- **KC, Map 1, Langklip, Waypoint 126, LKC_R1B area**

A lateral section exposed by mining of the Quaternary "RETs". Under ~1.6 m of grey, aeolian sand, a thick unit of pale, calcareous, marine sand with a capping, karstic pedogenic profile is ostensibly the LIG highstand (Image 36). Towards the east, its boulder-bearing lower contact is exposed and is formed on reddened, pebbly sands with pedogenic features and a basal boulder-cobble gravel on bedrock, probably 30 m P deposits. The exposure does not extend sufficiently far inland to reveal a pre-LIG highstand.

- **KC, Map 2, Koingnaas, Waypoint 122, KN_15A area**

Appears to be early? Quaternary beach deposits cresting out on the underlying 30 m Package (Image 37).

- **BMC, Map 3, Kleinzee, Waypoint 129, AK_61A area**

A basal boulder and cobble unit and pebbly sands are exposed in a slit trench within an old prospecting trench (Image 38). Shells of modern taxa suggest it is attributable to an earlier Quaternary transgression. Just nearby and farther east the exposure appears to be 30 m P deposits like those at 127 and 128 (Image 39). At the seaward end of the trench a thin, near-surface unit of cobbly gravel (LIG?) overlies pedogenically-reddened, decalcified sands, but closer examination is required to ascertain if it is "real" or not.

Potentially a very informative exposure, but requires "clean-up" to provide some clearer vertical sections.

- **BMC, Map 3, Tweepad, Waypoint 138, TP_240_J**

These trenches in the "RETs" are now incomplete exposures due to blown-in sand and collapse. An uppermost transgressive surface that extends inland is partially exposed (LIG?) in the northern trench (Image 40). It is underlain by pale, compact-cemented sands.

In a trench to the south of the previous exposure is a "shingle" unit of discoidal cobbles with a superimposed pedogenic profile, very likely the LIG beach (Image 41).

Again, potentially very informative exposures, but requiring "clean-up" to provide some clearer vertical sections and indications of lateral extents.

- **Discussion**

Section 2.7 refers. The significance of sampling and documentation of the Quaternary coastal deposits involves:

- History of global sea-level change and geodynamic crustal responses.
- Record of changes in local faunal communities/environments with time.
- Maximum ages of archaeologically-occupied surfaces.
- For future radiometric and chemical dating purposes (rates of coastal change).
- Preservation of fossils for future palaeo-oceanographic research *e.g.* stable isotope/palaeotemperature analysis etc.
- Preservation of fossils for the application of yet unforeseen investigative techniques.

- **Recommendations**
  - Representative collections should be made from the Quaternary deposits, with documentation of their contexts.
  - Photographic records and sketches made when the exposures were less covered would be useful.
  - Rehabilitation of trenches directly next to the coast might be seen as mandatory by some. Poor exposures could be temporarily uncovered for study prior to rehabilitation. However, an entire section through the Quaternary should be preserved as a type locality/geohistorical site.

- **7.6 BUFFELS RIVIER DEPOSITS**
- **BIC, Map 4, Nuttabooi, Waypoint 145**
- **BIC, Map 4, Mannels Vley, Waypoint 144**
- **BIC, Map 4, Dikgat, Waypoint 143**
- **Discussion**
  - These exposures exhibit the basic features mentioned in Section 5.5. At Nuttabooi, pale grey and white, compact to cemented deposits comprise the greater part of the exposures (Images 42 and 43) and it appears that these are more extensively preserved older deposits *cf.* those at Dikgat and Mannels Vley which appear to be mainly younger deposits. The lower, pale formation seems absent at Mannels Vley, or is disguised by weathering (Image 44). It is probable that the lowest gravels at Dikgat (Image 45) represent reworking of the older sequence. Prominent palaeosurfaces and channels are noticeable both within the older, pale, lower formation and the younger fluvial deposits.
  - To the writer's knowledge no fossil bones have ever been reported from the Buffels deposits and age constraints are thus lacking. However, it is possible that fossil material may have been noticed or collected in the past by DBNM personnel (*e.g.* fossil wood, plants?).
- **Recommendations**
  - These exposures should be diligently scanned for fossil material.
  - Existing descriptive documentation/projects should be reviewed beforehand, in order that the fossil search is informed by the prior observations of the deposits.
  - Existing descriptive documentation could compiled and considered for publication by their authors and De Beers, as little information on these deposits is available in the literature.
  - Consideration should be given to the preservation of type section localities/geohistorical sites where these fluvial sequences are of typical aspect and encompassing lateral variations.

8. RECOMMENDATIONS FOR MITIGATION

8.1 PRIMARY PALAEONTOLOGICAL MITIGATION - CURRENT EXPOSURES

It is advocated that all available mine pit faces be inspected for fossil content.

The extensive scale of the DBNM operation and exposures might appear to present special challenges for palaeontological mitigation. However, the main requirements are the time and requisite experience w.r.t. where to look more closely and where to scan briefly.

This process is to be prioritized in terms of the schedules for the filling the pits, including:

- Current pits that are being backfilled in the continued course of mining.
- Old pits that are being filled or due to be filled soon in terms of the rehabilitation program.

For the purposes of planning and costs containment, the contracted specialist must be informed on the scheduled excavation and filling planning and the progress being made *i.e.* would need to establish liaison protocols with a suitably-placed persons.

A prescribed data requirement is adequate 3D spatial referencing. For this the specialist would require the assistance of the surveyor w.r.t. co-ordinates and base maps, to plot the locations of finds during monitoring, the measured sections, samples and other observations.

In the process of the comprehensive pit inspection, particular exposures can be earmarked and rated w.r.t. their value as a type section/geohistorical site that should be maintained in an accessible and meaningful condition.

- Sections must be described where material is sampled. Additional observations of sedimentary features should be made where these inform about the origin of the deposits.
- This task should include the overlying terrestrial sequence, wherein scattered vertebrate material on major contacts (palaeosurfaces) is more common than generally held.

8.2 PRIORITY FOSSIL EXPOSURES

These exposures should not backfilled and the exposed fossils should be collected as soon as possible.

- The apparent silicified bone and macrofossil plant material exposed in the "Megalodon" palaeochannel at KVS_E16 (Waypoint 137).
- The fossil wood pieces and plant debris from the "Langklip Channel Clays" in the LK_LK_22 exposures (Waypoint 51).
- The unique 90 m Package fossil shells occurrence in the Koingnaas KN_KLNA_15 exposure (Waypoint 56).

8.3 CONTINGENT ARCHAEOLOGICAL MITIGATION

Buried Archaeological Material

In the process of scanning palaeosurfaces in the terrestrial sequences for fossil bones, further occurrences of ESA and MSA implements are certain to be found. The following procedure is proposed:

- If the occurrence is isolated, such as just one or two implements, these will be collected and the context in the section duly recorded, as for a fossil occurrence.
- If the occurrence comprises several implements and bone and/or shell material is associated, as in the case above, these will be left alone and the position and context will be recorded and the information relayed to the contracted archaeologist.

An Early Stone Age Site - Kareedoornvlei, Waypoint 139, KV_174_KL

The Early Stone Age site, found near the "Tortoise Midden" during the pilot fieldwork, should be examined by the UCT Archaeological Contracts Office. See comment in Section 7.3.

8.4 DUMPS AND DISCARDED OVERSIZE GRAVEL

Overburden dumps, particularly after deflation, have provided valuable fossils. Although provenance is no longer exact, they can be related to the relevant pit and also, in the case of shells, the accompanying shell assemblage provides biostratigraphic context. Because the shells are scattered over a large area, specimens of less common taxa are often revealed.

Discarded oversize gravel dumps have been the source of extremely valuable vertebrate teeth sourced from the basal petrified assemblage. Examples are massive teeth and bone parts from ancient, predatory "killer-whales

and the teeth and bones of large land mammals such as the elephant-like gomphotheres, large bovids and the rhinos. The petrified teeth that support the mid-Miocene age of the 90 m P come from dumps of smaller oversize gravel wherein the fossil teeth found are in the 1-3 cm size range (*e.g.* the Ryskop specimens collected by Wessels and Pick & Senut, 1977).

In the process of backfilling from these dumps or regrading them it is possible that fossil material will be exposed.

8.5 Legacy Material

Existing fossil collections of DBNM are a further resource. Another result emerging from heritage legislation compliance is the obligatory compilation of a detailed inventory of existing fossil samples and their state of diagnosis, together with where they currently are stored/displayed, at company sample archives, local museums and various research institutions.

The fossil plant samples from the Kareedoornvlei Cretaceous lake, the "Channel Clays", the "Megalodon" palaeochannels and probably the Buffels deposits are of particular importance. In this process, the status of previous palynological and wood-anatomy work on these deposits should be compiled and reviewed (unpub. reports to DBNM).

Existing descriptive documentation/projects should be reviewed where appropriate, in order that the fossil search and contexts of finds are informed by the prior observations of the deposits.

In the case of the Quaternary RETs, any photographic records and sketches made when existing exposures were less covered would be useful.

Proprietary information concerns should be addressed, such as non-disclosure agreements and limitations/permissions for access to reports.

Existing descriptive documentation could compiled and considered for publication by DBNM, with due acknowledgement to the original authors, as little information on the DBNM deposits is available in the literature.

9 GEOHISTORICAL HERITAGE SITES

There is considerable interest in the preservation of selected mine-pit exposures, both as:

- Type Sections for the formations of the Namaqualand coastal plain and the Buffels River.
- GeoHeritage sites that will form the basis of GeoTourism routes on the Namaqualand coast.

A Type Section is an officially-designated reference locality, endorsed by the South African Commission for Stratigraphy (SACS), where a particular formation is exposed in its typical aspect. In the case of the otherwise-buried coastal plain formations, the preservation of Type Section pit exposures provides the opportunity to return for additional observations and sampling, for instance for the application of new diagnostic insights and analytical techniques.

It is predicted that there will be agreement and support from the geological community that Type Section sites be preserved among the DBNM exposures. If necessary, this could be endorsed in a more official way, such as by responses elicited from SACS, the Council for Geoscience and the members of the Geological Society of South Africa. The geological community is also increasingly engaging in GeoHeritage and GeoTourism.

The Namaqualand community has an interest in GeoHeritage and GeoTourism, as a potential sustainable, albeit minor, economic opportunity while the diamond-mining mainstay continues to decline into the future.

The West Coast Fossil Park at Langebaanweg is the GeoTourism precedent on the West Coast.

Although the preservation of selected mine-pit exposures may reduce the costs of rehabilitation, there will obviously be costs incurred in keeping pits open and accessible, in stabilization of the faces and in safety concerns.

The following are initial proposals for potential Type Sections and GeoHeritage sites:

- The "Channel Clays" and the overlying 30 m Package in the Langklip LK_LK_22 exposures (Waypoint 51).
- The "Megalodon" palaeochannel at KVS_E16 (Waypoint 137), including the contact between the edge of the "Megalodon" palaeochannel sediments and the 90 m Package.
- An exposure (unspecified, if one still exists?) of the BMC Upper Terrace and overlying 90 m Package where it is of typical aspect. Aspects could include the 95 m cliff, silcrete boulder conglomerates and the black, heavy-mineral beach zones.
- The 90 m Package remnant occurrence with unique shell fossils in the Koingnaas KN_KLNA_15 (Waypoint 56). Overlain by the 30 m Package.
- An exposure (unspecified, if one still exists?) of the BMC Middle Terrace where it is of typical aspect. Important aspects are the 65 m Cliff, the sedimentary architecture in relation to the 65 m Cliff and the transgressive maximum of the 50 mm Package overlying the lower Middle Terrace.

- An entire section through the Quaternary RETs
- A suitable exposure (unspecified) of the Buffels deposits at Nuttabooi.

Additional Type Sections/GeoHeritage sites should be designated amongst the exposures at Alexkor, but Alexkor is yet to begin compliance with the National Heritage Resources Act. The exposures at Buffelsbank also require evaluation.

10. ADDITIONAL ASPECTS OF GEOHISTORICAL NOTE

Although not within the direct brief of palaeontological mitigation, the following may be considered whilst on the topic of GeoHeritage.

10.1 Evidence of Neotectonic Activity

On Langklip, in the vicinity of Waypoint 50, is a small scarp in the basement gneiss that is a fault (Image 46). Movement on this fault, now dubbed the Langklip Fault, displaces and thus post-dates the overlying Pliocene marine deposits. Some exposures seen previously exhibit extensive soft-sediment deformation features caused by shaking during earthquakes (Images 47 and 48). This evidence of neotectonics or geologically-recent (Quaternary) faulting is rare on the coastal plain. It is of considerable interest, for instance, in the site selection of nuclear power stations. The writer has been requested to propose such important exposures for preservation (C. de Beer, CGS).

Site	Lat (S)	Long (E)	Reason
Mining pit LKN-10-03	30° 21.336'	17° 18.843'	Location of Langklip fault
Exploration trench SLT-16	30° 16.190'	17° 18.433'	Strong ground motion faults
Mining pit KN/41A	30° 11.931'	17° 14.633'	Fluidisation pillar

10.2 Places of interest for the History of Mining

A good example is the early workings just to the south of Kleinzee. Additional sites could include "The Crater" and nearby exposures of silcrete cappings. Perhaps too, classic examples of deeply-gullied bedrock. DBNM personnel and accounts of the mine's history to be consulted.

Similarly, sites should be designated amongst the exposures at Alexkor.

10.3 Natural Exposures

An example of which the writer is aware occurs at Waypoint 53 (Map 2) on the north bank of the Swartlintjies Rivier. Here is a low outcrop of silicified sandstone (not weathering-profile silcrete) that has features suggesting it is an aeolianite (Image 49). Other examples may occur. It is thought that these and other examples are remnants of more extensive deposits, both fluvial and aeolian in origin, that filled the extant drainages and their buried tributaries during the upper Miocene 15-5 Ma (Figure 1) and represent a largely-unknown period of geological history post-dating the 90 m Package.

In this category may also be features of the Precambrian bedrock stratigraphy that could be included in a geohistorical route itinerary. Suggestions to be sought from relevant researchers.

Here the issue is not preservation of pit exposures, but eventual facilitation of access for inclusion in a GeoTourism itinerary.

11. PALAEONTOLOGICAL MONITORING

It is suggested that a degree of monitoring be carried out during the making of excavations in the future.

In general, fossil bones are sparsely scattered in coastal deposits and much depends on spotting them as they are uncovered during stripping.

Fossil shelly layers, when preserved, are usually more extensive and normally are exposed in the sides of the finished excavation, when they can be documented and sampled easily e.g. in some of the KC exposures. However, this does not seem to be the case in much of the 30 m P exposures and generally shells seem very sparse in the BMC.

In archaeologically-sensitive areas, monitoring by a qualified archaeologist of excavations as they are made might be a requirement stipulated by the provincial heritage authority. In such cases the archaeologist is likely to spot, investigate and report fossil material and separate monitoring by a palaeontologist should not be necessary.

Most areas have relatively low potential for fossil bone material and it is expensive and impractical to have excavations constantly monitored by a professional during the construction phase. Notwithstanding, the sporadic fossil occurrences are then particularly important and efforts made to spot them are often rewarded.

In order to spot the rare occurrences, it is very desirable to have the co-operation of the people "on the ground". By these are meant personnel in supervisory/inspection roles, such as geologists, surveyors, pit bosses etc., who are willing and interested to look out for occurrences of fossils. These personnel are also critical in informing excavator operators and manual workmen, whom being close to the sediments, would be more likely to spot fossils. Successful and cost-effective monitoring depends a lot on this goodwill and co-operation of managers and on-site people. To aid this process, a general background information document is useful.

There should also be guidelines for potential finds and a reporting/action protocol in place when finds are uncovered.

Isolated finds that are turned up should be handed over to a designated person for safekeeping, noting as far as possible where they came from. Excavated material with a clump of bones included can be stockpiled temporarily for safekeeping, until the site visit by the palaeontologist.

If major bone finds are encountered, the contracted specialist should be immediately informed. A temporary pause in activity at the limited locale will be required. The strategy is to "rescue" the material as quickly as possible. The method would be to remove representative samples and "best" material in encased blocks. In the case of considerable occurrences of bones, the methods could include the removal of a large, disturbed sample by excavator and conveying this by truck from the immediate site to a suitable place for "stockpiling". This material could then be processed locally, by sieving and further preparation.

At this stage it is perhaps premature to propose monitoring strategies in any detail.

It is suggested that feasible strategies be discussed in the near future.

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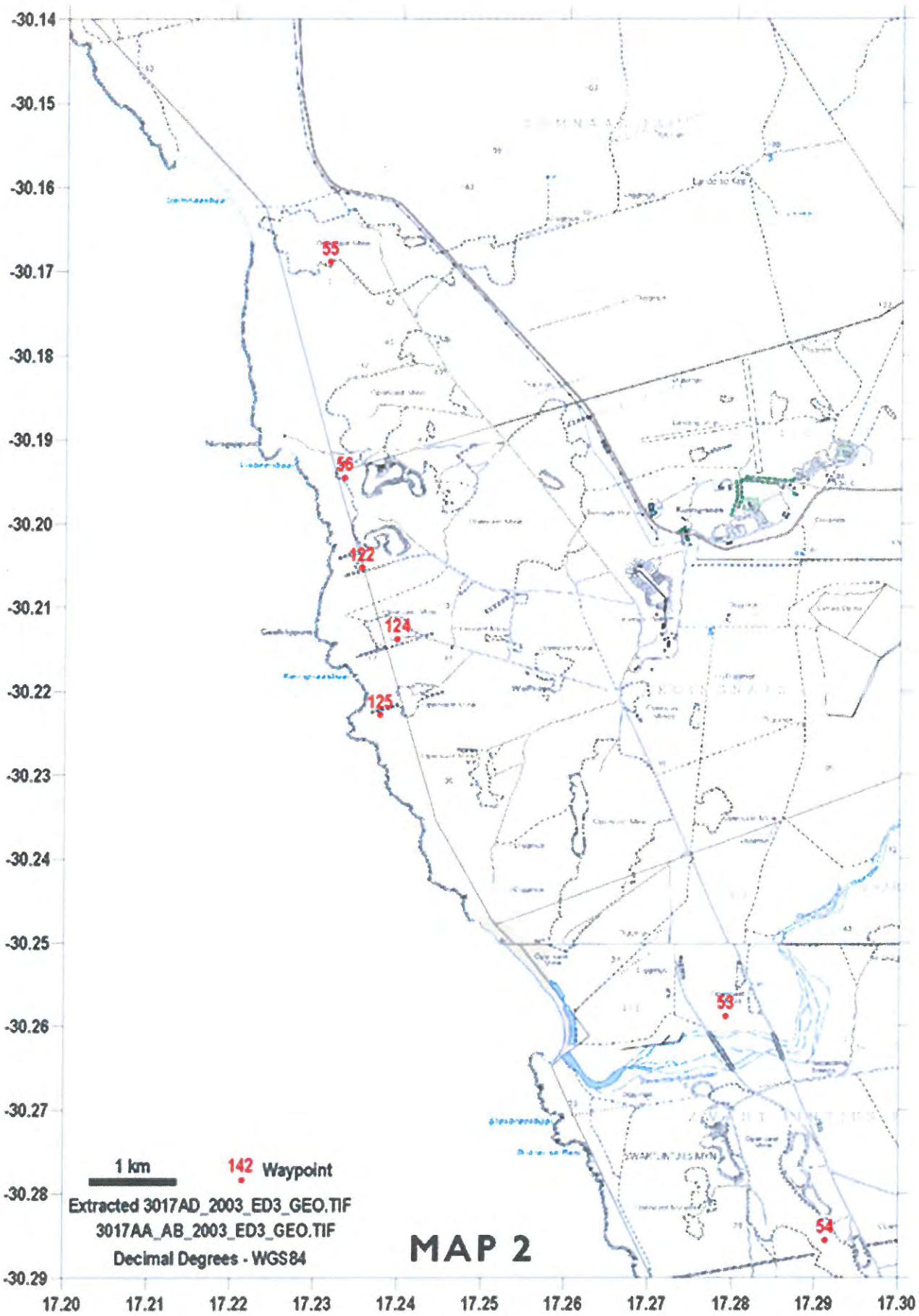
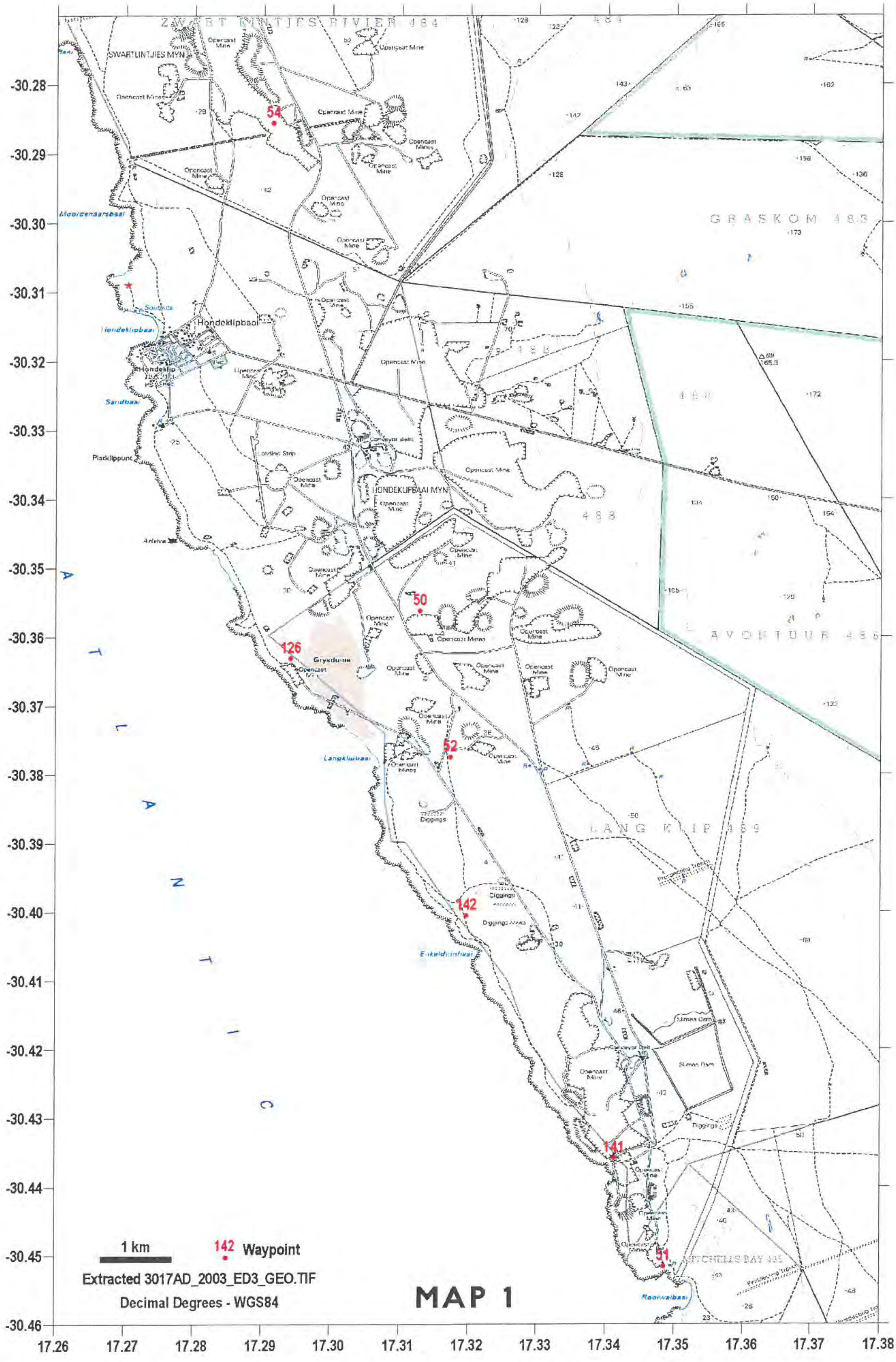
Maps showing where palaeontological mitigation was required in 2008.





1 km
142 Waypoint
Extracted 3017AD_2003_ED3_GEO.TIF
Decimal Degrees - WGS84
MAP 1
Hondeklipbaai
HONDEKLIPBAAI MYN
SWARTLINTJIES MYN
GRASKOM 483
AVONTUUR 486
LANG KLIP 489
MITCHELLS BAY 485

Appendix I – Quantum Calculation

JULY 2015 QUANTUM UPDATE/DETERMINATION REPORT

For

- KNR; Koingnaas : Koingnaas Proper
: Michell's Bay
: Michell's Bay Inland

- SBK; Samsonsbak
: Primarily the Somnaas Megladon channel in south

- Coffer Dam and selected beach mining

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IN ASSOCIATION WITH WCR

Report #2744
(WCR)/2015Q/R3
25 August 2015

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ANNEXURES

1. INTRODUCTION

This revision (R3) uses in its Part D the added coffer dam wall elevation and volume data contained in the WSP updated report dd 21 August 2015, and then, in respect of coffer dams applies the rehabilitation of their walls through dozing reduction of the wall crest, not costing wall rock removal by load and haul.
Furthermore, this R3 report has corrected a Geo-referencing error and recalculated the new land–mining disturbance rehabilitation cost in its part C. Additionally, the report contains the rehabilitation methodologies applied during the August 2011 calculation of the DBNM disturbances, which costing is used in Part A of this report.

WCR had intended to compile a comprehensive quantum update of land mining adapted to the current EIA update and extend it to include beach/coffer dam mining with the calculation ready for expansion to all Mining Right areas for end-September 2015 reporting.

However, in light of the following considerations, a comprehensive annual update for end-September has been postponed to 2016 and replaced by this July "interim" 2015 calculation. The considerations underlying this decision include the following:

- The WCR current Mining Work Programme preparation for mid-August requires a quantum cost by mid-August including both land mining and coffer dam provision.
- The following tasks which would have served as inputs to the comprehensive September update are not yet ready to fulfil that role:
  - The coffer dam design and sequencing of such dams is not yet finalised as the basis for detailed quantum costing for coffer dams.
  - The EIA update has been delayed and will not be ready to contribute to a rehabilitation calculation scheduled for completion in September.
- No works (disturbances) have been conducted in respect of the land mining areas since the March 2013 detailed rehabilitation liability calculation (figures dated 2011) of especially mining earthworks disturbances (compiled by Site Plan Consulting) and which accordingly can be escalated over 4 years to form the core of a fast July/August quantum calculation.

In essence therefore this fast-track July/August quantum calculation relies on the best available information regarding all main elements comprising the quantum and can serve both the end-July/mid-August Mining Work Programme and the September annual quantum update of 2015 within the context that a comprehensive review will be conducted in 2016 when all inputs have been finalised.
In light of the above considerations, this fast-track July/August 2015 quantum determination is structured and conducted consisting of the four following elements as detailed in part 2 hereafter:

(a) Pre-WCR Mining Earthworks Disturbances and Other Specific Items
(b) Buildings
(c) Planned New Land-Mining within the Current 7-year Mine Plan for new mining
(d) Planned Coffer Dams

2. APPROACH TO AND CALCULATION OF EACH COMPONENT OF THE QUANTUM

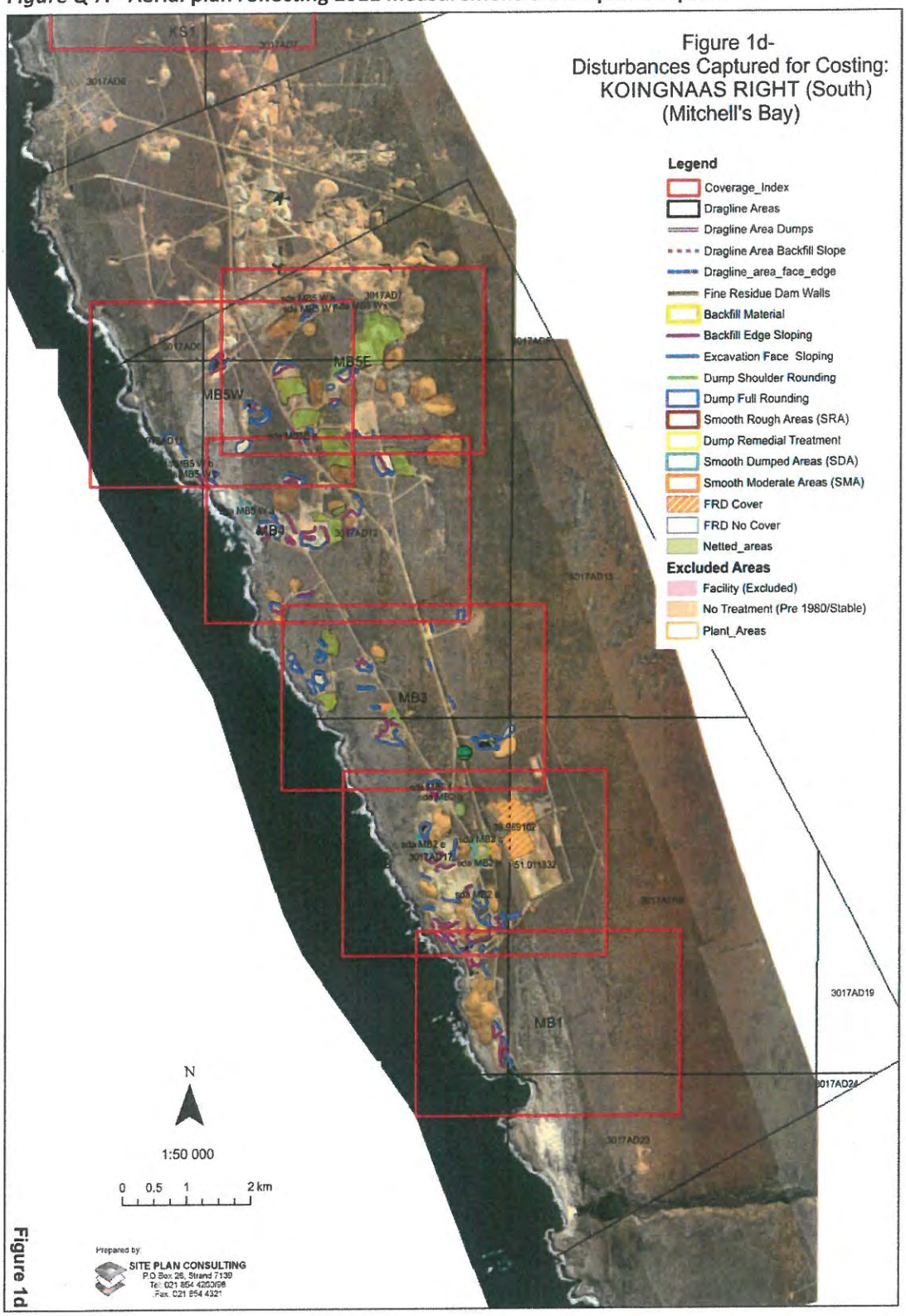
A. Pre-WCR Mining Earthworks Disturbances and Other Specific Items

Having compiled a detailed quantum calculation per individual mining earthworks disturbance in August 2011 (reported in 2013) and with no further disturbances having occurred in the transfer period from DBNM to WCR it is possible at July 2015 to simply escalate the 2011 calculated figures over 4 years at the following percentages (as taken from StatsSA)

- 2011-2012: 6.3%
- 2012-2013: 5.4%
- 2013-2014: 5.8%
- 2014-2015: 4.4%

Annexure A of this report contains descriptions of the methodologies used for rehabilitation costing during August 2011 as reported in the 2011 report entitled *" Competent Persons Report (CPR) for Trans Hex Group, Report #2568(a) CPR/R2, 4 August 2011 - Draft Report "*

Figure Q-A - **Aerial plan reflecting 2011 measurement GIS shapefile capture**



While the calculation paid detailed attention to the mining earthworks disturbances it estimated quantum values for other disturbances which have been transferred to WCR and also serve the basis for escalation.

Table Q – 1 hereafter reflects the costing of August 2011 and the escalated value to July 2015 per concession area per disturbance type:
Note that the full table is retained for all DBNM areas but only the KNR and SBR Mining Right areas are of relevance to the July 2015 updated as highlighted in the Table totals.

Table Q-1 – Costing of Pre-WCR disturbances (Costed August 2011, escalated to July 2015)

CPR: Cost Summary Table: DBNM. August 2011 Calculation of rehabilitation quantum: Immediate Closure		
Dragline Area	**KNR**	**SBR**
All Coastal	**KNR**	**SBR**
All Coastal Face Sloping	R5,454,669	
All Coastal Backfill Edge Sloping	R299,685	
All Coastal Smoothing areas (SDA)	R2,414,491	
All Coastal Smoothing areas (SMA)	R423,325	
Topsoil recovery and re-topsoiling of sloping: Backfill edge sloping	R310,192	
Topsoil recovery and re-topsoiling of sloping: Face Sloping	R2,669,452	
Samsons Bak		R2,872,380
SUB TOTAL ALL Coastal	**R 11,571,813.00**	**R 2,872,380.00**
Fine Tailings Dams	**KNR**	**SBR**
Surface Area Rehabilitation	R9,697,805	NA
Side Wall Rehabilitation (including Paddock provision)	R2,268,247	NA
SUB Total FRD	**R 11,966,052.00**	R -
Dumps	**KNR**	**SBR**
Dumps Full rounding (Shoulder rounding +SDA on 50% surface area)	R485,873	NA
Dumps Shoulder rounding	R260,508	NA
Dumps : Surface Remedial Treatment	R204,853	NA
Sub Total Dumps	**R 951,235.00**	R -
Plant Areas (incl paddocks around CRD's)	**KNR**	**SBR**
Tweepad	NA	NA
AK3	NA	NA
Bulk Sample	NA	NA
Langhoogte	NA	NA
Koiingnaas	R 893,901	NA
Mitchells Bay	R 90,987	NA
Dikgat Prospecting Plant - No calc - just allow	NA	NA
Final Recovery Plant (fate to be decide later possible landmark/heritage value)	NA	NA
Removal of concrete structures (retaining walls)	R199,000	NA
Sub Total: Plant Areas	**R 1,183,888.00**	R -
Buffels Inland	**KNR**	**SBR**
Dikgat	NA	NA
Mannelsvlei	NA	NA
Nuttabooi	NA	NA
Langhoogte	NA	NA
Sub Total Buffels Inland	**R -**	**R -**
Netting Provision	**KNR**	**SBR**
Germination netting and seeding - Allow 20ha @ total netting and seeding of R31 000.00 per hectare	R 620,000.00	R -
Sub Total Netting	**R 620,000.00**	R -
Roads	**KNR**	**SBR**
Allow SUM for KNR	R 240,000.00	R -
SubTotal Roads	**R 240,000.00**	R -
Waste Site Rehabilitation	**KNR**	**SBR**
After interim closure of numerous existing minor sites: Allow R200 000.00 for KNR	R 200,000.00	R -
SubTotal Waste Site Rehabilitation	**R 200,000.00**	R -
Asbestos Management	**KNR**	**SBR**
Reflected as Nil in this table as costed as a building demolition cost in rates used in Table Q2	R -	R -
SubTotal Asbestos Management	**R -**	R -
Services Infrastructure	**KNR**	**SBR**
Sea Water pump stations: Retained until mariculture and THG mine Plan finalised	Nil	Nil
Fencing: Current fencing considered functional for transition to stock or game and hence not costed	Nil	Nil
High Voltage Electriucal: Costs off set by value to demolition contractor	Nil	Nil
Water supply Pipelnes: Costs off set by resale / scrap value to contractor	Nil	Nil
SubTotal Infrastructure	R -	R -
Fuel & Lubricant Contamination	**KNR**	**SBR**
Allow R200 000 for KNR	R 200,000.00	
Sub Total: Fuel and Lubricant Management	**R 200,000.00**	
Monitoring	**KNR**	**SBR**
As this is not considered a full decommissioning closure monitoring is	R	

considered an operational expense for the 10 year period in which the rehab will take place. However R250 000 is allocated for dust plume monitoring and planning of its control		100,000.00 R 100,000.00	
Subtotal 1: Total Variable Cost for KNR and SBR	R 29,905,368.00	R 27,032,988.00	R 2,872,380.00
Management Fee (2.5%)	R 747,634.20	R 675,824.70	R 71,809.50
Contingency Fee (15%)	R 4,485,805.20	R 4,054,948.20	R 430,857.00
P&G's (5%) for establishment and mobile plant logistics	R 1,495,268.40	R 1,351,649.40	R 143,619.00
SUBTOTAL 2 (Total Fixed Costs)	**R 6,728,707.80**	**R 6,082,422.30**	**R 646,285.50**
SUBTOTAL 3 (Total Variable and Fixed Costs)	**R 36,634,075.80**	**R 33,115,410.30**	**R 3,518,665.50**
Escalated to 2012 (5.5%)	**R 38,648,949.97**	**R 34,936,757.87**	**R 3,712,192.10**
Escalated to 2013 (5.5%)	**R 40,774,642.22**	**R 36,858,279.55**	**R 3,916,362.67**
Escalated to 2014 (6.6%)	**R 43,465,768.60**	**R 39,290,926.00**	**R 4,174,842.60**
Escalated to 2015 (4.6%)	**R 45,465,193.96**	**R 41,098,308.60**	**R 4,366,885.36**
July 2015 Total KNR and SBR Pre-WCR Mining Earthworks Disturbances and other Specific Items	**R 45,465,193.96**	**R 41,098,308.60** **KNR**	**R 4,366,885.36** **SBR**

B. Buildings

In respect of buildings:

(i) The 2011 liability calculation assumed that all buildings not demolished by DBNM at plants would be retained for use by Transhex or constituted steel buildings which were saleable to fully offset demolition costs.

(ii) The WCR GIS however has now captured all buildings in GIS shapefiles permitting searches and expressing building size in square metre footprints enabling demolition costing with 2015 unit rates to be applied later once the buildings are ground-truthed to unit rate categorisation of buildings.

(iii) However as in-field ground-truthing categorisation is not possible within the time limit the calculation is based on "best possible building construction classification from 2011 ground photographs of buildings and later aerial photography".

Figure Q-B : **Plan from NGI Imagery with shapefile blue outlines of buildings, giving building footprint area in m^2 in shapefile tables**

(iv) SPC has recently determined demolition costs for various categories for buildings from two large Cape Town demolition contractors and based on these 2014 figures through application of one-year escalation we could develop a buildings demolition costing under this item as set-out in Table Q-2 hereafter.

Accordingly, Table Q-2 hereafter reflects the cost estimation of buildings demolitions.

a) In light of the fact that ground truthing of all buildings to the full classification available for costing cannot be done timeously for end-July, the Table relies on 11 basic building types as classified by photographic interpretation and reference of building use from WCR (old DBNM) plans.
b) In respect of steel buildings the costing model available (with ground truthing) allows for the contractor to credit the mine for steel buildings which qualify as either: saleable for re-erection, saleable steel profiles or saleable scrap steel. However, in the absence of detailed ground truthing in the July 2015 calculation, steel buildings are costed assuming an average credit of saleable steel profiles using an average steel mass (kilograms per square metre) to yield a zero cost of demolition.
c) The rates given in Table Q-2 include: demolition of the structure, load, haul and tip at a chosen excavation to serve as inert demolition building rubble waste burial site within 500m of the demolition.
   A provisional sum is allowed for the management and rehabilitation of such building rubble burial sites.
d) Demolition costs do not include the removal of heavy workshop floors or heavy concrete foundations which are designated to not be removed but have any concrete columns cut to maximum 250mm above ground level and the demolition area and retained slab covered by coarse-tailings to a depth of 500mm (refer coarse tailings cover cost).
e) Light strip footings and floors of single storey office/house type buildings will either be removed at the cost shown or where such buildings form a tight cluster be left in the ground and the cluster area covered by coarse tailings.
f) The cost of coarse tailings cover is based on the gross area determined for cover of retained floors and footings and based on a load, haul, tip and spread costing of coarse tailings cover as a specific item "foundations" under buildings in Table Q-2. These costs are additional to the cost provisions for concrete removal in Table Q-1.

Table Q-2: Buildings demolition costing

Row Labels	Sum of Total
Koingnaas	**R 1,770,873.46**
Concrete -350	R 111,945.34
Foundations	R 32,381.70
Industrial	R 895,853.13
None	R -
Plant	R 180,000.00
Prefab	R 12,481.79
Reservoir	R 15,690.00
Standard	R 356,358.34
Steel	R 138,530.71
Wood	R 27,632.45

Koingnaas Gate Security ("Town")	**R**	**254,446.16**
Concrete -350	R	3,811.00
None	R	-
Standard	R	194,403.17
Steel	R	56,232.00
Mitchells Bay	**R**	**573,000.88**
Foundations	R	7,367.43
Industrial	R	202,245.66
None	R	-
Plant	R	60,000.00
Prefab	R	566.68
Reservoir	R	15,690.00
Standard	R	106,822.30
Standard no roof	R	11,340.50
Steel	R	168,968.32
Samsons Bak	**R**	**32,364.22**
None	R	-
Prefab	R	2,535.19
Standard	R	29,829.03
Sub Total		**R 2,630,684.73**
Management (2.5%)	R	65,767.12
P&Gs (5.0%)	R	131,534.24
Contingency (15.0%)	R	394,602.71
Sub Total	**R**	**3,222,588.79**
Prov. Sum for 3x B. Rubble Sites incl. fixed costs	**R**	**367,500.00**
TOTAL BUILDING DEMOLITION	**R**	**3,590,088.79**

Building rubble waste burial sites

Given that demolished builders rubble classifies as inert, such sites do not require protracted approval applications under the NEMWA (National Environmental Management Waste Act) but will be shown as selected existing excavations proximate to demolition areas and submitted to DMR for their consideration as they administer the NEMWA.

In this July costing we provide a provisional sum for the management and rehabilitation of an assumed 3 such sites which include the final cover of the builder's rubble as site rehabilitation.

As in the case of foundations this cost item of R 367,500.00 including fixed costs forms a specific sub-item of buildings in the Q-2 Table above.

This is in addition to the existing waste site provision in the 2001 Calculation table (Table Q1).

C. Planned New Land-Mining disturbance rehabilitation within the Current 7-year Mine Plan

Method employed

In order to provide a figure in the July 2015 Quantum to cover the envisaged mining indicated in the August 2015 7-year Mine Plan, the following approach is applied as the basis for calculation.

The central point of departure is that:

- The areas identified in the 7-year Mine Plan have been electronically overlaid over the existing pre-WCR disturbances in order that a "nett future virgin

disturbance area" could be determined by: gross 2015 mine block areas, less existing disturbance areas within the mine blocks = nett future virgin area disturbance.

The DMR Quantum Area rehabilitation template is then applied with appropriate rates to:

- The earlier disturbed re-used areas; and
- The new virgin areas to be mined respectively.

- Furthermore, i.t.o. the 2015 EIA/EMP update, operational rehabilitation is to be applied on the following basis within any single mining excavation with stripped overburden to be directly tipped as either:
  - Backfill of the already mined portion of the excavation on the "principle of strip mining"; or
  - Where stripped areas are not yet available for backfill the removed overburden will be tipped in an old pre-WCR excavation available for backfill rehabilitation; or
  - Reshaping of the pre-WCR dump material.

  As such, new mining will lead to a cost reduction from the August 2011 rehabilitation costing of pre-WCR excavations given their backfill rehabilitation by future mining and accordingly the new mining rehabilitation rate per ha will be reduced from the gross DMR rate to a nett rate.

Accordingly, as per Figures Q-C (i) and (ii) hereafter, the mine block gross areas yield the gross area in Table Q-3 hereafter which then informs the Quantum Template Calculation in Table Q-4.

Figure Q-C(i) – 7-year Mine Plan extent of identified new mine block – Koingnaas

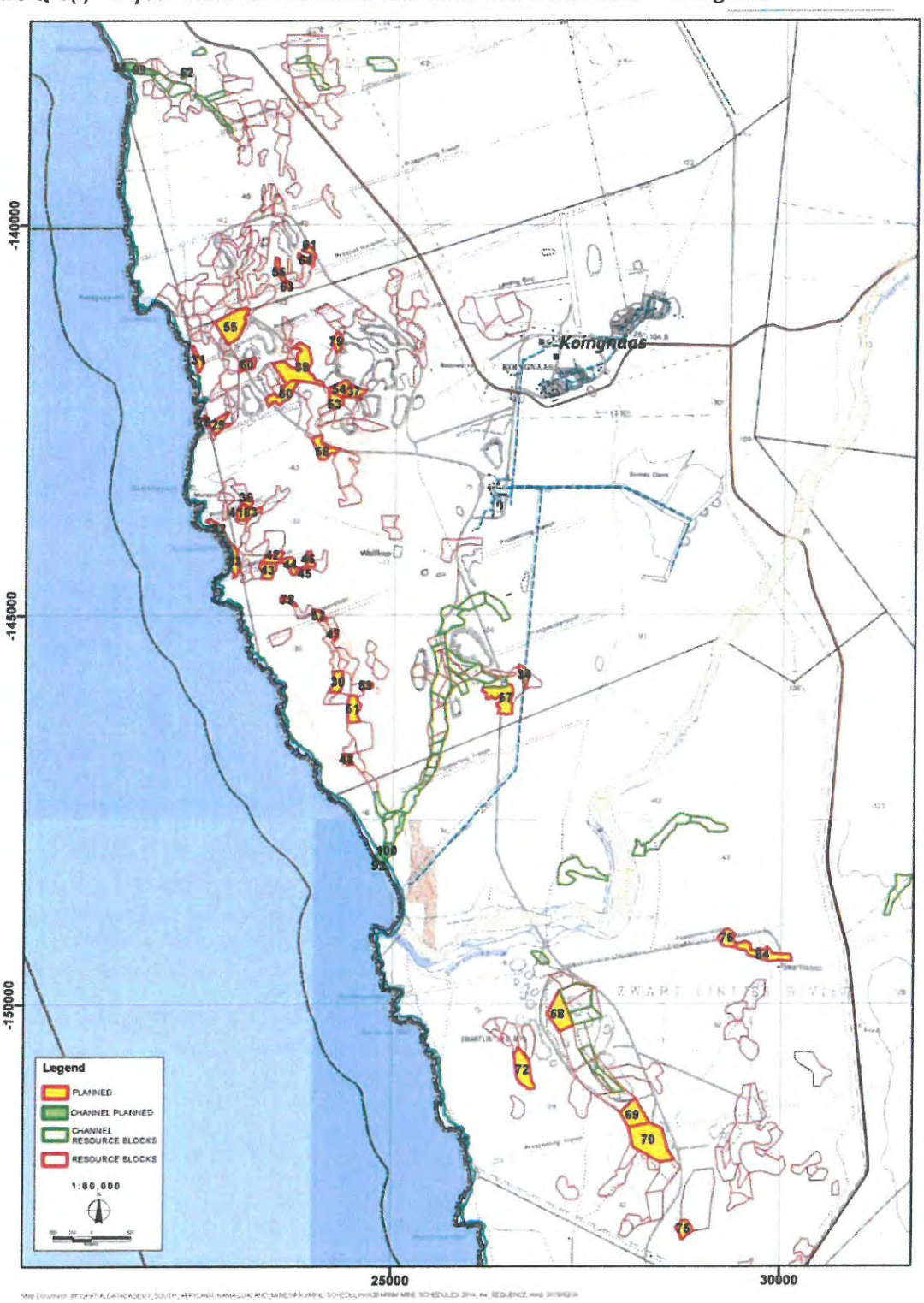


Figure Q-C(ii)– 7-year Mine Plan extent of identified new mine blocks – Michells Bay

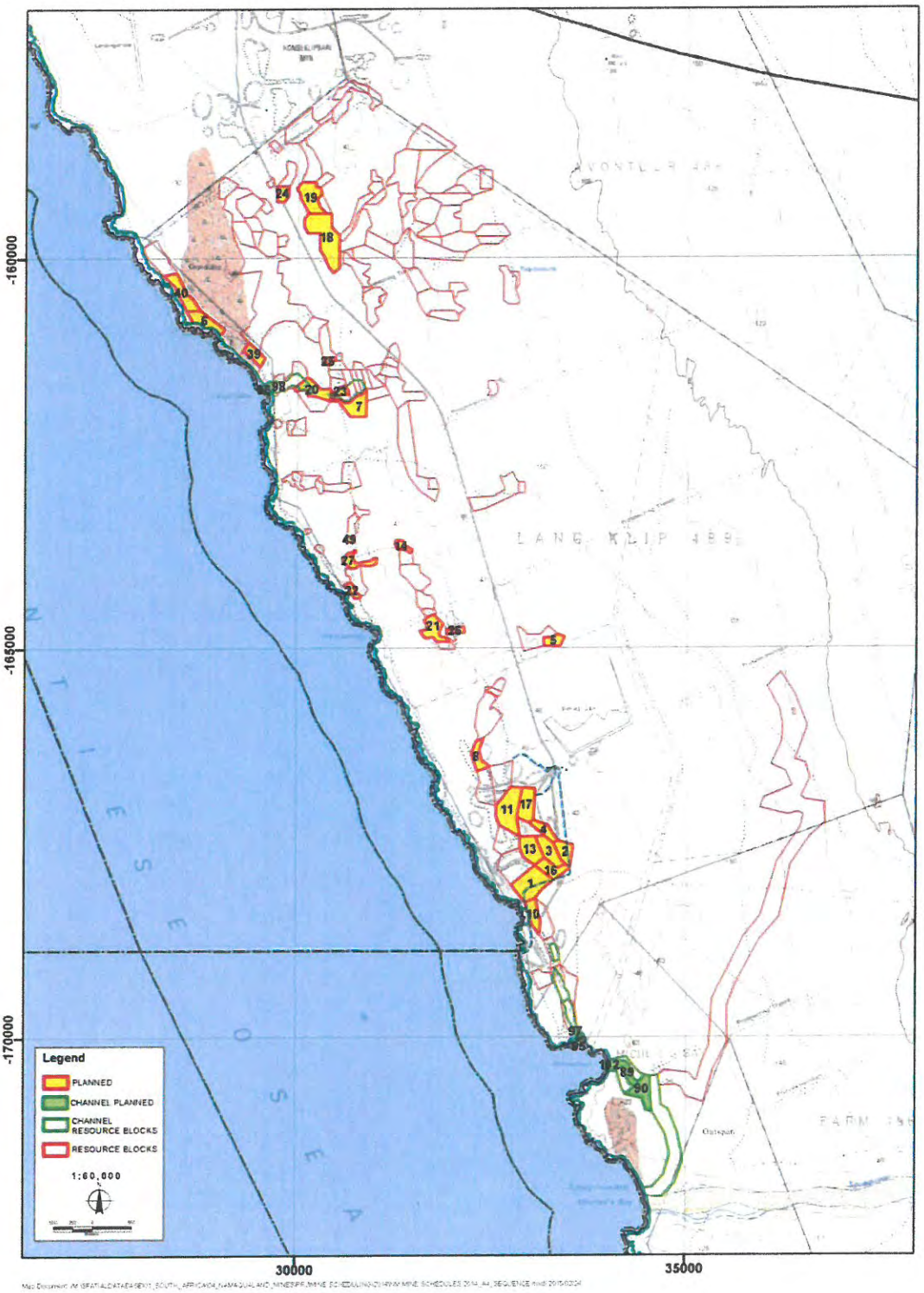


Figure Q-D – Example of gross new mining blocks (yellow) less existing disturbance areas = Nett Mining Area (virgin area to be disturbed (green))

Table Q-3 – New mining disturbance Area calculation

BLK_NAME	MW_Code THROUGHPUT	Gross Area of Mine Block Area_1	Mine_Area	Nett Virgin Area Area	All_distur	% Natural vegetation new disturbance
LK_LK_08	1	133312	MB	0	Yes	0.00%
LK_LK_11	2	51654	MB	7576	No	14.67%
LK_LK_12	3	71127	MB	21960	No	30.87%
LK_LK_10	4	40243	MB	1509	No	3.75%
LKC10-1	5	30935	MB	0	Yes	0.00%
LK_R1C	6	56841	MB	0	Yes	0.00%
LKC1-2E	7	72354	MB	48184	No	66.59%
LK_LK_02	8	43645	MB	0	Yes	0.00%
LK_LK_18	10	47786	MB	0	Yes	0.00%
LK_LK_05	11	138631	MB	0	Yes	0.00%
LK_LK_13	13	80492	MB	6524	No	8.11%
LKC-16	14	17699	MB	0	Yes	0.00%
LK_LK_14	16	56985	MB	0	Yes	0.00%
LK_LK_09	17	82020	MB	0	Yes	0.00%
LK_N10-2	18	187508	MB	0	Yes	0.00%
LK_N10-3A	19	92271	MB	0	Yes	0.00%
LKC1-3	20	63782	MB	0	Yes	0.00%
LKC6-1	21	63144	MB	5632	No	8.92%
LKC5-2	22	16406	MB	0	Yes	0.00%
LKC1-2B	23	18678	MB	0	Yes	0.00%
LK_N15	24	28126	MB	22751	No	80.89%
LKC1-8	25	9489	MB	4091	No	43.11%
LKC6-3	26	14505	MB	5987	No	41.28%
LKC5-3	27	39782	MB	13656	No	34.33%
KN_1140R	28	5504	KNR	4227	No	76.80%
KN_15A	29	33816	KNR	5553	No	16.42%
KN_27C	30	32196	KNR	21929	No	68.11%
KN_3R	31	18569	KNR	10163	No	54.73%
KN_R7	32	22354	KNR	8134	No	36.39%
KN_R8	33	25996	KNR	0	Yes	0.00%
KN_6869_17	34	20960	KNR	10128	No	48.32%
KN_7-1	36	12051	KNR	0	Yes	0.00%
KN_9882_20	37	29754	KNR	13191	No	44.33%
KN_41A	38	141458	KNR	0	Yes	0.00%
LK_L1D	39	38281	MB	29213	No	76.31%
LK_R1A	40	69323	MB	8393	No	12.11%
KN_11	41	19729	KNR	12574	No	63.73%
KN_14	42	25853	KNR	2289	No	8.85%
KN_15	43	34351	KNR	4882	No	14.21%
KN_17-1	44	23278	KNR	9708	No	41.70%
KN_17-2	45	3275	KNR	0	Yes	0.00%
KN_18-1	46	17046	KNR	0	Yes	0.00%
KN_20-1	47	6734	KNR	1845	No	27.40%
KN_25B	48	13139	KNR	5195	No	39.54%
LKC-15	49	7242	MB	0	Yes	0.00%
KN_41B	50	53891	KNR	6474	No	12.01%
KN_26	51	46341	KNR	19493	No	42.06%
KN_19-1	52	14480	KNR	8549	No	59.04%
KN_9882_21	53	26621	KNR	0	Yes	0.00%
KN_9882_24	54	33124	KNR	23104	No	69.75%
KN_KLNA_02	55	109905	KNR	29850	No	27.16%
SN_16	56	15108	KNR	9138	No	60.48%
KN6869_17-1	57	85371	KNR	7911	No	9.27%
KN_51	58	48310	KNR	35545	No	73.58%
KN_27	59	11885	KNR	0	Yes	0.00%
KN_KLNA_06	60	22768	KNR	0	Yes	0.00%
SN_17	61	11699	KNR	4740	No	40.52%
SN_78_7	62	5154	KNR	0	Yes	0.00%
SN_SN_16	63	4978	KNR	0	Yes	0.00%
SN_SN_17	64	12572	KNR	0	Yes	0.00%
SL__20_05	68	88055	KNR	30067	No	34.15%
SL__20_09	69	76495	KNR	0	Yes	0.00%
SL__20_10_A	70	176956	KNR	2800	No	1.58%
SL_4-1	72	80824	KNR	9378	No	11.60%
SLS_14	75	32035	KNR	2837	No	8.86%

SLS_15	76	36960	KNR	1638	No	4.43%
SN_78_R2	77	13416		13416	No	100.00%
KN_16-1	78	10414	KNR	0	Yes	0.00%
KN_9882_29	79	20969	KNR	0	Yes	0.00%
KN_7-2	83	19731	KNR	14276	No	72.35%
SLS_19A	84	75222	KNR	73363	No	97.53%
	TOTAL	3191608	m^2	577873	m^2	
		319.1608	ha	57.7873	ha	

Gross area of new Mining Blocks	319.155ha	
Nett new virgin area disturbance	57.789ha	18.11%
Area of existing disturbance in new mine blocks	261.366ha	

Note that these areas in report R3 derive from the recalculation of 24 August 2015, with a corrected georeferenced overlay.

Calculation of the Quantum in respect of new mining areas

CALCULATION OF THE QUANTUM
WCR NEW MINING

Applicant : WCR
Evaluator: Site Plan Consulting
Reference :

Location:
Date: 29-07-2015

Environmental Parameters	
Risk Class	C
Area sensitivity (Previously Mined)	Low
Area sensitivity (virgin Disturbances)	Medium
Nature of terrain	Rugged
Proximity to Urban Area	Remote

Comment:

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master rate(2015)	Multiplication factor	Weighting factor 1	Amount (rands)
1	Dismantling of **processing plant and related structures** (including overland conveyors and powerlines)	m3	0	R12.95	1.00	1.20	
2(A)	Demolition of **steel buildings and structures**	m2	0	R180.34	1.00	1.20	
2(B)	Demolition of **reinforced concrete buildings and structures**	m2	0	R265.76	1.00	1.20	
3	Rehabilitation of **access roads**	m2	0	R32.27	1.00	1.20	
4(A)	Demolition and rehabilitation of **electrified railway lines**	m	0	R313.22	1.00	1.20	
4(B)	Demolition and rehabilitation of **non-electrified railway lines**	m	0	R170.85	1.00	1.20	
5	Demolition of **housing and/or administration facilities**	m2	0	R360.67	1.00	1.20	
6(a)	**Opencast rehabilitation** including final voids and ramps (of areas previously disturbed and now reworked)	ha	261.34	R189,068.50	0.04	1.20	2,371,699
6(b)	**Opencast rehabilitation** including final voids and ramps (Virgin Areas now to be mined)	ha	57.79	R189,068.50	0.52	1.20	6,817,874
7	Sealing of **shafts, adits and inclines**	m3	0	R96.81	1.00	1.20	
8(A)	Rehabilitation of **overburden and spoils**	ha	0.00	R126,045.66	1.00	1.20	
8(B)	Rehabilitation of processing waste **deposits and evaporation ponds (basic salt-producing waste)**	ha	0.00	R156,987.60	1.00	1.20	
8(C)	Rehabilitation of processing waste **deposits and evaporation ponds (acidic, metal-rich waste)**	ha	0.00	R455,966.40	0.51	1.20	
9	Rehabilitation of **subsided areas**	ha	0.00	R105,544.26	1.00	1.20	
10	**General surface rehabilitation**	ha	0.00	R99,849.43	1.00	1.20	
11	**River diversions**	ha	0.00	R99,849.43	1.00	1.20	
12	**Fencing**	m	0	R113.90	1.00	1.20	
13	**Water management**	ha	0.00	R37,965.56	0.17	1.20	
14	2 to 3 years of **maintenance and aftercare**	ha	0.00	R13,287.95	1.00	1.20	
15A	Specialist study (EPA)	Sum	1.00		1.00	1.20	
15B	Specialist studies	Sum			1.00	1.20	
						SubTotal 1	**9,189,573**
1	Preliminary and General	6.0% if Subtotal 1 > 100 000 000 12.0% if Subtotal 1 < 100 000 000					1,102,749
	Final P&G's	Weighting factor 2				1.10	1,213,024
2	Contingency	10% of sub total one					918,957
						SubTotal 2 (Sub Total 1 plus sum of P&G's and Contingency)	**R11,321,554**
						Add Vat (14%)	1,585,018
						TOTAL (Subtotal 2 plus VAT)	R12,906,572

D. Planned Coffer Dams

Background

Coffer dam mining including mining of the adjacent beach has been introduced as a mining method in the July/August Mining Works Programme update for the WCR.

This R3 revision incorporates inputs possible from the WSP updated report dd 21-08-2015.

The coffer dam planning, site location, and marine engineering design as well as the EIA for the coffer dam programme is however still currently in progress of formulation and consequently this quantum assessment in respect of coffer dams is based on "best possible assumptions" regarding:

- Siting of coffer dams for costing
- Selection of preliminary design options regarding the method of construction (which accordingly directly affects rehabilitation method and costing)
- Number of coffer dams to be developed and rehabilitated within a 5-7 year mining programme.

As background it is noted that the overall programme for coffer dams consists of:

(i) 3x large coffer dam mine blocks at:
- Rooiwal Bay
- Koingnaas 68/69 Beach site; and
- LKC 1E Ext site; and

(ii) 63 smaller potential beach zone coffer dams located in 4 areas of the coastline, each containing between 6 and 26 contiguous coffer dams.

In light of the above, in order to determine a preliminary Rehabilitation Quantum Value the following assumptions are made:

(a) Within the first 5-7 year phase, the coffer dam programme will consist of:
- 1x large coffer dam chosen for calculation as the Rooiwal Bay enclosure; and
- 3x smaller coffer dams developed contiguously

(b) Of the construction method options offered in the WSP Coastal and Port Engineering Draft Report dd 29-07-2015:
- The preliminary option for Rooiwal Bay with the dynamic sea wall, reflecting a 660m long "*dynamically stable berm*" sea wall, with a minimum rock volume of 660 000m^3 required, is chosen as an appropriate large coffer dam site for rehabilitation costing, (Refer WSP Figure 5.5 "Layout and Section for dynamically stable berm for closure of Rooiwal Bay").

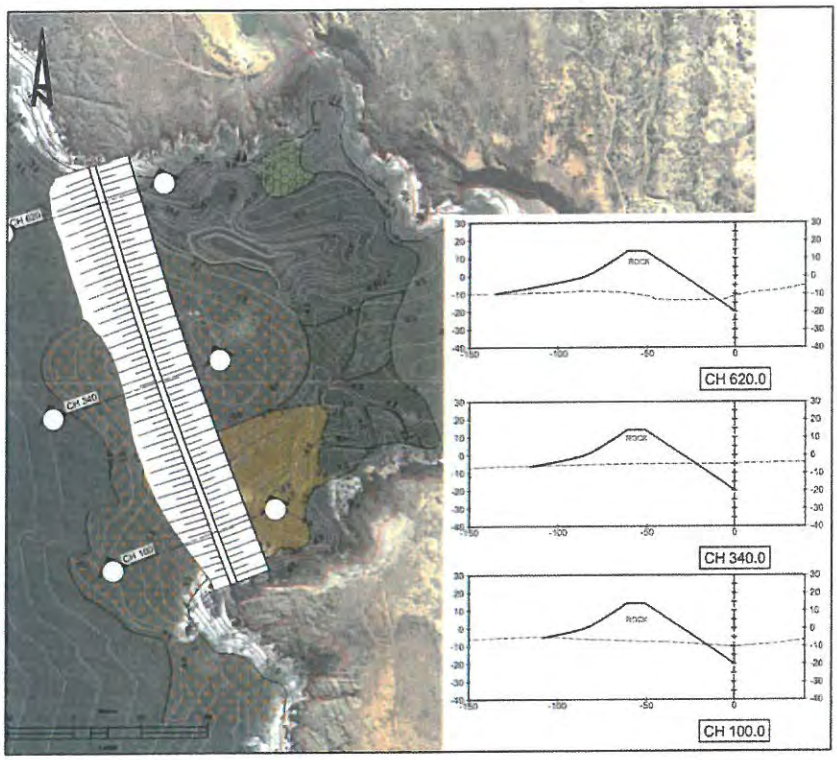
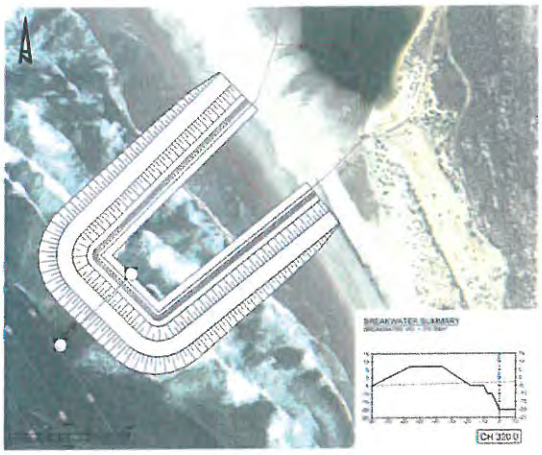


Figure 5.5: Layout and section for dynamically stable berm for closure of Rooiwal Bay

- Preliminary option discussed in WSP Chapter 6 for rock berm protection of smaller coffer dams and chosen in this instance to be best represented by their Stage 3 Mining to 200m seawards of the high water mark (ie 200x200m coffer dam)(as shown in WSP Report Figure 6.1 Stage 3), but developing 3 such coffer dams contiguously.



(c) The WSP 21/08/2015 update report gives the rock volume required for a Stage 3 (200x200m) coffer dam to be 21 000m^3, with 1:2 outer wall slope, 1:1.5 inner wall slope and a 1om wide wall crest, as per their Chapter 6 method.

(d) In addition to the removal of rock from a mined out coffer dam wall, the quarry from which the rock used in the coffer dam construction is sourced must be rehabilitated.

In this regard it is most likely that such rock source quarry will be blasted in an existing exposed mine block floor. If developed to 10m depth for providing 660 000m^3 per initial coffer dam, this will yield a quarry size of 256x256m perimeter, with a face backfill slope to 1:1.5 requiring 75 502m^3 of overburden backfill in rehabilitation

Rehabilitation costing calculation

a) **Coffer dam wall "removal"(height reduction by dozing)**

This revised report R3 adopts coffer dam wall rehabilitation by:
"reducing the berm crest by dozing it landwards and allowing natural erosion to redistribute the rock on the sea bed " As per WSP 21/08.

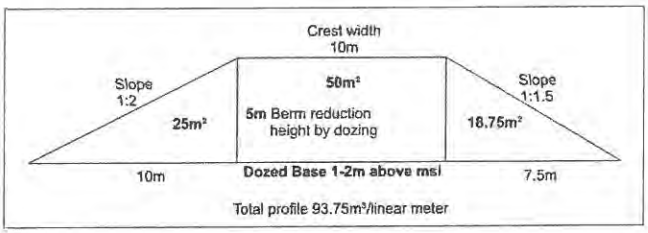
This dozing method is chosen to replace the loading and hauling of rock from the walls for reuse as the large individual coffer dams are distant from other coffer dams where the rock could be reused. Given the use of smaller diameter rock the coffer dam wall will be relatively unstable by its end-of-life and would not permit ease of excavator and dump truck operation for recovery of rock.

Both profiles have the following parameters:

- Wall crest width 10m
- Outer wall slope 1:2
- Inner wall slope 1:1.5

In the volume determination and costing below, the calculation relies on two variations in coffer dam rehabilitation on the assumption that in the large coffer dam construction the wall crest is constructed higher than in the shorter life 200x200m coffer dams (this 4 and 5m elevation change is deduced by SPC from WSP report Table 7.2 "berm crest levels for overtopping rates")(this reduction will no doubt be refined once wall method constructions progress and choices are made).:

i. Rooiwal wall profile (with 5m lowering of wall crest by rehabilitation dozing)

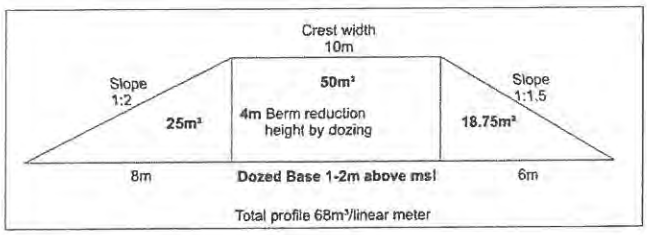


Based on the above profile related to dozing height reduction of 5m and a wall length of 660m at Rooiwal, the total volume to be dozed in wall height reduction is 61 875m^3

Given the rock size, and the difficulty of working on the boulder-constructed wall under sea conditions, a dozing rate of R8.00/m^3 is assumed, yielding a

total cost of wall height reduction by dozing at Rooiwal to be R495 000.00 (at a dozing rate of R7/m³ the cost would be R433 125.00)

ii. 200x200m coffer dam profile (with 4m lowering of wall crest rehabilitation dozing)



Based on the above profile related to dozing height reduction of 4m and a wall length of 600m, the total volume to be dozed in wall height reduction is 40 800m³

At the dozing rate of R8.00/m³ assumed, this yields a total cost of wall height reduction by dozing to be R326 400.00 (at a dozing rate of R7/m³ the cost would be R285 600.00)

For this initial reporting on dozing cost we assume the higher R8.00 rate and its associated cost.

b) Rock Source Quarry rehabilitation

Having determined in (d) above, the backfill volume to at minimum make the 10m perimeter faces safe and stable to be 75 502m³, the application of an overburden load, haul and tip rate of R15.05 yields a basic quarry rehabilitation cost to be **R 1 136 305.10** (without direct backfill from any adjacent new mining as a credit)

Quantum Provision for coffer dams under the above assumptions

In light of the above, in order to meet the minimum rehabilitation provision for the identified 5-7 year programme, the following rehabilitation funding is required:

Table Q-5 – Coffer Dam Data

Operation		Cost
Rehabilitation of Rooiwal dynamically stable berm crest dozing rehabilitation cost	R	495,000.00
Rehabilitation of the initial contiguous coffer dam wall crest reduction dozing	R	326,400.00
Rehabilitation of 2nd and 3rd coffer dam's wall removal in contiguous row at 60% of total cost (R326 400x2, at 60%)	R	391,680.00
Rehabilitation of 3x rock source quarries	R	3,408,915.30
Subtotal minimum variable cost	***R***	***4,621,995.30***
Management (2.5%)	R	115,549.88
P&Gs (5.0%)	R	231,099.77
Contingency (15%)	R	693,299.30
Total Coffer Dam Rehabilitation	**R**	**5,661,944.24**

While it is likely that a combination of rock recovery together with dozing will be conducted at contiguous coffer dam developments, the feasibility and percentage rock recovery is not sufficiently known at this stage to allow costing for this eventuality.(which cost will be offset by the saving in fresh rock quarrying)

3. JULY/AUGUST 2015 QUANTUM PROVISION

Table Q-6 – Summary Table

Aspect	Total per item (excl. VAT)
Pre-WCR Mining Earthworks disturbances and other specific items	**R 45,465,193.96**
Buildings demolition costing	R 3,590,088.79
Quantum in respect of new mining areas	R 11,321,554.00
Quantum Provision for coffer dams under the above assumptions	R 5,661,944.24
TOTAL (Including P&Gs, Contingencies, Management Fees) (Excluding VAT)	***R 66,038,780.99***

Annexure A:

The Methodologies Used For Rehabilitation Costing

5.0 SPC: TO INDUSTRY STD; PERSPECTIVE ON END USE, LEVEL OF RESTORATION AND METHODS CHOSEN IN REHABILITATION

5.1 SPC: to Industry Std; Perspective on End Use and General Level of Rehabilitation

The following position of SPC: to Industry Std; in respect of most aspects of rehabilitation takes it cue from the assessments in Chapters 2.1 & 2.2 of the 2000 EMPR and 2011 EMP's which underlie SPC: to Industry Std; perspective on post-mining land use (and reflects the THG perspective):

(i) That it is too optimistic and unrealistic to return the coastal strip (heavily disturbed mining zone within the sea-spray belt and highly impacted by high levels of natural wind-blown sand migration) to grazing of any significant status and this end-use should best be defined as Wilderness Use, with this portion of the NM land complemented by proper small-stock farming on the good retained veld inland and game farms and conservation areas on other well-preserved areas.

(ii) That especially coastal sites on attractive bays and promontories be identified as tourist/resort nodes as contemplated generally in the Land Use Plan Zones to be refined by THG with appropriate elevated levels of rehabilitation surrounding these nodes (as contemplated at Alexkor).

(iii) That existing road infrastructure network be identified and retained for post-mining use.

(iv) With respect to the retention of urban infrastructure, and the onus which the 2011 EMP's seek to place on the company in respect of creating sustainability for the towns of Kleinzee and Koingnaas and for creating the tourism nodes, the industry (as discussed in para 2.2.6 of this CPR) cannot accept creating such sustainability but undertakes to do whatever it can to promote NGO's and Government Agencies in fulfilling this role.

(v) With respect to dust, it is important to note that SPC holds the view that there is a realistic risk that full dust control will not be achievable through revegetation within the closure period and that post-closure dust will be a feature **until time reinstates sufficient natural vegetation to reduce dust to near ambient levels** (which in any event are high in this West Coast area). In light of DMR dealing with the various Mining Right Areas individually this dust consideration may be of lesser importance since it primarily relates to only the BMC.

(vi) SPC: to Industry Std; also require to achieve agreement with DMR in terms of buy-in by DMR and by the relevant existing communities and also to place restriction on future communities (associated with new mariculture farms and tourist nodes in respect of potential "civil liability claims" against the company in respect of such post-closure residual dust levels).

(vii) Regarding the key element of revegetation and its dependence on correct soil selection and climatic cycles, the achievement of post-miming dust control must be qualified by the 2000 EMPR acknowledgement of the success of revegetation being affected by:

- scale of disturbance

- climatic elements (low rainfall periods and high wind incidence)
- chemical and physical characteristics of the soils despite efforts which must be undertaken through trials to limit this risk on revegetation

SPC: to Industry Std; therefore seek that the EMP's in respect of revegetation should specify a range of levels of revegetation achievement commensurate with different areas in NM and qualify these ranges against the negative factors identified in the 2000 EMPR which sought only to "assist natural revegetation".

SPC: to Industry Std; as basic point of departure undertakes to include **all areas** (including pre-1980) within the context of "making safe and non polluting).

In respect of pre-1980 areas this includes:

- sloping highwalls
- rounding dumps and backfills to reduce wind erosion and dust generation
- promoting natural revegetation at levels applicable to the soils available and risk of blow-outs determining the level of appropriate intervention in these areas,

in all areas where the above has not yet occurred.

5.2 SPC: to Industry Std; Rehabilitation Methods chosen for each of the Listed Disturbances/Facilities Costed in Chapter 6

Note that final surface treatments such as netting and revegetation are considered as general items applied to all rehabilitation areas and not listed within the following activities:

(a) Overburden Dumps

(i) Backfill where appropriate.

- mainly partial backfill by load, haul and tip as especially in the dragline area and rounding of remnant dumps then applied to 1:3 slopes

(ii) Full rounding of dumps to 1:3 slope inclusive of smooth rounding of the central dump top applied to 50% of the dump area.

(iii) Shoulder rounding of flat dumps with perimeter sloping from angle of repose to 1:3.

(iv) Surface remedial treatment of rounded but significantly eroding dumps.

(b) Face Edge (highwall) Sloping (refer Plate 2, page 7)

All faces of excavations and sides of trenches to be sloped to 1:3 (excluding shallow trenches in isolation where natural revegetation is already well advanced.

Sloping to be preceded by doze-back of topsoil adjacent to the face edge and subsequent re-dozing of the topsoil over the dozed face slope. Such face edge sloping is to be conducted on all steep cuts inclusive of high walls from palaeo cliff mining in BMC north-east, dragline faces, excavation edges of mine blocks and high trench edges.

(c) Back-fill Edge Sloping

This involves sloping all backfilled edges (angle of repose slopes) as seen in plate 2, from angle of repose to 1:3 slope and similar to face edge sloping costed with a variable cost of dozing in proportion to dozing distance which derives from face height or backfill slope height (the sloping of face edges and backfill edges in (b) & (c) largely contributes to Mine Block floor cover).

(d) Smoothing of Dumped Areas

All areas where material has been dumped or where especially dozing activities have left an undulating surface, such areas are identified for smoothing by dozer in three categories:

- smoothing of rough areas (SRA's) (undulations greater than 3m)
- smoothing of medium undulating areas (SMA's) (undulations 1,5-3m)
- smoothing of dumped areas (SDA's) (tipper truck dumps)

(e) Topsoil Recovery and Re-topsoiling of Sloping

Where sloping of faces (highwalls) (b) above and backfill (c) above, adjacent natural vegetation and topsoil is to be back-dozed in a strip proportional in width to the height of the treatment feature with dozing to 0,3-0,5m deep to a temporary berm. Such dozing to include the occurrence of topsoil berm immediately above many of the later dated cut faces where topsoil stripping of the excavation retains the topsoil in these berms which to date have also acted as safety berms.

Upon completion of the slope dozing, the topsoil is to be replaced by dozing over the 1:3 slope to minimum 100mm deep (note: that despite the 300-500mm target depth, the achievement of this depth is subject to the inspection of suitability of the soil to such depth to serve a growing medium.

(f) Fine Residue (tailings) Dams (FRD's)

(i) Cover surface of dams after drying with coarse tailings from adjacent coarse tailings dumps assessed to have low ore-grade or with material already re-processed) to a depth of 150-200mm average 175mm as soon as dumps have dried sufficiently to carry equipment (avoiding loss of dozers by solfluction of the slimes by especially dozer vibration). Interim netting should be applied to control dust generation during the drying period.

(ii) Shape perimeter walls of FRD's to 1:3 to permit similar armouring (cover with coarse tailings as above).

(iii) Provide FRD walls with basic outer paddock to catch seepage water and prevent such saline water spreading into the veld.

(g) Plant Area Rehabilitation

As all processing plants are determined to be demolished to floor level by a demolition contractor (as per current Jet Demolition Contract) (at "no" cost to the Mine given sale of equipment/scrap by the contractor) the only additional works include to the following:

(i) Cover of remaining reinforced concrete foundations and floors with 1m deep coarse tailings to the DBNM EMP spec of "retaining concrete foundations below -1m below final ground level".

(ii) Demolish reinforced concrete retaining walls of the primary hopper ramps to retain the lower 50% of current height above ngl which will be covered by the rounding of the ramp perimeter as costed as a backfill edge sloping.

(iii) Ripping of the general compacted areas surrounding the plants and promoting revegetation by netting and seeding (with light topsoiling if locally available).

(iv) Providing a basic interim paddock around the perimeter of the CRD's to trap fines washed from the toe of the dumps. Such paddock may be later upgraded if still in place post re-processing of the dump.

(h) Roads

The main spine road and access roads to future farming portions, sea-water pumps, probable mariculture sites will be retained.

Other layered roads will be grader-ripped prior to the grader blading the roadside topsoil berm back over the road surface to provide target of 20-50mm topsoil over the ripped road surface. Such treated roads will be netted with seeding to promote revegetation (this method is adopted in Alekxor EMP in response to observations over 10 years of the varied rehabilitation success achieved on the closed old salt road between Port Nolloth and Alexander Bay as well as from observations of the varied success achieved in the THG Honde Klip Bay rehabilitation of roads.

Tracks will be lightly scarified by tractor and "grop" to promote seed entrapment.

Closure of such rehabilitation sections by signposting and placement of drums, rocks or berms must complement the above.

(i) Netting and Seeding as Promoting Natural Revegetation

Given the distinct contribution which netting makes to reducing the wind speed to reduce sand movement and seed loss as well as plant attrition, the advantage of netting in promoting and hastening the revegetation process prompts it to be included by provision in this CPR costing for a further 900ha of netting over the next 10-years in addition to the current netted area of 800ha plus the re-use from the 800ha of existing netting for a further 250ha in the first 10-years.

Revegetation promotion is contemplated by SPC: to Industry Std; as consisting of seed collection, processing and broadcasting at an average rate of 50kg seed/ha.

This specification will be reviewed in light of results achieved in current trials (current 800ha) and further adapted locally for increased intervention in areas justified in terms of the Land Use Zone Categorization and later THG identified coastal nodes.

5.3 Determination of Extent of Disturbances and Costing Methods Applied (to be read with Tables in Annexure A)

(a) Overburden Dumps

(i) Dragline dumps (refer Photo Page 5 for illustration of calculation basis)

- GIS measured height (or manual estimate from slope width measured x repose angle to determine height in areas not covered by Lidar

contours) and then calculated for volume by cross-section area per cross-sectional shape of dump in 4 categories (namely; "single ridge and cross-ribbed dump of; 20, 30 or 40m wide ribbed ridge") to determine volume; m^3/linear m.

- GIS measured length of dump to determine dump volume.

To determine the volume of material to be dozed or hauled from such dragline dumps (from the total volume) the dragline dumps are classified either:

- in excavation floors where the dump volume from the dump base to level of surrounding ngl is deducted as it already constitutes fill and only the "above ngl" volume of the dump is identified for dozing in shaping.
- on edge of excavations where the full dump is identified for transfer to the adjacent excavation by dozing at the dozing/sliding scale of unit cost proportional to distance; and
- away from excavations where the dump is costed by load, haul and tip to the excavation.

(ii) Other: Articulated Dump Truck (ADT) generated overburden dumps with angle of repose sloped circumferences.
Volumetric determination for dozing is by GIS determination of height and perimeter and application of the same cut-to-fill calculation method as per backfill sloping to 1:3 with additional provision for smoothing the centres of rough topped dumps to the smoothing rates applicable in (d) hereafter.

(b) Face Edge (highwall) Sloping by Dozing

- GIS measured length and height per uniform sector of each face
- volume calculated as per cut-to-fill sloping to 1:3 for m^3 determination
- dozing costs calculated at sliding-scale dozing rate proportional to 1:3 slope length x 75% and applied to cut-to-fill volume by excel formula
- pre-sloping back-dozing and subsequent replacement dozing of topsoil on the slope is determined from the slope length and the width of back-dozing strip which is proportional to the face height by the 1:3 sloping factor to determine dozed topsoil volume over that distance at the sliding-scale of dozing of topsoil and replacement dozing over the slope. A target 300-500mm topsoil removal depth and minimum 100mm replacement topsoil target is set.

(c) Backfill Edge Slope Dozing

- volumetric calculation as per the methodology of face sloping cut-to-fill determined from height and 1:3 angle but with the volume/linear m being determined by the angle of repose to 1:3 sloping and then multiplying by the length of slope for m^3 dozing

(d) Smoothing of Dump and Undulating Disturbed Areas
The areas are categorized by the undulation height differences within the area giving m^3 dozing requirements to smooth and applying the dozing rates/m^3 which yield the following classification and rate/ha for smoothing:

- SRA's (smoothing rough undulating areas greater than 3m areas) (category not applied to date in DBNM)
- SMA's (smoothing of moderate undulating areas) (undulations 1-3m by dozing, R70 000/ha)

- SDA's (smoothing of dumped areas) (close-spaced dumps by ADT's to be smoothed by grader or dozer, R20 000/ha).

(e) Topsoil Removal and Re-topsoiling of Sloping

- volumetric calculation based on back-dozing distance proportional to face height and 1:3 slope applicable.
- rates are applied at sliding-rate proportional to distance for topsoil dozing.

(f) Fine Residue (Dumps) Dams (FRD's)

- volumetric determination for **surface cover** is by GIS measurement of identified area of dump surface to be covered x average 175mm cover depth
- costing provides for load, haul and tip and spreading of the tipped material while an overhaul rate of R3.00/m³ km is applied beyond 500m from the source. Load haul and tip at R10.47m³ to 500m radius from source).
- **shaping of the outer slope of the FRD walls** by dozer is calculated by cut-to-fill volume/linear m proportional to height sloped to 1:3 x length of uniform wall sectors
- **cover rate for sloped walls** with coarse tailings to the required volume to cover these slopes as per the dump cover is then applied at same load, haul, tip & smooth rates as for surface cover
- the volumetric input to CRD wall **paddocks** is based on dozing 5m³ to a berm/linear m of FRD perimeter wall

(g) Plant Areas

- volume for cover of nett. plant footing and remnant foundation areas by 1m deep coarse tailings is calculated from GIS measurement of nett plant area with applied load, haul and tip rate and smoothing of such cover
- additionally, a gross compacted area around the plants is determined from GIS and a rate/ha for light ripping and seeding is applied
- costing for the provision of the interim coarse tailings paddock is by dozing rate of 5m³ of material/linear m of dump perimeter
- demolition of the primary ramp retaining wall to 3m above ground level with burial of such demolished material in a selected nearby deep excavation prior to cover based on a best estimate of such concrete volume from site photographs and GIS length measurement with commercial reinforced concrete demolition rate applied (R500.00/m³)

(h) Roads

Given further intended use of the roads and until a THG Mine Plan including identification of development nodes is prepared, only a **provisional sum** is provided for road grader-ripping and topsoiling (back-blading) based on experience from the Alexkor calculation to serve this CPR.

(i) Netting

The extent of netting is an estimate from the aerial photographic review of likely intervention areas and set at 900ha in addition to a further 250ha re-use of currently existing net from the existing 800ha to date.

The netting and seeding cost per ha are taken from current costing at DBNM with halving of the seeding rate as the seeding rate per ha of 100kg used at DBNM is considered high. Other contractors have indicated a lower new netting rate but then they advocate a lower percentage re-use rate after 3 years. Accordingly the rates of

R21 000/ha for new netting in the first 3 years followed by a saving of R9 000/ha in the following two 3-year periods within the 10-year lifespan of netting are applied in this CPR.

Seeding costs are applied at a unit rate of R11 000/ha at 50kg/ha.

(j) Provisional amounts are allocated to the following tasks without measurement:

- waste site rehabilitation/closure
- asbestos management (over and above Jet Demolition's contract for plant removal and associated building removal)
- hydro-carbon decontamination

West Coast Resources

MYEZO ENVIRONMENTAL MANAGEMENT SERVICES

Environmental Stewardship

WEST COAST RESOURCES-KOINGNAAS AND SAMSONS BAK COMPLEXES-ENVIRONMENTAL IMPACT ASSESSMENT

ENVIRONMENTAL IMPACT ASSESSMENT REPORT SUBMITTED FOR ENVIRONMENTAL AUTHORISATIONS IN RESPECT OF AN AMENDMENT OF A MINING RIGHT HELD BY WEST COAST RESOURCES (PTY) LTD, OVER THE KOINGNAAS AND SAMSONS BAK COMPLEXES

Document Name: WKSCE-Reports-Environmental Impact Assessment Appendices 1-h-7 and Appendix I

Document Status: Rev.1

Volume 3 (Public participation and supporting documentation: Appendices 1-to Appendix h-4.1.1.1

Volume 3 of 4
PART A

Date: 21 November 2016

Myezo Ref: WKSCE/2015/02/EIAr
DMR Ref: NC0043-MR/102 and NC0044-MR/102

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WEST COAST RESOURCES-KOINGNAAS AND SAMSONS BAK COMPLEXES-ENVIRONMENTAL IMPACT ASSESSMENT

INDEX FOR SUPPORTING DOCUMENTATION AND RESULTS OF PUBLIC INVOLVEMENT FOR THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT SUBMITTED FOR ENVIRONMENTAL AUTHORISATION, IN SUPPORT OF AN AMENDMENT TO MINING RIGHT, HELD BY WEST COAST RESOURCES (PTY) LTD, OVER THE KOINGNAAS AND SAMSONS BAK COMPLEXS

Document Name: WKSCE-PI-EIA -PI-Index for supporting documentation and results of public involvement for the Environmental Impact Assessment report (EIAr)

Date: 21 November 2016

Myezo Ref No: WKSCE/2015/02/EIA

DMR Ref No: NC0043-MR/102 and NC0044-MR/102

VOLUME 3 OF 4: PART A

Figure (d) (ii) - 11: Scheduled mine block depletion for the Koingnaas Complex – Michelle's Bay - Langklip area

Figure (d) (ii) - 12: Potential mine blocks (coffer dam location) for the NP (Noup) - Beach Zone on Noup

Figure (d) (ii) - 13: Potential mine blocks (coffer dam location) for the VB (Visbeen) - Beach Zone on Somnaas and Koingnaas

Figure (d) (ii) - 14: Potential mine blocks (coffer dam locations) for the KN (Koingnaas) - Beach Zone in the northern part of Koingnaas

Figure (d) (ii) - 15: Potential mine blocks (coffer dam location) for the KN_F7_Ext (6869-Channel Extension) - Beach zone on Koingnaas

Figure (d) (ii) - 16: Potential mine blocks (coffer dam location) for the LKC (Langklip) - Beach in the central part of Langklip

Figure (d) (ii) - 17: Potential mine blocks (coffer dam location) for the LK (Langklip) - Beach Zone the southern part of Langklip

Appendix e-1: Applicable legislation

Appendix h-1–h-7: Public involvement appendices (Adverts, site notices, IAPR register, communication to and from stakeholders, minutes, information sharing)

- Appendix h-1: Advert
  - Appendix h-1.1: Proof of publication
  - Appendix h-1.2: Print out of how it looks like
- Appendix h-2: Site Notice
  - Appendix h-2.1: Photos of proof
  - Appendix h-2.2: Print out of how it looks like
- Appendix h-3: IAP register
- Appendix h-4: Communication with Stakeholders
  - Appendix h-4.1: Communication to Authorities
    - Distribution List for Scoping and EIA reports
    - ✓ Appendix h-4.1.1: Correspondence regarding meetings and other general matters
    - ✓ Appendix h-4.1.1.1: DENC
      - Meeting requests and confirmation in the form of email and/or a letter
      - Scoping and EIA report submission and other related matters