Bureau Veritas shall make periodic onsite inspections while cable installation is in progress and must, as appropriate, verify, witness, survey, or check, the installation items required by this section including cable burial. Cable burial shall be verified (witnessed or document review) along the entire route.

5.13. Task 13 - Export Cables Design

Same scope of work and methodology as for IAC cable. Please refer to Task 10 description. The CVA verification will cover export cables in federal and state waters to cable landing.

5.14. Task 14 - Export Cables Fabrication

Same scope of work and methodology as for IAC cable. Please refer to Task 11 description. The CVA verification will cover export cables in federal and state waters to cable landing.

5.15. Task 15 - Export Cables Installation

Same methodology as for IAC cable. Please refer to Task 12 description. The CVA verification will cover export cables in federal and state waters to cable landing.

Bureau Veritas will review the Transport and Installation documentation and survey the commissioning of the export cables.

5.16. Task 16 - Project Management

Bureau Veritas shall assign a dedicated Project Manager to the Project over the duration of the Project. The Project Manager is the main interface point with the Developer, as well as with BSEE/BOEM. He is responsible for all aspects of delivery, ensuring that the project delivers the right outputs, to the required level of quality and within the constraints of time, cost, resources and risk. The Project Manager is responsible for day-to-day management of all aspects of project delivery.

The proposed project management activity should include the following:

- Prepare and maintain detailed Evaluation Plans for each phase of the CVA process, detailing how all the activities will be performed, by whom, and how the interfaces will be managed;
- Attend meetings with BSEE/BOEM and attend regular conference calls and meetings to hold technical discussions on specific design issues, as required;
- Ensure the continuity of the CVA team members. Staff assigned at the beginning of the Project shall remain along the whole Project duration;
- Coordinate the verification and inspection activities with the Bureau Veritas network offices

- Maintain a document register of all documents received from Atlantic Shores and all documents produced by the CVA; and,
- Provide regular tracking of work performed in accordance with CFR requirements.

6. DELIVERABLES

6.1. General

All **deliverables** will respect the following principles:

- The deliverables will be written in English and will be provided in electronic format.
- All other CVA Reports and documents issued under the CVA scope of work shall be delivered directly to BSEE, with a copy to Atlantic Shores.

The handling and exchange of the deliverables will be performed according to the agreed communication rules and documentation quality control requirements.

6.2. CVA Reporting Requirements

In addition to what is included in previous verification task, per CFR 285.708, the CVA must certify in the FDR that the facility is designed to with stand the environmental and functional load conditions appropriate of the intended service life and the proposed location. The CVA must also verify design compliance with the COP, and its terms and conditions.

Per 285.708, the CVA must certify in a report that project components are fabricated and installed in accordance with accepted engineering practices, the approved COP and the FIR. Also per 285.701(d), the CVA must review the design and as-built plans.

The CVA reports pertaining to Fabrication, Transportation, Installation and commissioning phases, shall identify all significant non-conformities and corresponding corrective actions

The planned CVA reporting structure is framed to satisfy the requirements set forth in the CFR and to provide documentation of the review process at relevant points in the design timeline. According to 30 CFR § 285.712 interim reporting of the CVA towards BSEE is required. According to § 285.712 (b) the reporting must:

- Give details of how, by whom, and when the CVA or project engineer activities were conducted;
- Describe the CVA's or project engineer's activities during the verification process;
- Summarize the CVA's or project engineer's findings; and
- Provide any additional comments that the CVA or project engineer deems necessary.

The deliverable reports include up to four BSEE-facing CVA Reports at conclusion of each project phase and regular monthly status updates. These BSEE facing reports are described in the following sections.

Several assumptions were listed in different sections of the CVA Scope of Work. If the assumptions end up not being true, the CVA shall notify BSEE and mitigations should be presented.

6.3. CVA Report - Facility Design Report

Bureau Veritas will issue a CVA report accompanying Atlantic Shores' Facility Design Report ("FDR") submittals certifying that the entire project design employed good engineering judgment and practices. The report shall contain all the relevant project details, analysis, reviews, conclusions, etc. for the government to understand the design of the project and ensure that full oversight of the design was completed. It shall also include a summary of all detailed design review findings, a copy of the Design Basis Review, and all the technical verification reports and approval statements for the completed technical review topics. Comments on the design must be resolved before the CVA certifies the design. BSEE shall be consulted for agreement of any departure. Review topics agreed to be pushed into the subsequent Fabrication Review process will be identified and excluded from approval in the FDR.

Bureau Veritas will provide an interim CVA report that covers, at a minimum, review of the Design Basis of all the assets along with a timeline of when the final CVA evaluation report of the FDR would be submitted.

It is possible to split the FDR submittal into separate reports each focused on a specific asset(s). In this case, the corresponding CVA reports will be provided in separate submittals. It is always desirable for reports to be issued as they become available. They can be submitted as preliminary. In the event changes are necessary revisions must be submitted.

6.4. CVA Report - Fabrication and Installation Report

The CVA will review Project's planned fabrication and installation procedures during the design phase. Bureau Veritas will issue a CVA report certifying that the Project's planned fabrication and installation procedures, summarized in Atlantic Shores' FIR, employ good engineering judgment and practices. It will include a summary of all detailed design review findings related to the Project's planned activities for manufacturing, transportation, installation, and commissioning plans. Review topics mutually agreed to be pushed into the subsequent Fabrication and Installation process will be identified and excluded from approval in the FIR.

If the FIR is not ready for review prior to start of fabrication, the CVA may provide interim CVA reports to report on a summary of current findings and a timeline to final CVA evaluation report for the FIR. BSEE shall be consulted for agreement of any departure.

6.5. CVA Report - Fabrication

At the conclusion of the fabrication phase, Bureau Veritas will issue a CVA report certifying that the Project's components are fabricated in accordance with accepted fabrication practices; the approved FDR, COP, SAP and the Fabrication and Installation Report (as applicable); and the submission of this report concludes the Fabrication Phase of the CVA scope. This report will also include detailed

reporting on fabrication activities. Non-conformities and/or deviations that are accepted by ASOW will be communicated to BSEE in the monthly reports.

Any deviations shall be accepted by BSEE before the final CVA Fabrication Report is issued.

6.6. CVA Report - Installation

At the conclusion of the commissioning phase, Bureau Veritas will issue a CVA report certifying that the Project's components are installed in accordance with accepted installation practices; the approved FDR, COP, SAP and the Fabrication and Installation Report (as applicable); and the submission of this report concludes the Installation Phase of the CVA scope. This report will also include detailed reporting on commissioning activities. Non-conformities and deviations that are accepted by ASOW will be communicated to BSEE in the monthly reports.

Any deviations shall be accepted by BSEE before the final CVA Installation Report is issued.

6.7. CVA Monthly Reports

The basic reporting document will be a summary memorandum issued to BSEE and Atlantic Shores monthly for the duration of the CVA activities. In addition to covering the CFR-mandated status update for each month, the Monthly Report will update administrative topics (e.g. schedule updates), and provide a high-level written statements for each of the completed reviews over the reporting period.

END OF CVA VERIFICATION PLAN