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Your Ref: Email received 05 August 2011

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Dear Professor Ellery

RE: ESKOM EIA CONCERNS FOR THE PROPOSED NUCLEAR POWER STATION AND ASSOCIATED INFRASTRUCTURE (DEA Ref. No: 12/12/20/944)

Your submission dated 05 August 2011 has reference. As such please find comment from Dr. Werner Illenberger (comment 1 – 31) and the Nuclear-1 EIA and Technical Teams attached.

Introductory Comment:

Comment on the Addendum to Dune Geomorphology Impact Assessment: Debris flows in the Sand River and potential for flood damage to the R330

Submission made by Fred Ellery, Department of Environmental Science, Rhodes University.

Introduction

I have yet again been presented with material that I find dismissive of issues that I have previously raised with Dr Illenberger. I will cover these here and in a report that accompanies this submission.

Introductory Comment:

Dr Illenberger thanks Prof Ellery for his contribution to this EIA but unfortunately still finds that Prof Ellery's submissions raise few scientifically valid issues.

Comment 1:

Study approach

The complete lack of field work as a part of this investigation is unsatisfactory. The specialist has not engaged in a way to reflect new knowledge on the role of water in structuring the dunefield. This has meant that his ability to explain events such as those that have happened over the weeks in July 2011 leading to destruction of the road bridge on the R330 across the Sand River is limited.

Response 1:

Dr Illenberger questions the validity of Prof Ellery's assumption that not much fieldwork was undertaken. For information:

Dr Illenberger undertook four field visits subsequent to the events that happened over the weeks in July 2011. He also procured a very valuable and extensive collection of aerial photographs taken by

Mr Don McGillivray of Afri-Coast Engineers on 9 July, two days after the destruction of the Sand River culvert.

Dr Illenberger performed additional investigation, such as grain size analyses and macro photographs.

Dr Illenberger procured aerial photographs taken 24 March 2011 of the whole area from Oyster Bay to the mouth of the Kromme River to Cape St Francis, taken at a resolution of 200 mm, as well as Lidar elevation data for the same area, accurate to 100 mm. The above were procured from Eskom, which commissioned the work.

Dr Illenberger also has very extensive experience and knowledge of the area gained over 27 years, including traversing the entire length of the Oyster Bay dunefield, numerous other forays into various parts of this dunefield, including exploration of the Sand River after flood events. Hundreds of field trips were undertaken.

Dr Illenberger additionally draws on the extensive experience and knowledge of his colleagues gained over the past 30 years, as detailed in the Geomorphology and Addendum Reports. He has been communicating with Mr. Frank Silberbauer, who has considerable experience and knowledge of the Sand River gained over many years. Considering that dune-sand dam breach events like the one that caused the destruction of the Sand River culvert on 5 July 2011 has happened previously in the recent history of the area, e.g. in 1992 and 1998 (Addendum Report, page 15) all this experience and knowledge is directly applicable to the events that happened in July 2011.

Prof Ellery, in an e-mail of 17 October 2010, stated "[Dr Illenberger] has an infinitely larger data set than we could ever collect".

It can be safely concluded that Dr Illenberger has sufficient information available to provide a robust analysis and interpretation of the events of July 2011.

Comment 2:

It has also meant that his views are entirely favourable in respect of the planned development, notwithstanding threats to infrastructure posed by natural processes.

The implication of the use of the study approach used here is that the dunefield is fully understood or can be understood entirely using remote sensing and interviews with local residents.

For a problem of the magnitude being examined here, nothing could be further from the truth. As a field scientist I am of the view that there is no substitute for field investigation, particularly during periods of contrasting climatic and environmental conditions in an unstable and dynamic environment such as this.

Response 2:

Please refer to Response 1. It is clear from this response that Dr Illenberger has undertaken more than sufficient field investigations of the Oyster Bay mobile dune field over many years, and also drawn on local knowledge and extensive data in the form of detailed aerial photographs and topographical maps. His assessment is not based only remote sensing or interviews. His views on dune dynamics and the implications for the development of Nuclear-1 are based on objective evidence.

Comment 3:

To illustrate this, I wish to capture the differences in perspective with respect to the structure and function of the dunefield between myself and Dr Illenberger. The critical issue in my view relates to the role of water in sediment transport in the eastern third of the Oyster Bay Dunefield. Dr Illenberger claims that the role of water in sediment transport has been adequately covered in the original Dune Geomorphology Specialist Report, which I have read repeatedly in respect of this issue. All the material on the role of water in sediment dynamics is provided in Table 1.

Table 1: Reference in Dr Illenberger's "Dune geomorphology specialist report" concerning the role of water on sediment dynamics.

Page/s	Para/s	Line/s	Text
17	3	1-3	Full quote: "The eastern third quarter of the dunefield is drained by the Sand River, which flows episodically during periods of high rainfall; floods transport appreciable volumes of sand into the Kromme estuary" End of quote. I am not sure what is meant by the "eastern third quarter" and assume it is an editorial error.
26	3	1-11	Reference is made to the eastern third of the Oyster Bay dunefield being drained by the "fairly permanent Sand River" and the suggestion is made that the "steeper slope of the eastern sector helps the Sand River keep its channel open because river flow is fast, and hence has strong erosional power." The material then goes on to suggest that "The smaller dunes in the eastern sector will also make it easy for the river to keep its channel open, as less dune sand needs to be eroded and carried downstream by the river". Remarkably, the author then says that "Surface flow only occurs after high rainfall events; the river responds rapidly to such events". Nevertheless, nothing more is said in this paragraph about the interaction of surface flow and sediment transport.

This (14 lines of text) is the sum total of what is said about the role of surface water in respect of the sediment dynamics of the Oyster Bay Dunefield. There is no reference to possible damage to infrastructure by surface water flow. I find that this is inadequate consideration of the relevant issues, particularly in the light of events in the dunefield over the period 7 to 26 July 2011.

There is no reference whatsoever in the report to:

- Flood deposits along the Sand River;
- Flood events and damage to infrastructure over the past decade or 2; and
- The likelihood or possibility of flood damage to infrastructure.

These are serious omissions because they relate directly to risk associated with the development and the infrastructure supporting it, and therefore cannot be overlooked.

Response 3:

Dr Illenberger would gladly correct the editorial error in "The eastern third quarter of the dunefield is drained by the Sand River". The below paragraph corrects the error and provides further explanation:

> "The eastern half of the dunefield that is currently still active (i.e. excluding the portion that has been artificially stabilized – the portion east of the R330) is drained by the Sand River, which flows episodically during periods of high rainfall; floods transport appreciable volumes of sand to the Kromme estuary. About half of the catchment of the Sand River is farmland to the north of the dunefield."

Furthermore, the Sand River, its floods and its effects on infrastructure are dealt with extensively in other parts of the Geomorphology Report as well as the Addendum Report (The Risk of Debris Flow, Appendix E30 of the Revised Draft EIR). It would appear that Prof Ellery has overlooked or ignored these parts of the text, which is puzzling, considering that the content of Dr Ellery's submission concerns the issues addressed in the Addendum Report. See also Response 1.

Comment 4:

The view of the role of surface water in sediment transport of Dr Illenberger is interesting and conflicts strongly with my own. His view is spelled out very clearly in the Dune Geomorphology Specialist

Report as follows (page 26 paragraph 3), and explains his lack of due consideration of the role of surface water in sediment transport in the eastern part of the dunefield.

I quote: "The steeper slope of the eastern sector helps the Sand River keep its channel open because river flow is fast, and hence has strong erosional power. The smaller dunes in the eastern sector will also make it easy for the river to keep its channel open, as less dune sand needs to be eroded and carried downstream by the river."

This view is of a passive and rather insignificant river that simply responds to prevailing conditions that are structured by wind. It is a river that can keep the channel open because of the steeper slope on the dunefield (the river is helped in keeping its channel open).

Furthermore, luckily for the channel, the wind-blown dunes are smaller, so that there is not so much sediment for the river to move. Therefore, the little Sand River keeps an open channel.

To reiterate, the view here is of the Sand River being shaped by wind-blown dunes. The river is passive:

The steeper slope allows the river to keep its channel open, (my emphasis) and because dunes are smaller the river is more easily enabled to keep its channel open (again my emphasis).

Response 4:

The sentence "The steeper slope of the eastern sector . . ." quoted by Prof Ellery was used to compare the influence on dunefield dynamics of the Penny Sands River in the western sector (where the slope is lower and dunes are higher) with that of the Sand River in the eastern sector (Dune Geomorphology Specialist Report, page 27). The quote in Comment 4 was taken out of context and thus does not provide an accurate reflection of the meaning in Dr Illenberger's report.

See also Response 5.

Dr Illenberger finds it regrettable that Prof Ellery had not communicated with him regarding the precise meaning of his text, rather than making assumptions. This would have eliminated Prof Ellery's apparent mis-interpretations, and made for much more meaningful and valuable constructive interaction in the EIA process. Dr Illenberger has always readily corresponded with Prof Ellery via e-mail and telephone.

Comment 5:

My view of the Sand River is quite the opposite. The Sand River is the very reason that the eastern part of the dunefield has a steep slope – it is the primary reason for the present structure of the eastern part of the dunefield.

It is not a meek river, but comes down in flood periodically, with devastating consequences. Developers should bear in mind the unpredictable and destructive nature of the Sand River because when it flows high, it is powerful and can be destructive, with devastating consequences for infrastructure!

I have been saying all along that one needs to have a much greater focus in the Dune Geomorphology Specialist Report on the role of the Sand River in respect of its episodic discharge and capacity to transport large quantities of sediment during floods. It occasionally results in debris flows.

My view is that it is more important to focus on the behaviour of this stream than on the work of wind, because this river is the key agent of sediment transfer in the eastern part of the dunefield.

Response 5:

The Dune Geomorphology Assessment (Appendix E2 of the Revised Draft EIR) has never claimed that the Sand River is a meek and mild river. The Sand River, its floods and its effects on infrastructure

are dealt with extensively in the Addendum Report, which report is not referred to by Prof Ellery and therefore does not appear to have been perused by Prof. Ellery.

Also, when considering the Cape Recife headland bypass dunefield, whose dimensions, geomorphologic setting, upwind and downwind slopes and dune dynamics are virtually identical to the Oyster Bay Dunefield (except that there is no river involved in moving sand downslope in the eastern sector of the former dunefield), it is clear that wind can be the major sand-transporting agent in such a setting.

There are many other examples of headland-bypass dunefields where wind is the prime agent that blows sand downslope over headlands. Sand dunes with large slip-faces that are only formed by wind-blown sand occur throughout the eastern sector of the Oyster Bay Dunefield. The sand dune that totally blocked the Sand River in 1992 (Addendum Report, Figures 5.3, 5.4 and 5.5) was formed by wind. This clearly shows that wind is a significant agent moving sand downslope in the eastern sector of the dunefield.

To expand on Dr Illenberger's reports:

It is clear from historic photographs of 1942, 1961 and 1969 that the advancing tip of the Oyster Bay Dunefield was wind-driven, and substantial volumes of sand were moved. At the same time, the Sand River was carrying appreciable volumes of sand eroded from dunes, and depositing it in the Kromme Estuary. Thus the morphodynamics of the dunefield involve both wind-blown and water-borne sand.

Wind-blown sand movement immediately upwind of the R330 was stopped by drift fences built from the 1960's onwards. Appreciable volumes of sand were trapped in this way. The current situation is that the Sand River is the only natural agent transporting sand out of the eastern end of the dunefield, and sand mining is the other significant agent removing sand from the eastern end of the dunefield.

Comment 6:

Once again, I wish to re-iterate what it is that is being said. East of the crest of the dunefield the landscape is fundamentally shaped by fluvial processes:

- Streams control the slope on the land surface and are the main agents structuring the landscape.
- This is achieved by flooding and transport of sediment by water
- It happens intermittently and is episodic
- It may have dire consequences for humans interacting with this landscape, including engineered structured built with the best intentions.

Response 6:

It is clear from Dr Burkinshaw's PhD thesis that wind is the prime agent *shaping the dunefield*, and the significant contribution of the Sand River to the dunefield morphodynamics is clearly identified in her thesis and subsequent work (see Geomorphology and Addendum Reports).

Also see Response 5.

Dr Illenberger clearly states in the conclusions of the Addendum report that "Road engineers should check what flood recurrence interval the culvert [where the R330 crosses the Sand River] can handle, and improvements should be made if necessary".

Comment 7:

The differences in my view of the dunefield and that of Dr Illenberger are profound in respect of what they mean for development and risks thereof.

This is readily illustrated by recent events in St Francis Bay where the road bridge on the R330 was washed away. Dr Illenberger might think that these are caused primarily by human actions; I think

they are a natural process and have happened before modern humans occupied and transformed the land.

Indeed, they are aggravated by human activities, and what we see today is a consequence of natural processes AND the cumulative effects of human activities. These factors provide good reasons to be cautious in considering future developments.

Response 7:

Dr Illenberger concurs that human activities have had a significant and cumulative impact on natural processes in the dunefield and surrounding area. The consequences of this are dealt with in the Addendum Report.

Also see Response 6.

Comment 8:

Debris flows
It is useful to clarify terms used in this discussion. I have used the Penguin Dictionary of Physical geography for much of the material provided here (Whittow 2000).

Definitions:

Dr Illenberger in his Addendum Report provides a good picture of what debris flows are. They are rapid flows of solid debris that are a consequence of unconsolidated sediment being liquefied and therefore moving rapidly downslope. This definition is consistent with the definition of debris flows provided by Dr Illenberger.

They:

- typically occur in environments with steep slopes;
- require a large supply of unconsolidated sediments;
- require a large volume of water; and
- typically occur in areas where unconsolidated sediment is poorly vegetated or un-vegetated.

All of these conditions are met within the Oyster Bay Dunefield.

Response 8:

In comment 8 Prof Ellery has ignored other crucial features of debris flows that are not present in the Oyster Bay Dunefield, as proven in the Addendum Report. Prof Ellery seems to have missed the point that the deposits are DEFINITELY NOT debris flow deposits, as proved conclusively in the Addendum Report.

Comment 9:

A further term that may be useful to define is slope failure, which is a general term relating to the downward movement of a large amount of slope material. There are several types of slope failure, of which two are of interest here – a flow and a slide. A flow is a slope failure that takes place in the presence of a large amount of water in the form of a mudflow or a debris flow. A slide is a rapid movement of slope material in the absence of a large amount of water (Figure 1).

Figure 1: A series of slides (indicated by 4 sets of arrows along the slope) where slope material has moved downwards without water acting as the medium causing slope failure.

Response 9:

Dr Illenberger cannot comment on Prof Ellery's photo and description of supposed slope failure without having visited the site, apart from observing that it can be seen in the photograph that the Sand River eroded into the base of the deposit during the recent floods, which would have caused slope instability, and it is quite possible that the sandy slope had a high water content during the time of the floods.

Comment 10:

Interpretation of the occurrence of debris flows in the Oyster Bay Dunefield:

In conjunction with the photographic evidence I have of what I and others identified as debris flow deposits (including initially Dr Peter Illgner), I have provided in an attached report compelling evidence of the circumstances leading to debris flows in the Sand River, and there is little doubt in my own mind that debris flows happen intermittently in the Oyster Bay Headland Bypass Dunefield.

We might invite a neutral specialist to judge our differences, but I do not think this is necessary because debris flows and floods are the main threats to infrastructure to be used to access the proposed power plant.

Response 12:

Prof Ellery seems to have missed crucial conditions necessary for a debris flow:

The eastern sector of the Oyster Bay Dunefield slopes eastward with a slope of 1:85 (1.2% or 0.67°). A slope of AT LEAST 15º is required to initiate a debris flow. Thus there must have been a substantial steep hill of sandy sediment upgradient, i.e. west, of the supposed debris flow deposits, in the dunefield, to form a debris flow of any size. There is no evidence that such a hill existed. Dr Illenberger invites Prof Ellery to provide evidence of such a hill.

Debris flows can continue flowing on shallow slopes, at least 1º, until friction dissipates their inertia. Considering that the slope of the dunefield is 0.67°, it is impossible for a debris flow to move down the dunefield. Also, Prof Ellery seems to imply that debris flows can initiate on the slope of the dunefield, which is clearly totally impossible.

Also see Response 11.

Comment 11:

It is useful to examine the language used by the specialist in this report. On page 8 (paragraph 3) he says that "The opinion of the above specialists is that the supposed debris flow deposits are river flood deposits ... ...sediments portrayed in Figures 2.2, 2.3 & 2.4 were probably deposited by a flood event of the Sand River like the one illustrated in Figure 2.7." The language used involves language typically used by scientists who "hedge" in their descriptions of their findings.

Response 11:

Firstly, again Prof Ellery seems to have missed the point that there is no evidence to indicate that the deposits are debris flow deposits, as proved in the Addendum Report.

Secondly, Prof Ellery initially only supplied a vague locality map for the supposed debris flow deposits. He has now supplied GPS co-ordinates in his report that was submitted on 5 August 2011. Dr Illenberger has since visited this site. The deposits here are material that was dumped by a bulldozer when Lionel Donnelly built a dam to the south of the deposits in the 1990's (Frank Silberbauer, pers. comm., November 2011). Frank Silberbauer has compiled a document describing the history and layout of the dam. He has prepared a document entitled "Sandriver Middle Reaches
General Geological and Environmental Observations, Compiled by Frank Silberbauer, Infinity Consulting, November 2011."

Upstream of Lionel Donnelly's dam there are some overbank deposits formed by the Sand River when it is in flood. Dr Illenberger will provide supporting evidence in the report he is preparing that covers the 2011 flood events.

Comment 12:

However, in the very next sentence (starts the next paragraph); Dr Illenberger concludes that "there are no debris flows or debris flow deposits in the Sand River." He goes on to be quite categorical about environmental conditions in the Cape St Francis area with respect to the occurrence of debris flows and the threats that may be posed by such to the Thyspunt site. I feel that in addition to providing strong direct (photographic) evidence of debris flow deposits, I am able to provide strong circumstantial evidence for their occurrence in the landscape, and therefore the claim that there are no debris flow deposits must be questioned.

Response 12:

See Response 11.

Comment 13:

Quicksands and liquefaction of sand:

I did not raise this as an issue, but I can testify that there are quicksands in the Oyster Bay Dunefield – I have experienced them first hand.

Response 13:

The relevance of this statement is unclear. The Addendum Report provides photographic and other evidence of quicksands in the Oyster Bay Dunefield. Dr Illenberger has on many occasions experienced them first hand.

Comment 14:

The November 2007 flood that damaged the R330: Material in the Addendum about the damage caused by the November 2007 flood needs to be reconsidered in the light of events in the study area in July 2011.

Response 14:

Dr Illenberger will provide detailed analysis of these events in the report he is preparing that covers the 2011 flood events.

Comment 15:

While this material describes and explains events in November 2007, it fails to recognise that events like this:

- can and will happen naturally
- are aggravated by human interventions in the landscape
- are highly likely in the future precisely because of cumulative impacts of human activities already present in the landscape
- may occur in the landscape in places other than where it happened in November 2007.

Response 15:

See Response 14.

Comment 16:

It is irresponsible to think that events like this will not happen again – they will happen with increasing frequency as developers and the Local Authority continue to develop and allow development respectively that is so at odds with natural processes.

A moratorium should be placed on development in order to improve our understanding of the natural environment so that development becomes more sustainable. Currently, the natural environment is treated as though there are no natural thresholds that exist, and the cumulative impacts of human activities in a soft environment like this will increasingly lead to natural disasters precisely because the system is pushed beyond natural thresholds.

Response 16:

Your opinion in this regard is noted.

Comment 17:

There are several general issues that need to be commented on.

Firstly, one cannot consider micro-catchments as isolated features in the way that Dr Illenberger has done because the groundwater beneath these systems is interconnected and erosion by surface water is a feature of the landscape that is very easy to overlook. The sediments, even when vegetated, are able to erode – as illustrated in the accompanying report where erosion (albeit facilitated by artificial breaching in this case) can take place naturally across a large dune. Furthermore, a gully has eroded from the south into the dunefield along what seems a natural course.

Response 17:

Dr Illenberger clearly described interconnected groundwater in the Oyster Bay Dunefield in the Geomorphology Report. Dr Illenberger does not see why erosion by surface water is a feature of the landscape that can be very easily overlooked. It is well known that a sand ridge (that is highly permeable) cannot be used to make a dam wall. That is why dam walls must be impermeable.

Comment 18:

Secondly, the removal of alien vegetation as a factor contributing to increased groundwater levels and therefore flood risk is very unlikely. Alien plants are unlikely to materially affect groundwater in a way that makes an appreciable difference given the rainfall over the period prior to the flood event. Alien

plants have a far bigger effect on base flows than peak flows, and given the amount of rainfall prior to the flood, their role in reducing or mitigating the flood is unlikely to be measurable.

I am not sure what the point is of going into detail on the localised nature of rainfall that gave rise to the flood damage – the area contains many wetlands and the water table is naturally high. There was a lot of rain.

Response 18:

The November 2007 event was a very unusual event. That is why Dr Illenberger investigated it in detail. Dr Illenberger will take Prof Ellery's comments into account in his report on the 2011 flood events.

Comment 19:

Thirdly, the question as to the likelihood of another flood of this magnitude is important. Dr Illenberger simply does not acknowledge the fact that further events like this will happen precisely because of a combination of natural processes AND cumulative human impacts. The issue about cumulative effects of already existing developments makes this issue even harder to deal with because existing developments will argue that they have rights to do what is necessary to protect their investment. All of this exacerbates an already delicate situation.

Ironically, another flood of this magnitude has happened less than 3 years following the November 2007 event, and caused considerable damage to the R330 – albeit at another location. This illustrates the susceptibility of this system to large episodic events, and therefore the difficulty in catering for them in developments.

Response 19:

Dr Illenberger has been gathering substantial information regarding the 2011 flood events and similar events that have occurred within recorded history. These are presented in the report on the 2011 flood events.

Comment 20:

Fourthly, the recommendation of placing a cut-off drain along the western boundary of the St Francis Links Golf Course is the kind of recommendation that will lead to the solution of 1 problem and the creation of others.

One cannot willy-nilly divert water from one location to another in this landscape without creating problems elsewhere! The diversion of water from the St Francis Links northwards contributed to the recent series of disasters on the Sand River where it is crossed by the R330.

These sorts of suggestions are alarming and reflect a lack of understanding of the cybernetic nature of the system – it is an integrated system with feedbacks such that interference in one part of the system has consequences for other parts of the system.

Response 20:

Dr Illenberger agrees with most of the sentiment expressed here. However the cybernetic nature of the system is understood to a fair extent.

Comment 21:

I have similar feelings about pipes, side drains and box culverts to take care of the existing and other roads – but what are the consequences for the St Francis Bay Golf Course – or does it matter? The impact of diverting water and focussing it locally at low points in the landscape increases "stream power" and therefore has consequences (see my main report).

Response 21:

Dr Illenberger agrees with the sentiment expressed here. However, it should be pointed out that improvements suggested by engineers for the St Francis Bay Golf Course have ameliorated the situation.

Comment 22:

Finally, it seems that improvements to infrastructure are reactive rather than proactive because of the diffuse nature of water in this system – it is a large interconnected groundwater system that interacts with a soft landscape. Unexpected things are likely to happen.

Response 22:

Dr Illenberger agrees with the sentiment expressed here. However, he wishes to point out that many of the advances in human technology are experiential.

Comment 23:

Potential for flood damage where the R330 crosses the Sand River:

The suggestions made by Dr Illenberger regarding mitigation along the R330 in order to prevent damage to the road bridge across the Sand River are as follows:

- Repair wing walls on either side of the culvert
- Check what flood recurrence intervals the culvert beneath the road can withstand and make improvements if necessary
- Check the culvert regularly to ensure that it is not blocked by sand
- Check the culvert during floods and remove any debris caught across the culvert.

These recommendations are unlikely to have increased the likelihood of survival of the bridge during flooding in July 2011 because erosion of the toe of the box culverts is what did the damage. My main contention is that the reason for this damage to the bridge is the presence of a box culvert beneath the road. Dr Illenberger's choice of action is to strengthen or reinforce the box culvert.

Response 23:

Dr Illenberger also recommends in the Addendum Report that "Road engineers should check what flood recurrence interval the culvert can handle, and improvements should be made if necessary".

Comment 24:

Nevertheless, my main concern is that the material presented here is not in the least precautionary. I find this material on risks to existing infrastructure linked to flooding along the Sand River rather gung-ho and favourable towards technical solutions and development. The sentiment is that "engineers can sort it out" and that engineers can do the work necessary to prevent failure. My contention is that they need to be guided by the environmental specialist about the sorts of hazardous things that might happen, so that engineering can be designed to meet the necessary specifications. Dr Illenberger simply does not deal with hazards in the system in sufficient detail and therefore engineers are likely to be poorly informed. In particular, the specialist completely underestimates the role of water in shaping this landscape, and ignores the likelihood that it might damage property and infrastructure.

Response 24:

The fact is that the R330's crossing of the Sand River is an existing piece of infrastructure that is essential for St. Francis's connection to the outside world, and therefore needs to be maintained. How else, besides on solid engineering principles, does Prof. Elllery suggest should the bridge be designed and constructed? As indicated in previous responses, the role of water in shaping the dune field has been considered and there is no objective evidence to indicate that water is the primary agent

responsible for the formation of the dune field. Please see Responses 5, 21, 22 and 23, which deal in detail with this issue.

Comment 25:

Conclusion:
Once again I find myself worried by the extent to which the specialist has ignored clear signs in the field of the role of surface water in the eastern part of the Oyster Bay Headland Bypass Dunefield, and further dismissed very useful information provided to him.

Response 25:

See Response 5.

Dr Illenberger presumes that the "very useful information provided to him" that Prof Ellery refers to is the information provided by Prof Ellery in his report. However, most of this information is not new.

Comment 26:

He has not been mindful of the precautionary principle and has consistently aligned his report in favour of development and by suggesting that engineering solutions are possible. Engineering solutions are only possible provided that the risks to infrastructure have been adequately pointed out. Developers should want the very best advice from specialists, with caution spelled out where it is appropriate. The current material indicates that the Oyster Bay Headland Bypass Dunefield is sufficiently well understood for the EIA and that there is nothing new that needs to be added. To dismiss material such as that presented to him throughout the process of acting as a specialist is negligent.

Response 26:

Dr Illenberger fully agrees with the precautionary principle. Dr Illenberger will always accept new information and undertake new investigations to help understand the Oyster Bay Dunefield better, from all sources, not only the "very useful information provided to him" apparently by Prof Ellery. See also Response 25.

It is worth noting that in an e-mail of 30 August 2011, Prof Ellery says

> "I had an intimate hand in all of the data collected for Lauren's[1] thesis, but cannot get my hands on it. I have tried for close to a year to get data from Lauren, but she simply will not give me anything."

This is after Prof Ellery and other I&APs protested that Dr Illenberger did not refer to the studies and data of the "Rhodes Group", in spite of Dr Illenberger trying numerous times to communicate and arrange a field trip with Prof Ellery (exact details are given in the Dune Geomorphology and Addendum reports), and Prof Ellery reneging on his undertaking at the focus group meeting of 29 July 2011 to arrange correspondence with Lauren Elkington for purposes of incorporating her findings in Dr Illenberger's reports.

Obviously it is not possible to incorporate Lauren Elkington's data in the investigations being undertaken for this EIA if her data is not made available.

Comment 27:

A further concern is that given the failure to deal with the part of the system that has been best studied by the specialist and his peers, and which (as far as I know) is best well known to the author of the specialist report, his analysis on the geomorphology of the stable dunefield in the vicinity of the power plant itself cannot be trusted either. This is an area that I do not know well, but (once again) which I would approach with the precautionary principle uppermost in my mind.

[1] With reference to Lauren Elkington

Response 27:

This statement is rather vague, and mostly seems to be an attempt to discredit the work of Dr Illenberger and his peers without having presented objective evidence that Dr Illenberger's work is factually poorly motivated.

Comment 28:

Nowhere in the Dune Geomorphology Specialist Report has the topography been carefully examined, particularly in respect of the southward slope of the dunefield towards the coast and its variability.

Response 28:

Dr Illenberger disagrees with this statement. Please refer to Response 1 regarding detailed topographical data that Dr Illenberger consulted in the preparation of his assessments.

Comment 29:

The likelihood of large engineering works reactivating the dunefield surrounding the power plant has not been considered at all. It may be argued that this will be managed by sound engineering principles, but there is a lot that can happen over a short space of time between excavating the site and full construction of the facility.

Response 29:

There are many of examples of house-building, commercial developments and engineering works reactivating dunefields, and it has never proved impossible to manage wind-blown sand with sound specialist and engineering principles, as stipulated in the Geomorphology Report.

Comment 30:

Other issues relate to the impact of the retaining wall at the interface of the nuclear facility with the dunefield (the specialist term for this structure escapes me) have on groundwater?

Response 30:

The term used in the Freshwater Ecology Assessment (Appendix E12 of the Revised Draft EIR) is a "cutoff wall". The cutoff wall is proposed to be placed around the perimeter of the excavation for the nuclear island (as shown in Figure 4.7B of the above-mentioned report) and would therefore be situated outside the Oyster Bay mobile dune field. The primary purpose of the cutoff wall would be to prevent drawdown of the groundwater table during excavation from impacting on the Langefonteinvlei wetland, which is situated to the northeast of the recommended power station position.

Comment 31:

How will groundwater be managed in order to ensure that surface flow of water is prevented?

Response 31:

The meaning of the comment is unclear. Surface flow cannot be prevented and will be directed around the excavation of the power station. The cutoff wall will serve to prevent the pumping out of groundwater that occurs inside the nuclear island's excavation from impacting on wetlands such as Langefonteinvlei, which is situated upstream of the recommended power station position. The Freshwater Ecology Assessment requires that the cutoff wall would need to be one of the first construction-phase activities, to reduce the extent of groundwater draw-down during construction.

Comment 32:

If surface flow of water occurs due to a damming effect of the retaining wall, how will this be managed?

Response 32:

Surface flow will be directed around the power station excavation in accordance with the recommended mitigation measures stipulated in the Hydrological Assessment (Appendix E6 of the Revised Draft EIR). Recommendations for handling stormwater flows at the Thyspunt site are discussed in detail in this report.

Comment 33:

Little attention has been paid to these matters, and there is very little precaution advised with respect development of this kind in a soft landscape.

Response 33:

Your comment is noted. As indicated by Dr Illenberger's detailed responses above, your opinion in this regard is contested.

Yours faithfully

For GIBB (Pty) Ltd
The Nuclear-1 EIA Team