



Ministry of Economic Affairs and
Climate Policy of the Netherlands



WORKSTREAM 2 – SITE SPECIFICS DELIVERABLES

Appendix to TFS Scope of Work & Deliverables

Document Title	Document Number
SITE SPECIFICS DELIVERABLES	AEOS-FEET-EZK-RE-0021 Rev B

Contents

1. Document Purpose	3
2. References	4
3. Terms & Definitions.....	4
4. Scope	5
5. List of deliverables	5

Document Title	Document Number
SITE SPECIFICS DELIVERABLES	AEOS-FEET-EZK-RE-0021 Rev B

1. Document Purpose

The purpose of this document is to detail the deliverables expected from the vendor related to the Site Specifics. The overall context is described under “§2.Purpose of the TFS” in document “TFS Specification-AEOS-FEET-RE-0001”.

One particular objective of the Technical Feasibility Study (TFS)/ Site Specifics Workstream is to identify collaboratively all necessary inputs required to facilitate the development of a robust tender package.

The work packages detailed herein will contribute to:

- Provide EZK with the information required for the licensing of the site;
- Provide EZK with the information required for engaging with key statutory and non-statutory stakeholders;
- Provide EZK with additional information that may be required for the SEA/Plan Mer and preliminary EIA;
- Identify any further site development studies and surveys including geophysical, geological, and geotechnical investigations to be undertaken by EZK that are required before signing the EPC Contract and/or opening the site, and evaluate the results against construction risks;
- Undertake plant preliminary design (Heat sink, Layout and Deep Foundations for example) and engineering required to develop the project programme and assess preliminary costs (schedule and cost certainty);
- Identify design enhancements arising from the NL environmental and regulatory context (ANVS).
- Perform design activities needed to support the tender programme and packages elaboration,

Document Title	Document Number
SITE SPECIFICS DELIVERABLES	AEOS-FEET-EZK-RE-0021 Rev B

2. References

No	Document reference	Title
	AEOS-FEET-EZK-RE-0001	TFS – Scope of Work & Deliverables

3. Terms & Definitions

TERM	DEFINITION
AIL	Abnormal and Indivisible Loads
ANVS	Dutch Authority for Nuclear safety and Radiation Protection
BAT	Best Available Technology
BIS	Bid Invitation Specification
BOP	Balance Of Plant
CAPEX	CApital EXpenditure
CI	Conventional Island
CIW	Commission for Integral Water Management (Belgium)
COL	Commissioning and Operation License
Deltares	Dutch Research Institute specialized in geo- and hydrology
DGCE	Directorate General Climate & Energy
DNE	Directorate of Nuclear Energy (The Hague)
EIA	Environmental Impact Assessment
EZK	Ministerie van Economische Zaken en Klimaat
EPC	Engineering Procurement Construction (Contract)
EPZ	Operator of existing Borssele NPP
FC	First Concrete
FEED	Front End Engineering & Design
FFS	Full Scope Simulator
FID	Final Investment Decision
GIS	Geographical Information System
HSE	Health Safety & Environmental
IAEA	International Atomic Energy Agency
IID	Intermediate Investment Decision
KNMI	Royal Netherlands Meteorological Institute
MER	Milieu Effect Rapportage / Environmental Impact Assessment
MOLF	Maritime Offloading Facility
NCEA	Dutch Commission for Environmental Assessment
NDA	Non-Disclosure Agreement
NI	Nuclear Island
NNB	Nuclear New Build
NPA	Nature Protection Act
NPP	Nuclear Power Plant
NSPA	North Sea Port Authority
OPEX	Operational Expenditure
RFG	Requirements For Generators
RFI	Request For Information
RWS	Ministry of Infrastructure and Water Management
SEA	Strategic Environmental Assessment
SITO	SITO Program
Site	Site for NNB (Borssele)
SSC	Structures, Systems and Components

Document Title	Document Number
SITE SPECIFICS DELIVERABLES	AEOS-FEET-EZK-RE-0021 Rev B

Tenne-T	TSO for the Netherlands
TFS	Technical Feasibility Study
TSO	Transmission System Operator
Technology Vendor	Technology Vendor means EPC contractor
WENRA	Western European Nuclear Regulators' Association

4. Scope

Ten Work Packages have been identified at this stage of the Project in terms of Site Specifics (Grid Interface not included) related to the scope of the TFS. They are:

- Work Package 01: Site Information Due Diligence and Gap Analysis
- Work Package 02: NPP Preliminary Layout
- Work Package 03: Platform Level
- Work Package 04: Deep Excavations & Constructability Study
- Work Package 05: Site Infrastructure Interfaces & Logistics
- Work Package 06: Integrated program from Early Works till First Concrete
- Work Package 07: Heat Sink Preliminary Design
- Work Package 08: Changes in Design due to Site and Dutch specifics
- Work Package 09: Construction Permits data
- Work Package 10: Overall project mobilization plan (Project Management, Engineering, Construction and Commissioning)

In each WP, the data relevant for the economical modeling in the Workstream 3 shall be clearly identified.

5. List of deliverables

Submission dates related to 1st issue “for review”. The Vendor is however encouraged to submit an early issue “for information” to accelerate the Owners review.

Work Package 01: Site Information Package Due Diligence and Gap Analysis

- Objective
 - To identify asap the missing site characterization and investigations results and site data information to complete the TFS and the BIS;
 - To enable the Owner to confirm the site parameters to be used by the Vendor (after 2 months).
- Scope
 - Preliminary Site desktop analysis and review of the available site licensing reports regarding the site geomorphology, geology, soil layers geotechnical parameters, hydrogeology and seismology and human induced events, as well as identification of potential site development issues that needs resolution or clarification at this point of the project
 - This includes the review of existing studies undertaken by Deltares (especially cooling water, meteorological and natural hazard studies), the technical

Document Title	Document Number
SITE SPECIFICS DELIVERABLES	AEOS-FEET-EZK-RE-0021 Rev B

assessments made, their results and conclusions; Recommendations should be made for further (design) site characterization;

- Develop the list of parameters which will be used by the Vendors for the TFS study;
- Develop a design/foundation investigations program & laboratory tests work plan. It should include a program of geophysical investigations, the locations of borehole drillings, and necessary complementary soil testing and ground water monitoring on the plant area, in addition to the already existing data provided by EZK.

- Tentative Deliverables list & Submission Dates

Item	Deliverable	Submission Date
WP01-01	Available Site Data desktop study and Gap Analysis including recommendations for further site investigations and/or surveys	T0 + 6 weeks
	Confirmation of Site Parameters by Owner	T0+8 weeks
WP01-02	Design/foundations investigations program & laboratory tests workplan and/or surveys	T0 + 14 weeks

Work Package 02: NPP Preliminary Layout

- Objective
 - To define and agree on land needs for the operation and construction phases including access roads, parking, security fence, taking into account the most effective construction gap between units and proposed arrangement for a 2 Units NPP
 - To agree on site and buildings layout(s) and operational requirements including interaction between buildings (both EPC and Owner scope)
 - To define and agree on architectural requirements and scope of architectural work to be included in EPC contract
 - To support Owner activities such as Master planning and Overall Architecture (including out of fence structures)
- Scope
 - Develop a preliminary layout for both construction and operation phase
 - Define and agree on layout technical requirements for site access, security, and emergency preparedness as per Vendors standard,
 - Develop a conceptual design for temporary buildings and site-specific buildings not included in the Reference Plant
 - Define the scope of architectural work to be included in EPC contract
 - The completion of this WP will require inputs from WP 2 to 8.
- Tentative Deliverables List and Submission dates:

Item	Deliverable	Submission Date
------	-------------	-----------------

Document Title	Document Number
SITE SPECIFICS DELIVERABLES	AEOS-FEET-EZK-RE-0021 Rev B

WP02-01	Site Location Map showing the proposed land needed for development and construction including access roads and MOLF in any (scale 1/2000)	T0 + 6 weeks
WP02-02	Preliminary Layout for construction phase showing the two units with their intake/forebay and discharge structures and ancillary buildings (Vendor and Owner scope) and all the temporary construction facilities, batching plant, aggregate and soil surplus stockpiles, laydown areas, heavy prefabrication areas and heavy crane needed for construction (scale 1/1000)	T0 + 12 weeks
WP02-03	Preliminary Layout for operation phase with identification of buildings (scale 1/500) within the fence	T0 + 12 weeks
WP02-04	Two cross section drawings, one cutting through the two completed reactor units for the purpose of showing relative elevations and the second through both NI & CI Island of Unit 1 (scale 1/500)	T0 + 14 weeks
WP02-05	Preliminary 3D view showing the completed site within the fence	T0 + 14 weeks
WP02-06	Conceptual site underground drainage network scheme adapted to the levelling (scale 1/1000)	T0 + 16 weeks
WP02-07	Typical internal layout & cost estimate of temporary buildings & infrastructures needed for construction	T0 + 6 months
WP02-08	Typical internal layout & cost estimate of ancillary buildings of Vendors scope (as per WS3 scope of supply) needed for operation	T0 + 6 months
WP02-09	Typical scheme of architectural treatment for the buildings	T0 + 6 months
WP-02-10	Typical elevation of buildings to illustrate this scheme (bird eye view) for LVIA (Landscape Visual Impact Assessment).	T0 + 6 months

Work Package 03: Platform Level

- Objective
 - To assess the required platform grade level and volume of backfilling materials
 - To initiate a phasing for these site levelling works and identify site constraints with regards to existing roads, railway line, primary dikes
 - To inform about the NI & CI Buildings Foundation Level
 - To inform about surface and underground drainage during this site levelling phase
 - To develop hypothesis and a methodology for site preparation and site levelling
 - To verify the earthworks balance sensitivity and optimization (volumes and associated costs) to any variation in the definition of the platform level and site arrangement
 - To inform potential landscaping needs during construction (and further operation)

- Scope

Document Title	Document Number
SITE SPECIFICS DELIVERABLES	AEOS-FEET-EZK-RE-0021 Rev B

- Technical evaluation of the site grade level incorporating existing geotechnical data and estimated water levels due to tsunami, storm surge, tides, wave run-up, climate change, etc. provided by EZK
- Evaluation of the nature, quality and volume of backfilling material needed for the site grading during site preparation and levelling
- Cost/Benefit analysis with regards to platform level(s) and earthworks balance
- Tentative Deliverables list & Submission Dates

Item	Deliverable	Submission Date
WP03-01	Platform level/Site Grade assessment Report including earthworks balance	T0 + 10 weeks
WP03-02	Report on surface and underground drainage during this site levelling phase	T0 + 10 weeks
WP03-03	Report on the nature, quality and volume of backfilling materials needed for the site grading during site preparation and levelling (including coastal protection if needed)	T0 + 12 weeks
WP03-04	Cost Estimation of the execution of the preferred option for Site Levelling	T0 + 14 weeks

Work Package 04: Deep Excavations & Constructability Study

- Objective
 - To develop hypothesis and a methodology for the execution of the deep excavations (including preliminary design for access, slopes for embankments, the construction of temporary retaining walls or retaining structure adequate to the nature of the soil)
 - To evaluate the potential of the site in terms of allocation of space/areas for on-site modular construction and/or prefabrication (modules and or liner ring prefabrication)
 - To develop a tentative construction program starting from site levelling integrating the site conditions and land constraints
- Scope
 - Develop conceptual plans for the phasing of the works after site clearance (access arrangement, fencing during construction and transportation/circulation on site, potential for diaphragm wall and dewatering, deep excavations, backfilling for the two nuclear units, excess soil disposal and re-use, site specific structures, roads and parking areas, laydown and assembly areas, heavy haul road for AILs delivery, heavy crane pads, etc.)
 - Estimate volumes of deep excavations and backfilling fill or appropriate material (concrete if necessary) below buildings foundation of Proposed Plant and/or against buildings till the platform level and estimate earthworks balance
 - Define the technical solution(s) for deep excavation dewatering and monitoring
 - Identify the impact of modular construction on the construction program with regards to the availability of site areas (modules and or liner ring prefabrication)
 - Optimization of the construction schedule (gap between Units)
 - Define the need for a MOLF and/or Jetty to support the delivery of construction materials and delivery of SSCs including AILs, if necessary.
- Tentative Deliverables List and Submission Dates

Document Title	Document Number
SITE SPECIFICS DELIVERABLES	AEOS-FEET-EZK-RE-0021 Rev B

Item	Deliverable	Submission Date
WP04-01	Constructability Report against project milestones T0 covering the completion/construction of the buildings infrastructures below platform level and backfilling below and against buildings at platform level including scheme drawings (to provide an overview of the site conditions based on Vendors experience starting from the beginning of the deep excavations)	T0 + 18 weeks
WP04-02	Cost/Benefit analysis with regards to the proposed strategy for deep excavations and earthworks balance	T0 + 20 weeks
WP04-03	Cost Estimation of the execution of the preferred option for Deep Excavations	T0 + 22 weeks

Work Package 05: Site Infrastructure Interfaces & Logistics

- Objective
 - To identify the interfaces (and requirements) between the Owner and EPC Vendor scope of works in terms of Site Infrastructure and Logistics supporting the construction phase
 - To clarify the final Division of Responsibility of the Owner and EPC vendor in terms of Site Infrastructure and Logistics supporting the construction phase
 - To characterize the EPC Vendor logistic needs related to the above identified interfaces in order to anticipate the development of the site infrastructures needed for site opening
 - To identify for site specific systems (such as drainage, raw water supply, sanitary drainage, plant security, etc.) the best options for the construction period
- Scope
 - Define a methodology for managing the above interfaces
 - Characterize the above interfaces and define the logistics needs/requirements over the construction period for:
 - High Voltage power supply
 - Raw and Potable Water supply
 - Water drainage (Domestic, Storm Water and Oily Water)
 - Communication Networks
 - Transportation and Access Roads
 - Site Access and Security
 - Construction Wastes Management (type and quantities)
 - Workforce and Accommodation
 - Emergency arrangements
 - Availability in terms latest required time after site opening
- Tentative Deliverables List and Submission Dates

Item	Deliverable	Submission Date
WP05-01	Construction Site Infrastructure Interfaces and Logistics needs Report	T0 + 20 weeks

Document Title	Document Number
SITE SPECIFICS DELIVERABLES	AEOS-FEET-EZK-RE-0021 Rev B

Work Package 06: Integrated program from Early Works till First Concrete

For the sake of clarity, Early Works are undertaken by the Owner between site opening and the arrival of Vendor at site, including site clearance and all necessary site preparation.

The Owner will provide the necessary assumptions regarding permitting and licensing sequences.

- Objective
 - To develop a robust schedule for the Early Works starting from site opening till First Concrete for both Units
 - To identify the Work Packages for activities to be undertaken before First Concrete
 - To identify the phasing and content of the FEED and “construction work” before Site Opening
- Scope
 - Identify the Work Packages for activities to be undertaken before First Concrete
 - Identify the phasing, content and interfaces between the Front-End Engineering and Design (FEED) work related to site preparation and construction activities before Site Opening
- Tentative Deliverables List & submission Date

Item	Deliverable	Submission Date
WP06-01	Early Works Level 2 Integrated Schedule and Narrative with identification of both FEED and Construction Work Packages at Level 2	T0 + 24 weeks

Work Package 07: Heat Sink Preliminary Design (site specific)

- Objective
 - To identify specific features and size of equipment, buildings, and structures (forebay, pumphouse, potential dry exchangers, etc.), intake and outfall channel or tunnel associated with the Heat Sink, Cooling Water and Essential Service Water System, etc. including the trash screens and fish protection features, required dredging (if needed), etc.
 - Confirm no cooling tower is needed.
- Scope
 - Develop conceptual design of the Heat Sink SSCs with regards to the site conditions on and offshore;
 - Develop conceptual design of the CWS discharge and outfall structure (discharge piping or tunnel) to minimize increase in seawater temperature, including discharge thermal plume assessment based on the available data regarding bathymetry, wave, meteorological, seasonal temperatures and salinity, existing industrial facilities, etc.
 - Several different schemes should be reviewed and analyzed, and the optimum variant should be recommended based on the results of the above studies (minimum environmental impact, construction ease and cost, etc.);
 - Cost/Benefit study for Heat Sink and CWS conceptual design;

Document Title	Document Number
SITE SPECIFICS DELIVERABLES	AEOS-FEET-EZK-RE-0021 Rev B

- Impact on Marine Life and fish return system.
- Tentative List of Deliverables & Submission Dates

Item	Deliverable	Submission Date
WP07-01	Optioneering Report for Heat Sink Design	T0 + 20 weeks
WP07-02	Cost/Benefit Analysis for Heat Sink Design & preferred option	T0 + 22 weeks
WP07-03	Heat Sink Conceptual Design drawings	T0 + 24 weeks

Work Package 08: Changes in Design due to Site and Dutch specifics

- Objective
 - To identify changes in design that could impact the proposed Reference Design (or Reference Plant, whatever more relevant)
- Scope
 - Review of Site Data against Reference Plant Design Basis;
 - Identify SSCs including foundations impacted by site conditions and ANVS/NL Specifics requirements
- Tentative List of Deliverables & Submission Date

Item	Deliverable	Submission Date
WP08-01	Report on Design Changes with regards to Site Conditions (including impact of soil conditions and nearby Industrial Installations)	T0 + 20 weeks
WP08-02	Cost estimation of the above changes on the Reference Design including EPC Vendors scope Ancillary Buildings	T0 + 22 weeks
WP08-03	Timeline for the FEED related to these changes	T0 + 24 weeks

Work Package 09: Construction Permits data

- Objective
 - To develop a permitting route and identify the Vendors contribution to the permits required for the construction period from site opening to First Concrete according to NL Laws and Regulations
- Scope
 - Describe Vendors organization and processes to support the permitting by the Owner
 - Report as soon as possible the expected emissions of noise, light, dust and vibration
 - Provide typical NOx and GHG emissions during construction and operational phase (to enable the Owner to use the AERIUS calculator, <https://www.aerius.nl/>); Propose NOx and GHG emission reduction plans.
 - Logistic movements (trucks/lorries, ships...) of materials and personnel
 - Evaluate the impacts of following possible constraints:
 - No works on Sunday,
 - No more than 25% of material delivery by truck (balance by rail or boat).

Document Title	Document Number
SITE SPECIFICS DELIVERABLES	AEOS-FEET-EZK-RE-0021 Rev B

- Tentative List of Deliverables & Submission Dates

Item	Deliverable	Submission Date
WP09-01	Construction permit data including typical quantification of NOx and GHG emissions	

Work Package 10: Overall project mobilization plan (Project Management, Engineering, Construction and Commissioning) and Organization Chart

- Objective
 - To evaluate the resources needed for an early mobilization, project engineering development and construction till the Commercial Operation of the second unit
 - To evaluate the resources for the 2 Units Plant Operation
- Scope
 - To define the labour needs, staffing policies and training plans during the engineering and construction period (locally in NL and at Home Office)
 - To define the organization and resources needs during the 2 Units Plant Operation
 - To describe how the Vendor intends to hire, train, qualify, retain and develop the necessary skills in the Dutch context based on past experience
 - Describe, based on previous experiences, the intended accommodation scheme for the work force.
- Tentative List of Deliverables & Submission Dates

Item	Deliverable	Submission Date
WP10-01	Typical mobilization Plan for Engineering and Construction	T0 + 24 weeks
WP10-02	Typical organization Chart and resources needed during the 2 Units Plant Operation	T0 + 24 weeks