CHAPTER 2

SCOPING AND TERMS OF REFERENCE

2.1 INTRODUCTION

This chapter provides the scoping notes for the proposed project that shall form the Terms of Reference for this EIA.

2.2 PROJECT TITLE AND NATURE

The project title is “The Construction and Completion of a Metals from Spent Catalyst Recovery Facility (SCaRF)” at Gebeng Industrial Estate, Kuantan, Pahang. The proposed project will be located on a lot owned by the project proponent, at Lot 29132, in Gebeng Industrial Estate (GIE). At the SCaRF spent catalysts, from petrochemical and related industries, containing Molybdenum (Mo) and Vanadium (V) will be processed to extract the valuable metals essential for high-tech products, such as electric cars, etc. using processes typical for metals from wastes industries, i.e., slow roasting followed by leaching, then separation of salts of the metals.

The same type of plant has been successfully operated by Taiyo Koko in Ako City, Japan (**see Figure 5.3.(3)**). The usefulness of these metals is as below:

Molybdenum (Mo):

- Molybdenum (Mo) has unique chemical properties, namely with respect to heat resistance, low thermal expansion and high thermal conductivity; thus is used in steel alloys to increase strength, hardness, electrical conductivity and resistance to corrosion.
- Mo addition shows improvements in current lithium-ion battery capacity of 125 and 240 units to over 783 units. Addition of both molybdenum and graphite/graphene increase performance to over 1200 units which is 5 to 6 times that of current battery technology.
- With increase in lithium-ion battery capacity, Mo is fundamental to the construction of electric vehicles.

Vanadium (V):

- Vanadium is valuable in the manufacturing industry due to its malleable, ductile and corrosion-resistant qualities.
- It plays a critical role in several strategic industrial applications including steel production and probable widespread utilization in next-generation batteries.

- Vanadium (V) oxide is used as a catalyst and in producing superconducting magnets (thus in modern industries of electric cars, wind turbines, etc.) vanadium is being added to various lithium-based battery technologies to produce a car battery that can store more energy (which translates into a greater distance travelled on a single charge).
- It is usually added in the form of ferrovanadium; vanadium steel alloys are used in gears, axles and crankshafts. Titanium-aluminium-vanadium alloy is used in jet engines and for high-speed aircraft. Vanadium foil is used in cladding titanium to steel.
- Conventional uses of vanadium oxide include as a pigment for ceramics and glass.

2.3 LEGAL REQUIREMENT

Under section 34A of the Environmental Quality Act, 1974 (EQA, 1974), activities prescribed in the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015 requires an Environmental Impact Assessment (EIA) to be undertaken before the project is carried out. For the development of SCaRF, the required EIA is:

The proposed Project falls under the First Schedule of the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order, 2015, the which covers:	
First Schedule	
Activity 14(a):	Waste Treatment and Disposal (a) Scheduled Waste (i) Construction of recovery plant (off-site).

The DOE has been consulted as to the above requirement for this project, and the DOE Putrajaya had agreed that the EIA Schedule 1 should be submitted to DOE Pahang, as shown below. Consequently, a discussion on the EIA scope and Terms of Reference, on the potential impacts of the Proposed Project on the environment and recommendations to mitigate the potential impacts, was held at DOE Pahang on 20th August 2022 as shown below, prior to preparation of this EIA report.

a) Letter from DOE on 5th February 2020

From: Fazildeliana binti Abdullah Sani [mailto:deliana@doe.gov.my]
Sent: Wednesday, February 5, 2020 2:27 PM
To: Ahmad Fhamy <ahmad.fhamy@iesb.my>
Cc: YM Tunku Khalkausar T. Fathahi <anies@doe.gov.my>; Rohimah Ayub <rba@doe.gov.my>
Subject: RE: SCaRF Project Presentation

ASSALAMUALAIKUM WBT & SALAM SEJAHTERA

Tuan,

Dengan hormatnya merujuk kepada perkara diatas dan perbincangan antara pihak tuan serta JAS sebelum ini.

2. Adalah dimaklumkan bahawa setelah semakan permohonan dibuat oleh Bahagian EIA, cadangan projek ini tertakluk kepada keperuan penyediaan Lapran Penilaian Kesan kepada Alam Sekeliling (EIA) di bawah aktiviti **Jadual (1) Aktiviti 14: Pengolahan dan Pelupusan Buangan (a) Buangan Terjadual (ii) Pembinaan loji pulih guna (luar tapak).** Laporan TOR dan laporan EIA hendaklah dikemukakan kepada JAS Negeri Pahang untuk pertimbangan selanjutnya.

3. Perhatian daripada pihak tuan didahului ucapan terima kasih.

Sekian, harap maklum.

SYMA

FAZILDELIANA ABDULLAH SANI

PA PENGARAH (BB)

BAHAGIAN BAHAN BERBAHAYA

JABATAN ALAM SEKITAR

No. Tel : 03-8871 2118

b) Discussion on Terms of Reference on 20th Jun 2022.

Invitation: TOR untuk EIA S1 SCaRF (Spent Catalyst Recovery Plant) at... @ Mon Jun 20, 2022 9am - 11am (MYT) (rakminuraini@yahoo.com) Yahoo/Inbox

20
MON, JUN

TOR untuk EIA S1 SCaRF (Spent Catalyst Recovery Plant) at Gebeng, Kuantan View on Calendar

When
9:00 AM - 11:00 AM

Who
9 guests invited

Where
Jabatan Alam Sekitar Pahang, Aras 1,...

Are you going? Yes, I'm going Edit

azrulsafrizal@doe.gov.my Mon, Jun 13 at 8:17 PM
To: rakminuraini@yahoo.com, NORLELAWATI SALEH (DOE-PAHANG), MOHD HISYAM ABDULLAH (DOE-PAHANG), ZARITH SUFIANI BINTI BAHAROM (DOE-PAHANG), abdghanit@gmail.com, MOHD NAZIR MANSOR (DOE-PAHANG), limkaheng@toyo-eng.com, joochungling@toyo-eng.com Hide

2.4 SENSITIVE RECEPTORS NEAR THE PROJECT SITE

The sensitive receptors near the project are as shown in the Zone of Impact (ZOI) diagram in **Figure 2.4(1)**; they are the coastal settlements along the coastline, from Balok in the south to Sg. Ular to the north. These coastal settlements are about 4 to 5 km from the proposed project site. The nearest sensitive receptor is the maritime academy, Akademi Maritim Sultan Ahmad Shah (AMSAS), located 4km away from the proposed project. Thus, there is no sensitive receptor in the immediate vicinity (within 300m) of the proposed project, as the site is within the Gebeng Industrial Estate (GIE).

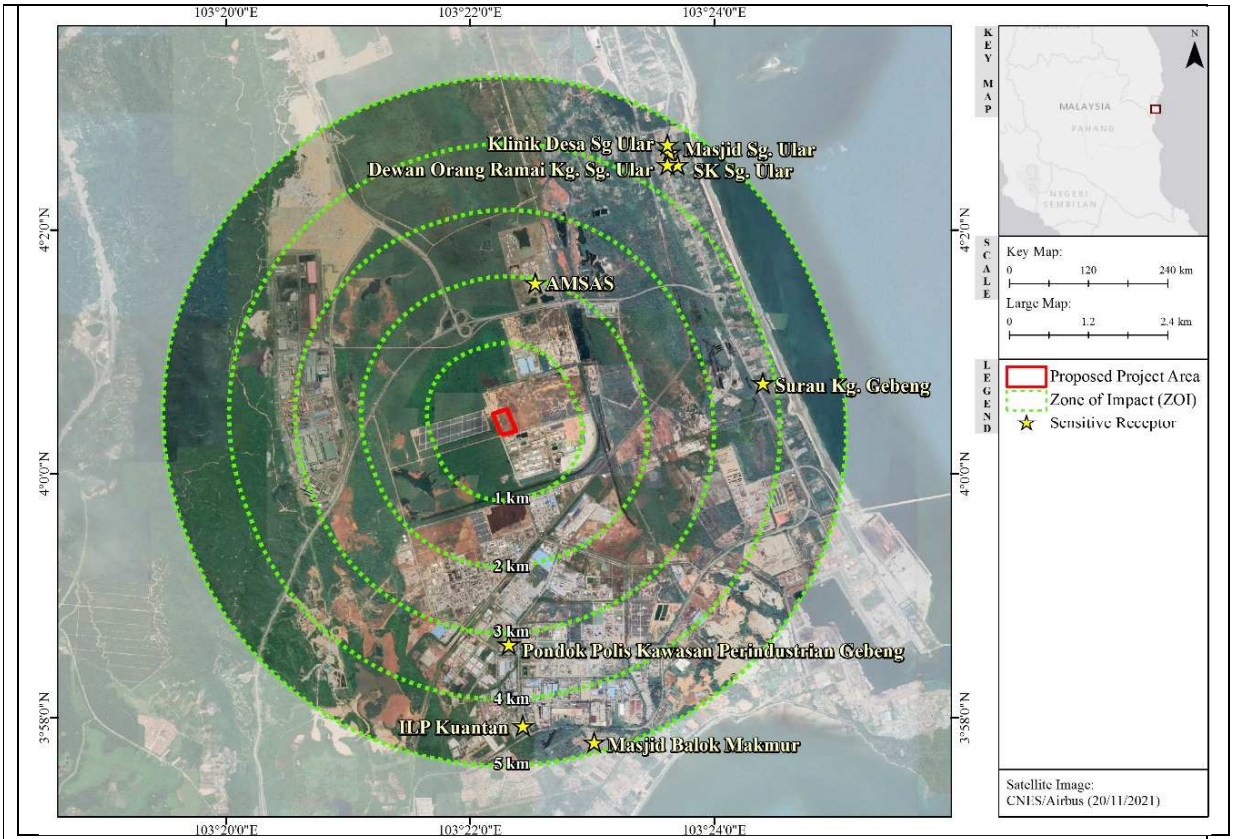

Figure 2.4(1) ZOI and Sensitive receptors around proposed SCaRF project

2.5 POTENTIALLY SIGNIFICANT IMPACTS TO BE STUDIED

The proposed project activities and those with or without potentially significant impacts are listed in **Table 2.5(1)** below. As shown in the list, those activities which could significantly affect the environmental quality, notably of air and water (i.e., have Potentially Significant Impacts) are:

- Activities related to earthworks
- Operation of plant, including plant commissioning, via the operations of the plant's air pollution control system (APCS) and industrial effluent treatment system (IETS).

Thus, this EIA will assess the existing air and water quality, as well as carry out studies on pollutants dispersions via Air Quality Modelling (AQM) and Water Quality Modelling (WQM).

Table 2.5(1) Proposed project activities with or without potentially significant impacts

Main activities	Sub-project activities			
Note: (O No significant Impacts; ⭘ Less significant/Insignificant Impacts; ● Potentially Significant Impacts)				
Project phase: Pre-Construction and Preliminaries		O	⭘	●
Surveys, Investigations and Preliminaries	Project Planning	√		
	Preparation and submission of EIA S1 for approval by DOE	√		
	Application for Written Permission for Setting-up of Scheduled Waste Off-Site Recovery Facility (Section 19 of EQA1974)	√		
	Application for Licence for Setting-up of Scheduled Waste Off-Site Recovery Facility (Section 18 of EQA1974)	√		
	Preparation and submission of EMP for approval by DOE	√		
	Preparation and submission of Written Permission for APCS and IETS for approval by DOE	√		
	Access to Project Site which is next to main road	√		
	Surveys/ Site Investigations	√		
	Technical and Engineering Feasibility Investigations	√		
Project phase: Construction				
Stage 1: Site clearing and erosion control measures	Marking of areas to be cleared	√		
	Placement of temporary toilets (workers stay offsite)	√		
	Digging up and completion of runoff retention pond (RP) and earth drains feeding to the RP, as per ESCP designs, with silt trap(s) and silt fence(s) to avoid surface run-off flow directly to the water body.			√
	Stockpiling of excavated earth, if any, at an area near to the site for future backfilling.			√
	Clearing of vegetation and manual chopping of branches for easier handling.			√
	Loading of green wastes not utilised for mulching into roro bins and transporting the wastes to nearest landfill.	√		
	Clearing off wastes found dumped onto site by others and hauling to nearest landfill.	√		
	Mobilization of Land Surveyor for setting out of proposed site and the existing platform level.	√		
	Covering of slopes of earth stockpile with plastic sheets to prevent soil erosion and turfing of areas not for construction.	√		

Table 2.5(1) Proposed project activities with or without potentially significant impacts

Main activities	Sub-project activities			
Stage 2: Foundation Works	Mobilization of Land Surveyor for setting out of foundation points and layouts at site.	√		
	Construction of onsite roads and drains.			√
	Construction of foundations for various equipment as per structural design.			√
Stage 3: Construction of Structures	On site steel bars cutting and bending works at required schedules; commenced at fabrication yard and completed concurrently upon completion of lean concreting.		√	
	Formwork placed layer by layer, maintained by 1.2m (plywood) or 0.6m (metal formwork) each to prevent occurrence of any cold joint.	√		
	Water stop will be placed along the horizontal and vertical construction joints.	√		
	Concreting works using approved concrete from permitted sources upon further inspection by clerk of works (COW). High Alumina cement to be applied at all internal surfaces of tank structures.	√		
Stage 4: Equipment Installations and commissioning	Installations of plant equipment.	√		
	Installation of electricity supply system.	√		
	Testing of each equipment.	√		
	Commissioning of plant.			√
	Monitoring to ensure designed performance and emission compliance.	√		
Project phase: Operation				
SCaRF Operation	Operation of SCaRF and IETS			√
	Operation of SCaRF and APCS			√
	Traffic movement		√	
	Maintenance work	√		
	Amenities	√		

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2.6 STUDY BOUNDARIES

A key part of the potential impact assessment process is to identify the scope to be most affected, so that impact prediction can be made. The potential impacts are as listed above. The boundary of each potential impacts to be studied are summarized below:

No.	Criteria	Boundary of Study Area
1.	Soil erosion and sedimentation	Plant site and infrastructure area.
2.	Water Quality	Within the 5km radius from the proposed project boundary, i.e., the zone of impacts (ZOI) and further along Sg. Baluk.
3.	Waste Management	Within project area

No.	Criteria	Boundary of Study Area
4.	Air Quality	Within project boundary and nearest residential areas
5.	Noise	Within project boundary and nearest residential areas
6.	Landuse	Within the project 5 km ZOI
7.	Topography	Within the project site.
8.	Climate & Meteorology	Gebeng and Kuantan area.
9.	Traffic	Within the 5 km ZOI, for roads and junctions relevant to the project.
10.	Socio-economics	Within the 5 km ZOI.
11.	Terrestrial Flora and Fauna	Within the 5km ZOI

2.7 ASSESSMENT STANDARD

Potential impacts assessments will focus on the environmental components which could be significantly affected due to the project development activities. **Table 2.7(1)** shows the assessment standard for the EIA study for the proposed project.

Table 2.7(1) Assessment Standard for the EIA Study

No	Environmental Component	Assessment Standard
1	Water Quality	• Environment Quality Act, 1974 (EQA,1974) • Environment Quality (Industrial Effluent) Regulation 2009 • Environment Quality (Schedule Wastes Treatment and Disposal Facilities) Regulations 2005 • National Water Quality Standards for Malaysia (NWQS)
2	Air Quality	• Environmental Quality (Clean Air) Regulations 2019 (CAR 2019) • Malaysian Ambient Air Quality Standards, 2020
3	Noise & Vibration	• Guidelines for Environmental Noise Limits and Control 3rd Edition 2019 • The Planning Guidelines for Vibration Limits and Control in the Environment 2nd Edition 2007
4	Hydrology	• Urban Storm Water Management Manual for Malaysia 2nd Edition (DID, 2012). • Hydrological Procedure No. 15, Bahagian Parit dan Taliair,

No	Environmental Component	Assessment Standard
		Kementerian Pertanian Malaysia (DID, 1976).
5	Soil Erosion and LD-P2M2	• Prevention and Control of Soil Erosion and Siltation, Department of Environment, 1999 • Guidance Document for Addressing Soil Erosion and Sediment Control Aspects in EIA Report • Guidelines for Erosion and Sediment Control in Malaysia (DID, 2010). • Urban Storm water Management Manual for Malaysia 2nd Edition (2012).
6	Flora & Fauna	• Malaysian Plant Red List • IUCN's Red List of Threatened Species • Wildlife Conservation Act 2010 (Amendment 2012) for Peninsular Malaysia • IUCN's Red List of Threatened Species
8	Socioeconomics & Public Health	• Questionnaires for nearest residential areas, clinics, schools, etc • Focus group discussions at residential areas • Secondary data assessment
9	Land Use	• Rancangan Tempatan Daerah Kuantan 2035 (Penggantian)
10	Traffic	• Road Traffic Volume Malaysia, JKR 2019

2.8 ASSESSMENT METHODS

The EIA consultants will predict the potential impacts to the environment based on results of the existing environment studies and the effects that the project would potentially impose to the environment. The tools and assessment methodologies that are proposed to be used to conduct the EIA study is described in **Table 2.8(1)**. Sampling and analysis will be carried out, at points as indicated in **Figures 2.8(1) to 2.8(3)** and **Tables 2.8(2) to 2.8(3)**.

Table 2.8(1) Assessment Methods for the EIA Study

No	Component	Assessment Methods
1.	Land Use Survey	• Obtain land use data from Local Plan/ Structure Plan • Verification of the land use during field study and GIS images

No	Component	Assessment Methods
		• Use existing data available from previous studies and historical records
2.	Geology and Soils	• Assess existing conditions, with secondary information from geological map of the area and studies in the area as reference.
3.	Soil Erosion and Sediment Control / LD-P2M2	• The existing soil loss during current condition will be predicted based on USLE estimation as per MSMA requirement, with soil type as stated by the client's civil and structure team. • Soil investigation (SI) data shall be carried out by the client before construction starts.
4.	Hydrology	• The hydrological study shall establish the preliminary baseline information on hydrological characteristics of the study area, including any flood record upstream and downstream of the project site from JPS and other most recent studies in the area as references.
5.	Water Quality	• Preliminary survey carried out to assess water quality based on assessment of water appearance and sources of pollution. • Sampling and analysis carried out by an accredited laboratory. • Parameters analysed are as per list in EQ(IE)R2009, with addition of in-situ parameters of Turbidity and Dissolved Oxygen (DO). • Sampling carried out at 8 points at a single depth of about one (1) meter below the water surface, where possible, at predetermined coordinates, at appropriate points. • Secondary data will also be used as reference to describe existing water quality. • All analysis will follow Standard Methods (APHA) or USEPA Approved Methods for the whole 30 parameters as per EQ(IE)R 2009. • Calculation of WQI carried out based on 6 parameters (Chemical Oxygen Demand, Biochemical Oxygen Demand, Dissolved Oxygen, Suspended Solids, pH and Ammoniacal Nitrogen) • Water Quality Modelling (WQM) carried out with the existing water quality obtained as baseline, for normal and worst case scenarios. • WQM uses the QUAL2K model developed by the United State

No	Component	Assessment Methods
		Environmental Protection Agency (USEPA) which is suitable for small rivers, such as Sg. Baluk, where the waters can be assumed to be completely mixed as it travels.
6.	Air Quality	• Ad-hoc Ambient Air Quality Monitoring (AAQM) carried out by accredited laboratory at identified Air Sensitive Receptors (ASRs) namely at Project Site (A1) and nearest settlement, such as Kg Gebeng, Kg. Sg. Ular, Institut Latihan Perindustrian Kuantan (ILPK Kuantan) and AMSAS (Akademi Maritim Sultan Ahmad Shah). • The criteria air pollutants monitored are the Malaysian Ambient Air Quality Standards (MAAQS) namely PM_{10}, $PM_{2.5}$, NO_2, SO_2, CO and O_3. In addition, Volatile Organic Compounds (VOCs) is also monitored; • The Project stack emission complying to the prescribed limits of the Environmental Quality (Clean Air) Regulations 2019 (CAR 2019**)** is simulated using the AERMOD air quality model with 3-years (2018 to 2020) WRF AERMET ready hourly meteorological data; • The predicted appropriate Maximum Average Incremental Concentration (MAIC) averaging time for the identified criteria air pollutants is added to the Baseline Level (BL) for the calculation Ground Level Concentration (GLC) at the identified ASRs; • The iso-contour overlay with the appropriate basemap is produced for the simulated averaging time; and • The calculated GLCs is compared against mainly the prescribed limits in the MAAQS. In addition, the MAIC from the Project will be compared against the adopted 25% threshold as recommended by the International Finance Corporation (IFC) for sustainable airshed. • Land clearing is of secondary vegetation of low bushes, with disposal of green wastes to the nearest landfill (the Jabor landfill). Construction is in a fairly small area and involves mainly installations of readymade equipment and tanks onto a prepared platform, thus any increase in particulates is expected to be limited to the site, and will be captured by the air quality monitoring.
7.	Noise level	• Noise measurements is carried out at 4 points nearest to the project

No	Component	Assessment Methods
		site. Processes during construction and operation of this plant is expected to be relatively quiet. • The existing noise level parameters, i.e., L10, L50, L90, Lmin, Lmax, LAeq, are measured at the identified sampling locations using calibrated sound level meter.
8.	Socio Economy and public health	• The human environment focuses on communities and land use located within the proposed Project ZOI of 5 km radius to assess the demographic socio-economic characteristics of the ZOI area and their relevance to the proposed project. • Socioeconomic and public health surveys is based on questionnaires and data from institutions in the Gebeng area. • Informal group discussions with the surrounding population will be carried out to: - inform of the project (thus potential for their involvement during construction and operation); - gauge their acceptance or otherwise of the project. • Secondary data will be employed based on other studies, to assess the implications of the proposed project. • The following departments will be sought, where required, for the above data and information: JPBD, Statistic Department, and the Local Government.
	Traffic	• This traffic study will be through the following stages: **a) Inventory review and data collection;** A review will be made of existing data and the need for further collection of any additional traffic will be identified. This is to enable assessment of the situation within the study area. **b) Assessment of Existing Conditions** The existing traffic conditions at and surrounding the project will be established. These will form the base conditions against which future impact from the proposed projects may then be assessed. **c) Evaluation of Traffic Impact** The estimated traffic volume on the surrounding road network will be compared with the road capacity to evaluate the impact of the

No	Component	Assessment Methods
		traffic generated from the proposed project. If the traffic volume is higher than the estimated road capacity, then remedial measures have to be recommended. **d) Recommendation of Remedial Measures** • Recommendation of remedial measures shall include road network improvement program, access to the development, temporary traffic management plan and traffic circulation and parking development activities • Recommended conceptual drawing for remedial measures to assist the other consultant/s team member (i.e. civil & structure engineer, etc.)
9.	Flora and Fauna	• Surveys of existing flora and fauna are carried out by observations, where there are still plants, eg., along Sg. Baluk river banks; • Secondary data from 2021 from detailed surveys of flora and fauna, including phytoplankton, zooplankton and fishes (EIA PDF, 2021), will be assessed and referred to. • To access possibility of maintaining a contiguous river reserve based on JPS guideline along Sg. Baluk: - as a form of enhancing the flora fauna of the area and the river, - as river banks protection along Sg. Baluk. - as water biofilters to protect water quality of Sg. Baluk in the face of rapid development of the Gebeng Industrial Area.

Table 2.8(2) Locations of Water Quality (WQ) Sampling Points and Rationale

Sampling Point	Location	Rationale for Selection
WQ1	4° 0'25.61"N 103°22'39.49"E	On Earth drain before any discharge from SCaRF
WQ2	4° 0'18.56"N 103°22'15.15"E	On Earth drain immediately after SCaRF
WQ3	4° 0'6.56"N 103°21'32.96"E	On earth drain after RE Gebeng, before joining Sg. Baluk
WQ4	4° 0'21.56"N 103°21'7.91"E	On Sg. Baluk before (upstream of) the junction of earth drain with Sg. Baluk; upper river of Sg. Baluk.
WQ5	3°58'56.98"N 103°21'26.11"E	Downstream of confluence of earth drain with Sg. Baluk; upper river of Sg. Baluk.
WQ6	3°57'32.87"N 103°21'47.75"E	Downstream of confluence, middle upper river of Sg. Baluk.
WQ7	3°57'3.75"N 103°21'49.46"E	Downstream of confluence, middle river of Sg. Baluk.
WQ8	3°56'38.29"N4 103°22'21.13"E	Downstream of confluence, middle lower river of Sg. Baluk.

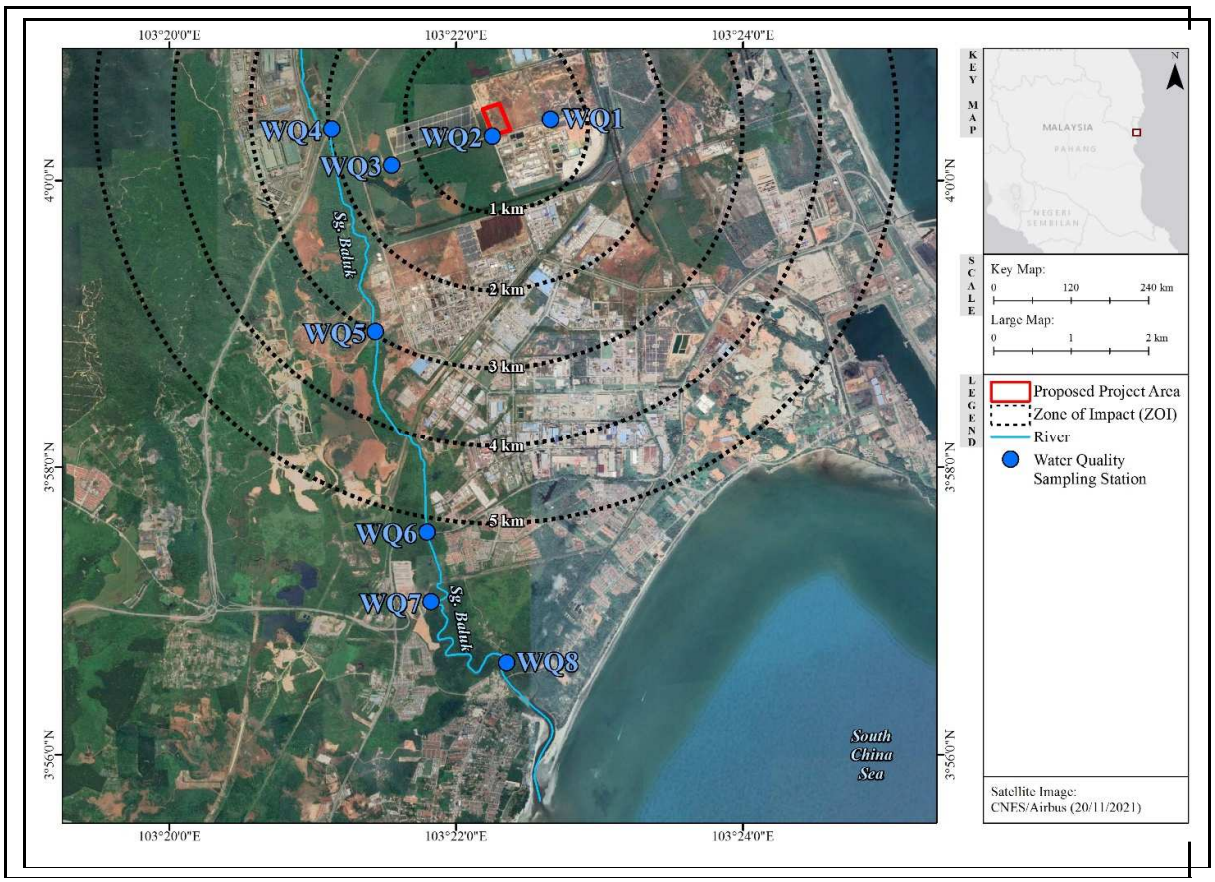

Figure 2.8(1) Sampling Locations for Water Quality

Table 2.8(3) Locations of Air Quality (A) and Noise (N) Sampling Points and Rationale

Sampling Point	Location	Rationale
A1 & N1	4° 0'26.97"N 103°22'17.61"E	At SCaRF site
A2 & N2	4° 2'31.56"N 103°23'36.43"E	At coastal residential villages, Kg. Sg. Ular
A3 & N3	4° 0'45.01"N 103°24'23.58"E	At seaside residential area, east of the SCaRF site.
A4	3°57'58.00"N 103°22'27.03"E	Next Institut Latihan Perindustrian Kuantan (ILPK), south of the site.
A5 & N4	4° 1'21.48"N 103°22'28.99"E	At Akademi Maritim Sultan Ahmad Shah (AMSAS), north of the SCaRF site.
A6	4° 0'3.03"N 103°20'58.58"E	In front of Malaysia China Kuantan Industrial Park (MCKIP), west of the SCaRF site

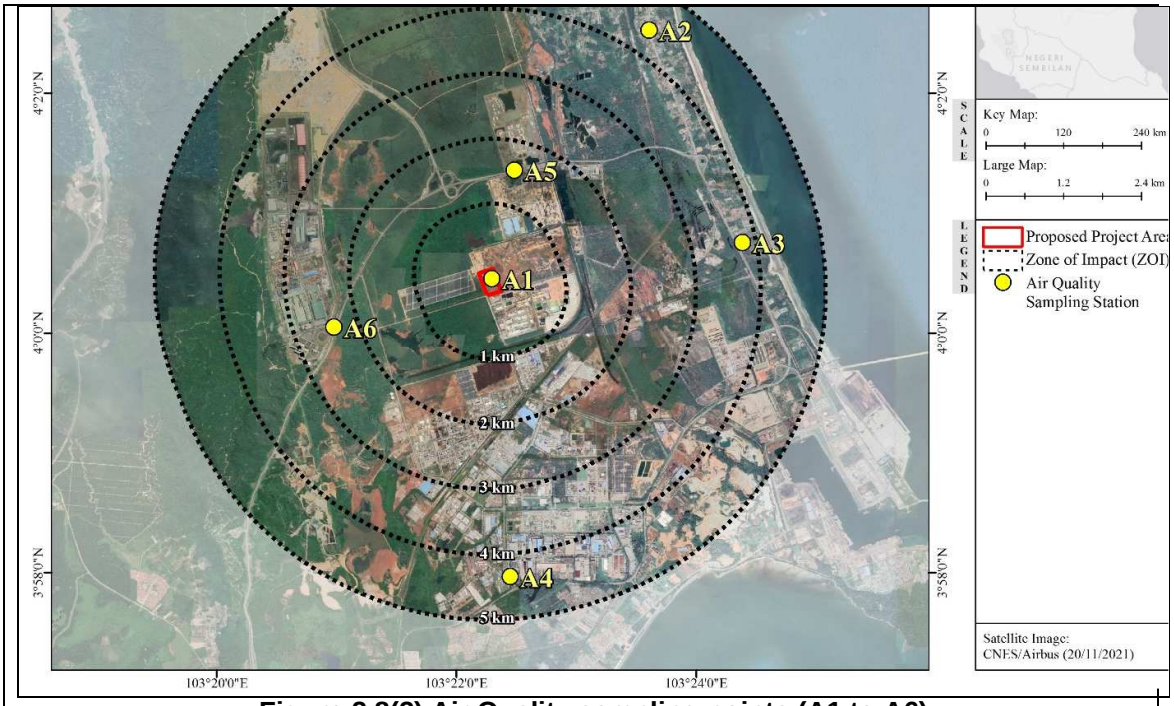

Figure 2.8(2) Air Quality sampling points (A1 to A6)

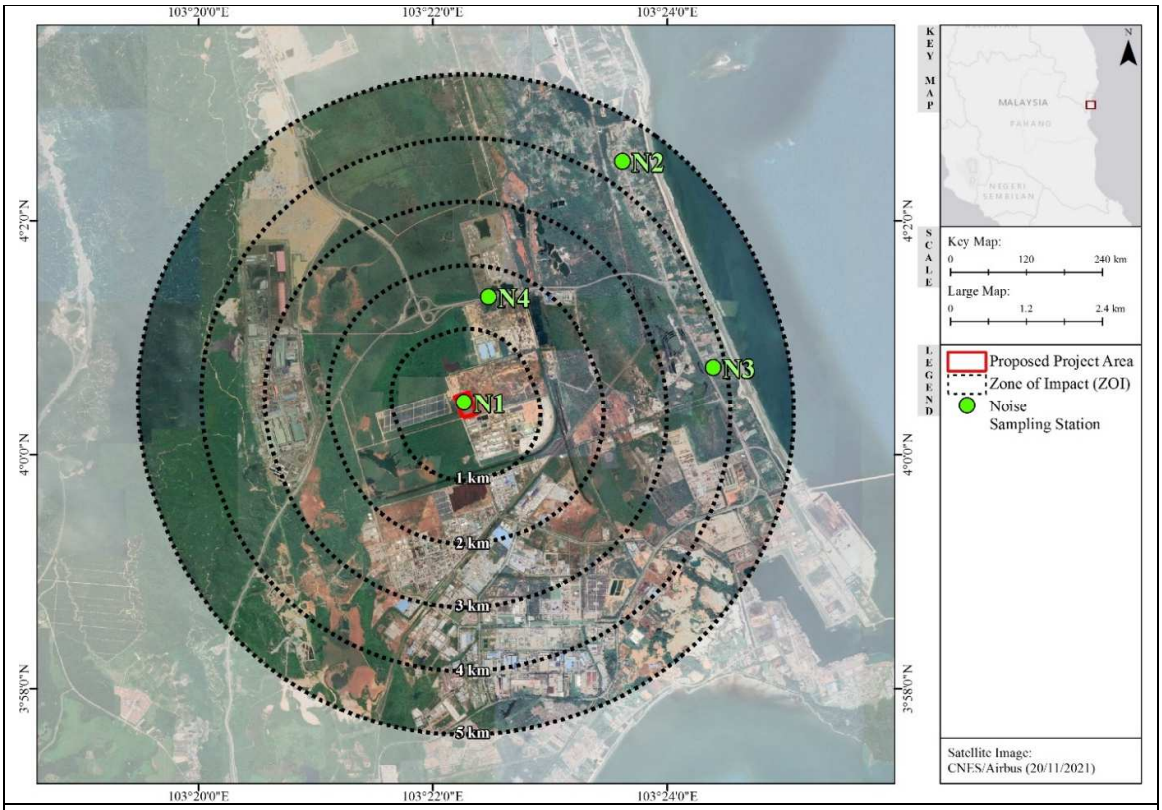

Figure 2.8(4) Locations of Noise level sampling points (N1 to N4)

2.9 MITIGATION MEASURES

Having identified (scoped) the activities with potentially significant impacts in this proposed project as given in **Table 2.5(1)**, the potential impacts are assessed in this EIA report (**Chapter 7**) and mitigating measures are proposed (**Chapter 8**).

2.10 CONCLUSION ON SCOPING

This project involves typical slow roasting of used catalyst to oxidise molybdenum (Mo) and vanadium (V) into soluble oxides so that they may be dissolved and separated from the main bulk of the used catalyst sediments. Thereafter the Mo and V solutions are enriched before the Mo and V are precipitated out. The whole process involves well known unit operations and should not pose significant environmental impacts if the processes are well managed at all times. The same type of process is being successfully operated in Ako City, Japan, by Taiyo Koko. The project proponent, Taiyo Koko, is a well-established company in Japan, thus is the best choice for this kind of project. The Mo and V are in increasingly high demands due to developments of high efficiency and capacity components for electric vehicles, wind turbines, etc., and are being mined, in China, South Africa, etc. causing environmental damages. This recovery by SCaRF from used catalysts available in Malaysia, using natural gas available on pipeline at the site (thus is a clean and safe process), will create a renewable source of these valuable metals. With proper mitigating measures and guided by the successful operations as in Ako City SCaRF plant, it can be seen that the benefits of recovering valuable metals from a waste will far outweigh the potential impacts.