

Public Participation

EIA Study of Arthit Expansion Project

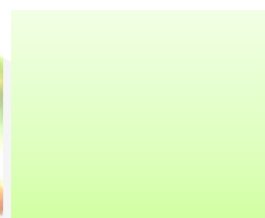
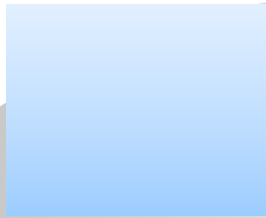
Phase 2 in Gulf of Thailand



PTTEP

Arthit Expansion Project Phase 2 in Block 14A, 15A and 16A,
Gulf of Thailand

PTT Exploration and Production Public Company Limited

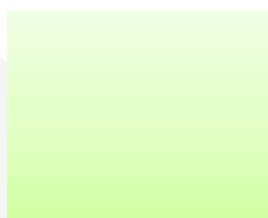
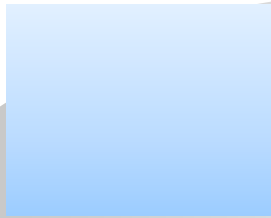


Agenda

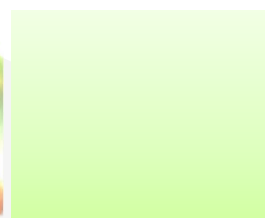
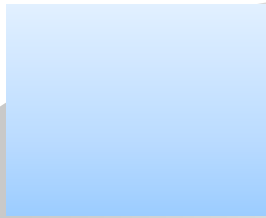
1. Project overview and components

2. Project description

3. Environmental Impact Assessment, Mitigation and Monitoring Measures



1. Project overview and components

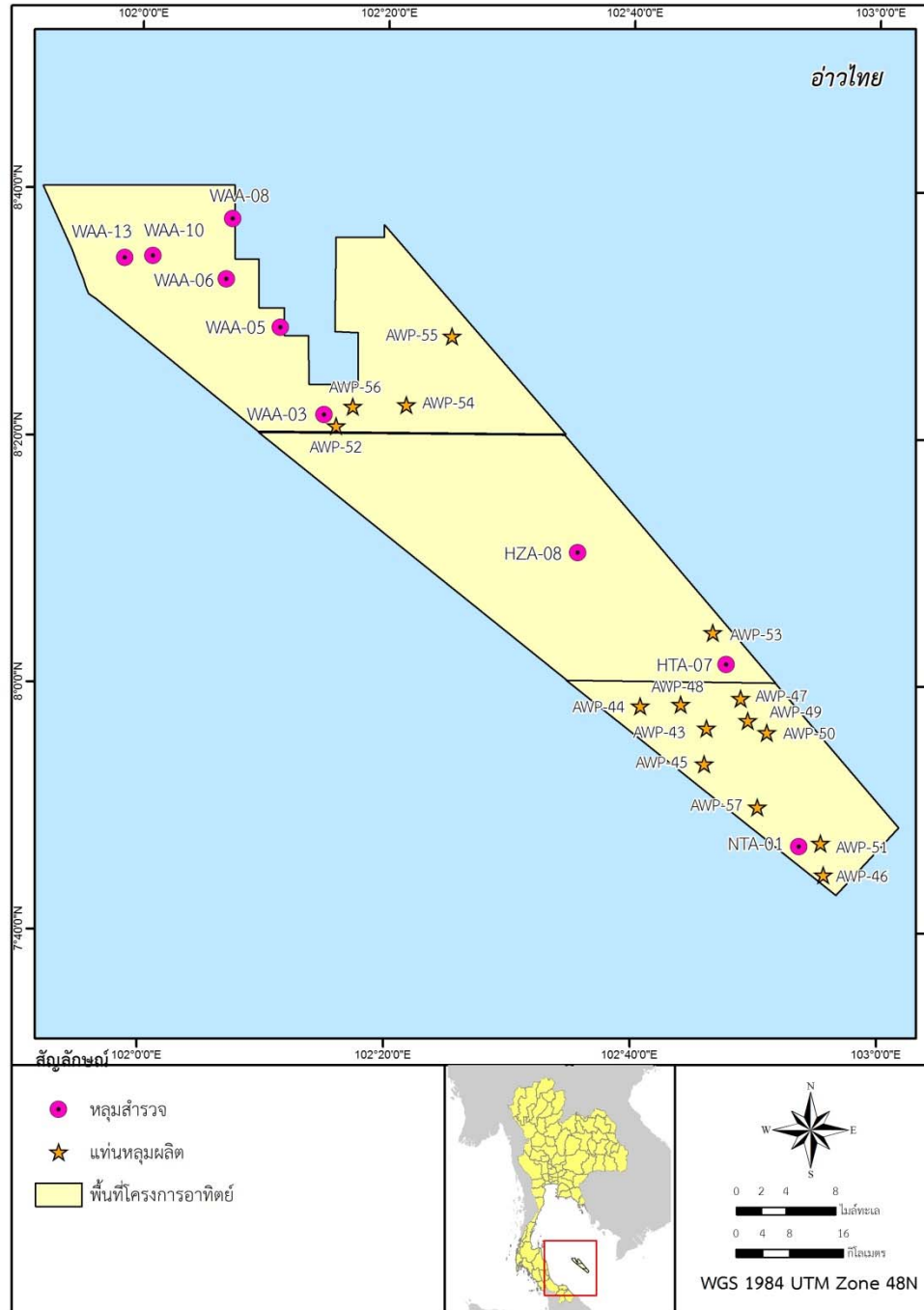


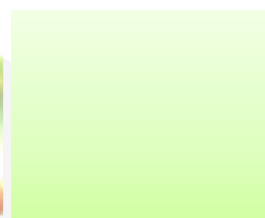
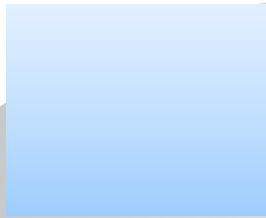
Background of Arthit

- ❖ PTTEP, a concessionaire in Block 14A, 15A and 16A has an obligation to develop Thailand's energy resources.
- ❖ In 2008, PTTEP is planning to develop production in Arthit field. The project is called **“Arthit Expansion Project Phase 2 in Block 14A, 15A and 16A”**



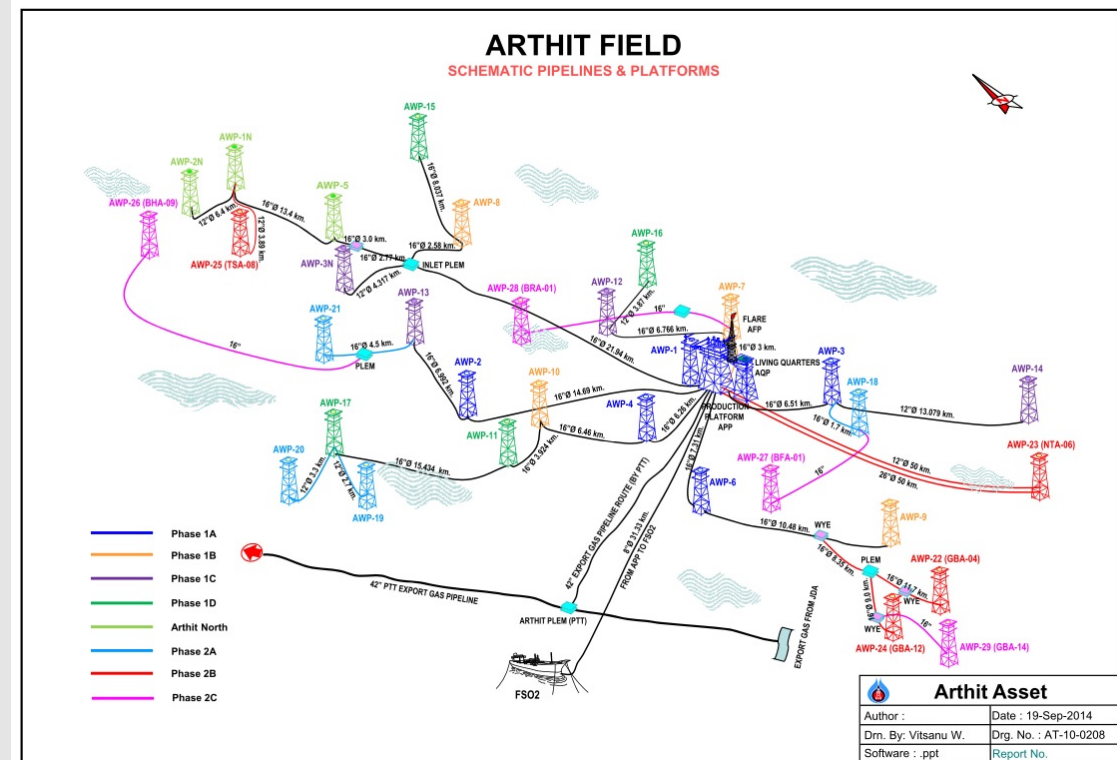
Arthit Project Location

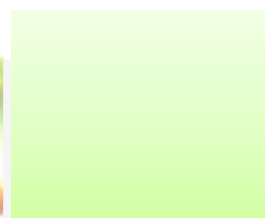
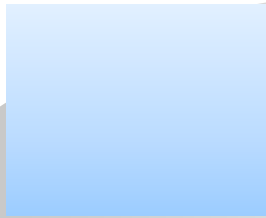




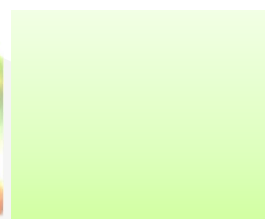
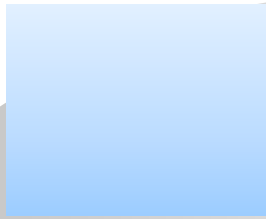
Project overview and Existing components

- Arthit Central Processing Platform – APP
- Living Quarter Platform – AQP
- Wellhead Platform 32 units
- Flare Platform – FP
- Gas Sealine and Condensate Sealine





2. Project Description



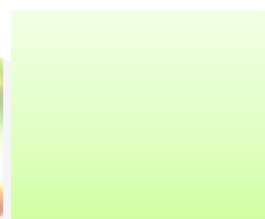
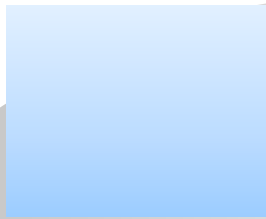
Expansion Project Phase 2

Objective

- ❖ To increase production capacity

Benefit

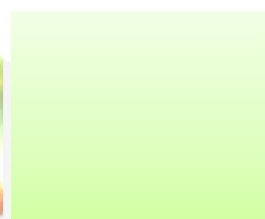
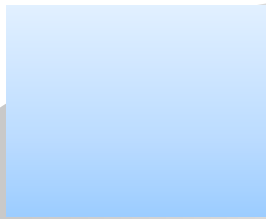
- ❖ To support the increasing of energy consumption in Thailand



Project development Plan

Production Development

- ❖ Install 15 Wellhead Platforms (WHPs) and 1st WHP is planning to install in 2019
- ❖ Drill first well in 2020 (15 days per drilling well)
- ❖ Start first production in 2020




ART Components (Phase II)

New Component

Existing Process



15 WHPs
(AWP-43 – AWP-57)



15 Sealine routes

Petroleum

ART CPP

Petroleum

32 WHPs
(AWP-1 – AWP-32)

Produced

water

Injection well at **AWP-1**

Gas



PTT Gas sealine

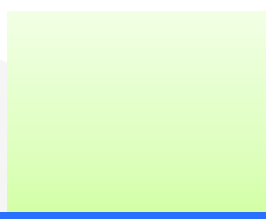
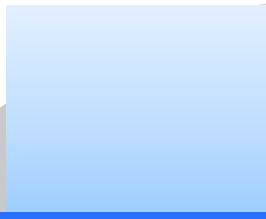


Condensate

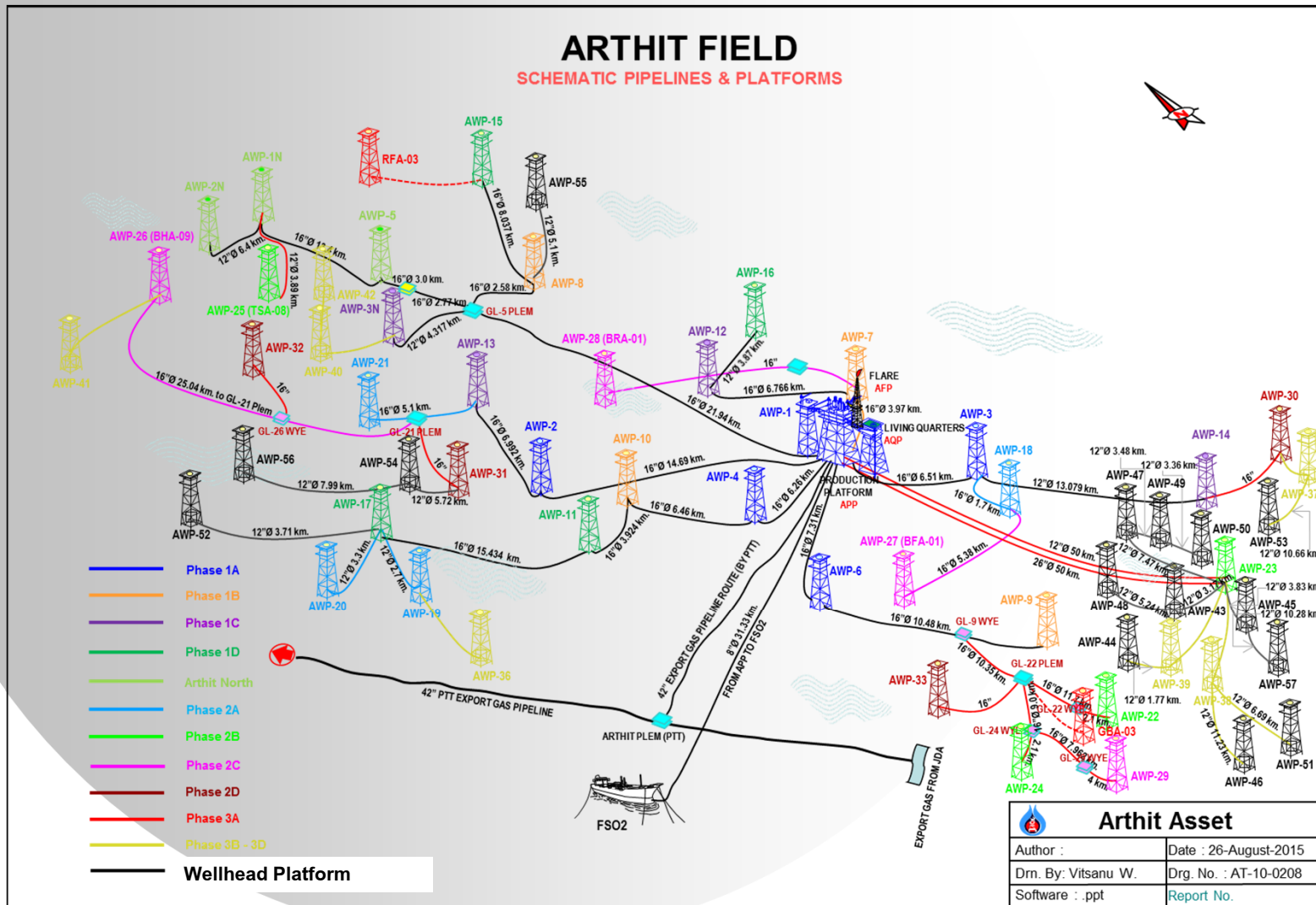


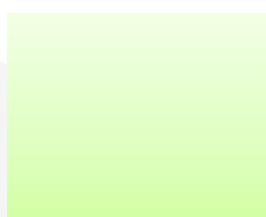
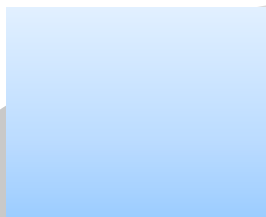
FSO2

Located at GBN



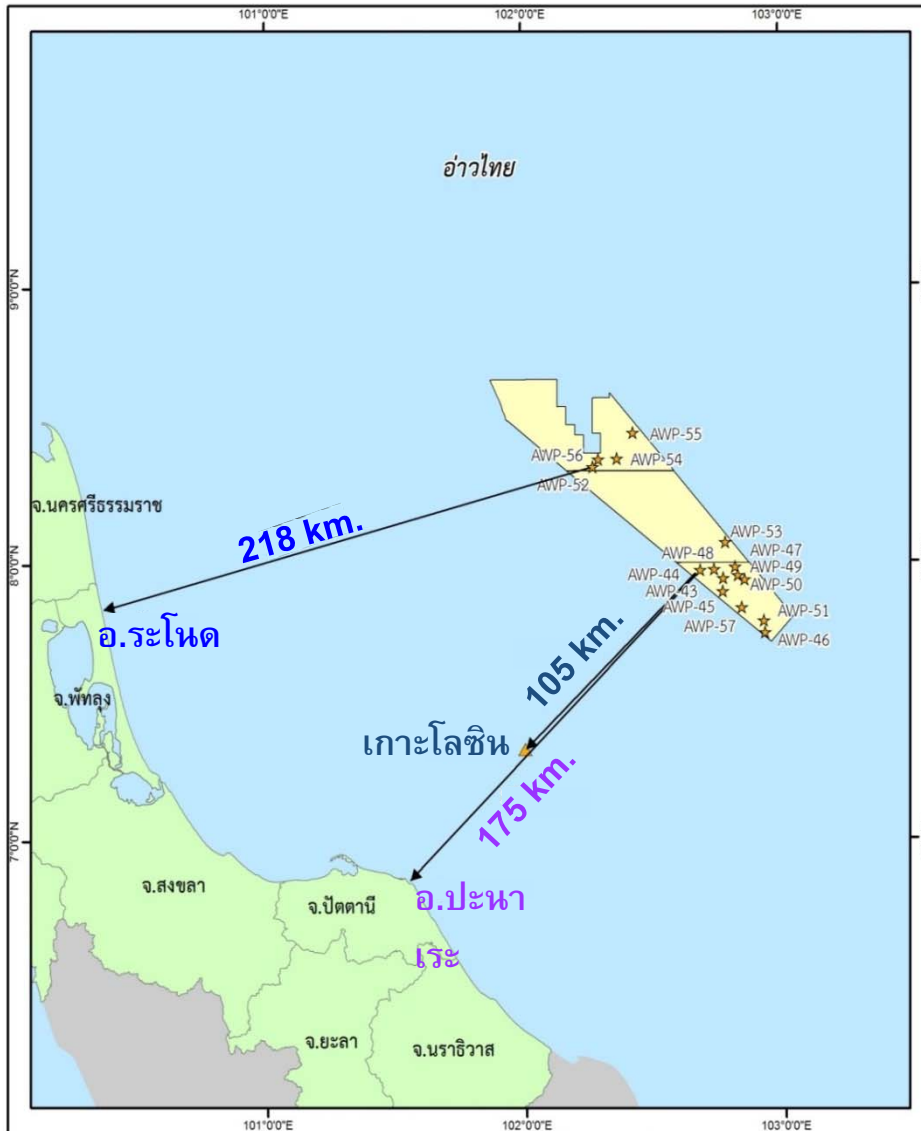
Project Overall of Petroleum Development in Arthit





Proposed 15 sealine routes

No.	Sealine connection	Dimeter (nich)	Distance (kilometer)
1	AWP-43 to AWP-23	12	3.17
2	AWP-44 to AWP-39	12	1.77
3	AWP-45 to AWP-23	12	3.83
4	AWP-46 to AWP-38	12	11.23
5	AWP-47 to AWP-23	12	7.47
6	AWP-48 to AWP-23	12	5.24
7	AWP-49 to AWP-47	12	3.48
8	AWP-50 to AWP-49	12	3.36
9	AWP-51 to AWP-38	12	6.69
10	AWP-52 to AWP-17	12	3.71
11	AWP-53 to AWP-37	12	10.66
12	AWP-54 to AWP-31	12	5.72
13	AWP-55 to AWP-8	12	5.10
14	AWP-56 to AWP-54	12	7.99
15	AWP-57 to AWP-45	12	10.28



สัญลักษณ์

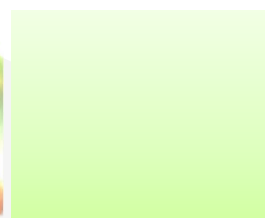
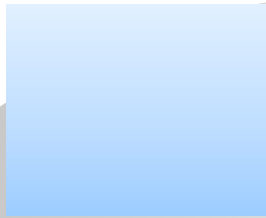
- ★ แทนหลุมผลิต
- พื้นที่โครงการอาทิตย์

WGS 1984 UTM Zone 48N



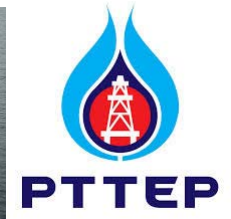
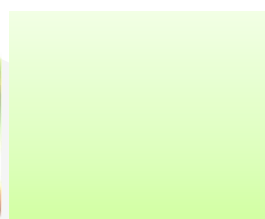
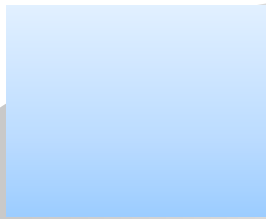
New Wellhead Platform (WHP) Location

WHP name	WGS 1984 Zone 48N	
	North	East
1. AWP-43	7° 56' 32.599" N	102° 46' 05.160" E
2. AWP-44	7° 58' 18.837" N	102° 40' 42.745" E
3. AWP-45	7° 53' 38.484" N	102° 45' 54.147" E
4. AWP-46	7° 44' 41.120" N	102° 55' 38.712" E
5. AWP-47	7° 58' 56.651" N	102° 48' 52.075" E
6. AWP-48	7° 58' 27.222" N	102° 43' 58.847" E
7. AWP-49	7° 57' 09.097" N	102° 49' 27.095" E
8. AWP-50	7° 56' 12.991" N	102° 51' 00.930" E
9. AWP-51	7° 47' 15.439" N	102° 55' 24.547" E
10. AWP-52	8° 20' 50.841" N	102° 15' 51.955" E
11. AWP-53	8° 04' 17.746" N	102° 46' 33.811" E
12. AWP-54	8° 22' 35.083" N	102° 21' 32.150" E
13. AWP-55	8° 28' 09.538" N	102° 25' 13.510" E
14. AWP-56	8° 22' 25.260" N	102° 17' 11.422" E
15. AWP-57	7° 50' 10.125" N	102° 50' 16.188" E



Project Activity

- ❖ Preparation and installation phase
- ❖ Drilling phase
- ❖ Production phase
- ❖ Plug and abandonment phase



Project activity

1. Preparation and installation phase (Platform Structure)

Platform structure assembled at onshore



Platform structure transported to designated location



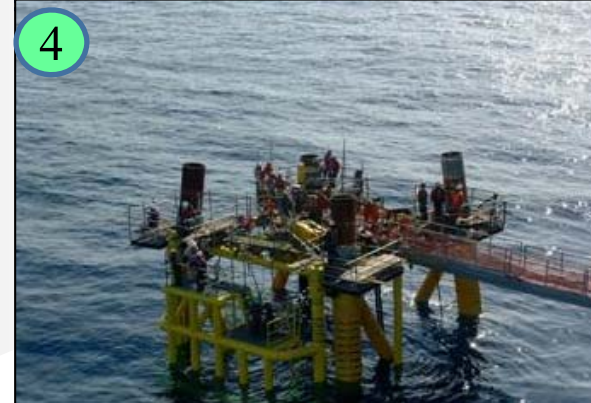
Installation of platform jacket

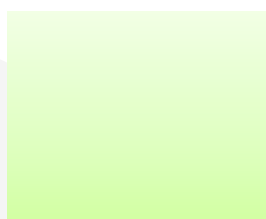
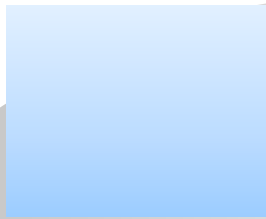


Example of installed platform



Installation of platform top side

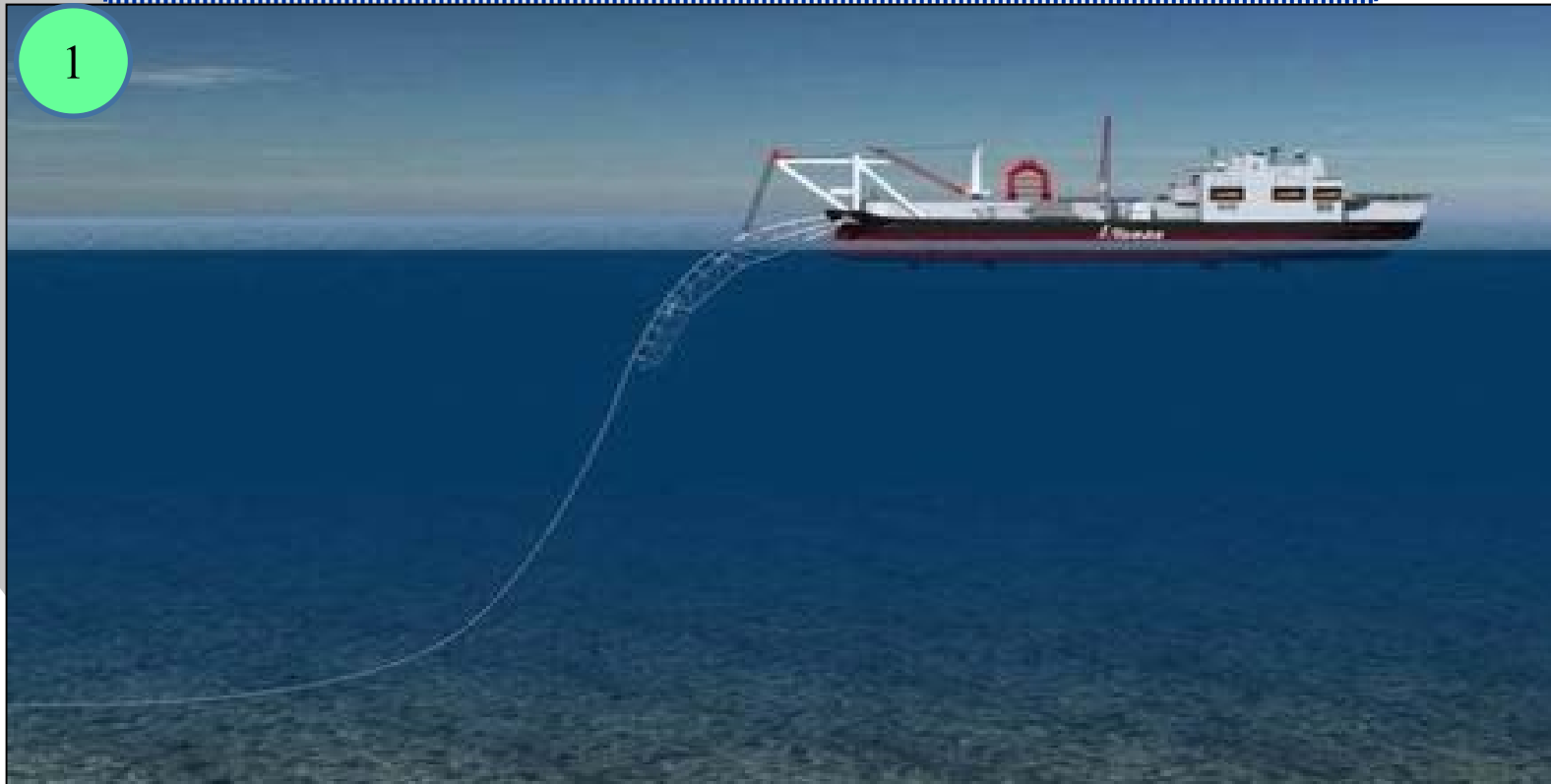


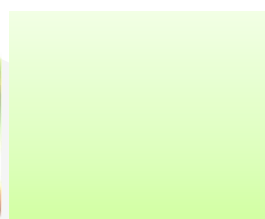
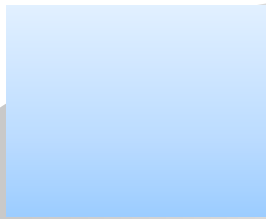


Project activity

1. Preparation and installation phase (Subsea pipeline)

Subsea pipeline installation – By vessel





2. Drilling phase

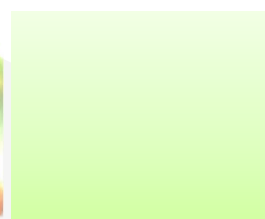
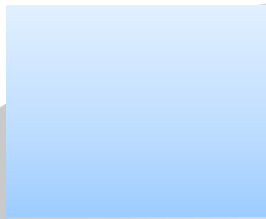
2.1 Rig



Tender rig



Jack-up rig



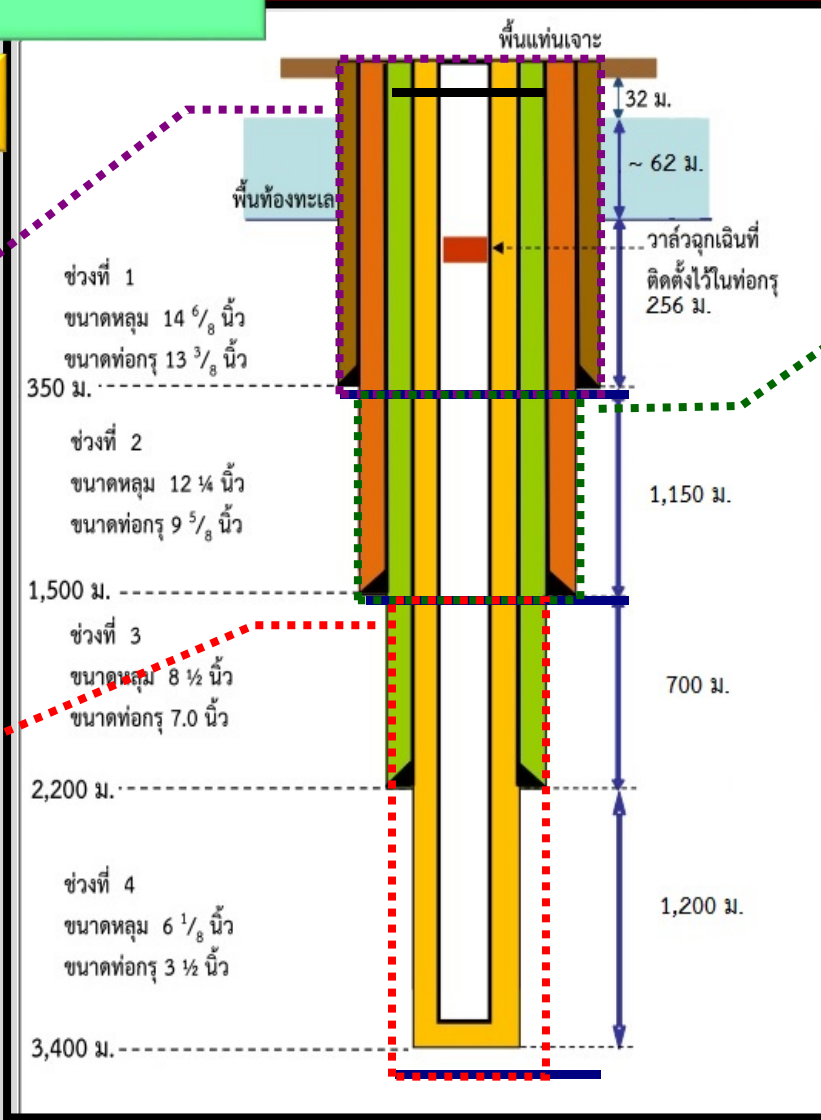
2. Drilling phase

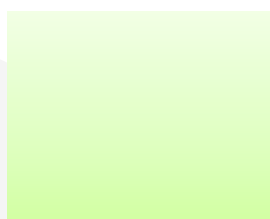
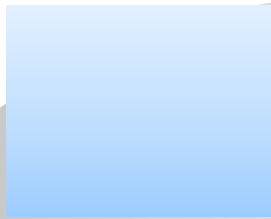
2.3 Drilling Fluid

Upper section (section 1)
Use seawater as drilling fluid

Medium and lower section (Section 3 and 4)
Use synthetic based mud (SBM) as drilling fluid

Medium section (Section 2)
Use seawater and water based mud (WBM) as drilling fluid





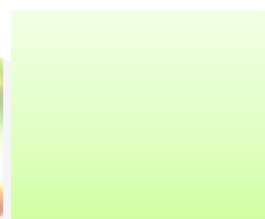
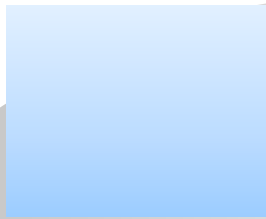
2. Drilling phase

2.4 Seismic survey

- Collect characteristics of rock bed such as electrical property, porosity, etc.
- Verify fluid type stored in rock bed
- Spend 1 day/well

2.5 Production well preparation

- Well completion
- Perforating
- Production well testing
- Spend 5 days/well



3. Production Phase

New Component

Existing Arthit components

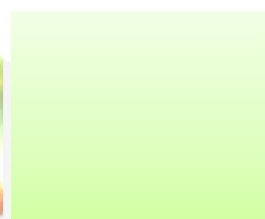
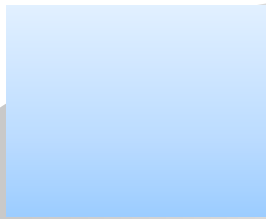


**15 WHPs
(AWP-43 – AWP-57)**

15 Sealine routes

Petroleum

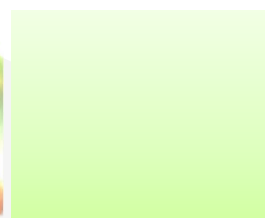
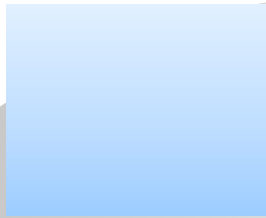




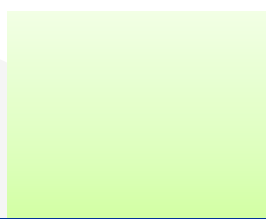
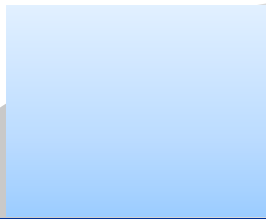
Project activity

4. Plug and abandonment phase

With reference to Petroleum Act (B.E. 2514), PTTEP will propose plug and abandonment plan to Department of Mineral Fuel for approval before starting the activity



3. Environmental Impact Assessment, Mitigation and Monitoring Measures



Seawater quality, seabed sediment and marine ecosystem impact assessment

Waste from vessel, rig and wellhead platform

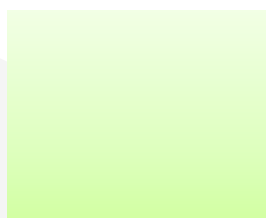
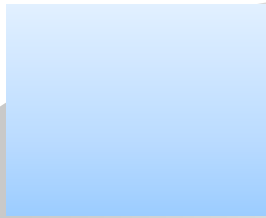
- Wastewater and sewage from domestic purpose
- Oily wastewater, e.g. drainage from vessel deck, bilge water, etc.

Water from pipeline hydro-testing

- Water used for hydro-testing comprises of seawater, oxygen scavenger, microbial inhibitor (Hydrosure O-3670R) to prevent pipe corrosion , and Fluorescent LT Dye
- Having hazard level to environment in GOLD Level (the lowest toxicity level) following to OCNS Group classification

- Rigs and vessels having volume of over than 400 gross tonnages have to install Oil Filter Equipment with reference to MARPOL Convention 73/78 and Vessel Inspection Requirement (Issue No. 34) B.E. 2551. This is to treat and limit oil concentration in bilge water of less than 15 ppm before releasing to the sea
- Verify equipment and oil & chemical spill/leak in working area, vessel deck and rig to prevent oil and chemical contamination to the sea when raining
- Verify contaminated wastewater containment to be in good condition to prevent oil and chemical contamination to the environment
- Follow the waste management mitigation

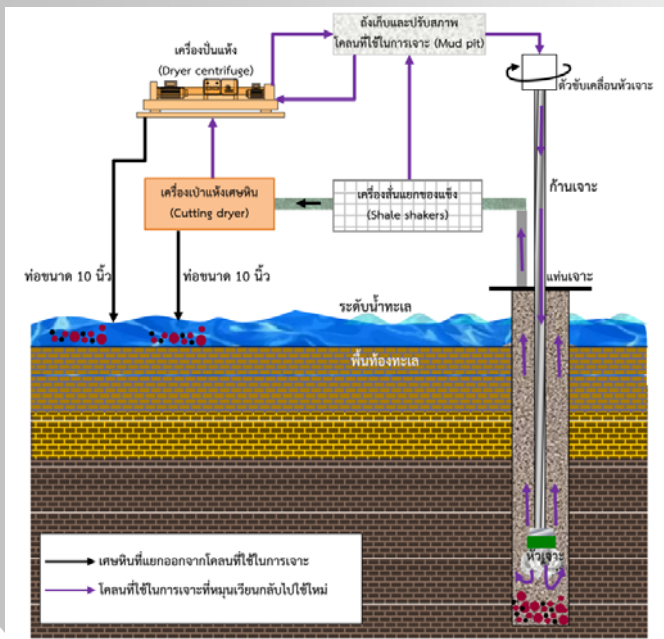
➤ Record type and amount of chemicals used for hydro-testing



Seawater quality, seabed sediment and marine ecosystem impact assessment

Impact from drilling mud and cutting

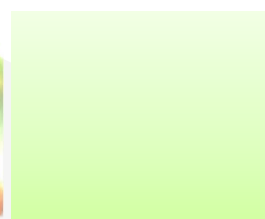
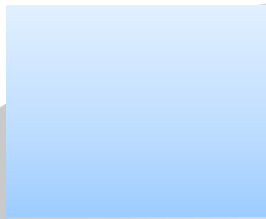
- Use environmental friendly mud and chemical and operate drilling operation in close system by separating drilling mud from cutting and circulating it for reuse, then, discharge the cutting to the sea



- Use slim hole drilling technique to reduce mud volume used
- Limit oil on cutting (the key constituent of SBM) not exceeding 12.5% by weight before discharging to the sea
- Control cutting discharge level at 3 meters from sea surface
- Verify cutting characteristics to confirm if it is hazardous waste by testing Total Threshold Limit Concentration (TTLC) and Soluble Threshold Limit Concentration (STLC) (refer to Notification of Ministry of Industry on Waste Disposal BE 2548)

Impact from produced water

- Produced water will be collected to re-inject into depleted well and no produced water discharged to the sea



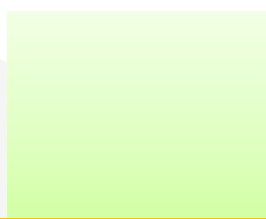
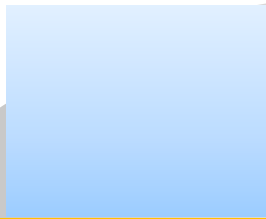
Occupational health and personal safety impact assessment

Key mitigation measure

Potential impacts from diseases from work and accidents at work may be generated by inappropriate working environment and working postures. Accidents at work may be caused by unsafe working environment and unsafe act of employees.

Planned Measures or Operation Procedures of the project:

- Provide appropriate working condition e.g. Sufficient lighting, ventilation.
- Provide appropriate and sufficient PPE according to the type of work and provide warning label for PPE use.
- Provide annual health check-up about hearing for offshore personal.
- Implement HSE procedures and preventive measures i.e. equipment safety procedures and permit to work procedures etc.
- Provide first aid for affected workers who loss of consciousness caused by heat exposure while working in hot workplace.
- Prepare patient or injured person evacuation plan in case of emergency.



Hazard from petroleum spill impact assessment (Blowout event)

Potential blowout during production well drilling and spill from separator during production testing and spill from subsea pipeline causing harm to personnel and damages in equipment and structure (rig, WP and subsea pipeline)

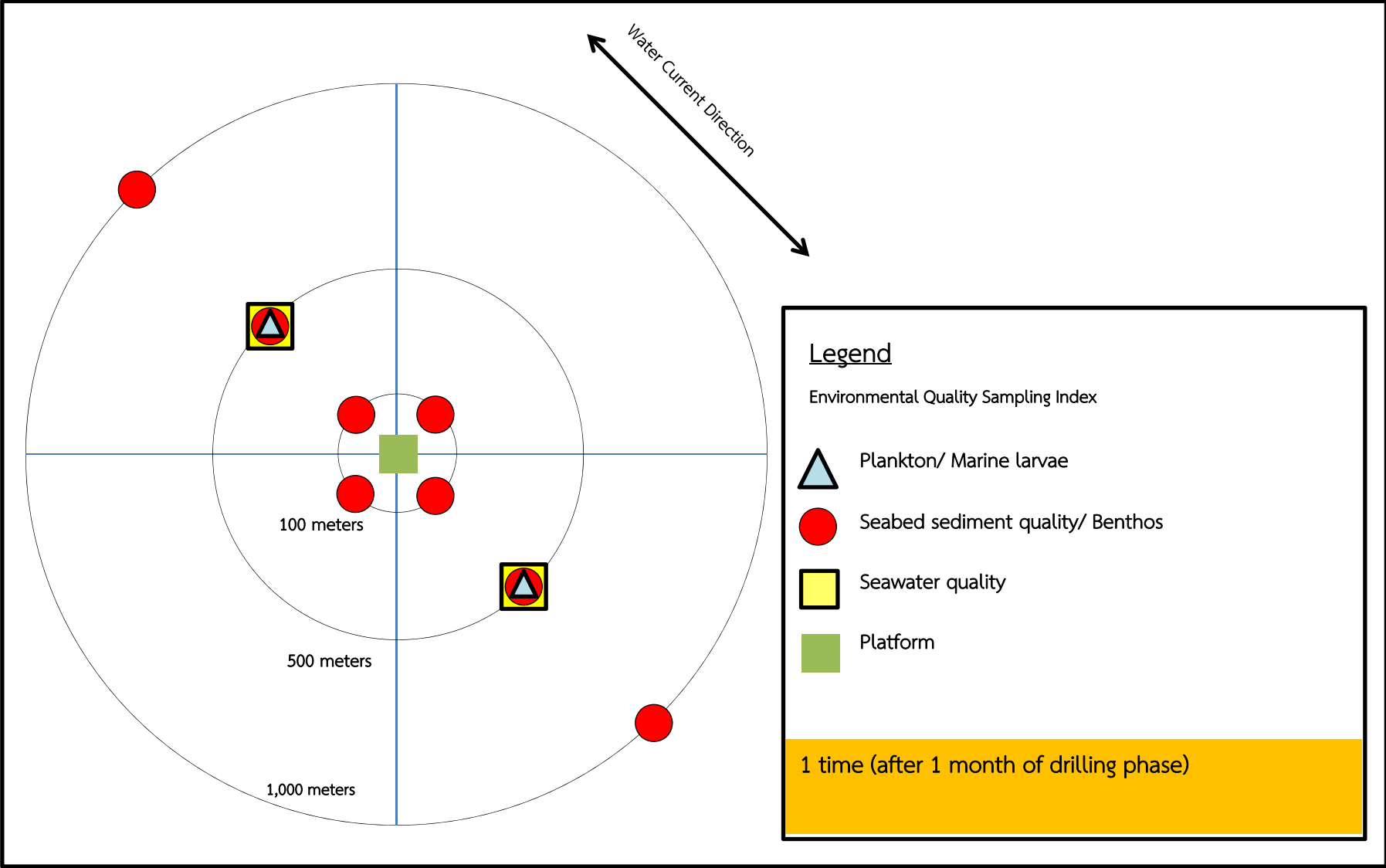
Key mitigation measure

- Conduct a shallow gas survey in the rig installation area and drill production wells according to reparation phase as provided in the plan. Shallow gas may cause blowout risk.
- Monitor downhole pressure and mud circulated throughout drilling.
- Select rig installed with blowout preventer (BOP), monitor BOP effectiveness and conduct change spare part appropriately for use regularly. Monitoring and maintenance shall be made before each well drilling or BOP is used more than 21 days.
- Implement blowout response plan and provide support for personnel in evacuation, medical support and prevention of damages in production wells and drilling rigs.
- Prepare oil spill response equipment to respond with oil spill tier 1 at the offshore operational base and onshore support base. Equipment shall be maintained in a good condition, ready for use.
- Implement oil spill response plan, coordinate and ask for assistance from relevant agencies in case of petroleum spill tier 2 or 3.



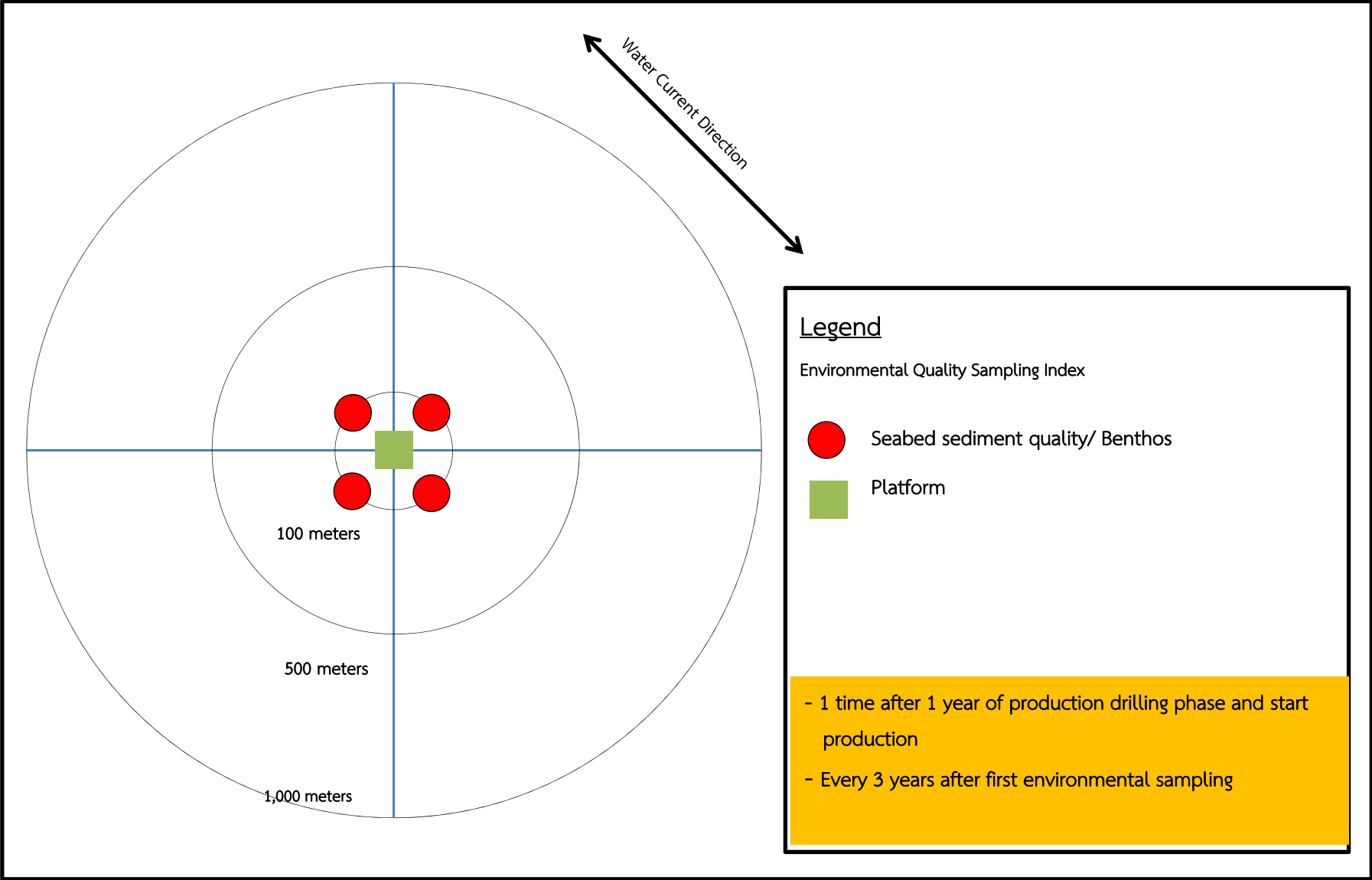
(Blowout Preventer, BOP)

Environmental Monitoring Program



Post drilling phase

Environmental Monitoring Program



Production Phase