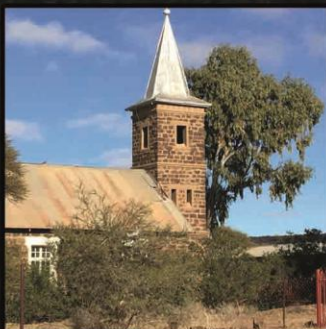


Taung Skull Fossil Site

Heritage Impact Assessment Report

Improvement of Visitor Facilities, Site Infrastructure and
Heritage Conservation Measures at the Taung Skull Fossil Site

DECEMBER 2015



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Site

December 2015

Vision for the Taung Skull Fossil Site¹

To ensure that the World Heritage and other multiple natural and cultural values of the Taung Skull Fossil Site are understood, conserved, protected, respected and shared by all.

¹ From: The Integrated Management Plan (IMP) for the Taung Skull Fossil Site 2010 - 2015.

Project Name

Improvement on Visitor Facilities, Site Infrastructure and Heritage Conservation Measures at the Taung Skull Fossil Site

World Heritage Property Name

Taung Skull Fossil Site
Taung, North West Province, South Africa

Management Authority

Department of Rural, Environment and Agricultural Development (READ)
North West Provincial Government of South Africa

Project Proponent and Report Prepared For

Department of Rural, Environment and Agricultural Development (READ)
North West Provincial Government of South Africa

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December 2015

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External Review

Dr David Morris and Dr Otsile Ntsoane have conducted a review on the document.

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Acronyms

CHRS	Cultural Heritage Resources Survey
CMP	Conservation Management Plan
FHSSA	The Fossil Hominid-bearing Sites of South Africa
HIA	Heritage Impact Assessment
HMP	Heritage Management Plan
KPA	Key Performance Area
IMP	Integrated Management Plan
LED	Local Economic Development
NHRA	National Heritage Resource Act
OUV	Outstanding Universal Value
PC	Project Component
READ	Rural, Environment and Agricultural Development of the North West Province of South Africa
SAHRA	South African Heritage Resource Agency
TSFS	Taung Skull Fossil Site
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VIA	Visual Impact Assessment
WHL	World Heritage List
WHP	World Heritage Property
WHS	World Heritage Site

Non-technical Summary

The Management Authority of the Taung Skull Fossil Site (TSFS) is the Department of Rural, Environment and Agricultural Development (READ). READ is also the promoter of the project, being improving visitor facilities, infrastructure and heritage conservation at the site, so that it can be experienced and enjoyed by more South Africans, as well as international visitors.

The project has its origins in a long process of project and development planning for the Taung Skull Fossil Site (TSFS). The process is documented in the various management documents and culminates spatially in the Conceptual Development Plan and Site Zoning Plan, both from 2003. All components of the project under application fall in line with the previous conceptual level site planning and land use zoning, as well as the objectives of the Integrated Management Plan 2010 - 2015.

The Taung Skull Fossil Site is located in the south-western part of the North West Province in the Greater Taung Local Municipality. Situated within the Dr Ruth Segomotsi Mompati District Municipality, the site lies approximately 10 kilometres (km) north of the provincial boundary of North West Province and Northern Cape Province, approximately 15 km south-west of Taung. The improvements proposed include the adequate provision of ablutions facilities, the construction of a road to Thomeng, restoration and reuse of buildings, heritage conservation measures and the provision of upgraded visitor facilities. All these project components represent improvements to existing facilities, with the exception of parking areas and the ablution facility at Thomeng.

Heritage impacts were considered and assessed according to criteria reflecting archaeological, paleontological, visual, cultural, socio-cultural and economic aspects, across all project components, and across all project phases. The heritage impacts of significance included negative impacts related to unsupervised visits to heritage sites, currently with limited conservation measures in place, and negative visual impacts related to deteriorating buildings and proposed new structures in the visually sensitive area in the region of the proposed entrance area. With mitigation however, negative impacts can certainly be minimised to be of acceptable level. Access to and use of the TSFS does however require good management and maintenance, and identified mitigation measures should be implemented. With further careful planning, design and construction the management of heritage resources can be significantly enhanced and negative impacts can be avoided and/or mitigated. Specific management and mitigation measures have been identified and are detailed across project phases in the Heritage Management Plan. This user-friendly manual is there to provide operational level guidance in managing the World Heritage Site property.

The following specific recommendations are made:

1. The option to establish a camping area within the Core Area is removed from the Conceptual Development Plan and alternative locations for such a camping facility must be explored.
2. No visitor access or development proposals for the lime kiln area are entertained. The lime kiln area falls within a high visual sensitivity area and the visual impacts of any activity need to be strongly considered. Alternative locations and concepts for the museum need to be explored, maximizing the use of existing buildings.

3. The proposed project components 1 to 11 are recommended for approval (with the exception of components 4 and 8) as they will lead to the general improvement of management on the Taung Skull Fossil Site and stimulate local economic development, as well as improve visitor experience and safety. Mitigation measures must however be implemented and conservation measures at sensitive heritage sites requires detailed planning.
4. Detailed plans should be compiled for conservation measures at the World Heritage Property (WHP), as a top priority and specifically for sensitive heritage sites like Equus Cave for instance, and be implemented before visitors are allowed unsupervised access to the sites.
5. Some of the existing buildings earmarked for reuse have stood derelict for years. Their structural integrity must be checked by structural engineers and confirmed during the planning and design phase.
6. The nightscape should be protected through the design of all lighting on the TSFS as low-level, down-facing dim lighting, as far as is possible and without compromising safety.
7. Mitigation and enhancement measures are detailed in a Heritage Management Plan that can deal with planning, design, construction, rehabilitation, operational and maintenance phases of the project. All management and mitigation measures should be implemented to effectively manage heritage resources from user damage.
8. The Conceptual Development Plan for the site was compiled in 2003 and should be reviewed and consolidated to reflect current ideas and intentions of the Management Authority. Such a revised site development plan would be best consolidated together with key and local stakeholders.
9. Further management interventions that are required are policies and strategies that address the issues related to the proposed and steady increase in visitation and usage of the site:
 - i) Safety Strategy and Emergency Strategy;
 - ii) Built Landscape Management Strategy;
 - iii) Research Policy Strategy and Research Plan;
 - iv) Visitor Management Strategy; and
 - v) Interpretation Strategy.
10. Mapping of the heritage resources be compiled into a GIS database, for ease of access and to enhance planning, management and interpretation at the site.
11. A revised Annual Operational Plan should be compiled for the site to put further focus on an already identified list of tasks that need to be completed. Such a plan typically should contain Key Performance Areas (KPA's), Annual Performance Targets, etc. and monitoring and evaluation of current projects should form part of it.

12. Where details are lacking, impact assessment can be conducted in the future, specific onsite management of impacts of approved projects can be managed with the Heritage Management Plan and through consulting with a qualified advisor, as necessary.

Content

This Heritage Impact Assessment (HIA) Report details the likely heritage impacts related to the improvement of visitor facilities, site infrastructure and heritage conservation measures at the Taung Skull Fossil Site (TSFS). The background to the TSFS is presented, together with detailed geographical and heritage descriptions of the site. The project and components are described and related plans and photographs are included in the appendices. The impacts related to the project are assessed and mitigation measures proposed that will enhance positive impacts and reduce negative impacts. The HIA Report should be read in conjunction with the related yet separate Heritage Management Plan (HMP), which assesses the core values of the site, describes the confines within which development on the site can occur, as well as general and specific mitigation measures for certain types of projects and the specific project components. The HMP also provides a general best practice management guideline for all activities on the site that may have a detrimental impact on the heritage resources, both tangible and intangible.

PART ONE: BACKGROUND

1. Introduction

The Taung Skull Fossil Site was designated as a National Heritage Site in 2002. It is also inscribed on the World Heritage List (WHL) forming part of serial World Heritage Site (WHS), together with Sterkfontein, Swartkrans, Kromdraai and Environs, and Makapan Valley fossil hominid sites in South Africa, together named the Fossil Hominid-bearing Sites of South Africa (FHSSA). The Taung Skull Fossil Site (TSFS) was added to the serial nomination, together with Makapan Valley and inscribed on United Nations Educational, Scientific and Cultural Organisation (UNESCO) WHL under criterion iii) and vi) in 2005, showing the site:

- iii. to bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared; and*
- vi. to be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance.*

As the Management Authority for the Taung Skull Fossil Site (TSFS), the Department of Rural, Environment and Agricultural Development (READ) is the promoter of improving visitor facilities at the site, so that it can be experienced and enjoyed by more and more South Africans and international visitors alike. The project under assessment involves improvements to existing visitor facilities, site infrastructure and heritage site conservation measures. These proposals come from a process of project and development planning for the TSFS over many years, and all projects under application fall in line with previous conceptual level site planning and land use zoning, as detailed in the Integrated Management Plan 2010 - 2015.

The Taung Skull Fossil Site, referred to as the 'site' in this report, falls on the property 'Remainder of Taung 894 HN' and has the following WHS property characteristics, as detailed in Table 1.

Table 1: Taung Skull Fossil Site Properties

Name Location	Criteria	Coordinates	Area	Date Inscribed
Taung Skull Fossil Site Taung, North West Province, South Africa	(iii) (vi)	27° 37' 10" S 24° 37' 59" E	Property: 58.742905 Ha Buffer Zone: 3387 Ha	2005

Visitor management and the development of visitor facilities at any WHS is no easy task, and local stakeholder and community support will need to form the basis of all attempts at stimulating the local economy. Creating realistic expectations amongst the local community of the risks, scale and likely economic impacts is also important. Much planning has however occurred and the local community want to now see improved project implementation.

In terms of the National Heritage Resources Act, 1999, as well the World Heritage Site Act, 1999, approvals from both the South African Heritage Resource Agency (SAHRA) and UNESCO are required and considered on the findings of this Heritage Impact Assessment (HIA) Report.

2. Legislative Requirements and Governance

South Africa's unique and non-renewable archaeological and palaeontological heritage sites are 'generally' protected in terms of Section 35 of the National Heritage Resources Act (Act No. 25 of 1999) and may not be disturbed at all without a permit from the relevant heritage resources authority. As many heritage sites are at risk from being damaged by development, both the environmental and heritage legislation require impact assessment (IA) reports by qualified professionals that identify all heritage resources and that make recommendations for protection or mitigation of the impact to the sites.

More specifically the management of the TSFS needs to conform primarily to the following guidelines and national Acts:

- World Heritage Convention and Operational Guidelines, 2012;
- World Heritage Convention Act, 1999 (Act 49 of 1999);
- National Environment Management Act (Act No. 107 of 1998) [NEMA];
- National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003); and
- National Heritage Resources Act (Act No. 25 of 1999).

It is an accepted international norm and best practice that any project and/or activity, especially implicating a World Heritage Site and the Outstanding Universal Value of the heritage resources it protects, will need to be considered in a precautionary manner. In applying such a precautionary approach, the assessment of heritage impacts related to any proposed change is thus a minimum requirement, informing decisions regarding the development and use of heritage resources and the site. Such assessment must consider various aspects throughout the project life cycle if an activity.

As far as planning legislation goes, the Spatial Development Framework for the Greater Taung Local Municipality is currently under review and needs to incorporate the Core Area and Buffer Zone of the TSFS. Furthermore the Environmental Management Framework for the Greater Taung Local Municipality is also currently being compiled, and makes satisfactory reference to the TSFS, both in spatial and planning considerations. The area is governed by the Greater Taung Local Municipality, as well as the BaPhuduhucwana Traditional Authority.

3. Approach

The Heritage Impact Assessment (HIA) has been conducted at two levels of detail. The 1st and higher level of assessment is conducted more broadly, assessing the development plan and proposed use zones, as defined in the Conceptual Development Plan and Site Zoning Plan of 2003 (refer to Figures 5 and 6). A comparative assessment of these plans, with and without the recommended alternatives, has been conducted.

The 2nd and more detailed level of assessment is focussed on the specific project at hand, which includes the assessment of the project as a whole, as well as the assessment of each of the 17 specific project components. Alternatives have been considered and various mitigation measures are proposed. The assessment of the project, as well as the broader development plan, makes use of the assessment methodology described in the next section of this report.

4. Methodology

This Heritage Impact Assessment (HIA) has been conducted in accordance with international norms and standards and abides by the principles of heritage management that conforms to UNESCO requirements. The steps followed in this impact assessment, include the following:

- Status quo review;
- Consolidation of baseline data;
- Defining the project description and inclusion of specialist studies;
- Impact assessment conducted with involved stakeholder consultation;
- Monitoring, evaluation, learning and intervention orientated heritage management planning; and
- Strategic evaluation determining detailed planning, intervention and implementation.

A two-tier assessment was conducted, firstly at a general level to identify the key heritage impact areas and where further investigation is required. Secondly a more in-depth assessment focussed on higher negative impact areas, or 'red flags' areas to identify ways and means to avoid negative impacts, and where not possible, to mitigate against and offset against the negative impacts. Both tiers of assessment are demonstrated in this report and in Appendix 6 in more detail.

The proposed project will have impacts both positive and negative. There is a tendency to see impacts as primarily physical and visual. While visual impacts are often very sensitive, a broad approach is needed as outlined in the ICOMOS Xi'an Declaration. Impacts take many forms – they may be **direct and indirect; cumulative, temporary and permanent; reversible or irreversible, visual, physical, social and cultural, even economic**. Heritage can be tangible and intangible and so can the impacts on heritage be tangible and intangible. These considerations apply during any Heritage Impact Assessment (HIA) and Visual Impact Assessment (VIA). In addition, the anticipated impacts of both the construction and operation stages of the proposed development should also be assessed, since there are often different types of impacts.

Table 2: Impact Assessment Quantification

Score	Description
3+	High significance of positive change
2+	Good positive change
1+	Minor positive change
0	Neutral, being no change
1-	Minor negative change
2-	Significant negative change
3-	High significance of negative change

Criteria considered to assess the impact of a specific activity include the heritage value, nature of the impact, as well as the extent, duration, intensity, probability, confidence, severity, significance and timing of impacts. These criteria are used to assess and score the impact across all criteria, for each proposed activity, for different phases of the project. The impact assessment data generated is detailed in Appendix 6, with the scoring method detailed in Table 2 above.

The two-tier assessment makes use of the above evaluation scale, to provide some texture to the heritage impact through a comparative evaluation, and also assesses what intervention would be recommended, how and where, to best manage the resulting changes in the context. The impact assessment matrix generated highlights areas of comparatively higher and lower impact, and where management intervention can be focussed.

5. Assumptions, Gaps and Uncertainties

The TSFS is well researched and much scientific information on the specific heritage resources on the site exists in various locations, including research institutions that have conducted research at the site. Many reports have also been compiled over the years, some of which are readily available and cited in the HIA Report or the Heritage Management Plan.

For the purpose of this assessment, the construction of the picnic site and access road from the current entrance are complete and thus excluded from the scope of the assessment. Operational measures are general across the site. Active management of visitor use zones is essential to keep the experience of the site authentic and heritage resource intact. Much can still be researched and discovered about historical and current day local and traditional knowledge, the practise of traditional beliefs and healing methods, tribal dances and the close association to nature. There are strong cultural links to the sacred sites and these can be further researched in time. This is a definite gap in the information on the site and tremendous effort must now be placed on the research of intangible heritage.

There are of course also gaps in information on the site and many uncertainties exist and while others may still emerge through time. As such a precautionary approach should always be taken to site planning, design, development, operation and maintenance.

6. Stakeholder Participation

Consultation with stakeholders is crucial to the assessment of the project. Consultation has occurred with all statutory bodies and community groups that form part of the project Steering Committee. Public notices have also been placed in the media and at strategic points on the site and in Taung. Further detail on the public participation process, the placement of notices and meetings are included in Appendix 8. A Response to Comment Report is also included in Appendix 9.

7. Project Need and Desirability

The need for the projects has been identified, and their desirability established through many years of planning, and finally the time has arrived for them to be implemented further. The desirability is thus not a further question, in that it has long been established to proceed with the improvement of the Taung Skull Fossil Site to increase visitor usage and income generation. The consideration of alternatives is however of importance, and this is dealt with in the following section.

The very planning and development of the site has arisen through interaction with the local community, with the needs and desires of the various parties having being heard and considered. Implementation and operationalising the Taung Skull Fossil Site remains a top priority for Buxton to stimulate local economic development (LED). It is clear that the proposed project aligns closely with the facility, infrastructural and safety upgrades required on the site. The proposed improvements furthermore fall in line the tasks identified in the Implementation plan in the Taung Skull Fossil Site Integrated Management Plan 2010 - 2015.

8. Consideration of Alternatives

The project components are at various stages in the planning pipeline, and various alternatives have of course been considered over the many years of planning. With the site development plan having been worked out and planned with stakeholders, it is now a matter of simply implementing the agreed upon activities, avoiding unnecessary negative impacts, and reducing such where avoidance is not possible. A summary list of alternatives considered includes the following:

- 8.1 The No Go option, meaning that nothing further is done on the site, is used as a theoretical reference in the impact assessment to draw comparison in the impact evaluation;
- 8.2 The use of wood and steel in the design and construction process is largely eliminated due to issues related to the theft of these materials;
- 8.3 An alternative to the proposed viewing pavilion designed at the Memorial needs to be considered;

- 8.4 Alternative parking areas for visitors are considered at different locations, both south and north of the entrance road to Buxton, at the existing entrance, as well as at Thomeng;
- 8.5 Development proposals for the kiln area, including the proposed development of silo-replica museum, provide for some consideration of alternatives. Alternative development styles and models need to be considered for the use of the kiln area, including leaving it as is, as well as the alternative locations and the use of existing buildings for a museum and interpretation centre; and
- 8.6 Alternative locations for a camping area need to be considered and planned in more detail in the future.

PART TWO: CURRENT SITE CONTEXT

The site context is drawn from field investigations and the management documents for the Taung Skull Fossil Site. The leading management document is the Integrated Management Plan 2010-2015. This document itself draws from the Cultural Heritage Survey 2003 and the Conservation Management Plan 2004, showing that the site is well researched, with further research and discovery opportunity in the future.

9. Site Locality

The Taung Skull Fossil Site is located in the south-western part of the North West Province in Ward 12 of the Greater Taung Local Municipality. Situated within the Dr Ruth Segomotsi Mompati District Municipality, the site lies approximately 10 km north of the provincial boundary of North West Province and Northern Cape Province, approximately 15 km south-west of Taung, and approximately 12 km from the N18 National Road (refer to Figure 1).

The TSFS lies to the eastern side of the village of Buxton and contains a section of the Thabasikwa River valley that drops off the escarpment of the Ghaap Plateau. The closest town is Taung, which is approximately 25 km from the site *via* the N18, R372 and a rural road. The closest airport to the site is Kimberley, which is approximately 150 km from the site. The provincial capital is Mafikeng which is approximately 240 km from the site.

The TSFS is in fair proximity to the N18, which links the Northern Cape with Vryburg and Mafikeng in the North West Province, but is not regarded as a national road that is used by many tourists. This emphasises the fact that the TSFS is *'off the beaten track'*. As such the rural location of the site can also be used as an advantage to escape the rapid pace of modern living and reflect on the origins of humankind.

10. Outstanding Universal Value of Taung Skull Fossil Site

The Outstanding Universal Value² (OUV) of any WHS, shows how the site is unique and of universal importance. The Fossil Hominid Sites of Sterkfontein, Swartkrans, Kromdraai and Environs include the serial listing of the Makapan Valley and Taung Skull Fossil Site. Collectively these sites have produced abundant scientific information on the evolution of modern humans over the past 3.5 million years. They constitute a vast reserve of scientific information, with enormous potential.

These hominid sites contain within their deposits all of the key interrelated and interdependent elements in their palaeontological relationships. Alongside and predating the hominid period of occupation is a sequence of mammals, micro-mammals, invertebrates reptile and identified avian components (Kuhn et al, 2015), which provide a window onto faunal evolution, palaeobiology and

² The description of the Outstanding Universal Value is sourced from the Integrated Management Plan (IMP) for the Taung Skull Fossil Site 2010 - 2015.

palaeoecology stretching back into the Pliocene. This record has come to play a crucial role in furthering our understanding of human evolution and the appearance of modern human behaviour.

The fossil evidence contained within these sites proves conclusively that the African continent is the undisputed Cradle of Humankind.

UNESCO Criteria iii) and vi)

The Fossil Hominid Sites of Sterkfontein, Swartkrans, Kromdraai and Environs were inscribed on the World Heritage List in 1999 under Cultural criteria (iii) and (vi). In justifying these criteria, the World Heritage Committee noted that the Sterkfontein, Taung and Makapan Valley areas contains an exceptionally large and scientifically significant group of fossil sites that are especially rich in hominid fossils that throw light on the development of the earliest ancestors of humankind. They constitute a vast and concentrated reserve of palaeo-archaeological fossils of outstanding scientific significance that provide a comprehensive record of human evolution.

Integrity/Authenticity

The Fossil Hominid Sites of Sterkfontein, Swartkrans, Kromdraai and Environs, Makapan Valley and Taung Fossil Site comprise of separate components that are situated in different provinces and each has a buffer zone. Collectively these components contain the necessary evidence of sites where abundant scientific information on the evolution of modern humans over the past 3.5 million years was uncovered. Furthermore, the nominated serial site covers an area big enough to constitute a vast reserve of scientific information, with enormous potential. Management of each site is guided by the World Heritage Convention Act (Act No 49 of 1999); the National Environmental Protected Areas Act (Act No 57 of 2003) (and the National Environmental Management Act (No 107 of 1998), and the National Environmental Management Biodiversity Act (Act No 10 of 2004). There are also site management plans for each of the sites as well as monitoring and evaluation programmes for each.

As regards authenticity, the sites contain within their deposits all of the key interrelated and interdependent elements in their natural palaeontological relationships. Thus, the breccia contains the fossilised remains of hominids, their lithicultural remains, fossils of other animals, plants and pollen, as well as geochemical and sedimentological evidence of the conditions under which each member of the deposits was laid down. They represent a succession of palaeo-ecosystems.

Most importantly, the site is not merely a vessel for material evidence of the early ascent of humankind. It also contains intangible heritage in the form of belief systems of modern humans and has a sense of place that adds to its qualities as a place of reflection where a certain feeling of 'timelessness' inspire thinking and discussion on humanity from its earliest stages to the present.

It is clear that the value of the Taung Skull cultural landscape is rich and holds opportunity for research and discovery, as well as local economic development and education. The universal value of the Taung Skull Fossil Site should be well understood by all stakeholders involved in the planning and improvement of visitor facilities and infrastructure on the site.

11. Site Description

From the heritage point of view, the geographically described TSFS is best defined through archaeological and palaeontological description, of sites bearing witness to millions of years of common human history, and witness to Africa undoubtedly being the Cradle of Humankind.

Current Site Description

The Integrated Management Plan (IMP) for the Taung Skull Fossil Site 2010 - 2015, is the leading heritage management document for the site, in which the site is described generally and in more specific detail.

General Site Description³

The Taung Skull Fossil Site is situated within a vast abandoned limestone quarry (the Buxton Lime Works), excavated into a series of ancient tufa deposits, which have formed along the flank of the Ghaap Escarpment, just west of the Harts River, 17 km south-west of the town of Taung in the North West Province of South Africa. The famous Taung Child Skull, named as a new species at the time, *Australopithecus africanus*, was blasted out by Lime Workers from a pink stony breccia fissure filling in the Thabaseek Tufa, in 1924.

The Core Area boundary of TSFS includes the entire Buxton Lime Works Area (refer to Existing Site Plan), because there remain numerous other fossiliferous deposits, some of them as yet unexplored, within the fenced area defining the quarry. The diagram of the Proclamation Area and the 41 beacons, defining its outline, are presented on the Site Boundary map. The size of the Core Area is 58.7429 hectares (ha), and includes the full extent of the former lime works, together with the associated lime-burning kilns, industrial buildings and mine compound. The entire Core Area falls within the Remainder of the property Taung 894 HN, and is on state-owned land, which falls under the sphere of influence of the Greater Taung Municipality and the BaPhuduhucwana Traditional Authority.

The Buffer Zone surrounding the Core Area is 3,383 ha in extent, and includes other archaeological sites which fall outside the boundary of the Core Area (refer to Buffer Zone Map). The Buffer Zone partly includes the settlements of New Town, Norlim, Draaihoek, Mokassa, Lokammona, Tamasikwa, as well as other villages in closely proximity, being Takaneng and Thomeng. This Buffer Zone preserves the rural ambience and setting of the Taung Skull Fossil Site by preventing undesirable land use, which may impact on the Integrity and Authenticity of the site, as described through its Outstanding Universal Value. The Buffer Zone is state-owned land which falls under the sphere of influence of the Greater Taung Municipality and the BaPhuduhucwana Traditional Authority.

³ The General Site Description is sourced from the Integrated Management Plan 2010 - 2015.

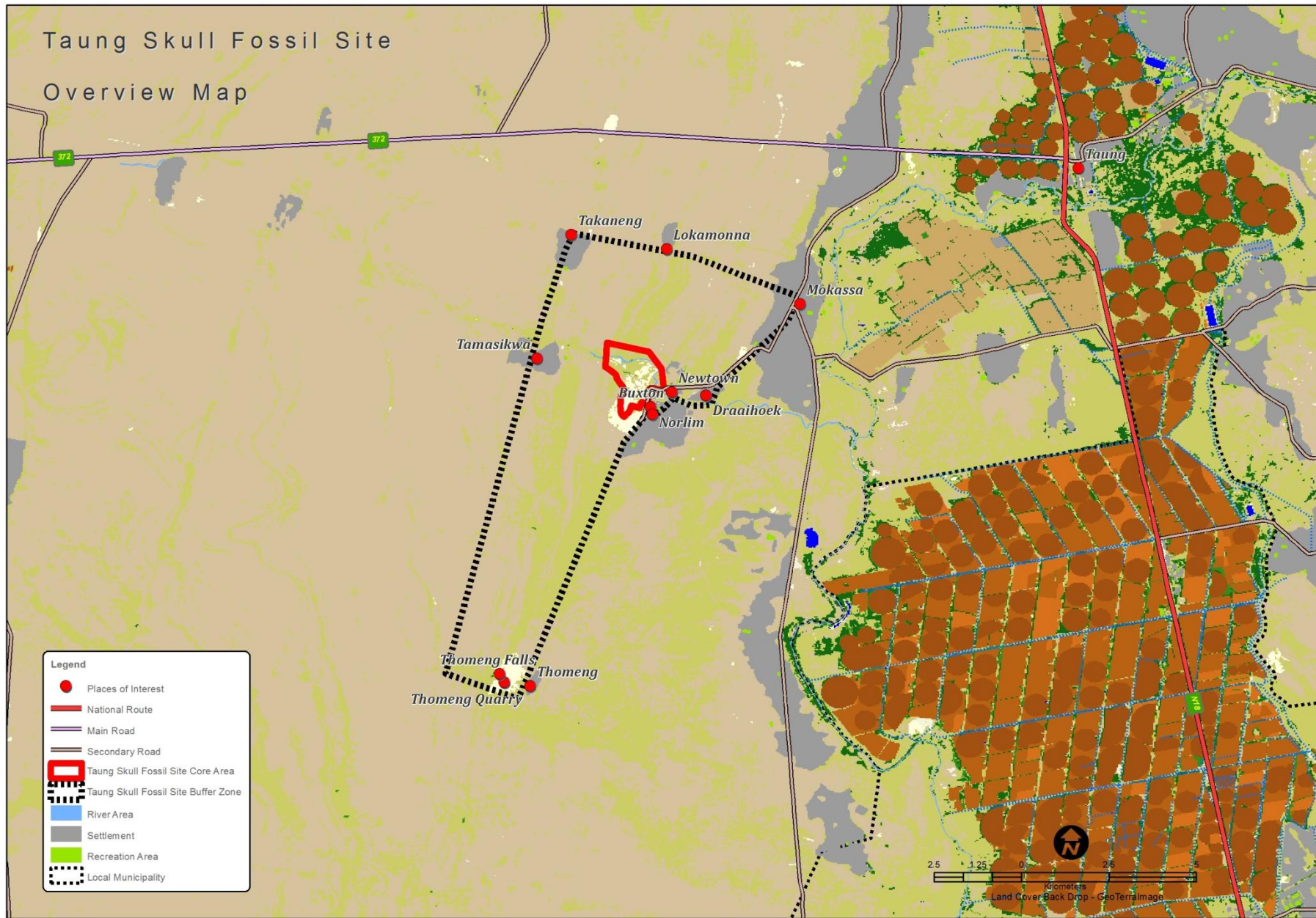


Figure 1: Overview Map of Taung Skull Fossil Site, showing Core Area and Buffer Zone with Villages and Taung

Detailed Site Descriptions

The sites⁴ of palaeontological and archaeological importance have detailed descriptions, while other sites of heritage significance within the Core Area remain to be further described.

Sites of Palaeontological Importance⁵

The Taung Skull Fossil Site at the Buxton Lime Works is best known for the 1924 discovery of the type specimen of *Australopithecus africanus*. The remains of the facial skeleton and endocranial cast of this early hominid child were the first fossils to confirm Darwin's assertions in 1859 that human ancestry probably could be traced to Africa. The discovery inspired 80 years of exploration and excavation in Africa, yielding hundreds of fossils from southern, eastern, and central Africa that trace the evolution of humans and their ancestors for as much as 6 million years.

The tufa accretions of the Buxton Lime Works are riddled with fossil sites sampling the Pliocene and Pleistocene fauna, dating back several million and hundreds of thousands of years. Most of these sites have not been excavated, and thus have potential for future research to investigate long term ecological changes in an area at the edge of the Ghaap Escarpment.

The Taung Skull discovery site comprises two localities near the monument cairn, each of which has multiple deposits. The Hrdlička deposits have yielded primarily *cercopithecoid* fossils, along with a sampling of numerous other species and the age of these deposits are currently under review⁶. The Dart deposits have been postulated to be the location from which the *Australopithecus* fossil came.

The main palaeontological sites are Hrdlička Deposits, Dart Deposits, Tobias Pinnacle Deposit, Berger Cave Complex, Lucky Moon Cave, LSN Cave, Innominate Cave, Quinney Cave, Cut-Through Alley, Black Earth Cave, Peabody's Equus Site, Equus Cave, Blom Cave, Satan Cave, Alcove Cave, Oxland Large Mammal Site and Acacia Cave⁷.

Sites of Archaeological Importance⁸

Intermittent fieldwork over the past six decades at the TSFS has shown that it was occupied by Stone Age peoples for a fair portion of the past hundred or more millennia, with arguably the four most important of the dozen known localities there, being as follows:

- Witkrans Cave has yielded Middle Stone Age artefacts and associated large mammal bones including two to three undescribed modern human molars, all dated to the last 89 000 years ago. This site falls outside the Core Area of the TSFS. It is however included in the Buffer Zone.

⁴ It is noted that Equus Cave, Black Earth Cave and the Drat and Hrdlička Pinnacles have all had some excavation since 2010.

⁵ The description of 'Sites of Palaeontological Importance' is sourced from the Integrated Management Plan 2010 - 2015.

⁶ Pers. Comm. Dr Brian Kuhn. 31 August 2015. Academic paper in review.

⁷ The Cultural Heritage Resource Survey of 2004 provides a comprehensive list of currently documented and widely known and specific sites within Taung Skull Fossil Site that are currently being researched by a variety of institutions, including the University of Witwatersrand, whom were involved in the initial identification and naming of *Australopithecus africanus*, the African Ape of Southern Africa.

⁸ The description of 'Sites of Archaeological Importance' is sourced from the Integrated Management Plan 2010 - 2015.

- Black Earth Cave, where one of the three strata yielded a large fossil mammal fauna including two modern human fragments that may be as old as or even earlier than those of the Witkrans.
- Equus Cave where the deposits produced a vast 30 000 large mammal samples. Identification representing 48 species, including modern human pieces, reflects its use for over 30 millenia as a brown hyena maternity den.
- Power House Cave, where Later Stone Age artefacts and associated large mammal bones relate to an occupation between 3 700 and 2 000 years ago. Schematic rock paintings here and at other sites in the area may be more recent.



Figure 2: North view of Dart's Pinnacle (left) and Hrdlička's Pinnacle (right)

Sites of Mining, Historical or Other Cultural Heritage Importance⁹

The Norlim Quarry at Buxton preserves a number of significant mining cultural imprints, in the form of a mining village *ghost town*, relics of lime-burning kilns and other mining infrastructure. These all add to site ambience and can be used to demonstrate the significance of mining activities in the history of liberating the fossil story from its entombment in the limestone tufas.

The value of the story of Buxton and the discovery of the Taung Child, which was a radical shift in thinking into the origins of humans at the time, can now in terms of UNESCO Criteria vi), bring attention to the living cultural heritage amongst the people of the area, which presents a particular authenticity related to rural living over the ages. Other heritage layers and attributes now need further description, and through further research the history of sacred sites and oral traditions, for instance, can be further described and incorporated into the site history. The improvement of visitor facilities and conservation measures is of critical importance to the success of TSFS as a unique visitor experience, which also ensures that the OUV of the site is protected.

⁹ The description of 'Sites of Mining Historical or Other Cultural Heritage Importance' is sourced from the Integrated Management Plan 2010 - 2015.

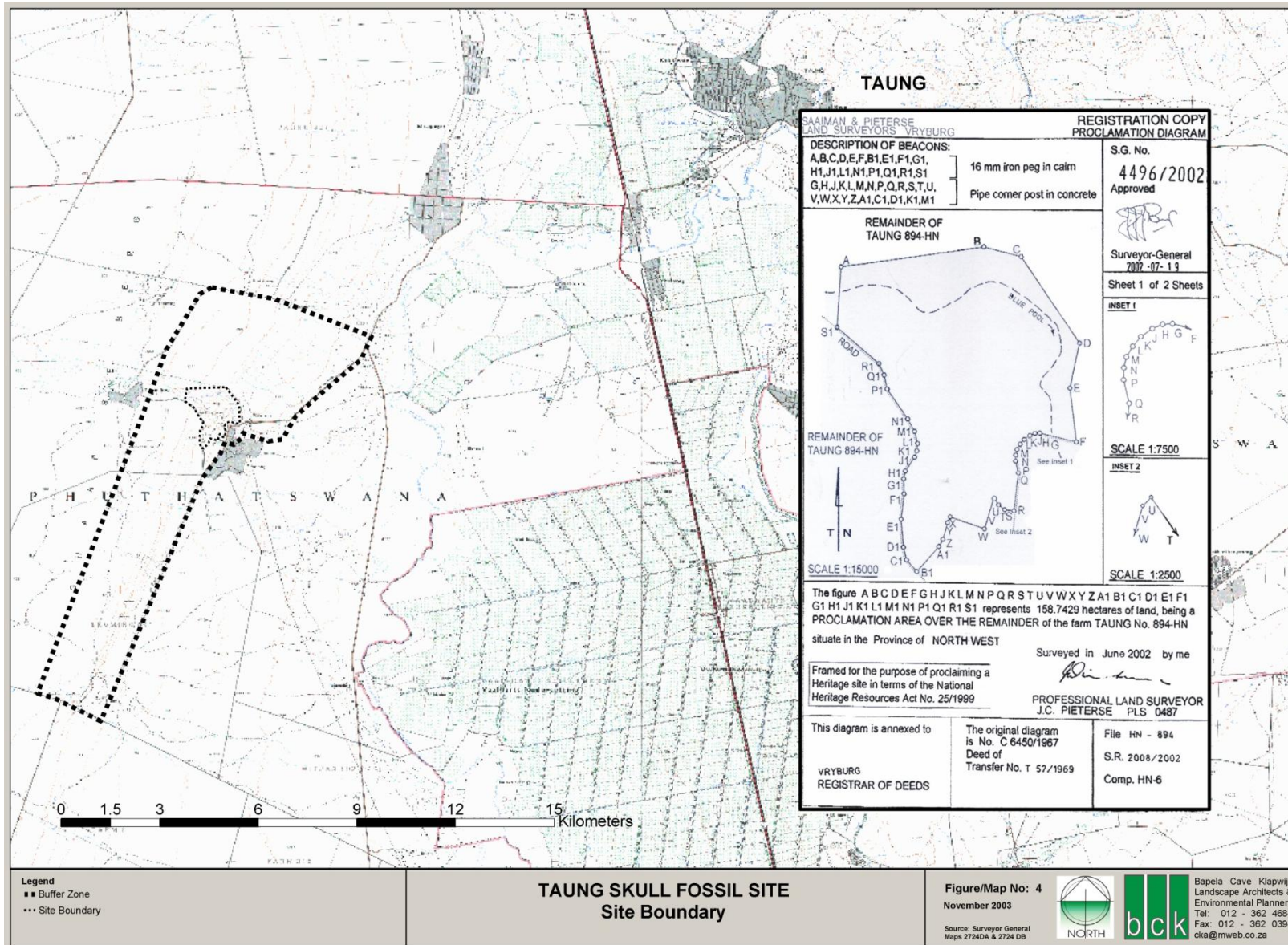


Figure 3: Site Boundary

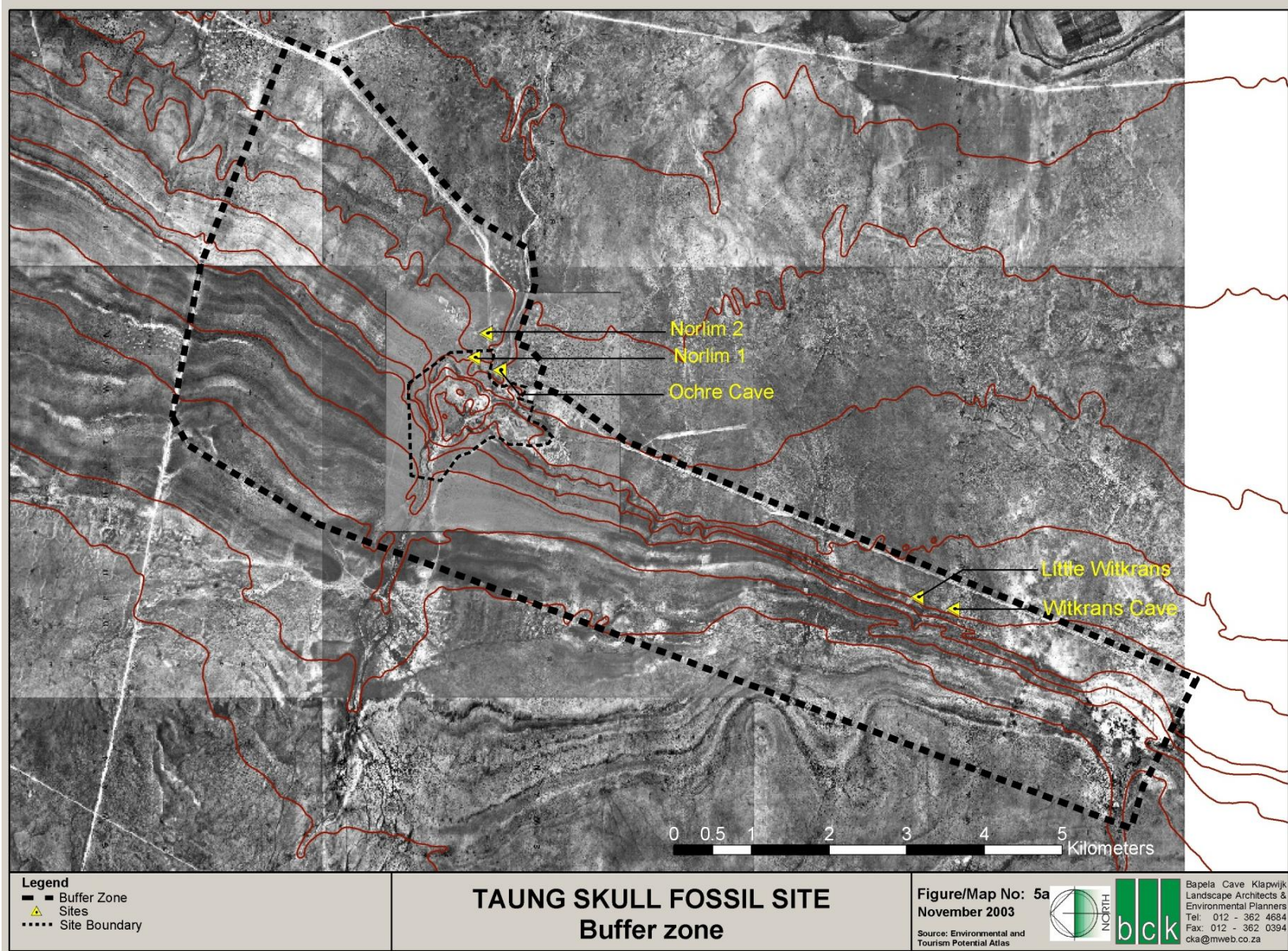


Figure 4: Buffer Zone

12. The Cultural Landscape

A cultural landscape¹⁰ is a landscape designed, improved or at least affected by human activity, whether deliberately or not. In other words, a cultural landscape refers to tangible human modifications of a natural environment and the intangible meanings associated with that modified landscape, like memories, traditions and stories.

The *Application for Inclusion on the World Heritage List* describes the Taung Skull Fossil Site as a cultural landscape that encapsulates not only remains from proto-human *Australopithecine* times over 3 million years ago, but from various segments of the Earlier, Middle and Late Stone Ages to the present. Cultural landscapes typically tend to be layered, reflecting a range of activities over time and the connection of ‘*past, present and future are seamlessly connected*’ (O’Hare 1997:47). The TSFS is no exception and provides rich layered tapestries of people, objects, events and times that provide the site a specific heritage texture.

Examination and appreciation of the different heritage layers and their interrelationships ultimately brings a deeper understanding and appreciation of the universal significance of the Taung Skull Fossil Site. The palaeontology and archaeology of the site has tremendous value and also provides a profound context for the practice of local belief systems, rituals and traditions, by local villagers. The TSFS can be represented through a framework of various interconnected tangible and intangible heritage layers, as listed in Table 3 below, with a variety of interpretive themes related to each.

Table 3: Heritage Layers comprising an Interpretation of the Cultural Landscape

	Heritage Layers	Interpretative Theme
1.	Palaeontology and Palaeo-anthropology	The Southern African Ape and Cradle of Humankind.
2.	Archaeology and African Origins	The common genetic root all people have with the aboriginal Khoisan people of Southern Africa.
3.	Geology and Geomorphology	Interesting geological formations related to tufa limestone deposits and natural freshwater rivers.
4.	Natural Habitat	The value of the natural environment and the need to use natural resources sustainably and rehabilitate natural habitat.
5.	Mining History	How miners came to and lived in Buxton for the commercial mining of limestone for the gold mining industry in the Witwatersrand.
6.	Architectural Setting	Varying living patterns in the landscape from organic rural settlement patterns and building methods of Norlim, Draaihoek, Mokassa, Lokammona, Thomeng, Tamasikwa and Takaneng, to colonial and industrial mining buildings that have been built in Buxton and New Town.
7.	Visual Landscape	Spectacular wide open views at Dart’s Pinnacle and the Hrdlička’s Pinnacle, as well as other views in or bordering the Core Area and Buffer Zone.
8.	Scared Sites, Local Legends, Rituals and Traditional Practices	The use of sacred sites in living local traditions and practises, in which for instance, local people regularly gather sacred healing water from Blue Pools, including historical and contemporary uses and practices.

¹⁰ A **cultural landscape**, as defined by the World Heritage Committee, is the ‘cultural properties [that] represent the combined works of nature and of man.’

The current narrative related to the TSFS, is the story of the Taung Child and the fossilised skull found here in 1924. The palaeontological and archaeological aspects of the site are well documented and researched. There is however much more to explore in the TSFS and many more discoveries to be made. The interesting and rich geology of the site provides a specific point of interest amongst all people interested in rocks and fossils, and these resources must be carefully guarded and protected. The link to the mining history of the town has been documented, yet requires more attention, and including focus on the intricate linkages to urban design, architecture and visual landscape. Further research related to the site can be done through creating local opportunities for local people to be trained in conducting research and documenting heritage.

Tangible heritage like the pinnacles at the fossil discovery site, the caves and sites with old fossils, the natural setting and river, the rocks and buildings constructed, and many more, are all linked to the stories that provide meaning to this physical heritage symbol of global importance. Through understanding the story or narrative of the site, so it gathers meaning for and value to any visitor. All the heritage layers have been well identified in the IMP 2010 - 2015, and now require further research, management, development and interpretation.

13. Status Quo on Heritage Resources and Attributes

The various tangible and intangible heritage layers contain a multitude of heritage resources and attributes, all intricately linked, and providing an interpretation of the history and value of the TSFS. These are catalogued in Status Quo Report. The heritage resources and attributes are grouped according to the proposed heritage layers, which can inform the mapping of the cultural landscape by stakeholders. These layers can be mapped individually or in a multi-layered manner, to deepen understanding and interpretation of the TSFS. The detailed mapping of heritage resources will certainly improve access to information and assist with strengthening management at the site.

It is clear from the site history focuses on the mining history as related to the discovery of the Taung Child Skull was what makes this site of universal and outstanding value and is thus inscribed as a WHS. There is a rich diversity to local traditions, pre-mining history and sacred sites like Blue Pools, Thomeng Falls and Ochre Cave, for instance. Now a deeper understanding of the TSFS needs to be sought together with local stakeholders from Buxton, Norlim, New Town, Draaihoek, Mokassa, Lokammona, Tamasikwa, Thomeng and Takaneng located in, or alongside, the Buffer Zone. The history of the site is best broadened and deepened together with stakeholders, local and from further afield.

The successful operation of the TSFS is dependent on the improvement of visitor facilities, yet the protection of heritage resources and attributes remains of paramount importance. The nature of the site demands that projects be planned and implemented in a sensitive manner so as to enhance heritage values. The project under assessment is certainly required as facilities on the site are not yet adequately developed. Heritage conservation measures must however be put in place, to avoid the further degradation of sensitive heritage sites. Intangible heritage¹¹ related to the TSFS is of great value, its documentation and preservation must be strengthened and no activities on the site, now or in the future, should interfere with it.

¹¹ Intangible heritage needs to be fully explored in the revision of the IMP for the TSFS, due in 2015/16.

PART THREE: PROPOSED DEVELOPMENT

14. Status of Planning at Taung Skull Fossil Site

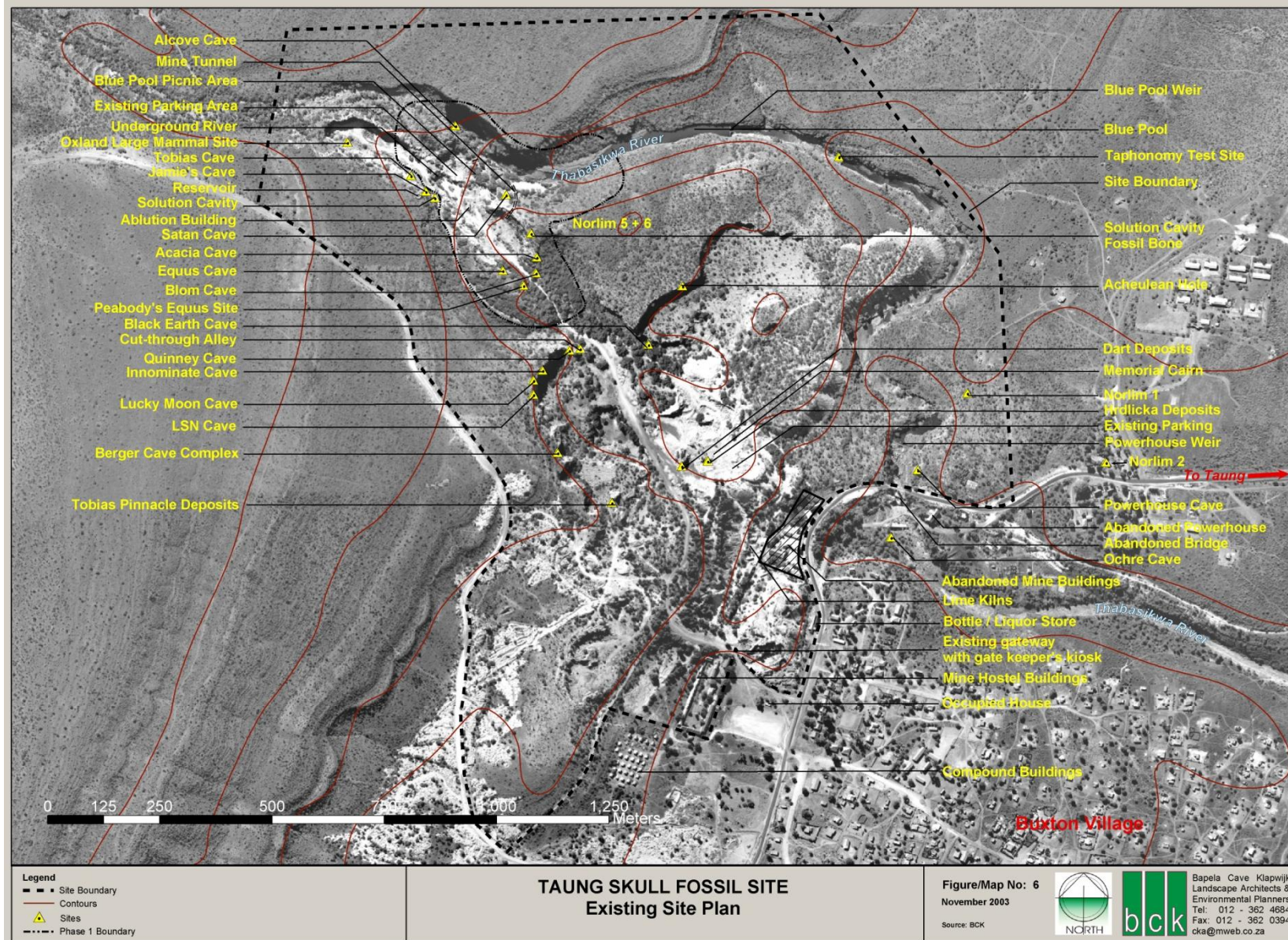
Much planning has been done on the Taung Skull Fossil Site over the years (Refer to Appendix 7 for a summary of TSFS management documents), and culminated in the Conceptual Site Development Plan dated 2003, as compiled by bck (Refer to Figure 5). The use zones shown in the Site Zoning Plan of 2003 (Refer to Figure 5) indicate areas for tourism use and areas for research. The safety risks associated with the use of the TSFS certainly needs to be considered and built into any more detailed planning and use of the site. An immediate response plan is also required to put in place an emergency response mechanism.

The improvements underway and proposed have heritage not only negative but also positive impacts, as assessed in the HIA Report, also detailing the associated impacts and best-practise management measures required to best manage heritage impacts in this WHS. The various project components related to the *Improvement on Visitor Facilities, Site Infrastructure and Heritage Conservation Measures at the Taung Skull Fossil Site*, and status of planning on each, are described in Table 4 below.

Table 4: Status of Planning on Various Project Components

No.	Project Component Name	Level of Planning	Project Status
1	Protection of the core area/fence	Detailed	Site handed over
2	The ablution block- picnic site	Detailed	Site handed over
3	The ablution block-Thomeng Waterfalls	Detailed	Site handed over
4	The road to Thomeng (roads infrastructure)	Detailed	Site handed over
5	The miners compound (restoration)	Detailed	Tender drawings
6	The mine manager's office (restoration)	Detailed	Tender drawings
7	The Power House Complex (restoration)	Detailed	Tender drawings
8	Parking and entrance area	Layout plans	Conceptual
9	Protection of sensitive and dangerous sites: Safety on the site, as well as conservation of Hrdlička's Fossil Site, Equus Cave, Black Earth Cave, and Oxland Large Mammal Site.	Concept	Conservation parameters
10	Trails and signage	Layout	Design stage
11	Memorial site	Layout	Tender drawings
12	Boom Gate and Security Shelter at Thomeng	Concept	Design parameters
13	Historical Buildings in the Buffer Zone	Concept	Conservation parameters
14	Museum and Amphitheatre	Concept	Design parameters
15	Restaurant	Detailed	Tender drawings
16	Auditorium	No plans available	Design parameters
17	Revamping of the Kiln area	No plans available	Design parameters

All of the projects components described above fall within the development framework for the site, and contribute towards achieving the Strategic Objectives of the IMP, all aimed at ensuring the effective use and enjoyment of the site by all visitors, leaving not only a positive experience, but also a lasting learning experience.



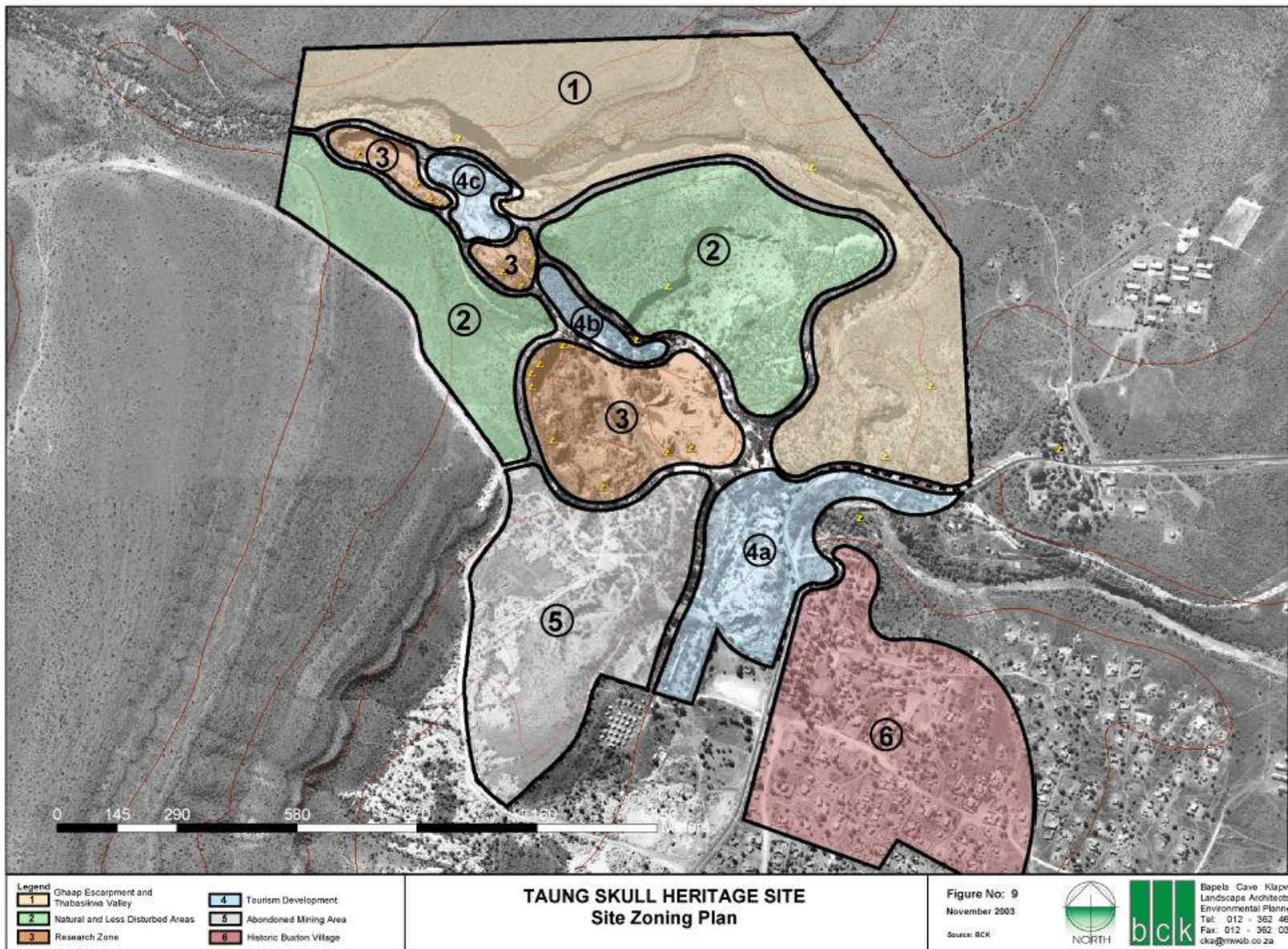


Figure 6: Site Zoning Plan

15. Project Description

Improvement on Visitor Facilities, Site Infrastructure and Heritage Conservation Measures at the Taung Skull Fossil Site includes various project components (PC) amongst others, upgrades to roads, fences, and the construction of ablution facilities, as well as the restoration of buildings as part of the creation of a new entrance for the site at the Mine Manager's Office. All components, including parking areas, facilities and security at Thomeng are described in Table 5 below.

Table 5: Project Components and Physical Attributes

PC No.	Project Component (PC) Name	Component Description	Related Infrastructure	Footprint/Scale
1.	Protection of the core area/fence	Fence to be constructed around the core area to replace the existing fence in parts.	New fence replaces previous and existing fence, in part along the boundary of the core area. The previous fence did not exist for the entire extent of the core boundary line.	Approximately 2,600m² (6.39 km, with trench width of 400mm on average).
2.	The ablution block - picnic site	The ablution facility at the picnic site is under upgrade.	Septic tank system and water supply lines. Electricity line also within close proximity.	Approximately 30m² (5m x 6m building)
3.	The ablution block - Thomeng Waterfalls	The ablution facility at Thomeng Waterfall is to be constructed. Concrete floor slab has been cast.	Septic tank system and water supply lines.	Approximately 50m² (5m x 10m building)
4.	The road to Thomeng (roads infrastructure)	The road to Thomeng is being upgraded.	Stormwater protection measures across the road. Solid waste management during and after construction.	Approximately 66,000m² (7.611 km x 8m road works and parking in Thomeng)
5.	The miners compound (restoration)	Restoration works on the building and surrounding built environment.	Water, solid waste, sewerage, electricity, telephone.	Approximately 1,200m² (200m x 60m wide)
6.	The mine manager's office (restoration)	Restoration works on the building and surrounding built environment.	Water, solid waste, sewerage, electricity, telephone.	Approximately 2,800m² (35m x 80m wide)
7.	The Power House Complex (restoration)	Restoration works on the building and surrounding built environment.	Water, solid waste, sewerage, electricity, telephone, roads, stormwater and parking.	Approximately 1,400m² (35m x 40m wide)
8.	Parking and entrance area	New entrance area to be created at the Mine Manager's Office and surrounds, making allowance for a parking area. A flyover bridge is also proposed.	Roads, solid waste, stormwater, traffic impact, pedestrian safety and most screened location for parking.	Approximately 3,000m² (60m x 50m wide)
9.	Protection of sensitive and dangerous sites: Hrdlička's Fossil Site, Equus Cave, Black Earth Cave, and Oxland Large Mammal Site.	Safety protection measures as recommended under separate consultation. Heritage site protection measures including the construction of paths, information panels, stairs, railing and other signage.	Interpretation signage, benches, paths, fencing and stone barricade walls. Protection measures in heritage sites as per specialist recommendation. Solid waste management.	Approximately 240m² (6 sites x 40m ² each)

PC No.	Project Component (PC) Name	Description	Related Infrastructure	Footprint/Scale
10.	Trails and signage	Trails have been laid out and mapped, with signage being placed along each. Signs have been put in place on steal pegs and trees. The signage can be reviewed and replaced.	Toilet facilities, waste management, safety infrastructure to prevent hikers entering unstable quarry site.	Approximately 5km of trails with no trail building.
11.	Memorial site	The Memorial Site is proposed for an upgrade to include wheel-chair access, a lookout point over Buxton, and access to Hrdlička's Fossil Site through walkway, signage and railing to assist with visitor management.	Paths, solid waste management, parking layout, signage and information boards.	Approximately 3,000m² (65m x 45m wide)
12.	Boom Gate and Security Shelter at Thomeng	The placement of a boom gate and shelter to control and monitor access at the Thomeng Waterfalls.	Roads, yet on existing. Solid waste management.	Approximately 20m² (4m x 5m building with boom gate)
13.	Historical Buildings in the Buffer Zone	The restoration of historical building in the Buffer Zone.	No additional infrastructure to what is already in place.	Existing development footprint.
14.	Museum and Amphitheatre	The construction of a museum through the reuse of existing buildings and infrastructure.	Water, solid waste, sewerage, electricity, telephone, roads, stormwater and parking.	Existing development footprint.
15.	Restaurant	The establishment of a restaurant in the shed alongside the Mine Manager's House.	Water, solid waste, sewerage, electricity, telephone, roads, stormwater and parking.	Approximately 200m²
16.	Auditorium	No plans available.	-	-
17.	Revamping of the Kiln area	No plans available.	-	-

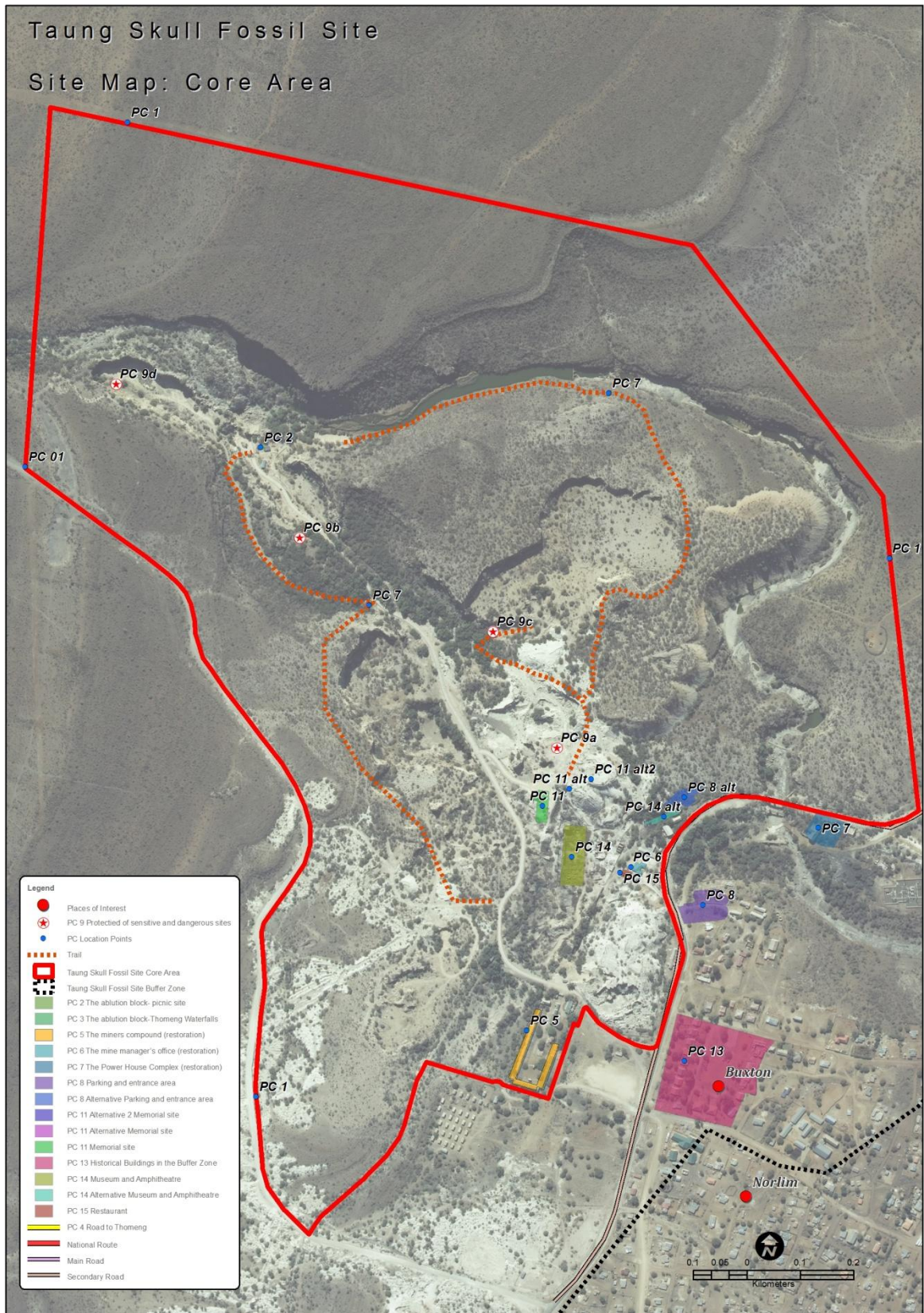


Figure 7: Site Map of the Core Area, showing the various Project Components (PC)

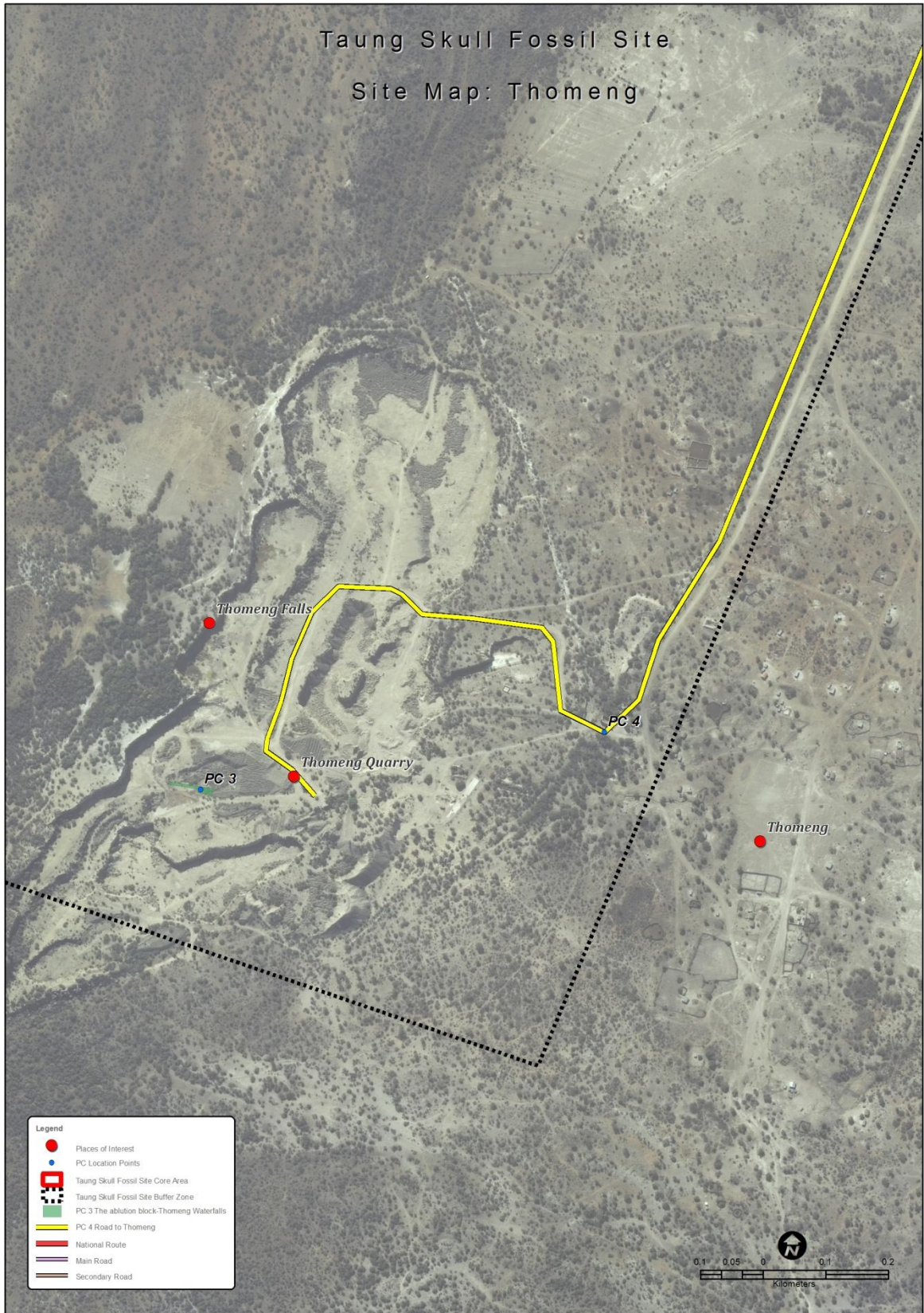


Figure 8: Site Map of Thomeng, showing the location of the Ablution Facility and Road Upgrade

PART FOUR: IMPACT ASSESSMENT

16. Evaluation of Heritage Impacts

The evaluation of heritage impacts is conducted on two levels. Firstly the Conceptual Site Development Plan and Site Zoning Plan are evaluated. The evaluation of this master planning reveals considerations that need to be considered in terms of improving and reviewing overall planning for the site, as deal with the Section 15.1. Secondly more specific evaluation is conducted on the 17 current project components, as detailed in Table 5, making use of comparative impact assessment methodology.

16.1 Evaluation of Conceptual Development Plan and Site Zoning Plan

The Conceptual Site Development Plan and Site Zoning Plan have undergone many years of planning and participation, and as such represent the collective thinking of a variety of stakeholders. These plans were last reviewed in 2003. In general the plans guide project implementation, which has been slower than expected. Two specific components within the conceptual planning do however require consideration, being the establishment of a camping site and use of the lime kiln area for tourism activities.

a) Camping Area

The establishment of the camping area within the Core Area of the TSFS would most likely lead to detrimental impacts to the various heritage sites within close proximity. It needs to be recognised that the removal of fossils and other heritage objects from the site remains a threat. Providing access to campers allows for vehicle access, as well as unguided access within the Core Area. Unguided access in the Core Area also poses a significant safety threat, within an area previously used for mining that has not been stabilised and rehabilitated.

Recommendation: It is recommended that the option to establish a camping area within the Core Area be declined and alternative locations for such a facility be explored within or around the Buffer Area.

b) Lime Kiln Area

The lime kiln area poses various safety issues including unstable mine dumps, near vertical rock walls and derelict buildings and infrastructure. This area is a high safety risk and is highly visual.

Recommendation: It is recommended that no visitor access or development proposals be entertained for this area, until alternatives and all safety aspects have been thoroughly and comparatively assessed.

16.2 Evaluation of Current Project Components

The *Improvement on Visitor Facilities, Site Infrastructure and Heritage Conservation Measures at the Taung Skull Fossil Site* currently has 17 project components under assessment. These project components are assessed across project phases and according to the following assessment criteria:

- Archaeological impacts;
- Palaeontological impacts;
- Visual impacts;
- Ecological impacts;
- Socio-economic impacts;
- Safety; and
- Cultural impacts.

Impact assessment can be done in various ways. For the purpose of this assessment on the 17 project components the heritage impacts are comparatively quantified across a common set of assessment criteria mentioned above. It must be well noted that the quantification of impacts is not an exact science, yet does allow comparative advantage and needs to be based on the same set of assessment assumptions.

Comparative Impact Matrix Evaluation

The results of the assessment are presented as an impact assessment matrix, as detailed in Table 6 and 7. Table 6 includes an assessment where no mitigation measures are adopted and implemented. Table 7 details an assessment of impacts once mitigation measures are adopted and implemented.

One advantage of using the impact matrix method is that one can more easily compare impacts across various components on a single page. In this case the one page assessment compares project components across project phases. Medium to high negative impacts are indicated in red, thus indicating 'red flag' issues that require attention and intervention. The disadvantage of the impact matrix method is that specific impacts are not fleshed out in more detail, as it is not possible to do so with a matrix and on a single page. This requires further detailed scrutiny and has been done for the specific 'red flag' issues that have been highlighted.

Specific mitigation measures are highlighted in the further detailed impact assessment conducted and documented from Tables 9 to 15. The mitigation measures identified are also summarised and categorised according to the 17 project components, as presented in Section 22 of this report.

Table 6: Comparative Impact Assessment Matrix: Project Components across Project Phases and Assessment Criteria – No Mitigation

Phase	Aspect	No Go	Fence	AbPNic	AbTho	RdTho	MCRest	MMRest	PHRest	P&EA1	P&EA2	Sites	Trails	Msite	BoomTho	HistB	Museum	Restaur	Auditor	KinArea	Tot	Avr	
		0	PNo. 1	PNo. 2	PNo. 3	PNo. 4	PNo. 5	PNo. 6	PNo. 7	PNo. 8	PNo. 8	PNo. 9	PNo. 10	PNo. 11	PNo. 12	PNo. 13	PNo. 14	PNo. 15	PNo. 16	PNo. 17			
Construction in Progress	Archeological Impact	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Paleontological Impact	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Impact on Heritage Site	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Visual Impact	-	1	2	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Ecological Impact	-	1	1	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Socio-economic Impact	-	1	1	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Safety	-	0	0	0	-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Cultural Impact	-	0	1	1	-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Planning Design and Construction	Archeological Impact	-3	-	-	-	0	0	0	0	-1	0	1	-1	-1	-1	1	-1	0	-	-	-	-	
	Paleontological Impact	-3	-	-	-	0	0	0	0	-1	0	1	-1	-1	-1	1	-1	0	-	-	-	-	
	Impact on Heritage Site	-3	-	-	-	-1	0	0	0	-1	2	2	-1	-1	0	-1	0	-	-	-	-	-	
	Visual Impact	-3	-	-	-	-1	-1	-1	-1	-2	-1	2	-1	-2	-1	2	-2	0	-	-	-	-	
	Ecological Impact	-2	-	-	-	-1	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
	Socio-economic Impact	-2	-	-	-	1	1	1	1	2	2	1	1	1	1	1	1	1	1	-	-	-	
	Safety	-3	-	-	-	-1	1	1	1	1	-2	1	2	-2	1	1	1	1	1	-	-	-	
	Cultural Impact	-2	-	-	-	0	1	1	1	1	1	2	-1	2	1	2	2	1	-	-	-	-	
Operation and Maintenance	Archeological Impact	-3	0	0	0	0	0	0	0	0	0	-2	-1	-1	0	0	0	0	-	-	-	-	
	Paleontological Impact	-3	0	0	0	0	0	0	0	0	0	-2	-1	-1	0	0	0	0	-	-	-	-	
	Impact on Heritage Site	-3	0	0	0	0	0	0	0	0	1	-1	-1	-1	0	-1	0	0	-	-	-	-	
	Visual Impact	-3	1	1	1	0	-1	-1	-1	-2	1	-1	-1	1	0	-1	0	-1	0	-	-	-	
	Ecological Impact	-2	1	1	2	-1	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
	Socio-economic Impact	-2	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-	-	
	Safety	-3	1	1	1	1	1	1	1	1	-2	1	-2	-2	1	1	-3	1	-	-	-	-	
	Cultural Impact	-2	-1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	-	-	-	
Decommissioning	Archeological Impact	0	0	0	0	0	0	0	0	0	0	-1	0	-1	0	NA	NA	0	-	-	-	-	
	Paleontological Impact	0	0	0	0	0	0	0	0	0	0	-1	0	-1	0	NA	NA	0	-	-	-	-	
	Impact on Heritage Site	0	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	0	-1	0	NA	NA	0	-	-	-	-	
	Visual Impact	-1	-1	-1	0	-1	-1	-1	-1	-1	1	0	0	-1	-1	NA	NA	0	-	-	-	-	
	Ecological Impact	0	-1	-1	1	0	0	0	0	0	0	0	0	0	0	NA	NA	0	-	-	-	-	
	Socio-economic Impact	0	0	0	2	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	NA	NA	-2	-	-	-	
	Safety	-1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	-1	1	1	0	NA	NA	0	-	-	-	
	Cultural Impact	0	0	0	-1	0	0	0	0	-1	-1	-1	0	-1	0	NA	NA	0	-	-	-	-	
Impact Summary	Archeological Impact	-6	0	0	0	0	0	0	0	-1	0	-2	-2	-3	-1	1	-1	0	-	-	-9	-0.5	
Management Indicators	Paleontological Impact	-6	0	0	0	0	0	0	0	-1	0	-2	-2	-3	-1	1	-1	0	-	-	-8	-0.5	
Pre-Mitigation	Impact on Heritage Site	-6	0	-1	-1	0	-1	-1	-1	-1	-1	0	-2	-3	0	0	0	0	-	-	-7	-0.4	
	Visual Impact	-6	1	1	1	0	-3	-3	-3	-5	1	-1	-2	-2	-3	-3	0	-	-	-	-16	-0.9	
	Ecological Impact	-4	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-5	0.4	
	Socio-economic Impact	-4	2	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	0	-	-	32	1.8
	Safety	-6	0	0	0	-1	1	1	1	1	-3	1	-3	0	2	2	2	-2	-	-	2	0.1	
	Cultural Impact	-4	-1	2	2	-1	2	2	2	2	2	2	2	2	2	2	2	2	2	-	-	23	1.7

Assessment Points:

- It is clear that the No Go option will continue to have several significant detrimental impacts across all assessment criteria and that improvement is required.
- The parking and new entrance Alternative 1 (P&E Alt1 PNo. 8) has four 'red flags' identified down the column, highlighting visual and safety issues.
- The parking and new entrance Alternative 2 (P&E Alt1 PNo. 8) has only no 'red flags' identified.
- Clearly there can be archaeological, palaeontological and safety 'red flags' for the sensitive heritage sites (Site PNo. 9).
- Safety issues are also highlighted in trails (Trails PNo. 10) and the monument site (Msite PNo. 11). The monument site also has visual impacts.

From the impact summary at the bottom of Table 6 it shows a significant improvement from more negative indicators on the left to less significant and positive indicators across to the right, even without effective mitigation. Effective mitigation is however required and one would thus expect better impact indicators, as shown in Table 7.

Table 7: Comparative Impact Assessment Matrix: Project Components across Project Phases and Assessment Criteria – With Mitigation

		No Go	Fence	AbPNic	AbTho	RdTho	MCRest	MMRest	PHRest	P&EAlt1	P&EAlt2	Sites	Trails	Msite	BoomTho	HistB	Museum	Restaur	Auditor	KilnArea			
		0	PNo. 1	PNo. 1	PNo. 2	PNo. 3	PNo. 4	PNo. 5	PNo. 6	PNo. 7	PNo. 8	PNo. 8	PNo. 9	PNo. 10	PNo. 11	PNo. 12	PNo. 13	PNo. 14	PNo. 15	PNo. 16			
1	Construction in Progress	Archeological Impact	-	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2		Paleontological Impact	-	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3		Impact on Heritage Site	-	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4		Visual Impact	-	1	2	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5		Ecological Impact	-	1	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6		Socio-economic Impact	-	1	1	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7		Safety	-	0	0	0	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
8		Cultural Impact	-	0	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9	Planning Design and Construction	Archeological Impact	-	-	-	-	0	0	0	0	-1	0	1	1	-1	-1	1	-1	0	-	-	-	
10		Paleontological Impact	-	-	-	-	0	0	0	0	-1	0	1	1	-1	-1	1	-1	0	-	-	-	
11		Impact on Heritage Site	-	-	-	-	1	0	0	0	1	2	2	1	-1	0	1	0	0	-	-	-	
12		Visual Impact	-	-	-	-	1	1	2	2	-2	-2	1	2	1	1	-1	2	2	0	-	-	
13		Ecological Impact	-	-	-	-	2	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	
14		Socio-economic Impact	-	-	-	-	1	1	1	1	2	2	1	0	1	1	1	1	1	1	-	-	
15		Safety	-	-	-	-	1	1	1	1	1	1	2	1	1	1	1	1	1	1	-	-	
16		Cultural Impact	-	-	-	-	0	1	1	1	2	1	2	2	1	2	2	2	1	-	-	-	
17	Operation and Maintenance	Archeological Impact	-	0	0	0	0	0	0	0	0	0	-1	1	-1	0	0	0	0	-	-	-	
18		Paleontological Impact	-	0	0	0	0	0	0	0	0	0	-1	1	-1	0	0	0	0	-	-	-	
19		Impact on Heritage Site	-	0	0	0	0	0	0	0	0	1	1	-1	-1	0	-1	0	0	-	-	-	
20		Visual Impact	-	1	1	1	0	2	2	2	2	1	1	-1	2	1	-1	0	1	0	-	-	
21		Ecological Impact	-	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	
22		Socio-economic Impact	-	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-	
23		Safety	-	1	1	1	1	1	1	1	-1	1	1	1	-1	1	1	1	1	-	-	-	
24		Cultural Impact	-	-1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	-	-	-	
25	Decommissioning	Archeological Impact	-	0	0	0	0	0	0	0	0	0	-1	0	-1	0	NA	0	0	-	-	-	
26		Paleontological Impact	-	0	0	0	0	0	0	0	0	0	-1	0	-1	0	NA	0	0	-	-	-	
27		Impact on Heritage Site	-	0	0	0	0	0	0	0	-1	-1	-1	0	-1	0	NA	-1	0	-	-	-	
28		Visual Impact	-	1	-1	0	0	0	0	0	-1	1	0	0	-1	-1	NA	-1	-1	-	-	-	
29		Ecological Impact	-	0	2	2	1	0	0	0	0	0	0	0	0	0	NA	0	0	-	-	-	
30		Socio-economic Impact	-	0	0	0	2	0	0	0	-1	-1	-1	0	0	0	NA	-1	-1	-	-	-	
31		Safety	-	1	1	1	1	0	0	0	1	1	-1	1	1	0	NA	-1	0	-	-	-	
32		Cultural Impact	-	0	0	0	-1	0	0	0	-1	-1	-1	0	-1	0	NA	0	0	-	-	-	
Impact Summary		Archeological Impact	-	0	0	0	0	0	0	0	-1	0	-1	-	-3	-1	1	-1	0	-	-	-	
Management Indicators		Paleontological Impact	-	0	0	0	0	0	0	0	-1	0	-1	-	-3	-1	1	-1	0	-	-	-	
Pre-Mitigation		Impact on Heritage Site	-	0	0	0	0	0	0	0	0	0	0	-3	0	0	-1	0	-	-	-	-	
		Visual Impact	-	1	1	2	0	3	4	4	-4	3	1	1	1	-3	2	2	-1	-	-	-	
		Ecological Impact	-	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	
		Socio-economic Impact	-	1	1	2	1	1	1	1	2	2	1	1	1	1	1	1	1	-	-	-	
		Safety	-	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	-	-	-	
		Cultural Impact	-	-1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	-	-	-	
		Ttl																				-4	
		Avr																					-0.2

Assessment Points:

- a) It is clear that the No Go option will continue to have several significant detrimental impacts across all assessment criteria and that improvement is required.
- b) The parking and new entrance Alternative 1 (P&E Alt1 PNo. 8) has one ‘red flag’ identified highlighting visual impact issues.

From the impact summary at the bottom of Table 7 it shows a significant improvement from more negative indicators on the left (No Go option) to far less significant and more positive indicators across to the right, as a result of effective mitigation.

Project Component Impact Evaluation

Further detailed impact assessment has been done for the specific project components with ‘red flag’ issues highlighted in the impact matrix assessment in the previous section of this report. A more elaborative set of assessment criteria is used to evaluate each of the project components requiring more detailed assessment, and entail the consideration of extent, duration, magnitude, probability, status, reversibility, irreplaceability and mitigation.

Further evaluation conducted on project components selected with ‘red flag’ issues, as detailed in Table 6, are listed in Table 8 below.

Table 8: Project Components and Further Impact Evaluation

No.	Project Component Name	Further Evaluation	Further Impacts Assessed
1	Protection of the core area/fence	No	-
2	The ablution block- picnic site	No	-
3	The ablution block-Thomeng Waterfalls	No	-
4	The road to Thomeng (roads infrastructure)	No	-
5	The miners compound (restoration)	No	-
6	The mine manager’s office (restoration)	No	-
7	The Power House Complex (restoration)	No	-
8	Parking and entrance area	Yes	Visual impact Safety
9	Protection of sensitive and dangerous sites: Safety on the site, as well as conservation of Hrdlička’s Fossil Site, Equus Cave, Black Earth Cave, and Oxland Large Mammal Site.	Yes	Archaeological impact Palaeontological impact Safety
10	Trails and signage	Yes	Safety
11	Memorial site	Yes	Visual impact Safety
12	Boom Gate and Security Shelter at Thomeng	No	-
13	Historical Buildings in the Buffer Zone	No	-
14	Museum and Amphitheatre	Yes	Visual impact Safety
15	Restaurant	No	-
16	Auditorium	-	-
17	Revamping of the Kiln area	-	-

Table 8 shows that components 1 to 4 are not assessed in more detail, as these are already in the construction phase. All the remaining components are not assessed in more detail since the impacts are less significant or no further planning information is available to assess. In particular, components 5 to 7 are not assessed more deeply, as heritage architects are actively involved in designing the restoration of these components to retain the heritage architectural fabric, as far as is possible. Components 12 and 13 require no further assessment as no plans are available. Component 15 requires no further assessment as it is established within the shed alongside the Mine Manager’s House and will result in no significant impacts. Components 16 and 17 are not assessed further as no plans are available.

Table 9: Potential visual impacts of the proposed entrance area, including parking and other related infrastructure.

Nature of Impact				
Potential visual impacts in the proposed entrance area, including parking and other related infrastructure.				
	No Mitigation		With Mitigation	
	Proposed: Parking S of road	Alternative: Parking N of road	Proposed: Parking S of road	Alternative: Parking N of road
Extent (E)	-2 (local)	-1 (local)	-2 (local)	1 (local)
Duration (D)	-3 (long-term)	-3 (long-term)	-3 (long-term)	3 (long-term)
Magnitude (M)	-2 (medium scale)	-2 (medium scale)	-2 (medium scale)	2 (medium scale)
Probability (P)	3 (high)	3 (high)	3 (high)	3 (high)
Significance Rating (E+D+M)*P	-21	-18	-21	18
Status (+, -, 0)	Positive			
Reversibility	Yes			
Irreplaceable loss of resources	No			
Can impacts be mitigated?	Yes			
Mitigation	<ol style="list-style-type: none"> 1. Make use of existing infrastructure and landscape so as to blend all proposed infrastructure into the visual and physical landscape to the north of the road behind existing buildings. 2. Design all infrastructure in a similar manner and theme to that used on the access road through the Core Area, and the Blue Pools picnic site. 3. All signage for the TSFS should be designed, and be placed in a low impact manner, so as to avoid any negative impacts on the visual landscape. 4. Architectural design for the restoration of the built landscape should incorporate detailed checks from a heritage architect. 			

The site is a sensitive built-environment heritage asset, as it holds testimony the operation of the lime works at Buxton. Visual intrusions will best be noticed upon entering through the New Town area, which opens up a high visual sensitivity area through the Thabasikwe River valley, towards Buxton and the amphitheatre created by the absence of the old lime works.

Table 10: Potential safety impacts of the proposed entrance area, including parking and other related infrastructure.

Nature of Impact				
Potential safety impacts in the proposed entrance area, including parking and other related infrastructure.				
	No Mitigation		With Mitigation	
	Proposed: Parking S of road	Alternative: Parking N of road	Proposed: Parking S of road	Alternative: Parking N of road
Extent (E)	-1 (local)	1 (local)	-1 (local)	1 (local)
Duration (D)	-3 (long-term)	-3 (long-term)	-3 (long-term)	3 (long-term)
Magnitude (M)	-2 (medium scale)	-2 (medium scale)	-2 (medium scale)	2 (medium scale)
Probability (P)	3 (high)	3 (medium)	3 (high)	3 (high)
Significance Rating (E+D+M)*P	-18	-12	-18	18
Status (+, -, 0)	Positive			
Reversibility	Yes			
Irreplaceable loss of resources	No			
Can impacts be mitigated?	Yes			
Mitigation	<ol style="list-style-type: none"> 1. Make use of existing infrastructure and landscape so as to blend all proposed infrastructure into the visual landscape to north of road. No flyover bridge is thus necessary in this case. 2. Design all infrastructure in a similar manner and theme to that used on the access road through the Core Area, and the Blue Pools picnic site. 3. All signage for the TSFS should be designed, and be placed in a low key manner, so as to avoid any negative impacts on the visual landscape. 4. Start slowing traffic down when entering entrance area and narrow bridge. 			

Road, traffic and pedestrian safety around the new entrance and required parking area is of particular importance.

Table 11: Potential archaeological and paleontological impacts in the protection of sensitive heritage sites.

Nature of Impact				
Potential archaeological and paleontological impacts in the protection of sensitive heritage sites.				
	No Mitigation		With Mitigation	
	No Go	Proposed	No Go	Proposed
Extent (E)	-3 (global)	3 (global)	NA	3 (global)
Duration (D)	-3 (long-term)	3 (long-term)	NA	3 (long-term)
Magnitude (M)	-2 (medium scale)	2 (medium scale)	NA	2 (medium scale)
Probability (P)	3 (high)	3 (high)	NA	3 (high)
Significance Rating (E+D+M)*P	-24	15	-	15
Status (+, -, 0)	Positive			
Reversibility	Yes			
Irreplaceable loss of resources	Yes			
Can impacts be mitigated?	Yes			
Mitigation	<ol style="list-style-type: none"> Carefully designed heritage conservation measures with limited and only guided access to sites. Interpretation signage to sensitise visitors to the sensitivity of the heritage sites. Design all infrastructure in a similar manner and theme to that used on the access road through the Core Area, and the Blue Pools picnic site. All signage for the TSFS should be designed, and be placed in a low key manner, so as to avoid any negative impacts on the visual landscape. 			

The heritage conservation measures at the sensitive sites are needed rather urgently to reduce the negative impacts being caused to these sites, with particular emphasis on Equus Cave currently being the most vulnerable.

Table 12: Potential safety impacts related to the use and development of existing trails.

Nature of Impact				
Potential safety impacts related to the use and development of existing trails.				
	No Mitigation		With Mitigation	
	Proposed	Alternative	Proposed	Alternative
Extent (E)	-1 (local)	1 (local)	-1 (local)	1 (local)
Duration (D)	-3 (long-term)	3 (long-term)	-3 (long-term)	3 (long-term)
Magnitude (M)	-2 (medium scale)	1 (small scale)	-1 (medium scale)	1 (small scale)
Probability (P)	2 (medium)	2 (medium)	2 (medium)	2 (medium)
Significance Rating (E+D+M)*P	-12	8	-8	10
Status (+, -, 0)	Positive			
Reversibility	Yes			
Irreplaceable loss of resources	Yes			
Can impacts be mitigated?	Yes			
Mitigation	<ol style="list-style-type: none"> All signage for the TSFS should be designed, and be placed in a low key manner, so as to avoid any negative impacts on the visual landscape and improve safety. Guided tours will significantly improve visitor safety and reduce the risk of heritage impacts being negatively affected. Informing visitors of the inherent dangers in entering and walking around an old quarry and the danger of snakes needs to be done prior to entrance. 			

Sharing of information, guided tours and remaining on designated hiking trails will reduce the existing safety risks associated with entering the site.

Table 13: Potential visual impacts in the Memorial area, including parking and other related infrastructure.

Nature of Impact				
Potential visual impacts in the proposed Memorial area, including parking and other related infrastructure.				
	No Mitigation		With Mitigation	
	Proposed	Alternative	Proposed	Alternative
Extent (E)	-1 (local)	-1 (local)	-1 (local)	1 (local)
Duration (D)	-3 (long-term)	-3 (long-term)	-3 (long-term)	3 (long-term)
Magnitude (M)	-2 (medium scale)	-1 (small scale)	-2 (medium scale)	1 (small scale)
Probability (P)	3 (high)	3 (high)	2 (medium)	3 (high)
Significance Rating (E+D+M)*P	-18	-15	-12	12
Status (+, -, 0)	Positive			
Reversibility	Yes			
Irreplaceable loss of resources	Yes			
Can impacts be mitigated?	Yes			
Mitigation	<ol style="list-style-type: none"> 4. Carefully placed and designed facilities to reduce intrusion into landscape. 5. Interpretation signage to sensitise visitors to the sensitivity of the heritage sites. 6. Design all infrastructure in a similar manner and theme to that used on the access road through the Core Area, and the Blue Pools picnic site. 7. All signage for the TSFS should be designed, and be placed in a low key manner, so as to avoid any negative impacts on the visual landscape. 			

The Memorial area is the most highly sensitive heritage area in TSFS. Visual intrusions will best be noticed from the 1st moment that sight of the pinnacles is gained along the road or walking trails. Visual intrusions in the Memorial site and surrounding visual landscape must be very carefully managed, and is probably the most sensitive visual landscape area on the site. Negative impacts on the Memorial site must be avoided.

Table 14: Potential visual impacts of the proposed new museum in the lime kiln area.

Nature of Impact				
Potential visual impacts in the proposed new museum in the lime kiln area.				
	No Mitigation		With Mitigation	
	Proposed: Museum in lime kiln area	Alternative: Alternative location	Proposed: Museum in lime kiln area	Alternative: Alternative location
Extent (E)	-2 (local)	-1 (local)	-1 (local)	1 (local)
Duration (D)	-3 (long-term)	-2 (long-term)	-3 (long-term)	2 (long-term)
Magnitude (M)	-3 (large scale)	-2 (medium scale)	-3 (medium scale)	2 (medium scale)
Probability (P)	3 (high)	3 (high)	3 (high)	3 (high)
Significance Rating (E+D+M)*P	-24	-15	-21	15
Status (+, -, 0)	Positive			
Reversibility	Yes			
Irreplaceable loss of resources	No			
Can impacts be mitigated?	Yes			
Mitigation	<ol style="list-style-type: none"> 1. Make use of existing buildings and infrastructure, and landscape so as to blend all proposed infrastructure into the visual and physical landscape to the north of the road behind existing buildings. 2. All signage for the TSFS should be designed, and be placed in a low impact manner, so as to avoid any negative impacts on the visual landscape. 3. Architectural design for the restoration of the built landscape should incorporate detailed checks from a heritage architect. 			

The proposed new museum falls in to a high visual sensitivity area situated just above the new entrance area, in the lime kiln area. Visual impacts and likely geotechnical instability count against this location. Alternative locations for the new museum should be considered, with the use of

existing buildings being considered as a priority, like the old Locomotive Maintenance Workshop and adjoining structures.

Table 15: Potential safety impacts of the proposed new museum in the lime kiln area.

Nature of Impact				
Potential safety impacts in the proposed new museum in the lime kiln area.				
	No Mitigation		With Mitigation	
	Proposed: Museum in lime kiln area	Alternative: Alternative location	Proposed: Museum in lime kiln area	Alternative: Alternative location
Extent (E)	-2 (local)	1 (local)	-1 (local)	2 (local)
Duration (D)	-3 (long-term)	2 (long-term)	-3 (long-term)	2 (long-term)
Magnitude (M)	-3 (large scale)	2 (medium scale)	-3 (medium scale)	2 (medium scale)
Probability (P)	3 (high)	3 (high)	3 (high)	3 (high)
Significance Rating (E+D+M)*P	-24	15	-21	18
Status (+, -, 0)	Positive			
Reversibility	Yes			
Irreplaceable loss of resources	No			
Can impacts be mitigated?	Yes			
Mitigation	<ol style="list-style-type: none"> 1. Strict control on access into the lime kiln area and the use of this area is required to reduce safety risks. 2. All signage for the TSFS should be designed, and be placed in a low impact manner, so as to avoid any negative impacts on the visual landscape. 3. Architectural design for the restoration of the built landscape should incorporate detailed checks from a heritage architect. 			

17. Heritage Impact Statement

The impacts related to the proposed project in the upgrading of facilities and infrastructure, as well as the implementation of conservation measures at selected sensitive sites, is required. A detailed impact assessment across all the proposed project components highlights both positive and negative impacts during the project phases that need to be managed accordingly.

The recommendations and mitigation measures proposed, once implemented, will reduce unnecessary negative impacts to heritage resources and thus the integrity of the site. Mitigation is also intended to enhance positive impacts resulting from further development of the site, and detail how to best manage ongoing operational and maintenance activities.

1. The No Go option is assessed in order to provide a reference for the evaluations of impacts. It is clear that to not do anything further at the TSFS would be detrimental to the site as a whole. Intervention is clearly required to allow the site to fulfil its potential as a unique WHS and profound visitor experience.
2. Archaeological impacts can be significant, if sites and visitor access are not well managed. With mitigation and proper site management, these impacts can be reduced. The impacts are deemed insignificant and will enhance sensitive heritage sites, if planned and managed effectively.
3. Palaeontological impacts can be significant, if sites and visitor access are not well managed. With mitigation and proper site management, these impacts can be reduced. The impacts are deemed insignificant and will enhance sensitive heritage sites, if planned and managed effectively.
4. Impacts on specific heritage sites, like Equus Cave, require urgent conservation measures. Further detailed planning of conservation measures is required and this will enhance the heritage value of each of the sites.
5. Visual impacts can be significantly negative, as related to the parking area south of the New Town Buxton road. This area falls within a highly visual landscape and receptivity towards additional infrastructure will be very low and needs careful planning. The possibility of higher negative visual impacts here, as well as around the Memorial Site, calls for the visual landscape to be well managed.
6. Ecological impacts related to the use of the Thomeng Waterfall area is to be noted. This area is of conservation importance and represents not only a rare and unique wetland habitat within a contrasting and relatively dry landscape, yet is also a unique natural formation that makes this wetland site of high conservation importance and interest. Of importance is the management of this ablution facility and the use of the broader Thomeng Waterfall area. Parking areas will certainly reduce current vehicle and access impacts close to the wetland area. Recent inspection shows littering and physical damage to the wetland area through open access. The ecological impacts here can be high and need to be well managed, with a 'no go' barrier demarcated and put in place.

7. Socio-economic impacts are all round positive as related to the further development of the site, as it will stimulate the local economy. Expectations and hopes on the scale and extent of economic opportunity available, or that would be made available, through the development of the site, would need to be realistically positioned and communicated, else such would have negative impacts.

Mitigation measures are proposed to best avoid, and if not possible, minimise the negative impacts, while enhancing the use of heritage resources to also ensure positive impacts. Cumulative impacts must also be considered.

18. Cumulative Impacts

The very purpose of improving visitor facilities and infrastructure at the site is to improve visitor experience and site interpretation, while curbing the degradation of the site. The cumulative impacts refer to additional impacts, which even if acceptable if considered in isolation, would together with the existing impacts, exceed the threshold of acceptability and cause harm to the cultural landscape.

Cumulative impacts that need attention are related to the state of buildings on the site, which are in dire need of restoration. Allowing the built environment to fall into a state of further disrepair would result in a significant negative cumulative impact on the site.

Another cumulative impact of significance includes the socio-economic impacts related to the site and its current state of operation. Currently the site is marginally functional, and improvements are required to enhance and stimulate the local economy.

A significant cumulative impact that needs attention is related to visitor impacts. The impacts of visitors to the site can be both positive and negative. A key negative cumulative impact is allowing visitors free access across the site, and this should not be allowed, especially with higher visitation numbers. A direct impact that is likely to result is the increased removal of fossils from the site, as is reported on other fossil sites. Visitor access needs to be tightly managed and through a well setup guiding system can ensure that visitors are accompanied and do not remove heritage resources.

Ongoing management is going to be required at the site to ensure that visual impacts are continuously managed. No significant cumulative impacts, over and above those already considered in the impact assessment, are foreseen at this stage of the assessment process, as long as visitor management on the site is improved. Alternatively cumulative impacts can be significant, if visitors are not well managed and have unguided access to the site.

19. Social Impacts

The socio-economic study conducted during the EIA process concludes that improvement to visitor facilities will have an improvement on the surrounding socio-economic context.

20. Archaeological Impacts

Archaeological impacts on the site can be minimised through the implementation of conservation measures at the sensitive heritage sites, and by ensuring that visitors are accompanied by a guide when on the site.

21. Palaeontological Impacts

Palaeontological impacts on the site can be minimised through the implementation of conservation measures at the sensitive heritage sites, and by ensuring that visitors are accompanied by a guide when on the site.

22. Visual Impacts

Visual impacts are an important factor in the design and development of the site. The involvement of professional heritage architects ensures the site is restored with integrity, and the reuse of existing buildings requires top priority, as opposed to the construction of new buildings.

23. Mitigation and Enhancement Measures

The various mitigation measures proposed for the improvements to conservation measures and visitor facilities at the site are noted below and further elaborated upon in the Heritage Management Plan (HMP).

It is recommended that all works on the site (planning, design, construction, rehabilitation, operational and maintenance phases) be monitored by the Site Archaeologist on a weekly basis, or as needed basis, and as per the monitoring requirements of the Heritage Management Plan. Outcomes are to be systematically recorded, with assistance being requested from specialists, as needed.

A short report can be written each month and provided to the contractors as well as the management authority, pointing to any unexpected single or cumulative impacts, or potential impacts, so that intervention can occur before damage is caused or resources are wasted. Mitigation measures specific to each of the project components are listed in the Table 16.

The Site Archaeologist may also intervene to direct and or halt activities, so as to avoid heritage resources from being irreversibly damaged. Such measures are more clearly outline in the monitoring provisions in the HMP.

Table 16: Mitigation Measures Specific to Project Components

No.	Project Component Name	Status	Proposed Mitigation Measures
1	Protection of the core area/fence	Construction in progress.	<ul style="list-style-type: none"> a. The removal of the old fence foundation with plastic enclosed, as well as other builder's rubble, to an appropriate waste disposal site that meets high standards for water management. b. The planting of trees for visual screening of the new fence where needed, appropriate and when funds are available.
2	The ablution block- picnic site	Construction in progress.	<ul style="list-style-type: none"> a. Proper security and effective waste management during operation. b. Recognition must be given to the fact the ablution facility is in close proximity to the sacred Blue Pools site, and effective pollution management is thus of critical importance. c. Decommissioning of previous ablution facility to be further considered from a visual perspective, and only if the building cannot be used effectively.
3	The ablution block-Thomeng Waterfalls	Construction in progress.	<ul style="list-style-type: none"> a. Proper security and effective waste management during operation. b. Specific attention of capacity and overflow capacity calculations for the septic tank system, as constructed within a broader sensitive ecological and wetland area. c. Adequate cleaning and maintenance required to reduce pollution risks. d. The proposed water tower must be placed to reduce visual intrusion and avoid skyline intrusion.
4	The road to Thomeng (roads infrastructure)	Construction in progress.	<ul style="list-style-type: none"> a. Finishing of stormwater management structures in stone and concrete, in keeping with the architectural theme of the TSFS. b. Tidying up of road works bulk soils in a visually pleasing manner and including rehabilitation.
5	The miners compound (restoration)	Detailed designs.	<ul style="list-style-type: none"> a. Make use of existing infrastructure and landscape so as to blend all proposed infrastructure into the visual and physical landscape. b. Renovate all buildings and infrastructure to retain the historic architectural fabric and narrative. c. All signage for the TSFS should be designed, and be placed in a low key manner, so as to avoid any negative impacts on the visual landscape. a. Architectural design for the restoration of the built landscape should incorporate detailed inputs and supervision from a heritage architect during the design and renovation phase of the project.
6	The mine manager's office (restoration)	Detailed designs.	<ul style="list-style-type: none"> a. Make use of existing infrastructure and landscape so as to blend all proposed infrastructure into the visual and physical landscape. b. Renovate all buildings and infrastructure to retain the historic architectural fabric and narrative. c. All signage for the TSFS should be designed, and be placed in a low key manner, so as to avoid any negative impacts on the visual landscape. a. Architectural design for the restoration of the built landscape should incorporate detailed inputs and supervision from a heritage architect during the design and renovation phase of the project.
7	The Power House Complex (restoration)	Detailed designs.	<ul style="list-style-type: none"> a. Make use of existing infrastructure and landscape so as to blend all proposed infrastructure into the visual and physical landscape. b. Renovate all buildings and infrastructure to retain the historic architectural fabric and narrative. c. All signage for the TSFS should be designed, and be placed in a low key manner, so as to avoid any negative impacts on the visual landscape. a. Architectural design for the restoration of the built landscape should incorporate detailed inputs and supervision from a heritage architect during the design and renovation phase of the project.

No.	Project Component Name	Status	Proposed Mitigation Measures
8	Parking and entrance area	Conceptual planning.	<ul style="list-style-type: none"> a. Make use of existing infrastructure and landscape so as to blend all proposed infrastructure into the visual and physical landscape, north of the existing road. b. Design all infrastructure to blend into existing landscape. c. All signage for the TSFS should be designed, and be placed in a low key manner, so as to avoid any negative impacts on the visual landscape. d. Architectural design for the restoration of the built landscape should incorporate detailed inputs from a heritage architect.
9.	Protection of sensitive and dangerous sites: Safety on the site.	Study Guideline.	<ul style="list-style-type: none"> a. The specialist study on safety and security on the site will be making important recommendations on how to improve safety on the site, and should be attended as a top priority. b. Make use of existing infrastructure and landscape so as to blend all proposed infrastructure into the visual and physical landscape. c. All signage for the TSFS should be designed, and be placed in a low key manner, so as to avoid any negative impacts on the visual landscape.
9a.	Conservation of Hrdlička's Fossil Site.	Concept.	<ul style="list-style-type: none"> a. Detailed plans be drawn up and circulated for comment and approval. b. Hrdlička's Fossil Site can also be a site that visitors can experience. c. The construction of a simple stone demarcated path and rim platform at the fossil site would work well. d. A 'Stay on the Boardwalk' sign should be included onto the boardwalk up to the site, as connected to the pathways and signage in the larger memorial site. e. A narrow boardwalk can be constructed into the excavation site, for 2 or 3 people to enter at a time, with interpretation signage placed on the structure and restricting reach to any fossils. This platform can be placed on adjustable feet and can be removable, to allow future excavation. f. A barrier can be placed all along the edge of the platform to avoid visitor from reaching to the fossils and an interpretation sign can also be constructed at the fossils. g. The sign for this site should be changed to 'Palaeontological Site'.
9b.	Conservation of Equus Cave.	Concept.	<ul style="list-style-type: none"> a. Detailed plans be drawn up and circulated for comment and approval. b. Equus Cave is fragile and vulnerable site and should be carefully managed. c. The current fence and gate should be retained, with the gate kept locked at all times. d. Access should only be provided with a well trained and TSFS accredited guide. e. Information signs and stone benches can be considered at entrance, outside the fenced area, with the fence being retained in the current position. f. Access to the site can be done in small groups of 3 or 4 people at a time. g. Entrance to the site can be preceded by a 30min interpretation session preparing one to enter the sensitive and fenced area. h. Access can be better managed through the construction of wooden steps and a small platform along the edge and rim of the cave. Such structures provide manageable access that can be anchored with adjustable leg supports, and provide a position at which small groups can view the site. i. Interpretation signage can be placed at the edge of the platform, as well as strategic points like the entrance, to further allow the visitor to understand the site fully. j. This site can be named the 'Equus Cave' and a 'No touching and taking' policy should be implemented.

No.	Project Component Name	Status	Proposed Mitigation Measures
9c.	Conservation of Black Earth Cave.	Concept.	<ul style="list-style-type: none"> a. Detailed plans be drawn up and circulated for comment and approval. b. Black Earth Cave needs to have access restricted, through the construction of a rock barricade to prevent visitors from entering the site. c. A safety warning sign should be placed, clearly stating that no access is permitted. d. The experience of the cave however needs not be lost due to a lack of access. Information boards can provide an even better understanding of the site, enriching the experience of the site, this going a long way to making the shaded areas under the Acacia trees more inviting. e. Stone bench seating can easily be placed here and this low impact suggestion will go well in a relatively harsh and exposed quarry landscape.
9d.	Conservation of Oxland Large Mammal Site.	Concept.	<ul style="list-style-type: none"> a. Detailed plans be drawn up and circulated for comment and approval. b. The Oxland Large Mammal Fossil Site is far more robust and accepting of visitation, yet certainly again not without a recognised local heritage guide. c. Again only small groups of 3 or 4 should be allowed access to the site at a time, accompanied by the guide. d. This site can be named the 'Oxland Large Mammal Fossil Site'. e. A 'No touching and taking' policy should be implemented. f. Stone benches can easily be placed at the entrance in the shade of the Pepper tree, allowing for an interpretation discussion of the site to prepare one for entering the site. g. Appropriate interpretation signage should also most certainly be provided at the base of the site in the shaded area.
10	Trails and signage	Maintenance requirement.	<ul style="list-style-type: none"> a. Hikes to be guided, with exception of organised hiking groups, who must sign off to the use of a hiking code. b. Trail pamphlet and code of conduct for hiking in TSFS. c. All signage for the TSFS should be designed, and be placed in a low key manner, so as to avoid any negative impacts on the visual landscape.
11	Memorial site	Detailed and layout planning.	<ul style="list-style-type: none"> a. Minimal invention into landscape so as to maintain authenticity of the site, thus blending activities and minimal facilities into the visual and physical landscape. b. Design low-impact infrastructure that is placed low to the ground and does not detract from scenic vistas. Smaller pavilion structure to be considered to reduce visual intrusion into the landscape. c. Wheelchair access to the Memorial at Dart's and Hrdlička's Pinnacles. d. Effective information and waste management required. e. Stone packing along path boundary for delineation, with stone sourced from a single approved area by the Site Archaeologist.
12	Boom Gate and Security Shelter at Thomeng	Concept.	<ul style="list-style-type: none"> a. Architectural design, materials use and colours to align with existing design themes in the TSFS. b. Minor infrastructure to be located in manner that is naturally screened and of low visual impact. c. Site Archaeologist to provide input on archaeological and paleontological impacts while locating the position.
13	Historical Buildings in the Buffer Zone	Concept.	<ul style="list-style-type: none"> a. Guideline on maintenance and renovation of existing buildings in the Buffer Zone required. b. Requirement for and purpose of a Built Environment Management Plan to be established.

No.	Project Component Name	Status	Proposed Mitigation Measures
14	Museum and Amphitheatre	Concept.	<ul style="list-style-type: none"> a. Alternative locations of the new museum making use of existing buildings for instance, like the Locomotive Maintenance Shed. b. Design guideline inputs on visual impacts, safety and reuse of existing buildings and infrastructure. c. Minimal invention into landscape so as to maintain authenticity of the site, thus blending activities and minimal facilities into the visual and physical landscape. d. Maximize the use of existing buildings for the museum and interpretation centre. e. All signage for the TSFS should be designed, and be placed in a low key manner, so as to avoid any negative impacts on the visual landscape.
15	Restaurant	Detailed designs.	<ul style="list-style-type: none"> a. Detailed design according to specific architectural fabric of shed alongside Mine Managers House. b. Good waste management must be implemented.
16	Auditorium	No plans.	<ul style="list-style-type: none"> a. Inputs into design and operational matters can be provided.
17	Revamping of the Kiln area	No plans.	<ul style="list-style-type: none"> b. Inputs into design and operational matters can be provided. c. This area could also be left as is, providing interpretation signage and a path through the area, for guided tours.

All of the above measures are included in the Heritage Management Plan.

PART FIVE: CONCLUSIONS AND RECOMMENDATIONS

It is concluded that the implementation of improvements at the TSFS is both necessary and urgent, in order to reduce negative heritage impacts and enhance positive impacts. It is clear that improving socio-economic benefits within the local community is a top priority that the Management Authority needs to continue focussing on.

The recommendations bring attention to pertinent and current issues at the TSFS requiring further action. It is recommended that:

1. The option to establish a camping area within the Core Area is removed from the Conceptual Development Plan and alternative locations for such a camping facility must be explored.
2. No visitor access or development proposals for the lime kiln area are entertained. The lime kiln area falls within a high visual sensitivity area and the visual impacts of any activity need to be strongly considered. Alternative locations and concepts for the museum need to be explored, maximizing the use of existing buildings.
3. The proposed project components 1 to 11 are recommended for approval (with the exception of components 4 and 8) as they will lead to the general improvement of management on the Taung Skull Fossil Site and stimulate local economic development, as well as improve visitor experience and safety. Mitigation measures must however be implemented and conservation measures at sensitive heritage sites requires detailed planning.
4. Detailed plans should be compiled for conservation measures at the World Heritage Property (WHP), as a top priority and specifically for sensitive heritage sites like Equus Cave for instance, and be implemented before visitors are allowed unsupervised access to the sites.
5. Some of the existing buildings earmarked for reuse have stood derelict for years. Their structural integrity must be checked by structural engineers and confirmed during the planning and design phase.
6. The nightscape should be protected through the design of all lighting on the TSFS as low-level, down-facing dim lighting, as far as is possible and without compromising safety.
7. Mitigation and enhancement measures are detailed in a Heritage Management Plan that can deal with planning, design, construction, rehabilitation, operational and maintenance phases of the project. All management and mitigation measures should be implemented to effectively manage heritage resources from user damage.
8. The Conceptual Development Plan for the site was compiled in 2003 and should be reviewed and consolidated to reflect current ideas and intentions of the Management Authority. Such a revised site development plan would be best consolidated together with key and local stakeholders.

9. Further management interventions that are required are policies and strategies that address the issues related to the proposed and steady increase in visitation and usage of the site:
 - vi) Safety Strategy and Emergency Strategy;
 - vii) Built Landscape Management Strategy;
 - viii) Research Policy Strategy and Research Plan;
 - ix) Visitor Management Strategy; and
 - x) Interpretation Strategy.
10. Mapping of the heritage resources be compiled into a GIS database, for ease of access and to enhance planning, management and interpretation at the site.
11. A revised Annual Operational Plan should be compiled for the site to put further focus on an already identified list of tasks that need to be completed. Such a plan typically should contain Key Performance Areas (KPAs), Annual Performance Targets, etc. and monitoring and evaluation of current projects should form part of it.
12. Where details are lacking, impact assessment can be conducted in the future, specific onsite management of impacts of approved projects can be managed with the Heritage Management Plan and through consulting with a qualified advisor, as necessary.

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Glossary

Authenticity and Integrity	Authenticity and Integrity are aspects of related to the quality of heritage that may be protected within a World Heritage Site or other heritage site. Such heritage may date from a specific period of time relevant to the significance of the site. Integrity refers to the degree by which a heritage attribute is still intact, undamaged or uneroded by outside impacts and influences. If it is still in 'good shape' then integrity would tend to be high. A site may not be intact, but it could still be authentic. A ruin with most of its fabric missing, for example, may be authentic because it has not been overlaid or distorted by subsequent layers; in other words it's still the 'real thing'. Memory and documentation can also be authentic (although not necessarily accurate), because it derives from the period under study or from someone who had direct experience of an event. For conservation purposes, neither authenticity nor integrity may be adversely affected.
<i>Australopithecus africanus</i>	The African Ape of Southern Africa, a new name given to the discovery by Dr Raymond Dart in 1924, as a result of the discovery of the Taung Child Skull Fossil at the subsequently named Dart Pinnacle, in Buxton Quarry.
Breccia	A specific kind of rock found within tufa. It is made up of calccrete – a mix of sand, gravel, clay, bones and other material cemented together by calcium carbonate. This rock forms in cavitous areas that occur or occurred in tufa in the past. These holes or caverns are then filled with loose material such as bones, pebbles and sediment and with time become cemented in the same matrix of calcium carbonate. Mineworkers referred to this material as 'impure limestone' and the Taung Skull was blasted out of this kind of rock during mine operations in 1924.
Bioturbation	The burrowing by small mammals, insects and termites that disturb archaeological deposits.
<i>Cercopithecus</i> fossils	A fossil grouping related to old world primate fossils linking to the origins of humankind and Apes from Africa.
Chert	A rock type that is a fine-grained silica-rich sedimentary rock that may contain small fossils. It varies greatly in colour, from white to black, but most often manifests as gray, brown, greyish brown and light green to rusty red. Its colour is an expression of trace elements present in the rock, and both red and green are most often related to traces of iron in its oxidised and reduced forms respectively.
<i>Hyracium</i>	Rock rabbit dung deposits that contain valuable information of the past.
<i>Koekepanne</i>	Small rail trolleys used in the mine for the transport of limestone.
Palynology	The study of the fossil pollens.
<i>Paranthropus</i>	A genus of extinct hominids that was bipedal and probably descended from the <i>Australopithecus</i> hominids millions of years ago. Members of this genus are characterised by robust craniodental anatomy, including gorilla-like sagittal cranial crests, which suggest strong muscles of mastication, and broad, grinding herbivorous teeth. However, <i>Paranthropus</i> skulls lack the transverse cranial crests that are also present in modern gorillas.

Phragmites beds	A common reed that grows in river beds and proliferates when water has been nutrient enriched. Also an effective reed when used in the bio-purification of freshwater systems.
Phytoliths	A rigid, microscopic structure made of silica, found in some plant tissues and persisting after the decay of the plant. These plants take up silica from the soil, whereupon it is deposited within different intracellular and extracellular structures of the plant. Phytoliths come in varying shapes and sizes and it commonly refers to siliceous plant remains.
Outstanding Universal Value	Outstanding universal value means cultural and/or natural significance, which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity. As such, the permanent protection of this heritage is of the highest importance to the international community as a whole.
Sangomas	Traditional healers that practice traditional African medicine and also known as <i>Ngaka</i> (SeTswana) locally. They fulfil different social and political roles in the community, including divination, healing physical, emotional and spiritual illnesses, directing birth or death rituals, finding lost cattle, protecting warriors, counteracting witches, and narrating the history, cosmology, and myths of their tradition. These healers are highly revered and respected in a society in which tradition lives and in which illness is believed to be caused by witchcraft, pollution (contact with impure objects or occurrences, recognised in the form of taboos) or through neglect of one's ancestors.
Speleothems	Cave deposits or formations that are a secondary form of mineral deposit formation in a cave. Speleothems are formed in limestone caves and consist of stalagmites and stalactites, as well as flowstone, for instance.
Stromatolites	Or stromatoliths, a mattress strata or rock, are layered bio-chemical accretionary structures formed in shallow water by the trapping, binding and cementation of sedimentary grains by biofilms (microbial mats) of microorganisms, especially cyanobacteria. Stromatolites provide ancient records of life on Earth within the fossil remains of which might date from more than 3.5 billion years ago.
Toponyms	The study of the history and root associations of place names. Many place names provide insight into the history of a certain place or object, as well as a certain link in time back to a specific event, cultural ritual and/or group of people, for example.
Tufa	Massive deposits formed over millions of years by the precipitation of calcium carbonate rich water flows. Water percolating through the dolomite of the Ghaap Plateau allows it to build up the chemicals necessary for the precipitation of tufa. This process is still happening, and the river provides a modern analogue of tufa formation. It is interesting to note that filamentous algae and mosses growing on the edge of pools are important in facilitating the precipitation process.

APPENDICES

Appendix 1: Acknowledgements and Authorship

Appendix 2: Site Plans and Other Illustrations

Appendix 3: Photographs

Appendix 4: Specialist Studies

Appendix 5: Alternatives Considered

Appendix 6: Heritage Impact Assessment Data

Appendix 7: Summary of TSFS Management Documents

Appendix 8: Public Participation Process

Appendix 9: Response to Comments Report

Appendix 10: Heritage Management Plan



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