

MEMO

Title:	Kilimiraka Review
Owner:	Steve Harrison
Stakeholders:	Jamie Wright
Date:	24 September 2014

Introduction

Kilimiraka has long been seen as the next logical project for development after Keysbrook. This project has particular technical challenges such as which require thorough evaluation and review prior to commitment for such a project.

This document has a three-fold purpose:

- (a) Evaluate the tonnage of potential mineralisation present in the Kilimiraka project
- (b) Evaluate the effectiveness of the historical drilling to ascertain whether the full thickness of dune material has been tested in each location based on the results from (a)
- (c) Review and modify the proposed and budgeted drilling proposal based on the results of (a) and (b)

Note that chemical and assemblage parameters are not assessed in this review and are contained in the resource estimate of Baxter (2011).

Mineralisation Potential

An estimate as to the potential mineralisation contained within the Kilimiraka Project has been undertaken using wireframes constructed in Micromine.

A summary of the results of this process are contained in Table 1.

Table 1. Summary of Wireframe Calculations for the Kilimiraka Project

Wireframe	No Buffers		50m Beach Buffer	
	Ore Tonnes	Contained THM	Ore Tonnes	Contained THM
Kilimiraka Resource				
Western Area	24,849,947	636,159	24,637,736	630,726
Eastern Area	35,298,938	903,653	35,050,516	897,293
TOTAL	60,148,885	1,539,811	59,688,252	1,528,019
EL24329				
Eastern 1	83,736,298	2,143,649	73,332,709	1,173,323
Eastern 2	5,769,148	147,690	5,666,010	90,565
TOTAL	89,505,446	2,291,3390	78,998,719	1,263,888
EL24851				
Eastern 3	7,318,216	187,346	6,811,471	108,984
Eastern 4	6,688,058	171,214	6,502,675	104,043
TOTAL	14,006,274	358,561	13,314,146	213,027
TOTAL EXTERNAL TO KILIMIRAKA RESOURCE				
	103,511,720	2,649,900	92,312,865	1,476,915

These wireframes have been constructed using differing processes depending on the location to existing data. The construction methods are described below.

The location of each of the areas outlined in Table 1 is displayed in Figure 1.

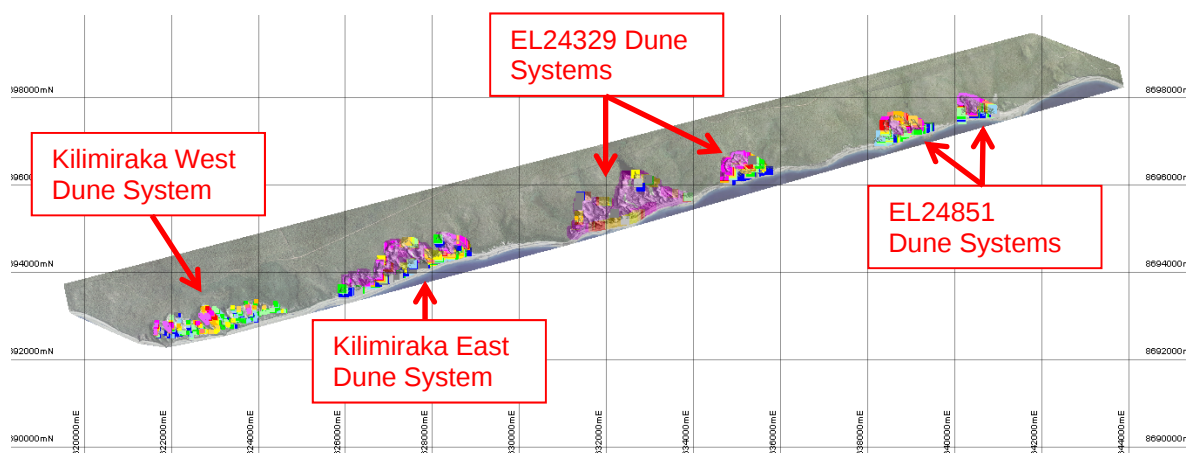


Figure 1. Location of dune systems

Geological Model

The mineralisation at Kilimiraka has been documented previously by Baxter (2011). In summary the mineralisation is hosted within a series of overlapping Bachaan dune systems.

For the purpose of this exercise these dunes are believed to lie directly on the sandstone material seen upslope and as sea cliffs behind the current beach systems. The slope between the exposed sandstone outcrop distal to the beach to the coast is seen as being primarily as linear. It is noted that in

some cases this may not be the case as there appears to be some weathering of the sandstone as breakaways. These may form a grading scree slope towards the current beach and would need to be confirmed with drilling to the base of the dune system.

Kilimiraka Resource Area

The Kilimiraka resource area was drilled using shell auger in 2011 (see Baxter, 2011). The determination of vertical locations was challenging due to the steep nature of the terrain and failures with the DGPS system used to pick-up the holes. It is also believed that the 2007 topographic contours currently located on the server were not used for the resource estimate. The difference between the surface representation is clear in Figures 2 (Baxter, 2011) and 3 (current work).

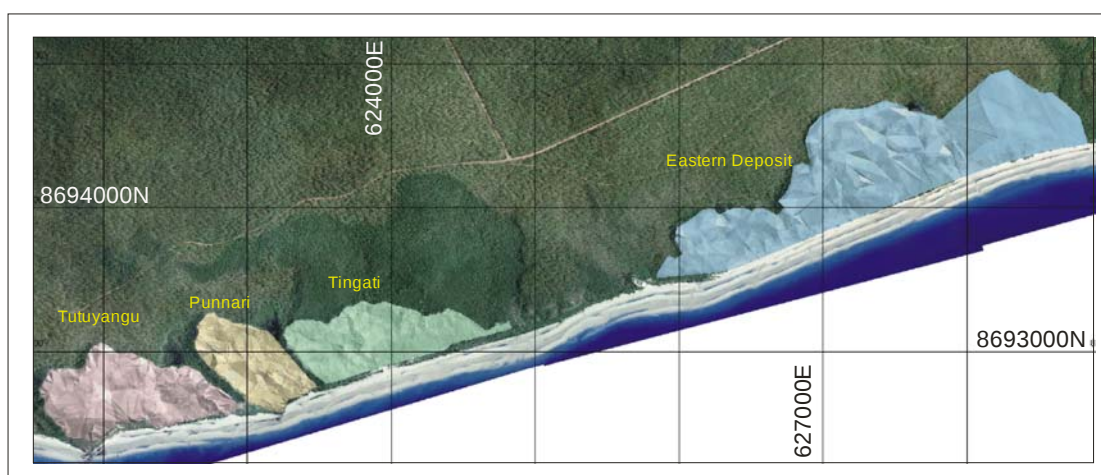


Figure 2. Plan view of 2011 resource showing low resolution topographic surface (after Baxter, 2011)

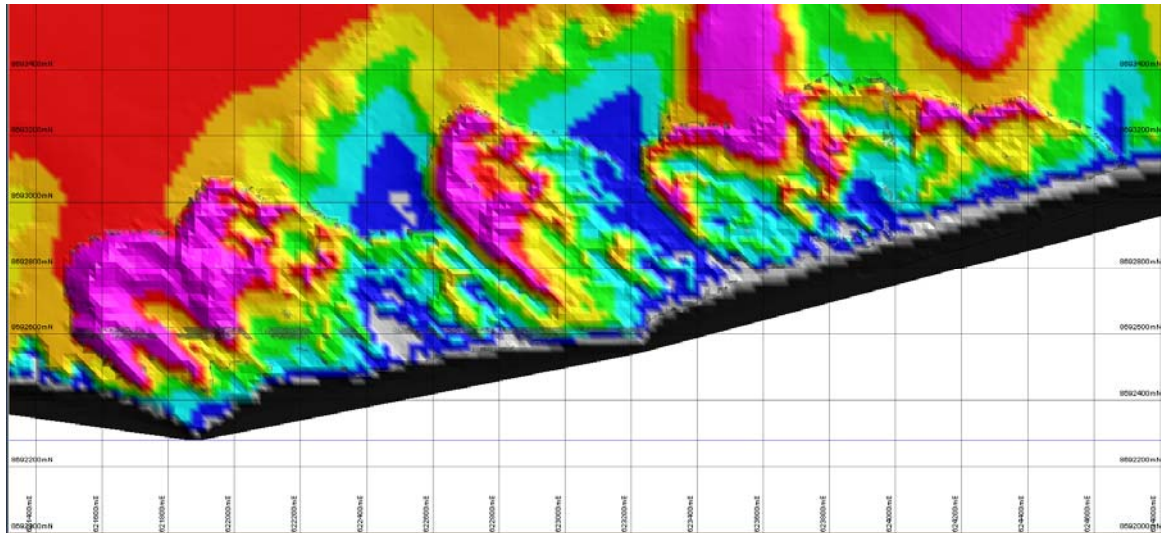


Figure 3. Plan view of Kilimiraka resource area based on high-resolution topography (coloured by RL)

As a result, the drillhole collars have been pressed onto the current topography to allow evaluation of the effectiveness of the drilling in subsequent sections.

Strings were then constructed on 100m sections across the strike extent of the deposit to define the base of the deposit. The vertical positions of these strings were defined by either:

- (a) The interpreted intersection of the dune system with the underlying sandstone from either the orthophotography or changes to the topographic gradient
- (b) Intersection by shell auger drilling, which would presumably be within sand due to the nature of the drilling method

Figure 4 shows the result of these constructed strings.

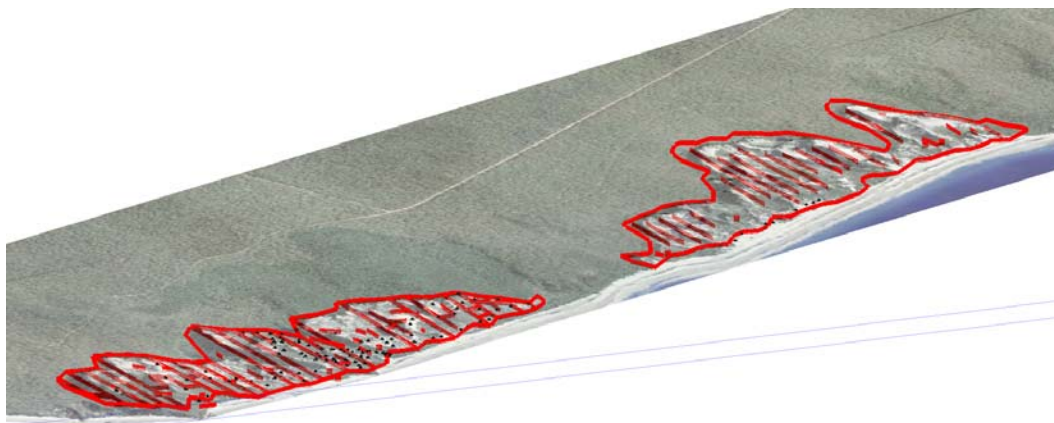


Figure 4. Wireframe construction strings for Kilimiraka ore outline

These strings were then wireframed to generate surfaces, then solids from which volumes could be reported. General steps in this process were:

- (a) Wireframe based on strings
- (b) Insert tie lines in areas where the wireframe overlapped with the topography within the area of the dune systems, modifying the RLs as required
- (c) Repeat (a) and (b) until all crossovers were completed
- (d) Boolean the topography and the wireframe, retaining the tops and bases where relevant
- (e) Calculate volumes/tonnes

In addition, a wireframe was created along the upper reaches of the current beach and translated 50m towards 342 degrees to reflect the rough strike of the current beach. This is to reflect the likely beach standoff required due to turtle nesting. This has been reduced from the normal 200m due to the presence of a sea cliff and the main requirement for a standoff being light pollution.

The wireframe process for this component was similar to that outlined above, however an additional Boolean was undertaken to remove the area within 50m of the current beach, with retention of the buffer wireframe where it has cut through the dune to allow creation of valid solids for volume calculations.

The results of this work are shown previously in Table 1. This displays that the tonnage estimate method is comparable to that undertaken for the Kilimiraka resource in Baxter (2011). Table 2 shows the comparison between the two processes. For reporting purposes it is assumed that the difference still exists as potential mineralisation and this has been entered into the deposit calculation sheet as such (Radix 41254).

Table 2. Kilimiraka Resource area comparison

	Resource	Current Method	
		No Buffer	50m Buffer
Western Dunes	25.6Mt	24.8Mt	24.6Mt
Eastern Dunes	30.6Mt	35.3Mt	35.0Mt

Potential Mineralisation Area

A similar process was undertaken for the Potential Mineralisation of dunes other than the Kilimiraka Resource, except that a plane was used to define the base of the dune system as no other data was available. A polygon was also drawn around each dune system and translated vertically to provide an

adequate cutting plane between the topography and base wireframe. This allowed for easy creation of valid solids for volume calculations. Figure 5 displays the strings.

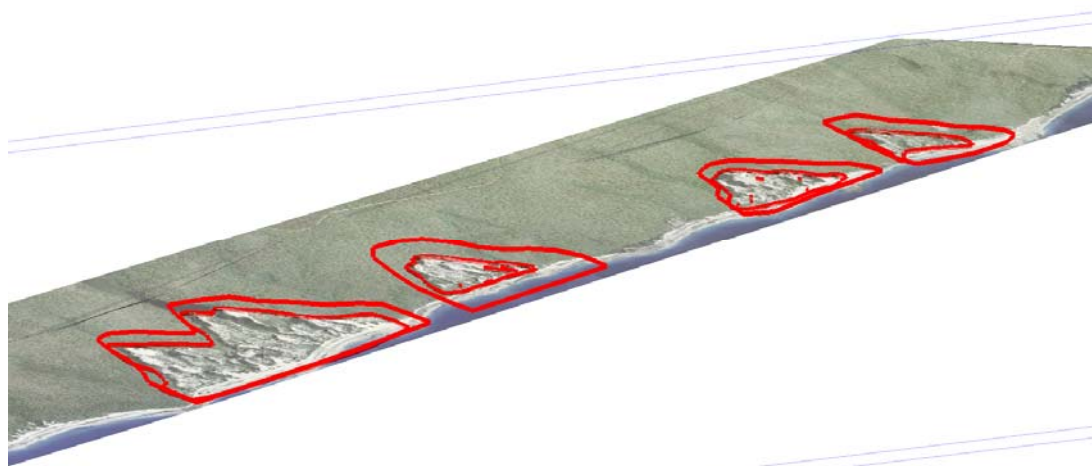


Figure 5. Wireframe construction strings for Potential Mineralisation

Drilling Assessment

The auger drilling undertaken at Kilimiraka was assessed after being pressed to the topography in order to ascertain its' effectiveness in fully assessing the Kilimiraka dune system.

Appendix A shows the results of this work.

In summary, 40% of the drillholes completed did not adequately test the dune system to the interpreted hole depths. There are several cases where the drillholes ended in grade. A general observation is that mineralisation grade increases towards the base of the dune, which would match with general thinking that the highest grades are at the first depositional events. If this is relatively consistent across the deposit, it provides good scope for upside for the project that requires drill testing.

Program Modification

The proposed program for Kilimiraka was reviewed based on the results of the previous sections.

A process was put together for this comprising:

- Import of strings into Micromine (see Figure 6)
- Addition of extra drill lines to ensure adequate drill coverage to 200 metre spaced lines
- Simplifying of the strings to ensure that there was a point every 50 metres to reflect the proposed drill spacing
- Pressing of the strings onto topography
- Exporting to Excel and modification to create drillhole collar file

- Importing of the Excel file to make a drillhole database in Micromine
- Running of a pierce point query of the drilling database with the mineralised volume to work out drillhole depths
- Modification of pierce point output to remove duplicate points (from top of hole)
- Export to Excel and recalculation of collar RL for visualisation purposes
- Reimporting into Micromine

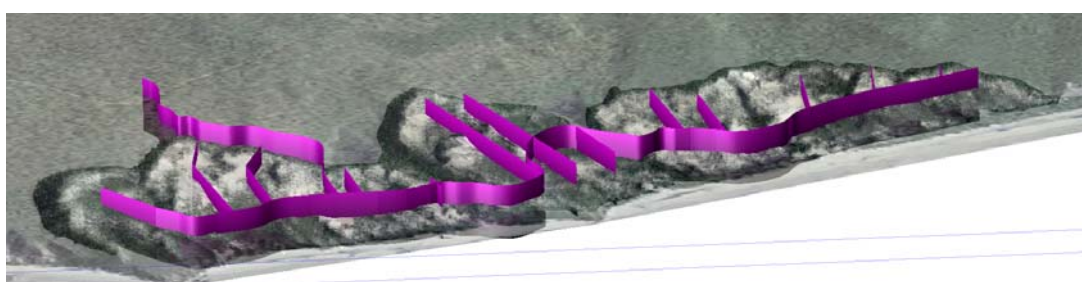


Figure 6. Wireframe of proposed drill lines from 2012 MMP.

The eastern dune systems were assessed in a similar manner to the process outlined above, except instead of importing of strings, the drill lines were digitised directly onto the topography to allow for best access and testing of sand dune material. The proximity of drilling to the current beach was limited using the 50 metre buffer digitised previously.

A compilation of the estimated drill metres required to test each dune system to roughly 200 metre line and 50 metre hole spacing is shown below in Table 2. The locations of the drillholes and proposed depths are also shown in Figures 7-10.

Table 2. Proposed Drill Metres for 200x50m (Indicated-Measured Classification) coverage

Wireframe	Drill Holes	Dril Metres
Kilimiraka Resource		
Western Area	368	3,508
Eastern Area	346	6,480
TOTAL	714	9,988
EL24329		
Eastern 1	397	11,725
Eastern 2	112	1,284
TOTAL	509	13,009

EL24851		
Eastern 3	134	1,864
Eastern 4	86	1,429
TOTAL	220	3,293
All Areas		
TOTAL	1,443	26,290

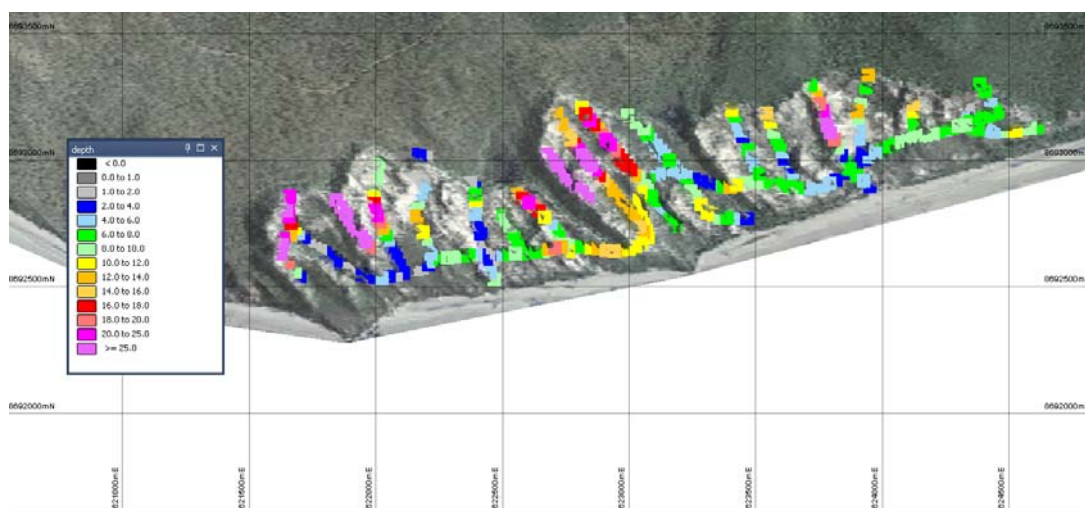


Figure 7. Proposed drill hole collar locations with estimated drill depth for the Kilimiraka Resource western dune complex.

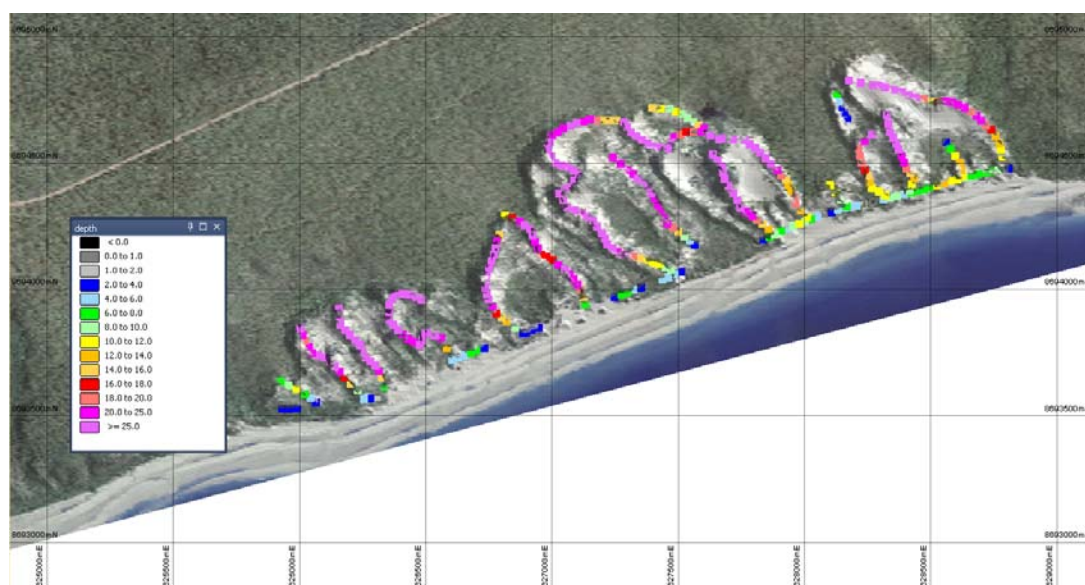


Figure 8. Proposed drillhole location and depth for the Kilimiraka Eastern dune complex

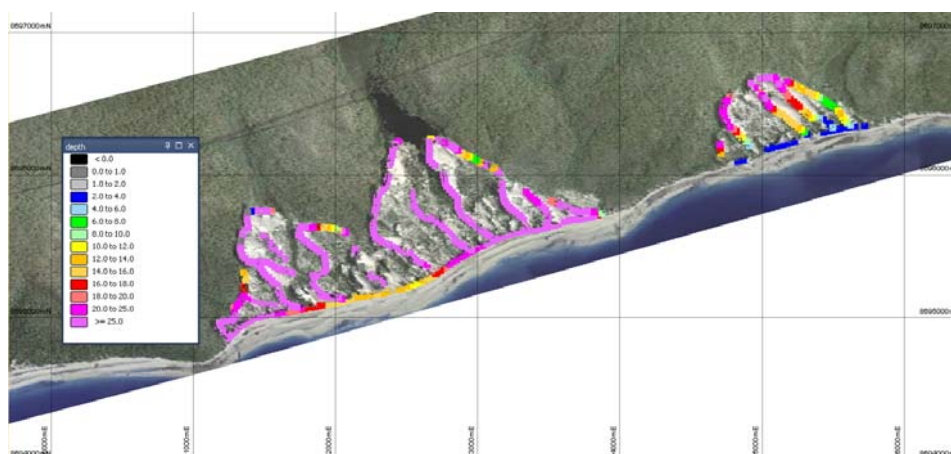


Figure 9. Proposed drillhole locations and depths for EL24329 dune complexes

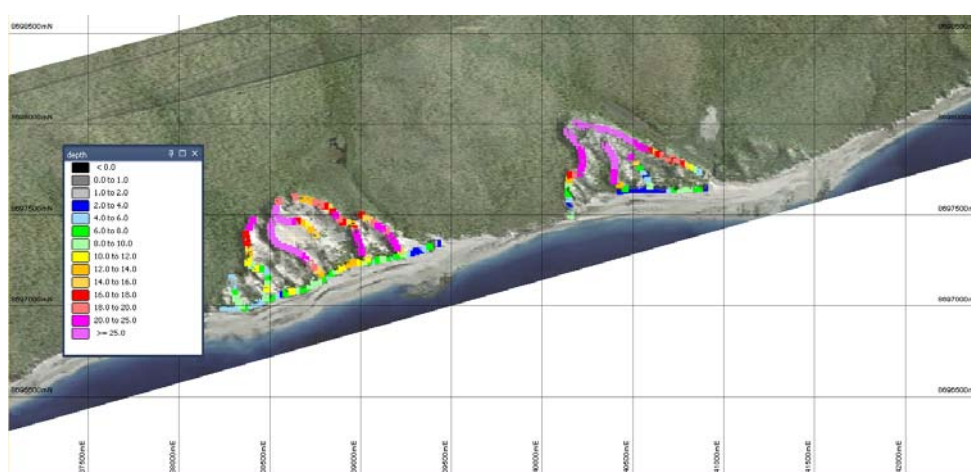


Figure 10. Proposed drillhole locations for EL24851 dune complexes

It is not the intent to drill these holes as a single campaign, but rather to stagger them to give an overall picture of the project.

A phased program may include, with the drill results and resource estimated providing toll gate points:

Table 3. Proposed Development Schedule

Area	Drill Spacing / Activity	2016CY		2017CY		2018CY		2019CY		2020CY	
		H1	H2	H1	H2	H1	H2	H1	H2	H1	H2
KW	200x100										
24329/24851	scout										
KW	Resource										
KW	200x50										
KE	200x100										
KW/KE	Resource										
KE	200x50										
24329	200x100										
KE/24329	Resource										
24329	200x50										
24851	200x50										
24329/24851	Resource										

Note: KW = Kilimiraka West Dune System; KE = Kilimiraka Eastern Dune System; 24329 = 2 dune systems on EL24329; 24851 = 2 dune systems in EL24851

The rationale behind this strategy has numerous components:

- Initially test the Kilimiraka Western Dune System to confirm the current resource. It is expected that this will increase the resource given that 40% of current drilling has not vertically tested the dune system. When combined with the Kilimiraka Eastern Dune System this should increase the project above the 1Mt contained THM threshold defined in the corporate strategy
- Should the strategic threshold be +2Mt contained THM, scout drilling will also need to be undertaken at the same time as the Kilimiraka West Dune System Drilling to confirm that mineralisation is present on the dune systems outside the declared resource. This would comprise 2 lines of scout drilling on each dune system. This would then allow a decision point to be reached as to whether to continue with the project. This is seen as a cost ineffective method due to the need to establish tracks into each dune system from the main access road due to inherent risks of tramming across beaches in an area with large tidal fluctuations, but may be necessary to ensure adequate decision making.
- Beyond this initial work, a staged approach to drilling is to be undertaken to initially define an Inferred Resource, followed by an Indicated/Measured resource in each of the areas. This has the benefit of delaying expenditure while progressing the project

Forward Actions

Further work is required around the development timelines for Kilimiraka, particularly around the strategy for drilling given limited available funds. As a result further work would be required around the budget required to drill the areas.

In addition the actual drillhole collar locations require refining prior to submission for a MMP.

It is proposed to lodge an MMP for the whole of the Kilimiraka Project in late-2015, which would allow the meeting of annual expenditure.

References

Baxter, J.L. (2011), "Kilimiraka Prospect Drilling & Resource Report, August, 2011", Report MZI 11/001, Radix Ref: 22347.

APPENDIX A – DRILL INTERCEPT SHEET

HOLE	E	N	DEPTH	RL	DUNE DEPTH	TESTED
PN1101	623494	8692758	3.5	8.744	0.5	Y
PN1102	623487	8692764	4.5	9.309	0.6	Y
PN1103	623484	8692774	5.25	10.176	1.0	Y
PN1104	623472	8692782	5.5	11.079	2.0	Y
PN1105	623465	8692776	5.5	11.508	2.5	Y
PN1106	623463	8692760	4.5	10.167	1.9	Y
PN1107	623477	8692742	3.5	8.796	1.5	Y
PN1108	623438	8692796	8	13.308	4.8	Y
PN1109	623401	8692814	8.25	13.372	5.7	Y
PN1110	623350	8692798	8.75	17.314	11.1	Y
PN1111	623307	8692815	13.5	19.492	13.5	Y
PN1112	623269	8692838	6	16.092	1.5	Y
PN1113	623227	8692870	7	22.042	14.0	Y
PN1114	623282	8692870	6	13.747	6	Y
PN1115	623324	8692874	4	11.854	3.4	Y
PN1116	623377	8692858	4	11.401	2.7	Y
PN1117	623420	8692824	5.8	11.802	2.0	Y
PN1118	623159	8692970	5	14.438	4.5	Y
PN1119	623106	8693008	5	14.878	5	Y
PN1120	623042	8693032	9	20.602	9	Y
PN1121	622998	8693038	10	23.685	10.5	Y
PN1122	623230	8692882	10	19.272	11.6	Y
PN1123	623188	8692908	11	19.984	11	Y
PN1126	623204	8692952	4	13.793	4	Y
PN1127	623134	8693014	4	15.662	4	Y
PN1128	623077	8693062	4	15.525	5.6	Y
PN1129	623030	8693086	7	17.055	5.9	Y
PN1130	622973	8693088	10	24.058	9.3	Y
PN1131	622926	8693182	10	25.8	7.5	Y
PN1132	623008	8693172	9	20.238	9.3	Y
PN1133	623069	8693148	9	20.986	9.7	Y
PN1134	623088	8693094	4	14.678	4.4	Y
PN1135	623128	8693134	4	16.208	3.9	Y
PN1136	623162	8693046	3	14.175	2.5	Y
PN1137	623222	8692774	5	12.136	7.0	Y
PN1138	623346	8692750	6	10.773	12.0	Y
PN1139	623293	8692742	9	17.445	12.0	Y
PN1140	623261	8692782	5	14.818	7.4	Y
PN1141	623277	8692988	7	10.693	5.0	Y
PN1142	623228	8692708	7	15.222	6.9	Y
PN1143	623195	8692738	9	18.588	8.9	Y
PN1144	623134	8692810	6	18.41	6.4	Y
PN1145	623108	8692850	5	21.339	9.3	Y
PN1146	623094	8692814	5	18.16	5.0	Y
PN1147	623136	8692754	10	19.809	6.7	Y
PN1148	623087	8692806	5	21.234	8.1	Y
PN1149	623133	8692756	7	19.666	6.7	Y
PN1150	623112	8692714	8	22.957	8.7	Y
PN1151	623135	8692664	8	23.331	9.5	Y
PN1152	623198	8692628	7	17.762	4.7	Y
PN1153	623216	8692662	6	15.772	5.7	Y
PN1154	623079	8692748	9	23.679	9.4	Y
PN1155	623036	8692774	8	24.471	10.9	Y
PN1156	623008	8692820	8	25.424	12.7	Y
PN1157	623023	8692866	8	23.707	11.1	Y
PN1159	622959	8692922	8	25.697	11.0	Y
PN1160	622924	8692948	8	31.678	16.4	Y
PN1163	622880	8692864	8	32.442	18.3	Y
TT1101	622909	8692630	8	24.117	15.0	Y
TT1102	622826	8692653	8	16.703	6.1	Y
TT1103	622719	8692660	8	26.489	16.5	Y
TT1104	622790	8692572	8	11.363	5.0	Y
TT1105	622856	8692630	7	16.277	8.0	Y
TT1106	622559	8692566	6	11.223	5.0	Y
TT1107	623113	8692634	2	11.112	4.2	Y
TT1108	622452	8692676	6	15.57	7.7	Y
TT1109	622497	8692660	2	12.226	2.3	Y
TT1110	622360	8692792	5	17.792	3.9	Y
TT1111	622304	8692694	8	23.245	7.8	Y
TT1112	622162	8692700	6	30.147	10.0	Y
TT1113	622057	8692740	6	36.037	10.6	Y
TT1114	622166	8692928	8	28.586	6.2	Y
TT1115	622068	8692602	5	24.13	1.5	Y
TT1116	622121	8692498	2	18.985	0	Y
TT1117	622030	8692456	8	21.582	0	Y
TT1118	621900	8692586	8	28.505	2.4	Y
TT1119	621809	8692668	8	42.884	7.5	Y
TT1120	621656	8692584	8	48.372	15	Y
TT1121	621792	8692474	2	26.606	0	Y
TT1122	621633	8692610	6	56.314	24	Y
GG1101	6242744	8693010	8	11.996	0.2	Y
GG1102	624186	8693101	4	27.673	9.4	Y
GG1103	624096	8693109	7	20.355	4.8	Y
GG1104	623940	8693121	5	17.216	3.2	Y
GG1105	623882	8693069	5	15.35	1.6	Y
GG1106	623785	8692943	5	13.538	2.4	Y
GG1107	623735	8692864	6	12.966	3.2	Y
GG1108	623662	8692876	8	14.918	4.0	Y
GG1109	623929	8692893	2	11.087	4.6	Y
GG1110	624104	8692953	3	9.176	0	Y
GG1111	624166	8692975	7	11.304	0	Y
GG1112	624343	8693026	7	10.704	0	Y
GG1113	624365	8693123	6	28.052	7.0	Y
GG1114	624466	8693115	2	19.305	7.0	Y
GG1115	624572	8693135	3	17.97	9.3	Y
GG1116	624694	8693144	4	14.612	0	Y
GG1117	624801	8693175	8	19.782	0	Y
GG1118	624559	8693217	8	25.111	7.2	Y
GG1119	624422	8693230	8	30.811	6.4	Y
GG1120	624381	8693302	8	41.597	8.8	Y
GG1121	624337	8693218	5	27.49	1.3	Y
GG1122	624248	8693156	8	30.428	5.6	Y
GG1123	624159	8693232	8	32.232	9	Y
GG1124	623879	8692842	8	16.379	6.0	Y
GG1125	623897	8692925	8	18.902	5.0	Y
GG1126	623458	8692934	8	14.641	2.5	Y
GG1127	623586	8692930	8	18.192	2.6	Y
GG1128	623634	8692915	7	17.852	6.4	Y
GG1129	623571	8692878	8	20.385	9.5	Y
GG1130	623396	8693052	8	23.402	7.0	Y
ED1101	626996	8693612	5	9.218	0	Y
ED1102	626482	8693675	6	11.375	0	Y
ED1103	626660	8693712	4	7.876	0	Y
ED1104	626703	8693750	6	14.913	3.6	Y
ED1105	626763	8693764	5	8.88	0	Y
ED1106	626992	8693808	8	15.708	3.7	Y
ED1107	627110	8693928	4	11.363	2.9	Y
ED1108	627165	8693928	5	9.674	1.1	Y
ED1109	627219	8693964	5	10.715	3	Y

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