COASTAL CANNING AIRBORNE SURVEY
EP SUMMARY
STP-SPA-0072

November 2018

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1. Introduction

1.1 Scope and Purpose

Goshawk (Canning Basin) Pty Ltd ('Goshawk' or 'the company') is a privately owned Australian company focused on exploring and developing petroleum resources in the Canning Basin in north-west Western Australia. Goshawk is operator of the "Squadron Goshawk Joint Venture", a joint venture between Squadron Energy Pty Ltd and Goshawk.

As part of its 2018 exploration work program, Goshawk proposes to conduct a number of aerial surveys in the Canning basin, one of which is the Coastal Canning Airborne Survey (Figure 1-1). The four other surveys are subject to separate applications and EPs.

This document is a summary for the Environment Plan (EP-0072-001) covering part of the airborne survey operations named the Coastal Canning Airborne Survey (SOP-SYA-0160), which will acquire up to 2,935-line km of data. The survey will be located within Special Prospecting Authority application area STP-SPA-0072.

Goshawk will be employing CGG Aviation (Australia) Pty Ltd to conduct the airborne survey and acquire the data. Goshawk is the custodian of this EP and has overall responsibility for its implementation, compliance and revision.

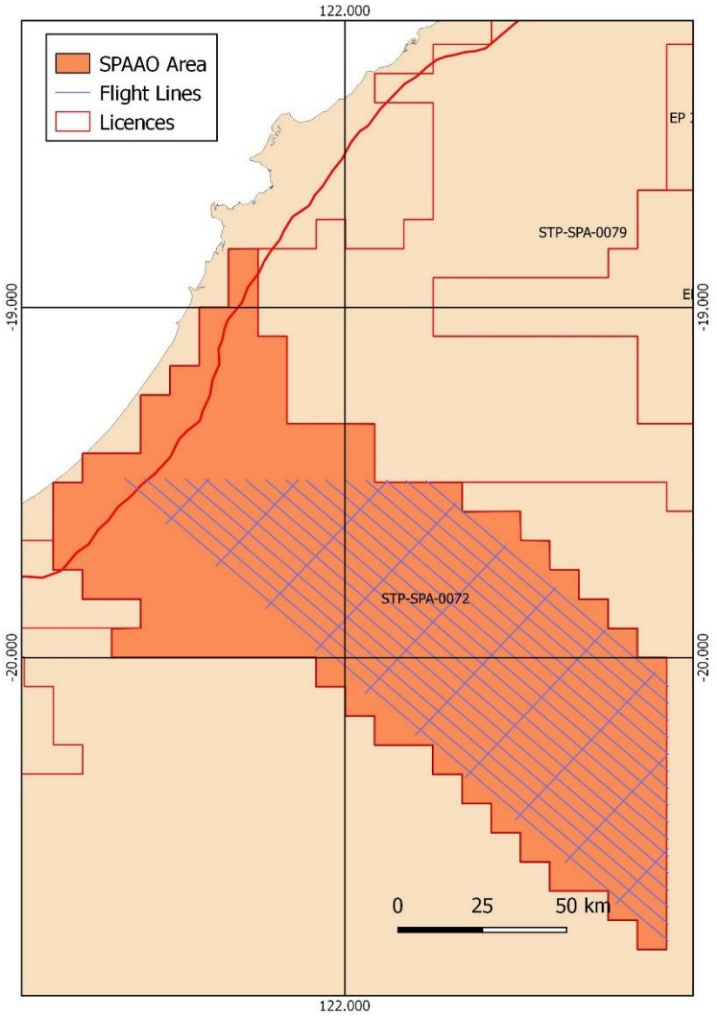

Figure 1-1: Location Figure

1.2 Nominated Operator

The nominated operator of the Coastal Canning Airborne Survey will be Goshawk (Canning Basin) Pty Ltd on behalf of the Joint Venture Applicants Squadron Energy Pty Ltd and Goshawk (Canning Basin) Pty Ltd.

The Operator has been nominated through the SPAAO Application form submitted to the Department of Mines and Petroleum.

Nominated Operator contact details are the following:

Instrument holder(s): Squadron Energy Pty Ltd and Goshawk Energy (Canning Basin) Pty Ltd – as joint venture partners

Licence/Permit: STP-EPA-0072 - SOP-SYA-0152

Contact person (on behalf of joint ventures): Richard Barker, Company Secretary

Address: 4/189 Stirling Hwy, Nedlands, WA, 6009

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2. Description of the Activity

2.1 Location and Tenure

The Coastal Canning Airborne Survey Area (Survey Area) sits within the Shire of Broome and Shire of East Pilbara, over a mixture of Unallocated Crown Land (UCL) and Pastoral Lease land. The closest town is Broome, 131 km north.

The proposed survey work over the SPA-AO area comprises the areas bounded by the co-ordinates below:

Coastal Canning	
Easting	**Northing**
419848	7843801
491415	7779919
491396	7698134
327135	7843923

2.2 Survey Specifications

The survey will encompass up to approximately 2,935 line km within the proposed survey area.

The survey will be a passive survey (gravity gradiometric, magnetic & navigational sensors only) and will be acquired using a fixed wing single engine aircraft flown to a minimum altitude of 80m (subject to onsite reconnaissance survey).

The survey aircraft provided by CGG will be a Cessna 208 Grand Caravan will be equipped with passive monitoring equipment and ground support systems.

There will be only very limited and transient impact to land receptors, with the aircraft travelling at a minimum of 65m per second.

Flight operations will operate daily from Broome Airport and strictly only occur during daylight hours.

When ferrying to the survey area of over any built-up/populated areas, the aircraft will never fly lower than 305m and in compliance with CASA requirements, standard aeronautical charts and aviation law (e.g. airports & towns).

Traverse lines will be acquired on a 132 degree angle, while tie-in lines will be acquired on a 90 degree angle (i.e. East-West). Traverse line spacing for the survey is 4,000 m, with tie line spacing of 25,000m.

The acquisition will be completed within approximately 2 to 4 weeks.

3. Description of the Environment

3.1 Bioregion & Landforms

The survey area is located within two bioregions: Dampierland bioregion in the north-west and Great Sandy Desert in the south-east of the survey area. The Dampierland bioregion is characterised by extensive plains, ranges and gorges. Vegetation is predominantly characterised by acacia thickets with scattered trees and areas of grasslands and savannas (Bastin, 2008). The Great Sandy Desert bioregion is characterised by red sand plains, dunefields and remnant rocky outcrops. Vegetation is predominantly spinifex grasslands, low woodlands and shrubs (Bastin 2008).

The survey area boundary aligns with Eighty Mile Beach. The Gascoyne River is located in the centre of the survey area, flowing from the south-east of the area towards the ocean. The survey area is located above the Mandora Salt Marsh, an important part of the Eighty Mile Beach RAMSAR wetland. Mandora Salt Marsh comprises of a series of floodplain depressions within a linear dune system (Semeniuk and Semeniuk 2000).

3.2 Climate, Air Quality and Noise

The survey area has a semiarid to tropical climate with monsoonal conditions experienced during summer months.

Rainfall in the region is highest during the summer months, with heavy falls associated with tropical cyclone activity. Evaporation in the region is high, with a daily average of 9.5mm in November.

Overall, the survey area is expected to extremely good air quality as it has a sparse population and subsequent low level of air pollutant emissions.

Dust and noise levels within the aerial survey are likely to reflect natural ambient levels given the areas extreme isolation and lack of inhabitation, industry or human activities.

3.3 Biological Environment

Given the airborne nature of the survey, this section focuses on fauna species with a conservation status that may occur within the airspace (above 80m in altitude) of the proposed survey area and surrounds, specifically birds and other flying species. Other protected fauna and flora are included for context only.

The EPBC Protected Matters Search Tool identified the following:

- A total of 12 threatened bird species which may or are likely to occur within the area, 3 of which are known to roost in the survey area;
- 3 threatened terrestrial mammal species of which one is the endangered northern quoll (*Dasyurus hallucatus*) which is likely to occur within the survey area;
- One terrestrial reptile, northwest coastal ctenotus (*Ctenotus angusticeps*), which is vulnerable and who's habitat may occur within the area;
- 42 migratory bird species of which 7 are migratory marine bird species, 4 are migratory terrestrial bird species and 31 migratory wetland species. 6 of these wetland species are threatened and may occur / are known to roost within the survey area; and
- A total of 52 listed marine bird species of which 8 are threatened and may occur within the survey area.

The WA NatureMap database identified 152 species within the area of which 10 are threatened fauna or priority flora species. Of these 10 species, the bilby (*Macrotis lagotis*) is identified as rare or likely to become extinct. One, a small spider *Storena paucipunctata*, is endemic to the survey area.

The BirdLife International Important Bird and Biodiversity Areas (IBA) mapping tool has been used to show that there are no IBAiD (IBA in Danger) sites reported within the proposed survey area (BirdLife, 2018).

3.4 Native Title & Indigenous Heritage

Native Title Determinations in the survey area include:

- Kara Jarri People (Area A)
- Kara Jarri People (Area B)
- Nyangumarta People (Part A)
- Nyangumarta Kara Jarri Overlap Proceeding (Yawinya)

Eight registered Aboriginal Sites are located within the survey area. A large proportion of the survey area is also designated as Indigenous Land Use Agreement (ILUA) areas.

The EPBC Protected Matters Search Tool identified no commonwealth heritage places within the survey area.

Section 6.0 describes the consultation undertaken with Native Titleholders. Meetings have been held with all claimants, and all objections are being lifted through the National Native Title Tribunal. Goshawk will maintain consultation with native title claimants through their representatives in relation to any future land access (if required), sensitive sites and heritage values associated with its SPAAO.

3.5 Socio-Economic Environment

The survey area is located in unallocated crown land and pastoral lease land. The staging airport in Broome and part of the access route to the survey area is within the Shire of Broome.

The main regional industries being tourism, mining and mineral exploration. The closest population centre is Broome approximately 131 km north.

A large portion (73%) of the Dampierland bioregion is grazed, reducing to a much smaller portion (7%) in the Great Sandy Desert bioregion. Agriculture is focused around the river and wetland areas associated with the Gascoyne River. A portion of the western side of the survey area is within pastoral lease land (Anna Plains and Nita Downs).

3.6 Conservation Areas and Reserves

There are several conservations areas within the survey area:

- The survey area lies within two conservation management zones: the North Australian Tropical Savanna Woodland to the north and the Arid Shrublands and Desert to the east.
- The survey overlaps an area delineated as - System 7 (named the Edgar Range Area) which is also a defined Schedule one clearing area and an Environmentally Sensitive Area
- There are no Threatened Ecological Communities (TEC) within the survey area however monsoon vine thickets occur on the coastal sand dunes of the Dampier Peninsula (approximately 1km away) which are classified as a KEF (DoE, 2018).
- The coastline adjacent to the survey area is part of the Eighty Mile Beach RAMSAR site, which also includes the Mandora Salt Marsh area located within the survey area.
- The north-west section of the survey area lies within the Mandora Marsh and Anna Plains Important Bird Area (IBA).

4. Environmental Risk Assessment

The planned and potential interactions between the described activity, the aspects triggered, and the described environment represent a source of risk (or impact) which has potential to affect the described environment.

Given the entirely airborne nature of the survey, impacts to the following receptors are not considered credible:

- Bioregions and landforms
- Climate
- Listed Heritage Places

These have not been included in the impact assessment.

With respect to traditional landowners, Goshawk will continue to consult with all native title claimants in relation to land access, sensitive sites, heritage values and planned cultural activities.

The environmental hazard identification and risk assessment process applied to the airborne geophysical survey is based on Goshawk's internal environmental risk assessment method and the principles of standard AS/NZS ISO 31000:2009 (AS/NZS 2009).

The risk assessment process is comprised of the following components:

- Establish the context for the assessment by defining the activity and associated environmental aspects
- Identifying the impacts or risks associated with the environmental aspects
- Identifying the environmental and social values and sensitivities with the potential to be exposed to the impact or risk
- Evaluate the potential impact (consequence);
- Identify control measures;
- Evaluate the likelihood of the impact (consequence) occurring;
- Assigning residual risk rating (after control measures are implemented) utilising the Goshawk risk matrix.
- Evaluate the acceptability of the potential impact or risk.

Risk is expressed in terms of a combination of the consequence of an impact and the likelihood of the impact occurring. Goshawk uses a Risk Matrix (Table 4-1) to plot the consequence and likelihood to determine the level of risk.

Table 4-1: Goshawk Risk Matrix

Consequence Level		Likelihood				
		Highly Unlikely	Unlikely	Possible	Likely	Highly Likely
		A	B	C	D	E
0	No Impact	L	L	L	L	L
1	Slight	L	L	M	M	M
2	Minor	L	M	M	H	H
3	Moderate	M	M	H	H	E
4	Major	M	H	H	E	E
5	Massive	H	H	E	E	E

Table 4-2: Goshawk Rating Descriptions

Risk Rating	Priority	Description of Risk Level
Extreme	1	Situation critical. No work to be undertaken without developing significant control measures.
High	2	Situation dangerous. No work to be undertaken without developing additional control measures.
Moderate	3	Proceed with caution and ensure all existing control measures are implemented. Identify additional control measures if possible.
Low	4	Situation acceptable. Proceed with care and ensure all control measures are implemented.

The Environmental Risk Assessment (ERA) is summarised in Table 4-3.

Table 4-3: Environmental Risk Assessment Summary

Activity	Aspect	Potential Impact	Inherent Risk C	L	R	Control Measures	Residual Risk C	L	R
Survey Operations	Noise, vibration and visual presence	Disturbance to fauna	1	D	M	• Implementation of CGG HSE&Q MS and use of experienced pilots. • Daytime operations only. • An additional co-pilot or observer can be assigned should the detailed pre-survey area hazard reviews identify the need for spotting.	1	B	L
		Disturbance to landowners and stakeholders	1	D	M	• No flying at altitudes lower than 80m in any location and 305m in built-up areas or other sensitive location. CGG follow requirements of CASA compliant aeronautical charts and have low altitude permit in place covering such activities. • Stakeholder communication strategy to notify potential sensitive receptors along proposed flight paths. Local government authorities, aboriginal communities and pastoral managers to be targeted (if applicable) and newspaper adverts for general consultation. • Detailed flight plan (lines and altitudes) will be revised in accordance with stakeholder and environmental sensitivity review prior to commencement of survey, as part of Project Safety Plan sign-off process. • Standard Aviation communication systems and protocols: Notification to Airmen (NOTAM), Fire Common Traffic Advisory Frequency (F-CTAF). • Short duration, low intensity and transient nature of the activity	1	B	L
	Atmospheric Emissions	Change in air quality	1	B	L	• Use of reputable aviation contractor with adequately serviced aircrafts • CGG HSE&Q MS and maintenance procedures and schedule. • CASA Certifications and Aircraft registration requirements	0	B	L
	Collision with Fauna	Injury or mortality to fauna	2	B	L	• No flying at altitudes lower than 80m in any location and 305m in built-up areas or other sensitive location. CGG follow requirements of CASA compliant aeronautical charts and have low altitude permit in place covering such activities. • Bird scaring propeller fitted on aircraft • Daytime operations only.	2	A	L

Activity	Aspect	Potential Impact	Inherent Risk C	L	R	Control Measures	Residual Risk C	L	R
						• An additional co-pilot or observer can be assigned should the detailed pre-survey area hazard reviews and feedback from environmental agencies identify the need for spotting. • Short duration and transient nature of the activity. • Regional DPAW advice relating to specific sensitivities, populations or species to be passed on to CGG pilots as part of detailed flight planning. • Implementation of CGG HSE&Q MS and use of experienced pilots.			
	Emergency Landing, leading to ground damage / fire	Damage to habitat	3	B	M	• Use of reputable aviation contractor with adequately serviced aircrafts • Selection of suitable aircraft type for operations • CGG HSE&Q MS and maintenance procedures and maintenance schedule. • CGG pilot training, experience and competencies. • Detailed pre-survey stakeholder consultation process undertaken for each survey area. • Daily reports and regular weather checks throughout survey. • Pre-survey area Hazard Reviews, Project Safety Plan (PSP) and reconnaissance flights conducted prior to commencement of activities. • Standard Aviation communication systems and protocols: Notification to Airmen (NOTAM), Fire Common Traffic Advisory Frequency (F-CTAF). • Presence of regional airstrips nearby all survey areas that can be used in the unlikely event where emergency landing is required. • CGG Emergency Response Plan & Coastal Canning Emergency Response Contact List. • Additional response and support from regional authorities (DFES and SES) can be triggered under WestPlan – AirCrash, WestPlan – HAZMAT and WestPlan – Marine Oil Pollution.	2	A	L
		Damage to infrastructure	3	A	M		2	A	L
		Disturbance to fauna	1	A	L		1	A	L
		Disturbance to landowners and stakeholders	3	B	M		2	A	L

Activity	Aspect	Potential Impact	Inherent Risk C	L	R	Control Measures	Residual Risk C	L	R
Survey Operations / Refuelling	Accidental release of hydrocarbons	Damage to habitat	2	B	M	• Use of reputable aviation contractor with adequately serviced aircrafts • Selection of suitable aircraft type for operations • CGG HSE&Q MS and maintenance procedures and maintenance schedule. • CGG pilot training, experience and competencies. • Detailed pre-survey stakeholder consultation process undertaken for each survey area. • Daily reports and regular weather checks throughout survey. • Pre-survey area Hazard Reviews, Project Safety Plan (PSP) and reconnaissance flights conducted prior to commencement of activities. • Standard Aviation communication systems and protocols: Notification to Airmen (NOTAM), Fire Common Traffic Advisory Frequency (F-CTAF). • Presence of regional airstrips nearby all survey areas that can be used in the unlikely event where emergency landing is required. • CGG Emergency Response Plan & Coastal Canning Emergency Response Contact List. • Additional response and support from regional authorities (DFES and SES) can be triggered under WestPlan – AirCrash, WestPlan – HAZMAT and WestPlan – Marine Oil Pollution.	2	A	L
		Contamination of ground water or waterways	3	A	H		2	A	L

5. Implementation Strategy

Environmental management is an integral part of Goshawk exploration activities and includes the following elements as shown below, to ensure that the environmental impacts and risks are reduced to ALARP and environmental management is undertaken.

For the Coastal Canning Airborne Geophysical Survey, Goshawk Environmental Management includes the elements shown in Figure 5-1.

Figure 5-1 Main components of the Environmental Management Implementation Strategy for the Coastal Canning Airborne Geophysical Survey

Goshawk's commitment to conduct activities in an environmentally responsible manner and implement systems and procedures to support this is demonstrated through the Goshawk Environment Policy.

To support this commitment, Goshawk have selected an Airborne Survey Contractor (CGG) with a mature Health, Safety & Environment Management System (HSEMS). CGG will conduct this survey in accordance with their HSEMS. Furthermore, CGG will provide the survey services under the professional project management standards, ISO 9001:2000 certified quality management system standards, and OHSAS 18001 certified safety management system standards. CGG is also a member of the International Airborne Geophysics Safety Association.

The outcomes of this ERA have driven the definition of environmental performance objectives and standards, and associated measurement criteria. Clearly defined roles and responsibilities allow Goshawk and CGG to ensure that environmental management is implemented adequately.

A monitoring and review program will be implemented to ensure ongoing assessment of compliance with procedures and the achievement of objectives including a system of reporting for recording of data and notification of incidents. An Emergency Response system must also be in place, suited for the scope of activities.

The environmental management system is supported by ongoing consultation and communication to seek input from, and inform, all parties of relevant issues.

6. Stakeholder Consultation

Goshawk has undertaken stakeholder consultation as part of its planning for the proposed airborne geophysical survey. The aim of the consultation program is to inform stakeholders of the planned activities, and to identify any unforeseen risks, conflicts, concerns, management strategies and positive benefits.

Detailed records of stakeholder consultation relating to government relations, public relations, HSE matters, complaints and other matters are being maintained in the Goshawk Project Stakeholder Register.

The stakeholder consultation program commenced in 2015. Stakeholders were identified using an established process, which considered the potential impacts or risks of the activity on each stakeholder. At the time of writing, Goshawk has consulted with the following stakeholders:

- Native Title holders;
- DPAW Environment Protection Branch, Head Office and Broome Work Centre;
- Department of Mines and Petroleum (DMIRS), Petroleum Environment and Titles Branches;
- Native Title Representative Bodies;
- Kimberly Regional Economic Development (KRED) Enterprise;
- Local Councils/Shires from which flights will be based; and
- Pastoralists.

DPAW and DBCA identified that the planned aerial survey location and timing may coincide with a planned aerial pest management control program over the DBCA managed Walyarta Conservation Park, however further discussion confirmed that no interaction was expected.

No other issues have been raised ~~to date~~.

The following additional consultation processes will also be undertaken closer to commencing the survey:

- WA Department of Fires and Emergency Services (DFES) Air Desk
- Aboriginal communities found around the survey area will be notified of upcoming survey no less than a month prior commencement of activities.
- Civil Aviation Safety Authority (CASA): CGG to issue general NOTAM (Notice to Airmen) one week prior to commencing the survey.
- Civil Aviation Safety Authority (CASA): CGG pilots to review any NOTAMS issued by other users and F-CTAFs (Fire Common Traffic Advisory Frequency) in the days prior to commencing the survey for specific areas (this is part of the regular CGG Project Safety Plan and flight planning process).

Any public or other stakeholder queries that may arise prior to commencement of the survey will be promptly addressed.

Consultation is ongoing, and Goshawk will maintain the engagement processes during project planning and execution phases. A summary of all interactions will be available at the end of project.

7. REFERENCES

Bastin,G (2008). Rangelands 2008: Taking the Pulse. Australian Collaborative Rangeland Information System - National Land & Water Resources Audit. Canberra ACT.

DoE (2018). Protected Matters Search Tool. Commonwealth of Australia, Department of Environment (DoE). Available: http://www.environment.gov.au/epbc/pmst/

Semeniuk, C. and Semeniuk, V., 2000, Wetlands of the north western Great Sandy Desert, unpublished, Perth