Environmental Impact Assessment for the proposed Aluminium Pechiney smelter within the Coega Industrial Zone, Port Elizabeth, South Africa

SPECIALIST STUDY:

VISUAL IMPACTS

September 2002

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Aluminium Pechiney proposes to construct and operate an aluminium smelter on an 80ha site within the Coega Industrial Development Zone (IDZ) 15 km from Port Elizabeth. The proposed project (referred to as the PAS 2005 project) involves a large shed-like potline building, as well as a number of tall stacks. The purpose of the plant is to manufacture aluminium ingots and it will have a life of approximately 40 years.

This specialist study, undertaken as part of the Environmental Impact Assessment for the proposed smelter, includes a description of the visual / scenic environment, including the identification of the view catchment, visual characteristics and visual sensitivity of the area which would be potentially influenced by the Aluminium Pechiney project.

Cognisance was taken of the rural, recreational and natural environment components of the general area, and the scenic resource values attached to these, particularly in relation to the proposed Greater Addo Elephant National Park (GAENP).

The view catchment extends from Swartkops River escarpment in the south-west to the Sundays River escarpment in the north-east, and from the foothills of the Zuurberg in the north-west, to the Algoa Bay coastline in the south-east.

Being one of the first possible developments in the IDZ means that it would be visually prominent in the area. The overall finding was that the impact of the proposed Aluminium Pechiney smelter would have a high significance rating, and the lighting a medium significance rating in terms of potential visual impact, before mitigation.

Given the height and bulk of the plant, which is dictated by the manufacturing process, and the relatively open nature of the landscape, little can be done to reduce the scale or screen the plant. However, the bulky rectangular form can be somewhat reduced by using careful colour and/or material treatment of the facade to assist in blending the plant with the background.

A number of mitigation actions have been proposed in this report. If implemented, the potential impact of the plant is expected to have a slightly reduced rating of medium to high, although the impact of lighting would probably remain medium. This would however depend on the final architectural treatment of the plant.

The conveyor belt from the port to the plant, as well as the ship unloaders in the port, will be highly visible in the landscape / coastline, and little can be done to reduce their visual impact.

It needs to be borne in mind, however, that the smelter will form part of a larger industrial development zone and eventually be surrounded by other factories, although these would probably be smaller in scale. The port facilities serving the smelter would likewise form part of a larger industrially oriented port. Planning for the IDZ indicates that the conveyor belt to the smelter would be one of several running in a conveyor belt corridor that would link the port with the IDZ.

These considerations imply that the significance of the visual impacts relating to the Aluminium Pechiney smelter (over its 40 year life) need to be considered in the context of the cumulative visual impacts for the Coega IDZ as a whole.
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This report is to be cited as follows:

Glossary of terms and abbreviations used

**View Catchment Area** – The geographic area over which the actual site and proposed facilities will be visible.

**Viewshed** – The outer delineation defining the view catchment area, generally determined by topographic ridgelines and crests.

**View Corridor** – A linear geographic area, usually along transportation routes, particularly visible to users of the route.

**View Shadow** – Areas within the view catchment from which the proposed facilities will not be visible as a result of the local topography, vegetation or buildings, which may obscure sightlines.

**High Mast Lighting** – High intensity mast mounted lights exceeding 10m in height (as seen at Motherwell). Visually obvious both day and night due to the effect of height and light ‘spillage’ at night.

**Floodlighting** – High intensity area lights, typically used to ‘wash’ facades or areas around buildings with light. These may be ground, low mast or building mounted.

**GAENP**  
Greater Addo Elephant National Park (the process of expanding the existing Addo Elephant National Park to create this new park is currently underway).
1. INTRODUCTION

This study has been undertaken as part of the Environmental Impact Assessment (EIA) of the proposal by Aluminium Pechiney to construct and operate an aluminium smelter in the Coega Industrial Development Zone (IDZ) near Port Elizabeth, South Africa. In particular, this study assesses the visual impact of the smelter and the associated facilities of the Port of Ngqura and the conveyor belt running from the port to the smelter. The study includes a description of the visual / scenic environment, including the identification of the view catchment, visual characteristics and visual sensitivity of the area which would be potentially influenced by the Aluminium Pechiney project.

1.1 Terms of Reference

The terms of reference for the specialist visual study are outlined below (CSIR, Terms of Reference for Sub-contracted Services):

- Describe the visual impact of the proposed PAS 2005 project both at the proposed site in the Coega IDZ, and at the proposed Port of Ngqura, and the conveyor belt system (during the day and at night).
- Determine the visibility and visual impact of the PAS 2005 project from important tourist routes (taking into consideration new initiatives such as the creation of the Greater Addo Elephant National Park).
- Evaluate the predicted magnitude of lighting impacts at St Croix islands which stem from Aluminium Pechiney's night-time lighting requirements.
- In terms of visual impacts at the IDZ site, place the predicted impacts from the Aluminium Pechiney smelter within the context of current and potential future developments.
- Propose remedial measures to reduce the potential visual impacts. These should take into account the visual guidelines prepared for the Coega IDZ.
- Identify potential permit applications and provide guidelines for satisfying these requirements (e.g. aviation lights on tall structures).

1.2 Assumptions

The visual assessment has been based on information and drawings provided by the CSIR and Aluminium Pechiney over the period April to June 2002.

Although an area has been provisionally set aside for possible future expansion, the visual assessment has been based on the current proposal to establish a single potline and therefore utilises drawings of the basic plant and ancillary infrastructure as provided by Aluminium Pechiney. It is assumed that another visual study will be undertaken if in future a proposal is made to expand the smelter.

This visual assessment is based on the assumption that the N2 will be raised where it crosses the Coega River, and that the conveyor belt will pass under the N2 and the
proposed adjacent railway line. In the short term, plans indicate that the conveyor will pass under the N2 in a culvert.

The visual assessment of the power lines that will supply the PAS 2005 plant (and the port), will form part of a separate Environmental Impact Assessment commissioned by Eskom and currently being undertaken by Bohlweki. It is assumed that the Environmental Impact Report to be prepared by CSIR for the proposed smelter will include extracts from the Eskom EIA in order to convey the visual impacts associated with the power lines to the smelter, provided this is available timeously.

This visual impact assessment does not include an assessment of visual impacts during the construction phase, due to the relatively short term and highly dynamic nature of this stage.

1.3 Key Issues

Various issues and concerns relating to the proposed smelter plant have been identified in the technical scoping exercise, or raised by I&APs and authorities. The full issues trail is contained in the Final Scoping Report (CSIR, July 2002). Those issues with visual implications have been summarised below, and have informed the visual assessment process:

- The visual impact of the plant on the Greater Addo Elephant National Park (GAENP), especially lighting at night.
- The impact on the proposed new entrance at Colchester to the GAENP.
- The impact of the development on the GAENP.
- The impacts on the N2 as an access route by potential tourists to the new Park developments at Colchester.
- The visual impact of the plant as seen from the camp sites in the GAENP.
- The extent to which the plant buildings will blend with the environment, and take colour into account.
- Whether there will be building height restrictions to limit visual impact on the GAENP.
- Whether lighting at night will impact on the St Croix Islands and the breeding of birds.
- The significance of shore-based lighting, with recommendations and mitigation measures to limit this possible disturbance.
- An assessment of the impacts of the proposed conveyor route from the harbour to the plant.
- Mitigation needed to limit visual impacts of the conveyor belt where it runs along the bottom of the hill, cutting into the slope at Butterfly Valley, before crossing the N2, and requiring substantial cut and excavation.
- Assessment of the total visual impact of the development, including power lines, conveyor belt, plant etc.
2. APPROACH

2.1 Visual Assessment Criteria

The assessment methodology, as prescribed by the CSIR, and based on convention, includes the following steps:

**Nature of impact** - the type of effect that the proposed activity will have on the visual-scenic environment is identified.

**Extent** - the geographic extent of the impact, whether local - limited to the immediate area of development (the site or the servitude corridor); or limited to within 5km of the development; or whether regional, national or even international.

**Duration** - the lifetime of the impact, short term being (0 - 5 years), medium (5 - 15 years), long term (>15 years but where the impacts will cease after the operation of the site), or permanent.

**Intensity** - whether the impact is destructive or innocuous - described as either low (where no visual-scenic resources are affected), medium (where visual-scenic resources remain intact, but are modified) or high (where visual-scenic resources are temporarily or permanently altered).

**Probability** - the likelihood of the impact occurring - described as improbable (low likelihood), probable (distinct possibility), highly probable (most likely) or definite (impact will occur regardless of prevention measures).

**Status of the impact** - whether the impact will be positive (a benefit), negative (a cost), or neutral.

**Degree of confidence in predictions** - based on the availability of information and specialist knowledge.

**Cumulative effects** - the impact evaluation takes into consideration the cumulative effects associated with this and other facilities, which are either developed or in the process of being developed in the region.

**Magnitude of impacts** - the visual study attempts to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used by using the criteria in Table 3. Where appropriate, accepted norms are used as a measure of the level of impact.

**Significance** – The significance of an impact is expressed as *high*, *medium* or *low*. The rationale used to ascribe these levels of significance provided in Table 4.
**Mitigation and Monitoring** - Impacts are described both before and after the proposed mitigation and management measures have been implemented.

Where negative impacts are identified, mitigation objectives are set (i.e. ways of reducing negative impacts), and attainable mitigation actions recommended.

Where no mitigation is feasible, this is stated and the reasons given. Where positive impacts are identified actions to enhance the benefit are recommended.

Quantifiable standards for measuring the effectiveness of mitigation and enhancement are set where possible. In addition, monitoring, and review programmes are recommended to assess the effectiveness of mitigation.

### 2.2 Visual Assessment Procedure

The procedure used by the authors included the following:

- A desktop survey using 1:50 000 trig survey maps, 1:10 000 orthophotos, and recent black / white aerial photography. These were used to identify topographical features, land use and landscape patterns, as well as view catchment areas.

- An on-site survey of the proposed PAS 2005 site and the surrounding area, including visibility of the proposed plant from various routes and viewpoints. These were recorded by means of a digital camera.

- A computer simulation of the proposed plant was constructed using CAD software, and then a photographic montage created, in order to test the potential visual impact from the selected viewpoints.

- Potential visual impacts were then rated using measurable criteria, such as geographic viewsheds and viewing distances, as well as qualitative criteria, such as landscape/townscape integrity.

- Finally, the significance of the potential visual impacts (and benefits) are evaluated, and the overall status determined.
3. DESCRIPTION OF VISUAL CHARACTERISTICS

3.1 General Description of the Area

The landscape character of the study area is determined largely by the landforms and the vegetation cover, as well as by the more recent pattern of human settlement. These in turn determine the visual experience of the area, its scenic attributes and its 'sense of place'.

The landforms of the area are primarily a function of the geology, and of climatic and coastal processes. These need to be understood in order to appreciate why the landscape looks like it does.

Three main landscape types are readily identifiable within the site's zone of visual influence:

1) The sandy coastline and coastal dunes, including the Coega River estuary and the proposed Nqgura Port. The dunes reach about 30 metres in elevation, and tend to visually separate the coastline from the main Coega Industrial Development Zone.

2) The raised coastal plain, characterised by coastal limestone, overlain by wind-blown calcareous sands, and dissected by rivers, such as the Swartkops, the Coega and the Sundays Rivers. The Aluminium Pechiney site is located on this landform, the elevation of the site ranging from 47 to 57 metres, and is generally visible from the surroundings.

3) The outcrops of sandstone, recognised as the Peninsula Formation of the Table Mountain Group. These include the Coega Kop, the only prominent landform within the Coega IDZ, with an elevation of 145 metres. Other notable sandstone features are the offshore St Croix Islands, and the rocky buttresses overlooking the Sundays River. The latter, which range from 60 to 140 metres in elevation, make up the wilderness area currently being incorporated into the Addo Elephant National Park.

The flat and relatively open coastal plain tends to be visually exposed, while the relatively low vegetation cover consisting of dune thicket near the coast, Succulent Thicket inland, and open Bontveld on the crests, provides little visual screening. Tall structures therefore tend to be prominent for some distance in this landscape.

Existing urban development lies mainly to the south in the form of Bluewater Bay and Motherwell residential areas. New residential development is spreading rapidly north of Bluewater Bay along the coast towards the Coega IDZ. Traditional settlement of the immediate area is rural in character with small farmsteads and settlements, but heavily impacted by quarries on Coega Kop and the salt works in the Coega estuary.

The area's 'sense of place' is derived mainly from its coastal setting and present rural quality, particularly the scenic Coega valley and estuary. The area, however, can more accurately be described as transitional, given the expansion of the Bluewater residential development and particularly the introduction of new roads and infrastructure for the
proclaimed Coega IDZ (for example, the expansion of Wells Estate to house construction workers for IDZ developments).

The actual site being considered for the plant lies within the planned metallurgical cluster of industries, and is flanked to the south by Markman Industria, and to the north by planned open space along the Coega Valley.

The site for the proposed plant, which measures approximately 80 ha, is located on a relatively flat crest, with a number of abandoned buildings together with disturbed veld once used for agriculture.

3.2 Significance of the Area

The surroundings include a number of significant natural features, the most obvious being the coastline, which has scenic and recreational value, as well as the Coega River estuary, which although highly disturbed by the salt works, still contains natural salt marshes along the southern bank.

The N2 to Colchester and Grahamstown is a national arterial route with scenic value, and the view from the road is therefore important. The R102 / R334 is a less significant route, but passes close to the site and therefore needs to be taken into account.

Finally, the Addo National Park, which is located some 16 km to the north of the site and is currently being expanded, relies heavily on the natural landscape to provide a wilderness experience for its visitors. The visibility of the Aluminium Pechiney site, and of the Coega IDZ generally, is an important factor, especially from the approach routes, such as the N2.

3.3 Description of Proposed Facilities

Extracts from the ‘Project Description’ (CSIR 2002), that have a bearing on the visual assessment, are given below. A list of the envisaged structures at the proposed plant and Port of Nqgura are given in Table 1.

3.3.1 The PAS 2005 Aluminium Plant

The smelter project will comprise a single potline located in two potrooms each 1200m in length; together with associated facilities for carbon anode production, aluminium casting, materials handling and storage, and port loading and unloading. There is a potential for a second potline which will be assessed at a later stage, if a decision is made to proceed with this second potline. Aluminium ingots will be the primary product that will be produced for shipment, from the proposed port facility, to international markets.

The materials transported to the smelter site will be stored in sealed dome-shaped silos for alumina, while coke will be stored in an A-frame shed.
Construction is anticipated to commence in early 2003 and last for a period of 26 months. The proposed site is currently uncleared and undeveloped, so initial construction will require the development of a suitable site upon which to build the smelter and an access road to the site. Site and earthworks are scheduled to commence in late 2002. Responsibility for site clearance and earthworks rests with the Coega Development Corporation, and these activities will be done in accordance with the Record of Decision issued for the EIA for the rezoning of land for the IDZ.

3.3.2 Port Facilities and Conveyor System

Dedicated port facilities for unloading raw materials and loading finished products will be constructed in conjunction with development of the Port of Nqgura. Most of the raw materials will be transported by ship to the port.

Fresh alumina and coke will be transported by dedicated vessels, which carry loose, dry-bulk material then unloaded by vacuum onto an enclosed conveyor system.

Initially the alumina will be delivered in Panamax class vessels approximately every three weeks. The coke will be transported and stored in the same way and by the same conveyor system.

3.3.3 Road Transport

Aluminium fluoride will probably be imported in 1 tonne bulker bags or 25kg layer bags and transported by truck to the site for storage and use. Liquid pitch will be shipped in a dedicated, heated vessel and transported by truck from the port to the smelter site unless a heated pipe is practical.

The final product will be aluminium in the form of ingots. The ingots will be stacked and trucked to the port from the smelter, loaded onto ships and exported.

3.3.4 Construction Phase

It is understood that a workers housing camp will be established by the Coega Development Corporation at Wells Estate, and does not form part of the present visual impact study.

3.3.5 Design Controls


The building would consist of some form of cladding on a steel frame structure. The materials and colours have not been finalised, and would be influenced by the VIA.
Table 1: Schedule of Proposed Facilities

<table>
<thead>
<tr>
<th>Proposed Facilities at the Plant</th>
<th>Footprint</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site area total</td>
<td>110 ha</td>
<td>54m elevation</td>
</tr>
<tr>
<td>Plant area total</td>
<td>80 ha</td>
<td>Varies</td>
</tr>
<tr>
<td>Building area</td>
<td>25 ha</td>
<td>Varies</td>
</tr>
<tr>
<td>Hardened area (eg parking, roads, storage)</td>
<td>25 ha</td>
<td>N/A</td>
</tr>
<tr>
<td>Unsealed area (mainly grassed or vegetated)</td>
<td>30 ha</td>
<td>N/A</td>
</tr>
<tr>
<td>Construction laydown / future exp. Area</td>
<td>30 ha</td>
<td>N/A</td>
</tr>
<tr>
<td>Potrooms x 2</td>
<td>1200 x 30m (2)</td>
<td>22.8m</td>
</tr>
<tr>
<td>Bulk storage silos</td>
<td></td>
<td>40m</td>
</tr>
<tr>
<td>Conveyor tower between silos</td>
<td></td>
<td>58m</td>
</tr>
<tr>
<td>Paste plant</td>
<td></td>
<td>45m</td>
</tr>
<tr>
<td>Gas /fume treatment stacks x 3</td>
<td></td>
<td>50m</td>
</tr>
<tr>
<td>Casthouse stacks x 5</td>
<td></td>
<td>32m</td>
</tr>
</tbody>
</table>

Proposed Aluminium Pechiney Facilities at Port of Nqgura

| Enclosed conveyor belt          | 3.8 km length | Av. 4 to 10m At silo 4 to 58m |
| Ship unloaders x 2              | 170 sq.m (2)  | 40m                          |
| Liquid pitch and metal storage  | 3900 m²       | Varies: 3.5m to 22m          |

4. IDENTIFICATION OF SOURCES OF IMPACTS

The scale and length of the buildings, and the height of the stacks, are such that they will be visually prominent, both within the Coega IDZ and the surroundings (see Fig. 10 to 14).

This implies that the plant, together with the ancillary conveyor and port facilities, could potentially be seen as impacting negatively on the visual / scenic quality of the area, which includes residential, recreational and National Park type land uses on the fringes of the view catchment area. The impact must however be seen within the context of the larger Coega Industrial Development Zone, as well as the adjacent Markman Industria.

The lighting associated with the proposed plant and port facilities would be potentially visible at night, (see Fig.15). This again needs to be seen in the context of the larger Coega IDZ and port. From discussions it was indicated that neither floodlighting nor high-mast lighting was required for the plant.
5. POTENTIAL VISUAL IMPACTS

5.1 Nature of the Visual Impacts

From the description of the area and the proposals, as well as the photographic montages, the following possible impacts could be anticipated:

- Potential visual intrusion of the proposed smelter plant, conveyor belt and port facilities on the natural and amenity value of the existing coastal/rural landscape.
- Potential increase of lighting at night, including navigation lights on the tall stacks, which may be visible to the surrounding areas, and to and shipping in the bay.

It was evident from the field survey that the proposed plant and related facilities would be particularly visible from the N2 which passes through the area, and which is the main approach route to Port Elizabeth from the north. The N2 would also become the main approach route to the GAENP, if the main entrance to the Park is moved to Colchester in the future.

5.2 Visibility and Viewsheds (see Fig. 6)

Visibility is largely determined by the following:

- topography (view catchment area, or viewshed);
- the elevation and distance of the observer, (viewlines);
- foreground landforms and trees or other urban development, which may obscure views of the plant, (view shadows).

Because all of these factors need to be taken into account, the delineation of an actual view catchment area is complex process, which means that the viewshed line as shown on Fig. 4 should be seen as nominal. Therefore the proposed plant would not necessarily be visible from all points within the viewshed, particularly once the Coega IDZ is built-up. The view catchment extends from Swartkops River escarpment in the south-west to the Sundays River escarpment in the north-east, and from the foothills of the Zuurberg in the north-west, to the Algoa Bay coastline in the south-east.

The degree of visibility in a relatively flat landscape is determined largely by distance, although silhouette effects against the skyline tend to increase visibility. The following degrees of visibility are included in Table 2 and are used to classify the magnitude of the impact:

<table>
<thead>
<tr>
<th></th>
<th>Descriptive classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly visible</td>
<td>Dominant within the observers view frame (0 to 2km);</td>
</tr>
<tr>
<td>Visible</td>
<td>Strongly noticeable within the observers view frame (2 to 4km)</td>
</tr>
<tr>
<td>Moderately visible</td>
<td>Recognisable feature within observers view frame (4 to 6km)</td>
</tr>
<tr>
<td>Marginally visible</td>
<td>Not particularly noticeable within observers view frame (6 to 8km)</td>
</tr>
<tr>
<td>Hardly visible</td>
<td>Practically not visible unless pointed out to observer (8km+)</td>
</tr>
</tbody>
</table>
5.3 Viewpoints and View Corridors

Viewpoints have been selected based on prominent viewing positions in the surroundings and are listed in Table 2. An attempt has been made to select the most sensitive points, mainly on public routes, and elevated sites, such as the top of the buttresses within the extended GAENP. These include sites identified by I&APs in the scoping process.

View corridors have been indicated on the same map (Fig. 7), based on the more important routes in the area. A nominal distance of 500 metres has been included on either side of the routes, to roughly represent the view cone taken in by a driver travelling at speed (tunnel vision).

*Note: The width of the view corridor is somewhat academic, as actual visibility will depend on topography and foreground vegetation on either side of the road. Vistas may be limited in places, but will increase where there are crests or bends in the road. 500 metres is therefore seen as being only nominal, based on site observations.*

The location of the viewpoints is shown in Figures 1, 7 and 8. The simulated views of the smelter, conveyor belt and port infrastructure are provided in Figures 10 to 16.

5.4 Impact Assessment

Visual impacts have been assessed in terms of the criteria presented in Tables 2 and 3, which are in turn used to determine significance ratings. The impacts have then been rated in Table 4 in terms of their significance (high, medium, low), status, and in terms of confidence, by means of a synthesis of the criteria listed in Table 3. Finally, impacts are assessed in Table 5, both with and without the recommended mitigation measures, as outlined later in Section 6.
### Table 2: Potential Visibility of Aluminium Pechiney Facilities

<table>
<thead>
<tr>
<th>Affected Area</th>
<th>View point</th>
<th>Distance from AP site</th>
<th>Potential Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mountain pass through Zuurberg</td>
<td>VP 1</td>
<td>45km</td>
<td>Lights of Port Elizabeth and Coega IDZ marginally visible in the distance at night. Smelter site not distinguishable.</td>
</tr>
<tr>
<td>Southern ext. of Addo Elephant National Park nr Ingleside</td>
<td>VP 2</td>
<td>16km</td>
<td>Lights of Port Elizabeth and Coega IDZ marginally visible in the distance at night. Smelter site hardly distinguishable behind ridge.</td>
</tr>
<tr>
<td>N2 National Rd looking south</td>
<td>VP 3</td>
<td>8.3km</td>
<td>Smelter marginally visible behind ridge to road-user. Lights of plant moderately visible directly ahead of road-user.</td>
</tr>
<tr>
<td>N2 National Rd looking south over Coega saltworks</td>
<td>VP 4</td>
<td>3.5km</td>
<td>Smelter visible in the middle distance on the skyline. Silhouette effect. Conveyor belt moderately visible.</td>
</tr>
<tr>
<td>N2 National Rd looking south over bridge and saltworks</td>
<td>VP 5</td>
<td>2.5km</td>
<td>Smelter visible on the skyline. Silhouette effect. Conveyor belt visible.</td>
</tr>
<tr>
<td>N2 and Coega Rd intersection</td>
<td>VP 6</td>
<td>2km</td>
<td>Smelter visible on the skyline. Silhouette effect.</td>
</tr>
<tr>
<td>Coegakop</td>
<td>VP 7</td>
<td>3km</td>
<td>Smelter highly visible on the plain below.</td>
</tr>
<tr>
<td>R334 Uitenhage Rd</td>
<td>VP 8</td>
<td>4km</td>
<td>Smelter moderately visible in the middle distance on the skyline. Silhouette effect. Conveyor marginally visible. Moderated by foreground vegetation.</td>
</tr>
<tr>
<td>R334 Uitenhage Rd</td>
<td>VP 9</td>
<td>3.4km</td>
<td>Smelter moderately visible in the middle distance on the skyline. Silhouette effect. Conveyor marginally visible. Moderated by foreground vegetation.</td>
</tr>
<tr>
<td>From new haul road looking east</td>
<td>VP 10</td>
<td>&lt;2km</td>
<td>Smelter highly visible in the foreground. Conveyor not visible.</td>
</tr>
<tr>
<td>From new haul road at Markman Industria</td>
<td>VP 11</td>
<td>&lt;2km</td>
<td>Smelter highly visible in the middle distance on the skyline. Silhouette effect. Moderated by foreground vegetation.</td>
</tr>
<tr>
<td>N2 / St Georges Strand intersection</td>
<td>VP 12</td>
<td>5km</td>
<td>Smelter moderately visible in the middle distance on the skyline. Silhouette effect.</td>
</tr>
<tr>
<td>N2 / New Haul Road bridge</td>
<td>VP 13</td>
<td>2km</td>
<td>Smelter highly visible in the distance. Silhouette effect.</td>
</tr>
<tr>
<td>N2 Coega River salt pans</td>
<td>VP 14</td>
<td>&lt;1km, 2.7km</td>
<td>Aluminium Pechiney conveyor belt highly visible. Ship-unloaders marginally visible.</td>
</tr>
<tr>
<td>Bluewater Bay</td>
<td>VP 15</td>
<td>8km</td>
<td>Smelter complex hardly visible in the distance. Navigation lights on stacks may be visible at night. Moderated by Motherwell light masts in the middle distance.</td>
</tr>
</tbody>
</table>
### Table 3: Potential Visual Impacts / Benefits

<table>
<thead>
<tr>
<th>Impact Assessment Criteria</th>
<th>Potential Visual Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spatial extent</strong></td>
<td>The extent of visual impact can be described as local to sub-regional, given the scale of the proposed structures and the extent of the viewshed. (See Figure 4 for viewsheds). Visual exposure is high because of the topographically exposed nature of the site, located on a relatively open coastal plain with little tree cover. The complex would be screened from the north-west by Coega Kop.</td>
</tr>
<tr>
<td><strong>Visual exposure</strong></td>
<td>Visual exposure is high because of the topographically exposed nature of the site, located on a relatively open coastal plain with little tree cover. The complex would be screened from the north-west by Coega Kop.</td>
</tr>
<tr>
<td><strong>Visibility of structures</strong></td>
<td>Visibility ranges from highly visible to hardly visible depending on distance of the complex from surrounding areas and viewpoints. The stacks, silos and conveyor tower would be prominent forms in the flat landscape, especially when seen in silhouette on the skyline.</td>
</tr>
<tr>
<td><strong>Visibility of lighting</strong></td>
<td>Visibility of general lighting would be moderate, assuming no flood-lighting of the complex, or the use of any high-mast lights. Red aviation warning lights on the stacks will be highly visible from a distance.</td>
</tr>
<tr>
<td><strong>Visual absorption capacity</strong></td>
<td>Visual absorption capacity is poor because of the exposed nature (openness) of the existing landscape, and therefore low inherent potential for screening by existing landforms, vegetation and/or structures.</td>
</tr>
<tr>
<td><strong>Landscape/ townscape integrity</strong></td>
<td>Effect on landscape integrity is moderate to high. The complex would eventually form part of the Coega industrial zone, but would initially be visually incompatible with the surrounding rural, and residential land uses / structures.</td>
</tr>
<tr>
<td><strong>Intensity or magnitude of impact</strong></td>
<td>The intensity of visual impact for the complex as a whole can be described as high. This will be moderated to some extent in the future when the complex is surrounded by other industrial buildings within the Coega IDZ.</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>The duration or time frame in which the impact will be experienced is expected to belong term to permanent, long-term being defined as longer than 15 years.</td>
</tr>
<tr>
<td><strong>Probability</strong></td>
<td>The probability of the impact occurring is highly probable, regardless of prevention measures, because of the large scale of the complex, and the exposed character of the landscape.</td>
</tr>
</tbody>
</table>
Table 4: Rating of Impacts

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significance:</td>
<td>The visual impact of the proposed structures is considered to be of high significance before mitigation, based on the assessment in Table 2.</td>
</tr>
<tr>
<td>structures</td>
<td>The high significance rating takes into account the proposed conveyor belt along the south-western edge of the saltworks; the need for ancillary port facilities; and that the N2 passes through the Coega IDZ and within the 2km radius of the Aluminium Pechiney smelter. The rating is also based on the potential for the proposed new entrance and camps for the GAENP to be located at Colchester. However, the considerable distance (16km) of the proposed plant from Colchester, and the fact that the plant will be hardly visible, is a moderating factor. Furthermore, the significance is rated as high given the loss of scenic amenity and rural quality in the general area, although this is moderated by the distance of the proposed plant from existing residential development. The significance of the impact is medium-high to when the smelter is considered in the context of the surrounding development of the IDZ in approximately 10 to 20 years time.</td>
</tr>
<tr>
<td>Status:</td>
<td>The overall effect of the proposed structures on the visual / scenic environment could potentially be negative, specifically from the N2 National Route. Although partly offset by the fact that the complex falls within an industrial zone, the sheer scale of the smelter buildings are likely to be larger than anything else in the area. The site survey revealed that the siting of the Smelter complex on high ground means that the long buildings, silos, conveyor tower and tall stacks will be visible on the skyline for up to 6km distance. The effect of lighting on the visual / scenic environment would potentially be negative within the existing context, but would be moderated if and when the Coega IDZ is developed.</td>
</tr>
<tr>
<td>structures</td>
<td>The degree of confidence in predictions, based on available information and specialist knowledge is high, and is dependent to some extent on the final architectural treatment (building forms and finishes), as well as the engineering and service requirements of the complex. The degree of confidence is medium in relation to lighting, as the final lighting levels are difficult to predict.</td>
</tr>
<tr>
<td>lighting</td>
<td></td>
</tr>
<tr>
<td>confidence</td>
<td>The degree of confidence is medium in relation to lighting, as the final lighting levels are difficult to predict.</td>
</tr>
</tbody>
</table>
6. RECOMMENDED MITIGATION MEASURES

Mitigation measures are intended to minimise negative visual impacts, assist detailed layout and design, and enhance project benefits. The effectiveness of mitigation measures for the PAS 2005 project may, however, be limited given that the height and form of the various buildings are dictated by the manufacturing process.

The mitigation measures are determined to some extent by the development controls and visual guidelines that have already been drawn up for the Coega IDZ. These and other measures are discussed below.

6.1 Architecture and Infrastructure Guidelines for the Coega IDZ

A design manual has been prepared for the Coega IDZ called “Architecture and Infrastructure Guidelines” (Albrecht Herholdt Architects et al, 2001). The section on the Metallurgical Use Zone prescribes the following:

*Retain human scale by paying attention to scaling down at entrances and towards the perimeter of the site. Avoid monotony and create architectural interest. Place the highest parts of the building on the middle of the site. Avoid monolithic roofscapes. Celebrate the industrial nature of the building by accentuating chimney stacks, mechanical equipment, towers etc.*

The Guidelines are based on the following principles:

- Nautical influence
- Contemporary architecture
- Industrial ‘sculptures’
- Horizontal emphasis
The Guidelines include a number of 'architectural principles' and 'urban environment codes' which need to be observed. These guidelines, however, seem to relate mainly to smaller industries, which form part of a streetscape together with other industrial buildings, in order to create an overall theme.

Colour codes are also given, in which a minimum of 60% of the elevational area of walls, and 90% of the roof area, are to be white or off-white. The balance may consist of 'intrinsic' colours, (i.e. the natural colour of the materials), and 'accent' colours, which must consist of strong blues and/or greens.

Although these and other guidelines in the manual help to create some unity within the Coega IDZ, they would probably have minimal effect in reducing the visual impact of the exceptionally large structures of the Aluminium Pechiney aluminium plant, when seen within the wider surrounding context.

### 6.2 Coega IDZ: Visual Guidelines for Development

Another document, 'Visual Guidelines for Development' (Cave Klapwijk Associates, June 2002), has been prepared for the Coega IDZ. These guidelines, which are still in draft form, are aimed at reducing the visual impact of the Coega industrial zone from the surroundings generally, and from the N2 and GAENP in particular. Some of the relevant guidelines are summarised below:

- **A perimeter buffer zone** where the scale and size of structures in the zone should be reduced by using smaller buildings, tree planting and mounding where appropriate.

- **Screening along the N2** using excess spoil to provide low mounding on the boundary to screen cars, storage areas, etc.

- **Signage controls** including a maximum of 1m high letters, no flashing signs, and no signs protruding above the height of the building.

- **Roof materials and colour** must not be reflective or glossy. Surfaces should be matt, and recommended colours light grey, dark buff, olive green tints, rust or ochre. *(Note: this guideline is partly at variance with the architectural controls in the previous section).*

- **Building fenestration** on the street side of buildings must not reflect into adjacent property or beyond. Dark glass curtain walling may be acceptable if reflection is not a visual nuisance.

- **Large or long building facades** that face the road or the Coega IDZ boundary are to be visually broken up by vertical bands of appropriate colour, such as buff, grey, grey-blue, olive green, blue-green, ochre, rust. Bright colours would not be acceptable. *(Note: this guideline is also at variance with the architectural controls in the previous section).*
Alternatively, other smaller buildings could be placed in front of the facade, or shadows created from roof overhangs, and the stepping of the surface to accommodate other building elements.

**External light fittings** shall not allow light to shine upwards. Security and street lighting to be shielded and directed downwards to prevent side spill. Tall mast lighting should be confined to the lower elevations, such as the harbour.

**Lighting on tall structures,** such as silos and chimneystacks will by law have to be fitted with a red flashing light. The position of these structures will have to be reported to the Civil Aviation Authority (CAA) and the position will be recorded. A NOTAM (Notice to Airmen) is sent by the CAA to all airports worldwide. Nothing can be done on site to reduce the visibility of this light.

The viewer will need to make provision for blocking views of these lights by screen planting, screens or orientation.

**Harbour navigation lights,** seen from vessels approaching or passing the harbour would not be seen from land since the angle of the light beam is directed out to sea to provide navigation bearings for approaching ships. Details of this navigational device are however required to accurately assess its visibility.

### 6.3 General Recommendations

Taking into account the mitigation proposed in sections 6.1 and 6.2, the following mitigation specific to the PAS 2005 project is proposed:

**Siting of Facilities**

Given the large bulk and length of the proposed complex, this should be divided, as far as possible, into smaller buildings (such as the office block etc.), to reduce the effect of large monolithic structures.

**Size of Facilities**

The height of structures must be kept to a minimum, to avoid excessive visual intrusion on the open landscape and arterial routes.

The size of the facilities, in terms of footprint and bulk should be minimised as far as possible, where technological improvements and miniaturisation permit.

**Built Form and Facades**

The proposed buildings should be articulated (i.e separated into smaller units or by means of relief and shadow patterns), as far as possible, to reduce their apparent scale, especially the roof lines. This is understandably not achievable in certain cases, where the manufacturing process determines the size and form of the buildings.
The buildings must, as far as possible, adhere to the development controls and visual guidelines which apply to the Coega IDZ, as outlined in Sections 6.1 and 6.2 above.

Note: There is some variance between the Coega Design Manual (2001), and the Visual Guidelines for Development (2002). Aluminium Pechiney have indicated that they intend to use a uniform pale grey colour for all building cladding, and to emphasize the horizontality of the buildings, which is generally in accordance with the Design Manual.

The visual scale of the structures, and the effect of large blank facades, should be reduced where possible by means of architectural modelling and surface colour treatment of the buildings. (See Fig. 16 for comparison of surface treatments).

Non-reflective surfaces using a maritime theme of colours in the grey and blue range are considered to be the most appropriate. It is recommended that primary colours (as per the Coega Design Manual) not be used on the Aluminium Pechiney plant, because of the size and prominence of the plant, (See Fig. 16).

The rationale for largely adhering to the Coega Design Manual is that over the longer term the Aluminium Pechiney plant should fit in with the surrounding industrial buildings, so that there is an overall theme and harmony within the IDZ.

Parking and Service Areas
Large paved areas must be avoided, and should instead be broken up with tree belts to provide visual relief and shade. Parking and service areas should be screened with low walls or berms.

Site Infrastructure
Minimise external signage clutter, and avoid signs or poles which have a silhouette effect on the skyline. Low signs tend to be less obtrusive in the landscape. Signs, where required, must be fixed to buildings where possible, to avoid the clutter of free-standing signs in the landscape.

Outdoor lighting, where required, should be as unobtrusive as possible, and should be fitted with reflectors to avoid light spillage. Low-level bollard-type lighting should be used for parking areas and footpaths.

Cut and fill slopes should be shaped so that they can support indigenous vegetation, to ensure that unsightly eroded slopes are avoided. Unsightly works and stockpile areas should be screened by low planted mounds and berms, or by fencing to minimise adverse visual impacts at close range.
Control Measures during Construction
Measures for visual screening, litter and dust control on construction sites must be incorporated in all contract documentation, with penalties for non-compliance, during the construction phase. This may involve carefully sited and confined construction camps and stockpiles, and the use of temporary shadecloth or plastic sheeting to minimise dust.

7. APPROVALS AND MONITORING

7.1 Permit Requirements

Besides complying with the National Building Regulations, the proposed plant will be subject to the Urban Design and the Development Management Plan for the Coega IDZ, which involves the preparation of a Site Development Plan (Albrecht Herholdt Architects, 2001).

In addition, the proposed plant will need to meet the requirements of the Civil Aviation Authority (CAA). All structures taller than 30 metres require red aviation warning lights. The paint markings on the stacks must also be visible during the day.

7.2 Design Review and Environmental Control

There should be a design review of the final layout and architectural design of the PAS 2005 plant, by the Coega Development Corporation and their consultants, before construction contracts are awarded, to ensure that visual mitigation measures, as outlined in this report, have been incorporated in the final documentation.

There should be monitoring of the construction and operational phases to ensure that visual screening and dust control measures, which should be contained in the Environmental Management Plan (EMP) for the smelter, are implemented. It is anticipated that this would be done by the Environmental Conservation Officer appointed by the project developer, and in close liaison with the environmental section of the Coega Development Corporation.

8. CONCLUSIONS AND RECOMMENDATIONS

The visual study revealed that the local area is a relatively flat to gently undulating raised coastal plain, which is presently generally rural in character, with a peri-urban transitional character in areas closer to Port Elizabeth. The site for the proposed smelter lies on a flat crest, which is visually prominent within the immediate surroundings.

The zone of visual influence (viewshed) includes a number of arterial routes, as well as recreational and residential land uses. The N2 would pass within 2 km of the proposed plant, which would be highly visible from the road.
The proposed PAS 2005 plant would be visually prominent in the immediate area, and probably larger in scale than other buildings envisaged in the Coega IDZ.

The significance of the visual impacts is moderated by a number of important considerations, namely:

- the PAS 2005 plant forms part of an industrial zone with envisaged buildings similar in form and function;
- the considerable distance of 3 to 8 kilometres from the proposed plant to the residential and coastal recreational areas, and some 16 kilometres to the extended GAENP at Colchester.

Based on available information, no floodlighting of buildings or high-mast lighting (as in the case of the Motherwell Township) are required for the proposed plant, and the normal lighting that would be required would not be significant, when seen in the larger context of the Coega IDZ.

The conclusion drawn therefore is that the significance of the visual impacts would be high for the main PAS 2005 complex, and medium for lighting, without mitigation.

It was felt that mitigation will have a minimal effect at the macro scale, given the height of the structures and the openness of the landscape. However, a number of site design and architectural recommendations have been suggested to ameliorate the effect of the proposed structures.

Depending on the effectiveness of the mitigating measures, and on the final architectural design, the significance of the visual impacts for the PAS 2005 complex will be medium to high, and for lighting, medium. The significance of the lighting would probably be further moderated to low/medium once the entire Coega IDZ is developed over 10 to 20 years.

Given the distance of the extended GAENP it is expected that the proposed Aluminium Pechiney plant will have negligible visual impact on the Park. However, the development of Coega IDZ as a whole will certainly have some visual effect on the wilderness quality of the extended Park, particularly at night. It is imperative from the Park's point of view therefore that the Coega development does not extend beyond the nominal viewshed as indicated in this document.

Similarly, the effect of lighting from the Aluminium Pechiney plant will probably have minimal impact on St Croix Island, given the distance, while the effect of lighting from Coega IDZ as a whole would undoubtedly be more significant. It was not possible to determine the precise intensity of lighting that would reach St Croix Island, based on the limited lighting information, and available visual simulation technology.
9. REFERENCES


## APPENDIX 1: RESPONSE TO ISSUES

<table>
<thead>
<tr>
<th>ISSUE</th>
<th>SCOPING RESPONSE</th>
<th>VIA RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1</td>
<td>Impacts on creation of the Greater Addo Elephant National Park</td>
<td>These issues will be addressed in the visual impact specialist study. Visual guidelines are being developed by CDC in conjunction with South African National Parks for the IDZ, which will also be integrated into the EIA when available.</td>
</tr>
<tr>
<td>9.1.1</td>
<td>What will be the impacts of this development on the Greater Addo Elephant National Park?</td>
<td></td>
</tr>
<tr>
<td>9.1.2</td>
<td>As the plant will be operating 24 hours, what will be the visual impact on Greater Addo Elephant National Park, especially at night with regards to lighting?</td>
<td></td>
</tr>
<tr>
<td>9.1.3</td>
<td>What will be the visual impact of the plant from the rest camps and camp sites in the Park?</td>
<td></td>
</tr>
<tr>
<td>9.1.4</td>
<td>Buildings will have to blend in with the environment and take colour into account.</td>
<td></td>
</tr>
<tr>
<td>9.1.5</td>
<td>Will there be building height restrictions to limit the visual impact on the Greater Addo Elephant National Park?</td>
<td></td>
</tr>
<tr>
<td>9.1.6</td>
<td>With new park developments in the Colchester area potential tourists would be using the N2 as an access route to the park. As a result these visitors would need to travel through the IDZ to reach the park. The visual impacts are therefore not only restricted to the area within the park boundary and this needs to be taken into consideration.</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td><strong>9.1.7</strong></td>
<td>The total visual impact of the development needs to be assessed: powerlines, conveyor belt, plants etc. The total visual impact of the plant, conveyor belt and related port facilities have been assessed, except for the Eskom powerlines, which are the subject of a separate VIA study.</td>
<td></td>
</tr>
<tr>
<td><strong>9.1.8</strong></td>
<td>How will lighting at night time impact on the St Croix Islands and the breeding of birds. The visual impact specialist study will consider the significance of lighting impacts on the St Croix Islands. If considered significant this may necessitate further investigations into the impacts on birds breeding on St Croix Islands. The visual impact of lighting on St Croix Island is difficult to quantify, but is considered to be minimal, given the distance. The effect of lighting from the Coega IDZ as a whole may be more significant, but this falls outside the scope of the present study. The impact on the breeding of birds requires a separate opinion from a biologist.</td>
<td></td>
</tr>
<tr>
<td><strong>9.1.9</strong></td>
<td>Although it is assumed that the significance from shore-based lighting and the subsequent impacts will be low, it should still be incorporated into the EIA, with recommendations and mitigation measures to limit this possible disturbance. The visual impact specialist study will assess the significance of lighting associated with the Aluminium Pechiney activities and will provide recommendations to mitigate negative impacts, where necessary. The visual impact of lighting has been assessed (Tables 3, 4), and recommendations made in sections 6.2 and 6.3.</td>
<td></td>
</tr>
<tr>
<td><strong>9.1.10</strong></td>
<td>What will be the impact of emissions on the Greater Addo Elephant National Park project, especially with regards to visible plumes? Under normal operating conditions, no visible plumes would occur. The potential for visible plumes to occur during upset conditions will be assessed in the air quality specialist study.</td>
<td></td>
</tr>
</tbody>
</table>

**9.2 Design alternatives**

**9.2.1** | The visual assessment should compare the impact of silos versus domes for the storage of materials. Domes are the preferred option for storage by CDC. At present, the dome design for storage of materials has been incorporated into the plans for the smelter by Aluminium Pechiney. The visual impacts of the domes will be assessed in the visual impact specialist study as part of the overall impact of the smelter. The visual assessment was based on drawings provided by Aluminium Pechiney. |

**9.3 Visual guidelines for the IDZ**

**9.3.1** | The visual assessment needs to take into account guidelines being developed by CDC. The visual impact study will include reference to the guidelines being developed by the CDC. The consultant preparing the visual guidelines for the IDZ will be involved in the review of the visual study for the Aluminium Pechiney EIA. The visual assessment incorporates both the Coega Design Manual, and the draft Visual Guidelines in Sections 6.1 and 6.2. |
Insert Figures 1 to 16 after this table.