

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

**Regional Workshop on  
Volcanic, Seismic and Tsunami Hazard Assessment  
Related to NPP siting Activities and Requirements  
13-17 June 2010  
Jakarta - Indonesia**

***“Site Preparation Works”***

**Jean-Pierre TOURET  
IAEA External Expert**



**IAEA**

International Atomic Energy Agency

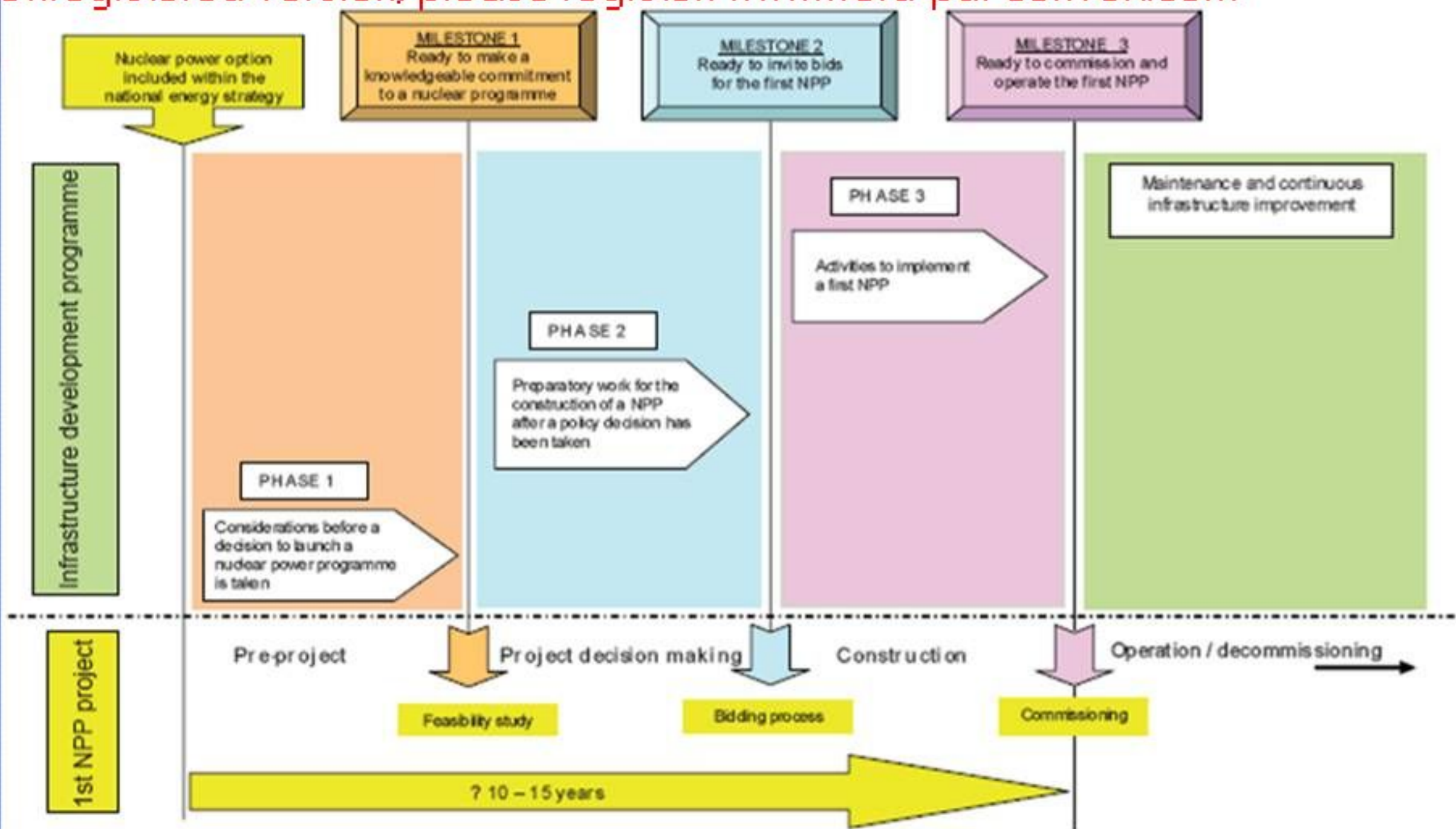


# Introduction

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- Once one or more preferred sites has been identified, the applicant apply for the Construction of the Plant.
- It is necessary after choosing the site to prepare it for the construction of the plant. That is say that the choice of a Reactor concept has been in parallel already made with all his constraints relative to the site.
- Site preparation is not considered, in general, as a formal step in the licensing process. After « a general License » the next formal step is the Construction license which coordinates all the other permits by the local authorities.
- It is why OECD decided in 2007 to launch a survey on the practices of the different country Safety Authorities in selection and preparation of nuclear sites.





You can refer to the OECD Working Group document which has established a « Report on the Survey on Regulations of Site Selection Preparation » NEA/CNRA/ R(2010) 3 from June 2010 (available on the net).



# Evaluation and selection of sites for a new NPP

Unregistered version, please register. [www.word-pdf-converter.com](http://www.word-pdf-converter.com)

1. Do you or another decision-making, regulate the selection of sites for NPP ?
2. To what extent do your legislative framework or regulatory expectations draw from, reference or resemble, NS-R-3 ?
3. Do you require or recommend that the applicant evaluate various sites before selecting a particular site ?
4. If so, what guidance is given to the applicant regarding expectations for the depth of evaluation of alternative sites ?
5. Do you require any form of environmental assessment to be performed as part of site selection or before site preparation may begin ?
6. Do you require an applicant to give special considerations to any natural factors ?



# Evaluation and selection of sites for a new NPP

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)  
(ctd)

7. Do you require an applicant to give special considerations to any man made factors (fires, climate changes malvolents actions)?
8. Do you , or another body, require an applicant to take transmission access or adequacy into account at the site selection stage?
9. Are there any requirements or expectations that an applicant consult the public, either prior to applying or subsequently?
10. Are there any requirements or expectations that the regulatory body or other government agency consult the public?
11. Are there any other elements of national practice that would be relevant (projecting population growth around the selected site, controlling land use...)



# Preparation of the selected site for a new NPP

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

1. Do you regulate or another decision making body regulate site preparation for new nuclear power plants?
2. If a license is issued for site preparation, does it have a fixed term or any standard conditions?
3. Do you define, by a license or otherwise, the activities that are permitted under site preparation, as opposed to what would be considered to construction?
4. Do standard plans or guides exist for use by the regulator in reviewing an application to prepare a site?
5. Are applications for any other licenses required in conjunction with a site preparation license (such a waste management or nuclear substances)?



# Preparation of the selected site for a new NPP

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

(ctd)

6. If a site being prepared for construction contains other facilities (such as operating units or units being refurbished or decommissioned) do you impose particular requirements to avoid impacts from one unit or another?
7. What form of regulatory oversight is performed of site preparation?
8. Do inspection plans or programs exist to guide your inspectors?
9. Are there any other elements of national practice that would be relevant?



# Summary of Responses to Surveys

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

## Questions

Table 1: Survey Responses to Part 1 of the questionnaire

Q	CAN	CR	FIN	FR	JPN	KOR	SL	SLO	SPN	SWT	UK	USA
1.1	N	Y	Y	N	Y	N	Y	Y	N	Y?	Y?	Y?
1.4	Y	Y	Y	?	Y	Y?	Y	Y	Y?	Y?	Y	Y?
1.5	Y	N	Y	Y	N	N	N	Y	N	N	N	Y
1.7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1.8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1.9	Y	Y	Y	Y	Y?	Y	Y	Y	Y	Y	Y	Y
1.10	N	Y	Y	N	N	?	N	Y	Y	Y	Y?	Y
1.11	Y	N	Y	N?	N	N	Y	N	Y	N	Y	N
1.12	Y	N	Y	Y	?	N	Y	Y	Y	Y	Y?	Y
1.13	N	Y	Y	N?	Y?	Y	N	Y	Y	Y	Y	Y

Table 2: Survey Responses to Part 2 of the questionnaire

Q	CAN	CR	FIN	FR	JPN	KOR	SL	SLO	SPN	SWT	UK	USA
2.1	Y	Y	Y	N?	N	Y	N	Y	?	n/a	Y?	Y?
2.4	Y	Y	-	n/a	Y	N	-	Y	?	-	N	Y
2.5	Y	Y	Y	?	N	Y	-	Y	N	-	N	Y
2.7	Y	Y	N	N	N	Y	-	Y	N	-	-	Y
2.9	N	Y	Y	-	N	N	-	N	Y	-	Y	Y
2.10	N	Y	Y	Y	N	Y	-	Y	Y	-	Y	Y
2.11	Y	Y?	Y	N	N	Y	-	-	Y	-	n/a	Y
2.12	N	Y	Y	N	N?	Y	-	N	N?	-	N	Y
2.14	N	N	-	-	Y	-	-	-	-	-	-	Y



# Summary of the survey

Unregistered version, please register: [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- All member states are following a similar system of site evaluation, site selection before construction could start.
- In contrast, approval to prepare a site is handled in many different ways. For example, Switzerland issues a general License, France uses an Authorization of Creation, the Slovak Republic does not license site preparation and in UK, the NII (Nuclear Installation Inspectorate) issues a licence for the site not for individual stages of activities on the site.
- Guidance for the site preparation activities is informal, seldom binding and sometimes available.
- When a site contains other facilities, requirements generally exist or are being created to consider the potential impact of existing operations on site on the new build and vice versa.



# SITE PREPARATION IN CANADA



# Process of application

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- Prior to issuing a license to prepare the site for construction of a nuclear power plant, the Commission must be satisfied that it is feasible to perform the site preparation activities in a manner that will satisfy all health, safety, security and environmental protection requirements.
- In addition, the Commission cannot issue a site preparation license, unless a decision as a result of the EA (Environmental Assessment) has been made, indicating that the project may proceed.
- The CNSC will also need to be assured that the site meets all applicable regulatory requirements
- An application for a *License to Prepare Site* does not require detailed information or determination of a reactor design; however, high level design information is required for the environmental assessment that precedes the licensing decision for a *License to Prepare Site*.



- The goal of the CNSC, during the site preparation stage, is to ensure that the site characteristics which may have an impact on health, safety, security and the environment have been identified, and that these characteristics can and will be taken into consideration in the design, operation and decommissioning of the proposed nuclear power plant.
- The CNSC staff, which issues the *License to Prepare Site* after holding a public hearing, where all parties (applicant, CNSC staff and interveners) have the opportunity to participate.
- It is the responsibility of the applicant to demonstrate that it will make any such adequate provisions, when applying for a license.
- Both environmental assessment and licensing (to prepare a site) processes occur concurrently when a project undergoes a Joint Review Panel process. This ensures that the information submitted by the proponent can be considered by public and government agencies through a single process.



# SITE PREPARATION IN USA



- Reference 10 CFR 10 - License required; limited work authorization.
- No person may begin the construction of a production or utilization facility on a site on which the facility is to be operated until that person has been issued either
  - a construction permit ,
  - a combined license (COL),
  - an early site permit authorizing the activities
  - a limited work authorization.



# Request for limited work authorization

Any person to whom the Commission may otherwise issue either a license or permit for a facility of NPP type , or a testing facility, may request a limited work authorization allowing that person to perform the driving of piles, subsurface preparation, placement of backfill, concrete, or permanent retaining walls within an excavation, installation of the foundation, including placement of concrete, any of which are for an SSC of the facility for which either a construction permit or combined license is otherwise required.



The Director of New Reactors or the Director of Nuclear Reactor Regulation may issue a limited work authorization only after:

- The NRC staff issues the final environmental impact statement for the limited work
- The presiding officer makes the findings of this chapter as applicable
- The Director determines that the applicable standards and requirements of the Act have been met. The applicant is technically qualified to engage in the activities authorized. Issuance of the limited work authorization will provide reasonable assurance of adequate protection to public health and safety and will not be inimical to the common defense and security
- The presiding officer finds that there are no unresolved safety issues



- Any activities undertaken under a limited work authorization are entirely at the risk of the applicant and the issuance of the limited work authorization has no bearing on the issuance of a construction permit or combined license with respect to the requirements of the Act, and rules, regulations, or orders issued under the Act.



# Works which are permitted in USA

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- Excavation
- **Erection of support buildings** (such as, construction equipment storage sheds, warehouse and shop facilities, utilities, concrete mixing plants, docking and unloading facilities, and office buildings) for use in connection with the construction of the facility
- **Building of service facilities**, such as paved roads, parking lots, railroad spurs, exterior utility and lighting systems, potable water systems, sanitary sewerage treatment facilities, and transmission lines;
- Procurement or fabrication of components or portions of the proposed facility occurring at other than the final, in-place location at the facility.



# Works which are permitted in USA

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- Manufacture of a nuclear power reactor under a manufacturing license under subpart F of part 52 of this chapter to be installed at the proposed site and to be part of the proposed facility; or
- With respect to production or utilization facilities, other than testing facilities and nuclear power plants, required to be licensed under Section 104.a or Section 104.c of the Act, **the erection of buildings which will be used for activities other than operation of a facility** and which may also be used to **house a facility** (e.g., the construction of a college laboratory building with space for installation of a training reactor).



# Works which are not permitted in USA

Safety-related structures, systems, or components (SSCs) of a facility, as defined in 10 CFR 50.2;

- SSCs relied upon to mitigate accidents or transients or used in plant emergency operating procedures;
- SSCs whose failure could prevent safety-related SSCs from fulfilling their safety-related function;
- SSCs whose failure could cause a reactor scram or actuation of a safety-related system;
- SSCs necessary to comply with 10 CFR part 73, 10 CFR 50.48 and criterion 3 of 10 CFR part 50, appendix A
- Onsite emergency facilities, that is, technical support and operations support centers, necessary to comply with 10 CFR 50.47 and 10 CFR part 50, appendix E.



# **SITE PREPARATION ACTIVITIES AND PRELIMINARY WORKS IN EPR PROJECT**



# Case study: EPR construction

Unregistered version, please register. [www.word-pdf-converter.com](http://www.word-pdf-converter.com)

- Construction of the EPR will be divided into three phases:
  - **Site preparation activities** (including upgrading of existing infrastructure when necessary) and Preliminary works including the site levelling, excavation of the main deep foundations, main underground pipes (drainage collectors and sea-water supply conduits) and tunnels construction;
  - **EPR Unit main buildings and ancillary buildings construction** and erection; including the sea bed tunnelling operations and water abstraction and discharge structures construction; and
  - **Commissioning tests** related to the EPR process until Commercial Operation.



- The total duration of the construction depends on the amount and extent of work required for the site preparation and earthworks.
- Eighteen months to three years may be necessary for the site preparation, while the construction of the buildings and the commissioning tests phases may take up to five years.



Major milestones of the EPR project	Timetable relative to D1
<b>Preparatory work</b>	
Site opening and preparation activities start	D1 -18 / -36
Preparatory works start	D1 -18 / -36
Platform levelling completed	D1 -12 / -30
<b>Construction of the nuclear island</b>	
Main Civil Work Contractor installation start	D1 -6
First nuclear concrete	<b>D1</b>
Basemat of the "cross" completed	D1+3
Basemat of the nuclear auxiliaries building completed	D1+5
Mechanical assembly in the Safeguard Auxiliary Building starts	D1+12
Electrical assembly in the Electrical Building starts	D1+15
Mechanical erection in the Reactor Building starts	D1+18
Reactor Building Containment completed	D1+20
Polar crane available	D1+24
Reactor Vessel introduction	D1+25
First steam generator introduction	D1+26
Prestressing completed	D1+31
Pool tests	D1+33
<b>Construction of the conventional island and BOP</b>	
Concreting the base for the foundation raft starts	<b>D1</b>
Foundation raft completed	D1+17
Main bridge crane in the Turbine Hall erected	D1+18
Condenser assembly starts	D1+18
Turbine-generator set assembled	D1+21
Auxiliary transformer powered up (400kV)	D1+24
Pumping Station commissioned	D1+33
Step-down transformers (400kV) energized	D1+36
<b>Main Components testing</b>	
Vessel flushing starts	D1+37
Turning gear used to start turbine-generator set	D1+39
Containment testing	D1+41
Condenser under vacuum	D1+42
Start of hot testing	D1+43
Fuel delivered	D1+43
Loading starts	D1+47



# SITE INVESTIGATIONS AND FEASIBILITY STUDIES

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- Feasibilities studies are carried out in order to determine the appropriate sitting for the new built. These include:
  - A preliminary archaeological field Investigation and Environmental Survey,
  - Site investigations (onshore and offshore boreholes, trenches, onshore and offshore dynamic tests and sampling), and a topographical survey of both ground and sea bed (bathymetry),
  - Environmental Surveys and collection of baseline data for the Environmental Impact Assessment of the new Power station Construction, Operation and Decommissioning phases.
- Note: The erection of a temporary fence and creation of an access control or surveillance may be required at this stage, depending on the existing organisation at the site.



# SITE PREPARATION

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- Prior to the starting of the preliminary earthworks and construction the following items must first be implemented (the extent of these depends on the site):
  - Mitigation measures (in terms of fauna, flora, air, soil, surface water and land drainage conservation or management);
  - Land clearance (demolition, tree removal and vegetation clearance, rerouting of underground cables and low voltage overhead lines, re-arrangement of existing roads (because of the increased traffic flows);
  - Construction of internal access roads or upgrading of existing roads;
  - Construction of a usable area for parking vehicles, storing equipment and providing services and facilities for the first contractors (workforce and machinery);
  - Preparation of a transit area for conventional wastes during the construction work, areas with oil removers at the outlet drains; and
  - Drilling of an independent well for industrial water supply if needed (site specific aspect).



# PRELIMINARY WORKS TO THE UNIT CONSTRUCTION

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- The activities to be considered during this stage are listed below. The extent of some activities may vary in duration and volume of impact since they are site specific.
  - Stripping off topsoil and transfer to a stockpile (re-use envisaged during the post-construction landscaping),
  - Removal of excess spoil from the site if necessary,
  - Site levelling,
  - Backfilling into the sea, if the platform needs to be extended on sea-bed,
  - Construction of the main site drainage network,
  - Temporary coffer dam may be built or injections of crushed rock or existing permeable material could be made into the fore-shore, in order to create a subterranean barrier to protect the excavation works against ingress of water from the sea,
  - Crushing of material before re-use as fill may be required,



# PRELIMINARY WORKS TO THE UNIT CONSTRUCTION (ctd)

Unregistered version, please register [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- Blasting and tunnelling operations may be necessary,
- Implementing provisions for dewatering the site (i.e., water to be pumped from below ground) will be installed,
- Construction of coastal protection, the underground tunnels, main water circulation system (CRF) pipes, and buildings foundation excavation,
- Construction of temporary and ancillary facilities such as a concrete laboratory, permanent staff offices, water reservoir (potable water for domestic purpose or raw water for buildings construction purpose, fire-fighting reservoirs and distribution conduits), adequate security, welfare facilities, canteen and a fully equipped construction campus, possibly including temporary training facilities and medical centre (list not exhaustive),
- Construction of temporary sewage disposal facilities in order to accommodate sewage for the construction phase,
- Construction of a temporary jetty for deliveries of material and equipment (site specific).



# ETC-C PART 2



# Earthwork of ground support of the civil works structures

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- Soft cutting
  - Performance and characterization (several phases)
  - Inspections performed continuously by topography to detect the possible deviations to the theoretical profile
- Rocky cutting
  - Performance (limit the resulting vibrations, avoid spattering and falling blocks)
  - Inspections (shots, vibrations...)



- **Backfills**

- Adequate mechanical properties (compression, shear, density...)
- Easy set-up of an often irregular shape
- Proximity of material deposits
- Ease of fabrication on site

**Several solutions (soft compacted, rocky, gravelly cement or concrete)**

- Performance and characterization
- Inspections



- If it appears, after the studies of adaptation of the NPP project to the site, that the ground as a whole needs to be strengthened or improved, the suitable treatment will be performed at the start or in the course of earthwork, depending on the process used.
  - Pre loading of the soil
  - Drainage of the foundation soil under backfill or not
  - Replacement of in place soils
  - Ground compaction
  - Filling cavities...



# Dewatering of excavations

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- General rule is to maintain the bottom of the excavation dry due to the type of material or for inspections purpose
- The system of dewatering is related to:
  - The foundation depth of the buildings
  - The elevation reached by the water table
  - The permeability of the aquiferous soil
  - The nature of the soil
  - The surface area
  - The risk of internal erosion of the materials
- Identify the right system for lowering the water table during the construction; it involves drains, filter, channels



# Acceptance of cavity bottom and inspection

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- Geological survey consists in geological mapping and geological analysis of the foundation
  - Rocky soil : numbering, ranking, filling of joints, identification of weathered zones
  - Soft soils: nature and compressible zones
- Acceptance methodology: different phases
  - Set-up of a mesh criss-crossing the zone
  - Topographical survey
  - Photographic
  - Geological
- The cavity bottom must be protected from weathering not to be left to the open air



# Blocking and substitute concretes (rocky foundations)

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- Faults (cracks or joints) or weathered zones must be assessed in order to provide a good foundation for the buildings
- Performance (blocking for small volumes or substituting for large volumes)
- Inspection (visual for small volumes and in situ test like plate tests for large volumes)



# Case of EPR on Hinkley Point site (UK)

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- EDF Energy is seeking consent from West Somerset Council for site preparation works at Hinkley Point, Somerset. Consent will be sought by way of planning permission under the Town & Country Planning Act 1990 (as amended).
- The site preparation works are proposed as Preliminary Works to support the construction of the Hinkley Point C Project.
- EDF Energy is seeking a Development Consent Order (DCO) for the Hinkley Point C Project from the Infrastructure Planning Commission (IPC) under the Planning Act 2008.



- The application for planning permission for the site preparation works is subject to Environmental Impact Assessment (EIA) in accordance with the requirements of European Community Directive (85/337/EEC as amended).
- The key features of the site preparation works are land clearance to remove existing structures and vegetation, earthworks to level the site and create development platforms, drainage works to manage surface water and groundwater that would be generated by dewatering deeper excavations during the earthworks, construction of internal haulage roads and site access points (including two new roundabouts off Wick Moor Drove), and commencement of the mobilisation of the main civil works contractor that would be involved in subsequent stages of the construction of Hinkley Point C nuclear power station, subject to the grant of a DCO for the Hinkley Point C Project



- It should be noted that if a DCO is not granted for the Hinkley Point C Project, then the proposed development provides for the removal of the site preparation works (including all infrastructure installed during the works) and reinstatement of the application site.
- In addition to the site preparation works, EDF Energy proposes to construct a temporary jetty as Preliminary Works to the Hinkley Point C Project. the site preparation works and jetty development are being treated as distinct (hence separate applications) but related projects, each of which has been subject to EIA in which consideration has been given to potential cumulative effects



- In order to construct and operate a nuclear power station (or most other types of nuclear installation) in the UK, a nuclear site licence must be granted by the Health and Safety Ex.
- The site licence is not the only legal permit or authorisation required to construct and operate a nuclear facility in the UK. Other authorisations are required from HSE and other regulators (most notably, the Environment Agencies and also the Department for Transport) to allow the construction and operation of most nuclear facilities (HSE)
- HSE and the Environment Agency have introduced a new process of Generic Design Assessment (GDA) for new reactor designs, with joint arrangements between the regulators.<sup>2</sup> It is envisaged that similar co-ordination between HSE and the Environment Agency will be applied to deal with site licence applications.



# Hinkley point site

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- Before construction can start on the new nuclear power station at Hinkley Point, it is necessary to prepare the site.
- It is proposed to apply for planning permission to undertake preliminary works before submitting the main application to the Infrastructure Planning Commission.
- Planning and consents applications, as appropriate, will be made to the relevant authorities in early 2010 for these preliminary works. The local authority will carry out public consultation before deciding whether or not to give consent.
- If applications be successful, all the preliminary work will be carried out at the risk of the owner. If permission for the new power station is refused then the owner will remove the works and restore the land.



# On-Site Work

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

On-site preliminary work are undertaken to prepare for the development. This includes:

- Removing three existing barns
- Removing existing hedgerows, woodland and some grassland
- Undertaking drainage work
- Fencing off the site for preliminary works
- Re-routing existing underground services
- Diverting or closing some rights of way across the land
- Providing a site access road and internal roads suitable for construction traffic
- Undertaking earthworks to form a series of terraces for the main construction.



# Temporary Jetty

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)



- It is planned to bring in bulk materials required for construction by sea, docking at a temporary jetty and connecting to an on-site storage facility.
- This will reduce the number of vehicles on local roads during the construction process.
- The temporary jetty will be dismantled and materials recycled at the end of its life.



- Changes for temporary use of the land for public recreational purposes;
- Site exploration, including necessary borings to determine foundation conditions or other preconstruction monitoring to establish background information related to the suitability of the site, the environmental impacts of construction or operation, or the protection of environmental values;
- Preparation of a site for construction of a facility, including clearing of the site, grading, installation of drainage, erosion and other environmental mitigation measures, and construction of temporary roads and borrow areas;
- Erection of fences and other access control measures;



# Sea Wall

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)



- In order to provide additional coastal protection it is proposed to extend the sea wall in front of the existing Hinkley Point power stations.
- The existing coastal path will be incorporated into the new sea wall and access to the beach will be provided.
- The sea wall will be retained as a permanent feature of the construction.



# WATER INTAKE AND DISCHARGE

Unregistered version, please register [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

## STRUCTURES CONSTRUCTION

- Although the final design is site dependent, water-inlet and / or water-outlet are likely to be offshore; therefore an onshore pit and tunnels shall be excavated.
- Building these structures will require several specific construction facilities:
  - Land based construction site: For excavating the discharge / intake tunnels and the onshore pits and also drilling or excavating the connecting structures;
  - Sea based construction site: for excavating the offshore shaft and constructing the diffusion apparatus.
- Depending on the site-specific design a platform may be built over the site with a heliport, a quay and equipment storage areas, and in particular, a concrete batching plant.



# EPR Flamanville 3

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)





# EPR Flamanville 3 Licensing Process

Unregistered version, please register. [www.word-pdf-converter.com](http://www.word-pdf-converter.com)

- Phase 1 : Choice of the site Apr. 2004 – Oct. 2004  
3 candidate sites:
  - Flamanville (Normandy)
  - Penly (Normandy)
  - Tricastin (Rhône river valley)
- Phase 2 : Public debate Nov. 2004 – Apr. 2006
- Phase 3 : Permitting, construction and commissioning



# EPR Public Debate

Unregistered version, please register: [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

A National Public Debate Commission, independent from the government and in compliance with the French environmental law

1. **Nov. 2004** : Launching of the process
2. **Year 2005** : Public debate preparation (drafting of the owner file, NGOs preparatory consultation, ..)
3. **Oct. 2005 - Feb. 2006** :
  - Public debate (21 meetings, more than 4000 participants, many Q&As on Commission website,..)
4. **Apr. 2006** : Final report by the public debate Commission
5. **May 2006** : Decision to proceed by EDF's Board



# EPR Flamanville 3 Licensing Process

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

## Phase 3 Permitting, construction and commissioning

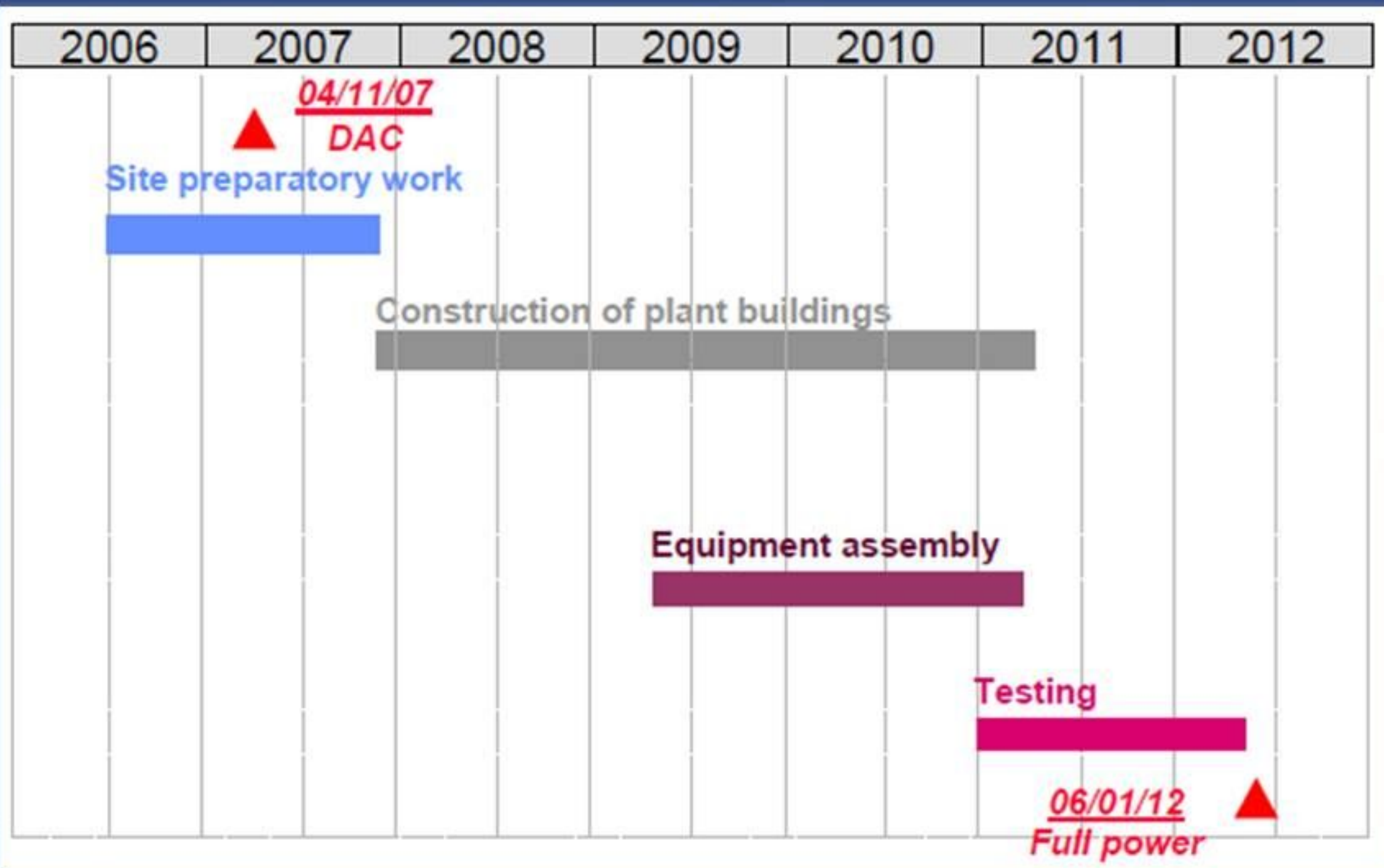
- **May 2006** : Application for “Authorization to Build” (autorisation de creation in French)
- **Summer 2006** : Launching of preparatory work on site
- **11 April 2007** : Official Government authorization for the “construction” of the NPP
- **Dec. 2007** : “First concrete” (*up to now everything is fine*)
- **54 months of construction**
- **June 2012** : Full power (*just a dream*)



# EPR flamanville 3 Construction

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

## Schedule





# On-Site Inspections by Safety Authorities

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- As part of the global control of the compliance of the reactor with its safety objectives, a control of the construction is carried out by ASN and IRSN, through a limited number of inspections.
- The first inspections were carried out in 2007, dealing with the preliminary works: foundation rock excavations by blasting, underground galleries and risks caused by the construction activities to the safety of the two nearby units under operation. The concrete works developed during 2008 and the first structural concrete of the nuclear island was poured in December. Foundation works finished in early 2009 for the Nuclear Island and the Pumping Station



# PREPARATORY WORK

Unregistered version, please register. [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

The earthworks consist in a first phase to Foundation of the buildings of the new tranche platforms:

- Blasting the rock in place and crushing of materials for reuse in embankments and as aggregates for the filling concrete.
- Injection of sealing of the dike and stopper inter-tranche of discharge canal.
- Retaining and remediation of slope.
- Concrete filling and sitting between the granite and the foundations of buildings.
- Connecting Galleries between buildings representing a linear of 2 km.
- The work of 2nd phase in phase with the main civil engineering: connection of the galleries and filling level of the platform of the plant



# PREPARATORY WORK (ctd)

Unregistered version, please register: [www.word-pdf-convert.com](http://www.word-pdf-convert.com)

- Maximum workers staff: 500
- Main quantities
  - 500 000 m<sup>3</sup> of excavations and 500 000 m<sup>3</sup> of earthworks,
  - 85 000 m<sup>3</sup> of concrete including 15 000 m<sup>3</sup> of galleries
  - 2 600 t of steel reinforced concrete.
- Duration: 16 months



- [http://webtvgroup.edf.com/index.php/video/flamanville-epr--august-2006---december-2007/259/epr--the-new-nuclear-power-paving-the-way-for-the-future-/27.html](http://webtvgroup.edf.com/index.php/video/flamanville-epr--<u>august-2006</u>---december-2007/259/epr--the-new-nuclear-power-paving-the-way-for-the-future-/27.html)



# International Atomic Energy Agency

Unregistered version, please register. [www.word-pdf-converter.com](http://www.word-pdf-converter.com)



***Thank you for your attention***