

# **VISUAL IMPACT ASSESSMENT**

**SECTION OF TRANSMISSION LINE  
AND NEW SUBSTATION**

**BITOU  
PLETTENBERG BAY  
WESTERN CAPE**

Second draft

Prepared for

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**ESKOM**

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## EXECUTIVE SUMMARY

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The author was approached by SiVEST Environmental Division to produce a visual impact assessment for a 2,5km section of transmission line and the proposed new substation at Bitou near Plettenberg Bay, Western Cape. This was in response to an appeal from the public. As the remainder of the transmission line and the upgrade to the Robberg substation, both of which are part of the overall project, had already received authorisation, only one development alternative was assessed, this being the logical extension of the already authorized section of the project.

The route for the transmission line runs adjacent to, and to the west of, the N2, and the substation site lies to the north and west of the intersection of the N2 and the R340, approximately 5km north of Plettenberg Bay.

The study area lies within a complex and appealing visual environment that is considered sensitive to any change in its visual nature due to the scenic route status of the N2 and the fact that many tourists pass through the area.

The visual assessment also had to take into consideration the proposed Future N2 alignment and interchange within 1km of the substation site and the continued development of housing in the area which will alter the area over time.

The desirable visual character of the area is determined by a complex array of features including the estuary, the two rivers, the hills in the middle ground, including the one on which the site is situated, and the mountains in the background where these are visible.

This complex visual context has resulted in many of the potential views of the substation site being mitigated by the local vegetation and the substation being overshadowed by the natural elements in the landscape such as the cliff face to the immediate north of the site, all of this reducing the potential visual impacts considerably.

The visual impacts of the transmission line will also be mitigated by the expansiveness and complexity of the natural landscape and, while affecting the local sense of place, will not constitute the focal point in any views.

The viewshed can be described by a line along the top of the cliff face immediately adjacent to, and north of, the substation site which extends to the west and the north-east, and by the ridgelines in Plettenberg Bay and along the Robberg Peninsula to the south at a distance of approximately 5,5km and 11km respectively, although no significant views are expected further than 2km from the substation and transmission line as a result of the fairly low impact nature of the installation.

The overall significance of the visual impact has been rated at medium-low for both the substation and the transmission lines with full mitigation. This is considered acceptable within the local context.

Partial vegetative screening of the substation site and several other visual mitigation measures will be required. These will lower the intensity of the visual impact however the total screening of the transmission line and substation will not be possible.

The visual impacts fall within the accepted norm for this type of development and therefore, in terms of visual issues it is recommended that the development be authorized subject to the implementation of the mitigation measures.

# **1 INTRODUCTION**

The author was approached by SiVest Environmental Division on behalf of Eskom to provide a Visual Impact Assessment for the proposed electrical substation at the Bitou River near Plettenberg Bay and a short section of transmission that will feed into the substation.

Only one development alternative was presented for assessment.

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## **1.1 VISUAL ASSESSMENT EXPERIENCE AND EXPERTISE**

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Over the past 10 years the author has been involved in the compilation of more than one hundred visual impact assessments. These included such high profile studies as:

- The Green Point Stadium
- Chapman's Peak Drive Toll Structures
- The Berg River Water Project
- Agulhas Golf Estate
- Several large scale Eskom projects
- Two large scale projects in the Waterfront
- PPC Cement Factory Riebeeck West
- Upgrade of Zanzibar waterfront
- 2 solar facilities Kenhardt Northern Cape
- Wind Farm Caledon Western Cape (71 3Mw turbines)
- 2 wind farms Swellendam District Western Cape
- Solar facility at Augrabies Northern Cape

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## **1.2 STATEMENT OF INDEPENDENCE**

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I hereby declare that I have no conflicts of interest related to the work of this report. Specifically, I declare that I have no personal financial interests in the property and/or development being assessed in this report, and that I have no personal or financial connections to the relevant property owners, developers, planners, financiers or consultants of the development other than the fees obtained for compiling this report.

I declare that the opinions expressed in this report are my own and a true reflection of my professional expertise.

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## **1.3 COPYRIGHT**

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The contents of this document are copyright of the author and, except as quotations in other documents concerned with this project, may not be used, copied, or altered in any way or form without the permission of the author.

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## **1.4 ASSUMPTIONS AND LIMITATIONS**

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This report has been compiled according to the requirements of the document 'Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes' issued by the Department of Environmental Affairs and Development Planning of the Provincial Government of the Western Cape, dated June 2005.

The assessment criteria that have been used in this report conform to the requirements of the guidelines and may differ from those used by the other assessment specialists. Certain assessment criteria specific to visual impacts, but not to other disciplines, such as visual absorption capacity of the local environment and the compatibility of the development with the local visual environment are not part of the generic methodology but are essential in understanding the visual implications of any development and have therefore played a vital part in the findings of this visual impact assessment.

Only one alternative was presented for assessment.

The section of transmission line and substation assessed in this report form part of a larger project that includes the upgrade of the Robberg substation and the construction of a new transmission line from the Robberg substation to the new Bitou substation. Authorisation was obtained for the overall project on 30<sup>th</sup> April 2010 but as a result of an appeal it was decided that additional studies were required for the section of transmission line between the proposed new N2 interchange and for the substation at Bitou. This visual impact assessment responds to these requirements and therefore only the Bitou substation and approximately 2,5km of the transmission line to the south of the substation have been assessed. The authorisation for the rest of the project still stands.

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## **1.5 METHODOLOGY**

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The following sequence was employed in this visual impact assessment.

- A desktop survey was made using maps and aerial photographs. These were used to identify landforms and landscape patterns and areas of potential visual impact.
- A photographic survey of the site and surrounding areas was conducted to identify potential viewpoints that would be visually affected.
- Significant viewpoints and areas where views of the substation site and transmission line route will be possible were identified and the visual impact on these was analysed.
- An evaluation was made of potential visual impacts on all areas where visual influence is anticipated.
- Relevant mitigation measures were proposed.

## 2 LOCALITY AND STATUS OF THE STUDY AREA

See Figures 1 - 3

The site for the **substation** lies at the north-west corner of the T junction of the N2 and the R340 approximately 5km north of Plettenberg Bay on Farm 305/16. The site is part of a larger property owned by Eskom most of which is unsuitable for development as a result of the rugged topography. The site which lies adjacent to the intersection is the only flat portion on the property. This property is unused at present.

The section of **transmission line** that forms the subject of this visual impact assessment lies to the west of, and approximately parallel to, the existing alignment of the N2 and extends approximately 2,5km south of the substation site. This is part of a new transmission line that runs between the Robberg substation and the proposed Bitou substation.

In the area covered by the scope of this report the **transmission line** runs immediately adjacent to the road reserve of the existing N2. The alignment of the section slightly to the west of the road reserve is the result of taking a planned future intersection between the old N2 and the proposed new N2 bypass into consideration and also in order to facilitate connection to the substation. (See Figures 5 – 7)





AERIAL VIEW SHOWING OVERALL LANDSCAPE CHARACTER

FIGURE 2



AERIAL PHOTOGRAPH - CLOSE UP

FIGURE 3



A) General View of Site from the N2 South of the Site



B) Existing Concrete Water Channel along the R304 and N2



C) Existing Fence and Vegetation on the Site

### 3 DESCRIPTION OF VISUAL CHARACTERISTICS

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#### 3.1 GENERAL DESCRIPTION OF SITE AND SURROUNDING AREA

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See Figure 4

The site for the **substation** is on a relatively flat, roughly triangular portion of land that lies immediately adjacent to the N2 and the R340 at the point where they intersect. As a backdrop to the site the property rises steeply up a relatively stable south-easterly oriented cliff face approximately 70m in height which blocks all potential views of the substation from the north.

Both the site itself and the cliff and hill areas are covered in vegetation which includes many mature trees although parts of the cliff face are open, being too steep to support growth. This results in an interesting patchwork landscape when looking towards the site from the N2 and surrounding areas.

The Bitou River runs adjacent to the R340 from west to east passing the site to the south of the R340 and then continuing under the N2 bridge before turning south to its confluence with the Keurbooms River approximately 1,6 km south of the site. The Keurbooms River runs north to south approximately 400m to the east of the N2.

The area adjacent to and east of the N2 and between the two rivers is taken up by the Twin Rivers Estate which runs as far south as the road reserve for the proposed new N2 bypass which is planned to run south-west to north-east across the existing N2 and both rivers. (See Figure 6)

The Twin Rivers Estate is an exclusive gated estate with its entrance running eastwards from the N2 approximately 100m north of the substation site. The estate is still in the process of being developed. Many of the erven that have recently been developed or are still to be developed face westwards towards the N2 and the inland areas to the west with very limited views eastwards towards the coast line. The substation site will potentially affect these views.

Further to the east, beyond the Keurbooms River, there are several housing estates but the bulk of the land is still rural in nature as far as the coastline approximately 2km south-east of the site.

The entire area between the site and the coastline is relatively flat except for some dunes along the coastline, and well treed, resulting in nearly all views at ground level towards the site being obscured by the vegetation and, except for some of the new houses in Twin Rivers Estate, no visual impacts are anticipated in this area. (See Panorama 1 Figure 10)

To the north of the site the N2 winds its way around the hills and over the Keurbooms River towards Port Elizabeth and is soon out of the viewshed for the proposed substation and transmission line.

To the west of the N2 and south of the R340 the landscape is agricultural in nature and relatively flat for a distance of approximately 1,2km before it rises to some low hills. (See Panorama 2 Figure 10)

There is one large farm house approximately 600m southwest of the substation site that has its main views towards the site and the ridgeline north of the Bitou River, part of which is formed by the cliff on the site.

Further to the south, on either side of the N2 the landscape is relatively flat and contains agricultural land and leisure facilities such as the Plett River Lodge B+B alongside the Bitou River, polo fields and a golf estate further to the south in the direction of Plettenberg Bay.

A visual characteristic of the area is the large number of trees which, as a result of the relatively flat terrain, form effective visual shielding to many long-range views and provide effective mitigation to views of the site from many viewpoints, especially those along the N2.

Further south, at a distance of approximately 5,5km the northward facing areas of Plettenberg Bay rise above the flat estuary areas of the Keurbooms River allowing for views towards the site, and

further south, at a distance of approximately 10,5km the Robberg peninsula is visible, the raised topography also allowing for views towards the site.

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### **3.2 THE VISUAL ENVIRONMENT AND SENSE OF PLACE**

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The Route of the transmission lines and the substation site both lie adjacent to the N2 which is considered a scenic route that carries a high number of tourists both local and international. The study area is therefore considered highly sensitive to changes in its visual nature.

The desirable visual character of the area is determined by a complex array of features including the estuary, the two rivers, the hills in the middle ground, including the one on which the site is situated, and the mountains in the background where these are visible. (There are no views of the coastline from the roads in the study area although these views open up both to the north and the south of the study area when travelling along the N2 and in future, views of the sea may be possible from the proposed bridge over the existing N2 and the rivers.)

The area is green in nature and includes a large number of trees that moderate the views alternately opening up the vistas and shielding them from view.

Apart from those who live in the area, most of the viewers will experience the terrain while passing through the area along the N2, or staying at the local visitor's facilities. Those using the N2 experience an ever changing vista which includes both areas which have been changed by human intervention, such as the agricultural lands and housing developments, and areas in which the natural elements predominate, such as the river courses and hills.

When the new N2 bypass is constructed a considerable change in the visual environment of the study area will occur as there will be a perceived increase in human intervention in the landscape as a result of the interchange with the existing N2 and the necessary bridges over the N2 and the Rivers, as well as changes to the agricultural terrain that will become part of the road reserve.

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### **3.3 DESCRIPTION OF THE PROPOSED DEVELOPMENT**

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See Figures 5 - 8

The project in the study area is comprised of two elements:

#### **3.3.1 The Transmission Line**

The study area includes the final section of approximately 2,5km of the planned transmission line between the Robberg and Bitou substations.

This line runs to the west of, and adjacent to, the N2, predominantly close to the road reserve but deviating to the west in the area where the new N2 bypass interchange is planned, and angling slightly away from the N2 for the last pylon at the substation in order to facilitate entry to the site.

There will be approximately seven pylons situated within the study area with differing lengths between them determined by the position of the various elements of the planned N2 interchange and the Bitou River. (See Figure 5)

The pylons used will be of a galvanized steel monopole design, (See Figure 8).

At an early stage of the design the use of wooden pylons was contemplated but these were found to be unsuitable to carry the spans involved and so cannot be used.

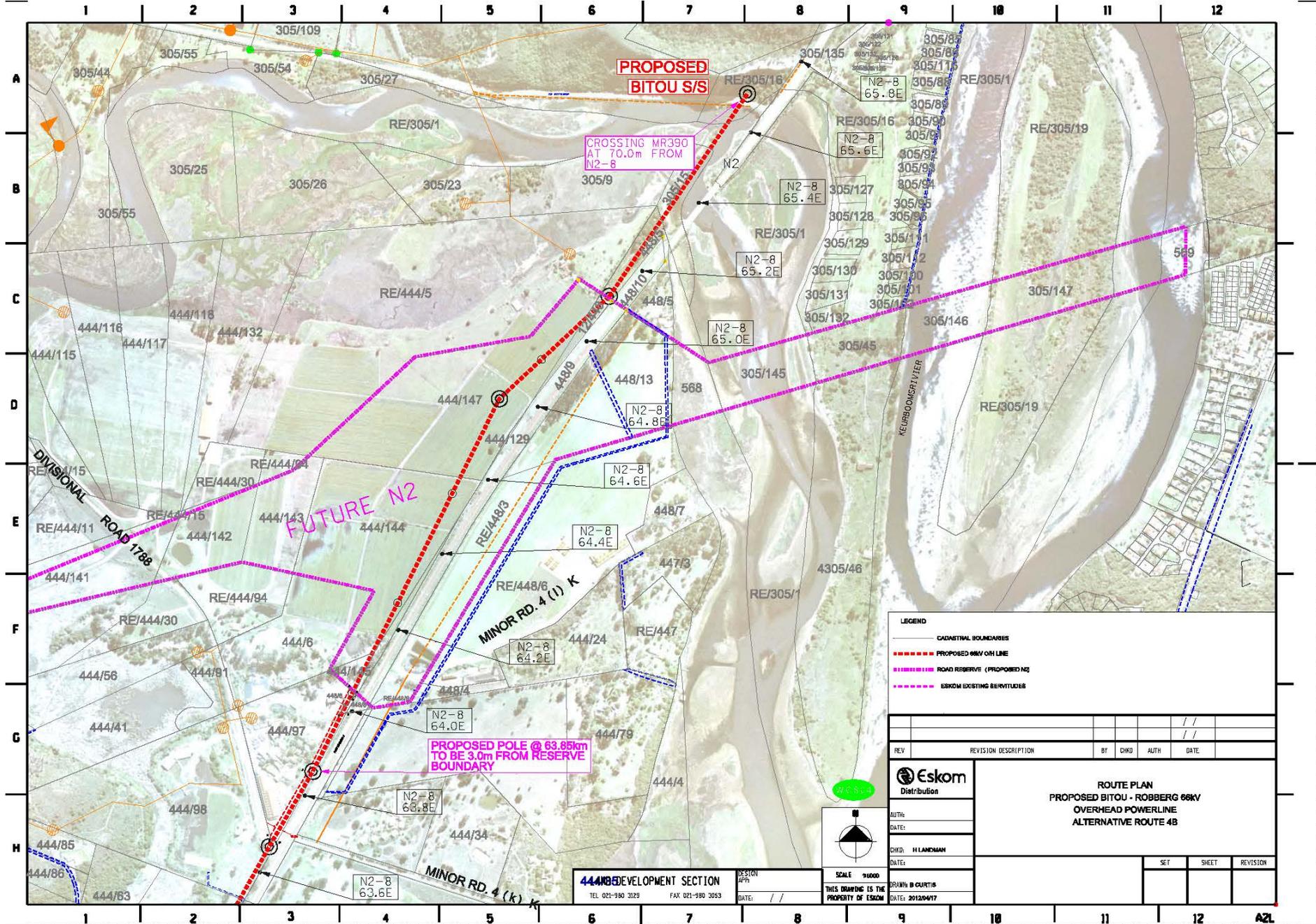
### 3.3.2 The Substation

See Figure 8

The substation will be situated on the flat section at the foot of the cliff in the angle between the intersection of the N2 and the R304.

The substation will consist of the following elements that have visual implications:

- The entire site within the area that is to be fenced will be cleared and leveled in preparation for the installation.
- A concrete retaining structure of approximately 2m in height will be built along the boundary of the site immediately below the cliff face. This is required as a protection against any subsidence or slippage of the relatively stable cliff face.
- Various galvanized steel structures with attendant buzz bars, isolators, connections, etc. and a transformer will be installed. The maximum height of these elements of the substation will be approximately 5m. The design being used will be low profile.
- A lightening mast approximately 14m in height will be needed.
- A small building with face brick walls and a pitched roof will be constructed.
- The final pylon in the transmission lines to the site, approximately 22m in height will be situated at the westernmost point of the site.
- The entire area within the boundaries of the site will be kept cleared and covered in gravel.
- The site will be surrounded by a steel palisade fence approximately 2,4m tall.
- The substation will not be lit at night except when afterhours work is required. (The night column in the assessment tables refer to this.)
- The cliff face, as far as possible will be left intact unless instabilities that threaten the operation of the substation are identified and remedial action is required.
- The entrance into the site will be from the R340 adjacent to the cliff.
- The existing channel and drainage system adjacent to the roads on two sides of the site will be retained.



**LEGEND**

- CADASTRAL BOUNDARIES
- - - - PROPOSED 66kV OH LINE
- - - - ROAD RESERVE (PROPOSED N2)
- - - - ESKOM EXISTING SERVITUDES

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE

<b>Eskom</b> Distribution	<b>ROUTE PLAN</b> <b>PROPOSED BITOU - ROBBERG 66kV</b> <b>OVERHEAD POWERLINE</b> <b>ALTERNATIVE ROUTE 4B</b>		
	AUTH: _____ DATE: _____ CHD: H LANDEMAN DATE: _____	DRAWN BY: B CARTER DATE: 2012/04/17	SET _____ SHEET _____ REVISION _____

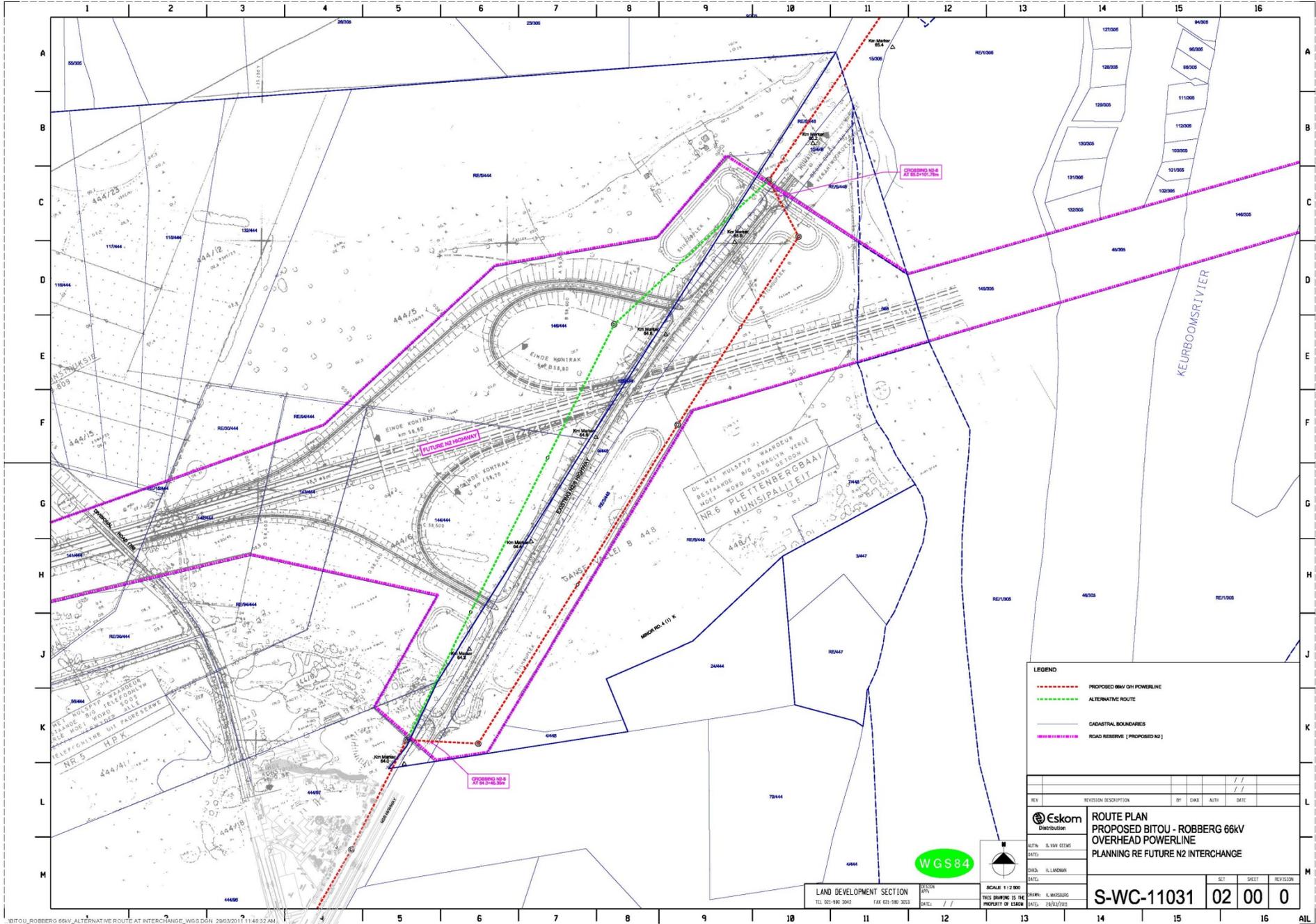
**444/85 DEVELOPMENT SECTION**  
 TEL 021-980 3129 FAX 021-980 3953

DESIGN APP: \_\_\_\_\_  
 DATE: / /

SCALE 1:1000  
 THIS DRAWING IS THE PROPERTY OF ESKOM

PLAN SHOWING ALIGNMENT OF TRANSMISSION LINES AND POSITION OF FUTURE N2 INTERSECTION

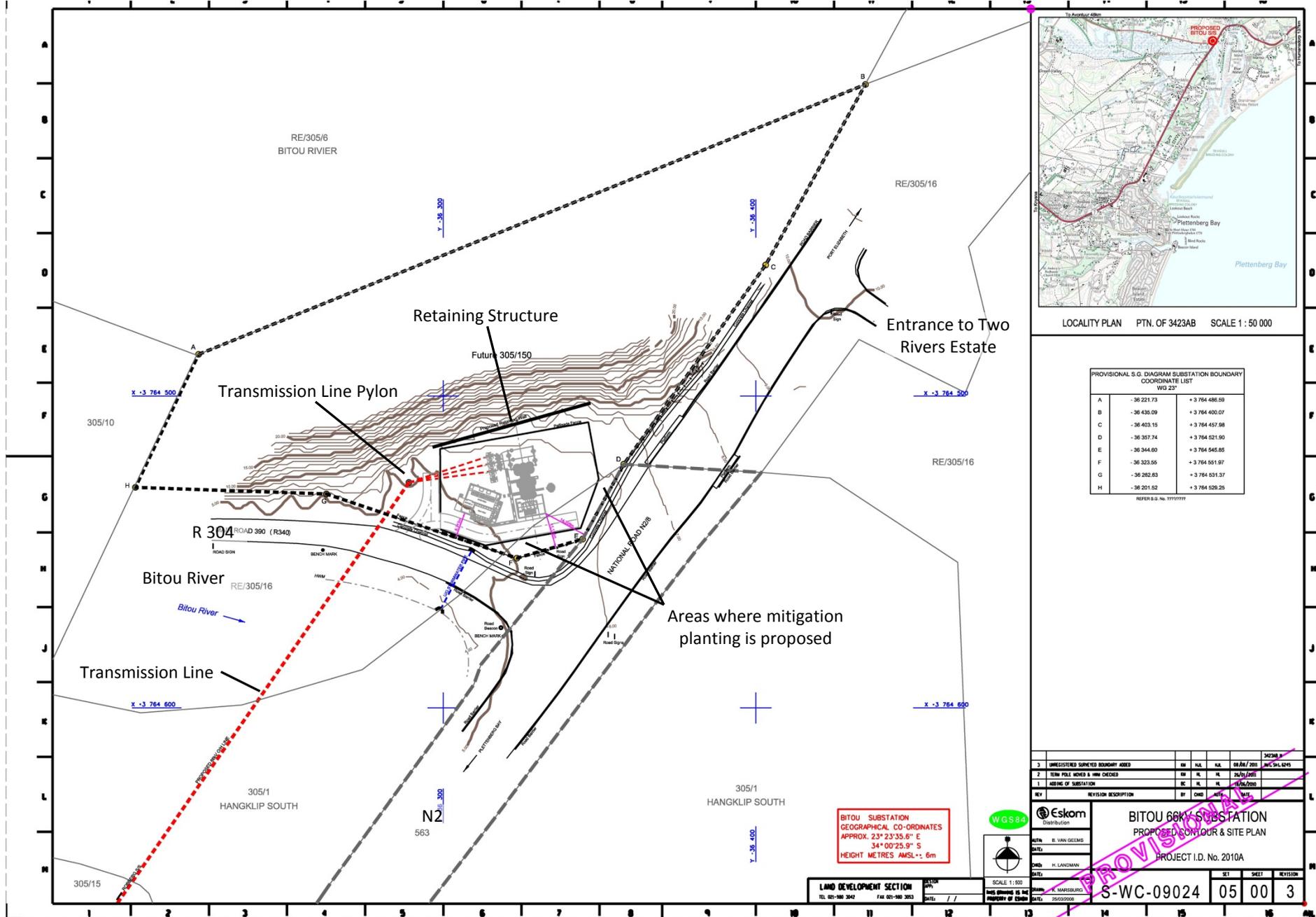
FIGURE 5



BITOU\_ROBBERG 66KV\_ALTERNATIEVE ROUTE AT INTERCHANGE\_WGS\_DGN 29/03/2011 11:48:32 AM

CLOSE-UP OF PROPOSED LAYOUT FOR NEW N2 INTERSECTION IN RELATION TO TRANSMISSION LINE

FIGURE 6



**PROVISIONAL S.G. DIAGRAM SUBSTATION BOUNDARY COORDINATE LIST**  
 WG 23'

A	-36 221.73	+ 3 764 486.50
B	-36 435.09	+ 3 764 400.07
C	-36 403.15	+ 3 764 457.68
D	-36 357.74	+ 3 764 521.90
E	-36 344.60	+ 3 764 545.85
F	-36 323.55	+ 3 764 551.97
G	-36 282.83	+ 3 764 531.37
H	-36 201.52	+ 3 764 526.25

REFER S.G. No. 17777777

REV	REVISION DESCRIPTION	BY	CHKD	DATE
3	UNREGISTERED SURVEYED BOUNDARY ADDED	AM	NL	04/M/2008
2	TEMP POLE MOVES & WIND CHECKS	AM	NL	26/07/2007
1	ADDING OF SUBSTATION	BC	NL	16/M/2005

SET	SHEET	REVISION
05	00	3

GENERAL LAYOUT OF THE SUBSTATION SITE

FIGURE 7



A) Pylon similar to the type that will be used



B) Photograph of Typical Low Profile Substation Installation Similar to the One Planned



C) Typical Substation Installation



D) Image of Typical Building Needed on Site and Palisade Fencing

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## 4 VISUAL IMPACT ASSESSMENT

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### 4.1 VIEWSHED AND VISIBILITY OF SITE

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*The "viewshed" refers to the theoretical outer-most extent or area from which a site can be seen. It must, however, be remembered that visibility may be obscured in reality by objects within the viewshed such as existing buildings, trees, lower ridges, outcrops and other topographical or natural features, and also by distance where an object can visually blend into its background or be completely lost to sight.*

See Figures 9 and 10

The viewshed is often determined by ridgelines or other physical features in the landscape which prevent any views from beyond a certain point. This is called a defined viewshed and, as with a watershed which determines the direction of flow of water, a development will be visible from one side of this type of viewshed but not from the other. This kind of viewshed can be defined by a line on a map.

The viewshed to the north-west, north and north-east of the site is a defined viewshed in which the cliff behind the substation and its associated hill will block all views in those directions. (See blue dotted line in Figure 9)

A further defined section of the viewshed lies to the south of the site and is determined by the hill on which Plettenberg Bay is built at a distance of approximately 5.5km and the ridgeline of Robberg slightly to the east of Plettenberg Bay at a distance of approximately 10,5km. (See Panorama 1 Figure 10)

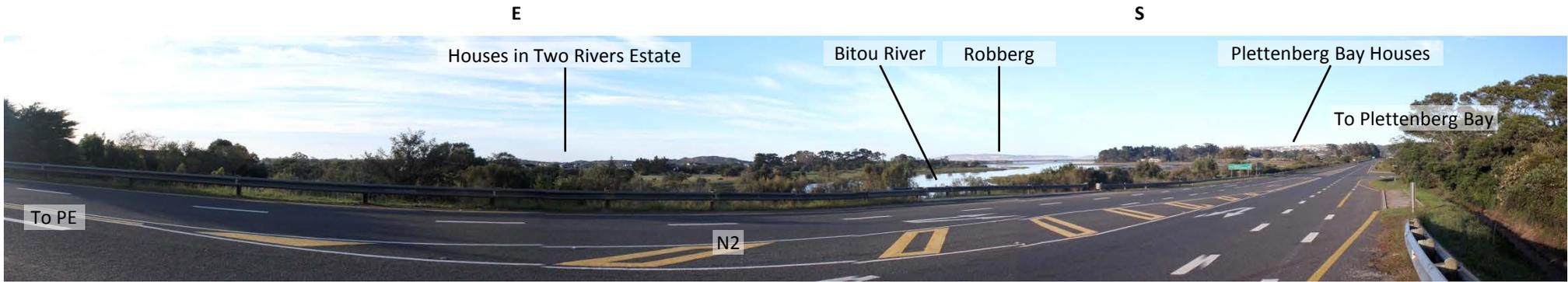
A second type of viewshed is called an indeterminate viewshed. This is when, due to the lack of defining features in the landscape, the development may become partially or totally visible from many points scattered across the landscape but there are also many points within the same landscape from which the development will not be visible as a result of minor topographical features, vegetation etc. This type of viewshed is normally applicable to relatively level landscapes and is applicable to the areas east and southwest of the site. An example of this is the houses in Twin Rivers Estate where views of the site at ground level will be blocked by the vegetation but from the second storey of these houses views of the site may be opened up.

Although the area of the viewshed is relatively large, (up to approximately 11km from the site,) the scale and visual nature of the transmission lines and substation are such that all significant views will be limited to a much smaller area which will not exceed 2km from the site and the Pylons.



LOCAL VIEWSHED AND VIEWPOINTS

FIGURE 9



Panorama 1 showing approximate viewshed towards the east and south

NOTE: Please be aware of the fisheye effect which is the result of joining several photographs together into a panorama. The road is straight.



Panorama 2 showing approximate viewshed towards the south-west and west

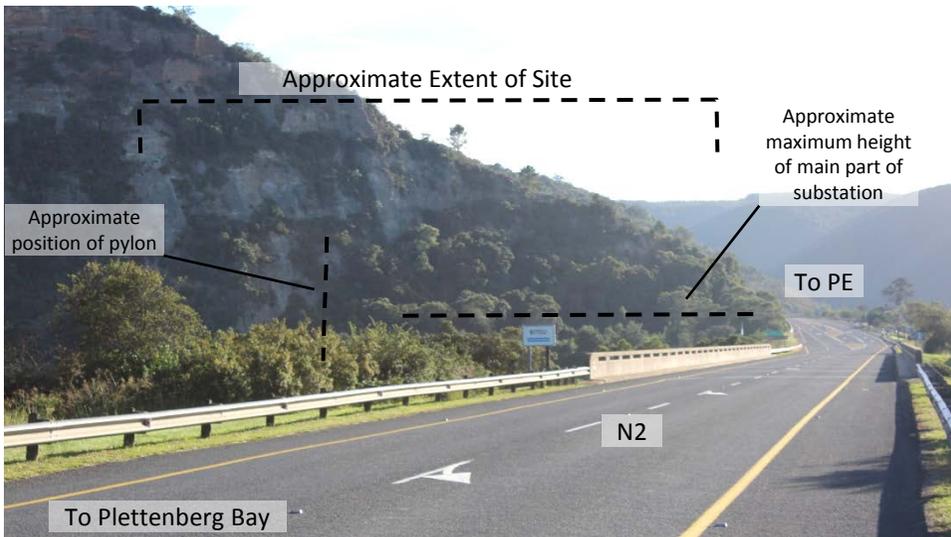
NOTE: Please be aware of the fisheye effect which is the result of joining several photographs together into a panorama. The road is straight.



VIEWPOINT 1 - The Site as seen from the N2 north of the site



VIEWPOINT 2 - The Site seen from the R340 approaching the N2 intersection



VIEWPOINT 3 - The Site seen from the N2 south of the site (



VIEWPOINT 4 - The site seen from the N2 further south of the site showing how the vegetation along the N2 shields the site from view within a short distance

## 4.2 ASSESSMENT

### 4.2.1 EXTENT OF THE IMPACT

*This assessment measures the extent of geographical area that will be impacted by the development.*

<i>Extent of Visual Impact</i>	
<i>Rating</i>	<i>Definition of Rating</i>
<i>Site Specific</i>	<i>Very small extent of visual influence – usually limited to the site</i>
<i>Local</i>	<i>Limited to the site and immediate surrounding area (1-5km)</i>
<i>Sub Regional</i>	<i>The visual influence covers a greater area (6-10km)</i>
<i>Regional</i>	<i>The influence covers an area that includes an entire geographic region or allows the visual impact to be extend beyond one region into another</i>
<i>National</i>	<i>The visual impact can be experienced across national boundaries and has national implications.</i>

The extent of the visual impact is considered local as no significant views of the facility should occur beyond 2 km from the site and the transmission lines. This is mainly as a result of the limited height of the substation, the backdrop of the cliff and the fact that there are only limited viewpoints in the terrain that are significantly higher than the substation, mainly associated with the houses in Twin Rivers Estate and the farm house to the south of the site.

A similar situation exists for the transmission lines although the impact will be more sustained as a result of one pylon being replaced by the next one as the viewer moves through the landscape.

**Table 4.1 Extent of Impact**

	<b>Construction</b>	<b>Operational</b>	<b>Night*</b>
<b>No Development Alternative</b>	-	-	-
<b>Substation and line</b>	Local	Local	Local

\*The night time column is included to assess the potential affect of any lighting at night.

### 4.2.2 ZONES OF VISUAL INFLUENCE

*This assessment describes the significant areas within the viewshed from which the development may be visible and estimates the degree to which these areas will be visually influenced.*

<i>Zones of Visual Influence – estimate of visibility</i>	
<i>Rating</i>	<i>Definition of Rating</i>
<i>Low</i>	<i>The proposed development will only be partially and or, (in the case of movement along roads etc.) intermittently visible and take up a relatively small percentage of the overall vista.</i>
<i>Medium</i>	<i>The proposed development will be readily visible but its visual influence will be limited by distance, compatibility etc.</i>
<i>High</i>	<i>The entire or a large portion of the proposed development will be visible in a way that seriously changes the visual nature of the area when viewed from the identified viewpoints.</i>

#### 4.2.2.1 The N2

The most significant views of both the transmission line and the substation will be from the N2 but only over a relatively short distance.

When **travelling south** towards Plettenberg Bay the **substation** will be shielded from view until approximately 150m from the site as the ridgeline behind the substation will block any potential views from this angle until almost adjacent to the site. The substation will then come into view when looking westward perpendicular to the line of the road until the viewer passes the site and the R340 intersection after which it will be behind the viewer.

Only approximately 150m of the N2 will be visually affected and the only users of the road that will be significantly affected are those turning southwards onto the N2 from the entrance to Twin Rivers Estate approximately 100m north of the site.

When **approaching the substation from Plettenberg Bay** to the south the **Substation** will gradually come into view from approximately 1,2km before the site although the vegetation along the western side of the N2 will partially shield it until just before the R340 intersection after which, for approximately 50m the entire site will be visible until it is passed.

Once the New N2 bypass is constructed the bridge and embankments will further limit the views of the site from the old N2 however, views of the substation from the new elevated section of road will become possible thus slightly increasing the visual impact on these views. (As the exact nature of the proposed road is not known assessment ratings for these views have not been included in the tables.)

The visual impact of the **transmission lines** will be experienced along the entire section of the N2 in the study area but will drop away on the section of road north of the site, the final pylon at the substation not being visible at all when travelling towards Plettenberg Bay.

The visual impact of the transmission line will be sustained when moving along the highway but will only affect views along the line of the road and to the west, or inland, with views towards the coastline being unaffected. The visually permeable nature of the lines and the relatively slim nature of the pylons means that the views will be influenced, especially when close to a particular pylon, but no views will be blocked and so the rating cannot be higher than medium.

**Table 4.2 - Zones of Visual Influence – The N2**

Alternative	Distance	Mitigation	Construction	Operational	Night
<b>No development Alternative</b>	-	-	-	No visual influence	-
<b>Substation</b>	±1200m and less	Without mitigation	Low to Medium*	Low to Medium*	High
		With mitigation	Low to Medium*	Low to Medium*	Low
<b>Transmission line</b>	±1200m and less	Without mitigation	Low to Medium*	Low to Medium*	-
		With mitigation	Low to Medium*	Low to Medium*	-

\* This depends on the position of the viewer

#### 4.2.2.2 The R340

When turning onto the R340 from the N2 the entire site will be visible to the viewer over the short distance along its boundary after which the substation will be behind the viewer. The final pylon on the substation site will be clearly visible adjacent to the road against the cliff until it is passed.

When travelling along the R340 towards the N2 the substation will only come into view approximately 150m from the site but the terminating pylon may be visible before this point standing out from the cliff face, and the transmission lines will be seen crossing the road. Views towards the south east could take in one or more of the pylons adjacent to the N2 although the

existing vegetation between the road and the Bitou River will mitigate these views significantly. The fishermen who use the banks of the River adjacent to the R340 will however be able to see several of the pylons to the south along the line of the N2.

**Table 4.3 - Zones of Visual Influence – R340**

Alternative	Distance	Mitigation	Construction	Operational	Night
No development Alternative	±150m and less	-	-	No visual influence	-
Substation		Without mitigation	High	Medium	High
		With mitigation	Medium	Medium-low	Low
Transmission line		Without mitigation	Medium	Medium	-
		With mitigation	Medium	Medium	-

#### 4.2.2.3 Local Housing

Only a few of the local houses will be visually affected. These include some of the westward facing houses in Twin Rivers Estate to the east of the site, and a single farm house approximately 600m to the south of the site. These houses will see the **substation** against the cliff face partially obscured by the intervening vegetation. Any significant reduction of the vegetation on the cliff face will significantly increase the visual impact to these views.

The pylon on the **substation** site will also be seen against the cliff as will the **transmission line** and two of the pylons in the direction of Plettenberg Bay.

It is only the farm house that will be significantly affected as the **transmission line** will pass directly over its entrance road and one of the pylons will be adjacent to the driveway.

**Table 4.4 - Zones of Visual Influence – Local Housing**

Alternative	Distance	Mitigation	Construction	Operational	Night
No development Alternative	±250m and further	-	-	No visual influence	-
Substation		Without mitigation	Medium	Medium	High
		With mitigation	Low	Low	Low
Transmission Line		Without mitigation	Low	Low	-
		With mitigation	Low	Low	-

#### 4.2.2.4 Other Areas

All other areas from which the **substation** can be seen will experience a low to nonexistent visual impact as the local vegetation or distance will render the substation in its particular context against the backdrop of the cliff visually unobtrusive.

The pylons and **transmission line** will also have a low visual influence on these areas although small areas close to an individual pylon could experience a medium visual influence

**Table 4.5 - Zones of Visual Influence – Other Areas**

Alternative	Distance	Mitigation	Construction	Operational	Night
No development Alternative	±100m and further	-	-	No visual influence	-
Substation		Without mitigation	Medium	Low	Medium
		With mitigation	Low	Low	Low
Transmission Line		Without mitigation	Medium	Medium to Low	-
		With mitigation	Low	Low	-

### 4.2.3 VISUAL ABSORPTION CAPACITY OF THE AREA

This assessment rates the area surrounding the project in terms of its basic landscape character with respect to its ability to visually absorb the proposed project.

This concept is closely linked to the concept of compatibility with the surrounding landscape, but the emphasis is on the **landscape's** ability to absorb the development and **not** on the **development's** ability to fit into its surroundings

<i>Visual Absorption Capacity</i>	
<i>Rating</i>	<i>Definition of Rating</i>
<i>Low</i>	<i>The landscape is very sensitive to alterations in its visual nature</i>
<i>Medium</i>	<i>The landscape can visually absorb small to medium sized alterations in its character.</i>
<i>High</i>	<i>The landscape can visually absorb medium to large changes in its character.</i>

**Note:** In this category 'low' is considered problematic and 'high' is considered desirable.

The visual absorption capacity of the landscape in the area surrounding the **substation** site is medium-high. The existing vegetation and the ridgeline behind the site result in developments with visual implications such as the substation being relatively easily visually absorbed; however, there will be a period during the construction phase when the site is cleared that the VAC may drop to low.

The visual absorption capacity for the area along the route of the **transmission line** is medium.

**Table 4.6 - Visual Absorption Capacity**

<b>Alternative</b>	<b>Mitigation</b>	<b>Construction</b>	<b>Operational</b>	<b>Night</b>
<b>No development Alternative</b>	-	-	-	-
<b>Substation</b>	Without mitigation	Low	Medium	Low
	With mitigation	Low	Medium-High	Medium
<b>Transmission line</b>	Without mitigation	Low	Medium	-
	With mitigation	Low	Medium	-

**Note:** In this category 'low' is considered problematic and 'high' is considered desirable.

### 4.2.4 COMPATIBILITY WITH THE SURROUNDING LANDSCAPE

This assessment evaluates the extent to which the **proposed development** conforms to usages in the surrounding landscape. Important to this assessment are the concepts of sameness, scale, diversity, texture, colour etc.

<i>Compatibility with surrounding Landscape</i>	
<i>Rating</i>	<i>Definition of Rating</i>
<i>High - Appropriate</i>	<i>The proposed development fits in well with the type and style of the surrounding landscape and no new or different elements are introduced.</i>
<i>Medium - Moderately Appropriate</i>	<i>The proposed development can blend into the surrounding landscape but its type and style may be different and new elements are introduced but not in a jarring way.</i>
<i>Low - Inappropriate</i>	<i>The proposed development is at odds with the type and style of development in the surroundings, and new and jarring elements are introduced</i>

**Note:** In this category 'low' is considered problematic and 'high' is considered desirable.

In general the substation will not be compatible with the agricultural and natural visual aspects of the surrounding landscape however, this is mitigated by the presence of the ridgeline and the vegetation which will aid in lowering the perceived incompatibility of the **substation**.

The **transmission line** will stand out in the landscape in a way that the vegetation will not be able to mitigate significantly except on a local level and also the pylons will not have the mitigating effect of the backdrop of the ridgeline, however they are not entirely unexpected within the semi-rural landscape and therefore they will be moderately appropriate.

Inappropriate lighting at night will not be compatible with the area.

**Table 4.7 - Compatibility with the Surrounding Landscape**

Alternative	Mitigation	Construction	Operational	Night
No Development Alternative	-	-	High	-
Substation	Without mitigation	Low	Medium	High
	With mitigation	Low	Medium-low	Medium
Transmission Line	Without mitigation	Low	Medium	-
	With mitigation	Low	Medium	-

*Note: In this category 'low' is considered problematic and 'high' is considered desirable.*

#### 4.2.5 INTENSITY OF VISUAL IMPACT

*This assessment refers to the intensity with which the visual nature of the landscape will be altered.*

<i>Intensity of Visual Impact</i>	
<i>Rating</i>	<i>Definition of Rating</i>
<i>Low</i>	<i>The sense of place and visual functions of the area are negligibly altered and the perceived character of the area is not qualitatively changed.</i>
<i>Medium</i>	<i>The sense of place and visual functions of the area are altered and the perceived visual character of the area is altered but not in an unacceptable way.</i>
<i>High</i>	<i>The sense of place and visual functions of the area are severely altered in a way that changes the perceived character of the area.</i>

##### 4.2.5.1 The N2

The sections of the road adjacent to the **substation** site will experience a high intensity visual impact without mitigation and a medium intensity of visual impact once the mitigation has had time to mature and the galvanizing on the steel elements has oxidized. The intensity will drop rapidly as the viewer moves away from the site.

The **transmission line** will have a medium intensity when the viewer is close to any of the pylons but the intensity will drop rapidly as the viewer moves away from them.

**Table 4.8 - Intensity of Visual Impact – The N2**

Alternative	Mitigation	Construction	Operational	Night
No development Alternative	-	-	No visual influence	-
Substation	Without mitigation	Low to High*	Low to high*	High
	With mitigation	Low to High*	Low to Medium*	Low
Transmission Line	Without mitigation	Low to High*	Low to Medium*	-
	With mitigation	Low to High*	Low to Medium*	-

*\* This depends on the position of the viewer*

##### 4.2.5.2 The R340

The intensity of the visual impact for the **substation** will be high on the section of the R340 adjacent to the site during the construction period but will drop to medium-low once the mitigation measures have had time to mature.

The **transmission line** will have a low intensity impact from the R340

**Table 4.9 - Intensity of Visual Impact – R340**

Alternative	Distance	Mitigation	Construction	Operational	Night
No development Alternative	Adjacent and further	-	-	No visual influence	-
Substation		Without mitigation	Low to High*	Low to high*	High
		With mitigation	Low to High*	Low to Medium*	Low
Transmission Line		Without mitigation	Low to High*	Low to Medium*	-
	With mitigation	Low to High*	Low to Medium*	-	

\* This depends on the position of the viewer

#### 4.2.5.3 Local Housing

The housing in Twin Rivers Estate, where views of the **substation** are possible, will experience a medium intensity of visual impact during the construction period but this will fall to low once the mitigation measures have had time to mature and the galvanizing has had time to age. The same will be true for views from the farm house.

The **transmission line** will have a low intensity impact on the houses in Twin Rivers Estate but will have a medium intensity impact on the farm house as the lines will pass directly over the entrance to the property.

**Table 4.10 - Intensity of Visual Impact – Local Housing**

Alternative	Distance	Mitigation	Construction	Operational	Night
No development Alternative	±100m and further	-	-	No visual influence	-
Substation		Without mitigation	Low to Medium*	Low to Medium*	Medium
		With mitigation	Low to Medium*	Low to Medium*	Low
Transmission Line		Without mitigation	Low to Medium*	Low to Medium*	-
	With mitigation	Low to Medium*	Low to Medium*	-	

\* This depends on the position of the viewer

#### 4.2.5.4 Other areas

All other area will experience a low to non-existent intensity of visual impact for both the substation and the transmission lines.

**Table 4.11- Intensity of Visual Impact – Other areas**

Alternative	Distance	Mitigation	Construction	Operational	Night
No development Alternative	±1km and further	-	-	No visual influence	-
Substation		Without mitigation	Low	Low	Low
		With mitigation	Low	Low	Low
Transmission Line		Without mitigation	Low	Low	-
	With mitigation	Low	Low	-	

#### 4.2.6 DURATION OF VISUAL IMPACT

*This assesses the visual impact in terms of the lifespan of the development and therefore the lifespan of the visual impact.*

<i>Duration of Impact</i>	
<i>Rating</i>	<i>Definition of Rating</i>
<i>Temporary</i>	<i>Change will occur but the timing is unknown</i>
<i>Short-term</i>	<i>Up to 3 years</i>
<i>Medium-term</i>	<i>3 to 15 years</i>
<i>Long-term</i>	<i>More than 15 years</i>
<i>Permanent</i>	<i>The nature of the impact is such that it will be irreversible over time.</i>

The duration of visual impacts associated with the construction phase will be short-term.

The duration of visual impacts associated with the operational phase will be long-term. It will not be permanent as it will be possible to reverse the visual impact should the facility be decommissioned.

#### 4.2.8 OVERALL SIGNIFICANCE OF THE VISUAL IMPACT

*This rating combines the ratings for the extent of the impact, the duration of the impact, the intensity of the impact and the sensitivity of the viewers to arrive at a rating for the impact as a whole.*

It is very difficult to arrive at a single overall significance rating for a project of this type. This rating is based on the ratings in the sections preceding this one, but also on the experience of the independent visual specialist. There will always be a limited number of viewpoints within the viewsheds from which the ratings in the table below may be considered too high or too low.

The overall significance of the visual impact during the construction phase is assessed as being Medium-high for both substation and transmission line as the nature of the construction activities will draw the attention of all viewers. During the operational phase the facility the overall significance will drop to medium-low as the line and substation become an accepted part of the overall visual environment.

**Table 4-12 – Overall Significance of Visual Impact**

<b>Alternative</b>	<b>Mitigation</b>	<b>Construction</b>	<b>Operational</b>	<b>Night</b>
<b>No development Alternative</b>	-	-	Low	-
<b>Substation</b>	Without mitigation	Medium-high	Medium	Medium
	With mitigation	Medium-high	Medium-low	Low
<b>Transmission Line</b>	Without mitigation	Medium-high	Medium	-
	With mitigation	Medium-high	Medium-low	-

#### 4.2.9 STATUS OF THE VISUAL IMPACT

*This assessment rates the estimated perception of the development by viewers in terms of being positive, neutral, or negative.*

The usual reaction to the sight of any new development, especially by those who know an area well, is negative, and that is likely to be the initial reaction to the proposed development by the viewers who use the N2 and R340 and those who live in the area, however, it is believed that, with time, the transmission line and substation will become part of the accepted landscape and achieve a neutral status even though it is unlikely that they will be viewed as visually positive by any of them.

#### 4.2.10 REVERSIBILITY

The basic landform will not be altered by large scale earthworks and so visual impacts will be reversible and the land can be returned to its original visual status. This is of course dependant on the prevention of any future activities on site that could have long-term negative visual implications.

#### 4.2.11 PROBABILITY OF THE IMPACTS OCCURRING

*This quantifies the probability of the impact occurring as described in the text.*

<i>Probability of Occurrence</i>	
<i>Improbable</i>	<i>&lt;40% chance of occurring</i>
<i>Possible</i>	<i>40%-70% chance of occurring</i>
<i>Probable</i>	<i>&gt;70% to 90% chance of occurring</i>
<i>Definite</i>	<i>&gt;90% chance of occurring</i>

It is probable that the visual impacts described in this report will occur.

#### 4.2.12 CONFIDENCE IN THE ASSESSMENT

*This states the level of confidence that the visual assessor has in the assessments above. It is possible that, because of such factors as the availability or quality of the input data, the assessor may have more confidence in certain assessments than in others.*

<i>Confidence in the Assessments</i>	
<i>Low</i>	<i>Data is insufficient or unavailable and further input may change the assessment</i>
<i>Medium</i>	<i>Some data is inadequate or unavailable but it is unlikely that the assessment will change significantly.</i>
<i>High</i>	<i>The available data is detailed and accurate leading to high confidence in the assessments</i>

The confidence in the findings of this report is medium-high provided that the substation and transmission line are constructed within the parameters described above. Any significant changes to the layout, number of structures, or their scale could invalidate the findings of this report.

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### 4.3 CUMULATIVE IMPACTS

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The substation and transmission line will represent an incremental increase in the 'industrial' or urban elements in the overall landscape but their character in a visual environment that is undergoing steady change with the addition of more urban elements and development is not entirely unexpected.

It is believed that, while adding a new visual element to the overall vista, the sense of place will not seriously be affected as the balance in the visual environment will not be changed in a way that is unacceptable. This is because of the visual strength of the natural elements in the overall landscape as opposed to the relatively small changes that the development will incur.

Future developments in the area, such as the proposed new N2 alignment and interchange, and continued development of housing will however strengthen the urban visual elements at the expense of the natural.

## 5 RECOMMENDED MITIGATION MEASURES

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### 5.1 GENERAL PRINCIPLES

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These general principles inform the mitigation measures in the sections below.

- The visual impact must always be taken into account when contemplating any activities or development on the site of the substation or along the route of the transmission line. Concern for visual issues must become part of the overall management ethos.
- The treatment of any visual issues must be seen as being long-term so as to avoid incremental visual degradation of the site over time.
- The ability to leave the site as close to its present state as possible should the substation be decommissioned must inform all planning, construction and operational criteria.

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### 5.2 DESIGN PHASE

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- All structures on the substation site are to be kept as low as possible in the landscape.
- The use of concrete is to be kept to a minimum as this will facilitate better decommissioning.
- The gate along the R340, and any signage, is to be in line with local usages and not draw attention.
- All colours and finishes of the building on the substation site are to be chosen for their ability to blend in to the local environment. The face brick finish is to be of a dark earth tone and the roof to be charcoal grey.
- All galvanized elements are to be left to weather rather than being painted. This includes the transmission line pylons and the palisade fence. If, at some stage in the future the fence needs to be painted, the colour should be dark grey or black. The use of green is to be avoided.
- Excavation on the site is to be kept to the absolute minimum required for the successful implementation of the project.
- The design and construction methods must be planned in such a way that the maximum amount of natural vegetation is left undisturbed. This is especially true for the cliff face, the disturbance of which could greatly increase the visual impact.
- Any lighting which may be needed for occasional maintenance at night must be shielded in such a way that no direct light is allowed to escape into the surrounding terrain or up into the sky. Only the areas that are necessary to be lit must be lit, the surrounding terrain being protected from any light pollution. No direct light sources must be visible from the N2 or the R340 although reflected light is permissible. (See Addendum 2 for the general principles involved.)
- The design phase must take into consideration the need for partial vegetative screening of the substation site between the fence and the water channel using shrub and tree species that are endemic and will not require regular maintenance. It will be impossible to screen the whole of the substation site but the aim must be to provide a vegetative foreground which partially screens the site, with the visible parts of the substation seen as the middle ground, and the cliff face providing the background.

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### **5.3 CONSTRUCTION PHASE**

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- A photographic record of the site and its immediate surrounding area must be kept as part of the EMP to serve as a baseline for measurement of all future visual impacts and as an aid to the full rehabilitation of the site should the facility be decommissioned in future.
- The disturbance of the existing environment around the substation and along the route of the transmission line is to be kept to minimum.
- All areas where disturbance of the existing environment is not necessary are to be marked or fenced off and access to these areas by the construction crews is to be prohibited.
- All stockpiles necessary for the construction of the substation and the transmission line, such as cement and other building materials, diesel etc., must be prevented from entering the natural environment by any means whatsoever including dispersion by wind or water.
- All littering is to be strictly controlled.
- All areas that need to be disturbed in the construction process but are not required during the operation of the facility must be rehabilitated as soon as possible after their use is no longer needed. This includes specifically any areas that need to be disturbed by the installation of the pylons.
- The use of fire by the construction workers is to be strictly controlled so that bush fires, especially on the substation site, are prevented. These could have a significant short-term visual impact if allowed to occur.

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### **5.4 OPERATIONAL PHASE**

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- Littering is to be strictly controlled over the entire life of the project.
- All waste is to be regularly removed from substation site to a recognized dumping site. Waste, in any form, should not be allowed to collect on the site.
- The use of any cleaning materials or defoliants to aid in the control of vegetation is to be strictly monitored so that their long-term use does not cause future problems should the site be decommissioned.
- The use of lighting is to be monitored over the entire life of the project so as to minimise light pollution. (See note on lighting in section 5.2 'Design Phase' above.)
- A strict fire prevention policy must be implemented and monitored.

## 6 CONCLUSION AND RECOMMENDATIONS

Although the **substation** site is adjacent to the N2 which is considered a scenic route and therefore is in need of special protection in terms of its visual environment, several factors will aid in limiting the visual impact to an acceptable level:

- The structures on the site will be relatively low (approximately 5m) except for the lightening mast at approximately 14m and the final pylon at approximately 22m.
- The backdrop of the cliff face behind the substation will result in the lowering of the perceived visual impact of the substation as the relative percentage of change in the overall vista will be relatively small.
- The substation will at no time be seen against the skyline thus lowering the visual impact.
- The partial screening of the substation by means of vegetation planted between the N2/R340 edges and the fencing around the site will aid in breaking the perceived intensity of the visual impact.
- The presence in the surrounding environment of a significant number of trees and other vegetation will mitigate the impact on the surrounding terrain and specifically on the houses in Twin Rivers Estate and the one farm house that will be affected.

The overall significance of the visual impact of the **substation** has therefore been assessed at medium without mitigation and medium-low with full mitigation.

The nature of the visual impact of the **transmission line** is different to that of the substation in that the visual impact will be sustained along its route and the pylons and lines will be seen against the skyline from many viewpoints. However, the relatively long distance between the pylons, their slim nature and the visual permeability of the lines serves to lower the visual impact with the overall significance also being assessed at medium-low once the galvanizing on the pylons has had time to weather and the construction scars have been revegetated.

The changing visual context in the area with the increase in housing and the proposed new N2 bypass will also alter the visual context over time in a way that will reduce the visual impacts.

The visual impacts are therefore considered as being within the range that is acceptable within the overall visual context and it is therefore recommended that, in terms of the visual issues, the project be allowed to proceed provided that the mitigation measures are implemented in full.

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## **ADDENDUM 1**

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Lighting Pamphlet

# Good Neighbor OUTDOOR LIGHTING

PRESENTED BY THE NEW ENGLAND LIGHT POLLUTION ADVISORY GROUP (NELPAG) AND SKY PUBLISHING CORP.

## What is good lighting?

Good outdoor lights improve visibility, safety, and a sense of security, while minimizing energy use, operating costs, and ugly, dazzling glare.

## Why should we be concerned?

Many outdoor lights are poorly designed or improperly aimed. Such lights are costly, wasteful, and distractingly glary. They harm the nighttime environment and neighbors' property values.

**Glare** Here's the basic rule of thumb: If you can see the bright bulb from a distance, it's a bad light. With a good light, you see lit ground instead of the dazzling bulb. "Glare" is light that beams directly from a bulb into your eye. It hampers the vision of pedestrians, cyclists, and drivers.

**Light Trespass** Poor outdoor lighting shines onto neighbors' properties and into bedroom windows, reducing privacy, hindering sleep, and giving the area an unattractive, trashy look.

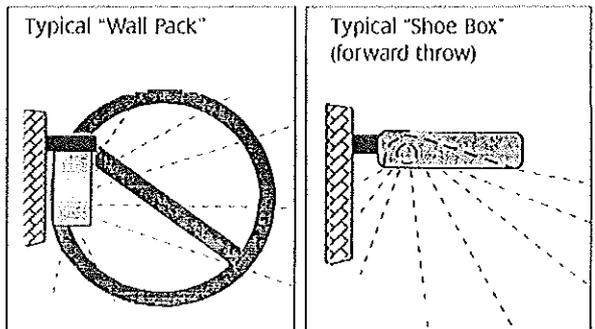
**Energy Waste** Many outdoor lights waste energy by spilling much of their light where it is not needed, such as up into the sky. This waste results in high operating costs. We waste over a billion dollars a year in the United States needlessly lighting the night sky.

**Sky Glow** Rays that beam uselessly above the horizon create murky skyglow – the "light pollution" that washes out our view of the stars.

## How do I switch to good lighting?

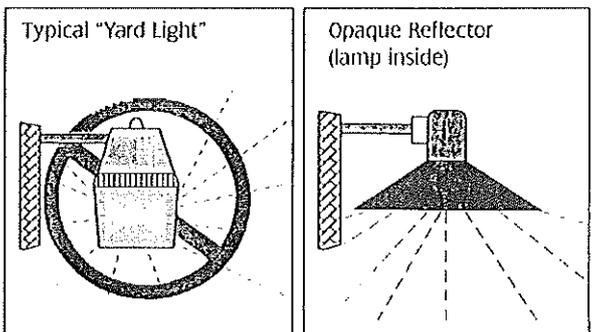
- 1 Provide only enough light for the task at hand; don't over-light, and don't spill light off your property. Specifying enough light for a job is sometimes hard to do on paper. Remember that a full Moon can make an area quite bright. Some lighting systems illuminate areas 100 times more brightly than the

## Some Good and Bad Light Fixtures



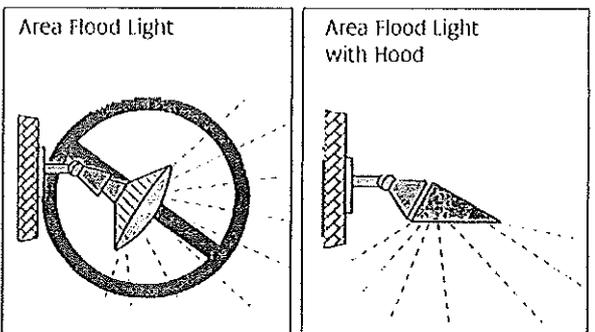
**BAD**

**GOOD**



**BAD**

**GOOD**



**BAD**

**GOOD**

full Moon! More importantly, by choosing properly shielded lights, you can meet your needs without bothering neighbors or polluting the sky.

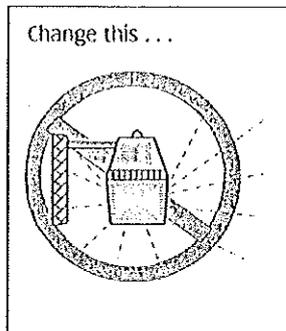
- 2** Aim lights down. Choose "full-cutoff shielded" fixtures that keep light from going uselessly up or sideways. Such fixtures produce minimum glare. They create a pleasant-looking environment. They increase safety because you see illuminated people, cars, and terrain, not dazzling bulbs.
- 3** Install fixtures carefully to maximize their effectiveness on the targeted area and minimize their impact elsewhere. Proper aiming of fixtures is crucial. Most are aimed too high. Try to install them at night, when you can see where all the rays actually go.

Properly aimed and shielded lights may cost more initially, but they save you far more in the long run. They can illuminate your target with a low-wattage bulb just as brightly as a wasteful light does with a high-wattage bulb.

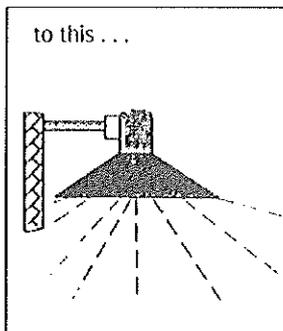
- 4** Choose energy-efficient low-pressure sodium (LPS) or high-pressure sodium (HPS) lamps wherever yellowish light will do the job. Use less efficient white lights only where ideal color rendition is important.
- 5** Where feasible, put lights on timers to turn them off each night after they are no longer needed. Put home security lights on a motion-detector switch, which turns them on only when someone enters the area; this provides a great deterrent effect!

### Replace bad lights with good lights.

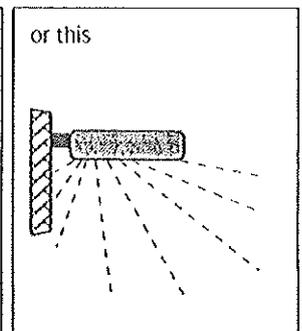
You'll save energy and money. You'll be a good neighbor. And you'll help preserve our view of the stars.



**YARD LIGHT**

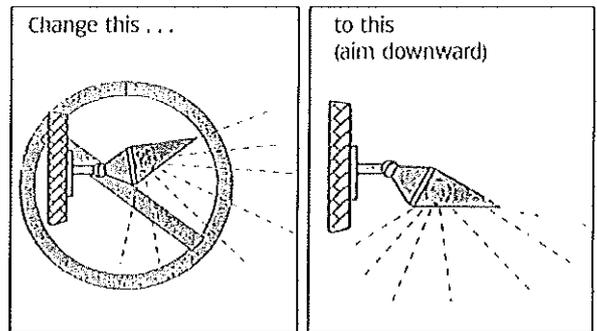


**OPAQUE REFLECTOR**

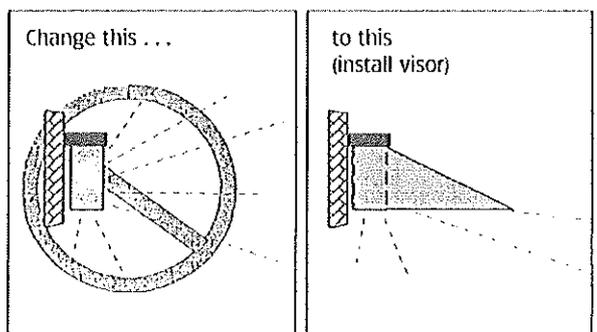


**SHOE BOX**

### What You Can Do To Modify Existing Fixtures



**FLOOD LIGHT**



**WALL PACK**

Presented by the

New England Light Pollution Advisory Group (NELPAG)

(<http://cfa-www.harvard.edu/cfa/ps/nelpag.html>) and

Sky Publishing Corp. (<http://www.skypub.com/>).

NELPAG and Sky Publishing Corp. support the

International Dark-Sky Association (IDA) (<http://www.darksky.org/>).

We urge all individuals and groups interested in the problems of light pollution and obtrusive lighting to support the IDA and subscribe to its newsletter. IDA membership costs \$30 per year; send your check to IDA, 3225 N. First Avenue, Tucson, AZ 85719, U.S.A.

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