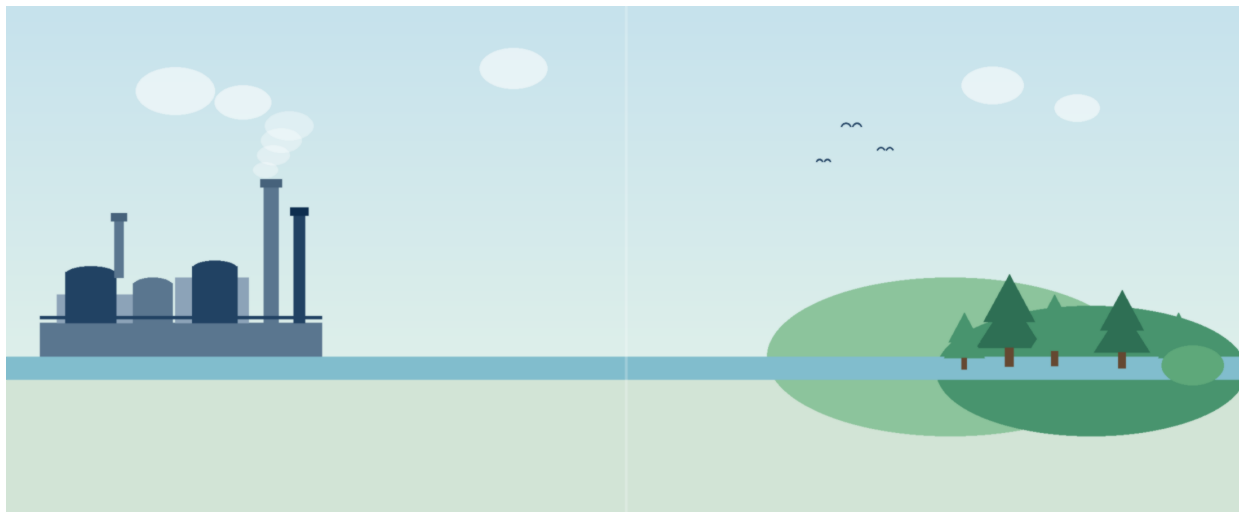




Biodiversity and Ecosystem Service Risk Assessment Report

IRPC Public Company Limited

Prepared by
Environmental Management
Quality, Safety, Occupational Health and Environment Management Department

Year 2025 (B.E. 2568)

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1. Objective

This Biodiversity and Ecosystem Service Risk Assessment Report has been prepared to help IRPC Public Company Limited recognize the level of biodiversity and ecosystem risk arising from the operations of the various projects within the company group across different locations, and to use this information to plan for the reduction of potential risks that operations may pose to biodiversity in the future. The report also ensures compliance with the requirements of applicable standards and procedures for the management of biodiversity and ecosystem services.

2. Scope



This report assesses the biodiversity and ecosystem risk of the following projects:

1. Projects of IRPC Public Company Limited, comprising the refinery, oil depots, a water production plant, and wastewater treatment plants, as listed in the table below.

No.	Facility Name	Address / Location
1	Power Plant & CHP	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
2	Refinery	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
3	Lube Base Oil	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
4	Ethylene	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
5	ABS & SAN	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
6	Ayutthaya Depot	99 Tumbon Pho-En, Amphur Tha Rua, Ayutthaya Province
7	Praphradaeng Depot	2505 Tumbon Bang Kru, Amphur Praphradaeng, Samut Prakan Province
8	Chumphon Depot	40/2 Tumbon Paknam, Amphur Muang, Chumphon Province
9	ACB	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
10	PRP	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
11	CONDENSATE	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
12	HDPE	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
13	PP	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
14	UT_BK	2/3 Tumbon Bangbut, Amphur Bankai, Rayong Province
15	BTX	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
16	PS	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province

17	PTK	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
18	EBSM	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
19	CCM	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
20	EPS	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
21	WWT1 & 2	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
22	WWT3	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
23	UT_IP	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
24	UHV	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
25	PPC	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province
26	DCC	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province

2. This assessment was carried out in accordance with IRPC Public Company Limited's Biodiversity and Ecosystem Service Risk Assessment Guidelines, using the PTT Group Biodiversity and Ecosystem Service (BES) Risk Assessment Tool. The assessment is based on the Global Reporting Initiative (GRI) reporting framework, using indicators EN11, EN12, EN13, and EN14.

3. Methodology

GRI reporting protocols were adapted to define the methods and approach used for the biodiversity and ecosystem service risk assessment. The risk assessment was carried out according to the following indicators:

3.1 Biodiversity Indicator EN11 (GRI Disclosure 304-1)



This indicator assesses the location and size of the land area of each operation in relation to its proximity to protected areas and to areas of high biodiversity value located outside protected areas (such as significant wetlands). These areas serve as centers of species diversity and provide natural or semi-natural habitats for various species, and are often important habitats for species that are commonly threatened. This assessment helps identify and understand potential risk trends, and enables closer monitoring of project activities so as to reduce the risk of potential impacts through more rigorous management and operational control. Table 3.1 shows the parameters used for measurement and the data sources used for the assessment of indicator EN11.

Table 3.1 Measurement Parameters and Data Sources for Indicator EN11

Measurement Parameters	Data Sources
• Geographic coordinates • Size of the operational area (in square kilometers) • Position (distance) relative to protected areas and areas of high biodiversity value outside protected areas • Biodiversity classification according to the characteristics of protected areas and high-biodiversity areas outside protected areas (forest ecosystem, freshwater ecosystem, or marine ecosystem) and their protection status (e.g. areas managed under the International Union for Conservation of Nature (IUCN), the Ramsar Convention, or national requirements)	• Integrated Biodiversity Assessment Tool (IBAT) • Ramsar Convention • UNESCO World Heritage Sites • Thailand National Biodiversity Strategy • WWF Wildfinder • BirdLife International • IUCN Centres for Plant Diversity

Definition of a Protected Area

A protected area is a clearly defined geographical space that is recognized, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature, together with its associated ecosystem services and cultural values (IUCN, 2018).

Definition of an Area of High Biodiversity Value

An area of high biodiversity value is one where a wide variety of species are found and which provides a natural or semi-natural habitat for those species. Such areas are often important habitats for threatened species. The types of areas considered to be of high biodiversity value include the following:

- Key Biodiversity Areas (KBA)
- World Heritage Areas
- Ramsar sites
- Important Bird and Biodiversity Areas (IBA)
- Alliance for Zero Extinction (AZE) sites
- Endemic Bird Areas (EBA)
- Tiger Conservation Landscapes

The IUCN classification of protected area categories is shown in Table 3.2.

Table 3.2 IUCN Protected Area Categories (IUCN, 2008)

Category	Description
Category Ia	Strictly protected areas set aside to preserve biodiversity and geological/geomorphological features, through strict control and limitation of human access and use, to ensure the original values of the area are conserved. These areas are maintained as important reference sites for scientific research.
Category Ib	Larger areas that are strictly protected but with somewhat less restriction on human access and use than Category Ia. Although large numbers of visitors are not permitted, certain types of visitors – such as those arriving on foot or by sailboat – may be allowed.
Category II	Areas that combine ecosystem protection with areas for recreation, managed through a zoning approach.
Category III	Areas that bring together specific natural features; the main management objective is to preserve these features, which differs from Category Ia's aim of preserving the integrity of the entire ecosystem and its processes.
Category IV	Areas that protect only part of an ecosystem or habitat and typically require continuous, active management, unlike Category Ia, which affords greater protection and more restricted access. Category IV areas tend to focus on protecting particular species or habitats rather than the ecosystem as a whole, as is the case for Category Ia.
Category V	Terrestrial and marine areas of cultural value shaped by human activity over more than a hundred years – in some cases over a thousand years – and which continue to be actively managed. Many Category V areas contain permanent human settlements and therefore cannot be classified as Category Ia.
Category VI	Natural areas that link biodiversity conservation with the sustainable use of natural resources, differing from Category Ia; however, a Category Ia area may exist as a zone within a larger Category VI area managed through zoning.

Assessment Approach for Biodiversity Indicator EN11 (GRI Disclosure 304-1)

For indicator EN11, the risk assessment is based on considering the project's relationship to protected areas and to areas of high biodiversity value, by evaluating the distance between the project and the nearest protected area or area of high biodiversity value. The assessment criteria are shown in Table 3.3.

Table 3.3 Biodiversity Risk Assessment Criteria for Indicator EN11

Distance from Protected Area / High-Biodiversity Area	Assessment Rating
Insufficient information is available to assess whether the project's location will affect protected areas or areas of high biodiversity value	Insufficient Data
Protected areas or areas of high biodiversity value are located more than 5 kilometers from the project	Low
Protected areas or areas of high biodiversity value are located more than 2 kilometers but less than 5 kilometers from the project	Moderate
Protected areas or areas of high biodiversity value are adjacent to, or located less than 2 kilometers from, the project	High
The project is located within a protected area or an area of high biodiversity value	Very High

3.2 Biodiversity Indicator EN12 (GRI Disclosure 304-2)

The risk assessment under indicator EN12 evaluates the nature of significant impacts arising from a project's activities, products, and services on biodiversity within protected areas and within areas of high biodiversity value located outside protected areas. The parameters used for measurement and the data sources used for the assessment are shown in Table 3.4.

Table 3.4 Measurement Parameters and Data Sources for Indicator EN12

Measurement Parameters	Data Sources
Nature of impact: • Type of project • Pollution generated by operations • Spread of invasive species, rodents, and pathogens • Decline in species • Change in habitat • Changes in ecological processes beyond natural variation Description of impact: • Species affected • Size of area affected • Duration of the impact • Recovery from the impact • Accident history • Trend of significant impacts arising from project operations	• Information from responsible agencies regarding issues and problems that have occurred (pollutant releases, invasive species, habitat change, ecological processes) • Data from the project's Environmental Impact Assessment (EIA)

Assessment Approach for Biodiversity Indicator EN12 (GRI Disclosure 304-2)

The risk assessment for this indicator considers whether the impacts arising from operations are likely to have a "significant" effect on biodiversity, whether temporarily or permanently, and takes into account the project's distance from protected areas or areas of high biodiversity value. The assessment must also take into account the control measures used to avoid and mitigate the impacts that occur. Assessment of indicator EN12 requires entering data into the Biodiversity Risk Assessment Calculator in order to evaluate the potential risk trend arising from the project. The assessment criteria are shown in Table 3.5, the data used in the Biodiversity Risk Assessment Calculator are shown in Table 3.6, and the assessment approach is set out in Table 3.5.

Table 3.5 Biodiversity Risk Assessment Criteria for Indicator EN12

Risk Arising from Project Operations	Insufficient Data	> 5 km	2 – 5 km	< 2 km
Insufficient Data	Insufficient Data	Insufficient Data	Insufficient Data	Insufficient Data
Low – nature of the project's impact indicates a low level of risk of significant impact	Insufficient Data	Low	Low	Moderate
High – nature of the project's impact indicates a moderate level of risk of significant impact	Insufficient Data	Low	Moderate	High
Very High – nature of the project's impact indicates a high level of risk of significant impact	Insufficient Data	Moderate	High	Very High

Note: Column headers denote the distance from the project to the nearest protected area or area of high biodiversity value (result derived from indicator EN11).

Table 3.6 Data Used in the Biodiversity Risk Assessment Calculator

Impact Type	Operational Phase	Classification	Duration	Reversibility of Impact	Species Found	Control Measures	Accident History
Pollution	Construction / Operation / Decommissioning	None; Air; Soil; Water; Noise; Waste; Visual	No data; None; Short-term; Medium-term; Long-term/Permanent	No data; Cannot be reversed; Can be reversed	No data; None; Low; Moderate; High; Very High	No data; Emergency case; Measures in place; No measures in place	No data; None; Small scale; Moderate scale; Large scale
Invasive weeds and pests	Construction / Operation / Decommissioning	None; New invasive species; Pathogens; Vertebrates; Weeds; Insects; Parasites	No data; None; Short-term; Medium-term; Long-term/Permanent	No data; Cannot be reversed; Can be reversed	No data; None; Low; Moderate; High; Very High	No data; Emergency case; Measures in place; No measures in place	No data; None; Small scale; Moderate scale; Large scale
Impact on habitat (land clearing)	Construction / Operation / Decommissioning	None; Large-scale clearing; Linear clearing; Localized clearing; Cultivated land; Construction of structures; Shifting cultivation; Modified habitat	No data; None; Short-term; Medium-term; Cannot be reversed; Long-term; Permanent	No data; Cannot be reversed; Can be reversed	No data; None; Low; Moderate; High; Very High	No data; Emergency case; Measures in place; No measures in place	No data; None; Small scale; Moderate scale; Large scale

Change to ecological processes	Construction / Operation / Decommissioning	None; Salinity; Groundwater level; Soil contamination; Land clearing; Fire; Forest; Agriculture	No data; None; Short-term; Medium-term; Long-term; Permanent	No data; Cannot be reversed; Can be reversed	No data; None; Low; Moderate; High; Very High	No data; Emergency case; Measures in place; No measures in place	No data; None; Small scale; Moderate scale; Large scale
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Table 3.7 Assessment of Impact on Biodiversity Value for Indicator EN12

Pollution

Assessment: Identify the quantity and type of waste discharge and its impact on the environment (air, water, noise, waste, visual) arising from the project's current operations. The pollutant most likely to affect species and habitats should be used in the risk calculation. Where more than one type of impact or discharge occurs, the discharge with the greatest likely effect on species and habitats should be assessed – for example, the discharge of wastewater into the sea or a natural freshwater source that serves as habitat for a Red List species.

Data sources: relevant permits and licenses granted to the project area; monitoring of discharges from the project area.

Rating	Description
Insufficient Data	Insufficient information is available to identify pollution arising from the project's operations and its potential impact on biodiversity value.
None	No impact arises from the project area.
Low	Pollution generated is within environmental regulatory requirements.
Moderate	Pollution generated exceeds environmental regulatory requirements on some occasions.
High	Pollution generated regularly exceeds environmental regulatory requirements.

Invasive Weeds and Pests

Assessment: Identify the distribution of weeds and pests both within and outside the project area. The weed or pest species with the greatest likely effect on important species and habitats must be used in the risk calculation. Where more than one type of weed or pest distribution occurs within the project area, the distribution with the greatest impact, both within and outside the project area, must be assessed – for example, weeds introduced into the area that then invade a nearby protected area or area of high biodiversity value should be considered to cause a significant impact or spread.

Data sources: the project's EIA; information from relevant agencies associated with the project; information from local or regional administrative bodies.

Rating	Description
Insufficient Data	Insufficient information is available to identify the number and distribution of invasive weeds and pests entering the project area.
None	No invasive weeds or pests have entered the area.
Low	Weeds or pests and their distribution are controlled within the project area.
Moderate	Weeds or pests and their distribution are controlled but are distributed throughout the project area, though still within a limited scope.
High	Weeds or pests and their distribution extend throughout the area, both within and outside the boundary of the project.

Impact on Habitat (Land Clearing)

Assessment: Identify the area and type of vegetation clearing that occurs during the project's current phase, including habitat areas altered within the project site. Clearing of habitat that would affect important species should be included in the risk calculation – for example, clearing of habitat for species of significance or those at risk of extinction and listed on the Red List. Clearing that occurred prior to project construction should not be taken into account.

Data sources: the project's EIA; information from relevant agencies associated with the project.

Rating	Description
Insufficient Data	Insufficient information is available regarding habitat clearing in the project area.
None	No habitat clearing has occurred.
Low	Area cleared is less than 1 hectare.
Moderate	Area cleared is more than 1 hectare but less than 5 hectares.
High	Area cleared is more than 5 hectares.

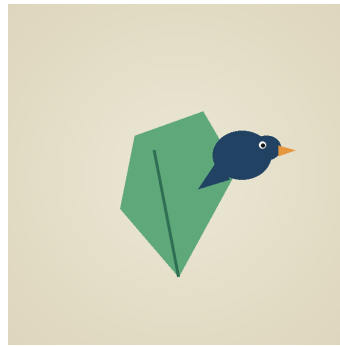
Change to Ecological Processes

Assessment: Identify changes to ecological processes that occur during the project's current operational phase. Where more than one type of change occurs, the most significant change must be assessed – for example, a change in groundwater level that affects a water source or habitat in a nearby wetland. This assessment considers the boundary of the project area and the extent of impact on areas outside the project, whether at the district or regional level.

Data sources: the project's EIA; information from relevant agencies associated with the project.

Rating	Description
Insufficient Data	Insufficient information is available.
None	No change to ecological processes has occurred.
Low	The impact occurs within the project area.
Moderate	The impact occurs outside the project area.
High	The impact occurs at the district or regional level.

Species Identification



Species identification refers to identifying the species that inhabit the project area, or within any protected area or area of high biodiversity value located within 5 kilometers of the project. Where more than one species is found, the species of the highest significance according to IUCN category is used for the assessment. Table 3.8 shows the IUCN categories and the corresponding risk levels of species.

Table 3.8 IUCN Species Categories and Risk Levels

Category	Level
Critically Endangered species	Very High
Endangered species	High
Vulnerable species	Moderate
Near Threatened species	Low
Least Concern species	Low
Species of concern likely not detected	Low
No species of concern detected	None
Insufficient data available for assessment	Insufficient Data

Duration of Impact

The duration of the impact refers to the timeframe over which each type of impact is expected to occur, as shown in Table 3.9.

Table 3.9 Duration of Impact

Duration	Level
More than 2 years	Permanent
More than 6 months but not exceeding 2 years	Long-term
More than 3 months but not exceeding 6 months	Medium-term
More than 1 week but not exceeding 3 months	Short-term
No impact	None
No data available	Insufficient data for assessment

Reversibility of Impact

Reversibility of impact refers to the ability to restore an impact to its original condition during the course of the project's operations. Where an impact is permanent, it means that it cannot be restored even after the project ceases operation. Table 3.10 shows the reversibility ratings for impacts.

Table 3.10 Reversibility of Impact

Indicator	Level
Impact on species and habitats can be reversed within the project's operational period	Low
Impact on species and habitats cannot be reversed within the project's operational period	High
Insufficient data available for assessment	Insufficient Data

Likelihood of Impact on Species

Likelihood of impact on species refers to the probable relationship between the type of impact (pollution, weeds and pests, land clearing, and changes to ecological processes) and the species identified as being present in or near the project area. This assessment should be made in relation to the life patterns of the species concerned, considering whether the pollutant in question is likely to affect the species – for example, if water pollution is identified as the primary type of impact, then aquatic or marine species may be affected by wastewater discharge from the project. Table 3.11 sets out the assessment criteria and the corresponding levels of likelihood of impact on species.

Table 3.11 Likelihood of Impact on Species

Assessment Criteria	Level
No likelihood of impact on species, based on the type of impact (see Table 3.6)	None
Likelihood of impact on species exists, based on the type of impact (see Table 3.6)	Present
Insufficient data available for assessment	Uncertain

Existing Control Measures

Existing control measures refer to the manuals, standards, and emergency procedures used in the area to control threats and risks to biodiversity value. This may include operating standards that limit or manage the release of pollutants into the environment, as well as pollution control equipment, all of which are taken into account in the risk assessment.

Accident History

Accident history refers to past accidents and emergencies at the project that have caused impacts on biodiversity value. The assessment level considers the extent of impact that the accident had on the area in which it occurred. Table 3.12 shows the assessment criteria for the project's accident history.

Table 3.12 Accident History of the Project

Assessment Criteria	Level
One or more accidents occurred that could not be contained within the project area, causing environmental harm with continuing effects on the surrounding environment	High
One or more accidents occurred that could not be contained within the project area, causing environmental harm within the project area	Moderate
One or more accidents occurred within the project but were contained within the project area, with no impact on the surrounding environment	Low
No accident history	N/A
Insufficient data available for assessment	Insufficient Data

3.3 Biodiversity Indicator EN13 (GRI Disclosure 304-3)

Biodiversity indicator EN13 is used to record habitat areas that have been protected or restored by the project. These areas may include those restored voluntarily or as required by government mandate. Data from this indicator can be used to support the risk assessments for indicators EN11 and EN12, as well as in the preparation of a Biodiversity Action Plan (BAP). The data required for this record include:

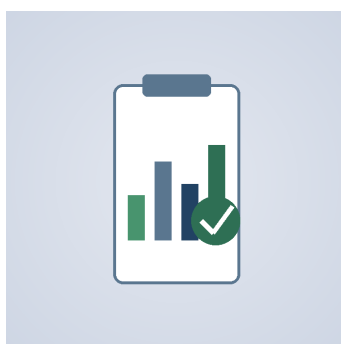
- The size and location of all habitat areas that have been protected or restored
- Whether the restoration of the area was successful and certified by an independent expert
- Whether the work was carried out in partnership with relevant stakeholders or partners in protecting or restoring the habitat area
- The standards and methods used for the restoration

3.4 Biodiversity Indicator EN14 (GRI Disclosure 304-4)

Biodiversity indicator EN14 is used to record species listed on the IUCN Red List, and species whose habitat lies within an area affected by the project's operations, based on their risk of extinction as a result of the project's activities. Data from this indicator can be used to support the risk assessments for indicators EN11 and EN12, as well as in the preparation of a Biodiversity Action Plan (BAP). The data required for this record include the number of species on the IUCN Red List, and species protected under applicable local law, that are affected by the project's operations, classified by level of extinction risk as follows:

- Critically Endangered species
- Endangered species
- Vulnerable species
- Near Threatened species
- Least Concern species

4. Results of the Biodiversity Risk Assessment of the Projects



A summary of the biodiversity risk assessment results for indicators EN11 and EN12 is presented in Table 4.1. The biodiversity risk assessment for indicators EN13 and EN14 returned No Data for all facilities.

Note: The biodiversity risk assessment report for each individual project, and the associated Biodiversity Action Plan (BAP) documents, are available at the following link: https://irpcplc.sharepoint.com/sites/QSHE_Portal

Table 4.1 Summary of Biodiversity Risk Assessment Results for the Projects

No.	Facility Name	Address / Location	EN11	EN12	Biodiversity Risk Assessment Result	BAP
1	Power Plant & CHP	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
2	Refinery	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
3	Lube Base Oil	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
4	Ethylene	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
5	ABS & SAN	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No

6	Ayutthaya Depot	99 Tumbon Pho-En, Amphur Tha Rua, Ayutthaya Province	High	Moderate	High	Yes
7	Praphradaeng Depot	2505 Tumbon Bang Kru, Amphur Praphradaeng, Samut Prakan Province	High	Moderate	High	Yes
8	Chumphon Depot	40/2 Tumbon Paknam, Amphur Muang, Chumphon Province	High	Moderate	High	Yes
9	ACB	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
10	PRP	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
11	CONDENSATE	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
12	HDPE	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
13	PP	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
14	UT_BK	2/3 Tumbon Bangbut, Amphur Bankai, Rayong Province	Low	Low	Low	No
15	BTX	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
16	PS	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
17	PTK	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
18	EBSM	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
19	CCM	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
20	EPS	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
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22	WWT3	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
23	UT_IP	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
24	UHV	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
25	PPC	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No
26	DCC	299 Moo 5, Sukhumvit Road, Muang District, Rayong Province	Low	Low	Low	No