



EPBC Referral Lee Point Master-planned Urban Development Darwin, NT

Prepared by: EcOz Environmental Consultants

2015



DHA
Defence Housing Australia

EcOz
Environmental Consultants


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Planning & Design

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Planning & Design

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Referral of proposed action

Project title: Lee Point Master-planned urban development

1 Summary of proposed action

1.1 Short description

Defence Housing Australia (DHA) proposes to develop a master-planned urban area at the northern end of Lee Point Road on the outer edge of Darwin's northern suburbs. The area proposed for development is 132 ha of land located on the northern extent of Darwin's northern suburbs, approximately 14 km north-north-east of the Darwin city centre (Figure 1). The development will include urban residential housing at varying densities, rural residential allotments, land for community development including a primary school, a mixed use urban centre including a tourism precinct; and open space areas incorporating parklands and drainage reserves.

1.2 Latitude and longitude	location point	Latitude			Longitude		
		degrees	minutes	seconds	degrees	minutes	seconds
	1	12	20	23	130	53	27
	2	12	20	26	130	53	33
	3	12	20	33	130	53	30
	4	12	20	45	130	53	29
	5	12	20	45	130	53	45
	6	12	20	51	130	53	45
	7	12	20	51	130	54	08
	8	12	21	04	130	54	08
	9	12	21	04	130	52	57
	10	12	21	03	130	52	58
	11	12	21	03	130	52	47

1.3 Locality and property description

The project area is located in the locality of Lee Point and comprises two properties, vacant Commonwealth land owned by DHA and vacant Crown Land owned by NT Government. The properties lie across Lee Point Road, which is currently a 2-lane (one lane in each direction) road that provides access to recreational areas at Lee Point and Buffalo Creek that are part of the Casuarina Coastal Reserve. The land is at the northern extent of Darwin's urban area and is bound to the east by coastal swampland that is unzoned for development; and to the north and west by land zoned for Conservation, Public Open Space and Community Purpose uses.

1.4 Size of the development footprint or work area (hectares) 132 ha of land under two separate titles

1.5 Street address of the site Lot 4873 is located at 577 Lee Point Road
Lot 9370 is located at 544 Lee Point Road

1.6 Lot description

The proposed development will occur on Lots 4873 and 9370 Town of Nightcliff (the 'project area'). The location and boundaries of the project area are shown in Figure 2.

Lot 4873 is vacant Commonwealth land currently zoned Future Development (FD) under the NT Planning Scheme (NTPS). The site is referred to as the 2 Control and Reporting Unit (2CRU) site in reference to its previous use as a Defence communications facility and is owned by the proponent DHA. The land area of the lot is 81 ha of which approximately 61 ha will be developed as part of the proposed action.

The remaining area within Lot 4873 comprises land where development is 'restricted by constraints' in accordance with the Lee Point Area Plan approved under the NTPS. This area of land is proposed for future rezoning to CN (Conservation) and transfer to NT Government for incorporation into the Casuarina Coastal Reserve. The proposed action will include some works within the portion of land zoned CN for the purpose of providing pedestrian access into the Casuarina Coastal Reserve from the new urban area and establishing a mountain bike trail as requested by NT Parks and Wildlife.

Lot 9370 is Vacant Crown land currently zoned FD under the NTPS. The site is owned by the NT Government and is referred to as Muirhead North in reference to its location to the north of the existing DHA developed suburb of Muirhead. The lot has a total area of 51 ha of which most will be developed excepting an area of approximately 1.5 ha which will be retained for protection of a small monsoon rainforest patch (approximately 0.88 ha in size).

The NTPS was amended in September 2015 to introduce zone Future Development (FD) to Lot 4873, Town of Nightcliff (2CRU); and to rezone Lot 9370 Town of Nightcliff (Muirhead North) to Future Development (FD). The NTPS Part 8 was also amended to include the Lee Point Area Plan and Planning Principles, which are provided at Attachment A. The development Master Plan is provided at Attachment B.

1.7 Local Government Area and Council contact (if known)

The land proposed for development is located in the City of Darwin local government area. LGA's are not responsible for issuing subdivision and development permits in the NT; however, the *NT Planning Act* requires that Council be formally advised of development applications within the municipality.

DHA has engaged the City of Darwin early in the project planning phase conducting a number of meetings with Council staff and aldermen; and intends to continue engagement as the project progresses through the development planning and approvals process. Details of consultation with Council to date are provided in Attachment C.

Ownership of Lot 9370 currently resides with the NT Department of Lands, Planning and the Environment. The project contact officer within DLPE is:

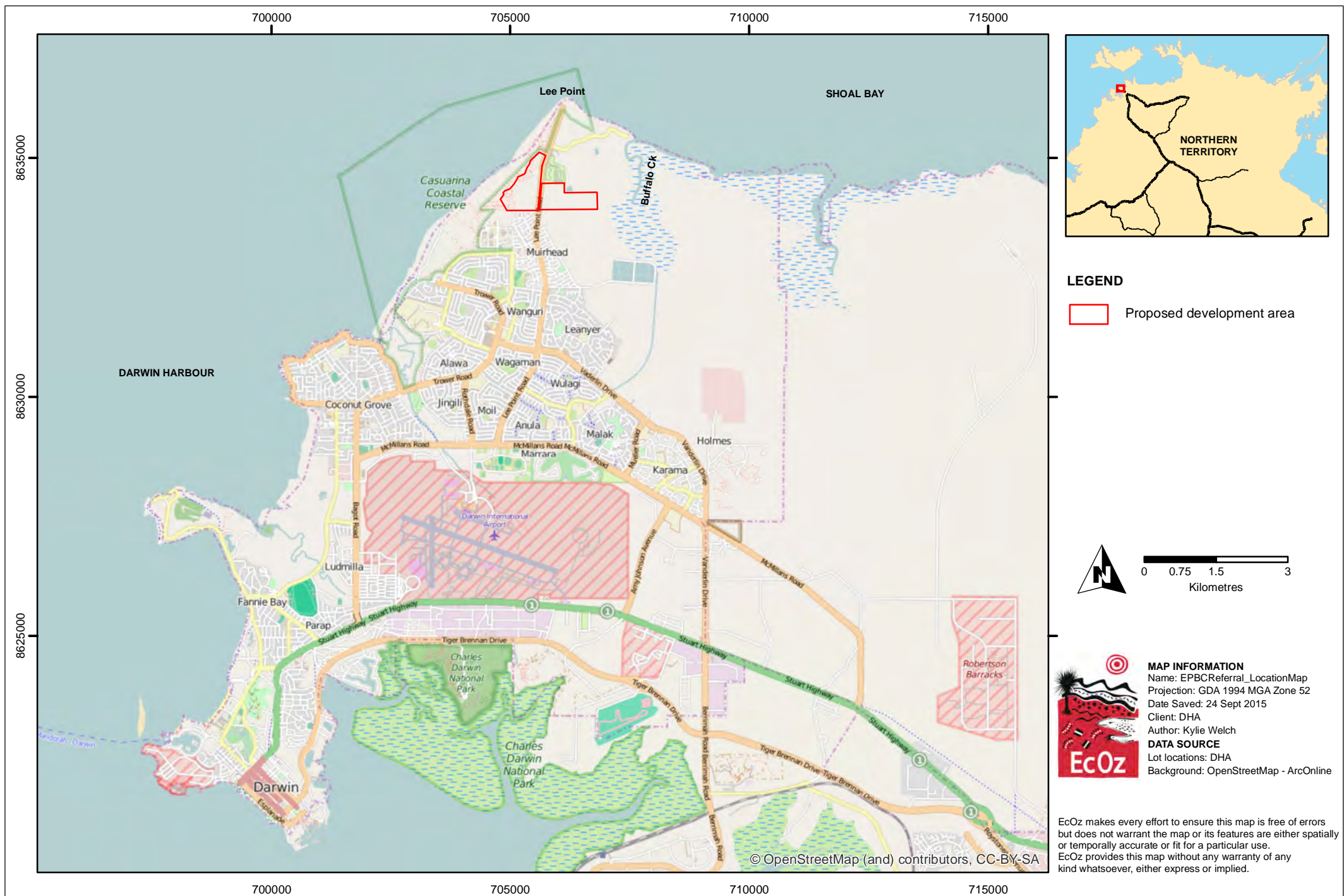
Karen White
Manager Land Release
Land and Economic Development
ph: 08 8924 7201
email: Karen.white@nt.gov.au

1.8 Time frame

Commencement of the first stage of civil construction is planned for early 2017 on the 2CRU site. The initial stages of construction will include the extension of services northward along Lee Point Road to the proposed main street. DHA also plans to commence construction of the main street in order to provide a suitable connection to the tourism precinct and to support early establishment of the mixed use area.

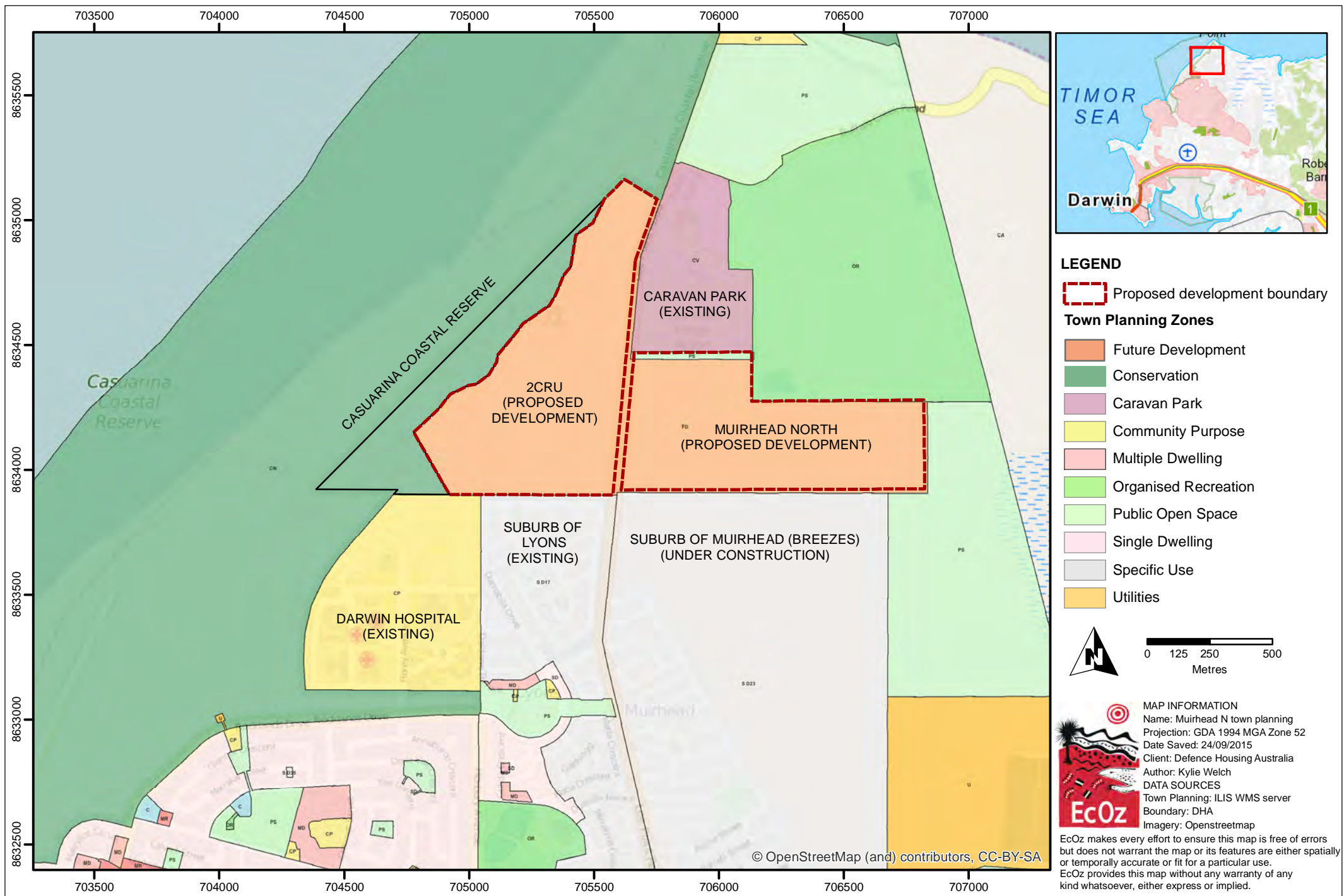
The overall development of 2CRU is expected to be staged over a four year period with the completion of the final stage in 2020. The development of Muirhead North is planned to be constructed in 3-4 stages concurrent with the 2CRU development program.

1.9 Alternatives to proposed action Were any feasible alternatives to taking the proposed action (including not taking the action) considered but are not proposed?	X	No
		Yes, you must also complete section 2.2
1.10 Alternative time frames etc Does the proposed action include alternative time frames, locations or activities?	X	No
		Yes, you must also complete Section 2.3. For each alternative, location, time frame, or activity identified, you must also complete details in Sections 1.2-1.9, 2.4-2.7 and 3.3 (where relevant).
1.11 State assessment Is the action subject to a state or territory environmental impact assessment?	X	Decision yet to be made. A Notice of Intent has been submitted to the NT EPA for consideration of assessment requirements.
		Yes, you must also complete Section 2.5
1.12 Component of larger action Is the proposed action a component of a larger action?	X	No
		Yes, you must also complete Section 2.7
1.13 Related actions/proposals Is the proposed action related to other actions or proposals in the region (if known)?	X	No
		Yes, provide details:
1.14 Australian Government funding Has the person proposing to take the action received any Australian Government grant funding to undertake this project?	X	No
		Yes, provide details:
1.15 Great Barrier Reef Marine Park Is the proposed action inside the Great Barrier Reef Marine Park?	X	No
		Yes, you must also complete Section 3.1 (h), 3.2 (e)



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\IEZ14097 2CRU & Muirhead North NOI - LSA\01 Project Files\EPBCReferral_LocationMap.mxd

Figure 1. Map of project location



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ14097 2CRU & Muirhead North NOI - LSA\01 Project Files\Muirhead N town planning.mxd

Figure 2. Map showing the project area and surrounds town planning zones

2 Detailed description of proposed action

2.1 Description of proposed action

This section provides details of the proposed development with reference to the Lee Point Area Plan (Attachment A) and DHA's proposed Master Plan for the development (Attachment B).

The proposed action will involve land clearing, earthworks and excavation for the purpose of creating land suitable for construction of residential housing, commercial infrastructure and community facilities; and the provision of transport infrastructure and connection to utilities services. The total land area that will be cleared / disturbed is approximately 111 ha.

Excavations will be required for the provision of civil engineering services including road works, stormwater drainage, sewerage reticulation, water reticulation, electrical provision and telecommunications. Utilities services will be provided through connection to existing power, water and sewage networks that terminate in the suburbs to the south of the proposed development. A stormwater drainage network will be installed and stormwater will be discharged into existing natural drainage lines in the catchments of Buffalo Creek and Sandy Creek.

The sections below provide further details in relation to each aspect of the proposed action.

Residential development

The Area Plan identifies land for residential development at General Urban, Sub-Urban and Rural Residential densities, in addition to medium-high density residential housing within a mixed-use neighbourhood centre. Nominal densities are provided below based on net developable area (i.e. residential areas exclusive of open space, road infrastructure and community facilities):

- Mixed-use Urban Centre: 60 - 80 dwellings per hectare, reflective of intended future development in the form of medium-high density housing as part of the mixed use neighbourhood centre.
- General Urban: 20 - 40 dwellings per hectare to facilitate a range of housing options including detached housing (single dwellings), duplex housing, units, townhouses, row dwellings and apartments.
- Sub-Urban: 10 - 20 dwellings per hectare reflective of a more traditional sub-urban residential area, whilst retaining the ability to provide a range of housing options. Within this zone small-lot housing (less than 400 m²), townhouses, units and walk-up housing developments to be concentrated in areas of high amenity and/or in close proximity to public open space.
- Rural Residential: Provision of housing development with minimum lot size of 4,000 m² due to the need to retain the 1 kilometre biting insect buffer to urban development.

Based on the above densities and servicing requirements, it is anticipated that the area to be developed under the Lee Point Area Plan will accommodate approximately 700 ground-level dwellings, between 30 and 40 rural residential lots, and between 200 and 250 apartments.

Tourism and mixed use centre

The Area Plan identifies a mixed use neighbourhood centre with a main street accessed from Lee Point Road. The main street extends through the site in a north-westerly direction perpendicular to the coastline, terminating near the top of the escarpment located on the 2CRU site. The intended location of the neighbourhood centre seeks to maximise development opportunities in an area which

provides the best combination of coastal views and access to the coastline, connectivity with Lee Point Road and suburban areas to the south, connectivity with the community precinct and central location to residential development.

The non-residential components of the project will include tourist accommodation and commercial and retail services within the neighbourhood centre located on the western side of Lee Point Road. The tourism component of the proposed development would comprise between 200 and 300 hotel / motel rooms and accommodation apartments and is an initiative of the NT Government that is being facilitated by the Proponent. The proposed commercial developments include a mix of retail aimed at servicing the local and broader community, and local convenience shopping.

The north-western side of the 2CRU site includes land identified for potential tourism and/or community activities, which is intended to facilitate recreational activities that take advantage of the natural setting and opportunities for integration with the Casuarina Coastal Reserve. Potential community purpose uses include a tourism related recreational facility, adventure playground and/or commercial uses such as a café, restaurant or club facility.

The centre is expected to take advantage of the ability to combine residential and non-residential opportunities in accordance with Zone C (Commercial), including medium-high density residential uses above ground level. Varied building heights along the main street, from 4, to 8 to 12 storeys, along with the setback requirements for residential buildings within the Planning Scheme, will prevent overbearing built form and ensure an appropriate transition of scale to urban residential areas. Mixed use development incorporating residential uses will extend the use of the neighbourhood centre beyond daylight hours and outside of the peak tourist season, and increase opportunities for a range of housing options to be co-located with goods and services.

Community purpose

A Primary School and Community Hub is proposed to be located on the eastern side of Lee Point Road. The area will comprise approximately 3.7 ha of land for community development including combined community and education facilities. Potential facilities include a primary school, after school-hours care facilities, pre-school / long day care / kindergarten and child care facilities, with the inclusion of school-specific play space and sports facilities.

Open space

The Area Plan indicates the following primary areas of open space as part of the proposed development:

- Esplanade parkland will run along the lineal extent of the western boundary of the development adjacent to Casuarina Coastal Reserve. The parkland will encompass a shared pedestrian/cycle trail and will provide a buffer between residential housing development and the escarpment edge bordering the expanded Casuarina Coastal Reserve.
- An Active Recreation Reserve (2 ha) will be located adjacent to the Primary School/Community Hub site on the eastern side of Lee Point Rd. This site will provide for larger organised recreation facilities such as an AFL / cricket oval.
- A rainforest patch located in the centre portion of the Muirhead North lot east of Lee Point Rd will be preserved and incorporated into 1.57 ha of open space. This proposal is consistent with the NT Land Clearing Guidelines which recognise rainforest as sensitive or significant vegetation and recommend that clearing of this community be avoided.

The location and design of additional open space in the form of local and neighbourhood parks will be provided as part of the future master plan / subdivision proposal in accordance with the requirements of the NT Planning Scheme.

Conservation zone

The Area Plan shows an area of 21.8 ha on the 2CRU lot located below the escarpment edge where development is restricted by constraints. This area of land is zoned Conservation (CN) and ownership will be transferred to the NT Government to become part of the Casuarina Coastal Reserve. Excluding this land from development is intended to avoid impacts to the sensitive monsoon rainforest vegetation communities and provide buffers to potential storm surge inundation and biting insect breeding areas.

The Area Plan and Master Plan provide pedestrian access from the developed area through to the Casuarina Coastal Reserve in two defined locations as described below:

- A staircase and access trail will be constructed as an extension to the main street. The trail will traverse through the area zoned Conservation (CN) to provide access to the Casuarina Coastal Reserve and foreshore areas.
- A second pedestrian / cyclist trail will be constructed from the southern portion of the developed area through the area zoned Conservation (CN) and into the Casuarina Coastal Reserve. The trail will traverse through the Reserve to a location on the beach just to the north of the mouth of Sandy Creek.

The trails will be 3.5 m wide.

As requested by NT Parks and Wildlife a new (technical) mountain biking trail is proposed for construction within the area zoned Conservation (CN). The trail will traverse parallel to the coast between the foreshore and escarpment over a distance of approximately 1.5 km. The trail will be 1.5 m wide.

Roads and transportation

Road and transportation requirements for the proposed development are considered in the Engineering Services Report prepared by SMEC (2015) (Attachment D).

Both the 2CRU and Muirhead North sites front Lee Point Road, which currently consists of two lanes, one in each direction. It is proposed that Lee Point Road will be upgraded to 9 m wide comprising two 3 m wide lanes and two 1.5 m wide cycle lanes. Three main road linkages are proposed from Lee Point Rd into the development area, two links west into the 2CRU site and one link east into the Muirhead North site.

The Area Plan establishes the intent for a primary local road network that enables efficient access to and between all areas of the estate, with connections to the adjacent suburbs of Lyons, Breezes at Muirhead and the primary connections to Lee Point Road. Road connections heading west from Lee Point Road are generally aligned perpendicular to the coast to allow the creation of focal points at the western extent of the site. The main street will provide an efficient connection to Lee Point Road to encourage vehicles into the neighbourhood centre, whilst retaining fluid vehicle movements for those visiting destinations further north, including the Lee Point Village Resort, Lee Point coastal area and the Buffalo Creek boat ramp.

The intention for primary pedestrian and cycling routes are shown in the Area Plan (refer Attachment A). DHA engagement with the Public Transport Division within the NT Government

Department of Transport has led to the development of a bus route that connects to the existing Lyons service through Damabila Drive, along the Coastal Esplanade within the 2CRU site and back along Lee Point Road.

Stormwater and drainage

Stormwater and drainage requirements for the proposed development are considered in the Engineering Services Report prepared by SMEC (2015a) (Attachment D). The project area traverses two distinct catchment areas, the western catchment (Sandy Creek) and eastern catchment (Buffalo Creek), which are divided by a north-south ridge west of Lee Point Road.

The stormwater drainage system will comprise a network of sealed roads, roadside kerb and channel, entry pits and piped drainage supplemented by a system of overland flow paths located in a public open spaces and drainage reserves. The Area Plan incorporates two drainage reserves, one located along the south-west boundary of the 2CRU site for treatment of stormwater flows from the western catchment area and one located on the eastern boundary of the Muirhead North site for treatment of stormwater flows from the eastern catchment area.

Design of the stormwater drainage system and structures will be in accordance with the requirements of Australian Rainfall and Runoff (IEAUST) and *City of Darwin Development Guidelines* and will be approved through the Development Application process administered under the *NT Planning Act*.

Western catchment – stormwater drainage

The western catchment (2CRU site) typically falls from east to west with a relatively consistent grade extending from the ridge to the south-west corner of the development area. It is envisaged that a pit and pipe stormwater system will be designed extending along the road network, and will convey stormwater to a detention basin constructed within a drainage reserve located in the south-west corner of 2CRU site. The detention basin will collect all post-development stormwater flow prior to discharge to an existing drainage line that flows into Sandy Creek approximately 1 km upstream from the creek mouth (point of discharge into Darwin Harbour).

Eastern catchment – stormwater drainage

The eastern catchment area combines the western side of the 2CRU site and the entire area of the Muirhead North site. Flows generated from the catchment area will be conveyed to a detention basin constructed within the drainage reserve located at the eastern boundary of the site. The detention basin will collect all post-development stormwater flow prior to discharge to an existing drainage line that flows into Buffalo Creek approximately 4.5 km upstream from the creek mouth (point of discharge into Shoal Bay).

The eastern catchment area within Muirhead North will be further divided into sub-catchments to allow for management of stormwater flows so that pre-development flows can be maintained to the rainforest patch located in the centre of the site. A hydrological review of the rainforest patch prepared by SMEC (2015) (Attachment E) determined the post-developed catchment area that is required to discharge into the rainforest in order to maintain pre-development flows. The remainder of the total catchment will be conveyed via a pit and pipe system around the rainforest, along the top of the Muirhead North site for discharge to the detention basin.

For the purpose of maintaining water quality entering the rainforest patch the post-development 'first flush' flows (i.e. ARI 3-month) will be conveyed into a bio-retention treatment basin before flowing into the rainforest. Flows greater than an ARI 3-month event will be discharge into a grassed overland flow swale, which will then flow to the rainforest.

Utility services infrastructure

The utilities services infrastructure requirements for the proposed development are considered in the Engineering Services Report prepared by SMEC (2015a) (Attachment D). The report considers the serviceability of the proposed development, including the provision of potable water, reticulated sewerage, power supply and telecommunications.

Sewer

Reticulated sewerage services can be provided by connection to existing services located in the adjacent suburbs of Lyons and Breezes Muirhead with only minor upgrades required to ensure the capacity of these services to receive the anticipated loads from the new urban areas.

The Leanyer Sewerage Treatment Plant is located approximately 1.4 km south-east of the proposed development. Consultation with Power and Water Corporation (PWC) has indicated that the LSTP will have capacity to service the proposed development.

Water

The water supply authority for the development is PWC and the servicing of the land will be based on the PWC "*Guidelines for Developers and Consulting Engineers for the Provision of Water and Sewerage Infrastructure in Subdivisions*" manual. The existing water supply servicing the area is located in the adjacent road reserve of Lee Point Road and incorporates a private DN300 main servicing the Caravan Park along with a DN100 reticulation main. These water supply mains are insufficient in capacity to service the proposed development and a number of augmentation works are proposed within the existing utilities corridor. Subject to the planned undertaking of augmentation works, the Engineering Services Report (SMEC 2015a) concludes that the site can be connected to reticulated potable water mains.

Power

The 2CRU site is anticipated to require 3.6 MVA of load to power 400 residential lots and the proposed hotel accommodation facilities. The Muirhead North site is anticipated to require 2.5 MVA of load to power 220 residential lots and the potential school facilities. The required electrical load is expected to exceed the capacity in the Muirhead and Lyons existing circuits.

It is understood that PWC are working towards the design and construction of a Lee Point Zone Substation with an estimated completion date of 2017 - 2018. On this basis, further consultation will be required with PWC to identify the constraints and timing around servicing the Muirhead North development. Following determination of the base supply, design of the internal HV and LC reticulation will be undertaken.

Telecommunications

National Broadband Network (NBN Co.) have earmarked the area as a high priority and the rollout of services has commenced. Implementation and rollout within the development site will be subject to application and formal agreement with the NBN Co, and compliant pit and pipe infrastructure will be funded by the developer and designed / installed in conjunction with electrical reticulation.

2.2 Alternatives to taking the proposed action

None considered.

2.3 Alternative locations, time frames or activities that form part of the referred action

Not applicable

2.4 Context, planning framework and state/local government requirements

The proposed Lee Point master-planned residential development will be primarily assessed under the *Planning Act (NT)*. The Act establishes the NT Planning Scheme (NTPS) and development assessment and approvals process that DHA are required to comply with in order to proceed with the proposed action.

The proposed development must also comply with NT environment and heritage legislation as described in the sub-sections below. At a local government level the *City of Darwin Subdivision and Development Guidelines* are applicable and the City of Darwin will be involved in assessing future development applications submitted for approval under the *NT Planning Act* and approval of certain works within Council's jurisdiction.

Planning Approvals

The NTPS was amended in September 2015 to introduce zone Future Development (FD) to Lot 4873, Town of Nightcliff (2CRU); and to rezone Lot 9370 Town of Nightcliff (Muirhead North) from zone SD26 to Future Development (FD). The NTPS Part 8 was also amended to include the Lee Point Area Plan and Planning Principles, which are provided at Attachment A to this referral.

The development will be required to comply with the development assessment and approvals process established under the *NT Planning Act*. The master plan and subdivision proposals will be further developed by DHA and ultimately a Development Application will be lodged with the Development Consent Authority (DCA). Upon the completion of the various stages of development within the site, the land will be rezoned from FD to the relevant Planning Scheme Zones likely to include (but not necessarily limited to):

- TC (Tourist Commercial) and C (Commercial)
- SD (Single Dwelling), MD (Multiple Dwelling), MR (Medium Density Residential) and HR (High Density Residential)
- CP (Community Purpose)
- PS (Public Open Space) and OR (Organised Recreation)
- CN (Conservation)
- SU (Special Use).

NT environment and heritage legislation and approvals

Other NT legislation under which approvals are required or considered against is summarised below.

Waste Management and Pollution Control Act

It is not anticipated that the proposed development would not require approval or licensing under the *Waste Management and Pollution Control Act (WMPC Act) (NT)*, however, the general environmental duty provisions of the Act are applicable.

Water Act

The proposed development is located in the Darwin Water Control District established under the *Water Act*. No extraction of surface water or groundwater is proposed, and consultation with PWC has occurred in relation to meeting any additional demand for water resources. The proposed action does not require licensing under the *Water Act*.

Territory Parks and Wildlife Conservation Act

The only species protected under the *TPWC Act* that is known to occur in the development area is the Darwin Cycad *Cycas armstrongii*. A permit to take or interfere with wildlife will be required prior to any works to salvage or clear Cycad plants.

Weed Management Act

A weed survey of the 2CRU and Muirhead sites has been undertaken. Mapping identifies the presence of a number weed species listed under the Act, with Gamba Grass being the most abundant of the declared species present. The general duties provisions of the *NT Weeds Management Act* will be applicable to the proposed development.

Heritage Act

Various cultural heritage assessments have been undertaken across the 2CRU and Muirhead North sites over the past 5 years. Aboriginal archaeological objects protected under the *Heritage Act* were identified on the 2CRU site. The proponent intends to apply for a Works Permit as these objects will be disturbed or destroyed by the proposed development.

In addition there are a number of sites with identified military heritage values located on both the 2CRU and Muirhead North sites. These sites are not afforded any statutory protection under the *Heritage Act*; however, the proponent intends to work with NT Heritage Branch to develop appropriate conservation strategies for the heritage sites along Lee Point Road referred to as the 'Lee Point Bunkers' and 'Konfrontasi Cruciform'.

Management of potential impacts to cultural heritage is addressed in addressed in Section 4 of this Referral.

NT Aboriginal Sacred Sites Act

All Aboriginal sacred sites recorded or not, are protected under the *Northern Territory Aboriginal Sacred Sites Act*. The Aboriginal Areas Protection Authority (AAPA) is the body established under the Act to be responsible for the protection of sacred sites. A Register Inspection lodged with the AAPA did not identify any known sacred sites in the area proposed for development; and the proponent intends to obtain an Authority Certificate from the AAPA prior to commencement of works.

City of Darwin Requirements

The proposed development will occur within the City of Darwin Council area. The Council is not responsible for issuing subdivision and development permits; however, the *NT Planning Act* requires that Council to be formally advised of development applications within the municipality. This allows Council the opportunity to comment on development applications within the public exhibition period defined under the Act.

Council has a wide range of responsibilities under the *Northern Territory Local Government Act (LGA)* in addition to its role under the *Planning Act*. Under the *LGA*, Council is specifically responsible for:

- Maintenance and management of most public roads and verges
- Traffic control
- On street and off street car parking;
- Footpaths and cycle-ways
- Foreshore protection
- Stormwater drainage
- Waste collection.

In the case of development of existing allotments, Council has the right under the *LGA* to require the upgrading of all assets such as roads and drains, street and public lighting and landscaping of verges or parks or public spaces.

City of Darwin Subdivision and Development Guidelines (Darwin City Council 2005) should be used by anyone wanting to develop or redevelop property within Darwin. The guideline provides council

philosophies and policies when undertaking development works. It includes the planning process, construction requirements, maintenance and approvals.

In accordance with the advice provided in the Guidelines, the proponent commenced engaging with Council early in the project planning phase and intends to continue engagement with the Council as the project progresses through the development planning and approvals process. Details of consultation with Council to date are provided in Attachment C.

2.5 Environmental impact assessments under Commonwealth, state or territory legislation

Development proposals assessed under the *Planning Act (NT)* require referral under the *Environmental Assessment Act (EA Act)* (NT) if they have potential to cause significant impact to the environment. The *EA Act* (NT) is administered by the NT EPA.

A Notice of Intent (NOI) was lodged with the NT EPA on 7 September 2015 for determination of whether or not the proposed action requires assessment under the *EA Act*. As required by clause 8(1) of the *Environmental Assessment Administrative Procedures* the NT EPA will review the NOI in consultation with Northern Territory Government (NTG) advisory bodies. Following assessment of the NOI the NT EPA will notify DHA as to whether or not formal assessment is required under the *EA Act*. If assessment is required, the proponent may be directed to prepare either a Public Environment Report (PER) or Environmental Impact Statement (EIS).

If no further assessment is required, the NT EPA decision and recommendations from the review of the NOI will be forwarded to the Proponent and the NT Government Department of Lands Planning and Environment for consideration in decision-making in relation to future development applications submitted under the *Planning Act*.

The NT EPA contact details are provided below:

Dr Alana Mackay
Manager Environmental Assessments
(08) 8924 4020
Alana.mackay@nt.gov.au

2.6 Public consultation (including with Indigenous stakeholders)

DHA is committed to engaging with community and government stakeholders throughout the planning and design phases of the proposed development. A log of stakeholder engagement undertaken to date is provided in Attachment C.

In addition to the formal public comment opportunities provided through the processes of the *NT Planning Act*, engagement with residents in areas surrounding the proposed development has occurred through community newsletters and information sessions held in August and December 2014 at the Lyons Community Centre. Details of community engagement undertaken to date are also collated in Attachment C.

2.7 A staged development or component of a larger project

Not applicable – the proposed action is not a staged development or component of a larger project.

3 Description of environment & likely impacts

3.1 Matters of national environmental significance

3.1 (a) World Heritage Properties

Description

There are no World Heritage Properties in proximity to the proposed action.

Nature and extent of likely impact

Not applicable

3.1 (b) National Heritage Places

Description

There are no National Heritage Places in proximity to the proposed action.

Nature and extent of likely impact

Not applicable

3.1 (c) Wetlands of International Importance (declared Ramsar wetlands)

Description

There are no RAMSAR wetlands in the Darwin region.

Nature and extent of likely impact

Not applicable

3.1 (d) Listed threatened species and ecological communities

Description

Desktop and field ecological assessments undertaken in relation to the proposed development area are summarised in Attachment F. The assessments identified one EPBC listed threatened species, Black-footed Tree-rat (*Mesembriomys gouldii*) as 'likely' to occur within the terrestrial environments that constitute the project area. This species has not been recorded there; however, it has been recorded in previous surveys of adjacent analogue sites (Rankmore et al. 2001).

In addition, five EPBC listed threatened marine species (3 turtles and 2 fish) and two listed threatened migratory shorebird species have been recorded in the coastal and marine environments that adjoin the project area. These species are listed below:

- Olive Ridley (*Lepidochelys olivacea*)
- Green Turtle (*Chelonia mydas*)
- Flatback Turtle (*Natator depressus*)
- Dwarf Sawfish (*Pristis clavata*)
- Green Sawfish (*Pristis zijsron*)

- Curlew Sandpiper (*Calidris ferruginea*)
- Eastern Curlew (*Numenius madagascariensis*).

The following EPBC listed threatened species were not confirmed to occur within or surrounding the project area and have not been recorded previously; however, applying the precautionary principle they may occur due to the presence of suitable habitat conditions:

- Bare-rumped Sheath-tailed Bat (*Saccolaimus saccolaimus*)
- False Water Mouse (*Xeromys myoides*)
- Freshwater Sawfish (*Pristis microdon*).

Table 1 below summarises the likelihood of occurrence assessment results for each EPBC listed threatened species identified during the desktop study as occurring in the Darwin region. The complete assessment for all EPBC listed species is provided in Attachment F.

Table 1 Likelihood of occurrence assessment for EPBC listed Threatened species.

Criteria	Threatened Species	EPBC status	TPWC status
KNOWN	Reptiles		
	Olive Ridley (<i>Lepidochelys olivacea</i>)	EN	VU
	Green Turtle (<i>Chelonia mydas</i>)	VU	NT
	Flatback Turtle (<i>Natator depressus</i>)	VU	DD
	Birds		
	Curlew Sandpiper (<i>Calidris ferruginea</i>)	CR	VU
	Eastern Curlew (<i>Numenius madagascariensis</i>)	CR	VU
LIKELY	Fish		
	Dwarf Sawfish (<i>Pristis clavata</i>)	VU	VU
	Green Sawfish (<i>Pristis zijsron</i>)	VU	VU
	Mammals		
	Black-footed Tree-rat (<i>Mesembriomys gouldii</i>)	EN	VU
MAY	Fish		
	Freshwater Sawfish (<i>Pristis microdon</i>)	VU	VU
	Mammals		
	Bare-rumped Sheathail Bat (<i>Saccolaimus saccolaimus</i>)	CR	NT
	False Water Mouse (<i>Xeromys myoides</i>)	VU	DD
UNLIKELY	Reptiles		
	Mertens' Water Monitor (<i>Varanus mertensi</i>)	-	VU
	Loggerhead Turtle (<i>Caretta caretta</i>)	EN	VU
	Leatherback Turtle (<i>Dermochelys coriacea</i>)	EN	CR
	Hawksbill Turtle (<i>Eretmochelys imbricata</i>)	VU	VU
	Fish		
	Speartooth Shark (<i>Glyphis glyphis</i>)	CR	VU
	Northern River Shark (<i>Glyphis garricki</i>)	EN	EN
	Great White Shark (<i>Carcharodon carcharias</i>)	VU	-
	Whale Shark (<i>Rhincodon typus</i>)	VU	DD
	Birds		
	Red Goshawk (<i>Erythrotriorchis radiatus</i>)	VU	VU
	Gouldian Finch (<i>Erythrura gouldiae</i>)	EN	VU
	Christmas Island Frigatebird (<i>Fregata andrewsi</i>)	VU	LC
	Partridge Pigeon (<i>Geophaps smithii smithii</i>)	VU	VU
	Masked Owl (northern) (<i>Tyto novaehollandiae</i>)	VU	VU
	Mammals		
	Blue Whale (<i>Balaenoptera musculus</i>)	EN	DD
	Northern Spotted Quoll (<i>Dasyurus hallucatus</i>)	EN	CR
	Humpback Whale (<i>Megaptera novaeangliae</i>)	VU	LC

Status key: - = Not Listed, CR = Critically Endangered, DD = Data Deficient, EN = Endangered,

NT = Near Threatened, VU = Vulnerable, LC = Least Concern

The remainder of this section focuses on describing the potential importance of the EPBC listed Threatened species populations that are 'Known' or 'Likely' to occur in and surrounding the area proposed for development. For the two EPBC listed species that 'May' occur despite never being recorded in the area, Bare-rumped Sheath-tail Bat (*Saccolaimus saccolaimus nudiclunatus*) and False Water Mouse (*Xeromys myoides*), a precautionary approach has been applied and the potential for an 'important population' is discussed.

In accordance with the EPBC Guidelines, for Critically Endangered and Endangered species, any occurrence of the species within the project footprint constitutes a population, and all populations are 'important'. For Vulnerable species, an 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal
- Populations that are necessary for maintaining genetic diversity
- Populations that are near the limit of the species' range.

SPECIES THAT ARE KNOWN OR LIKELY TO OCCUR WITHIN OR SURROUNDING THE PROJECT AREA

Black-footed Tree-rat (*Mesembriomys gouldii*) – LIKELY TO OCCUR

The Black-footed Tree-rat is listed as Endangered under the *EPBC Act*. The exact driver for the species decline is unknown, but is thought to be related to a changed fire regime which has modified prime habitats (Hill 2012). Within the Darwin area this species is known to occupy large territories (7-11 ha) and show a clear preference for using hollows in the Darwin Stringybark *Eucalyptus tetrodonta* (Griffiths et al. 2002), which is a common tree species recorded throughout the proposed development area.

The Black-footed Tree-rat has not been recorded in the proposed development area but is known from Casuarina Coastal Reserve (Chatto pers. comm. 2015) and from a previous survey of adjacent analogue sites (Rankmore et al. 2001). The location of Casuarina Coastal Reserve in relation to the project area is shown in Figure 2.

In 2005 the Black-footed Tree-rat was considered to have remained relatively abundant in the Darwin rural area (Price et al. 2005). Recent survey data suggests this is still the case, with records from Darwin Airport in 2013 and 2014 (records from EcOz biodiversity surveys for DIA), and from Charles Darwin NP, the RAAF base at Darwin Airport and Buffalo Creek (Stokeld & Gillespie 2015).

Given the large territories held by this species it seems reasonable to assume that the local population, known from records within the Casuarina Coastal Reserve, ranges across the greater Lee Point area (incorporating the project area). If the species was to occur in the project area, it would be considered an 'important population' as due to the species being listed as Endangered any occurrence constitutes a population, and all populations are 'important'.

Marine Turtles - Olive Ridley (*Lepidochelys olivacea*), Green Turtle (*Chelonia mydas*) and Flatback Turtle (*Natator depressus*) – BREEDING KNOWN TO OCCUR

Casuarina Beach, which is located within the Casuarina Coastal Reserve adjacent to the project area, has been monitored by Parks and Wildlife for turtle nesting each year since the mid-1990's, with all nests being recorded from the 1999 season to present (Chatto & Baker 2008). Of 155 nests recorded to 2014 (data from two years are missing), 151 have been Flatback Turtles, three Olive Ridley's and a single Green Turtle (noting this Green Turtle nest was the only one recorded between Darwin and the West Australian border during a detailed survey of the NT coastline).

Turtle nesting occurs anywhere between Rapid Creek and the Buffalo Creek side of Lee Point, which includes the section of Casuarina Beach adjacent to the project area. Once consistent monitoring of Casuarina Beach began in 1999, the number of Flatback Turtle nests recorded during each dry season (between March and November) varied from five (in 2012) to 20 (in 2006). Between the 1999 and 2006 seasons nests were laid in all months of the year from March to November. Most nesting occurred in the month of September (39), followed by August (26), October (18), June (17), May (15) and July (15). Fewer nests were found in March (7) and April (1).

Olive Ridley turtles are listed as Endangered under the *EPBC Act*. There are three nesting records (out of 155 total records) of this species on Casuarina Beach, which indicates this species nests infrequently in the area. The occurrence of three Olive Ridley nests on Casuarina Beach in the past 15 years constitutes an important population as due to the species being listed as Endangered any occurrence constitutes a population, and all populations are 'important'.

Green Turtles and Flatback Turtles are both listed as Vulnerable under the *EPBC Act*. There are nesting records of these species (predominantly Flatback) on Casuarina Beach, with between 7 and 20 nests being recorded each year since 1999. Whilst there is significance in the fact that marine turtles are nesting on a beach in a capital city, the number of nesting records compared to other locations along the NT coastline does not indicate that the populations present are likely to be key breeding populations; neither are the populations isolated in a way that would make them important for maintaining genetic diversity and the area is not at the extent of the species range.

Dwarf Sawfish (*Pristis clavata*), Green Sawfish (*Pristis zijsron*) – KNOWN TO OCCUR

Freshwater Sawfish (*Pristis microdon*) – LIKELY TO OCCUR

The three species of sawfish – Dwarf, Green and Freshwater – occur in the tropical waters of Australia and, for some species, South-East Asia (Cavenagh et al. 2003). These species are all listed as Vulnerable under the *EPBC Act* and a draft Recovery Plan has been prepared (DoE 2014).

They inhabit both marine and estuarine habitats, entering estuarine or fresh waters to breed during the wet season and moving into marine waters following the wet season (Peverell 2005). The main threatening processes for sawfish in Australia are fishing (targeted and incidental capture) and habitat degradation (Cavanagh et al. 2003).

Two specimens of Dwarf Sawfish (*Pristis clavata*) were recovered from Buffalo Creek east of the project area in 1997, as were five specimens of Green Sawfish (*Pristis zijsron*) – four in 1997 and one in 2002. Freshwater Sawfish (*Pristis microdon*) has not been recorded in the area, but has similar habitat requirements and so seems likely that it may occur in Buffalo Creek. There is a paucity of records of these species in the NT; the fact that there are records of this species in the area maybe a consequence of concentrated fishing activity or because the area is important habitat for sawfish.

Applying the precautionary principle the assumption is made here that Sawfish are Likely to occur in Buffalo Creek at times. The location of Buffalo Creek in relation to the project area is shown in Attachment G Figure 4-8.

Any population of sawfish occurring in Buffalo Creek would be considered 'important' as it may constitute a population that is necessary for maintaining genetic diversity. Sandy Creek is much shorter and more tidal than Buffalo Creek and is therefore unlikely to constitute suitable habitat for any of the sawfish species.

Shorebirds - Curlew Sandpiper (*Calidris ferruginea*) and Eastern Curlew (*Numenius madagascariensis*) – KNOWN TO OCCUR

The Curlew Sandpiper (*Calidris ferruginea*) and Eastern Curlew (*Numenius madagascariensis*) are listed

as Critically Endangered under the *EPBC Act*. These species have been recorded at the mouth of Sandy Creek, which is located in the section of the Casuarina Coastal Reserve that adjoins the project area. Further details of the Sandy Creek migratory shorebird habitat is provided in section 3.1 (e) of this referral and the location of the shorebird site in relation to the proposed development is shown in Figure 3.

The occurrence of the Curlew Sandpiper and Eastern Curlew at the mouth of Sandy Creek constitutes and 'important' population as due to the species being listed as Critically Endangered any occurrence constitutes a population and all populations are 'important'.

SPECIES THAT MAY OCCUR WITHIN OR SURROUNDING THE PROJECT AREA

There are a further two EPBC listed threatened species that have not been confirmed as occurring within or surrounding the project area; however, they may occur based on the presence of suitable habitat conditions. The sections below assess the potential importance of any populations should they occur in the area.

Bare-rumped Sheath-tail Bat (*Saccolaimus saccolaimus nudiclunatus*)

The Bare-rumped Sheath-tail Bat is listed as Critically Endangered under the *EPBC Act* due to a decline in abundance (Milne et al. 2009). The species has never been recorded in the proposed development area, but is known to utilise the type of common *Eucalyptus tetrodonta* and *E. miniata* woodland that is present on both the 2CRU and Muirhead North sites. Within the Northern Territory this species is known from a few records from Pandanus woodland and eucalypt tall open forests (Friend *et al.* 1986; Churchill 1998; Milne et al. 2009) where it roosts in tree hollows and caves (Duncan et al. 1999).

The most recent local records of this species came from Howard Springs in December 2006, where a dead tree containing a colony of about 100 individuals was blown over during a storm (Milne *et al.* 2009). The surrounding area was dominated by *E. tetrodonta* and *E. miniata* woodland, which is a very common and widespread habitat in the greater Darwin region and across the Top End of Australia. This colony is considered highly significant as it is the only known roost site in the Northern Territory and contained neonates and juveniles (Milne et al. 2009).

A population of a Critically Endangered species' is defined under the *EPBC Act* as an occurrence of the species in a particular area. There are no recorded occurrences of this species in the area of the proposed development; however, applying the precautionary principle, due to the presence of a habitat type utilised by the species and the previous record of a breeding habitat in the Darwin region, the species may roost and/or feed in the area.

Given the species have a very sporadic distribution and the area of *E. tetrodonta* and *E. miniata* woodland within the project area is relatively small, the likelihood that a nesting site would occur is considered to be low.

False Water Mouse (*Xeromys myoides*)

The False Water Mouse (*Xeromys myoides*) is listed as Vulnerable under the *EPBC Act* due to a decline in abundance (Milne et al. 2009). The species requires mangrove communities and associated saltmarsh, sedgeland, clay pans, heathlands and freshwater wetlands with intact hydrology that provide adequate nest sites and prey resources (DEWHA 2009). The removal and degradation of habitat as a result of development actions is the principal threat to the survival of the False Water Mouse (Department of Environment 2015a). There is a recovery plan for this species (DERM 2009).

False Water Mouse has never been recorded in the proposed development area and would not occur there as there is no suitable habitat. The closest habitats to the development area that are potentially

utilised by this species occur on the western bank of Buffalo Creek where there are mangroves and tidal salt-flats. The species has never been recorded in this area; and in the NT it is known only from ten records at six sites, including one in East Arnhem Land (Woinarski 2007), although many of these records are questionable (Trembath pers. comm. 2015).

There are no recorded occurrences of this species in the area; however, applying the precautionary principle, due to the presence of habitat that is utilised by the species, the False Water Mouse may occur in the coastal environments to the east of the project area. Given the sporadic distribution of the species and the fact that the Darwin area is comparatively well surveyed, the likelihood that the species occurs is considered to be low.

Nature and extent of likely impact

Black-footed Tree-rat (*Mesembriomys gouldii*)

The proposed development will not impact on any known 'important populations' of the Black-footed Tree-rat. However, as the home range of the population recorded in the Casuarina Coastal Reserve is likely to extend into the project area land clearing for the proposed development will remove habitats that are likely to be utilised by this species.

The project area is located within the urban boundaries of Darwin where, as is typical of urbanised areas, native fauna is generally restricted to reserved areas and/or larger land holdings. The 111 ha of land that will be cleared for the project occurs contiguous with the reserved habitats within the Casuarina Coastal Reserve where the Black-footed Tree-rat has been previously recorded, and these reserved habitats will be buffered from direct disturbance by the 21.8 ha of land within 2CRU that DHA has set aside to be zoned Conservation (CN) for expansion of the Casuarina Coastal Reserve. Therefore whilst it is expected that the development will further restrict the range of Black-footed Tree-rats in the local area, the proposed action is not expected to impact the local population as it is already largely confined to reserved areas as a result of urbanisation.

If the species is present in the development area at the time of land clearing there is potential for injury or death to occur. DHA proposes to engage a fauna spotter-catcher during land clearing and have demonstrated their ability to implement this control measure through their contractors on the previously approved Muirhead developments immediately to the south of the project area. This approach is expected to ensure that the proposed development does not negatively impact on any local populations of the Black-footed Tree-rat.

Marine Turtles - Olive Ridley (*Lepidochelys olivacea*), Green Turtle (*Chelonia mydas*) and Flatback Turtle (*Natator depressus*)

The proposed development does not involve direct disturbance of beaches where marine turtle species are known to nest. It is anticipated that the beach areas near to the proposed development area will receive a higher level of use by people than is currently the case and there will be a general increase in light emissions from the residential areas and tourism precinct. If future development proposals include lighting on multi-storey buildings that may be visible from the beach the lighting will be designed in consultation with local marine turtle specialists at Charles Darwin University (CDU). It is expected that Parks and Wildlife will continue to monitor nesting activity and collect / protect as they currently do, and consequently the proposed development should not alter nesting success of the individuals that do nest along Casuarina and Lee Point Beaches.

Dwarf Sawfish (*Pristis clavata*), Green Sawfish (*Pristis zijsron*), Freshwater Sawfish (*Pristis microdon*) -

The proposed development does not involve direct disturbance of marine habitats utilised by Sawfish, however, the development area is within the catchment of the Buffalo Creek, from which there are species records. Stormwater from the eastern catchment of the proposed development could introduce

increased sediment, contaminants and / or nutrients into the creek and degraded water quality could impact on Sawfish, although it should be noted that the Sawfish occurrence in Buffalo Creek is in an area where existing water quality is known to be poor due to discharge from the Leanyer Sanderson Wastewater Treatment Plant.

The key contaminant of concern from urban runoff is nutrients; and sediments are of concern during construction. Nutrient fate modelling undertaken for the Muirhead subdivision to the south (Aurecon 2013) and supplied to the Department of Environment (DoE) (the DEWHA) as preliminary documentation for the Muirhead (Breezes) subdivision (ref EPBC2010/5525), indicated that there is the potential for annual nutrient loads into Buffalo Creek to increase if the impact of urban development on stormwater and increased in-flows to the Leanyer Sanderson Wastewater Treatment Plant are not mitigated.

Modelling of water quality in-flows to Buffalo taking into account the PWC upgrade of the sewage treatment plant and implementation of a Stormwater Management Plan that includes Water Sensitive Urban Design (WSUD) principles (AURECON 2013), indicated that water quality of in-flows to Buffalo Creek would improve compared to the current (business-as-usual) scenario. DHA and their consultant engineers SMEC incorporated WSUD into the Muirhead Breezes development to the south; and similar measures have been incorporated into the Master Plan for the proposed development of the 2CRU and Muirhead North sites. The development Master Plan (refer Attachment B) shows a series of WSUD treatment trains and retarding basins designed to reduce the amount of sediment leaving the site and assist in reducing nutrient load. Based on the modelling prepared by AURECON (2013) these measures should be sufficient to prevent any impact on water quality in Buffalo Creek.

The Darwin Harbour Region Report Card (2014) indicates that the quality of water in Buffalo Creek has improved since last year but the creek still has consistently poor water quality due mainly to effluent discharged from the Leanyer Sanderson Wastewater Treatment Plant, compounded by the poor flushing of the creek (Fortune 2015). Over the monitoring period assessed in the report parts of the upper catchment were under construction as part of the Muirhead Breezes development, in which DHA have incorporated WSUD. Despite the urban development activities occurring in the catchment the water quality monitoring and reporting undertaken by DLRM in Buffalo Creek over the past 3 years has not attributed poor water quality in the creek to urban development.

Subject to implementation of the above-mentioned measures (which have been tested at the Muirhead Breezes development) the proposed action is not expected to cause a measurable change to water quality parameters in Buffalo Creek and therefore is not expected to impact on any Sawfish that utilise the area. The Proponent is committed to implementing a water quality monitoring program that will assess the effectiveness of the ESCP and WSUD measures implemented at the site.

Shorebirds - Curlew Sandpiper (*Calidris ferruginea*) and Eastern Curlew (*Numenius madagascariensis*) –

The potential impacts of the proposed action on Migratory shorebirds, including the Curlew Sandpiper and Eastern Curlew, which are known to utilise the area around the mouth of Sandy Creek is discussed in section 3.1 (e) below. The location of the Sandy Creek shorebird site in relation to the project area is shown in Figure 3.



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Figure 3. Map showing location of Casuarina Beach (used for turtle nesting) and Sandy Creek (shorebird roost)

3.1 (e) Listed migratory species

Description

The potential occurrence of migratory shorebirds, marine migratory species, terrestrial migratory species and wetland migratory species within and surrounding the area proposed for development is described in the sections below.

Migratory shorebirds

There are two significant shorebird sites within or near to the proposed development area – Sandy Creek mouth and Buffalo Creek mouth (refer Figure 3). Whilst the proposed development is not expected to have a direct impact on either creek, its proximity to Sandy Creek, and the creek mouth in particular, mean that potential impacts on the Sandy Creek mouth shorebird site must be considered.

Historic shorebird counts for Darwin Harbour (including Sandy Creek), which were used to identify the species and numbers of birds that utilise the Sandy Creek area. The BirdLife Australia database contains records from 89 shorebird surveys undertaken at Sandy Creek Point between 2009 and 2015. A total of 20 migratory shorebird species have been recorded at Sandy Creek – three of these have been recorded no more than twice (Asian Dowitcher, Curlew Sandpiper and Oriental Pratincole).

The largest congregation of shorebirds recorded at Lee Point is 5,376 and the largest number of species recorded in a single count is 15. Wet season surveys yield more birds and more species than in the Dry season, which is coincident with the migratory behaviour of these species. Generally the largest counts were recorded in October to January, and species diversity was highest in September to December.

The most abundant species are Great Knot, Greater Sand Plover and Red Knot. Whilst not occurring in as large numbers as the more abundant species, Eastern Curlew, Grey Plover, Sanderling and Whimbrel were frequently counted in surveys.

Migratory shorebirds feed in loose congregations along the sand flats of Casuarina foreshore. At high tide, Buffalo Creek, Lee Point, Sandy Creek, Nightcliff Rocks and East Point are the common shorebird roosts in this area of Darwin Harbour. Roost site utilisation depends on factors such as the height of the tide, the wind direction, and disturbances such as humans and dogs. When roosting at Sandy Creek, migratory shorebirds typically select the western side of the creek mouth.

All migratory shorebirds are protected under the *EPBC Act*, and two of the species recorded at Sandy Creek, the Curlew Sandpiper and Eastern Curlew, are also listed as Critically Endangered. In 2012 the Northern Territory Government amended the list of threatened fauna to include a number of migratory shorebirds whose populations are decreasing, primarily because of impacts on feeding habitat overseas. The statuses and the maximum counts of each species of migratory shorebirds recorded at Sandy Creek are listed in Table 1.

Table 1. Status, maximum counts and *EPBC Act* important habitat criteria (0.1% of the flyway population) for shorebird species at Sandy Creek

Species	Scientific name	EPBC status	TPWC status	No. of surveys counted	0.1%	Max. no. counted
Asian Dowitcher	<i>Limnodromus semipalmatus</i>	-	VU	1	24	1
Bar-tailed Godwit	<i>Limosa lapponica</i>	-	VU	39	325	16
Black-tailed Godwit	<i>Limosa limosa</i>	-	NT	6	160	20
Common Greenshank	<i>Tringa nebularia</i>	-	LC	24	60	6
Common Sandpiper	<i>Actitis hypoleucos</i>	-	LC	23	25	3
Curlew Sandpiper	<i>Calidris ferruginea</i>	CR	VU	2	180	1
Eastern Curlew	<i>Numenius madagascariensis</i>	CR	VU	64	38	7
Great Knot	<i>Calidris tenuirostris</i>	-	VU	43	375	4215
Greater Sand Plover	<i>Charadrius leschenaultii</i>	-	VU	55	110	1300
Grey Plover	<i>Pluvialis squatarola</i>	-	NT	56	125	23
Grey-tailed Tattler	<i>Tringa brevipes</i>	-	NT	11	50	11
Lesser Sand Plover	<i>Charadrius mongolus</i>	-	VU	8	140	20
Oriental Plover	<i>Charadrius veredus</i>	-	LC	1	70	1
Red Knot	<i>Calidris canutus</i>	-	VU	26	220	590
Red-necked Stint	<i>Calidris ruficollis</i>	-	LC	28	325	96
Ruddy Turnstone	<i>Arenaria interpres</i>	-	NT	24	35	35
Sanderling	<i>Calidris alba</i>	-	LC	60	22	120
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	-	LC	4	160	17
Terek Sandpiper	<i>Xenus cinereus</i>	-	LC	4	60	2
Whimbrel	<i>Numenius phaeopus</i>	-	NT	53	100	16

LC = Least Concern; NT = Near Threatened; VU = Vulnerable; CR = Critically Endangered

The *EPBC Act Policy Statement 3.21* (DEWHA 2009) defines the criteria for 'important habitat for migratory shorebirds' as sites that support any of the following:

- **At least 0.1 per cent of the flyway population of a single species:** There are four species at Sandy Creek for which this is the case a highlighted red in the above table – Great Knot, Greater Sand Plover, Red Knot and Sanderling.
- **At least 2000 migratory shorebirds:** There are nine records of shorebird congregations greater than 2000 birds at Sandy Creek (and a tenth record of 1972 birds).
- **At least 15 migratory shorebird species:** There is one instance of 15 species counted during one survey at Sandy Creek, one instance of 14 species, and five instances of 13 species.

Under each of these criteria Sandy Creek qualifies as an important habitat for migratory birds.

In addition, there are two Critically Endangered shorebird species that have been recorded at Sandy Creek, the Curlew Sandpiper (recorded on 2 occasions) and Eastern Curlew (recorded on 64 occasions). The occurrence of the Curlew Sandpiper and Eastern Curlew at the mouth of Sandy Creek constitutes and 'important' population as due to the species being listed as Critically Endangered any occurrence constitutes a population and all populations are 'important'.

Marine migratory species

The *EPBC Protected Matters Search* report identifies ten marine migratory species (not including threatened species which are examined above) that occur in the marine environments adjacent to the project area. These are listed below:

- Fork-tailed Swift (*Apus pacificus*)
- Bryde's Whale (*Balaenoptera edeni*)
- Dugong (*Dugong dugon*)
- Irrawaddy Dolphin (*Orcaella brevirostris*)
- Indo-Pacific Humpback Dolphin (*Sousa chinensis*)
- Little Tern (*Sterna albifrons*)
- Green Turtle (*Crocodylus porosus*)
- Giant Manta Ray (*Manta birostris*)
- Killer Whale (*Orcinus orca*)
- Spotted Bottlenose Dolphin (*Tursiops aduncus*).

All of these species are common and/or widespread across tropical Australia. Their use of the marine waters surrounding the areas proposed for development is primarily for passage and incidental feeding, and therefore the area does not include important habitat for these species nor contain any known ecologically significant proportions of populations of these species. Furthermore, the proposed action is not expected to impact on marine areas.

Terrestrial migratory species

The *EPBC Protected Matters Search* report identifies four terrestrial migratory species (not including threatened species which are examined above) that may occur within the project area. These are listed below:

- White-bellied Sea-Eagle (*Haliaeetus leucogaster*)
- Rainbow Bee-eater (*Merops ornatus*)
- Barn Swallow (*Hirundo rustica*)
- Rufous Fantail (*Rhipidura rufifrons*).

These species are common and/or widespread across tropical Australia (apart from Barn Swallow which is a vagrant) and the proposed development area does not include important habitat for these species nor contain any known ecologically significant proportions of populations of these species.

Wetland migratory species

The *EPBC Protected Matters Search* report identifies eight species of wetland migratory species (not including threatened species and migratory shorebirds which are examined above) that may occur within or in areas surrounding the project area. These are listed below:

- Great Egret (*Ardea alba*)
- Oriental Pratincole (*Glareola maldivarum*)
- Little Curlew (*Numenius minutus*)
- Marsh Sandpiper (*Tringa glareola*)
- Cattle Egret (*Ardea ibis*)
- Broad-billed Sandpiper (*Limicola falcinellus*)
- Pacific Golden Plover (*Pluvialis fulva*)
- Wood Sandpiper (*Tringa glareola*).

Whilst there are seasonally inundated *Melaleuca* woodland areas within the Muirhead North lot, these do not constitute the type of open wetland habitat utilised by the above-mentioned listed wetland

migratory species. The proposed development area therefore does not include important habitat for these species nor contain any known ecologically significant proportions of populations of these species.

Nature and extent of likely impact

Migratory shorebird roosting and feeding habitats

Urbanisation of the area and the creation of foreshore access trails through the Casuarina Coastal Reserve to the beach will increase beach use by people and dogs near to the Sandy Creek mouth. Disturbance has potential to alter the use of roost sites by shorebirds and is identified in EPBC Act Policy Statement 3.21 (DEWHA 2009b) as a conservation issue for migratory shorebirds:

"Disturbance is emerging as a major conservation issue for migratory shorebirds. Certain activities may interrupt migratory shorebirds during their limited foraging periods, such as during low tide, and prevent them from foraging effectively. Disturbance can also affect roosting birds and cause them to waste energy stored for migration."

The proposed development Master Plan rationalises access to the Casuarina Coastal Reserve by providing two well-defined access points from the 2CRU site into the reserve. The foreshore access trails have been sited to the east of the Sandy Creek mouth, which will mean that the roost area on the western side of the creek mouth is only accessible during the mid to low tide as during the high tide the creek mouth is impassable to walkers. It is the Proponent's intention to stop people accessing the coastal reserve outside these access points by closing off old access tracks and ensuring the new tracks are well sited and designed.

To manage disturbance to shorebirds the Casuarina Coastal Reserve Draft Plan of Management (Parks and Wildlife May 2015) indicates that the area of beach 100 m either side of Sandy Creek is a 'dog on lead' zone, where people are permitted to walk dogs as long as they are on a lead and under control. With these management measures in place shorebirds have persisted at the Sandy Creek site to date. However, shorebird roosting sites around the Casuarina Coastal Reserve and elsewhere in Darwin Harbour are under increased pressure from disturbance and hence there is likely to be a cumulative effect.

The proposed action will contribute to increasing beach use around the mouth of Sandy Creek, a trend set in motion as a result of urban development on the northern extent of Darwin's urban area and associated increase in use of the Casuarina Coastal Reserve. The trend of increasing use of the Reserve would be expected to continue as the NT Government has recently committed \$10 million to infrastructure upgrades that will facilitate better access. It is unknown the extent to which the ongoing implementation and enforcement of the 'dog on lead' zones around Sandy Creek and continued monitoring of the shorebird population by Parks and Wildlife, will be sufficient to prevent a reduction in use of the Sandy Creek shorebird site as visitor numbers continue to increase.

The Sandy Creek catchment is largely urbanised and given that shorebirds have continued to utilise the creek mouth, it is not expected that the proposed action will cause water pollution or changes to the water regime that would affect the productivity of the feeding environment.

3.1 (f) Commonwealth marine area

Description

There are no Commonwealth marine areas in proximity to the proposed action.

Nature and extent of likely impact

Not applicable

3.1 (g) Commonwealth land

Lot 4873 Town of Nightcliff (the 2CRU site) is owned by the Commonwealth and therefore part of Part of the action is on Commonwealth land. As the action will be undertaken on Commonwealth Land by a Commonwealth Agency, the nature and extent of likely impact on the whole environment has been assessed in accordance with the *EPBC Act Significant Impact Guidelines 1.2 Actions on, or impacting upon Commonwealth land, and actions by Commonwealth Agencies*. Refer section 3.2 (b) and section 3.2 (d) of this referral

Description

Refer section 3.2 (b) and 3.2(d) of this Referral.

Nature and extent of likely impact

Refer section 3.2 (b) and 3.2(d) of this Referral.

3.1 (h) The Great Barrier Reef Marine Park

Description

The area proposed for development is not located near the Great Barrier Reef Marine Park.

Nature and extent of likely impact

Not applicable

3.1 (i) A water resource, in relation to coal seam gas development and large coal mining development

The proposed development is not a coal seam gas development or large coal mining development.

Description

Not applicable

Nature and extent of likely impact

Not applicable

3.2 Nuclear actions, actions taken by the Commonwealth (or Commonwealth agency), actions taken in a Commonwealth marine area, actions taken on Commonwealth land, or actions taken in the Great Barrier Reef Marine Park

3.2 (a)	Is the proposed action a nuclear action?	X	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment

Not applicable

3.2 (b)	Is the proposed action to be taken by the Commonwealth or a Commonwealth agency?		No
		X	Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment

The Proponent of the proposed action is Defence Housing Australia (DHA), a Commonwealth Agency.

The nature and extent of likely impact on the whole environment was assessed in preparing the Notice of Intent (NOI) for the proposed development submitted to the NTEPA on 7 September 2015. The assessment was prepared with reference to the following EPBC Guidelines:

- *EPBC Act Significant Impact Guidelines 1.1 Matters of National Environmental Significance*
- *EPBC Act Significant Impact Guidelines 1.2 Actions on, or impacting upon Commonwealth land, and actions by Commonwealth Agencies.*

The assessment of whole of environment impacts is presented at Attachment G, which is an extract of the NOI submitted to the NT EPA.

3.2 (c)	Is the proposed action to be taken in a Commonwealth marine area?	X	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(f))

Not applicable

3.2 (d)	Is the proposed action to be taken on Commonwealth land?		No
		X	Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(g))

The nature and extent of likely impact on the whole environment was assessed in preparing the Notice of Intent (NOI) for the proposed development submitted to the NTEPA on 7 September 2015. The assessment was prepared with reference to the

following EPBC Guidelines:

- *EPBC Act Significant Impact Guidelines 1.1 Matters of National Environmental Significance*
- *EPBC Act Significant Impact Guidelines 1.2 Actions on, or impacting upon Commonwealth land, and actions by Commonwealth Agencies.*

The assessment of whole of environment impacts is presented at Attachment G, which is an extract of the NOI submitted to the NT EPA.

3.2 (e)

Is the proposed action to be taken in the Great Barrier Reef Marine Park?	X	No
		Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(h))

Not applicable

3.3 Other important features of the environment

3.3 (a) Flora and fauna

Refer Attachment G *Section 4.6 Vegetation* and *Section 4.7 Fauna* for a description of the flora and fauna that are known from the area.

EPBC listed Threatened species are addressed in previous sections of this referral.

There are species present in the area proposed for development and surrounding areas that are not listed under the *EPBC Act* but are considered Threatened pursuant to the *NT Parks and Wildlife Conservation Act*. These are discussed at Attachment G *Section 4.8 Threatened Species*.

3.3 (b) Hydrology, including water flows

The areas proposed for development occur across the catchments of Buffalo Creek and Sandy Creek, which flow into Shoal Bay and Darwin Harbour respectively. Both catchment areas are partly urbanised; and Buffalo Creek currently receives discharge of treated sewage effluent from the Leanyer Sanderson Wastewater Treatment Ponds approximately 5 km upstream of the mouth.

A minor ephemeral drainage line traverses the Muirhead North site but there are no permanent waterbodies. The ephemeral drainage line flows through a rainforest patch located in the centre portion of the site, which will be retained as part of the open space network proposed as part of the development. A review of the hydrology of the rainforest patch has been undertaken to inform stormwater infrastructure design (refer Attachment E).

Refer Attachment G *Section 4.5 Water* for a complete description of the surface and groundwater and assessment of likely impacts.

3.3 (c) Soil and Vegetation characteristics

The area is typified by alluvium surface soils overlaying laterite gravels and claystone. Geotechnical investigations in the Muirhead North lot (eastern area of proposed development) reported that the area consisted of loose silty sandy top soils with organic material overlying dense residual sands, which were generally underlain by cemented sandy laterite. In the eastern half of the Muirhead

North lot sandy loam soils are underlain by light clays, which contributes to seasonal waterlogging that occurs in some areas.

Refer Attachment G *Section 4.4 Soils and other substrates*.

The proposed development area contains the following vegetation communities:

- Woodland
- Rainforest
- Vine thicket
- Shrubland
- Grassland (introduced species).

The area contains a mix of remnant and regenerated vegetation communities that are common in the Top End but not all are well represented in the Darwin area because of clearing for urban development. Weeds are abundant.

Refer Attachment G *Section 4.6 Vegetation* for a complete description of the vegetation types present and assessment of likely impacts.

3.3 (d) Outstanding natural features

Not Applicable. For a general description of the landscape refer to Attachment G *Section 4.3 Landscapes and landforms*.

3.3 (f) Gradient (or depth range if action is to be taken in a marine area)

Not Applicable.

3.3 (g) Current state of the environment

Refer Attachment G *Section 4.2 History, current use and condition of the environment*.

The 2CRU site contains an area of disused Defence radar communications facilities, which are in the process of being dismantled and removed. Site investigations undertaken by GHD (2014a) indicate there is no gross contamination of soils or groundwater. Although some metal concentrations were identified within the site soils and some minor petroleum hydrocarbon impacts in the vicinity of the underground storage tanks, nothing was identified that would render the site unsuitable (from a contamination perspective) for a residential end use.

The remainder of the 2CRU site comprises vegetation cover of varying stages of growth and condition, along with various disused structures associated with Defence operations within the site. There is a formal vehicle track from Lee Point Road to the compound, with other less formal tracks, including from the compound heading in a southerly direction connecting with the trails in the Casuarina Coastal Reserve. Vehicle tracks / firebreaks are present along the eastern and southern property boundaries. There is also evidence of itinerant camps within the site (GHD 2010).

The Muirhead North site appears to have always been Vacant Crown Land with no formal land use with the exception of a telecommunications tower and associated equipment shelter located near to Lee point Road. Historic aerial photos show that the site has been extensively cleared and excavated/borrowed in the past. Given the timing of the disturbance was pre-1970 this activity may have been related to the use of the site as part of an anti-aircraft battery established in the Lee Point area in the 1960's. Military remnants in the form of several steel drums are located in the north-west corner of the site, and there has been minor illegal dumping across the site.

There is a large erosion gully located in the south-west corner of the 2CRU site. Both 2CRU and Muirhead North are infested with weeds.

3.3 (h) Commonwealth Heritage Places or other places recognised as having heritage values

There are no Commonwealth Heritage Places or other heritage sites protected under either the *EPBC Act* or *NT Heritage Act* within the area proposed for development or surrounding areas.

The heritage assessment reports prepared by Crassweller (2010) and Jung (2014) (refer Attachments H1 & H2) identify places and items within Lot 4873 and Lot 9307 that whilst not formally protected under the *EPBC Act* or *NT Heritage Act* may hold cultural heritage value. A number of these heritage sites are proposed for retention and formalisation as interpretative sites as part of the proposed development; and this intent is reflected in the approved Area Plan and Planning Principles.

Refer Attachment G *Section 4.11 Heritage Places and Items* for a complete description of the heritage values present in the area proposed for development and assessment of likely impacts.

3.3 (i) Indigenous heritage values

A background scatter of isolated stone artefacts was recorded on the 2CRU site at grid location 705050E 8634250N (Heritage Surveys 2001a). This site was assessed as having low significance. Refer Attachment G *Section 4.11* for a description of the site location and assessment of likely impacts. It is proposed that the artefacts will be relocated by a qualified heritage consultant in consultation with the NT Heritage Branch.

The Aboriginal Areas Protection Authority has no record of sacred sites listed within the area of Lots 4873 and 9370 Town of Nightcliff.

3.3 (j) Other important or unique values of the environment

The proposed development area is located adjacent to the Casuarina Coastal Reserve and is within the catchment of Shoal Bay, which is recognised as a Site of Conservation Significance (SOCS). Refer Attachment G *Section 4.10 Conservation and special use areas* for details of the location of the proposed development in relation to these areas and assessment of likely impacts.

3.3 (k) Tenure of the action area (eg freehold, leasehold)

Lot 4873 Town of Nightcliff (2CRU) is vacant Commonwealth land currently zoned Future Development (FD) and Conservation (CN).

Lot 9370 Town of Nightcliff (Muirhead North) is Vacant Crown land currently zoned Future Development (FD). The site is referred to as Muirhead North and is currently owned by the NT Government.

The NT Planning Scheme (NTPS) was recently amended to introduce zone Future Development (FD) to Lot 4873, Town of Nightcliff, and to rezone Lot 9370 Town of Nightcliff to FD. The Lee Point Area Plan and Planning Principles were also included in the NTPS as part of the recent amendment.

3.3 (l) Existing land/marine uses of area

The land area proposed for development is currently unused bushland. The land-use surrounding the area proposed for development is a mixture of residential, tourism and recreation, and conservation. The Darwin Regional Land-use Framework (Clause 4.2 of the NT Planning Scheme) categorises the area as 'Urban'. Over the past 10 - 15 years there has been rapid expansion of urban residential development on both the eastern and western sides of Lee Point Road. The

proposed action will further expand the urban residential areas consistent with the 'Urban' land-use category assigned to the area under the NT Planning Scheme.

3.3 (m) Any proposed land/marine uses of area

The adjacent land areas to the south are currently being developed for urban residential land-use. The NT Government has recently committed \$10 million to providing infrastructure upgrades in the Casuarina Coastal Reserve that adjoins the western boundary of the proposed development.

4 Measures to avoid or reduce impacts

The site chosen for the Lee Point master-planned urban development is situated on land that is adjacent to existing urban areas and categorised as 'Urban' on the *Darwin Regional Land Use Framework (Clause 4.2 NT Planning Scheme)*. The site has been substantially disturbed by past land-use activities and is heavily infested with weeds, and the land is currently used informally for activities that do not contribute to maintaining the environmental values of the area and surrounds (i.e. off-road driving / dirt bike activities, illegal dumping and itinerant camping). Road access and utilities services connections are readily available through connection to the existing trunk services that terminate in the adjacent suburbs of Lyons and Muirhead to the south. For these reasons the site is a suitable choice for an urban development.

Through the process of establishing an Area Plan, Master Plan and Planning Principles, which have been formalised into the NT Planning Scheme, land-use zones have been put in place to guide the siting of activities and infrastructure on the site in a way that reduces or avoid impacts to the environment and community. All future Development Applications submitted under the *Planning Act* will be assessed in accordance with the Area Plan, Master Plan and Planning Principles.

Measures to avoid impacts

The key impact avoidance measures incorporated into the planning framework for the site are summarised below:

- 21.8 ha, or 26% of the 2CRU site area, is identified in the approved Area Plan as 'development restricted by constraints' and this area will be re-zoned to Conservation (CN) to become part of the Casuarina Coastal Reserve. In accordance with the approved Planning Principles, development below the escarpment will be limited to "community and/or tourism activity uses and public walking and cycling tracks that protect the environmental values of the coastal reserve and adjoining vegetation types." Restriction on development in this area will avoid impacts to the sensitive monsoon vine forest community and will provide a buffer between the development and the Casuarina Coastal Reserve.
- The proposed boundary between the development and the Casuarina Coastal Reserve is defined by the top of the existing escarpment within the 2CRU site. The Area Plan establishes a 50m buffer between new homes and the site boundary, which will comprise a linear public open space, a local road that will act as a promenade and a small area (0.65 ha) of non-residential land set aside for community/tourism use.
- The provision of access trails and a mountain biking trail through the Conservation (CN) zoned area connecting to the existing trails and foreshore / beach areas within the Casuarina Coastal Reserve will avoid impacts to the monsoon vine forest and beach dune areas associated with uncontrolled and unmanaged access.
- Access trails have been sited to provide beach access east of Sandy Creek mouth, which means that disturbance of the migratory shorebird roosting site on the western side of the creek mouth, during the high tide period when the largest numbers of birds congregate, will be limited by the creek being impassable at high tide.
- The regionally significant rainforest patch in Muirhead North has been designated for retention as Open Space in the approved Area Plan. The area is to be owned and managed by the NT Government, and stormwater drainage has been designed to maintain pre-development flows to the patch. A hydrological review of the rainforest patch prepared by

SMEC (2015) (Attachment E) determined the post-developed catchment area that is required to discharge into the rainforest in order to maintain pre-development flows.

- The approved Area Plan maps pedestrian / cyclist routes and public transport services area identified in the Engineering Services Plan (refer SMEC 2015a). This infrastructure will provide a range of options for non-car-based transport and recreational activities.
- To avoid reducing access to community services and overcrowding of retail services the approved Lee Point Area Plan identifies a Primary School and Community Hub and retail floor space.
- Rural residential lots of minimum 4, 000 m² are the only development permitted on the east side of the 1 km urban biting insect buffer zone indicated by Medical Entomology (Warchot and Whelan 2008). This buffer will provide a diversion to biting midges and mosquitoes dispersing inland from Buffalo Creek.
- The proposed development will not occur within the Leanyer Sanderson Wastewater Treatment Plant 700 m buffer zone established for the purpose of minimising potential odour impacts to urban residential areas.

Measures to reduce impacts

As with all developments there are environmental impacts that cannot be entirely avoided through site selection and design. The likely impacts of the proposed action on EPBC listed matters and the whole of the environment are summarised below from the relevant sections of this Referral and Attachment G (Whole of environment assessment) respectively. For each likely impact the mitigation and management measures that are proposed to limit impact severity are described.

Some of the identified measures have been designed in detail and where this design detail is available it has been presented in the sections below. Other measures are conceptual at this stage for the purpose of confirming constructability and likely impacts, and these will be progressed through to detailed planning and design prior to submission of future Development Applications. The requirement for each stage of the subdivision and development to be approved under the NT *Planning Act* prior to commencement of construction establishes the process by which the mitigation and management measures proposed will be reviewed and approved by NT Government stakeholders, including the NT EPA.

Implementation of construction phase mitigation measures will occur through Construction Environmental Management Plan's (CEMP). DHA will ensure that contractors engaged for civil works provide a CEMP. The preparation of a CEMP is a standard requirement of DHA contracts and will need to be approved by DHA's Superintendent of works prior to commencement of works. DHA has demonstrated its ability to oversee environmental contractual requirements through their delivery of the Lyons and Muirhead subdivision developments to the south of the project area, including those requirements arising from assessment and approval of the Muirhead subdivision (Lot 9737 Lee Pt Rd) under the *EPBC Act* (refer EPBC 2010/5525).

Impacts on landscapes and soils

Mitigation and management measures to avoid or reduce impacts to landscapes and soils are presented below:

- *Impact: Land clearing and earth works are likely to cause erosion in some areas if surface water flows are not appropriately controlled and managed.*

An Erosion and Sediment Control Plan (ESCP) will be prepared to manage erosion and sedimentation across the development site for each stage of construction. The ESCP will be developed by an appropriately qualified engineer in accordance with the *International Erosion and Association Guidelines*. The ESCP will be submitted for review and approval by the Department of Land Resources Management (DLRM) as part of future Development Applications, and in accordance with approval processes established under the *NT Planning Act* the development will not be given approval to proceed without an approved ESCP.

ESCP implementation will be addressed in the CEMP prepared for each subdivision. DHA will ensure that contractors engaged for civil works provide a CEMP. The preparation of a CEMP is a standard requirement of DHA contracts and will need to be approved by DHA's Superintendent of works prior to commencement of works. The CEMP is where staging of ESCP requirements will be addressed.

- *Impact: Land clearing and earthworks in the Muirhead North lot will occur in areas where seasonal ponding of water occurs*

The Stormwater Strategy Plan for the development area is provided in the Engineering Services Report (Attachment D) and summarised in Section 2 of this Referral. It is intended that the stormwater drainage system will prevent ponding of water within the Muirhead North site during the wet season and this will provide trafficability for development.

The Geotechnical Report (SMEC 2014) indicates that some measures may be required to maintain trafficability across the Muirhead North site during wet periods, especially in areas where the surface materials are in a loose state. If localised areas become too soft to be successfully proof rolled, the soft material could be excavated and replaced (ensuring that undercutting of existing earthworks and structures does not occur), or if larger areas become untrafficable then a working platform comprising granular material, possibly with geo-grid reinforcement, could be placed across the area to improve trafficability.

Impacts on the marine environment

Mitigation and management measures to avoid or reduce impacts on the marine environment are presented below:

- *Impact: Land clearing, earthworks and establishment of a stormwater drainage system could increase sediment and nutrient loads entering the marine environment via stormwater runoff*

The Stormwater Strategy Plan for the development area is provided in the Engineering Services Report (SMEC 2015a) (Attachment D) and summarised in Section 2 of this Referral. The Master Plan shows a series of WSUD treatment trains and retarding basins designed to reduce the amount of sediment leaving the site and assist in reducing nutrient load. The Stormwater Strategy Plan (SMEC 2014) indicates that stormwater management for the development would comprise the following features:

- Maximising on site storage and recharge of surface runoff into existing aquifers
- Limiting runoff to pre-development conditions by promoting filtration of runoff through enhanced natural vegetation and storage systems
- Provide erosion and sediment control by incorporating measures during construction and permanent sediment basins at outlets to natural waterways.

Detailed stormwater drainage designs will be developed in a Stormwater Management Plan (SMP) to be prepared and submitted with future Development Applications. Best practice design for the detention basins in both catchments will involve early consideration of design levels to ensure free-

flowing outlets are achieved, road and allotment levels are adequately drained and the characteristics of the basin/s are such that they form a feature of the finished landscape design.

To gain Development Approval under the *NT Planning Act* design of any open trunk drainage and the detention basins will need to be completed in accordance with City of Darwin maximum depth and velocity requirements. Peak flood discharges within the subject site shall be established and documented in a "Hydraulic Impact Assessment" report. This report will determine the required drainage infrastructure needed for conveyance of post-development discharges through the site and will review the hydraulic impact of the development concept on existing flood levels.

The Planning Principles for the development approved under the *NT Planning Act* state:

Future Development within the Lee Point Area is to preserve and integrate areas and/or items of environmental and heritage significance by implementing appropriate environmental and engineering measures including but not limited to the application of principles of water sensitive urban design.

WSUD has been incorporated into the DHA's Breeze's Muirhead development to the south and it is intended that similar measures will be adopted in the proposed development area. The extent to which these measures are likely to be effective in maintaining the quality of post-development stormwater discharges to Buffalo Creek can be considered with reference to the water quality monitoring undertaken by the NT Government DLRM, which indicated minor improvements in Buffalo Creek water quality over the period 2013 to 2014 (Fortune 2015) when Muirhead Breezes was under construction. Whilst the water quality in Buffalo Creek is reported as 'Very Poor' the monitoring report attributes this to discharge from the Leanyer Sanderson Wastewater Treatment Plant with no changes reported in associated with urban development in the catchment.

As mentioned previously, an Erosion and Sediment Control Plan (ESCP) will be prepared to manage erosion and sedimentation across the development site for each stage of construction.

Impacts on water resources

Mitigation and management measures to avoid or reduce impacts on water resources are presented below:

- *Impact: Urbanisation has potential to alter the quality, quantity and velocity of stormwater in-flows to the downstream receiving environments of Sandy Creek and Buffalo Creek*

The Stormwater Strategy Plan for the proposed development area (SMEC 2015a) indicates that the design philosophy for drainage shall ensure that downstream discharges are limited to existing flows. By limiting stormwater discharge it is intended that the quantity of stormwater entering Sandy Creek and Buffalo Creek will not change.

Stormwater management will include compensation and nutrient stripping structures prior to discharge (SMEC 2015a). The Stormwater Strategy Plan indicates that stormwater management for the development would comprise the following features relevant to ensuring impacts to water quality are managed:

- limiting runoff to pre-development conditions by promoting filtration of runoff through enhanced natural vegetation and storage systems
- erosion and sediment controls incorporated during construction and permanent sediment basins at outlets to natural waterways.

The approved Area Plan incorporates Open Space Areas (incorporating drainage features) and the Master Plan shows the location of stormwater detention basins.

Detailed design of the stormwater drainage network will be presented in a Stormwater Management Plan, which will comply with the approval requirements of NT Government and City of Darwin; and will be submitted for approval through the Development Application processes under the *NT Planning Act*.

To monitor the effectiveness of the stormwater management controls, ESCP's and WSUD measures the Proponent commits to implementing a water quality monitoring program that assesses nutrient and sediment loads in stormwater flowing off the 2CRU and Muirhead North sites.

- *Impact: Establishment of a stormwater drainage network will alter local hydrology, which has potential to alter the quality and quantity of flows entering the rainforest patch located within the Muirhead North site*

A hydrological review of the rainforest patch prepared by SMEC (2015) (Attachment E) determined the post-developed catchment area that is required to discharge into the rainforest in order to maintain pre-development flows. Further details on measures that will be implemented to reduce impacts to the rainforest patch are provided in the 'Impacts on plants' section below.

- *Impact: Groundwater quality could be degraded if shallow groundwater is intercepted by excavations.*

The Geotechnical Report (SMEC 2015b) indicates that if excavations are required in the Muirhead North site within sands to depths below the groundwater table then local de-watering measures are likely to be required to ensure their stability. Any requirement for dewatering has not yet been confirmed; however, mitigation and management measures for this activity will be included in the ESCP and SMP submitted for approval as part of future Development Applications. Implementation of controls for disposal of contaminated water will occur through CEMP's and consideration will be given to any requirements for a license under the *Waste Management Pollution Control Act*.

Pollutants, chemicals and toxic substances

Mitigation and management measures to avoid or reduce pollution are presented below:

- *Impact: There are a number of hazardous building materials present on the 2CRU lot that when disturbed have potential to contaminate surrounding areas if not appropriately handled*

Contamination Investigations were undertaken across the 2CRU and Muirhead North sites (GHD 2010, 2014b and EcOz 2015) and a Destructive Hazardous Material Survey prepared for the 2CRU site (2014a). All recommendations provided in those reports will be implemented.

To remove any hazardous materials and / or contamination on the 2CRU site prior to construction the Proponent has released a tender with the following stated scope of works:

"to demolish and remove all the existing infrastructure including the removal of all hazardous materials within the site prior to general demolition, the removal and associated validation of two underground storage tanks, and the validation upon completion of demolition works that the site is suitable for residential use."

The tender documents require the following hazardous materials and contamination plans and reports be provided to the satisfaction of the Superintendent:

- Remediation Sampling Analysis Plan
- Site Remediation and Validation Investigation and Report
- Air Monitoring and Hazmat Report
- Independent Audit statement for site remediation and validation.

The Contractor must provide confirmation from a suitably qualified and experienced consultant that the plans and reports are appropriate for their intended use.

The tender documents require that the Contractor must provide certification from an appropriately qualified person under *Section 68 of the NT Waste Management and Pollution Act* that confirms the site is suitable for its intended use.

The works awarded under the tender will be completed and site validation reports provided prior to any development occurring at the site.

- *Impact: The accidental release of hydrocarbons or other hazardous substances and/or disturbance of pre-existing contamination have the potential to cause temporary degradation of soils and impact on the quality of receiving waters.*

Details of hydrocarbon and hazardous materials storage and handling requirements will be developed as part of the construction planning process. Management will be in accordance with Australian Standards with details of onsite storage and handling to be provided as part of CEMP's.

- *Impact: The disturbance of soils in coastal regions by excavation at depths below 5 m AHD from sea level increases the risk of exposing ASS*

The risk of exposing ASS is considered to be low as no earthworks are proposed that will require excavation below 5 m AHD in any part of the proposed development area. Service trenching in the low lying areas in the east of Muirhead North is expected to be relatively shallow and not extend below 5 m AHD. Stormwater attenuation basins proposed in the south-east corner of the Muirhead North lot will need to be constructed above the natural surface allowing free-draining discharge of stormwater from the site to the natural drainage channels.

Impacts on plants

Mitigation and management measures to avoid or reduce impacts on plants are presented below:

- *Impact: Land clearing will cause loss of approximately 111 ha of native vegetation*

To ensure land clearing is confined to those areas identified for development on the Master Plan, site boundaries will be accurately surveyed and pegged prior to construction. Areas of native vegetation to be retained in Open Space areas or parkland will be clearly demarcated. Requirements for pre and post land clearing surveys will be documented in CEMP's.

DHA has demonstrated its ability to implement these standard environmental management measures at its Muirhead Breezes development to the south of the project area where there has been no unauthorised land clearing.

- *Impact: Clearing corridors for construction of foreshore access and mountain bike trails will disturb monsoon vine forest habitat within the Casuarina Coastal Reserve and may make the habitats more susceptible to invasion by weed species which are prevalent in the surrounding areas.*

- *Impact: Land clearing in areas surrounding the rainforest patch in Muirhead North will make the habitat margins more susceptible to invasion by weed species which are prevalent in the surrounding areas.*

Control of Gamba Grass on the 2CRU site along the boundary that interfaces with the Casuarina Coastal Reserve commenced in May 2015 through a DHA contract and will continue with the objective of reducing the area of infestation prior to commencement of construction activities. Prior to any works an up to date weed survey will be undertaken to inform preparation of a Weed Management Plan. The Plan will identify weed control requirements and specific measures to minimise the likelihood of transferring weeds from the infested areas of the 2CRU site into the adjacent areas of the Casuarina Coastal Reserve and from Muirhead North into the rainforest patch. Implementation of measures identified in the Weed Management Plan will occur through CEMP's.

Ongoing weed management within the expanded Casuarina Coastal Reserve and Muirhead North rainforest patch will be the responsibility of the NT Government.

- *Impact: Localised changes to hydrology have potential to impact on the preservation of the rainforest patch in Muirhead North.*

The eastern catchment area within Muirhead North will be further divided into sub-catchments to allow for maintaining pre-development flows to the rainforest patch with the intent of preserving the ecological integrity of the area. A hydrological review of the rainforest patch prepared by SMEC (2015) (Attachment E) determined the post-developed catchment area that is required to discharge into the rainforest in order to maintain pre-development flows.

For the purpose of maintaining water quality entering the rainforest patch the post-developed 'first flush' flows (i.e. ARI 3-month) will be conveyed by pit and pipe system into a bio-retention treatment basin before flowing into the rainforest. Flow greater than an ARI 3-month event will be discharge into a grassed overland flow swale, which will then flow to the rainforest.

An Erosion and Sediment Control Plan (ESCP) will be prepared to manage erosion and sedimentation across the development site for each stage of construction. The ESCP will be submitted for review and approval as part of future Development Applications. ESCP implementation will be addressed in CEMP's.

Impacts on animals

Mitigation and management measures to avoid or reduce impacts on animals are presented below:

- *Impact: Land clearing will cause direct loss of fauna habitat within the clearing footprint*

To ensure land clearing is confined to those areas identified for development on the Master Plan, site boundaries will be accurately surveyed and pegged prior to construction. Areas of native vegetation to be retained in Open Space areas or parkland will be clearly demarcated. Requirements for pre and post land clearing surveys will be document in CEMP's.

DHA has demonstrated its ability to implement these standard environmental management measures at its Muirhead Breezes development to the south of the project area where there has been no unauthorised land clearing.

- *Impact: Noise / dust emissions from construction activities are likely to disturb habitats surrounding the development area resulting in temporary avoidance by fauna*

Dust and noise controls will be documented in CEMP's. As there are no known sensitive habitat areas nearby, standard mitigation measures detailed in *Noise Guidelines for Development Site in the NT* (NT EPA 2013) will be referenced. Dust will be managed to ensure no adverse effect on the amenity of the surrounding areas in accordance with the *Waste Management and Pollution Control Act*.

- *Impact: Fauna disturbance, injury or mortality may occur during land clearing and construction activities*

Pre and post land clearing assessments will be undertaken, and fauna spotter – catchers will be engaged to be onsite during land clearing activities to rescue injured wildlife. The proponent will communicate this requirement to all contractors through tender documentation, and contractors will be responsible for addressing the requirement in CEMP's and engaging appropriately qualified personnel to undertake this role.

DHA has demonstrated its ability to implement pre-clearing surveys and fauna-spotter catcher measures on the Muirhead subdivision to the south of the proposed development. The construction contractor for that development, BMD constructions, engaged EcOz Environmental Consultants to undertake work at each stage of the subdivision clearing.

- *Impact: Stormwater could introduce increased sediment, contaminants and / or nutrients into Buffalo Creek and Sandy Creek with a subsequent decrease in the quality of habitats available for aquatic and marine fauna*

The Stormwater Strategy Plan (Attachment D) and the development Master Plan (Attachment B) show a series of WSUD treatment trains and retarding basins designed to reduce the amount of sediment leaving the site and assist in reducing nutrient load. Details of these mitigation measures and discussion of why downstream impacts are not expected to occur have been provided in earlier sections of this Referral.

An ESCP will be prepared to manage erosion and sedimentation across the development site for each stage of construction. The ESCP will be submitted for review and approval by NT Government stakeholders as part of future Development Applications submitted in accordance with the *NT Planning Act*. ESCP implementation will be addressed in CEMP's.

The extent to which the proposed measures are likely to be effective in maintaining the quality of post-development stormwater discharges from the site was discussed previously, where it was concluded that the DHA urban developments to the south of the project area have not caused any measurable change to the water quality in Buffalo Creek. To monitor the effectiveness of the stormwater management controls, ESCP's and WSUD measures the Proponent commits to implementing a water quality monitoring program that assesses nutrient and sediment loads in stormwater flowing off the 2CRU and Muirhead North sites.

Impacts on Threatened species

Mitigation and management measures to avoid or reduce impacts on Threatened species of plants and animals are presented below:

- *Impact: The proposed development has potential to create Cane Toad breeding habitat within the proposed drainage reserves if stormwater drainage and detention basis are not appropriately designed and maintained. Cane Toads are the main threatening process for Threatened fauna which may occur in areas surrounding the development area.*

The Stormwater Management Plan overview provided in SMEC (2015a) states that “best practice design for the detention basins in both catchments will need to involve early consideration of design levels to ensure free outlets are achieved, road and allotment levels are adequately drained and the characteristics of the basin/s are such that they form a feature of the finished landscape design.” Detailed designs will be developed and submitted as part of the Stormwater Management Plan with future Development Applications. Design will comply with the *Guidelines for Preventing Biting Insect Problems for Urban Residential Developments or Subdivisions in the Top End of the NT* (Medical Entomology 2014), which includes specific requirements for free-draining infrastructure.

As detailed designs will be required for development approval, and the established development assessment processes involves review of plans by Council and Medical Entomology, the requirement for all drainage infrastructure to be free draining will need to be met prior to approval being granted and construction commencing.

- *Impact: The increase in users of Casuarina Coastal Reserve that will result from a new residential community could increase potential for disturbance to shorebird roosting habitats around Sandy Creek and turtle nesting along Lee Point Beach*

It is anticipated that the beach areas near to the proposed development area will receive a higher level of use by people than is currently the case and there will be a general increase in light emissions from the residential areas and tourism precinct. If the lights from multi-storey buildings will be visible from the beach, lighting will be designed in consultation with local marine turtle specialists at Charles Darwin University (CDU).

Details of measures that will be implemented to reduce impacts to the Sandy Creek shorebird site are provided in the ‘Impacts to migratory species’ section below.

- *Impact: Land clearing will result in the loss of habitat that may be utilised by an important population of the Black-footed Tree-rat. If this species, or any other fauna, is present in the development area at the time of land clearing there is potential for injury or death to occur if appropriate fauna spotter-catcher guidelines are not followed.*

Pre and post land clearing assessments will be undertaken, and fauna spotter – catchers will be engaged to be onsite during land clearing activities to rescue injured wildlife. The pre land clearing surveys will specifically target suitable roost trees for a range of species. The proponent will communicate this requirement to all contractors through tender documentation, and contractors will be responsible for engaging appropriately qualified personnel to undertake this role.

DHA has demonstrated its ability to implement pre-clearing surveys and fauna-spotter catcher measures on the Muirhead subdivision to the south of the proposed development. The construction contractor for that development, BMD constructions, engaged EcOz Environmental Consultants to undertake work at each stage of the subdivision clearing.

- *Impact: Stormwater could introduce increased sediment, contaminants and / or nutrients into Buffalo Creek with a subsequent decrease in the quality of habitats available for Threatened species of Sawfish that may utilise the creek at stages of their lifecycle.*

Discussion of why downstream impacts to water quality are not expected to occur is presented in previously.

Impacts on Migratory shorebirds

Mitigation and management measures to avoid or reduce impacts on Migratory shorebirds are presented below:

- *Impact: Urbanisation of the area and the creation of foreshore access trails will increase beach use by people and dogs near to the Sandy Creek mouth, which does have potential to impact on the use of the area by migratory shorebirds.*

The proposed development Master Plan rationalises access to the Casuarina Coastal Reserve by providing two well-defined access points from the 2CRU site into the reserve. The foreshore access trails have been sited to the east of the Sandy Creek mouth to avoid disturbance impacts to the high tide roosting sites located on the western side. It is the Proponent's intention to stop people accessing the coastal reserve outside these access points by closing off old access tracks and ensuring the new tracks are well sited and designed.

To manage disturbance to shorebirds the Casuarina Coastal Reserve Draft Plan of Management (Parks and Wildlife May 2015) indicates that the area of beach 100 m either side of Sandy Creek is a 'dog on lead' zone, where people are permitted to walk dogs as long as they are on a lead and under control. In consultation with Parks and Wildlife interpretative signage will be installed at the new beach access points advising visitors of the restrictions in place.

The proponent proposes to increase environmental awareness of visitors and residents through brochures that will accompany marketing material and through visual aids integrated in the sales and marketing suite. Educational information will focus on awareness of the local environment including flora and fauna species, highlighting ways to minimise human interference particularly in relation to shorebirds. It is intended that these materials will complement management activities implemented by Parks and Wildlife Commission in the Casuarina Coastal Reserve.

- *The development area is within the catchments of the Buffalo and Sandy Creeks where important populations of shorebirds are known to roost. Land clearing, earthworks and establishment of a stormwater drainage system could increase sediment and nutrient loads entering the creeks via stormwater runoff*

Refer to the 'Impacts on Water' section above for a summary of mitigation measures relevant to reducing likely impacts to Buffalo Creek and Sandy Creek. The Sandy Creek catchment is largely urbanised and given that shorebirds have continued to utilise the creek mouth, it is not expected that the proposed action will cause water pollution or changes to the water regime that would affect the productivity of the feeding environment.

Impacts on heritage

Mitigation and management measures to avoid or reduce impacts on heritage are presented below:

- *Impact: The proposed development has potential to disturb and/or destroy a number of cultural heritage places and items that whilst not protected under the NT Heritage Act have been indicated to have some heritage value.*

The approved Lee Point Area Plan identifies the heritage sites referred to as the 'Bunkers' within the 2CRU site and a Konfrontasi Cruciform site located on the eastern side of Lee Point Road. The approved Planning Principles indicate:

"future Development within the Lee Point Area is to preserve and integrate areas and/or items of environmental and heritage significance by adopting measures that acknowledge the role of Lots

4873 and 9370 Town of Nightcliff in the Indonesia – Malaysia Confrontation including, where practicable, the retention of existing defence items or replacement with artistic/cultural interpretive works that reflect the historical significance of the land."

The Area Plan specifically demarcates the above-mentioned sites for retention. The proponent intends to develop conservation strategies in consultation with NT Heritage Branch.

- *Impact: The background scatter of stone artefacts recorded on the 2CRU site will be destroyed. These artefacts are prescribed Aboriginal heritage objects under Section 18 of the NT Heritage Act.*

The proponent intends to apply for an approval (a work approval) to carry out work on a heritage place or object in accordance with Section 72 of the *NT Heritage Act*. The artefacts will be relocated by a qualified heritage consultant in consultation with the NT Heritage Branch.

- *Impact: The proposed development will not impact on any recorded or registered Aboriginal Sacred Sites protected under the NT Aboriginal Sacred Sites Act.*

The proponent intends to apply for an Authority Certificate under section 19B of the *NT Aboriginal Sacred Sites Act* prior to commencement of works to further ensure there is no potential for disturbance of protected sites that are not currently recorded or registered with the AAPA.

Impacts on people and communities

Mitigation and management measures to avoid or reduce impacts on people and communities are presented below:

- *Impact: Air pollution generated by exhaust and dust emissions during construction has the potential to cause localised impacts to nearby residents and people utilising recreational and tourism facilities in the Lee Point area.*

Standard dust and noise controls will be implemented through CEMP's. The Proponent intends to comply with the requirements of the *Noise Guidelines for Development Sites in the NT (NT EPA January 2013)*. In accordance with the *Waste Management and Pollution Control Act*, the measures included in the CEMP's will be designed to reduce the potential for any adverse effect on the amenity of an area that is caused by noise, smoke, dust, fumes or odour; and unreasonably interferes with or is likely to unreasonably interfere with the enjoyment of the area by people. The effectiveness of controls will be monitored through standard inspection and auditing processes included in CEMP's and through any complaints received from neighbours and land users.

- *Impact: Increasing residential densities in areas close to the naturally occurring biting insects breeding areas that occur to the west of Muirhead North and in the Casuarina Coastal Reserve has potential to expose larger numbers of people to the public health issues associated with biting insects.*
- *Impact: Establishment of a stormwater drainage system has potential to create new biting insect breeding habitats if not appropriately designed and constructed.*

The biting insect assessment prepared for the Muirhead development (Warchot and Whelan 2008) provided the following recommendations that will be implemented:

- An open wind buffer of around 200m should be provided on the east boundary of the rural residential lots, to provide some disruption to biting midge and mosquito dispersal to these areas.
- The subdivision should be constructed in accordance to the '*Guidelines for preventing biting insect problems for urban residential developments or subdivisions in the Top End of the Northern Territory*', and '*Construction practice near tidal areas in the Northern Territory-Guidelines to prevent mosquito breeding*'.
- Stormwater drainage designs, in particular the design of stormwater outfalls and drains in areas outside of residential areas should be forwarded to Medical Entomology for approval before construction commences.
- If Water Sensitive Urban Design is utilised for this development, all design plans should incorporate the avoidance of mosquito breeding in the design and plans should be forwarded to Medical Entomology for comment and approval.
- There should be a notification on the land titles for those blocks within 1.5km of the mangrove margin that there will be seasonal mosquito and biting midge problems.

Detailed designs for stormwater management will be developed in a Stormwater Management Plan to be submitted for review and approval by the Medical Entomology Branch with future Development Applications submitted under the NT *Planning Act*. As detailed designs will be required for development approval, and the established development assessment processes involves review of plans by Council and Medical Entomology, the requirement for the above measures to be implemented will need to be met prior to approval being granted and construction commencing.

- *Impact: The proposed development area is located approximately 1.2 km to the north-west of the Leanyer Sanderson Sewage Treatment Plant, managed by PWC.*

PWC has provided guidance to urban developments through establishment of a 700 m buffer zone from the treatment ponds. The south-eastern corner of the Muirhead North site (closest) is located approximately 650 m from the outer edge of the buffer zone. As the development is outside of the buffer zone no further odour mitigation measures are considered necessary.

5 Conclusion on the likelihood of significant impacts

5.1 Do you THINK your proposed action is a controlled action?

- | | |
|-------------------------------------|---------------------------|
| <input checked="" type="checkbox"/> | No, complete section 5.2 |
| <input type="checkbox"/> | Yes, complete section 5.3 |

5.2 Proposed action IS NOT a controlled action.

To assess whether or not the proposed Lee Point master-planned urban development is likely to have a significant impact on the environment the following Guideline documents were referenced:

- *EPBC Act Significant Impact Guidelines 1.1 Matters of National Environmental Significance*
- *EPBC Act Significant Impact Guidelines 1.2 Actions on, or impacting upon Commonwealth land, and actions by Commonwealth Agencies.*

The assessment considered potential impacts on MNES protected under the *EPBC Act*. As the Proponent is a Commonwealth agency and part of the development will occur on Commonwealth Land, assessment of the likelihood of significant impact in accordance with the requirements of the *EPBC Act* considered the 'environment' more broadly, which also aligns with the requirements of the *NT Environmental Assessment Act*.

The proposed development is not expected to cause a significant impact to the environment for the following reasons:

Site selection

- The development is consistent with the surrounding land-use and the *Darwin Regional Land Use Framework* identifies the area as 'Urban'.
- The areas that will be developed have been substantially disturbed by past land-use activities. Large portions of the Muirhead North site were previously cleared and excavated and both sites contain dense weed infestations.

Landscapes and soils

- The proposed development does not involve medium or large-scale excavation of soils as the levels required for construction can be achieved by re-contouring. Excavations for services will be shallow (typically within 3 m of the ground surface) and there is no identified requirement for importation of fill material.
- Areas of high erosion risk on the 2CRU site along the existing low escarpment are in an area where development is restricted by the approved Area Plan and so these areas will not be developed. Impacts on the existing low escarpment are further avoided through the inclusion of open space buffers between developed areas and the escarpment; and the establishment of a formal access point (staircase) into the Casuarina Coastal Reserve.
- The Muirhead North lot has gradual slopes that pose a low erosion risk.

Coastal and oceanic landscapes and processes

- There will be no direct disturbance of beach, dune or intertidal areas. The proposed development is not expected to cause off-site impacts that would alter the coastal or estuarine environments that occur in surrounding areas.

Water resources

- There is no requirement for extraction of surface water or groundwater. Changes to hydrology will be localised within the development area; and post-development stormwater discharges to Buffalo Creek and Sandy Creek will equal pre-development flows.
- Stormwater discharged from the development area to Buffalo Creek and Sandy Creek is not expected to increase sediment or nutrient levels in those creeks due to incorporation of WSUD treatment trains into the development design and the use of retention basins prior to discharge.

Pollutants, chemicals and toxic substances

- There is no requirement for storage or handling of large amounts of hazardous substances during construction and the development does not include industrial or commercial facilities that would produce pollution.
- Contamination assessments undertaken across the development area indicate the only potential source of existing contamination is the 2CRU compound area. Removal of hazardous building materials from the 2CRU compound area and site validation was in progress at the time of preparation of this Referral and will be finalised prior to commencement of construction.
- The development is not expected to cause a long-term change to the local air-shed. Impacts to air quality are expected to be confined to localised increases in dust nuisance to nearby residences and land-users during construction.
- ASS risk is low as there will be no excavation in areas below 5 m AHD.

Plants

- There are no EPBC listed Threatened plant species or ecological communities within or surrounding the area proposed for development.
- The vegetation and habitats that will be cleared / disturbed are common in the region and in the northern parts of the NT more broadly.
- Sensitive monsoon vine forest habitats that occur on the 2CRU site are protected as the approved Area Plan constrains development in the areas where the habitats occur. The habitats will be further protected through rezoning to Conservation (CN) under the NT Planning Scheme and transfer to the NT Government for inclusion in the Casuarina Coastal Reserve.
- The sensitive monsoon rainforest patch that occurs on the Muirhead North site will be retained in an Open Space area and stormwater management has been designed to maintain the quantity and quality of stormwater flows into the patch.
- The risk of spreading weeds into Casuarina Coastal Reserve during construction will be mitigated through pre-construction weed surveys and control programs on the 2CRU site

boundary with the Reserve, which commenced 2015. The weed infestations in other parts of the proposed development area are located in areas that will be cleared prior to commencement of construction.

Animals

- Ecological assessments have concluded that there are no known important populations of any listed Threatened fauna species located in the area proposed for development.
- The proposed action is not expected to cause a long-term decrease in the size or area of occupancy of the Black-footed Tree-rat population as suitable habitats are present adjacent to the project area in the reserved areas of Casuarina Coastal Reserve.
- The potential for construction activities to cause death or injury to the Black-footed Tree-rat and other fauna will be mitigated through the use of fauna spotter-catchers during land clearing.

Migratory & Threatened Marine Species

- Off-site impacts to water quality are not expected to occur, and have not occurred in association with DHA's Muirhead Breezes subdivision to the south, and therefore any Sawfish that may utilise the aquatic and marine environments of Buffalo Creek will not be affected by the proposed development.
- Light emissions are not expected to be sufficiently visible from the beach that nesting success of marine turtles would be affected.

Migratory & Threatened shorebirds

- The approved Area Plan sites foreshore access trails to the east of the Sandy Creek mouth to avoid disturbance impacts to the shorebird roosting sites located on the western side during the high tide when the largest numbers of birds are generally present.
- To manage disturbance to shorebirds the Casuarina Coastal Reserve Draft Plan of Management (Parks and Wildlife May 2015) indicates that the area of beach 100 m either side of Sandy Creek is a 'dog on lead' zone, where people are permitted to walk dogs as long as they are on a lead and under control.
- In consultation with Parks and Wildlife interpretative signage will be installed at the new beach access points advising visitors of the restrictions in place.

People and communities

- Demand for community services; commercial and retail outlets, has been assessed (GHD 2014). Where additional services are required the development Area Plan and Master Plan provides for these.
- To minimise exposure of future residents to odours the proposed development has been sited outside of the 700 m odour buffer zone established by Power Water around the Leanyer Sanderson Wastewater Treatment Ponds.
- To minimise exposure of future residents to biting insects only 'Rural Residential / Max 5 dwellings per hectare' development will occur within the 1 km Biting Insect Buffer zone defined by Medical Entomology.

Heritage

- The proposed development will not impact on any sites listed on the NT Heritage Register, National Heritage List, World Heritage List or Commonwealth Heritage List.
- Whilst there are no legislative requirements for protection of the heritage recorded in the area proposed for development, the Proponent proposes to retain the sites referred to as the 'Bunkers' located on the western side of Lee Pt Road and the Konfrontasi Cruciform anti-aircraft gun position located in the north-east corner of the Muirhead North site.
- There are no registered or recorded Aboriginal Sacred Sites protected under the NT Aboriginal Sacred Sites Act in the area proposed development and an Authority Certificate will be obtained by the Proponent prior to commencement of construction.

Strategic planning and sustainability

- The utilities servicing requirements have been assessed and the serviceability of the proposed development has been confirmed in consultation with PWC.
- The development will increase demand for power and water, and will result in more sewage waste processed through the Leanyer Sanderson plant; however, the servicing requirements are not anticipated to exceed the capacity of the existing networks subject to completion of upgrade works already planned by PWC.

5.3 Proposed action IS a controlled action

Not applicable

6 Environmental record of the responsible party

	Yes	No
<p>6.1</p> <p>Does the party taking the action have a satisfactory record of responsible environmental management?</p> <p>Provide details</p> <p>Defence Housing Australia is committed to sustainability. Since 1 July 2010, all of DHA's new housing has been built to a minimum six star energy rating (National Housing Energy Rating Scheme). Where possible, DHA housing complies with the Australian Government's Liveable Housing Design Guidelines - Silver Level.</p> <p>DHA's focus is on five key areas of sustainability:</p> <ul style="list-style-type: none"> • low energy consumption • low water consumption • effective waste management • human wellbeing • biodiversity of local flora and fauna. <p>The following recognition received for developments in the NT demonstrate DHA's commitment to the environment:</p> <ul style="list-style-type: none"> • Finalist (highly commended) – 2014 NT Natural Resource Management Awards, Best collaboration in natural resource management for Breezes Muirhead Aboriginal landcare program • Finalist – 2014 Awards for Excellence, Environmentally sustainable development for Breezes Muirhead, Urban Development Institute of Australia. <p>DHA have previously referred two development proposals under the <i>EPBC Act</i> and have constructed those developments in accordance with approval conditions. The Lyons and Muirhead developments in the NT are further evidence of DHA's record of responsible environmental management in the delivery of NT projects.</p>	X	
<p>6.2</p> <p>Has either (a) the party proposing to take the action, or (b) if a permit has been applied for in relation to the action, the person making the application - ever been subject to any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources?</p> <p>If yes, provide details</p> <p>Not applicable</p>		X
<p>6.3</p> <p>If the party taking the action is a corporation, will the action be taken in accordance with the corporation's environmental policy and planning framework?</p>		

	Yes	No
If yes, provide details of environmental policy and planning framework Not applicable		
6.4 Has the party taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act? Provide name of proposal and EPBC reference number (if known) EPBC 2011/6163 Defence Housing Australia/Commonwealth/North of Heysen Street, Weston Creek/ACT/North Weston Residential Development, dated 31 Oct 2011 2010/5525 Defence Housing Australia/Residential development/Lot 9737, Town of Nightcliff, approx 18km NE of Darwin CBD/NT/Muirhead Subdivision, dated 03 Jun 2010	X	

7 Information sources and attachments

(For the information provided above)

7.1 References

Documents that are readily available to the public online and those documents provided as attachments to the EPBC Referral are highlighted. Other documents referenced are either unpublished reports prepared by consultants for DHA (available on request) or books / journal articles that can be purchased.

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GHD 2014a, 'Destructive Hazardous Building Materials Survey – 2CRU RAAF Transmission Facility, NT', Report prepared for Defence Housing Australia, November 2014.

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7.2 Reliability and date of information

The information presented in this Referral is largely taken from site and project specific assessments and reports prepared by consultants engaged by DHA. The ecological information has been supplemented by publically available information in relation to the flora and fauna present in the Casuarina Coastal Reserve and occurrence of Threatened species in the area; and information provided by NT Parks and Wildlife in relation to shorebirds and marine turtles.

The first project specific site assessments were undertaken in 2010 as part of the due diligence associated with transfer of the 2CRU site ownership from Department of Defence to DHA. These site assessments included ecological investigations, contamination reviews and heritage assessments (GHD 2010).

Over the period 2014 – 2015 DHA engaged numerous site specific assessments to inform development of the Area Plan, Planning Principles and Master Plan, which have subsequently been approved under the NT Planning Scheme. These assessments included geotechnical, engineering services, hydrology, community infrastructure requirements and retail requirements.

In early 2015 EcOz Environmental Consultants was engaged to prepare a NOI and EPBC Referral for the project. A gap analysis was undertaken of the existing environmental information and the following additional assessments were undertaken:

- Site characteristics assessment across 2CRU and Muirhead North (vegetation, soils, slope etc)
- Stage 1 Preliminary site investigation (Muirhead North).

Given that the information has been sourced mainly from project and site specific assessments the information is considered current and reliable.

7.3 Attachments

LeePt_boundary.shp (GIS file of project area boundary)

Attachment A: Approved Area Plan and Planning Principles

Attachment B: Development Master Plan

Attachment C: Stakeholder Consultations

Attachment D: Engineering Services Report

Attachment E: Hydrological review of Muirhead North rainforest patch

Attachment F: Ecological Assessment Report

Attachment G1: Description of environment and likely impacts (Part 1)

Attachment G2: Description of environment and likely impacts (Part 2)

Attachment H1: Heritage assessment 2 CRU

Attachment H2: Heritage Assessment Muirhead North

		✓ attached	Title of attachment(s)
You must attach	figures, maps or aerial photographs showing the project locality (section 1)	✓	Fig 1: Project location
	GIS file delineating the boundary of the referral area (section 1)		Fig 2: Project area and surrounds town planning zones LeePt_boundary.shp Attachment A Attachment B
	figures, maps or aerial photographs showing the location of the project in respect to any matters of national environmental significance or important features of the environments (section 3)	✓	Attachment G1 & G2 ¹
If relevant, attach	copies of any state or local government approvals and consent conditions (section 2.5)		NA
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 2.6)	✓	Attachment C Attachment H1 Attachment H2
	copies of any flora and fauna investigations and surveys (section 3)	✓	Attachment F
	technical reports relevant to the assessment of impacts on protected matters that support the arguments and conclusions in the referral (section 3 and 4)	✓	Attachment D Attachment E Attachment G
	report(s) on any public consultations undertaken, including with Indigenous stakeholders (section 3)	✓	Attachment C:

¹ Contains figures showing the location of the project in relation to MNES and important features

8 Contacts, signatures and declarations

Project title: Lee Point Master-planned urban development

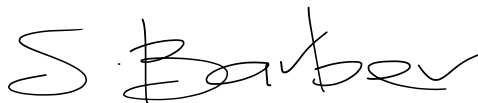
8.1 Person proposing to take action

1. Name and Title: Shaun Barber, Senior Development Manager
2. Organisation: Defence Housing Australia
3. EPBC Referral Number (if known): Not assigned
4. ACN / ABN (if applicable): 72 968 504 934
5. Postal address: Level 3, 120 Bay Street Port Melbourne VIC 3207
6. Telephone: 0417 540 963
7. Email: shaun.barber@dha.gov.au
8. Name of designated proponent (if not the same person at item 1 above and if applicable): NA
9. ACN/ABN of designated proponent (if not the same person named at item 1 above): NA

Declaration

I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct.
I understand that giving false or misleading information is a serious offence.
I agree to be the proponent for this action.
I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.

Signature



Date

21/10/2015

8.2 Person preparing the referral information (if different from 8.1)

Name Kylie Welch
Title Managing Consultant - Approvals
Organisation EcOz Pty. Ltd.
ACN / ABN (if applicable) ABN 81 143 989 039
Postal address GPO Box 381, Darwin NT 0801
Telephone 08 8981 1100
Email Kylie.welch@ecoz.com.au
Declaration I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct.
I understand that giving false or misleading information is a serious offence.

Signature



Date 7 Oct 2015