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Heritage Impact Assessment

Heritage Impact Assessment for the Proposed Road Upgrade of the Alma-Marakeli road (route P240-1) in the Alma District, Limpopo Province.

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May 2008

Credit Sheet

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Disclaimer; *Although all possible care is taken to identify all sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the study. AINP and its personnel will not be held liable for such oversights or for costs incurred as a result of such oversights.*

SIGNED OFF BY: MARKO HUTTEN

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Management Summary

Site name and location: Proposed road upgrade of the Alma-Marakeli road (route P240-1) from the R33/P240-1 T-junction at Heuningfontein, to Alma, to the P240-1/Kralinge road T-junction in the Alma District, Limpopo Province.

Magisterial district: Waterberg District Municipality

Developer: Road Agency of Limpopo Province (RAL)

Consultant: AINP, PO Box 7296, Thohoyandou, 0950, South Africa

Date development was mooted: March 2008

Date of Report: 21 May 2008

Proposed date of commencement of development: June 2008

Findings: No site-specific actions or any further heritage mitigation measures are recommended as no heritage resource sites or finds of any value or significance were identified in the indicated study areas. The proposed road upgrade of the Alma-Marakeli road (route P240-1) in conjunction with the utilization of the indicated borrow pits can continue from a heritage point of view.

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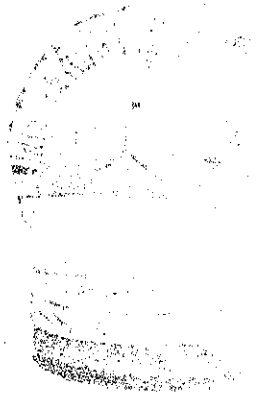

Chapter 1

Project Resources

Heritage Impact Assessment

Proposed road upgrade of the Alma-Marakeli road (route P240-1) from the R33/P240-1 T-junction at Heuningfontein, to Alma, to the P240-1/Kralinge road T-junction in the Alma District, Limpopo Province.

Introduction

Archaeo-Info Northern Province (AINP) was contracted by Mr. Jonathan Okonkwo to conduct a Heritage Impact Assessment (HIA) on the proposed road upgrade of the Alma-Marakeli road (route P240-1) from the R33/P240-1 T-junction at Heuningfontein, to Alma, to the P240-1/Kralinge road T-junction in the Alma District, Limpopo Province.

This HIA forms part of the Environmental Impact Assessment (EIA) as required by the Environmental Conservation Act (ECA) 73 of 1989, the Minerals & Petroleum Resources Development Act, 28 of 2002 and the Development Facilitation Act (DFA), 67 of 1995. The HIA is performed in accordance with section 38 of the National Heritage Resources Act (NHRA), 25 of 1999 and is intended for submission to the South African Heritage Resources Agency (SAHRA).

Qualified personnel from AINP conducted the assessment. The team comprised a Principal Investigator with a minimum of an Honours degree in an applicable science as well as at least five years of field experience in heritage management assisted by a fieldworker with at least a BA degree in an applicable science. All of our employees are also registered members of the Association of South African Professional Archaeologists (ASAPA).

A member of AINP performed the assessment on May 20, 2008.

The extent of the proposed development sites were determined as well as the extent of the areas to be affected by secondary activities (access route, construction camp, etc.) during the development. The sites were plotted using a Global Positioning System (GPS) and photographed digitally. The sites were surveyed on foot and by vehicle.

All results will be relayed in this report, firstly outlining the methodology used and then the results and recommendations for the identified resources.

Proposed Project

The Roads Agency of Limpopo Province (RAL) has proposed a road upgrade of the Alma-Marakeli road (route P240-1) from the R33/P240-1 T-junction at Heuningfontein, to Alma, to the P240-1/Kralinge road T-junction in the Alma District, Limpopo Province. The proposed project will consist of a road upgrade (gravel to tar) and the utilization of 2 identified borrow pits during the project. This road upgrade will cover a stretch of ± 12km of existing gravel roads and each borrow pit will cover an area of approximately 2ha. The purpose of the study was to determine if the proposed areas were suitable for the project from a heritage point of view.

The project was tabled during March 2008 and the developer intends to commence construction as soon as possible after receipt of the ROD from the Department of Environmental Affairs

Project Area

Site co-ordinates: Upgrade Start 24° 27,302 S

28° 09,707 E

Borrow pit # 1	24° 28,108 S
	28° 06,713 E
Borrow pit # 2	24° 30,678 S
	28° 04,087 E
Upgrade end	24° 31,656 S
	27° 55,334 E

The proposed road upgrade project for the Alma-Marakeli road (route P240-1) will start at the T-junction with the R33 tar road (Modimolle/Vaalwater) at Heuningfontein (Photo 1) and will proceed westward and will end approximately 12km further at the T-junction of route P240-1 and the Kralinge road (Photo 2). The proposed road upgrade (gravel to tar) will follow the existing gravel road and will not deviate from its original course and will pass through the small town of Alma. Most of the route will pass through farmland (Photo 3) with ploughed fields for crops such as maize. The route will also pass through the small rural town of Alma, but will follow the existing roads and bridges (x2) across the Sand River in the town (Photo 4).

2 Borrow pits were identified to be utilised during the project. The proposed borrow pit # 1 was situated next to and on the southern side of the road to be upgraded (Photo 5). It was an existing borrow pit which was to be extended to the south, east and west by approximately 2 hectares. The area to be utilized was situated in between ploughed fields and most of it was disturbed. It was situated on the farm Knopfontein 184 KR.

Borrow pit # 2 was situated next to and on the eastern side of the road to be upgraded (Photo 6). It was also an existing borrow pit which was to be extended to the north, south and east by approximately 2 hectares. This area was mostly undisturbed except for the areas affected by the previous earth moving activities. It was situated on the farm Koppie Alleen 359 KR.

The proposed road upgrade will pass through the farms Boekenhoutskloof 187 KR, Riviersbaken 186 KR, Knopfontein 184 KR, Koppie Alleen 359 KR, Doornkop 361 KR, Klipdrift 468 KQ, Rietvley 300 KQ, Langkloof 285 KQ and Rhenosterfontein 465 KQ. (See Appendix E: Location Map)

Good weather conditions were experienced during the field investigations.

Methodology

Inventory

Inventory studies involve the in-field survey and recording of archaeological resources within a proposed development area. The nature and scope of this type of study is defined primarily by the results of the overview study. In the case of site-specific developments, direct implementation of an inventory study may preclude the need for an overview.

There are a number of different methodological approaches to conducting inventory studies. Therefore, the proponent, in collaboration with the archaeological consultant, must develop an inventory plan for review and approval by the SAHRA prior to implementation (*Dincause, Dena F., H. Martin Wobst, Robert J. Hasenstab and David M. Lacy 1984).*

Site Surveying

Site surveying is the process by which archaeological sites are located and identified on the ground. Archaeological site surveys often involve both surface inspection and subsurface testing. For the purposes of heritage investigations, *archaeological sites* refers to any site with heritage potential (i.e. historic sites, cultural sites, rock art sites etc.).

A systematic surface inspection involves a foot traverse along pre-defined linear transects which are spaced at systematic intervals across the survey area. This approach is designed to achieve representative area coverage. Alternatively, an archaeological site survey may involve a non-systematic or random walk across the survey area. Subsurface testing is an integral part of archaeological site survey. The purpose of subsurface testing, commonly called "shovel testing", is to:

(a) assist in the location of archaeological sites which are buried or obscured from the surveyor's view, and

(b) help determine the horizontal and vertical dimensions and internal structure of a site.

In this respect, subsurface testing should not be confused with evaluative testing, which is a considerably more intensive method of assessing site significance *(King, Thomas F., 1978)*.

Once a site is located, subsurface testing is conducted to record horizontal extent, depth of the cultural matrix, and degree of internal stratification. Because subsurface testing, like any form of site excavation, is destructive it should be conducted only when necessary and in moderation.

Subsurface testing is usually accomplished by shovel, although augers and core samplers are also used where conditions are suitable. Shovel test units averaging 40 square cm are generally appropriate, and are excavated to a sterile stratum (i.e. C Horizon, alluvial till, etc.). Depending on the site survey strategy, subsurface testing is conducted systematically or randomly across the survey area. Other considerations such as test unit location, frequency, depth and interval spacing will also depend on the survey design as well as various biophysical factors. *(Lightfoot, Keng G. 1989)*.

Survey Sampling

Site survey involves the complete or partial inspection of a proposed project area for the purpose of locating archaeological or other heritage sites. Since there are many possible approaches to field survey, it is important to consider the biophysical conditions and archaeological site potential of the survey area in designing the survey strategy.

Ideally, the archaeological site inventory should be based on intensive survey of every portion of the impact area, as maximum area coverage will provide the most comprehensive understanding of archaeological and other heritage resource density and distribution. However, in many cases the size of the project area may render a complete survey impractical because of time and cost considerations.

In some situations it may be practical to intensively survey only a sample of the entire project area. Sample selection is approached systematically, based on accepted statistical sampling procedures, or judgementally, relying primarily on subjective criteria *(Butler, W., 1984)*.

Systematic Survey Sampling

A systematic sample survey is designed to locate a representative sample of archaeological or heritage resources within the project area. A statistically valid sample will allow predictions to be made regarding total resource density, distribution and variability. In systematic sample surveys it may be necessary to exempt certain areas from intensive inspection owing to excessive slope, water bodies, landslides, land ownership, land use or other factors. These areas must be explicitly defined. Areas characterized by an absence of road access or dense vegetation should not be exempted. *(Dunnel, R.C., Dancey W.S. 1983)*.

Judgemental Survey Sampling

Under certain circumstances, it is appropriate to survey a sample of the project area based entirely on professional judgement regarding the location of sites. Only those areas which can reasonably be expected to contain archaeological or heritage sites are surveyed.

However, a sufficient understanding of the cultural and biophysical factors which influenced or accounted for the distribution of these sites over the landscape is essential. Careful consideration must be given to ethnographic patterns of settlement, land use and resource exploitation; the kinds and distribution of aboriginal food sources; and restrictions on site location imposed by physical terrain, climatic regimes, soil chemistry or other factors. A judgemental sample survey is not desirable if statistically valid estimates of total heritage resource density and variability are required *(McManamon F.P. 1984)*.

Assessment

Assessment studies are only required where conflicts have been identified between heritage resources and a proposed development. These studies require an evaluation of the heritage resource to be impacted, as well as an assessment of project impacts. The purpose of the assessment is to provide recommendations as to the most appropriate manner in which the resource may be managed in light of

the identified impacts. Management options may include alteration of proposed development plans to avoid resource impact, mitigative studies directed at retrieving resource values prior to impact, or compensation for the unavoidable loss of resource values.

It is especially important to utilize specialists at this stage of assessment. The evaluation of any archaeological resource should be performed by professionally qualified individuals.

Site Evaluation

Techniques utilized in evaluating the significance of a heritage site include systematic surface collecting and evaluative testing. Systematic surface collection is employed wherever archaeological remains are evident on the ground surface. However, where these sites contain buried deposits, some degree of evaluative testing is also required.

Systematic surface collection from archaeological sites should be limited, insofar as possible, to a representative sample of materials. Unless a site is exceptionally small and limited to the surface, no attempt should be made at this stage to collect all or even a major portion of the materials. Intensive surface collecting should be reserved for full scale data recovery if mitigative studies are required. Site significance is determined following an analysis of the surface collected and/or excavated materials (*Miller, C.L. II, 1989*).

Significance Criteria

There are several kinds of significance, including scientific, public, ethnic, historic and economic, that need to be taken into account when evaluating heritage resources. For any site, explicit criteria are used to measure these values. Checklists of criteria for evaluating pre-contact and post-contact archaeological sites are provided in Appendix B and Appendix C. These checklists are not intended to be exhaustive or inflexible. Innovative approaches to site evaluation which emphasize quantitative analysis and objectivity are encouraged. The process used to derive a measure of relative site significance must be rigorously documented, particularly the system for ranking or weighting various evaluatory criteria.

Site integrity, or the degree to which a heritage site has been impaired or disturbed as a result of past land alteration, is an important consideration in evaluating site significance. In this regard, it is important to recognize that although an archaeological site has been disturbed, it may still contain important scientific information.

Heritage resources may be of scientific value in two respects. The potential to yield information which, if properly recovered, will enhance understanding of Southern African human history is one appropriate measure of scientific significance. In this respect, archaeological sites should be evaluated in terms of their potential to resolve current archaeological research problems. Scientific significance also refers to the potential for relevant contributions to other academic disciplines or to industry.

Public significance refers to the potential a site has for enhancing the public's understanding and appreciation of the past. The interpretive, educational and recreational potential of a site are valid indications of public value. Public significance criteria such as ease of access, land ownership, or scenic setting are often external to the site itself. The relevance of heritage resource data to private industry may also be interpreted as a particular kind of public significance.

Ethnic significance applies to heritage sites which have value to an ethnically distinct community or group of people. Determining the ethnic significance of an archaeological site may require consultation with persons having special knowledge of a particular site. It is essential that ethnic significance be assessed by someone properly trained in obtaining and evaluating such data.

Historic archaeological sites may relate to individuals or events that made an important, lasting contribution to the development of a particular locality or the province. Historically important sites also reflect or commemorate the historic socioeconomic character of an area. Sites having high historical value will also usually have high public value.

The economic or monetary value of a heritage site, where calculable, is also an important indication of significance. In some cases, it may be possible to project monetary benefits derived from the public's use of a heritage site as an educational or recreational facility. This may be accomplished by employing established economic evaluation methods; most of which have been developed for valuating outdoor recreation. The objective is to determine the willingness of users, including local residents and tourists, to

pay for the experiences or services the site provides even though no payment is presently being made. Calculation of user benefits will normally require some study of the visitor population *(Smith, L.D. 1977).*

Assessing Impacts

A heritage resource impact may be broadly defined as the net change between the integrity of a heritage site with and without the proposed development. This change may be either beneficial or adverse.

Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource. For example, development may have a beneficial effect by preventing or lessening natural site erosion. Similarly, an action may serve to preserve a site for future investigation by covering it with a protective layer of fill. In other cases, the public or economic significance of an archaeological site may be enhanced by actions which facilitate non-destructive public use. Although beneficial impacts are unlikely to occur frequently, they should be included in the assessment.

More commonly, the effects of a project on heritage sites are of an adverse nature. Adverse impacts occur under conditions that include:

(a) destruction or alteration of all or part of a heritage site;

(b) isolation of a site from its natural setting; and

(c) introduction of physical, chemical or visual elements that are out-of-character with the heritage resource and its setting.

Adverse effects can be more specifically defined as direct or indirect impacts. Direct impacts are the immediately demonstrable effects of a project which can be attributed to particular land modifying actions. They are directly caused by a project or its ancillary facilities and occur at the same time and place. The immediate consequences of a project action, such as slope failure following reservoir inundation, are also considered direct impacts.

Indirect impacts result from activities other than actual project actions. Nevertheless, they are clearly induced by a project and would not occur without it. For example, project development may induce changes in land use or population density, such as increased urban and recreational development, which may indirectly impact upon heritage sites. Increased vandalism of heritage sites, resulting from improved or newly introduced access, is also considered an indirect impact. Indirect impacts are much more difficult to assess and quantify than impacts of a direct nature.

Once all project related impacts are identified, it is necessary to determine their individual level-of-effect on heritage resources. This assessment is aimed at determining the extent or degree to which future opportunities for scientific research, preservation, or public appreciation are foreclosed or otherwise adversely affected by a proposed action. Therefore, the assessment provides a reasonable indication of the relative significance or importance of a particular impact. Normally, the assessment should follow site evaluation since it is important to know what heritage values may be adversely affected.

The assessment should include careful consideration of the following level-of-effect indicators, which are defined in Appendix D:

- magnitude
- severity
- duration
- range
- frequency
- diversity
- cumulative effect
- rate of change

The level-of-effect assessment should be conducted and reported in a quantitative and objective fashion. The methodological approach, particularly the system of ranking level-of-effect indicators, must be

rigorously documented and recommendations should be made with respect to managing uncertainties in the assessment. *(Zubrow, Ezra B.A., 1984).*

Impact Effect	Score
Magnitude	0-4
Severity	0-4
Duration	0-4
Range	0-4
Frequency	0-4
Diversity	0-4
Cumulative effect	0-4
Rate of change	0-4
Total score:	0-32

Impact severity table.

Impacts will be defined along the following parameters;

Effect	Score
No effect on site	0
Insignificant impact on site	1-5
Significant impact on site	6-16
Major destruction of site and attributes	17-24
Total destruction of sites and attributes	25-32

The study area was surveyed using standard archaeological surveying methods. The area was surveyed using directional parameters supplied by the GPS and surveyed by foot. This technique has proven to result in the maximum coverage of an area. This action is defined as;

'an archaeologist being present in the course of the carrying-out of the development works (which may include conservation works), so as to identify and protect archaeological deposits, features or objects which may be uncovered or otherwise affected by the works' (DAHGI 1999a, 28).

Standard archaeological documentation formats were employed in the description of sites. Using standard site documentation forms as comparable medium, it enabled the surveyors to evaluate the relative importance of sites found. Furthermore GPS (Global Positioning System) readings of all finds and sites were taken. This information was then plotted using a ***eTrex Legend*** GPS (WGS 84- datum).

Indicators such as surface finds, plant growth anomalies, local information and topography were used in identifying sites of possible archaeological importance. Test probes were done at intervals to determine sub-surface occurrence of archaeological material. The importance of sites was assessed by comparisons with published information as well as comparative collections.

Test excavation is that form of archaeological excavation where the purpose is to establish the nature and extent of archaeological deposits and features present in a location which it is proposed to develop

(though not normally to fully investigate those deposits or features) and allow an assessment to be made of the archaeological impact of the proposed development. It may also be referred to as archaeological testing' (DAHGI 1999a, 27).

'Test excavation should not be confused with, or referred to as, archaeological assessment which is the overall process of assessing the archaeological impact of development. Test excavation is one of the techniques in carrying out archaeological assessment which may also include, as appropriate, documentary research, fieldwalking, examination of upstanding or visible features or structures, examination of aerial photographs, satellite or other remote sensing imagery, geophysical survey, and topographical assessment' (DAHGI 1999b, 18).

All sites or possible sites found were classified using a hierarchical system wherein sites are assessed using a scale of zero to four according their importance. These categories are as follows;

Degree of significance	Justification	Score
Exceptional significance	Rare or outstanding, high degree of intactness. Can be interpreted easily.	13 – 16
High significance	High degree of original fabric. Demonstrates a key element of item's significance. Alterations do not detract from significance.	9 – 12
Moderate significance	Altered or modified elements. Element with little heritage value, but which contribute to the overall significance.	5 – 8
Little significance	Alterations detract from significance. One of many. Alterations detract from significance.	1 – 4
Intrusive	Damaging to the item's heritage significance.	0

Table 1. Site significance table for pre-contact sites.

Degree of significance	Justification	Score
Exceptional significance	Rare or outstanding, high degree of intactness. Can be interpreted easily.	29 – 24
High significance	High degree of original fabric. Demonstrates a key element of item's significance. Alterations do not detract from significance.	13 – 18
Moderate significance	Altered or modified elements. Element with little heritage value, but which contribute to the overall significance.	7 – 12
Little significance	Alterations detract from significance. One of many. Alterations detract from significance.	1 – 6

Intrusive	Damaging to the item's heritage significance.	0

Table 2. Site significance table for post contact sites.

The qualitative value of a site's significance will be calculated by tabling its significance characteristics (as outlined in appendix B & C) on a sliding value scale and determining an accumulative value for the specific site. Two tables will be used;

Site significance characteristics slide scale (Pre-Contact Criteria)					
Scientific Significance	0	1	2	3	4
Public Significance	0	1	2	3	4
Ethnic Significance	0	1	2	3	4
Economic Significance	0	1	2	3	4
				Total Score	

Table 3. Pre-contact site criteria (0- no value, 4- highest value)

Site significance characteristics slide scale (Post-Contact Criteria)					
Scientific Significance	0	1	2	3	4
Historic Significance	0	1	2	3	4
Public Significance	0	1	2	3	4
Other Significance	0	1	2	3	4
Ethnic Significance	0	1	2	3	4
Economic Significance	0	1	2	3	4
				Total Score	

Table 4. Post-contact site criteria (0- no value, 4- highest value)

The values calculated (as specified in appendix B&C) are attributed to a category within the site significance table to provide the site with a quantifiable significance value. This will only be done for identified sites. Should an area under investigation not show any evidence of human activity this will be stated and no further qualifying will be done.

This information will be contained in a report that will strive to;

Review the purpose, approach, methodology and reporting of archaeological assessment and monitoring and propose guidelines on how to adequately address four key questions:

i. What is the research value and potential of the archaeological remains?
ii. What will the impact of development be?
iii. What types of mitigation (by design modification or further investigation) would be appropriate to mitigate the impact of development and/or make a useful contribution to knowledge?
iv. What will be the likely cost and timescale of any further investigation, analysis and reporting, given the nature of the archaeology and the type and extent of further work required?

Chapter 2

Resource Inventory and Management

Resource Inventory

This section will contain the results of the heritage site inventory. Any identified sites will be indicated on the accompanying map plotted using the OziExplorer Geographis Information System (GIS).

Alma-Marakeli road upgrade

GPS	Upgrade Start	24° 27,302 S
		28° 09,707 E
	Upgrade end	24° 31,656 S
		27° 55,334 E

The proposed road upgrade project for the Alma-Marakeli road (route P240-1) will start at the T-junction with the R33 tar road (Modimolle/Vaalwater) at Heuningfontein (Photo 1) and will proceed westward and will end approximately 12km further at the T-junction of route P240-1 and the Kralinge road (Photo 2). The proposed road upgrade (gravel to tar) will follow the existing gravel road and will not deviate from its original course and will pass through the small town of Alma. Most of the route will pass through farmland (Photo 3) with ploughed fields for crops such as maize. The route will also pass through the small rural town of Alma, but will follow the existing roads and bridges (x2) across the Sand River in the town (Photo 4).

After intensive investigations, no sites or finds of any heritage potential were identified.

Alma-Marakeli road upgrade borrow pits

GPS	Borrow pit # 1	24° 28,108 S
		28° 06,713 E

The proposed borrow pit # 1 was situated next to and on the southern side of the road to be upgraded (Photo 5). It was an existing borrow pit which was to be extended to the south, east and west by approximately 2 hectares. The area to be utilized was situated in between ploughed fields and most of it was disturbed.

GPS	Borrow pit # 2	24° 30,678 S
		28° 04,087 E

Borrow pit # 2 was situated next to and on the eastern side of the road to be upgraded (Photo 6). It was also an existing borrow pit which was to be extended to the north, south and east by approximately 2 hectares. This area was mostly undisturbed except for the areas affected by the previous earth moving activities.

Resource Evaluation

Alma-Marakeli road upgrade

No heritage resources, or remains of any heritage resource, were identified within the indicated study area.

Alma-Marakeli road upgrade borrow pits

No heritage resources, or remains of any heritage resource, were identified within the indicated study areas.

Impact Identification and Assessment

Alma-Marakeli road upgrade

No impacts on cultural resources are anticipated as no resources were identified in the study area.

Alma-Marakeli road upgrade borrow pits

No impacts on cultural resources are anticipated as no resources were identified in the study areas.

Resource Management Recommendations

Alma-Marakeli road upgrade

The proposed road upgrade project for route P240-1 will start at the T-junction with the R33 tar road (Modimolle/Vaalwater) at Heuningfontein and will proceed westward and will end approximately 12km further at the T-junction of route P240-1 and the Kralinge road. The following steps and measures are recommended:

- The proposed upgrade of the road will follow the route of the existing gravel road and will pass mainly through disturbed areas.
- No further site-specific actions or any further heritage mitigation measures are recommended as no heritage resource sites or finds of any value or significance were identified in the indicated study area.
- The proposed road upgrade along the indicated route can continue from a heritage point of view.

Alma-Marakeli road upgrade borrow pits

The proposed utilization of 2 areas as borrow pits were indicated and studied. The following steps and measures are recommended:

- The proposed areas to be utilised as borrow pits were mainly disturbed due to previous construction and earth moving activities.
- No further site-specific actions or any further heritage mitigation measures are recommended as no heritage resource sites or finds of any value or significance were identified in the indicated study areas.
- The proposed utilization of the indicated areas as borrow pits can continue from a heritage point of view.

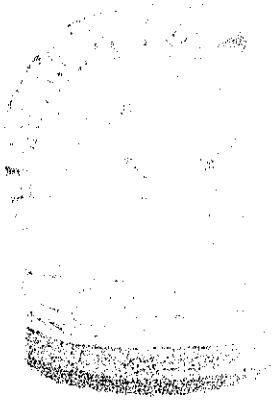

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Photo 1 Direction to Alma from R33

Photo 2 (right) & Road D2748

Photo 3: Farmland along the route.

Photo 4: Bridge in Alma town.

Photo 5: Location of borrow pit # 1.

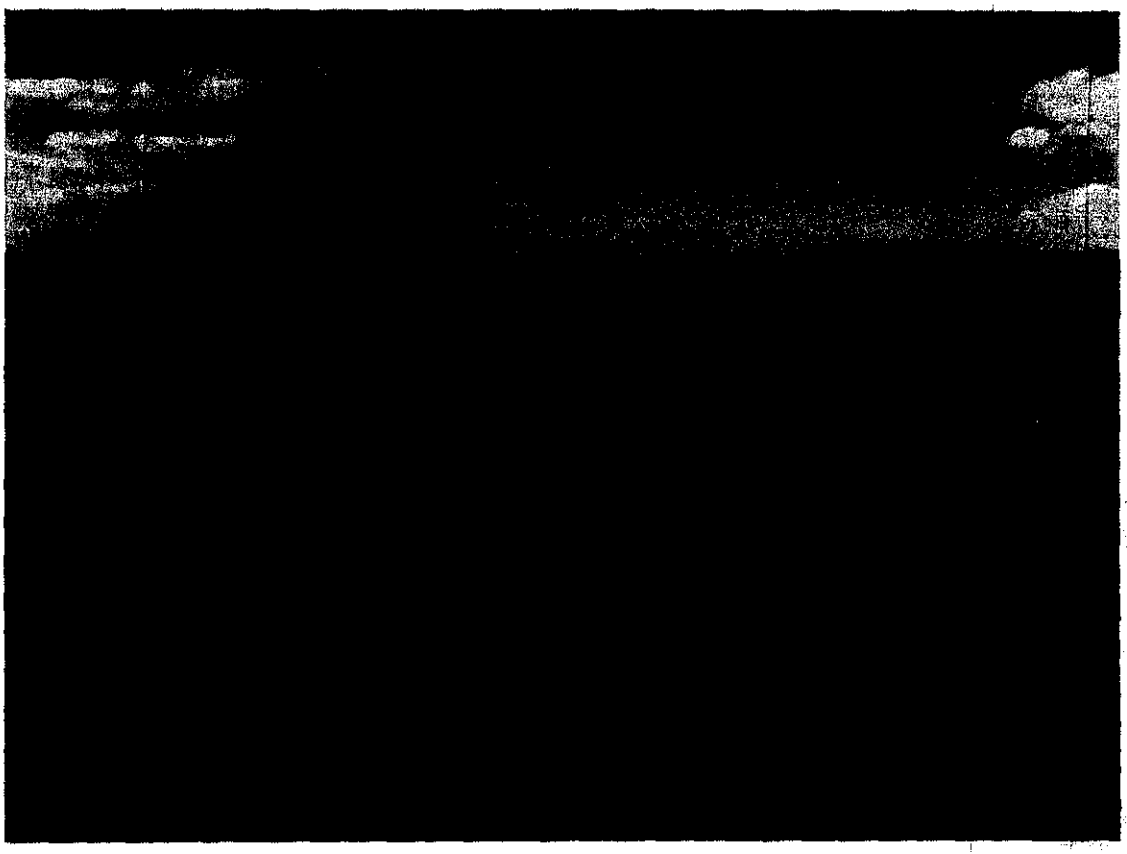
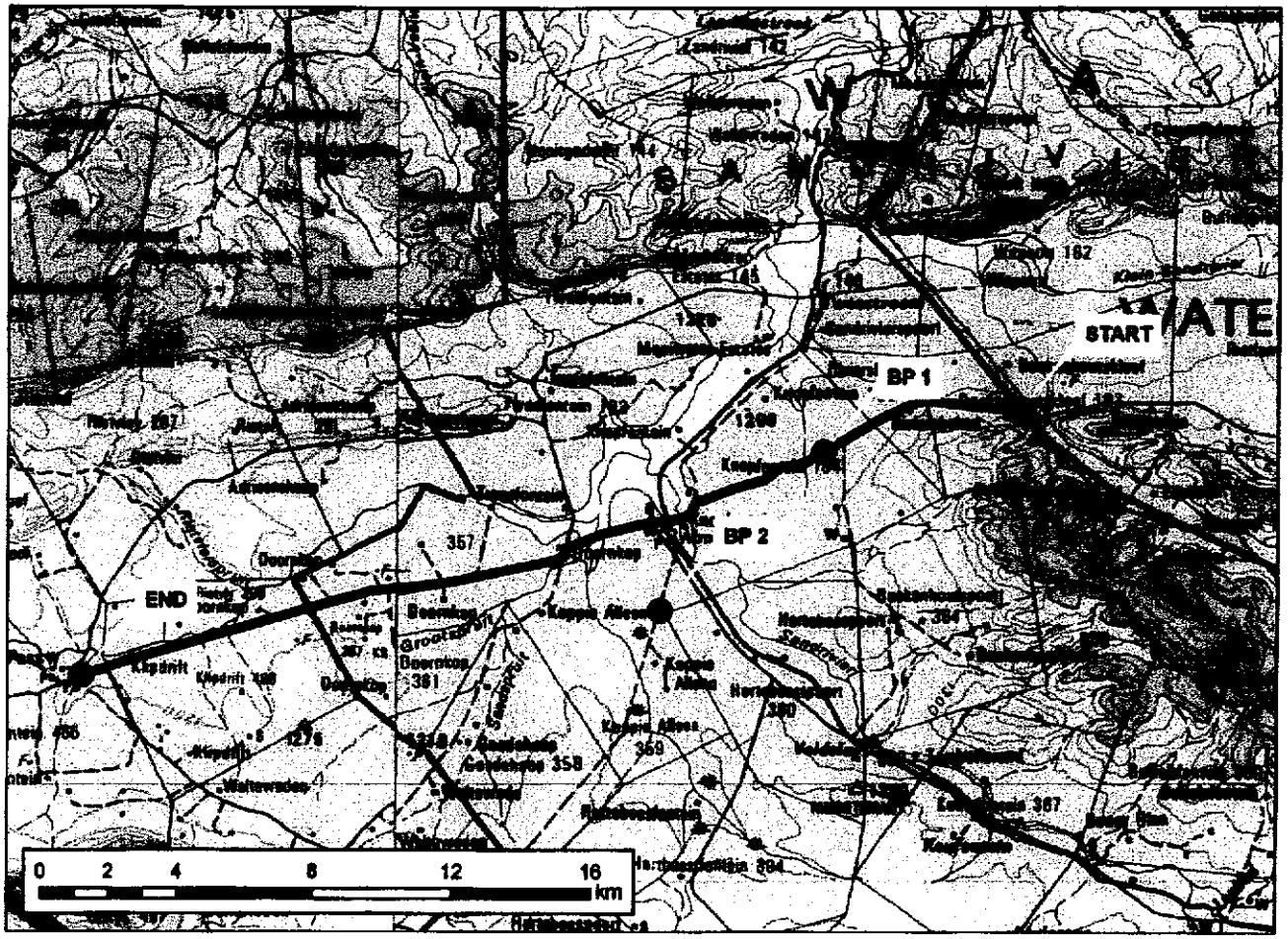


Photo 6: Disturbed areas around borrow pit # 1.

Alma - Marakeli Road Upgrade



04-06-2008

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Maps used: 1: 25000 Topo-cadastral
Reference: 2426 & 2428

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