

WEST COAST FOSSIL PARK: SITE DEVELOPMENT PLAN IN CONTEXT

1. SITE LOCALITY AND DESCRIPTION

The West Coast Fossil Park (a portion of unregistered Farm 1223, Malmsbury) is located within the Saldanha Bay Municipal Area on the R45 between Vredenburg and Hopefield.

The erven comprising the WCFP have been consolidated into Farm 1223 (which has been approved by the Surveyor General but not yet registered at the Deeds Office). The exact boundaries and ownership of the WCFP and Green Village are yet to be finalised and are in the process of being confirmed. The WCFP is currently comprised of the following portions:

- Remainder Portion 15 of Farm 185;
- Remainder Portion 29 of Farm 185;
- Remainder Portion 45 of Farm 185;
- Remainder Portion 47 of Farm 185; and
- Remainder Portion 1 of Farm 188.

The WCFP is presently zoned Agricultural Zone 1 in terms of the Saldanha Bay Scheme and is approximately 830ha in extent. It is bordered by Green Village, a Primary School, a backpackers Centre and farm land. The Park activities are presently focussed around the existing visitors' centre in one of the old mining offices ('blue building') and the Fossil Dig Site which is presently comprised of two agricultural tunnels. Vula environmental who have been involved in the environmental rehabilitation of the Park after closure of the Phosphate mine also still operate from the largest structure on site, referred to as the 'Green shed.'

NM & Associates Planners and Designers, appointed by the WCFP Trust, are in the process of finalising the required set of documents to submit as part of a Land Use Application associated to the proposed development of a new Interpretive Centre at the Park.

2. PLANNING APPROACH AND PROCESS

The Saldanha Bay Municipality has indicated that through a **Package of Plans approach**, it is possible to begin some building work with a reduced application for development rights as long as a larger Contextual and Conceptual Framework plan accompany such an application and the Development Framework (DF) process for the site at a larger scale is understood to run in parallel with a view to submission of a full Development Framework for the entire site, in time.

Given the need to respond to short term requirements of the WCFP Trust to firstly utilise Lottery money in the building of an Interpretive Centre and secondly construct a new enclosure to the existing Fossil dig later on, a land use application for Consent Use will be made. The land use application approval can be subject to the submission of a Site Development Plan although the intention is to submit the SDP with the Consent Use Application to prevent delays in gaining approvals.

The Consent Use Application will seek approvals to permit the development of an Interpretive Centre supported by a multi-purpose educational facility, exhibition space, a tourist shop, restaurant and administration, parking and landscaping. **The Consent Use will be for the erection of an 'Education building' in an Agriculture Zone. The Application will simultaneously apply for regularising of the existing land uses associated to the core paleontological /archaeological role of the WCFP.**

3. PROCESS TO DATE

A Contextual and Conceptual Planning Framework for the WCFP is in the process of being drafted to accompany the Consent Use Application to be submitted in April 2013. The Contextual Framework considers the role of the Park within its context (regional and local). It should be noted that the preliminary Conceptual framework covers the area comprising Farm 1223, AND additional erven not owned by the WCFP Trust. These additional erven include Green Village and some vacant municipal land. The Conceptual Framework is informed by recent studies, design and technical professional input and stakeholder engagement processes.

The finalised SDP will be included in the Consent Use application. The SDP will focus on the area where the new IC will be constructed and include the Fossil Dig, associated parking areas, landscaping and service infrastructure. For the purposes of the associated Environmental Authorisation process, this area needed to be a maximum of 20ha in extent. This area is referred to as a sub-precinct 1. To see the Precincts and Sub precinct see Figure 1.

The SDP will fix the building footprint and provide a provisional sense of the form and location of new structures including facilities required to deliver water and power and to treat sewage. It will define the parking arrangements, access and circulation requirements for vehicles and visitors on foot. The SDP will also demonstrate the approach of the designers (landscapers and architects) to the site and how they respond to the heritage indicators already identified through the engagement with HWC.

4. PRELIMINARY CONCEPTUAL FRAMEWORK

The Conceptual framework as it stands presently identifies 2 main precincts. The precincts proposed at the moment are not fixed with the exception of Precinct 1B, which is where the new Interpretive Centre is proposed to be constructed. The Precincts are as follows:

Precinct 1

Precinct 1 has been divided into two (1A and 1B) as the area identified as the focus of all development needs to be considered in a phased manner. The Interpretive Centre and potential upgrade of the Fossil Dig site all located within proposed Precinct 1B are understood to be the first phase of development at the Park and development of the old processing plant area in proposed Precinct 1A is seen as a second and long term phase.

Precinct 1A: Tourism / Education Hub

Precinct 1A covers the area previously occupied by the Mining Plant of which there are remnants remaining. It includes the area presently operating as the WCFP's visitors' centre, a very large shed structure (green shed) leased to Vula Environmental Services, the old pilot plant building and a few smaller structures used to accommodate researchers and students working on site as and when required. This precinct is regarded as the existing operations of the Park and presently services the Fossil Dig Site.

It is proposed in the 2011 review of the 2006 Masterplan for the WCFP that this area be reconsidered as a potential activity node / visitor hub, including a research component to be accommodated in the existing visitor centre and a venue for exhibits, special events and venue hire in the green shed. Part of the exhibits could include a mine museum.

The future of the existing rail siding terminating in this precinct is uncertain and will be clarified through the Development Framework Process however at this stage it is considered unlikely that the siding will ever be actively used again.

Future land use activities which have been discussed and may reinforce the notion of the Park becoming a major tourism node include:

- A Science centre focussing on climate change and sustainable technologies;
- A small camp site for educational groups;
- A nursery

Precinct 1B: Museum / Visitors' Centre and Fossil Dig

This precinct is the site of the first phase of development to be funded by the National Lottery Distribution Trust Fund and is to include construction of a new Interpretative centre close to the Fossil Dig site with a museum component, education component and associated functions such as a small restaurant and shop, parking and landscaping. The new Interpretative Centre will be linked to the Fossil Dig via pedestrian paths which will function as part of the exhibition experience. A sub-precinct of 20ha (Sub-precinct 1) defines the main focus of immediate development in this Precinct.

A subsequent phase will involve a structure that will replace the existing covering of the Fossil Dig Site and the construction of carefully designed network of landscaped paths across the mined floor to allow visitors the opportunity to see in-situ fossils.

Precinct 2: Remainder of the site

The remainder of the broader site will be considered in more detail at a later stage. This area is important as it holds further paleontological and archaeological resources including significant features such as the cut face overlooking the main mining basin and blow out area on Anyskop. It will in all likelihood include areas for farming, conservation, recreation and interpretation. The future of the precinct will be best determined at the Development Framework Stage once the full impact of the new Interpretive Centre can be felt.

Precinct 2 also includes areas presently occupied by Green Village, Jurie Hayes Primary School and the Backpackers. At this preliminary stage there is no clarity with respect to how the land around the eastern entrance could possibly be consolidated into a more coherent node but it needs to be

considered as a potential means to see Green Village and the WCFP develop as a coherent node at a larger scale.

5. SITE DEVELOPMENT PLAN FOR SUB-PRECINCT 1

The following provides an explanation of how the Sub precinct is intended to operate. It includes explanations of both the Interpretive Centre (IC) and the Fossil Dig Site notwithstanding the fact that the Fossil Dig upgrading will only happen in further phases to follow. Explanations of the way the Fossil Dig will be handled in the future conceptually are important as the IC and Fossil Dig are programmatically linked.

5.1. Site layout and relationship to the landscape

The location of the new IC has been carefully considered. Its location has been informed by input from a number of specialists, requirements in terms of the WCFP's role as a key educational venue and input from a range of design and planning professionals. **Figure 2.1: Site Development Plan** indicates the new IC location on the west facing slope of an existing overburden mound overlooking Quarry E and the Fossil Dig.

The building has been conceptualised as a set of smaller buildings to prevent the landscape from being dominated by a single large volume. The collection of smaller buildings are linked via a pedestrian street located on the 38 meter contour of the slope. This contour sits midway between the top contour of 46 meters and the bottom contour of 31m. The buildings are strung along this contour as long, thin buildings with their longest elevations always orientated towards the fossil dig site. This reinforces the importance of the dig site and offers significant views from all the buildings towards the dig site. This strategy learns from that which was used by the architect Solomons when he designed the site for the University of Cape Town at the turn of the Twentieth Century. It is hoped that the effect will be similar albeit the buildings are much smaller and more modest in the case of the Fossil Park.

The 38 meter contour is at the level of the street and is the level at which entry is made to all four buildings. It is also the mid-point between the top of the mound and its base. At this level the buildings do not break the continuity of the top line of the mound. (See **Figure 2.2: West elevation**) This strategy works in line with that of Frank Lloyd Wright who declared that when one builds on the slopes of a mountain the architecture should never breach the continuity of the brow of the

mountain. In this way architecture gives over prominence to the importance of nature over the man-made.

The key intention of the Landscape proposals (see **Figure 2.3: Landscape Site Development Plan**) is to unlock the potential of the landscape for learning and in association with the built form, create an improved sense of place. Further the proposals hope to create a sense of identity by using indigenous vegetation, capitalising on the fossils on site and using the landscape features left behind by the mining operations to complete the narrative of what has occurred in recent history.

The randomness of most elements (fossil distribution, overburden, roads) creates the need for legibility through strong structuring elements. The main visible structuring elements currently on the site are the topography and to a lesser degree the established avenues of gum trees and roads. The landscape designers therefore propose the introduction of strong ordering mechanisms to increase legibility and create a sense of place.

5.2. Access, circulation and parking strategy

Access into the Park remains unchanged via the existing entrance off the R45. The intention is over time to improve this entrance with landscaping and a toilet for the guard that already operates from here through restricted hours.

Vehicles will enter through the gate and be directed with signage and landscaping via the existing access road network to a parking area indicated in **Figure 2.1**. This parking area will offer parking for approximately 50 cars and 6 buses. The 50 bays for cars includes approximately 8 bays for staff, which are separated from the visitor parking in the way the layout has been designed.

The sequence of movement from the car park onwards has taken into account the importance of having access to different viewpoints that connect the visitors to the landscape and the dig site, and occurs in the following way:

From the car park the visitor will move along a man-made cut in the overburden mound to emerge into a circular orientation space, which will provide one with the first glimpse of the fossil dig site. **See Figure 2.4: IC Floor Plans** for a more detailed layout of the proposed Interpretive Centre. To the north of this entry point is the multi-purpose education centre and to the south along the pedestrian street lies the visitors' centre and administration. Groups utilising the multi-purpose education centre will go directly there and other visitors will be directed left to enter the visitors' centre, where

they will pay for tickets, secure whatever provisions are needed and visits the ablutions, if required. From here they can either enter the open piazza with views towards the mining basin, and proceed directly to the dig site or continue southwards past the restaurant towards the museum/exhibition centre. To access the entrance of the museum/exhibition centre, one will move through a tropical garden designed to mimic the landscape of 5 million years ago.

On entry into the museum/exhibition centre one will circulate horizontally through a set of spaces which tell the story of the site. A large glass window on the west side will showcase the landscape as an interpretive tool and a timeline located on the opposite wall to the large glass window will help to tell the history of the site. After this experience one will descend to the lower level, which contains the main exhibition spaces via a set of stairs or a small lift. Once the visit to the museum / exhibition Centre is completed one will exit at the lower level onto a circular platform which orientates one towards the dig site being the next part of the visit.

The public will then move along a path and timber boardwalk towards the Fossil Dig where they will move through the two covered spaces on suspended timber decks. From here they will return via another path to the Piazza from where they can decide either to visit the restaurant and play area or return via the visitors centre to the parking area.

Fire and emergency services will be catered for along the 'street' in a similar manner to the way in which these services generally operate along and through city streets. Access for emergency and fire service vehicles will be facilitated via the multipurpose education centre off the existing road network a small part of which is intended to be realigned – see **Figure 2.1**.

The Interpretive Centre buildings will be serviced along the pedestrian street via golf carts or similar. This will include deliveries of all supplies as well as refuse removal. The street will also be wide enough to accommodate large bulked displays intended for the museum / exhibition space.

The Fossil Dig will be serviced via park vehicles after visitor hours using the existing road network.

5.3 Building Programme

The IC centre has been considered as four separate buildings comprising a visitors centre and administration, restaurant, museum/exhibition centre and multi-purpose/education centre.

The Accommodation Schedule below provides a high level breakdown of each building and the activities to be accommodated in each respectively.

Accommodation Schedule			
	Building component	Notes	Area of covered space
Interpretive Centre	Multipurpose Education centre	Multipurpose teaching spaces, storage, staff ablutions and kitchen	184m ²
	Visitors Centre and Administration	Includes offices, a boardroom, ticket office, visitor toilets, staff toilets and kitchen, shop, library	468.5m ²
	Restaurant	Kitchen with internal and external eating areas, staff toilets, storage,	173m ² with external seating area of 130m ²
	Museum / Exhibition Centre	Museum / exhibition space, office, store, interactive lab. Note: this may decrease in size depending on funds available	1198m ²
Internal	SUBTOTAL		2023.5m²
External	Play Park	External play area associated to the restaurant	±70m ²
	Parking Area		± 42 visitor parking bays, ± 8 staff parking bays, ± 8 bus parking bays
Fossil Dig	Fossil Dig		1197m²

5.4 Building Form

(Refer to **Figure 2i-iii**)

The buildings belonging to the IC are linked together by a pedestrian street 5 meters in width and covered with a planted timber pergola for most of its length. In this way the building mass creates an intimate village scale which is appropriate for the site. The buildings are a maximum of two stories in height with the biggest internal volumes being associated to the Interpretive Centre Museum/exhibition centre. Large volumes are required in this space to accommodate large exhibits to illustrate the size of the animals found in the fossil bed.

There is a constant conversation between the IC and the site through glass windows with permeable breeze block screens in front. See **Figure 2iii**. The screens provide solar shield from the western sun, without obstructing views, since they are placed at strategic distances away from the glass and because the size of the blocks allow comfortable views through. The same window and screen design repeat on the Administration building's western facade.

The position of the existing covers of the Dig will be maintained except that the enclosure will be made approximately 50% larger as per a request from researchers to allow future digging to occur under the new cover. The vaulted form of the existing structures will be maintained.

5.4.1 Building restriction areas and other physical restrictions affecting the development

In terms of the Vredenburg-Saldanha Scheme Regulations the consent use to permit an education building within an agriculturally zoned area being applied for has unrestricted parameters.

However while the design of the buildings is unrestricted in terms of development parameters the municipality has discretion to impose restrictions in the best interests of the public and as they see fit. Given that the design of the IC is sensitive and considered in response to the public domain particularly in respect of circulation, and having regard for the intrinsic value of the sensitive environmental, paleontological, archaeological and geological resources, it is suggested that the design be endorsed as presented in the figures attached.

5.5 Materiality and founding strategy

5.5.1 The Interpretive Centre

The materials are informed by the site and the need to explore more environmentally sustainable solutions.

The building will be masonry, retained mostly on the eastern edge but poised over the old mining basin on its west edge. A cut and fill exercise will enable the building to be seated below the brow of the overburden mound.

Different kinds of plaster will be employed externally to represent the horizontal layering of the buildings as elements of the landscape. This is important given the nature of the site as a site of disruption scarred by the actions of the mining operations. The base of the building below the street will be made of a very roughly textured plaster which will be darker than the existing calcrete sand on the site. The exposed wall surfaces above this datum level will be finished in an unpainted plaster which is wood floated and tinted to match the calcrete sand on the site.

All exposed roofing materials will be white colomet “s” ribbed sheeting chosen for its reflective qualities. All doors, windows, general openings etc. will be timber.

The geotechnical investigation undertaken proposes that the buildings be founded using a dynamic compaction technique which will not affect the fossil bearing mine floor. Refer to the letters from Dr D. Stynder (28 March 2013) and M. Van Wieringen & Associates (4 April 2013, ref 31/12) clarifying the nature of the actions required and potential impact on the existing.

5.5.2 The Fossil Dig

The Fossil Dig site provides additional constraints as any structure will be located on ground which cannot be disturbed. For this reason it has been proposed that any new structure be ‘founded’ on stone filled gabions onto which the supports of any new roof structure could be fixed. The new roof structures to replace the existing agricultural tunnels will in all likelihood be reminiscent of the forms that are there now. Two new arched roof structures made from lightweight galvanized steel sections onto which translucent polycarbonate roof sheeting will be fixed, will seal the spaces and facilitate the environmental control necessary to preserve the exposed fossils.

5.5.3 Landscaping

The landscape elements can play an important role in revealing the site and adding to a unified identity as well as integrating the building into the natural landscape. The use of natural materials is encouraged, fitting with the building finishes and the sense of place of the wider landscape. The chosen material should stand up to the harsh climate and add to the philosophy of creating a sustainable built environment.

Surfacing

Where asphalt is laid (and this is only likely into the future when the present access road surface needs to be upgraded), it will have a high content of light coloured aggregate. Where pedestrian volumes are greatest i.e in the Piazza, arrival space and the main path between the parking area and the visitor centre it is proposed that an exposed sandstone aggregate combined with limestone pigmentation be used to form an in-situ concrete surface with appropriate cut-line patterns.

The parking area and roads other than the main asphalted access route, will have a laterite wearing course as per the engineers recommendations.

The pedestrian link between the new IC and the Fossil Dig will be comprised of an upper and lower route, the lower route will be located on more sensitive ground and will therefore be in the form of a timber board walk on pre-cast concrete cube footings to reduce the extent of excavations normally associated with foundations. The upper path is proposed to be laterite edged with semi dressed stone. See **Figure 2.3: Landscape Site Development Plan** for sections through the lower and upper paths.

Planting

In keeping with principle of sustainability and encouraging the ecosystem biodiversity of the site, the plant choices will be locally indigenous and water-wise. The exception to this will be the use of trees that are not indigenous to the site as large trees do not occur in the Strandvelt vegetation type. Trees are necessary to create natural shade and wind shelter, mark and define places and to lend a human scale to the flat open landscape.

The approach to soft landscaping is to use four types of arrangements

- i) constructed landscape around the buildings and parking area with mass plantings of selective species
- ii) the constructed landscape for educational purposes

- iii) natural and rehabilitated landscape away from buildings and blending into existing landscape.
- iv) Extension of existing olive groves as a landscape feature.

Trees that can adapt to local conditions, do not strain the water resources and the surrounding vegetation as well as provide shade and structure are recommended. For this purpose *Acacias xanthophloea* (Koorsboom) and *b. Acacia sieberiana* (Paperbark Thorn); *c. Ficus nataliensis* (Fig) and *d. Olea europaea subs Africana* are suitable.

All landscaping around the building and walkway structures will be highly controlled in terms of alien vegetation eradication and management. Minimal planting will be done on the fossil bed floor to minimize interference with the fossils.

In contrast to the structured landscape, the larger park re-vegetation will continue to be implemented with high priority to controlled alien eradication and succession management. Minimal and highly controlled planting will be done in the identified fossil bed floor minimizing interference with the fossils.

The wetlands are considered to be of high ecological sensitivity and therefore the interventions at the wetlands will be minor, focusing on alien control and a few amenities, such as a bird hide in the future, to enhance the visitor's experience of the wetlands.

5.6 Infrastructure and services

5.6.1 Roads and Stormwater

The Park is largely undeveloped with no natural water courses or water bodies. Water bodies that exist are a result of mining activities that have exposed the water table. With the exception of the new access road to Green Village, the few buildings and a couple of remaining slabs from the mining plant, surfaces are largely porous. The road network in particular is mostly porous with the exception of the access road between the gate and the blue building. It is proposed that this remains asphalt or at least the first section up to the substation. Where we are utilising the existing soft surfaced roads and constructing new roads and parking areas, it is proposed that we provide a laterite wearing course and swales on the edges that accommodate surface run-off. These swales can also act as filters, cleaning the water before it enters more sensitive areas. Footpaths outside of

sensitive paleontological areas will be surfaced in the same manner. Where paths are located on sensitive areas boardwalks will be installed. See Figure 5.3 Landscape Plan for details.

Stormwater has never been a critical issue given the very low rainfall of the region and the rehabilitation exercise which saw to it that all unstable and sandy surfaces/forms were vegetated. However development will result in increased run off so special attention to detail will ensure that point loads are prevented and planting utilised to stabilise and retard water flows in more risk prone areas such as the slopes. With the proposed collection of rain water off all the roofs of the Interpretive Centre there is a reduced risk of erosion from high volume run off through storms.

5.6.2 Water

Water to the WCFP is provided by the Saldanha Bay Municipality from the WCDM Vergeleë reservoirs via a distribution main (225mm Ø) to Langebaanweg Air Force Base. The distribution main is located adjacent to the R45 with the connection point being at the entrance gate.

The instantaneous peak demand for the new IC is calculated to be $Q_p = 4.3\text{l/s}$. The fire demand according to the Red book requirements for a low risk area is 15l/s. There is adequate capacity to address these demands from the LA supply if the main existing supply from the LA connection point at the existing entrance buildings to the blue building be upgraded to a 110mmØ pipe to address the fire fighting requirements and a new water supply be installed between the blue building and the new interpretive centre. The new 110mmØ water supply pipe is proposed to be aligned along the existing road network as far as possible in a trench with a minimum of 900mm cover to the new pipe. This trench will be separate to the trenching for the electrical and telecoms cabling sleeves. Water supply to the Fossil Dig will be handled above ground, between the new IC and the Dig site. The supply pipe can be fixed to the boardwalks if necessary.

In addition to the upgrade of the water supply connection, it is proposed that a 9m³ water storage facility is provided close to the new IC for fire fighting purposes. This will be connected to the building with a new 110mmØ pipe that can if necessary be located above ground. This is in the event that the LA supply is disrupted and a temporary water supply is required to respond quickly.

Water conservation will be a strategy employed to decrease the demand of a scarce resource. Fixtures to reduce water consumption such as low flow sanitary fittings will be installed and the landscaping will utilise indigenous and water wise species. Non-potable water from sewage treatment facilities can potentially be utilised (dependant on the sewage treatment system to be

used) for the flushing of toilets and irrigation (if the quality of the treated effluent is at all times of high enough standard). It is also proposed that rainwater is harvested and that this water is stored underground in tanks below the building and utilised for irrigation of the tropical plants exhibition.

Other landscaping will be irrigated using a combination of grey water and / or borehole water.

5.6.3 Sewage

There is presently no local authority regional water borne sewerage system to connect to. The WCFP is serviced by an AMPAK 1-6 treatment plant close to the old rail siding which presently does not have the capacity to handle the needs of the Park. The AMPAC unit is therefore emptied by a honey-sucker from the SBM on average once a week.

The estimated sewage flows, premised on the assumption that 85% of the potable water consumption ends up in the sewers, are 16.5 kl/day for average visitor periods and 33.1 kl/day for peak visitor periods. Depending on the type of treatment adopted different multipliers will be applied as provision for peak flows / safety factors (see section below).

Given the potential for the new IC centre to showcase more sustainable technology as an educational resource it was decided to service it independently of what operates at present at the Park. There are currently three options for the treating and disposal or reuse of sewage generated at the IC. The first is a Package treatment Plant similar to that used at the Park already. The second option is waste stabilisation ponds (oxidation ponds) and the third option is a Septic tank option.

Option 1 Final: Waste Stabilisation Ponds (Oxidation Ponds)

Treatment of sewerage in waste stabilisation ponds (WSP) involves the sewage passing through a series of shallow dams in each of which a different treatment process takes place – anaerobic in the 1st and 2nd pond and aerobic in the other. The number and size of the individual ponds is determined based on the treatment volumes, but at least 5 ponds will be required. The ponds do not require any mechanical equipment.

It is recommended that the discharge from the ponds pass through a reed bed to polish the effluent for re-cycling.

Because of the capacity of WSPs' to cope with overload it is proposed that the WSP's be designed for an inflow of 1.25 x the flow generated by the average visitor numbers, ie a flow of 20.6 kl/day.

During times of peak visitor numbers the WSP's will be "over-loaded" but as this will generally be for short periods at a time, little impact will be noticed on the quality of the treated effluent discharge.

The WSPs' will require an area of approximately 0.5 ha in extent and have been located on the overburden mound southeast of the new IC where they will not be visible and have less chance of impacting on the visitor experience.

Option 2 Final: Package Treatment Plant

The sewage can be treated in "package" plants (PTP), which for the most part comprise a prefabricated or manufactured unit that is delivered to or assembled at the site where treatment is to take place. The specifics of the treatment process and the equipment involved is in most instances proprietary and thus varies depending on the supplier of the package plant.

For the WCFP it is proposed that this option would include post treatment so that the treated effluent can be re-cycled. Should this option be adopted it is proposed that the package plant be located near the new parking area for ease of access and for close proximity to electrical power, with the stabilisation (maturation) pond and polishing reed beds some distance away so that the ponds don't impact on the paleontologically sensitive areas. The PTP itself will need to be placed above

ground and screened or alternatively also located outside of the paleontologically sensitive areas. Should a PTP be installed it is proposed the package plant design provide for two phases – one for the flow from average visitor numbers and one for the peak visitor numbers. Phase 2 will thus see a doubling of capacity and the end result will be two identical plants operating side by side. Provision will need to be made in future operating budgets for the second package plant. The design flows will be 16.5 kl/d for each plant.

The area required for the package plants will be approximately 500 m² and 0.25 Ha for the stabilisation (maturation) pond and reed bed.

Option 3 Final: Septic Tank

A third option is a septic tank which will be located in a position that allows the tanks to be accessible by large vehicles as they need to be de-sludged from time to time.

The anticipated storage volumes of the tanks are 33 cu m for average flows and double that for peak hour flows. The proposal at present is to pump the effluent to a tank / tanks ($\pm 30\text{m}^2$ in extent) on

the top of the overburden mound east of the IC with the french drains / soak-aways located south of this away from the building to prevent potential 'daylighting' having an impact on visitors.

5.6.4 Power

Power for the WCFP is presently supplied by Eskom via an 11kV overhead line, through a 100kVA transformer close to the 'Blue building'. The transformer feeds through an Eskom meter which is fed to the main distribution board positioned in the blue building.

Given the estimated load of approximately 199kVA for the new IC development, it is proposed that the existing 100kVA transformer is upgraded to a 315kVA mini-sub at the site of the new IC. A new 11kV supply cable will be installed in a trench below the existing road network, 900mm below the surface. The telecoms cables, where required, will be laid in the same trench. Between the new IC and Fossil Dig the low voltage supply cables will be fixed to the underside of the boardwalk to avoid the need to disturb the potentially sensitive ground in this portion of the park.

It has been suggested that the electrical supply to the package treatment plant (should this be the chosen system) be supplied by a PV system.

All cooking will be done using gas. The buildings will incorporate solar water heaters for the ablutions, showers and the restaurant. Energy efficient lighting will be installed throughout the development and the electrical low voltage network will be designed in such a way, that a PV system could be connected hereto and carry a percentage of the electricity supply demand in the future.

Natural Light and Ventilation

In addition the new buildings have been designed as far as possible to maximise on passive cooling and heating opportunities. The following provides an explanation of how the building design has responded to the climatic conditions in a manner which reduces reliance on artificial lighting, cooling, heating and mechanical ventilation.

To ensure that the building does not overwhelm and or dominate the landscape, the building has been designed as a linear set of smaller buildings along a north south axis. The choice to break down the program into smaller buildings, rather than a big mass promotes the use of natural light and ventilation. Most of the buildings are also narrow further aiding natural lighting and ventilation.

The building envelopes will be well insulated, high mass buildings with thermal inertia and strategic punctures based on orientation and ventilation requirements.

A carefully placed breeze block screen will avoid excessive direct heat gain from the west facade during summer and still provide the visitors with views over the dig site. This screen is detached from the west facade allowing any heat transfer to be dissipated through natural ventilation. In the Visitors Centre and Administration, a courtyard planted with deciduous trees is introduced which separates the visitors activities from the administrative activities. The courtyard, which faces east, will shade the Administrative building in summer and will allow early sun through in winter.

The main facades, facing east and west, will allow the buildings to receive early morning and late afternoon sun which will naturally heat up the buildings in winter.

In the museum/exhibition centre, a large rectangular translucent roof is designed to perform two main tasks. The first is to allow natural light into the exhibition spaces, reducing the need to use a great amount of artificial lighting. The second is to naturally ventilate the building using the 'Venturi Effect'. A series of air extractors placed in the roof will help to reduce the power required for air circulation and to provide a more comfortable indoor environment during the day.

The new Fossil Dig cover consists of translucent material to allow for uniform natural light. However requirements for the Fossil Dig to be a dust free environment that is comfortable and vandal proof means that some mechanical controls will be necessary.

Telecoms

Telecoms infrastructure will be necessary to ensure data connectivity at the new Interpretive Centre. The cables will be accommodated with the power supply cables in the same trench and or under the boardwalks as necessary.