

Appendix E-1

Sea turtles report - Part 1

Report to URS on Tiwi Islands Project for Matilda Minerals

Sea Turtles

Part 1

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Executive Summary:

Lethbridge Bay West Prospect. 19 February 2005

A survey by foot along the beach of the lease revealed four Olive Ridley Sea Turtle nests. All had been opened by goannas and the entire clutch of eggs had been eaten. These nests had been laid in the last couple of days, as the eggs had not developed to any obvious extent. This species is listed as endangered under the EBPC 1999. A Flatback Sea Turtle nested amongst the paperbarks at the eastern end of the beach.

I strongly advise the clients, Matilda Minerals, to declare a buffer zone of at least 200 metres between their mining operations and the high water mark. This would provide a visual barrier between the ore body and the habitat utilised by the nesting olive ridley sea turtles. Because of the density of the dune vegetation this buffer zone would screen the campsite and its lights from the nesting beach.

Andranangoo Creek West Prospect 20 February 2005

At the western end of the beach were two Flatback Sea Turtle nests. Animals had raided both nests; in this case a goanna and a dingo. The entire clutch of eggs had been eaten. One nest was from last night as the tracks were clearly visible and the egg contents were still liquid and very fresh. Within 20 metres the other nest was considerably older and lacked any evidence of a track. The eggshells were dried and indicated that the nest was possibly two weeks old. These two nests could have been

from the same turtle. As Flatback Sea Turtles tend to be very faithful to their nesting locations and nest at approximately two week intervals.

Again I stress the need for a buffer zone of at least 200 metres to protect the fore dunes, its vegetation and nesting sea turtles. This vegetation will provide an effective visual barrier between the nesting and hatchling sea turtles and the mining activities.

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Introduction:

Matilda Minerals Ltd., a publicly listed company (ASX: MAL), has successfully negotiated with the Tiwi Land Council for mineral exploration tenements for several coastal regions of Bathurst and Melville Islands, Northern Territory. The company has completed successful exploration of two areas of mineralisation. The areas are Lethbridge Bay West Prospect and Andranangoo Creek West Prospect. Both localities are on the northern shore of Melville Island. Mineralisation at Lethbridge Bay West occurs in a lens 40 to 70 metres in width and 3 to 5 metres in depth with a strike of 1000 metres. This lens of heavy minerals comprising up to 80% deemed valuable heavy minerals, is located 500 to 600 metres inland of the present high water mark.

At Andranangoo Creek West, the mineralisation is more concentrated, being up to 91% valuable heavy minerals. Several lenses of mineralisation occur from 500 to 600 metres inland from the present high water mark and vary in width from 20 to 200 metres in width and up to 5 metres in depth along a lens stretching 2,500 metres along the base of the escarpment. The mineralisations in both prospects sit above the permanent water table and are characterised by being well sorted with low levels of slimes.

To date the projects have built on previous exploration by Renison Goldfields Consolidated (RGC) between 1992 and 1994. Aerial photography and ground magnetic surveys have been completed. Preliminary drilling to identify the extent of the mineralisation has been completed and tenement agreements with the Tiwi Land Council have been recognised by the Northern Territory and Federal Governments. Mining lease applications have been lodged and scoping studies are underway. Preliminary work of the Notice of Intent (NOI) is also underway. It is the purpose of this report to address the issue of species listed under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC1999) being affected by the proposed mining operations at the above sites. The animal species thought most likely to be affected by the mining operations are the species of sea turtles that feed along the shores of the mining leases and lay their eggs on the beaches the are either in or adjacent to the mining leases.

Six species of sea turtles are listed as either vulnerable or endangered under the EPBC1999. All occur in the waters of the Northern Territory and each differs in the conservation status that is awarded under International, National and Northern Territory legislation (Table 1).

Table 1 Conservation status at the International, National and Territory levels of the six species of sea turtles inhabiting Australian waters

Sea Turtle Names		Conservation Status		
		International	National	Northern Territory
Common	Scientific	Red List 2000	EPBC 1999	Threatened Species 2002
Flatback or Greenback	<i>Natator depressus</i>	Vulnerable	Vulnerable	Data Deficient
Green	<i>Chelonia mydas</i>	Endangered	Vulnerable	Least Concern
Hawksbill	<i>Eretmochelys imbricata</i>	Critically Endangered	Vulnerable	Data Deficient
Leatherback	<i>Dermochelys olivacea</i>	Critically Endangered	Vulnerable	Vulnerable
Loggerhead	<i>Caretta caretta</i>	Endangered	Endangered	Endangered
Olive Ridley	<i>Lepidochelys olivacea</i>	Endangered	Endangered	Data Deficient

Methods:

An aerial and foot survey of the beaches in and near the mineral leases is the most practical method for accessing sea turtle abundance and utilisation of the area. This will provide a snapshot of sea turtle activity by identifying the number of tracks made by nesting females. The species of sea turtle for the tracks can be identified by the morphology and width of the track. The species of sea turtle can also be identified by the size of the eggs, the number in the clutch and the depth and location of the nest.

Temporal changes in seasonal activity and historical changes in the numbers and species of sea turtles can be gauged by interviews with traditional owners who can relate any noticeable changes over several decades.

The surveys were conducted on 19 and 20 February 2005. Mr Andrew Tipungwuti, a Tiwi Marine Ranger and traditional owner of the region, accompanied Mr Chris MacHunter (URS) and myself in the Jetranger 3 helicopter supplied by Jayrow, Darwin. The itinerary was similar on both days. As indicated below:

- Darwin to Milikapiti (Snake Bay) to pick up Mr Andrew Tipungwuti.
- Milikapiti to Lethbridge Bay (19/02/05) and Andranangoo Creek (20/02/05) via the coastline to assess sea turtle nesting activity.
- Foot surveys of the lease and the adjoining beach recording sea turtle nesting activity.
- Return to Milikapiti to drop off Mr Andrew Tipungwuti.
- Continue to Garden Point to refuel (19/02/05 only)
- Return to Darwin.

Results:

The surveys were conducted during a period of neap tides (Figure 1). Because of the lower tidal amplitude during the neaps tides any tracks from nesting sea turtles during the previous few days would be readily visible from the air.

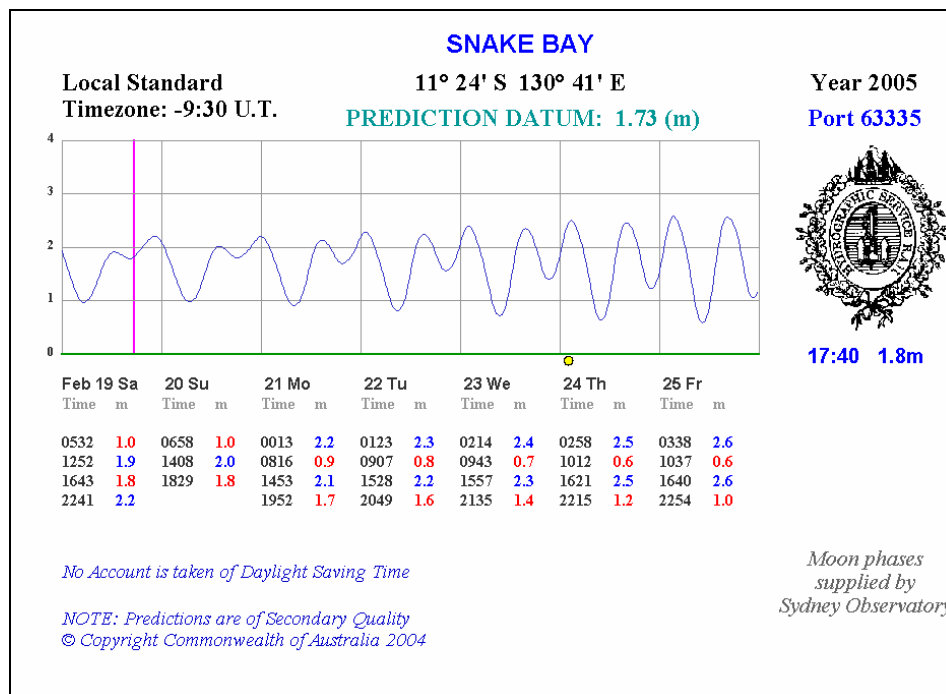


Figure 1. Daily tidal predictions for Snake Bay (Milikapiti) during the time of the sea turtle survey on 19 and 20 February 2005.

Several tracks made by nesting female sea turtles were visible from the air on the flight from Milikapiti to Lethbridge Bay on 19 February. These were concentrated in the northern most point near Radford Point, between the Andranangoo Creek lease and the Lethbridge Bay West lease. The species involved were Flatback and Olive Ridley sea turtles. In all, two tracks of each species were seen in the vicinity of the cliffs at Radford Point (Figure 2).

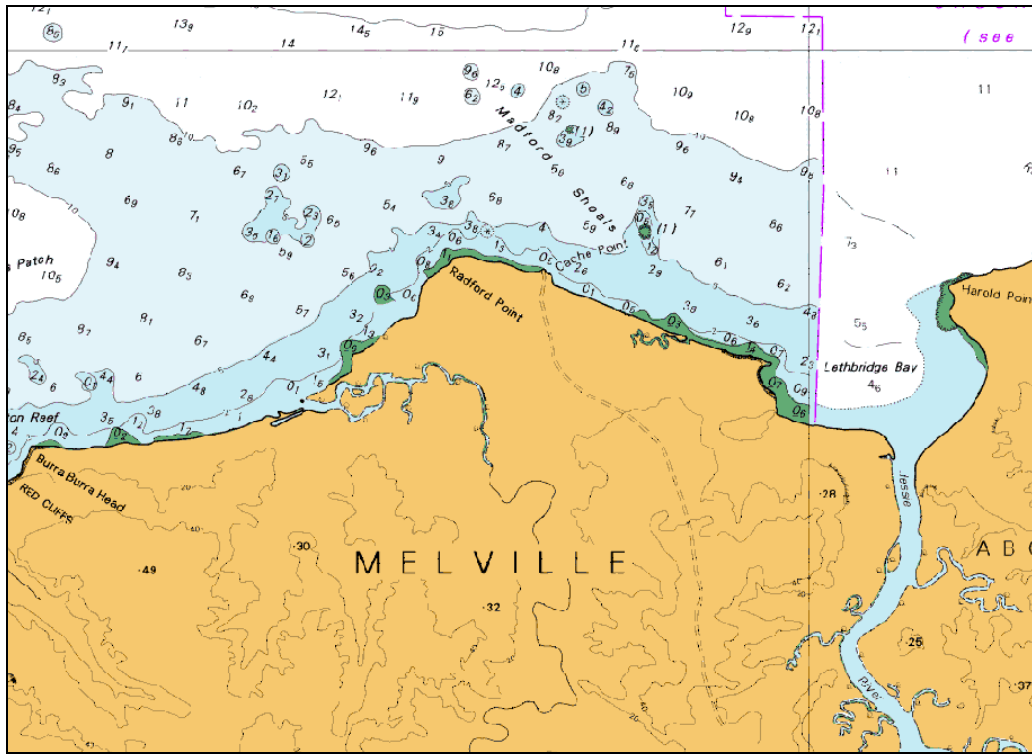


Figure 2. Map of the northern coastline of Melville Island showing the location of Radford Point and Lethbridge Bay.

Lethbridge Bay West Prospect

The beach at Lethbridge Bay was relatively narrow with the high water strand line reaching the vegetation (Figure 3 and Figure 4). Noticeable within this strand were numerous auger shells (*Turritella terrebra*), the preferred food of Olive Ridley and Loggerhead sea turtles in Fog Bay, Northern Territory. Judging by the number of auger shells on the beach it is assumed that there is a substantial feeding ground for sea turtles in Lethbridge Bay. The stand vegetation consisted of a dense stand of Casuarina, Paper-barks and Beach Hibiscus trees with convolvulus (*Ipomea*) and other vines as ground cover.

Three olive ridley nests were located just above the strand line along the western section of the lease. All had been raided by goannas and the empty eggshells were beside the hole that the goanna dug to gain entry to the nest. The entire clutch had been destroyed. The nests were typical of Olive Ridley nests in that the location was just above the strand line and there was very little evidence of the track (Figure 5). Nest depth was 42 cm and the empty eggshells formed a sphere approximately 35 mm in diameter (Figure 15). All of these features agree with the description of Olive Ridley nests that have been found elsewhere in the Northern Territory (Guinea 1990, Whiting 1997).



Figure 3. View to the west at Lethbridge Bay West showing the extent of the spring tides and the strand line of auger shells



Figure 4. View to the east at Lethbridge Bay West showing the width of the beach and strand line.

A single Flatback Sea Turtle nest was located amongst the paperbark trees on the dune crest at the mouth of the creek at the eastern portion of the lease. Two unfinished egg chambers indicated that the shallow roots of the trees had hampered nest construction. A successful nest was located a few metres further along the dune (Figure 6).



Figure 5. Olive Ridley Sea Turtle nest opened by goannas at Lethbridge Bay West Lease



Figure 6. Flatback Sea Turtle nest amongst paperbark trees at Lethbridge Bay West lease.

The dense vegetation on the dunes provided an effective barrier between the proposed mine site and the beach habitat used by the sea turtles for nesting (Figure 7). The beach was not visible from site of mineralisation along the access track (Figure 8).



Figure 7. Dense dune vegetation dwarfs Andrew Tipungwuti and Chris MacHunter at the site of a Olive Ridley nest at Lethbridge Bay West Lease.



Figure 8. The beach is obscured by dense vegetation at the site of the closest drill core site along the track at Lethbridge Bay West Lease

Andranangoo Creek West Prospect

The beach at Andranangoo West was well developed with a small sparsely vegetated dune positioned between the high water mark and the strand trees consisting of Casuarina, Paperbarks and Beach Hibiscus (Figure 9). The beach sand was well sorted and lacked the shell content of Lethbridge Bay (Figure 10).



Figure 9. View to the East along the beach at Andranangoo Creek West lease.



Figure 10. View to the West along the beach of Andranangoo Creek West lease.

Two Flatback Sea Turtle nests were located at the western end of the beach (Table 2). Animals had raided both nests and their entire clutches had been destroyed. One Flatback Sea Turtle had laid night the night of 19 February, as there was no track present when the beach was checked the previous day (Figure 11). The eggshells were large (about 50 mm in diameter), soft and pliable (Figure 15). The egg contents were still liquid and spread over the sand. Tracks around nest indicated that the nest had been opened by a goanna. A dingo had scavenged after the goanna had left. Approximately ten metres along the beach were the remains of a second Flatback nest. This nest was some days, even weeks, old as the shells were brittle and there was no evidence of the egg contents (Figure 6). It may have well been the previous nest of the same turtle as Flatback Sea Turtles are very faithful to their nesting beach.



Figure 11 Flatback Sea Turtle tracks on the beach at Andranangoo Creek West lease.



Figure 12. A Flatback Sea Turtle nest raided by goannas on Andranangoo Creek West lease.

Coastal paperbark swamps and thick vegetation backed the beach at Andranangoo Creek West Lease (Figure 13). This provided an effective barrier between any proposed mining operations and the nesting activities of sea turtles (Figure 14).



Figure 13. Dense vegetation behind the fore dune at Andranangoo Creek West lease



Figure 14. Dense vegetation seaward of the zone of mineralisation at Andranangoo Creek West lease

Table 2. Species of sea turtle nests and location and the fate of the eggs found on Lethbridge Bay West and Andranangoo Creek West Leases. Symbols identify individual nests shown in Figure 16 and Figure 17.

Symbol	Species	Location Easting Northing	Comments
Lethbridge Bay West Project			
A	Olive Ridley	0718269 8743626	Two nests side by side opened and all eggs eaten by goannas
B	Olive Ridley	0718166 8743646	Nest opened and all eggs eaten by goannas
C	Olive Ridley	07181168 8743646	Nest opened and all eggs eaten by goannas
D	Flatback	0720446 8743326	Nest intact but laid amongst tree roots of the Paperbark trees.
Andranangoo Creek West Prospect			
E	Flatback	0697716 8743210	Nest opened and all eggs eaten by goannas
F	Flatback	0697691 8743204	Nest opened and all eggs eaten by goannas

Discussion:

Sa turtles are prone to negative impacts by coastal development and modifications to their nesting environment (DEH 2003). A part of the EPBC 1999 is the identification of threats to the listed species of animals and plants. The pivotal question in this mining proposal is “What is the likely impact of the operations on the species of sea turtles that feed and nest along the beaches of the leases?”. Beach stand shells indicate there is a considerable feeding ground in the vicinity of Lethbridge Bay. The eastern side of Lethbridge Bay was nominated as an important turtle and dugong feeding area and a locality where the Tiwi people hunt for these marine animals (Andrew Tipungwuti pers. comm.). Offshore from Andranangoo Creek are a number of coral reefs in the vicinity of Laxton Reef and Saunders patch that are used by the Tiwi people for fishing and hunting. As there was no proposal to utilise the coastal

waters offshore the mineral leases, it can be argued that there will be no impact on these feeding turtles and dugongs.

Most sea turtle nesting occurred on the sandy beaches in the vicinity of Radford Point with only minor nesting activity on the beaches adjacent to the mining leases. Presumably ground surveys at Radford Point would have revealed more nests that were not visible from the air. Even though the nesting activity along the beaches of the mineral leases might be considered minor, their presence still requires addressing before mining commences. In particular, the means of minimising any negative impact on the nesting sea turtles require closer attention.

Nesting sea turtles are prone to disturbance by beach development in two major ways. Adult sea turtles when approaching the beach to nest are disturbed by the presence of lights on the beach. This may cause them to move to a nesting location away from the lighted beach. After laying their eggs the female turtle will be attracted to lights visible from the beach. This attraction can disorient the turtles and lead them inland where they become entangled in vegetation or die from exhaustion and dehydration. Hatchling sea turtles after they leave the nest are attracted to lights visible from the beach. This disorientation leads to their death by dehydration and exhaustion and exposes the hatchlings to more predators. For this reason it is important to maintain a visual barrier between the nesting beach and the mining operations and the proposed camp sites on the escarpment.

The dense coastal vegetation provides an excellent natural barrier between the nesting beaches and the proposed operations. The trees are high enough to obscure the campsites on the escarpment from the beach. With a buffer zone of at least 200 metres inland of the high water mark will be very effective in obscuring any visual indication of human presence in the mineral lease sites. Mining operations will be conducted only during daylight hours; hence there is no requirement for bright lighting at the mine site at night. Some security lighting may be present but care should be taken to ensure that it is not visible from the beach.

Provided that there is a vegetated buffer zone of at least 200 metres inland from the high water mark, the proposed operations as presented in their documentation would have no predicable impact on the sea turtles that nest along the beaches in the leases at Lethbridge Bay West and Andranangoo Creek West.

Recommendations:

I recommend that a buffer zone of native vegetation and at least 200 metres width be left between the high water mark and the site of the proposed mining operations

References:

DEH (2003) Recovery Plan for Marine Turtles in Australia. Department of Environment and Heritage, Canberra.

Guinea, M. L., (1990) Notes on sea turtle rookeries on the Arafura Sea islands of Arnhem Land, Northern Territory. *Northern Territory Naturalist*. **12**: 6-14.

Whiting, S. (1997) Observations on a nesting olive ridley turtle in the Northern Territory. *Herpetofauna* **27**(2):39-42.

Appendices:

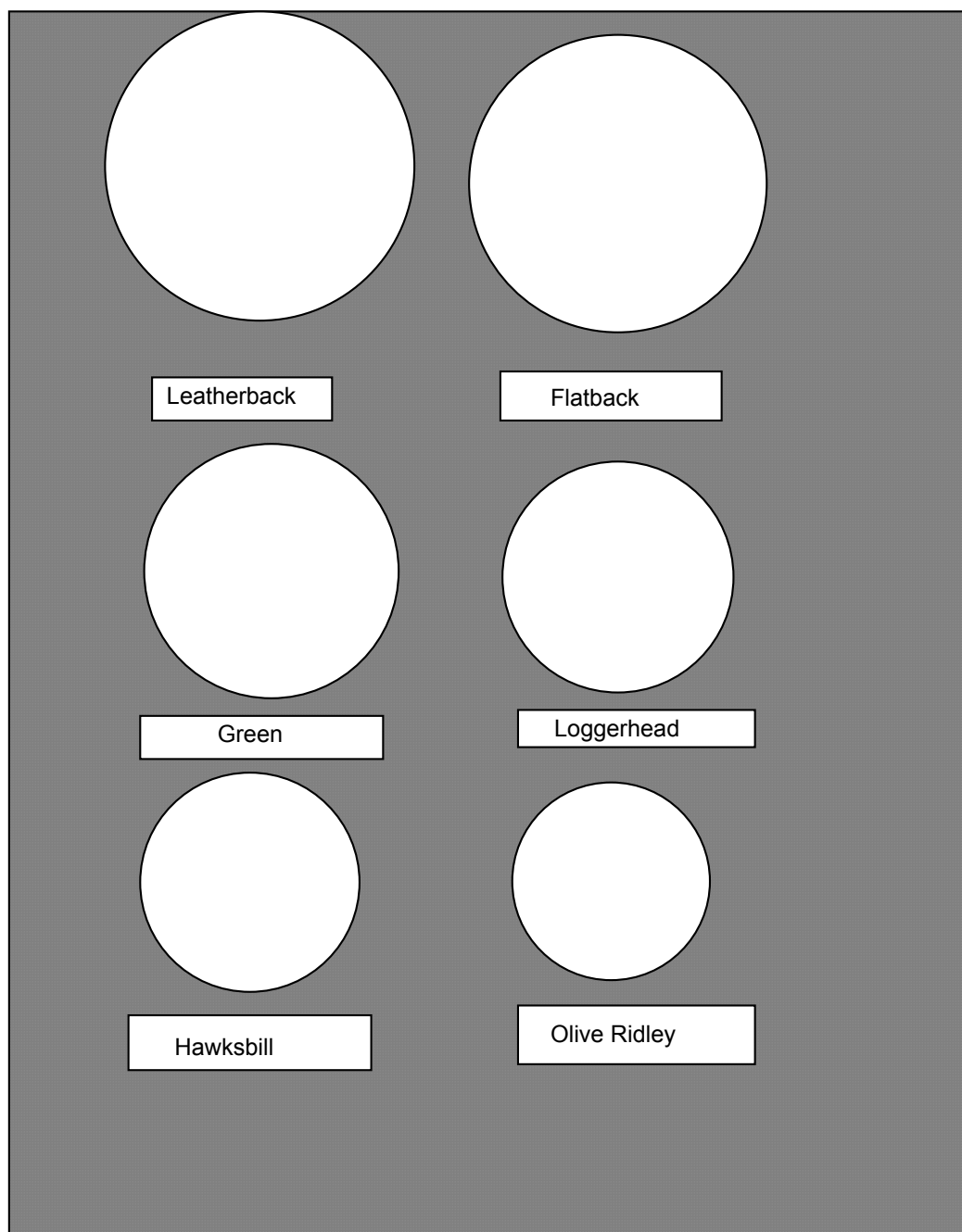


Figure 15. Silhouettes (not actual size) of eggs of the sea turtle species used during interviews with Traditional Owner.

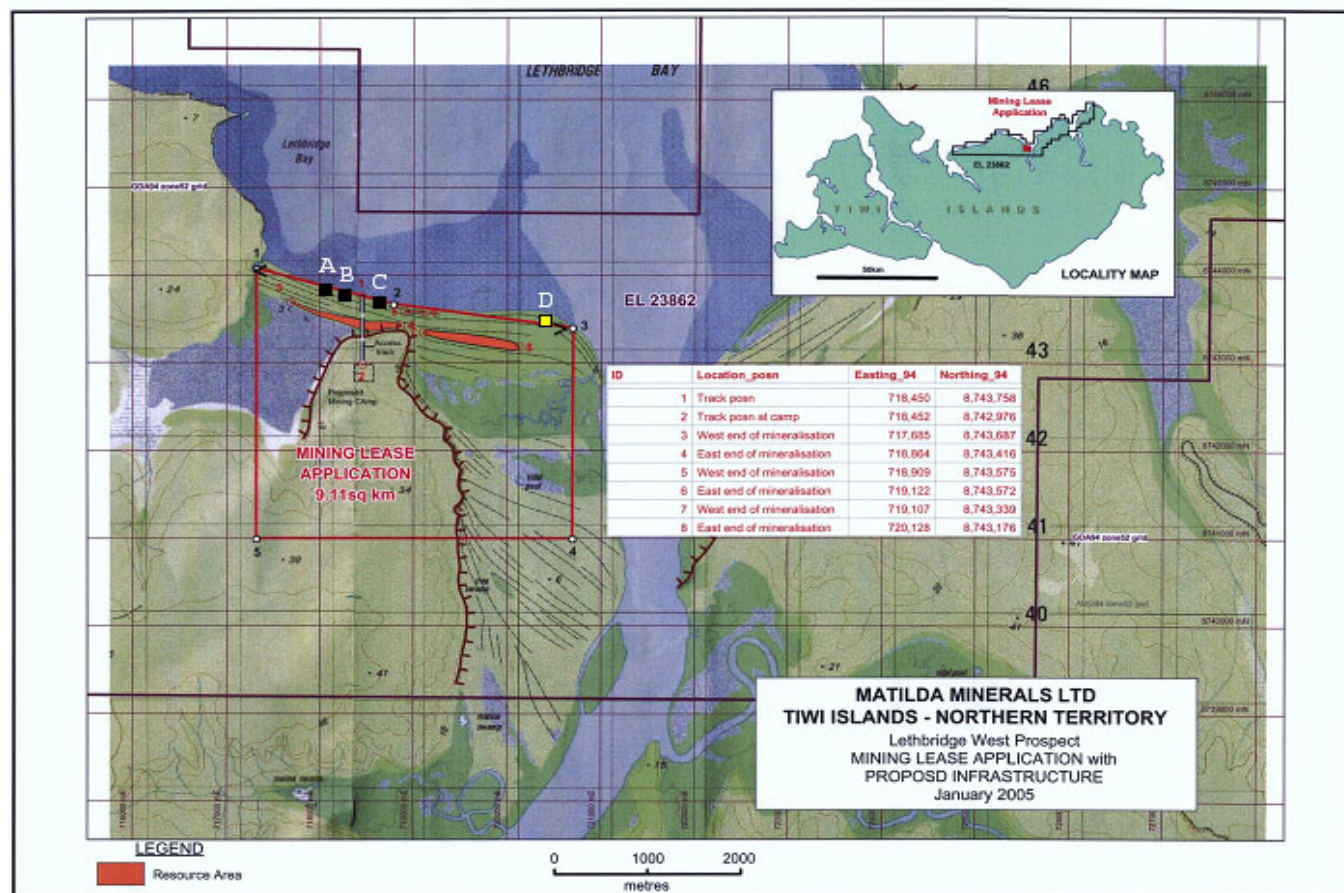


Figure 16. The locations of Olive Ridley (black) and Flatback (yellow) sea turtle nests along the beach at Lethbridge West Prospect on 19 February 2005. The length of beach surveyed is indicated by the < and > marks.

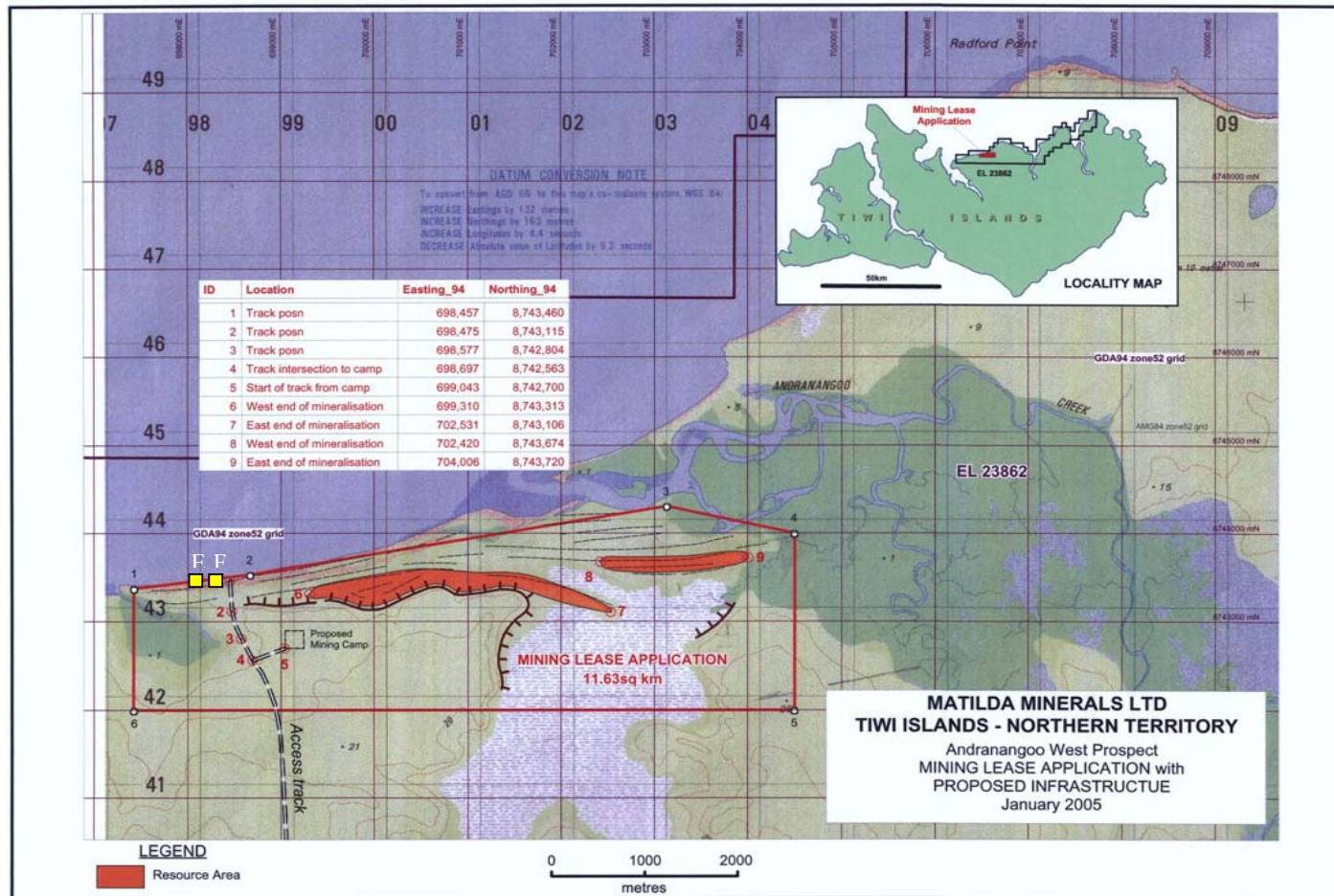


Figure 17. The locations of Flatback (yellow) sea turtle nests along the beach at Andranangoo Creek West Prospect on 20 February 2005. The length of beach surveyed is indicated by the < and > marks.