Shorebird Monitoring Program
Lee Point Master-planned Urban Development
DEFENCE HOUSING AUSTRALIA

www.ecoz.com.au

DOCUMENT CONTROL RECORD

Job	EZ22045
Document ID	219317-21
Author(s)	Amanda Lilleyman (CDU) Updated by Nerida Liddle (EcOz)

DOCUMENT HISTORY

This monitoring program was prepared in 2017 by Dr Amanda Lilleyman (CDU) as chapter 4 in a *Report on potential impacts from disturbance to migratory shorebirds in Darwin: Defence Housing Australia, Lee Point Master-planned Urban Development* which was an appendix of the EIS for the project.

For submission with a development application, a few minor changes have been made to contemporise this version of the program. These include reference to the NT EPA's recommendations and inclusion of specific timeframes.

Rev	Reviewed by	Approved by	Issued to	Date
1	Glen Ewers	Glen Ewers	Chris Grimm	28 September 2022

Recipients are responsible for eliminating all superseded documents in their possession.

EcOz Pty Ltd.
ABN: 81 143 989 039
Level 1, 70 Cavenagh Street
DARWIN NT 0800
GPO Box 381, Darwin NT 0800

Telephone: +61 8 8981 1100
Email: ecoz@ecoz.com.au
Internet: www.ecoz.com.au

TABLE OF CONTENTS

Tables

Figures

Appendices

1 CONTEXT

Through the environmental approvals' process, it was identified that the Lee Point Master-planned Urban Development project now being undertaken by Defence Housing Australia (DHA) has the potential to impact migratory shorebirds through increased anthropogenic disturbance (due to a significant increase in the number of beach users) to the important roosting and feeding site Sandy Creek, on the northern beaches of Darwin, Northern Territory. As noted in the Environmental Impact Statement (EIS) for this proposal, this site is classified as nationally important and supports populations of migratory shorebirds listed under the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*). It also supports internationally-important numbers of a Critically Endangered species – the Great Knot.

In its assessment report for this project, the Northern Territory Environment Protection Agency (NT EPA) provided the following recommendation:

> *Recommendation 3*
>
> *That approvals for the proposal should include a condition that requires DHA to develop and implement a monitoring program to quantify impacts from the Proposal on local shorebirds. The program is to be designed in consultation with Flora and Fauna Division, Department of Environment Natural Resources, and Wildlife and Heritage Division, Department of Tourism and Culture Parks, and implemented before commencement of construction activities. Results and annual updates from the program should be made publicly available on the internet. (NT EPA 2018)*

The EIS had as Appendix N a comprehensive report by Dr Amanda Lilleyman (Charles Darwin University) entitled *Report on potential impacts from disturbance to migratory shorebirds in Darwin: Defence Housing Australia, Lee Point Master-planned Urban Development.* Chapter 4 of that report contained a monitoring program. That program has been duplicated in this document, with a few minor changes made to contemporise this version of the report. These include reference to the NT EPA's recommendations and inclusion of specific timeframes.

This monitoring program has been designed in consultation with Brydie Hill from the Flora and Fauna Division, of the Department of the Environment, Parks and Water Security, and Dean McAdam from the Parks and Wildlife Division. Their assessment of this program is that the methodology proposed has been determined adequate for detecting impacts to shorebirds from this development.

2 MONITORING PROGRAM

This monitoring program has been developed to detect any significant changes in shorebird usage of Sandy Creek that are attributable to the impacts of the development and not external or regional factors. Therefore, the program intensively surveys two sites (Sandy Creek and Lee Point) that are expected to be exposed to higher rates of anthropogenic disturbance as a result of the DHA housing development. Three additional sites are surveyed (Nightcliff Rocks, East Point and Spot on Marine) so that the wider Darwin region shorebird population is adequately surveyed.

It is important that any variation in species and abundances are detected over the migration months. Therefore, all months during the austral summer season when shorebirds are expected to occur in Darwin are included in the monitoring program. The population of shorebirds in Darwin varies over the summer months and it is important to monitor those months – which include the southern migration period, the core non-breeding period and the northern migration period.

Monitoring data from this period will be compared against BirdLife Australia's Shorebirds 2020 data and the data presented in the EIS (Appendix N) to detect any local changes to shorebirds at the monitoring sites.

The uptake of houses in the DHA development area will be staggered and so the increased use of the Casuarina Costal Reserve, Sandy Creek and Lee Point beaches will take some time. Consequently, this monitoring will commence once development of the western (i.e. coastal) side of the development commences. A monitoring period of five to ten years should be sufficient to detect local changes to the shorebird population that are due to the DHA housing development.

The survey methodology outlined in section 2.1 exceeds *EPBC Act* survey requirements for detecting migratory shorebirds as outlined in the *EPBC Act Policy Statement 3.21* – see Table 1 for survey guidelines (Commonwealth of Australia 2015; DEWHA 2009). The outcomes of the monitoring program will be reviewed and evaluated using the steps outlined in Figure 1. Resources for the monitoring program are listed in Appendix A.

The aim of the monitoring program is to quantify the magnitude of impact of disturbances to migratory shorebirds associated with the proposal (Commonwealth of Australia 2015). A significant impact on the regional population of migratory shorebirds would be:

1) a decrease in the size of the population that visits the northern beaches of Darwin each year that cannot be reasonably attributed to other factors or broader population trends and;
2) an increase in the number of disturbances (> 10 per survey session) that these shorebirds are exposed to at the monitoring sites.

Table 1. Survey guidelines for migratory shorebirds set out in the *EPBC Act* Policy Statement 3.21 (Commonwealth of Australia 2015)

Coverage	Timing	Effort	Minimum data requirements
• All of the habitat thought to be used by the same population of shorebirds. • The entire area of contiguous habitat where shorebirds may occur.	• The months when the majority of migratory shorebirds are present in the area. • Numbers of shorebirds may vary during these months, particularly in the north of the country, due to presence of additional shorebirds during inbound and outbound migration at the beginning and end of the non-breeding season. Local knowledge should be sought to determine optimum survey times. • The northern hemisphere breeding season (mid – April to mid – August) to obtain data on nonbreeding non-migrating populations of immature migratory shorebirds.	• Four surveys for roosting shorebirds during the period when the majority of shorebirds are present in the area. • Replicate surveys over this period are important to measure population variability. Some areas will meet the importance criteria only during the migration periods when many birds are temporarily stopping over. In most cases, one survey in December, two surveys in January and one survey in February will be adequate.	• Shorebird statistics relating to roosting areas: total abundance (total number of birds present across all species); species richness (number of species observed); species abundance (number of birds of each species present). • Shorebird behaviour: activity (roosting, foraging); foraging location (spatial data of the area used by shorebirds for feeding to enable mapping of foraging habitat). • Survey conditions: date, time of day; tide height; weather conditions (temperature, precipitation, wind speed & direction). • Number of observers and experience level. • Method used to conduct the survey. • The following habitat characteristics may also be useful: dominant landform type; hydrology; dominant terrestrial and aquatic vegetation types; intertidal substrate characteristics; invasive species; current disturbance regime; presence of suitable nocturnal roosting areas.
	• Surveys for roosting shorebirds should be conducted as close to the time of high tide as practicable and at a maximum of no more than two hours either side of high tide (unless local knowledge indicates a more suitable time).	• One survey during the northern hemisphere breeding season to capture data on birds that remain in Australia during the breeding season.	

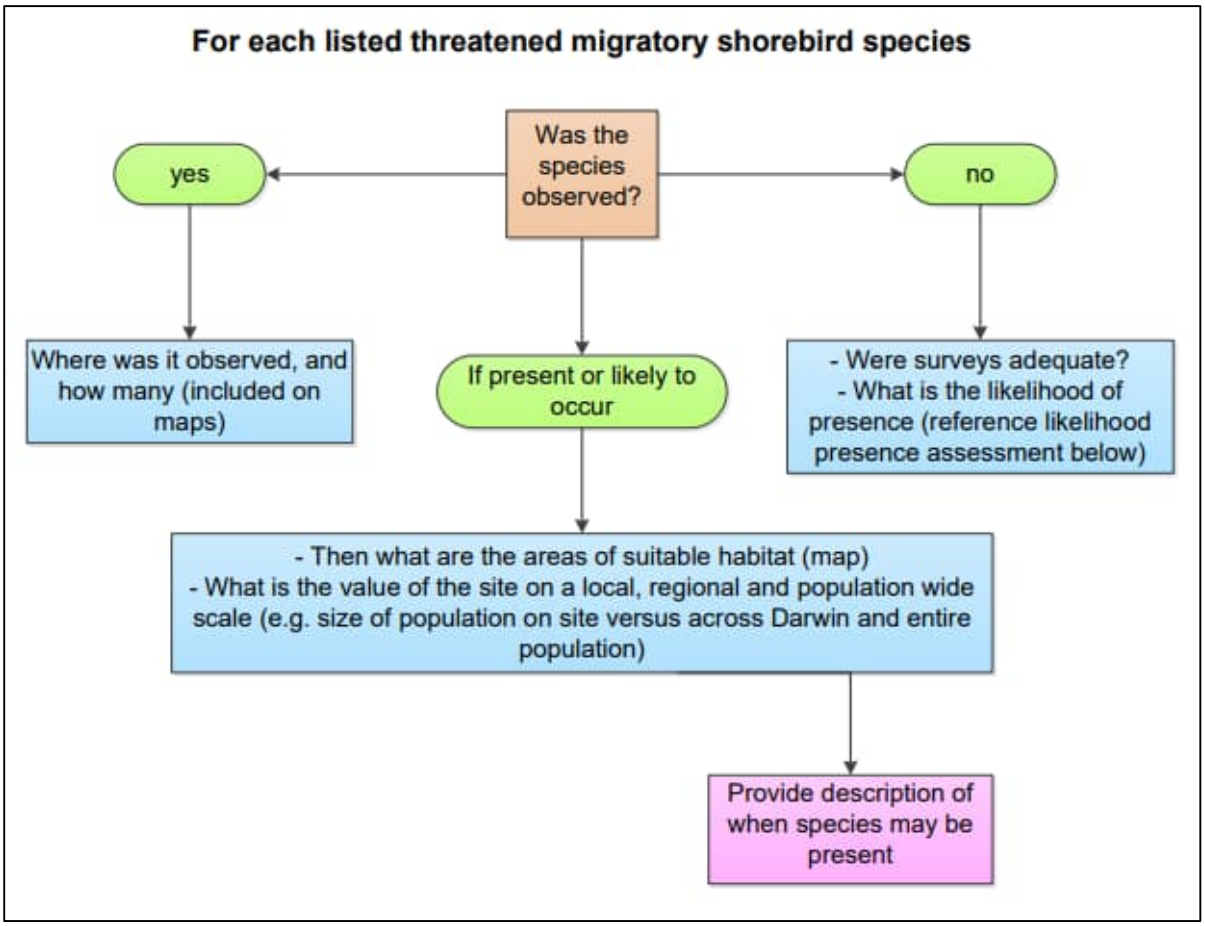

Figure 1. Flow chart for evaluating monitoring survey program for migratory shorebirds

2.1 Methodology

The shorebird monitoring program should consist of one survey per month from September through to April each austral summer season at the following sites: Sandy Creek and Lee Point [performed simultaneously – e.g. two personnel]; East Point; Nightcliff Rocks; and Spot on Marine (Table 2; see Appendix A for suggested resources). Migratory shorebirds begin arriving in Darwin from August and depart as late as May the following year. An additional survey in July each year should be performed at all monitoring sites to capture information on shorebirds that remain at the survey sites during the northern hemisphere breeding season.

The surveys should be performed at high tides of > 6.5 m during the spring tide cycle and during daylight hours. Surveys should be conducted two hours either side of the peak of the high tide. The semi-diurnal tides mean that two high tides occur per day, usually with one in the morning (sunrise) and one in the evening (sunset). Surveys should be conducted for a minimum duration of two hours. All shorebirds and all other waterbirds should be identified and counted. Shorebird activity should be recorded (foraging, roosting). The start and end time of the survey should be recorded. Any changes to the environment should be recorded.

Surveys can be performed by one person (the observer) per site. The observer should be competent in shorebird identification and counting techniques. The observer should perform the survey from a distance of 100 m or more so as not to cause a disturbance. The observer should use binoculars and a zoom spotting scope of 20 – 60 x magnification. Survey areas for Lee Point and Sandy Creek are outlined in Figure 2 and the other three sites are shown in Figure 3.

All disturbances and potential disturbances to shorebirds and other birds should be recorded. If the disturbance stimulus is close enough to the flock of birds it should be recorded as a disturbance and the response (flight, walking away, no response) of the birds should be recorded. If the disturbance stimulus is

not close enough to cause a disturbance, then it should be recorded as a potential disturbance (i.e. this is the no response category and is simply a measure of the number of people using the beach and additionally helps in creating appropriate buffer zones through recording the distance of the stimulus to the birds). The time of the disturbance should be recorded along with the details (e.g. human [walking, running, cycling etc.], human with dog [leashed or unleashed], vehicle on the beach, kite surfer, aircraft, bird of prey) and the number of each disturbance stimuli. The observer should also record where the disturbance stimulus entered the beach from (if possible) and the exit point (which access path).

Table 2. Survey timing, guidelines and effort for the migratory shorebird monitoring program

Month	Guidelines	Effort
September October November December January February March April	Perform shorebird surveys simultaneously at Sandy Creek and Lee Point. Perform surveys at Nightcliff Rocks, East Point and Spot on Marine during the same spring tide cycle as Lee Point and Sandy Creek. Count all shorebirds (species and abundance) and all other birds in the survey area. Record all disturbances and potential disturbances to shorebirds and other birds. Record any physical changes to the environment.	One high tide survey at five sites for 2 hours, each month = 10 hours per month = 80 survey hours per austral summer season
July		One high tide survey at five sites for 2 hours for the month of July = 10 hours
Total survey hours per season		90

2.2 Triggers and responses to trigger exceedances

Monthly survey monitoring data should be reviewed to detect any significant changes in the shorebird subpopulation for both Sandy Creek and Lee Point (following the steps outlined in Figure 4). DHA should review monitoring data for the five monitoring sites and calculate the combined population of shorebirds for the northern beaches region. If shorebirds are detected at all sites but not at Sandy Creek then this will cause a trigger to check the total abundance data. If the total abundance of shorebirds for Lee Point or Sandy Creek is >4,000 individuals (from October to November) then that trigger is terminated. If it is <4,000 individuals across all five sites then this will cause a trigger and DHA should investigate if the population changes are attributable to a site-specific event at Sandy Creek or other environmental changes in the Darwin region.

If the monitoring guidelines are not followed and surveys are performed on tides lower than 6.5 m then there is the chance that shorebirds will not be sighted during the surveys. It is important that these guidelines are followed to fully represent the shorebird population in the Darwin region.

If any triggers are exceeded, then DHA will need to investigate if conditions at the local sites are attributable to the changes in the shorebird population. After examination of the abundance data, DHA should examine the disturbance data to determine the rate of anthropogenic disturbance compared to the background rate of natural disturbance by birds of prey, and compare this against baseline disturbance data reported in Lilleyman et al. (2016). For example, if the number of disturbances exceeds ten alarm flights per survey session, then DHA should seek an increase in the number of patrols by Parks and Wildlife rangers and City of Darwin council rangers to ensure that visitors to the beach roost sites are abiding by dog zoning regulations and are not disturbing shorebirds despite educational signs and barrier fencing.

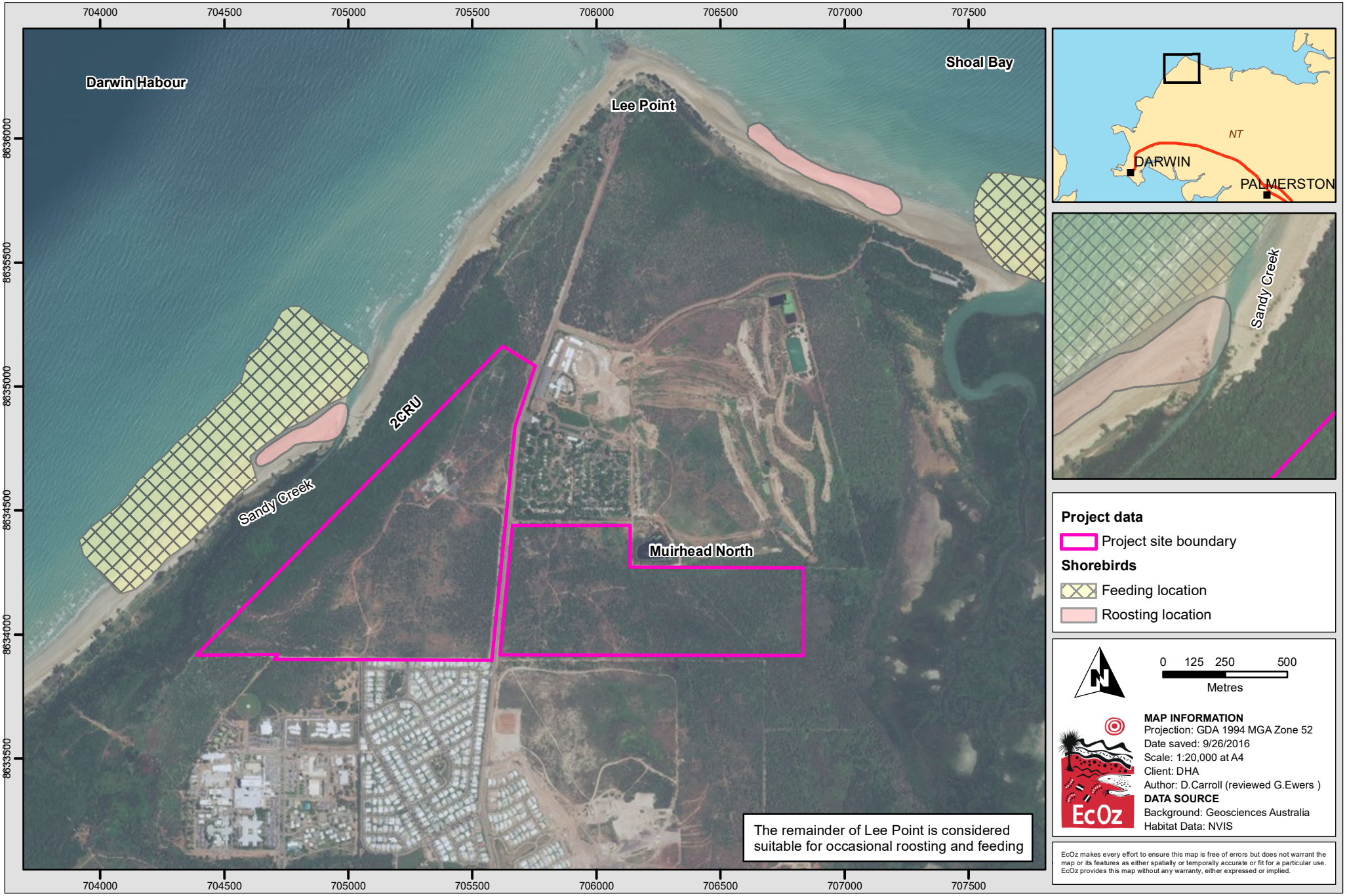

Figure 2. Map of roosting and feeding areas for migratory shorebirds at Sandy Creek and Lee Point-Buffalo Creek

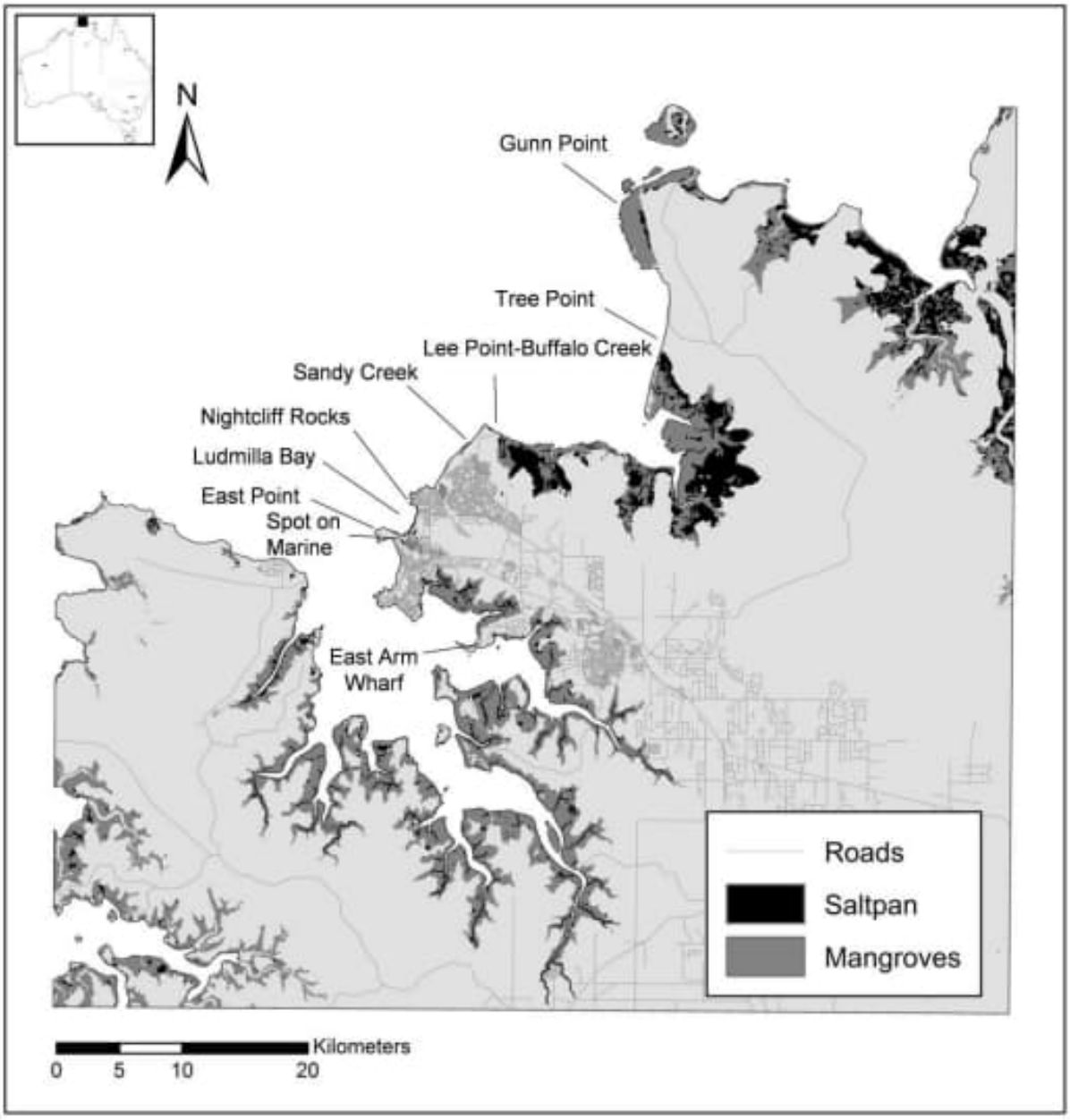

Figure 3. Map displaying the monitored shorebird roosting and feeding sites in the Darwin Harbour region

(including the three broader monitoring sites; East Point, Nightcliff Rocks and Spot on Marine)

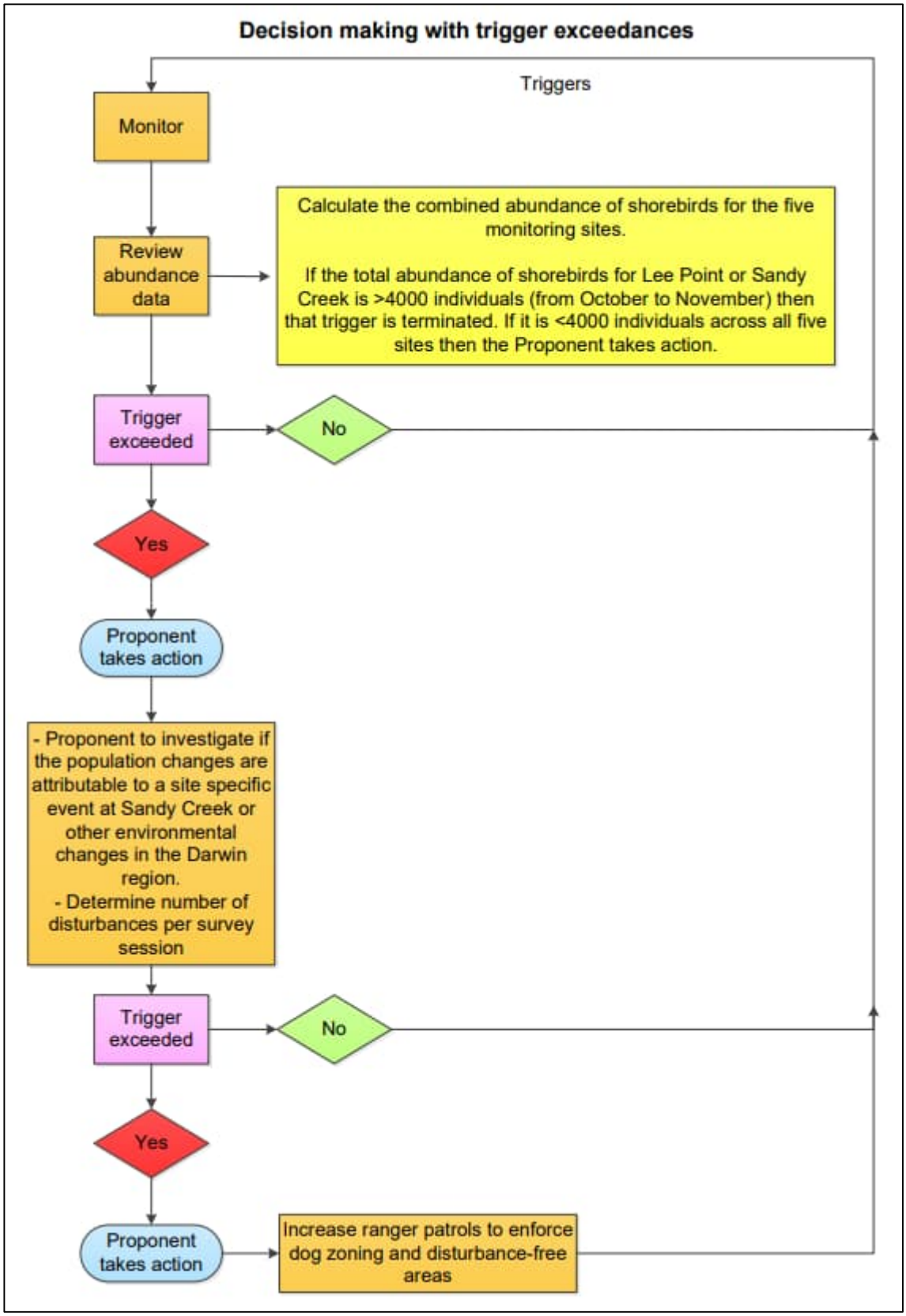

Figure 4. Flowchart to detect significant changes in the migratory shorebird population at Sandy Creek

3 REFERENCES

Commonwealth of Australia (2015). *EPBC Act Policy Statement 3.21—Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species*. Canberra: Commonwealth of Australia.

(DEE) Department of the Environment and Energy (2019) *Approval – Lee Point Master-planned Urban Development, Darwin, Northern Territory (EPBC 2015/7591)*. Canberra: Australian Government.

(DEWHA) Department of the Environment Water Heritage and the Arts (2009*). Significant impact guidelines for 36 migratory shorebird species – Background paper to EPBC Act policy statement 3.21*. Australian Government.

Lilleyman, A. (2017). *Report on potential impacts from disturbance to migratory shorebirds in Darwin: Defence Housing Australia – Lee Point Master-planned Urban Development*. Darwin: report to EcOz Environmental Consultants.

Lilleyman, A., Franklin, D.C., Szabo, J.K., and Lawes, M.J. (2016). Behavioural responses of migratory shorebirds to disturbance at a high-tide roost. *Emu*, 116 (2), pp. 111-118.

(NT EPA) Northern Territory Environmental Protection Authority (2018). *Assessment report 88 – Lee Point master-planned urban development, Defence Housing Australia*. Darwin: NT EPA.

APPENDIX A RESOURCES FOR MIGRATORY SHOREBIRD MONITORING PROGRAM

Shorebird identification sheets: http://birdlife.org.au/documents/SB-IDsheetsALL.pdf

Shorebirds 2020 field datasheet: http://birdlife.org.au/documents/SB-countform.pdf

Table 3. Suggested field datasheet (with example data) to record disturbances to migratory shorebirds observed during the monitoring program

Date:	Site:	Researcher:	Tide height (m):	Tide time:	Notes:		
28/11/2015	*Sandy Creek*	*Amanda Lilleyman*	*7.2*	*18:42*	*All shorebirds roosting in front on mangroves near the mouth of Sandy Creek.*		
Time of disturbance	Duration of disturbance stimulus (mins)	Disturbance type (human, dog, bird of prey etc.)	Shorebird response (flight, walk, no response)	Shorebird species affected	Shorebird species numbers affected (total flock)	Did the affected birds leave the site after the disturbance? (Y/N)	Entry and exit point of disturbance stimulus
17:30	*2*	*Human walking with 2 dogs (leashed)*	*Flight*	*Great Knot, Greater Sand Plover, Eastern Curlew and Bar-tailed Godwit*	*2436*	*N*	*Casuarina beach (walking along beach)*

EcOz Environmental Consultants

EcOz Pty Ltd.
ABN 81 143 989 039

Level 1, 70 Cavenagh St,
GPO Box 381,
Darwin, NT 0801

T: +61 8 8981 1100
E: ecoz@ecoz.com.au

www.ecoz.com.au