REPORT

Summary of Impacts Caused by Associated Infrastructure (Upstream Activities) Supporting the Central Térmica de Temane Project

Moz Power Invest, S.A. and Sasol New Energy Holdings (Pty) Ltd

Submitted to:

Ministry of Land, Environment and Rural Development (MITADER)

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List of Acronyms

Acronym	Description
CPF	Central Processing Facility
EIA	Environmental Impact Assessment
LPF	Liquids Processing Facility
LPG	Liquefied Petroleum Gas
PPA	Petroleum Production Agreement
PSA	Production Sharing Agreement
PPZ	Partial Protection Zone
ZIT	Zone of Tourism Interest

1.0 INTRODUCTION

The scope of the EIA for the Central Térmica de Temane ("CTT"), previously known as the Mozambique Gas to Power Project (MGtP), excludes the development of the gas reserves necessary to supply the power plant. Sasol proposes to supply the CTT from known gas reserves in the PSA license area for which the Government approved a Phase 1 Field Development Plan ("FDP") in January 2016[1]. This will include supply from new wells planned in the PSA (Figure 1). All of the new PSA wells and associated road and flowline infrastructure have already been licensed by MITADER, based on a comprehensive EIA and EIA Addendum (Golder, 2014; 2015). With the exception of T-19A, all gas wells currently proposed in the PSA are west of the EN-1 highway. The wells shown in purple in Figure 1, all east of the EN-1, are described as 'oil wells', but they will also supply gas and may therefore be considered to be in support of the CTT as well.

This summary describes the main findings of the PSA EIA in relation to the development of gas reserves that may be used to supply the CTT (upstream activities).

[1] *It is possible that the gas could be supplied from alternative sources, as yet undefined. Should this be the case, separate environmental licensing of these facilities would be required. The present summary assumes that the gas will be supplied from the PSA.*

Figure 1: The elements of the proposed PSA Development and LPG Project

2.0 BACKGROUND TO THE PSA PLANNING

The Pande and Temane gas fields in Inhambane Province, Mozambique, were first discovered in 1961 and 1967 respectively. In 2001, Sasol and its partners initiated the planning of a US$1.2 billion project to process natural gas in a Central Processing Facility (CPF) at Temane and transmit it via an 865 kilometre pipeline, with various offtake points in Mozambique, to Sasol's gas distribution network in Secunda, South Africa. This was first known as the Sasol 'Natural Gas Project'.

Since the commissioning of the project in 2004, Sasol has been involved in a range of activities intended to further develop hydrocarbon resources within its license areas. Appendix A provides a summary of these activities in rough historical order. The CTT and activities that are in support of it are highlighted in grey, which, in addition to the planning and licensing of the power plant itself, include all of the activities necessary to develop the gas reserves supporting the plant.

The environmental license for the PSA was issued by MITADER on 23 April 2015. The subsequent changes proposed in the EIA Addendum were authorised on 16 March 2016 (Reference: MITADER /DINAB / GDN/ 183 / 16). Of the wells described below, seven PSA oil wells and two Temane gas well have already been drilled.

The PSA Development and LPG Project consists of two main components, which may be implemented at the same time or in a sequential fashion (see Figure 1 and Figure 2):

- Phase 1 PSA Gas Development, involving six production wells in the Temane Field and a fifth gas train inside the CPF boundary to process the additional gas and condensate from the wells. Gas production is expected to increase by up to 150 MMscfd[2] to approximately 600 MMscfd. The process is shown in Figure 2[3]
- Phase 1 PSA Liquids Development, involving 12 oil production wells and one data-gathering well (not connected to the CPF) in the Inhassoro Field, and a new Liquids Processing plant and Liquefied Petroleum Gas (LPG) plant adjacent to the CPF. The plant is expected to produce 15,000 stock tank barrels of oil per day (stbopd[4]) and 20,000 tonnes per annum of LPG. The gas from the wells will be separated and delivered to the gas processing facilities at the CPF shown in Figure 3.

[2] *MMscfd – million standard cubic feet per day*

[3] *Discussions are ongoing to explore the possibility of avoiding investment in the 5th train by rather investigating debottlenecking of the existing CPF facility. The text in this summary reflects the status of the project at the time the EIA was completed.*

[4] *A stock tank barrel refers to the volume occupied by sales oil (i.e. after stabilisation to meet sales specification) and measured in barrels at standard conditions of 1.01325 bara (14.7 psia) and 15.56°C (60°F). Note, as indicated on Page 2, that these wells will also produce gas.*

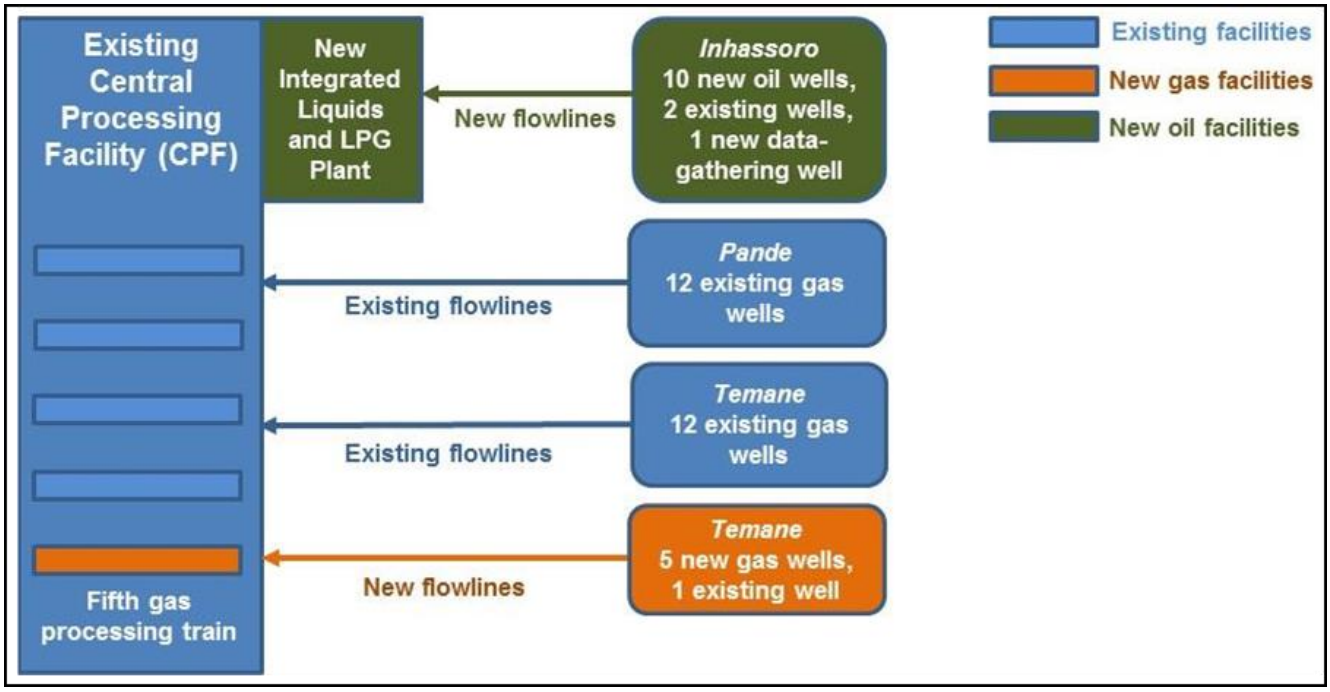

Figure 2: Outline of Sasol's PSA Development

2.1 The Processing Plant (the 5th Gas Train)

The CPF's existing gas/liquid separation equipment and four gas processing trains will be supplemented by a 5th Gas Train which will include additional gas/liquid separation and will be of the same capacity as the existing trains (150 MMscfd), with similar equipment. All infrastructure associated with the 5th gas grain will be accommodated within the boundary of the existing CPF (refer to Figure 4). Details of all infrastructure may be obtained from Golder (2014:11-31). The following summarises key information about the 5th Gas Train:

- No additional condensate tanks will be required. Stabilised condensate will be stored before being transported off site by third party contractors;
- No new power generators will be required. Power generation will make use of existing approved capacity;
- The existing flare system will continue to be used;
- No additional process water will be required. Utility water use is expected to increase by 10%. The increased water demand will be supplied from Sasol's existing water supply boreholes;
- The existing waste management systems, including the High Hazard (HH+) disposal site within the boundary fence of the CPF and the incinerator will cater for the additional waste loads without expansion;
- The increase in utility water usage referred to above will result in a proportional increase in potentially oil contaminated water (POC) draining to the Industrial Effluent Treatment Plant (IETP). No expansion of the capacity of the IETP is required;
- The increased produced water resulting from the PSA Gas development will be treated and disposed of in the existing reinjection well at the CPF and at a new reinjection well at proposed and assessed in the EIA Addendum (Golder, 2015);

- There will be additional air emissions resulting from the processing of the fluids from the new wells. All new turbines will be fitted with low NO_x burners. Some additional flaring will occur during shut downs, upset conditions and emergencies;
- Small quantities of additional solid waste are expected. This includes additional waste filters from compressors (10 kg/year). These filters will be drummed and incinerated;
- A small increase in incinerator ash is expected. Additional process waste will result from the 5th Gas Train, but little change will result in domestic waste given the small change in staff numbers;
- Less than five additional permanent staff will be required; and
- No additional accommodation will be required.

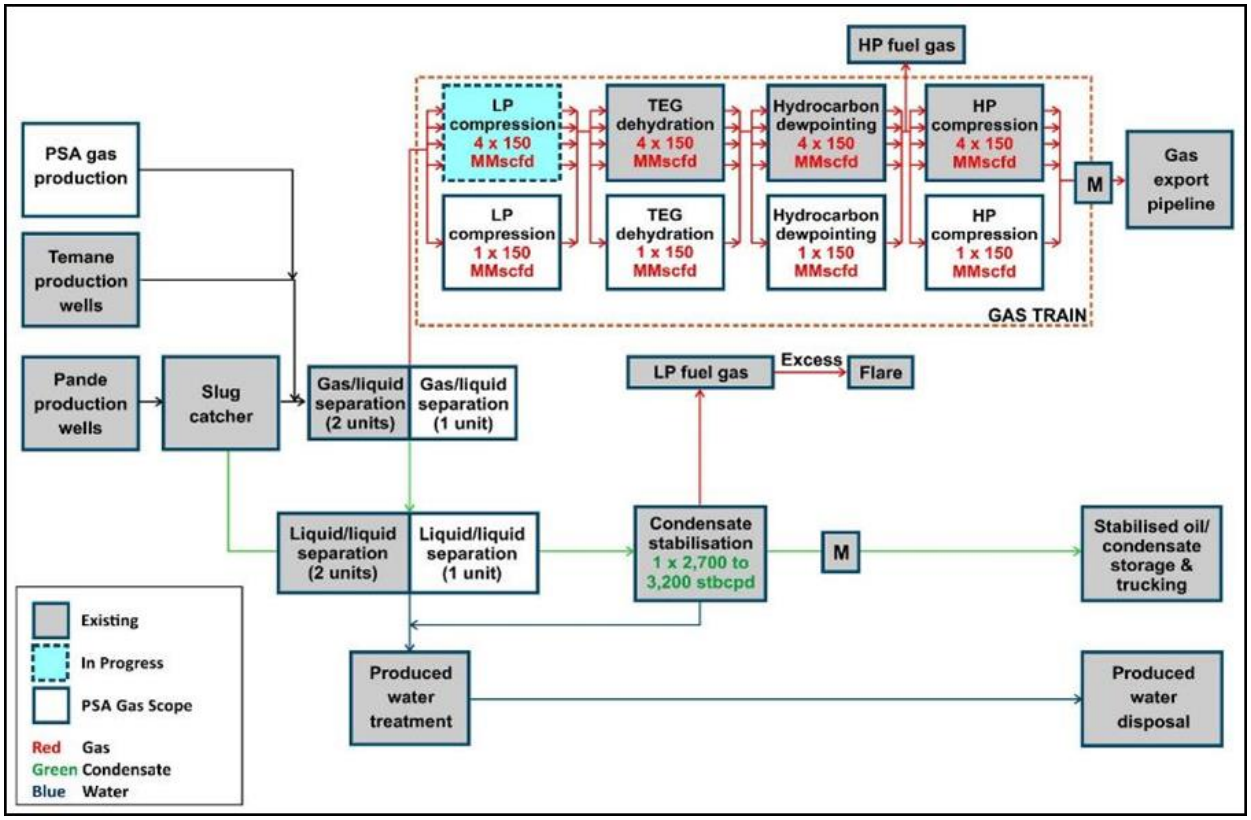

Figure 3: Additional plant at the CPF to be installed as a part of the PSA Gas Project

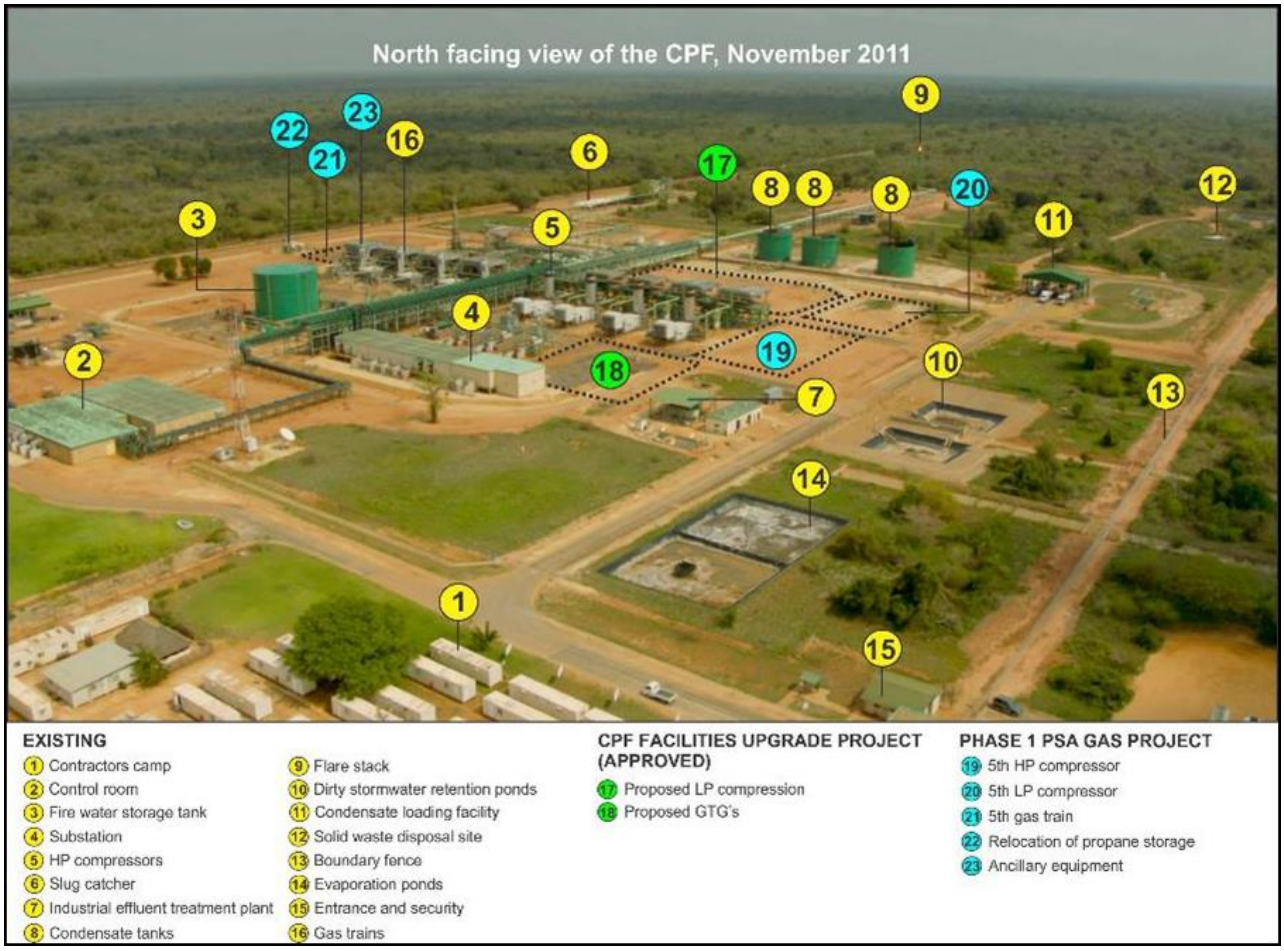

Figure 4: Location of the proposed 5th Gas Train in relation to existing infrastructure at the CPF

2.2 The Flowlines

Oil and gas wells will be connected to the CPF by pipelines known as 'flowlines,' buried approximately 1 m underground, similar to those currently supplying the plant with gas. New flowlines will follow existing roads and seismic lines as far as possible (approximately 111 km of new flowlines of which about 22 km will require new maintenance roads). Existing roads are shown in Figure 1 as light grey lines. Where new flowlines are not along existing roads, permanent all-weather gravel roads will be built

Fluids from the oil wells will be accumulated into a single pipeline at the Inhassoro Manifold Station and routed beneath the Govuro River to the Liquids Processing Facility (LPF) via an existing spare section of pipe under the river. While the use of a second spare pipe under the river was intended for delivery of gas from well T-19A to the CPF, its integrity was found to be suspect after completion of the EIA. The EIA Addendum consequently assessed the impact of a gas pipeline laid under the Govuro River using Horizontal Directional Drilling.

2.3 The Wells

The wells will be centred in a cleared, fenced well pad of roughly 100 m x 100 m with a permanent guard. The wells are drilled to depths of between 1,800 m and 2,200 m below the surface and are grouted to prevent groundwater contamination. A well head (or 'Christmas tree') in the centre of the well pad (Photo 1) controls the flow of fluids from the well. No night lighting is required. All fluids produced by the well will be transported by flowlines to the processing plant.

Photo 1: A typical Sasol well pad

Photo 2: Rehabilitated flowline along an access road

3.0 FINDINGS OF THE PSA EIA AND EIA ADDENDUM

The EIA (Golder, 2014) describes the impacts of the 5th Gas Train, the PSA Liquids Plant and all associated wells, flowlines and road infrastructure. Since the LPF provides for initial separation of gas from liquids recovered from the PSA oil wells (before the separated gas is routed to the 5th Gas Train at the CPF), the 'oil production' components of the project, which include most of the wells and flowlines east of the Govuro River, are therefore also involved in producing gas that may be used by the CTT. The inclusion of the assessment of the PSA Liquids Plant and associated infrastructure in this summary provides a conservative view of the impacts of all infrastructure potentially providing gas to the power plant.

Appendix B and Appendix C set out a summary of the impacts and significance ratings associated with the PSA Development and LPG Project. Significance was scored using a recognised impact assessment methodology, which included impact duration, scale (geographic extent), intensity and probability of occurrence.

3.1 Fatal Flaws

The EIA found no fatal flaws affecting the PSA Development and LPG Project, either during construction or operation.

3.2 Positive Impacts

The EIA concluded that the benefits of the project will be significant. The project will provide a major economic contribution to the country through taxes and royalties, commitment to local employment during construction, a firm local procurement policy and substantial CSI initiatives, which will expand Sasol's existing contribution to improving economic and local health statistics locally and regionally. Sasol's continued support to education, health services and water supply will benefit many people in project-affected areas. Long term benefits (nationally) were considered to be highly significant, while local benefits were rated as moderately significant.

3.3 Negative Impacts

3.3.1 Physical Environment

Physical impacts associated with the construction and operation of the 5th Gas Train were considered to be generally minor and, subject to management, of low significance. The gas train is proposed within the

boundaries of the existing CPF, the impacts of which are well known, well managed and extensively monitored.

The proposed LPF is situated adjacent to the CPF, avoiding unnecessary duplication of facilities. Issues relating to air pollution, noise pollution, groundwater and surface water pollution, and available water supply were evaluated. Cumulative air pollution impacts of the existing CPF, 5th Gas Train and LPF on air quality were found to be well within the project standards for criteria pollutants. Cumulative noise impacts at the nearest surrounding inhabitants were also found to be acceptable, but further noise source management measures were recommended to bring the project into line with international noise standards at the battery limits of the plant. The expansion of the buffer zone (Partial Protection Zone) around the CPF and LPF was an important general recommendation, to include a larger area within which future settlement should be prohibited. This recommendation was intended to extend the existing buffer that protects communities from nuisance and risk associated with the Sasol complex, while also protecting Sasol from increasing pressures raised by surrounding communities. No restriction on future agriculture within the buffer zone was proposed, thus minimising the impact on land use.

3.3.2 Biological Environment

Assessed biodiversity impact caused by the enlargement of the project footprint to accommodate the LPF were considered to be of low significance. Outside of the battery limits of the plant, assessed biodiversity impacts included (among others) habitat loss, impact on species of conservation concern, faunal disturbance, hunting and persecution of wild animals, impact of pollution caused by drilling waste, impact of road kills and open trench faunal mortality during construction, pollution caused by toxic releases of hydrotest water, and biodiversity impact of inter-basin transfers resulting from hydrotesting. Impacts were assessed under typical (normal) construction and operational conditions and under unplanned (accident) conditions.

In general, the proposed infrastructure is well-removed from habitats of high biological sensitivity (permanent and seasonal wetlands, aquatic ecosystems, barrier lakes, coastal areas), with the exception of the proposed Govuro River pipeline crossing and the well nearest to the Nhangonzo coastal stream (I-G6PX-1). This limits the potential for pollution-related incidents under normal and abnormal conditions, subject to appropriate management. The EIA recommended that four of the sixteen new wells and one section of flowline / access road be relocated to minimise impacts on tall forest patches associated with termite mounds, which are considered to be local biodiversity hotspots. Other direct biodiversity impacts were considered to be manageable with appropriate mitigation, based on measures set out in Sasol's existing EMPs, supplemented by specific measures related to the PSA project. Management of drilling wastes and hydrotest water were issues of particular concern that will require management during the construction phase. The EIA recommended that management of drilling waste should continue to be based on the detailed methodology set out in the Alberta Energy Regulator D50 Code of Practice for aqueous drilling wastes. Specific recommendations to minimise the toxicity of hydrotest water were made, together with requirements to conduct bioassay tests of the water, prior to disposal, as a basis for decisions about an appropriate release or treatment strategy that avoids toxic effects in local rivers and wetlands.

The biodiversity impacts of a pipeline crossing of the Govuro River were extensively addressed in the EIA Addendum. Horizontal Directional Drilling (HDD) under the Govuro River is proposed to replace the existing pipeline. Detailed analysis of this proposal found that impacts could be minimised subject to careful management of drilling wastes and other aspects of HDD.

A potential Critical Habitat associated with the Nhangonzo coastal stream was identified, located between Vilanculos and Inhassoro (Figure 5). As a precautionary measure, the Critical Habitat boundaries were defined as the extent of the catchment of the stream, providing a buffer of some 4359 ha. Of the proposed PSA wells situated within this area, two were within the buffer. *Direct* impact significance was rated as low,

particularly due to the use of existing seismic cutlines to locate the access roads. However, the potential for *induced* impact was considered to be highly significant, with the road to I-G6PX-1 providing access into the centre of the Critical Habitat adjacent to the coastal stream.

Further detailed investigation was undertaken for the EIA Addendum, in consultation with key stakeholders, both to verify the status of the area as a Critical Habitat and to plan for future activities that could affect it. Stakeholders consulted in two workshops during the studies for the EIA Addendum agreed that measures to protect the area would need to take into consideration oil industry and tourism interests in the area. After slight amendment of the CH boundaries, only one Sasol well remained within the buffer area (I-G6PX-1) and this was approved subject to relocation of the well at least 200 m from the coastal stream. MITADER's authorization also required final verification of the area as a Critical Habitat and the preparation of a Biodiversity Management Plan. This work is currently ongoing, with the findings of an Area Categorization Report indicating that Critical Habitat status is not justified in accordance with IFC criteria except for an area of Coastal Forest within 500 m of the coastline. According to this report (Impacto, 2018: unpublished), the Nhangonzo stream should be classified as high value Natural Habitat and should be managed according to the same rules as the other areas of sensitive Natural Habitat within Sasol's license areas. MITADER has agreed to the revised classification and the additional requirements for the management of the Critical Habitat have been withdrawn.

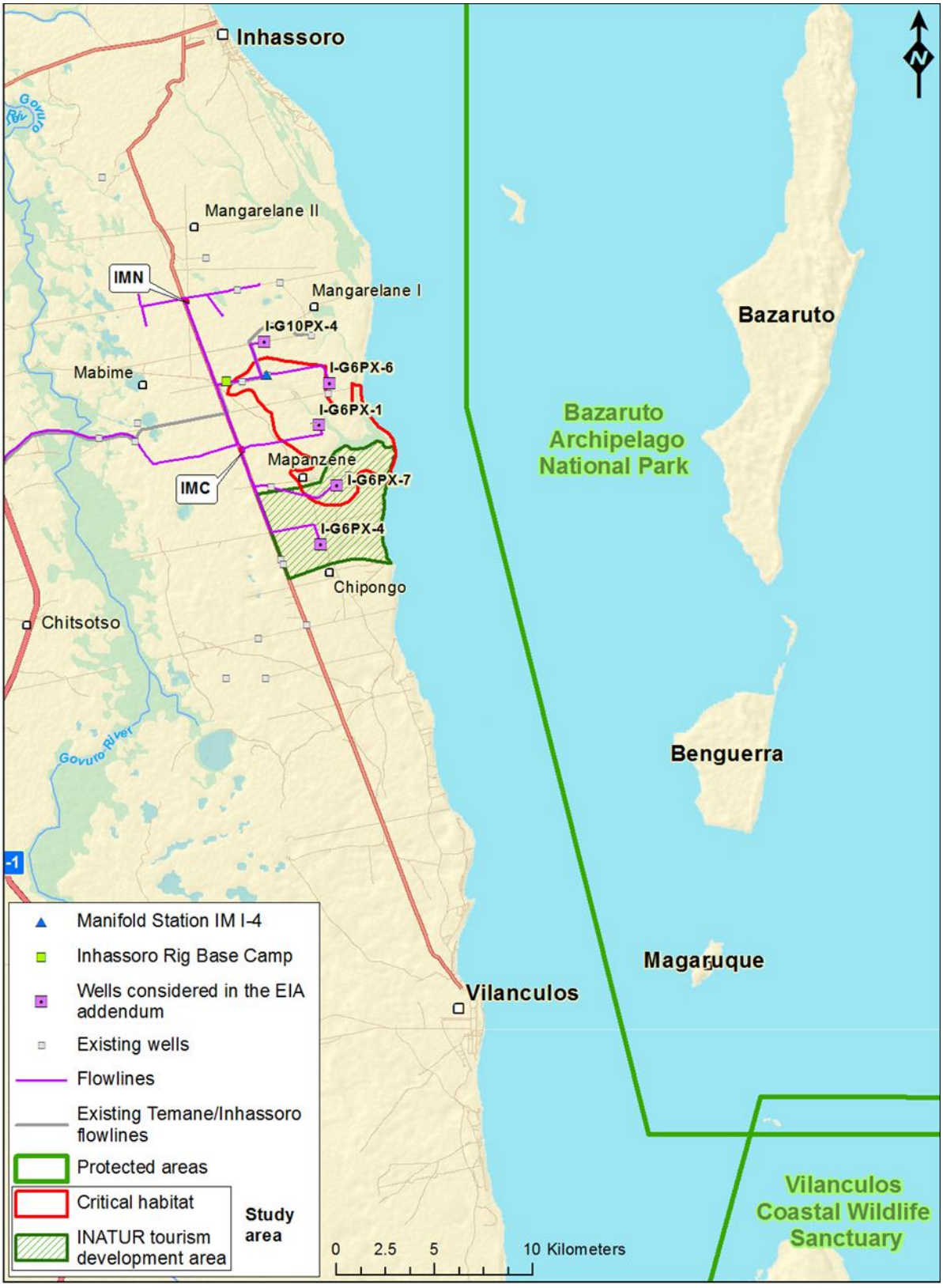

Figure 5: Provisional Nhangonzo Critical Habitat and INATUR ZIT

Note: Subsequent to the EIA and EIA Addendum, it has been agreed that the Nhangonzo Coastal Stream should be classified as a Natural Habitat rather than a Critical Habitat). The figure includes I-G6PX-7 which was evaluated in the EIA Addendum.

3.3.3 Social Environment

No physical resettlement will be necessary as a result of any of the proposed PSA project infrastructure. Compensation for lost agricultural resources and restoration of livelihoods was a key recommendation to be implemented during the construction phase. Among many other recommendations, the management of the behaviour of construction teams with respect to local communities was considered to be key during the construction phase, as well as actions necessary to minimise the risk of migration of people into the area in search of work.

The negative social impacts of the infrastructure outside of the battery limits of the production complex were found to be relatively limited, particularly after construction is completed, with effective management of impacts possible through the project EMPs. Once operation of the project starts, the activities along access roads, flowlines and at the well pads will be very limited, typically no more than one or two vehicles per day. The well pads will be fenced and provided with a security guard, but there will be no security lighting and the operation of the wells will involve no noise or other impact that extends beyond the boundaries of the well pads. Maintenance requires standard pollution management procedures, which are included in Sasol's existing EMPs.

An area of important concern was Sasol's activities near the coastline, where there is significant tourism potential and environmental sensitivity, including an area originally defined with the assistance of the IFC as an Anchor Tourism Site, which has subsequently been proclaimed as a Zone of Tourism Interest (ZIT). Further Government planning has included the preparation of a detailed development plan for a portion of the ZIT. INATUR are the Government Agency responsible for the ongoing planning, development and management of the ZIT. The development plan overlaps with the area defined for the Critical Habitat, described above. In the stakeholder discussions concerning the Critical Habitat, it was agreed that a compromise would need to be reached between the competing land uses in the area, and that the proposed Sasol infrastructure within the boundaries of the ZIT was acceptable, since it did not materially affect any of the areas in the development plan. It was also agreed that Sasol's activities should be restricted in the vicinity of the coastline, including a total restriction on all activities within 500 m of the coast and a partial restriction on activities between 500 m and 1000 m from the coast.

3.3.4 Cross Sectoral Impacts

Risk management was a key aspect of the studies undertaken for the PSA EIA, with two of the investigations covering risks associated with major hazards, including a blowout from a well and a burst pipeline in an assumed worst-case location, crossing the Govuro River. While the probability of the events occurring was considered to be very low, the consequences would be severe, particularly as an accident could affect areas of high conservation and tourism value. Specific recommendations were made in the EIA for appropriate levels of emergency preparedness to deal with accident risks. The increased presence of hazardous installations in the area also warranted a significant step-up in environmental impact monitoring. The EIA recommended more comprehensive monitoring, both around the CPF complex and in the areas outside of the battery limits of the CPF and Liquids Plant, and including air quality, noise, soils, surface water and groundwater at defined locations in the study area. Increased monitoring for leak detection was also recommended, including the specific involvement of communities in reporting leaks.

4.0 ROAD MAP OF SASOL'S ENVIRONMENTAL MANAGEMENT PROGRAMME

4.1 Environmental Management Plans

Over the twelve years since the commissioning of the Natural Gas Project, Sasol's EMPs have developed into the suite of tools shown in Figure 6. There are three core management plans governing Sasol's exploration, appraisal and development activities. The core plans are supplemented by a group of ancillary plans, two of which are overarching, while a further six provide management support. In addition to the three core plans, Figure 6 shows:

Overarching Plans

- Biodiversity Offset Management Plan (future plan); and
- Sustainable Development Plan (future plan).

Supporting Plans

- Communications Plan;
- Compensation and Resettlement Plan;
- Emergency Response Plan;
- Oil Spill Response Plan;
- Waste Management Plan; and
- Decommissioning and Rehabilitation Plan (Framework).

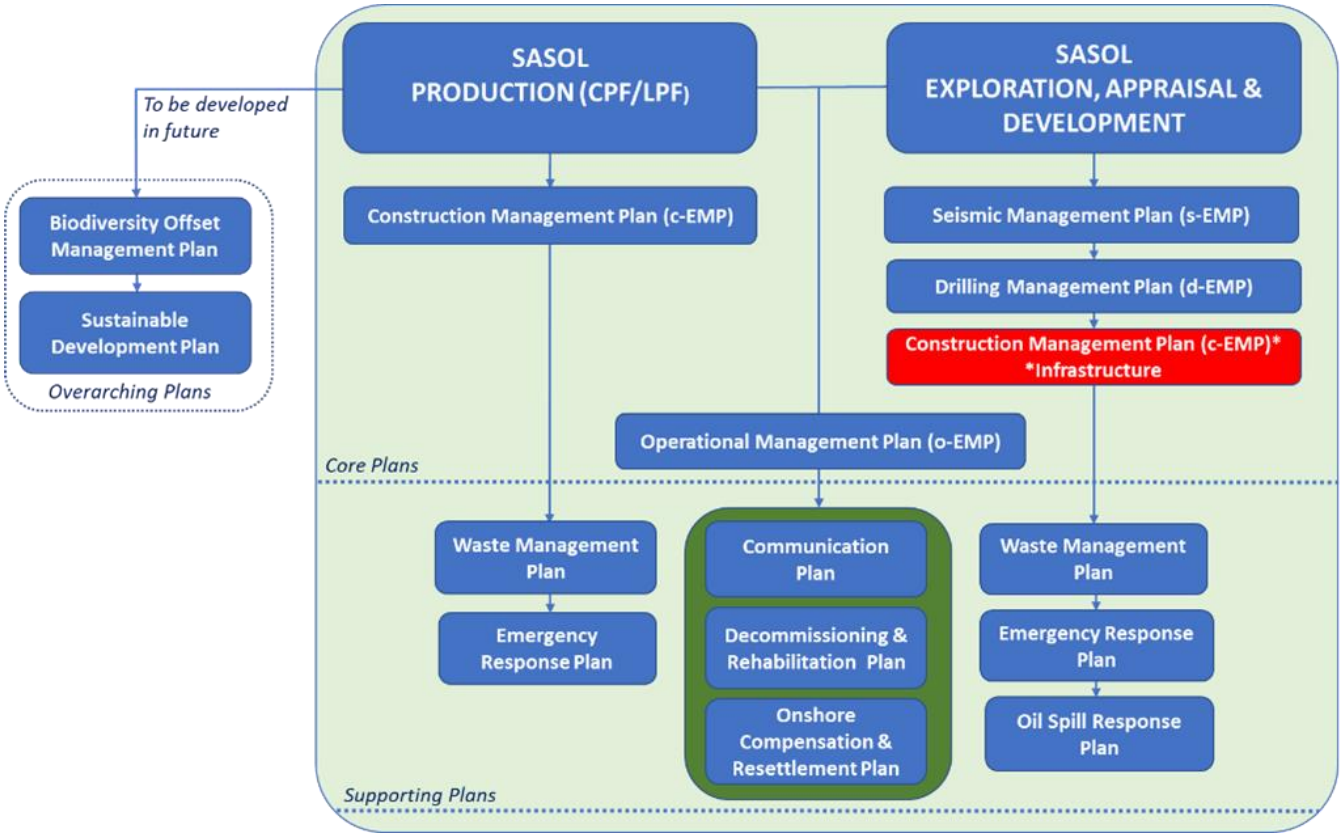

Figure 6: Sasol's Suite of Environmental Management Plans

The Operational EMP (o-EMP) deals mainly with production-related activities at Sasol's Central Processing Facility (CPF), but is relevant in respect of exploration, appraisal and development as well. Since the contractors who undertake all of the seismic, civil construction and drilling related work are decommissioned after the work is completed, long term management and monitoring of the residual impacts of these activities reverts to Sasol Petroleum Temane, whose activities are managed through the Operational Environmental Management Plan (o-EMP) for the project as a whole.

Figure 7 presents a road map showing the changes to the core group of EMPs, including the o-EMP, over time. The current revisions are shown against grey shading at the bottom of the flow diagram.

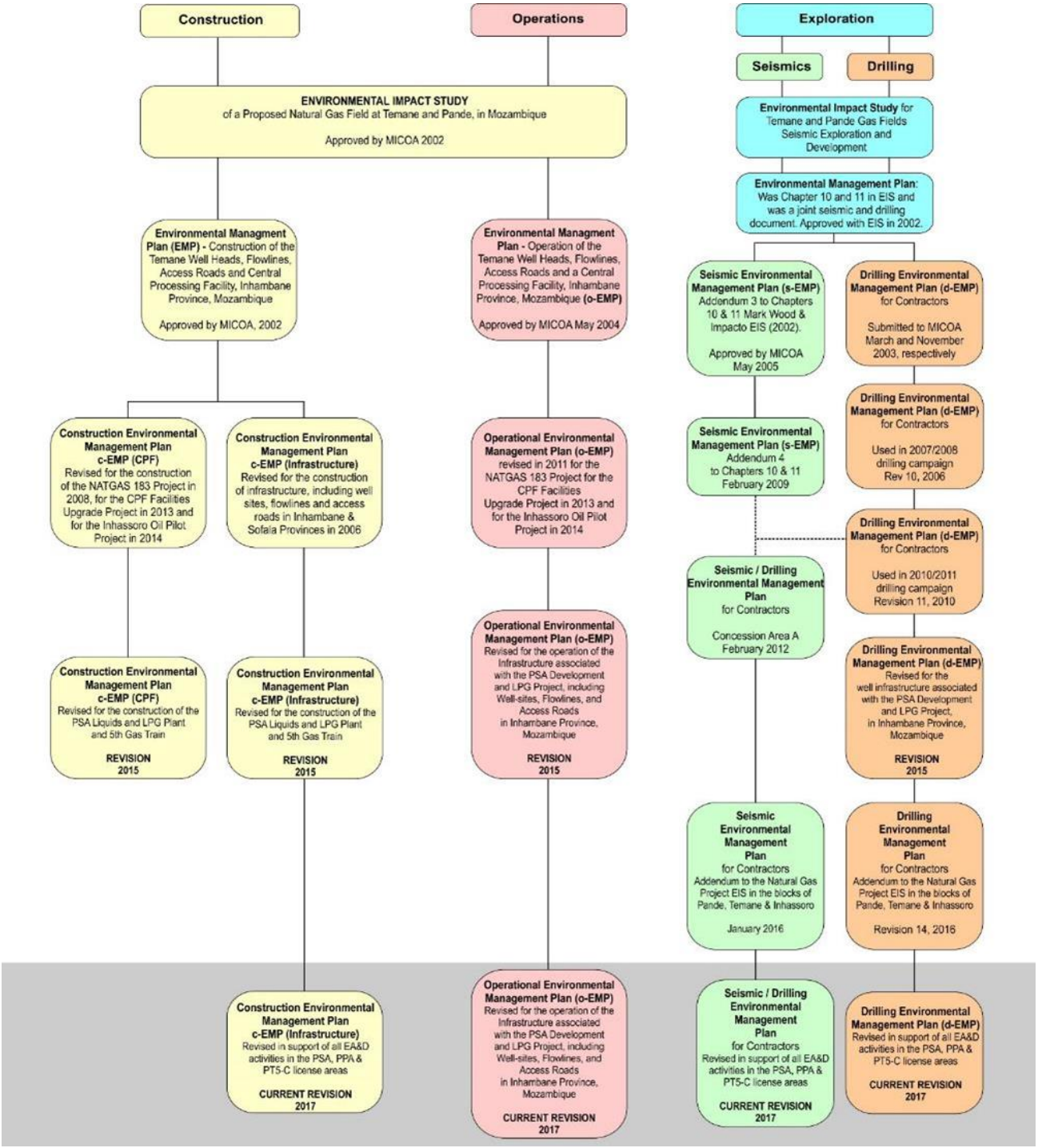

Figure 7: Road map of changes to core EMPs managing Sasol's activities in Mozambique

With the exception of the Onshore Compensation and Resettlement Plan, Sasol's pre-2017 EMPs have been modified for each new project to deal with the specific activities being proposed. While this provided a functional approach to managing the impacts of new projects, it resulted in the history of previous projects being lost (or only available as earlier revisions of the EMP).

In the case of the Onshore Compensation and Resettlement Plan, Sasol retained the basic principles and management requirements that are common to all projects in a 'master' document, while introducing new projects as Addenda. This approach has been followed in the latest 2017 Exploration and Development EMP's, which are generic in the sense that they do not cover details of any new Sasol developments, which are to be included as Addenda under the plans. These EMPs are linked to a regional assessment prepared on Sasol's behalf (Golder, 2017), which recommends (in addition to individual EIAs undertaken for specific activities that Sasol proposes to license), that a broader assessment is required to assess and manage the cumulative impacts of all of Sasol's developments. Two overarching management plans are expected to result from this assessment (refer to Figure 6) – a Biodiversity Offset Management Plan and a Sustainable Development Plan (refer to section 4 for further detail).

Sasol is also ISO 14001 accredited and is audited annually by independent specialists for re-certification purposes.

4.1.1 Monitoring

Monitoring requirements are built into the project-specific EMPs for exploration, appraisal and development. Long term monitoring falls under the Operations EMP, and includes the following:

- Stack emission monitoring (CPF) (annual);
- Flare emission monitoring (CPF, calculated from flow data) (annual);
- Greenhouse Gas Assessment (CPF) (annual);
- Air quality monitoring (CPF) (annual);
- Soils monitoring (CPF boundary fence) (annual);
- Groundwater monitoring (CPF and community control boreholes) (bi-annual);
- Groundwater monitoring (reinjection well) (bi-annual);
- Groundwater monitoring (exploration and development wells) (bi-annual); and
- Ecological monitoring (all Sasol license areas) (annual).
- Need to add workers' satisfaction, community health and safety, stakeholder engagement, grievance management, local socio-economic well-being, influx management

4.1.2 Reporting to MITADER

Sasol submits biannual (twice yearly) reports to MITADER, covering monitoring of environmental and social aspects of all of its activities in terms of its EMPs and other license conditions.

4.1.3 MITADER Auditing

MITADER schedules annual audits of the Sasol CPF and associated infrastructure, although these audits are not always undertaken. On occasion, MITADER appoints external consultants to audit Sasol on their behalf.

4.1.4 Internal and External Auditing

Sasol appoints independent auditors annually to audit its performance against the ISO and BS standards, for which it is certified. Sasol has been re-certified on all occasions. Re-certification audits are required by the ISO standard every 3 years, with annual surveillance audits at intervals in between. Auditing is currently undertaken by the following independent organisations:

- COWI – ISO 14001 Environmental Compliance Audit
- UL DQS Inc. Re-certification Audit – ISO 9001, ISO 14001, BS OHSAS.

4.1.5 Reporting to the World Bank Group

In terms of its agreements for the financing of Phase 1A of the project, a consolidated disclosure report covering environmental and social issues was submitted to the World Bank annually. This report (the Annual Integrated Disclosure Report) was submitted at the end of February each year for disclosure on the World Bank Infoshop website. The report was prepared over a 10-year period, starting in 2005 and ending in 2015.

4.1.6 Closure Liability Assessment

Sasol annually updates its estimated of the closure liability costs associated with all its infrastructure, including the CPF, wells, flowlines and the ROMPCO trunk line. The revised assessment is submitted to MIREME.

5.0 CUMULATIVE IMPACTS ASSOCIATED WITH ALL OF SASOL'S LICENSE AREAS

In 2017, Sasol commissioned an environmental assessment entitled '*Future Exploration, Appraisal and Development (FEAD) EIA*'; which covers all of its license areas and provides an overview of the impacts of its activities outside of the CPF, since the inception of the Natural Gas Project. While supporting the findings of many of the previous individual EIAs, the study argued in favour of a broader approach to the identification and management of certain impacts. Selected paragraphs from the Conclusions of this report are set out below, providing a useful summary of the most important recommendations of the study, and the basis for the overarching Management Plans described in Figure 6 (Golder, 2018:280):

- *"Sasol's operations in Inhambane Province started in 2004. For EA&D over the past twelve years, some 5,000 km of 2D seismic lines and 169 km^2 of 3D seismic lines have been cut, 160 km of access roads have been built, often by improving existing tracks, and 49 wells have been drilled. These activities have been in support of increasing gas production at the CPF and, in the past few years, the development of light oil reserves.*

  The study concludes that the direct impact of Sasol's EA&D activities has been well managed over the past twelve years, leaving a limited range of residual impacts that are generally of low significance.

  From a social perspective and following the initial resettlement of households as part of the original Natural Gas Project (NGP) and commissioning of the CPF, no further physical resettlement has taken place for any EA&D activity. Compensation has been paid for temporary and permanent damages, and alternative land provided where required for affected economic activities under the provisions of the Sasol/Government of Mozambique Compensation and Resettlement Procedure. Thereafter Sasol conducted its activities in terms of specific a Compensation and Resettlement Procedure which has been regularly updated, based on the original joint procedure. For EA&D activities in the future, Sasol is expected to pursue a similar policy in which impact on resettlement and important community resources is minimised.

  Regarding biodiversity, the main direct impact of past EA&D activities has been to clear habitat within the PSA and PPA. The permanent losses have been mainly due to access roads and well pads, amounting

to some 200 - 300 ha, while temporary losses of some 4,500 ha have accompanied clearing for seismic acquisition and borrow pits, where habitat clearance has been short term and recovery generally rapid. The total area affected by permanent losses is a fraction of 1% of the PPA and PSA license areas, while seismic impacts have resulted in clearing of some 1.6% of these areas.

The direct impact of permanent and temporary loss of habitat on the biodiversity of the study area has been of low to medium significance. The EA&D over the next 10 years is unlikely to materially change the relative impact on habitat loss. Direct impacts on sensitive habitats and species is considered to have been of low significance, and Sasol has steadily improved methods to identify and minimise these risks during the survey phase of EA&D projects in advance of bush clearing. No material pollution impacts have been reported, either as a result of waste disposal or unintentional spills and the EMPs that have been developed to manage these impacts are considered to be appropriate and are suitable for use in future projects.

The main issues associated with the long-term social and environmental impacts of EA&D activities have been as a result of induced effects. From a social perspective, these impacts include in-migration and its various consequences for resident communities and natural habitats. Where this is allied to the perception that there is insufficient benefit to local people and businesses, and that local people obtain only unskilled jobs with limited opportunity for training and skills development, it creates an environment of mistrust. Sasol has done much to minimise these perceptions through adherence to an agreed labour plan, ongoing communication with stakeholders, the creation of a community liaison forum which is used to identify and allocate jobs to local people in a fair manner, and a CSI programme aimed at providing benefits to local communities. This effort is likely to be sustained in future projects, taking into account the lessons of the past 12 years.

In respect of induced biodiversity impacts the principal long-term issue has been the creation of access into previously remote areas, particularly in habitats that are natural-resource rich and vulnerable to the effects of unsustainable harvesting and hunting. These problems have been experienced along some seismic lines, such as in the Pande tall forests, and along some project roads and flowlines, which provide permanent access into remote areas, encouraging the spread of settlement and commercial extraction of natural resources. In these cases, the impacts have been of high significance. At present, it is not possible to quantify the extent of the impacts fully, without further long-term monitoring, but they are considered to be of potentially greater biodiversity significance than the direct impacts of the project. It is acknowledged, however, that access into natural areas brings benefits to poor communities and that unsustainable harvesting of hardwoods, in particular, is a problem which affects many areas in Mozambique and not just the Sasol license areas."

Further useful commentary in the FEAD EIA on Sasol's cumulative impacts (Golder, 2018:283) is as follows:

- *"Sasol's presence in Inhambane Province will increase substantially over the next 10 years. In addition to EA&D activities, possible projects include:*
  - *the construction and commissioning of the first phase of the PSA Development and LPG Project (activities underway);*
  - *the construction of the Export Pipeline and FSO project; and*
  - *the construction of the Mozambique Gas to Power Project / Central Térmica de Temane (CTT) south of the CPF.*

  This will result in a continuous presence of construction contractors and personnel within the study area. There will be potential local benefits associated with jobs and multiplier effects but also social risks,

particularly the induced impacts associated with in-migration. These impacts will need to be managed through integrated communication with local Government and community stakeholders and targeted interventions both at project level and CSI level. At present, even within Sasol, this process is insufficiently integrated, with individual projects being assessed and managed independently of broader company objectives.

Given the increasing EA&D activities and the other new projects potentially coming on stream, it is recommended that Sasol prepares a Sustainable Development Plan (SDP) covering a 10-year horizon, which is fully integrated with its CSI objectives so as to manage key social risks and benefits associated with the growing project. As an adjunct to the SDP, a Project-Induced In-Migration Plan should also be prepared, as a basis for reducing in-migration risks as far as possible.

Cumulative biodiversity impacts will also increase, particularly if the accelerating construction activity draws many more migrants into the area. It is recommended that Sasol pursues the investigation of offsets as a means of mitigating its increasing footprint and the additional induced impacts resulting from all project activities. At this stage, the existing induced impacts have not been quantified and the extent of future induced impacts is somewhat speculative as a result. Sasol may wish to consolidate work to establish appropriate offsets with the investigation which is currently being done to finalise management options for the proposed Nhangonzo Critical Habitat. This work has involved extensive Government and other stakeholder consultation and has identified a number of biodiversity management alternatives that Sasol could consider, including the specific option of protecting the Nhangonzo environment, and other, broader, alternatives aimed at the management of biodiversity within its license areas."

These two investigations, culminating in Management Plans, are referred to in Figure 6 above.

6.0 CONCLUSIONS

The PSA EIA has shown that all negative impacts of the existing Natural Gas Project, combined with the additional PSA processing capacity and associated infrastructure to increase the supply of gas, can be managed to acceptable levels of residual impact. Positive socio-economic impacts will be significant and can be enhanced by efforts to extend Sasol's existing CSI in project-affected communities. Sasol's acknowledgement of the well-known limitations of individual, project-specific, EIAs and its commitment to broaden its approach to biodiversity and social sustainability planning across all its license areas will bring it into line with best international practice

Signature Page

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APPENDIX A

History of Sasol's Activities and Environmental Licensing in Mozambique (in rough historical order)

Initial production activities (2003 - 2004)

An extensive drilling campaign was conducted by Sasol in 2003 including exploration and production wells in the Pande and Temane blocks. The campaign was successful in finding the targeted reservoir in Temane and led to the discovery of the Inhassoro gas field, increasing the total estimated recoverable reserves to 4,6 trillion cubic feet.

The first phase of the Sasol Natural Gas Project (NGP) involved the initial extraction, processing, transportation and utilisation of natural gas reserves in the Inhambane Province of Mozambique. This comprised:

- Development of the Temane gas field, including the installation of wells and construction of flowlines and access routes between the wells and the Central Processing Facility (CPF);
- The establishment of a CPF at Temane, which separates the gas from liquid hydrocarbons and produced water which is present in the produced well fluids; and
- The construction of an 865 km pipeline between Temane and Ressano Garcia in Mozambique and Sasol's gas reticulation network at Secunda in South Africa).

Related to the NGP, the Government of Mozambique (GoM) entered into a gas sales agreement with the Matola Gas Company (MGC) to sell a portion of the Petroleum Production Tax taken in kind (royalty gas). MGC undertook the construction of a 68 km pipeline from the off-take point at Ressano Garcia to Matola, for distribution to industrial clients in Matola and Machava .

Avoidance of large baobabs during the construction of the Mozambique - Secunda Pipeline (MSP)

Livelihood restoration monitored in accordance with Sasol's Resettlement Planning and Implementation Programme for farmers who lost crops

Development of additional capacity to supply gas (2006 - 2009)

In order to sustain the CPF expansion, the capacity to produce gas from the Petroleum Production Agreement (PPA) area was increased. This involved the development of the Pande G6 gas reservoir as well as increasing the production capacity of the Temane G9 reservoir. Pande gas is conveyed to the Temane CPF by means of a 48 km long trunkline. The first production from the Pande field started in July 2009.

Community Pedestrian and Road Safety Programme in Pande, developed by Sasol and the Provincial Roads authorities

[5] *http://www.erm.com/contentassets/471ab23ccbd64a30a613c2045d9986a2/eia/chapter-1---introduction.pdf*

Expansion of the CPF (2007 - 2011)

The 183 Expansion Project was designed to increase the production capacity of the plant from 120 MGJ/a to 183 MGJ/a.

The project consisted of the installation of additional equipment within the CPF perimeter, designed to process the additional volumes of gas, store increased volumes of by-products, and provide additional capacity to treat and safely dispose of waste products.

MICOA License: 2014/26.

MBR (membrane bioreactor) sewage treatment plant installed at the CPF to significantly increase treatment capacity as a part of the 183 Expansion Project

Other drilling and construction activities (2006 - 2008)

As part of the 2006 - 2008 drilling campaign to support the CPF expansion project, as described above, a further eight appraisal wells in the Inhassoro field east of the Govuro River were drilled and fourteen old wells were permanently plugged and abandoned. In addition, three exploration wells were drilled, two north of the Save River and one south of Vilankulo in the Temane field.

Rehabilitation of an abandoned well site using drilling mud waste

Blocks 16 and 19 (2008 - 2009)

In 2005, an offshore licence agreement was signed between Sasol (85%) and ENH: 15% for Blocks 16 and 19, an area of 11,000 km^2 to the east of Inhambane and Sofala provinces, where no wells had previously been drilled.

In the period October 2008 to February 2009 Sasol drilled two exploration wells (Njika-1 & Njika-2) which resulted in the discovery of gas at several stratigraphic levels. While the wells were technical successes, the gas accumulation was not found to be commercially viable on a stand-alone basis.

Sasol relinquished the Njika-deep-water parts of the concession at the end of the contract term on 30 June 2013 (all commitments fulfilled) but retained the shallow water area (<50 m water depths) which covers an area of 2,965 km^2.

Further work here is dependent on the outcomes of the coastal Strategic Environmental Assessment (SEA) undertaken by the Mozambican authorities covering near-shore areas along the entire coastline.

Seismic aquistion under way offshore for Block 16 and 19 (2019-)

Onshore PSA seismic acquisition campaign (2009)

In March 2009, Sasol launched its third onshore seismic project in two areas, one between Mabote and Maphinane in the Area A concession and the other north of the Pande gas field and the Save River. A total of 927 km of seismic lines were de-mined and shot.

Gradual recovery of woodland along an old seismic line cut in 2009

Onshore drilling campaign (2010 - 2011)

The drilling campaign included two exploration wells, one north of the Save River and one south of the Temane field, a horizontal appraisal well in the Inhassoro District and a second produced water reinjection well at the Temane CPF, designed to provide Sasol with redundancy in the event of reinjection failure at the single reinjection well. In addition, eight wells were recompleted in both the Temane and Pande fields in order to improve gas production flows. The two exploration wells, North Save-1 and Falcão-1 failed to prove the presence of commercially viable hydrocarbons.

Using the mixed-bury-cover (MBC) technique to dispose of drilling waste at Inhassoro well pads

Increasing the capacity of the MSP compressor stations (2007 - 2010)

In accordance with a long-term strategy to increase gas flow in the Mozambique-South Africa pipeline, Sasol built compressor stations at Komatipoort, in South Africa, and at Dindiza, Gaza Province, in Mozambique. The design of the facilities included above ground infrastructure housing two compressors driven by gas turbines.

Compressor station at Komatipoort

Area A (2010)

In 2010, Sasol signed an agreement to explore an onshore gas concession known as Area A. The concession currently covers some 6,698 km^2 and is adjacent to the existing Pande and Temane gas fields. A 2-D seismic acquisition campaign covering 2,250 km^2 was concluded in the fourth quarter of 2013.

Sasol 50%: Operator; Petrogas: 40%; ENH: 10%.

Sasol drilled an exploration well in this area in 2017 which was dry.

Sofala and M-10 (2012)

In 2009, Sasol acquired further exploration rights for two offshore licences in Mozambique adjacent to the offshore blocks 16 & 19, namely Sofala and M-10, totalling 44,561 km^2. The details were as follows:

- M-10: ENH: 15%; Sasol (operator) and Petronas: 42, 5% each; and
- Sofala: ENH: 15%; Sasol (operator): 85%.

In August 2012, Sasol drilled a wildcat well, 'Mupeji' in the offshore area M-10. The well targeted a reservoir objective in the Lower Domo. Logging data revealed that the well had not encountered oil or gas bearing reservoirs and it was plugged and abandoned. The concession was relinquished in April 2013.

Detailed re-evaluation of the seismic and well data confirmed no viable economic prospect and there was consequently no justification to support further drilling. Sasol terminated the licence in January 2015.

The rig on location at the Mupejiwell in offshore area M-10

PF facilities upgrade (2013 - 2014)

Following on from the 183 Expansion Project commissioned in October 2011, the CPF facilities upgrade includes further infrastructure designed to ensure continued efficient production of gas at the CPF over time. The project entails the construction of additional low pressure (LP) compressors driven by gas turbines, the upgrade of the existing high pressure (HP) compressor trains system and installation of additional gas turbine generators for power supply. Construction of the first two LP compression units began in 2014 and was completed in 2015. These will be followed by the third and fourth units as needed in future. Civil work for phases 3 and 4 was completed in the first phase. Work on the remainder of the project will continue, in phases, until 2022.

Left: Measuring emissions from the plant stacks as a basis for air pollution modelling of cumulative impacts. Right: LP Compression under construction

Increasing the capacity of the MSP Loop Line project – Phase 1 (2013 - 2015)

Together with iGas (25%) and Companhia Moçambicana de Gasoduto (CMG) (25%), Sasol (50%) is a partner in the Republic of Mozambique Pipeline Investments Company (ROMPCO) which owns the 865 km Mozambique–Secunda Pipeline (MSP).

The loop line was planned to increase the capacity of the MSP from 170 MGJ/annum to 212 MGJ/annum. The first (128 km) phase of the loop line (LL1) became operational in December 2014, routed from the CPF to Scraper Trap Station 1. This phase increased the MSP's capacity to 188 MGJ/a.

In 2015, ROMPCO embarked on the loop line 2 project (LL2) which will further raise pipeline capacity from 188 MGJ to 213 MGJ. Costing approximately US$210 million, LL2 will run for 127 kilometres to Scraper Trap Station 2, from the end of LL2, with beneficial operation expected by January 2017.

Cleaning of earth moving equipment brought into the loop line construction area for invasive plant prevention

Central Térmica de Ressano Garcia (CTRG) (2015)

In 2015, in-country monetisation of Mozambique's gas resources on a large scale reached a milestone with the commissioning of Central Térmica de Ressano Garcia, known as CTRG. Completed at a cost of US$246 million, CTRG is a 175 MW gas-to-power plant that is a joint venture between EDM (51%) and Sasol (49%). This, the first permanent, gas-fired power plant in Mozambique, supplies electricity to more than two million Mozambicans.

One of seventeen graves identified for exhumation at the CTRG site, prior to construction. Revision of the site boundaries avoided all but one of these exhumations

5th Licensing bid round (2015)

Sasol submitted three bids in the 5th licensing bid round and in October 2015 were notified as the successful bidder for:

- The PT5-C licence in the onshore Mozambique Basin: Sasol 70%: operator and ENH: 30%; and
- The A5-A licence in the offshore Angoche Basin: Eni 34%: operator, Sasol: 25,5%, Statoil: 25,5% and ENH: 15%.

Sasol's commitments in the first four-year period are as follows:

- Area PT5-C: Two wells and the acquisition of 1 600 line kilometres of 2D seismic data; and
- A5-A: Three wells and the acquisition of 4,400 km^2 of 3D seismic data.

Both licenses have been awarded.

Bat caves in Area PT-5C which are important biodiversity hot spots

Proposed Central Térmica de Temane (CTT) (2015-ongoing)

To further reduce Mozambique's reliance on foreign power imports, and to position Mozambique as an energy hub in Southern Africa, Sasol and the Mozambican state power company, EDM, propose to develop the Mozambique Gas to Power Project (CTT), a 450 MW natural gas power plant using PSA gas. The proposed CTT site is located in close proximity to the CPF, approximately 500 m south of the existing fence line. The proposed shareholding structure for CTT was initially structured to be the same as for CTRG, i.e. Sasol: 49% and EDM: 51% , although noting that EDM in 2018 brought in a Globeleq led consortium (the Temane Energy Consortium) to partner with EDM in EDM's 51% ownership stake.

In addition to the plant itself, the CTT project will include a 25 km long double circuit 400 kV power line linking the plant to the national grid, a 13-km long water supply pipeline from the Govuro River (if required – a recent study has shown that water in underground aquifers may be sufficient), a 3-km long access road and a gas pipeline between the CPF and the power plant.

Example of large equipment being offloaded from a barge - information presented to stakeholders in Inhassoro public meetings

The PSA development & LPG project (2014 – ongoing)

The project involves the development of 12 new oil wells in the PSA licence area (plus one water well) and 5 new gas wells (and one existing well). The liquids will be delivered through flowlines to a new Liquids Processing Facility built adjacent to the Sasol CPF. The additional gas may be processed by a 5th gas processing train at the CPF, although the alternative of further debottlenecking capacity of the existing 4 CPF trains is being investigated as an alternative. The project is to include production of 20,000 tpa of LPG, which will help to replace much of the imported product into Mozambique.

Environmental licensing of road transport and the onshore /offshore pipeline and floating storage and off-loading unit is in separate EIAs.

As of August 2018, seven of the oil wells and two of the gas wells have been drilled.

The Nhangonzo coastal stream, a potential 'critical habitat' identified during the PSA Development EIA (2014)

Seismic acquisition project (2016 - 2017)

Sasol proposes to conduct further 2D and focused 3D seismic acquisition over large areas of its PPA and PSA licence areas. In the short term, an urgent programme has been scheduled in the Pande and Inhassoro fields, within the PSA licence area, to support the development of G10 and G6 oil reservoir well drilling plans. Both 2D and 3D seismic data will be acquired. This is the first 3D seismic campaign in onshore in the country.

(Update: A 2D and 3D seismic campaign was undertaken in the PSA in 2017).

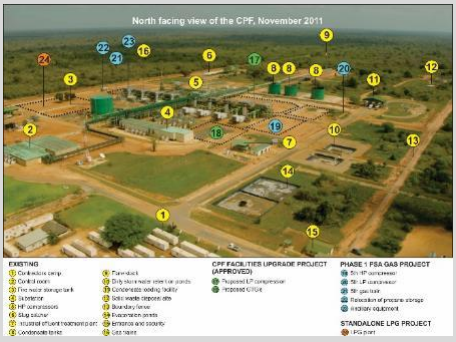
Encephalartos ferox identified in the Govuro River floodplain near Nova Mambone during fieldwork for the NGP Seismic EIA Addendum (2015).

5th Train at the CPF (2016)

A 5th train at the CPF in Temane is being considered to provide sufficient processing capacity for the PSA gas although the alternative of further debottlenecking capacity of the existing 4 CPF trains is being investigated as an alternative.

The 5th train will be funded, owned and operated by the PPA UJV.

The construction of the 5th train, together with the field development plan for the PSA licence, was approved in January 2016.



The CPF from the air – the 5th Gas Train will be within the western border of the site

APPENDIX B

Summary of Impacts of the Sasol PSA Development and LPG Project

Impact	Construction Phase	Operational Phase
Air Quality (5th Gas Train and LPF)	The CPF is isolated from immediately surrounding communities. Main impacts due to increased construction traffic along the access road from the EN-1 (NO_2, SO_2, CO, TSP, PM_{10}). Impacts were modelled and assessed to be of low significance. **Mitigation:** None required over and above standard management procedures in Sasol's existing Construction EMP for the CPF, with the exception of modification to include residential dust fallout guideline provided by the South African National Air Quality Standard (no Mozambique standard in this regard).	All new equipment constructed for the 5th Gas Train and PSA Liquids and LPG Plant will be designed with emission specifications that are similar to or higher than those of the existing plant. All equipment is expected to fully comply with the Mozambique emission standards, the standards set out in the o-EMP and the IFC guidelines. Regarding the incinerator, the project is expected to result in a minor increase in waste destined for incineration. The capacity of the incinerator will not be exceeded by this increase and there should be little change in emissions. Annual monitoring of incinerator stack emissions shows dioxins and furans to be well within the standard of 1 ng I-TEQ Nm^3. Overall impact on air quality will be of low significance. Modelled concentrations of all criteria air pollutants at the extended PPZ boundary (the nearest point at which inhabitants could reside in the future) will be less than 50% of the legal / o-EMP standard. **Mitigation:** Ensure that all future gas turbines use low NO_x burners. Increase the size of the PPZ to prohibit settlement near the CPF/LPF Liquids Plant boundary.
Air Quality (Wells and Flowlines)	Impact of diesel driven generators for well drilling assessed in respect of NO_2, SO_2, PM_{10} and TSP. Some (worst case) exceedance of the NO_2 daily standards was predicted for four of the wells where households were close by (I-G6PX-4, I-G6PX-5, T-G8PX-4, T-G8PX-5 – see Figure 1). It was not possible to predict the number of exceedances, but exceedances would be short term since drilling of a well occurs over a 1 - 2 month period only. Impacts were assessed to be of moderate significance prior to mitigation. Dust impact of construction traffic was also assessed, the main area of concern being the gravel access road out of Inhassoro towards Vilanculos, from which all construction vehicle traffic for the wells east of the Govuro River would be routed. Impact could continue over an extended (2 year) period with moderate impact significance for people living close the road. **Mitigation:** Compliance with the general dust management standard in Sasol's existing infrastructure Construction EMP. Modification of the standard to include World Bank/IFC air quality guidelines. Dust suppression by means of water carts to achieve at least a 50% reduction in emissions. Monitoring by visual checks by the ESO or, if instructed by the engineer, other more formal monitoring methods.	Impacts were assessed to be of low significance. Maintenance traffic on access roads to the wells will be very occasional, typically not more than a few vehicles per day. There will be no venting from wells or flowlines occurs under normal operating conditions.
Noise (5th Gas Train and LPF)	Construction activities will cause a slight increase in the *day-time* noise levels caused by the existing plant, but these will be of low significance at surrounding communities. Construction at night is expected to be in exceptional circumstances only.	No significant noise increase is expected as a result of the 5th Gas Train, for which power generation will be from existing generating sources at the CPF. Most of the increase will be associated with the PSA Liquids Plant east of the existing CPF. Cumulative Sasol CPF/LPF sound levels at the PPZ boundary will exceed the 45 dBA and 3 dBA increment guideline limit prescribed by the IFC although, at present, they do not exceed these limits at the nearest households. Impacts based on the present household locations will be of low significance but could become more significant if people were to settle near the PPZ boundary. **Mitigation:** A range of measures are recommended including extension of the PPZ to restrict future settlement, encouraging EDM to shield noise from their gas generators north east of the CPF (a major source of noise, independent of Sasol), and improved monitoring and maintaining equipment that generates noise to minimise mechanical source noise.

Impact	Construction Phase	Operational Phase
Noise (Wells and Flowlines)	Night noise caused by drilling is potentially of high magnitude at 29 houses (5 well pads) where sound levels will increase to >45 dBA (generally greater than 10 dBA above background ambient). Due to the short duration of noise impact at any household (less than 2 months), impact is rated as of moderate significance. **Mitigation:** Fit the diesel generators with effective mufflers. Enclose or install custom made noise barriers around site generators. Communicate effectively and regularly with affected households regarding schedules. Monitor noise levels at the nearest households.	Impacts will be of low significance. Operating wells will result in no significant noise impact beyond the boundary of the well pads. Traffic noise along access roads to the wells will be negligible.
Groundwater and Surface Water Quality	Impact assessed as of moderate significance, reduced to low significance subject to the necessary water treatment capacity for sanitary wastewater generated by construction workers and responsible management of solid and liquid construction wastes (hazardous and non-hazardous). **Mitigation:** Implementation of wastewater and solid waste management requirements set out in Sasol's existing Construction EMPs, updated for the current project.	*Domestic Wastewater:* The PSA Liquids and LPG Plant and 5th Gas Train will add approximately 7.5% to the total load on the Membrane Bioreactor (MBR) sewage works. Since the plant is designed with significant spare capacity, the additional contribution from the new PSA Liquids and LPG Plant staff is unlikely to have a measurable effect on the performance of the works. It is noted, however, that the issues related to out-of-specification nitrogen need to be resolved in order to minimise future risk to groundwater. Impact significance was rated as moderate, reducing to low with appropriate monitoring and management. No significant impact on surface water is anticipated. *Solid Wastes:* The additional solid waste generated by the new plant is unlikely to overtax any of the existing waste handling procedures at the CPF. The new plant will slot into an efficient, well run, waste management system. It is unlikely that any negative impacts on surface water or groundwater will result from the extension of the existing management practices to cover the additional waste generated by the new project. This presupposes that the issue concerning the flooding of the H:H site in summer months is resolved, since this could, over a period of time, lead to a significant groundwater hazard, were leachate to breach the liner and seep into surrounding groundwater. No impact on surface water is anticipated. On the grounds of this single item the impact is therefore considered to be moderately severe and of moderate significance, reducing to negligible significance once the flooding is resolved. *Produced Water:* From an environmental point of view, the reinjection of produced water into a produced water well is a widely recognised practice for onshore disposal. Internationally recognised guidelines exist to assist the oil industry to plan, operate and maintain produced water reinjection wells to a standard that minimises environmental risks. The Oil and Gas Producers (OGP) *"Guidelines for Produced Water Reinjection"* Report No. 2.80/302, January 2000) provides one such guideline. Impacts were rated as of moderate significance. Subject to Sasol complying with this or similar international guidelines in the siting, design, operation, maintenance and monitoring of an additional produced water reinjection well, the significance of produced water disposal impacts on groundwater should be reduced to negligible significance. **Mitigation:** Recommended mitigation includes a wide range of measures to ensure domestic wastewater treatment improves to consistently meet the o-EMP nitrogen standards, measures to prevent rainfall ingress into the HH+ landfill, and preparation of a Method Statement for siting, installation, operation, maintenance and monitoring of the new reinjection well according to the OGI (2000), Guidelines for Produced Water Injection or similar appropriate standard.
Groundwater Supply	Impacts were rated to be of low significance. Water supply will be obtained from existing Sasol boreholes which are licensed to provide sufficient capacity for the CPF and construction needs. Additional usage is not expected to materially influence ecological base flows in the Govuro River (borehole T-9 supplies the CPF with water from the Govuro sand aquifer), or local inhabitants who use groundwater.	The recommended sustainable 24-hour abstraction rate for the T-9 borehole is 450 m^3/day (Rison, 2011), which is more than three times the current abstraction rate and nearly two and a half times the proposed abstraction rate. Impact significance will be low.

Impact	Construction Phase	Operational Phase
Groundwater Quality (Wells and Flowlines)	Sasol proposes to use water-based drilling fluids. An assessment of Sasol's previous methods of disposal included mix-bury-cover of cuttings waste at the well pads, land spreading of cuttings waste (limited); spreading of the clear liquids on local gravel roads; removal of hazardous completion fluids to the CPF for incineration or removal to a registered hazardous waste disposal site. No significant residual impacts were identified. Potential impacts were assessed to be of moderate significance, but subject to appropriate management methods at the rig site, impacts were assessed to be of low significance. **Mitigation:** Recommendations included the preparation of a detailed method statement for the management and disposal of driliing waste, based on the requirements and methodologies set out in the Alberta Energy Regulator D50 Code of Practice.	Few emissions are expected under normal operating conditions. Small spillages of hydrocarbons may occur on the well pads and along the flowlines during maintenance Subject to standard methods for handling small quantities of waste hydrocarbons and other potentially hazardous wastes, included in Sasol's existing EMPs, the residual impacts will be of low significance. **Mitigation:** Implement standard pollution prevention procedures set out in the existing o-EMP for the ongoing operation of wells, flowlines and other associated infrastructure. Monitor groundwater quality at boreholes on the well pads to verify integrity of the well and the drilling waste disposal sites.
Soils (5th Gas Train, LPF, Wells, Flowlines and Access Roads)	Direct impact on soils during construction was divided into impacts caused by erosion and sedimentation after bush clearing, impacts of soil pollution and the impacts of disposal of drilling waste. Soil loss due to project infrastructure was also quantified. Soil erosion, based on review of experience of existing project infrastructure outside of the CPF indicates impacts of low significance. Impact on soils due to construction spills at the processing facility and the wells is expected to be of moderate significance, reducing to low significance if managed by appropriate preventative and clean-up procedures during construction. No evidence was found of impact on soils beyond the well pads caused by disposal of drilling cuttings by M-B-C for previously drilled wells. **Mitigation:** Recommendations included implementation of standard pollution prevention and clean up methodologies set out in Sasol's existing construction EMPs and the preparation of a method statement for the disposal of drilling waste, based on the requirements and methodologies set out in the Alberta Energy Regulator D50 Code of Practice.	Issues about possible crop failures caused by the CPF were raised during public participation for the EIA. In the past, concerns were expressed in relation to black smoke from the flare stack, which until 2006 was quite noticeable. This problem was later resolved by improving combustion at the flare tip. Nevertheless, at least some members of surrounding communities still express the opinion that Sasol's air emissions are affecting crops. Since the PSA Liquids and LPG Plant will result in additional emission sources at the CPF, this concern was tested in the EIA by analysing soil samples at locations around the plant. No evidence was found of any impact. The EIA considers drought conditions at critical growing periods and lack of fertilizer application to the likely cause of poor crop yields around the CPF. **Mitigation:** Improve ongoing communication with surrounding stakeholders to improve understanding of this issue.
Botanical Biodiversity and Fauna (5th Gas Train, LPF, Wells, Flowlines and Access Roads)	Assessed impacts on vegetation and habitats included habitat loss, impact on specific vegetation units, impact on species of conservation concern, impact on living natural resources of economic value, impact on water supply and construction-related pollution. Direct habitat loss was estimated to be some 166.7 ha (5th Gas Train 0 ha; PSA Liquids Plant 9.5 ha; Inhassoro Manifold Station 8.8 ha; wells 15 ha; access roads 133.4 ha). Of this 98 ha will be in untransformed habitat. Impacts were considered in relation to the sensitivity of the identified vegetation types and their associated animal species. Overall, habitat loss was considered to be of low or negligible significance at regional level. At local level, a number of areas were identified where bush clearing would impact on locally local biodiversity hotspots, typically associated with tall forest patches on termite mounds, which were flagged as impacts of moderate significance that should be avoided. Potential impact on plant species of conservation concern was limited to two endemic plant species (red data status 'Vulnerable) occurring on well pad T-G8PX-5 (*Pavetta*	The operating environment of the project is unlikely to cause significant *direct* impact on biodiversity. Monitoring of the ongoing impacts of the existing wells and flowlines show that there is little significant direct impact on biodiversity during the operational phase. Direct impact significance of the operation of the PSA development will be low. *Induced* impacts are considered to be the more important biodiversity risk caused by Sasol's activities in Inhambane Province. The potential for induced impacts was first identified in the EIAs prepared for the Phase 1A gas project in 2004. The EIA identified the creation of access (roads, cut lines) into previously inaccessible areas as a potential risk leading to logging, cutting of live trees for sale as firewood or for use as charcoal, slash and burn clearing of vegetation for cultivation, increased hunting and general over-exploitation of natural resources. There is evidence that this prediction was accurate, at least in some places. Sasol has monitored the effect of access creation along some of its flowlines and along the full length of the Mozambique/Secunda Pipeline (MSP) for the past 10 years. In a recent review, de Castro (in ERM, 2013) concluded that the MSP had greatly facilitated access to and extraction of harvestable sized specimens of the more valuable hardwoods, resulting in their virtual extirpation[6] from the area along the pipeline. As the most commercially sought after and valuable hardwoods are depleted, the next most sought-after species are targeted until they become depleted. Since the start of the Natural Gas Project, the majority of hardwood stockpiles awaiting collection by truck have been found by this author along permanent access

[6] *'Extirpated' in the context of harvestable plant populations means to have declined to zero and usually refers to local populations so as to distinguish the term from 'extinction'.*

Impact	Construction Phase	Operational Phase
	gracillima (DD) and *Croton inhambanensis* (VU). This impact was rated as highly significant. Assessed impacts on terrestrial fauna included loss of habitat, impact of faunal disturbance, hunting and persecution, impact of construction-related pollution, impact of road and open trenches, impact of bush fires, and impact on Red Data fauna and sensitive habitats. and impact of construction disturbance, hunting or persecution. No threatened terrestrial fauna were identified that would be affected by construction impacts or warrant relocation of any of the proposed infrastructure. Other identified impacts on fauna in general (hunting or persecution by construction staff, impact of road kills and open trenches, impact of bush fires), while potentially significant in some cases, were considered to be manageable by implementing the requirements in Sasol's existing construction-related EMPs. Impacts of No significant wetland impacts were identified, with project infrastructure generally well removed from permanent and seasonal wetlands, with the exception of the Govuro River pipeline crossing where no construction impact was expected due to the proposed use of an existing available pipeline beneath the river. (This pipeline was later found to be damaged, and an assessment of the proposed installation of another pipeline across the river using Horizontal Directional Drilling was made in the EIA Addendum (Golder, 2015). Subject to the careful management of drilling wastes, this impact was considered to be of low significance. A potential Critical Habitat was identified associated with the Nhangonzo coastal stream between Vilanculos and Inhassoro. As a precautionary measure, the Critical Habitat boundaries were defined as the extent of the catchment of the stream, providing a buffer of some 4,359 ha. Of the proposed PSA wells situated within this area, two affected this buffer. Direct impact significance was rated as low, particularly due to the use of existing seismic cutlines to locate the access roads (see reference to Indirect impacts). **Mitigation:** Recommendations were made to relocate four of the wells (including T-G8PX-5), the Inhassoro Manifold Station and a section of pipeline to well T-G8PX-5. An extensive range of further recommendations were made to minimise construction impacts on biodiversity, including measures to minimise the project footprint and to avoid construction-related pollution, control of hunting and persecution of animals, and a wide range of other management measures, many of which are already in Sasol's existing construction-related EMPs. It was further recommended that any activity in the provisional Critical Habitat should be delayed until further study had been completed.	roads, along pipeline routes and along seismic cut lines. Seismic cut lines are also believed to have facilitated a significant increase in hardwood exploitation in the Pande hardwood forests (McClelland; in Golder 2017). This is not a significant issue where good road access already exists. Much of the study area for the PSA project is already accessible, taking into consideration the EN-1 and the main District gravel road between Inhassoro and Vilanculos through the centre of the study area east of the Govuro River and the road along the Mozambique Secunda Pipeline. Only 21% of the 111.1 km of roads required by the project will need to be newly constructed, which is indicative of the generally good existing access. This should reduce the induced impact of project access on biodiversity to low levels of significance for most of the study area. Following review, two sections of road were nevertheless considered to be of concern with respect to induced impact. Both of these were within the proposed Critical Habitat of the Nhangonzo coastal stream. The potential risk of increased harvesting and hunting in this area was considered to be highly significant. **Mitigation:** The EIA recommended that a decision whether to approve wells I-G6PX-6 and I-G6PX-1 and their associated access roads should be delayed until further study of the Critical Habitat had been undertaken. [Two further independent studies have subsequently been undertaken. A full biodiversity survey, including studies of the aquatic biology of the coastal stream and estuary and the terrestrial catchment areas was prepared by EOH Coastal and Environmental Services (2015) (in Golder, 2015). The study found one potentially new species of skink - subsequently positively identified as a known species – but otherwise no threatened animal species. The study continued to support a provisional Critical Habitat designation for the coastal stream and its catchment. Following detailed consultation with key stakeholders, it was agreed that limited Sasol access into the area as proposed by the PSA development plan would be permissible, subject to (i) relocating well I-G6PX-1 at least 200 m from the stream (ii) the preparation of a Biodiversity Management Plan (ii) continued consultation with stakeholders to determine the best option for future sustainable development in the area, given a number of competing uses which included oil industry use, tourism proposals and existing subsistence habitation and agriculture. In 2018, a final review of the Critical Habitat status of the area was undertaken (Impacto, 2018: unpublished, Nhangonzo Area Categorization Study), considering the development of the biodiversity offset framework in Mozambique by the World Bank and recent experience of the application of IFC rules for Critical Habitat determination. With the participation of Mozambique experts from the COMBO project (a project designed to promote conservation, impact mitigation and biodiversity offsets in Mozambique) it was agreed that the Nhangonzo area is not Critical Habitat, with the exception of a small section of Coastal Forest, which occurs within 500 m of the coastline. The designation of the coastal stream is high value Natural Habitat. **Mitigation:** The Nhangonzo Area Categorization Study recommended that any oil industry activities in the Nhangonzo area should be determined, in future, by the methodology and sensitivity classification provided in a recent biodiversity study of the whole of Sasol's license areas (Golder, 2017). Any decisions about biodiversity offsets should not be applied to small areas, in isolation, but to Sasol's license areas in Inhambane Province as a whole. It has been agreed with Government that a Biodiversity Management Plan will be prepared for the whole of the PSA, rather than the former proposed Critical Habitat area of the Nhangonzo coastal stream catchment.
Aquatic Biodiversity (Wells, Flowlines and Access Roads)	Assessed impacts on aquatic habitats and fauna included impact of sediment generation, impact of toxic releases of hydrotest water, impact of the use of water from barrier lakes and coastal streams for construction purposes, impact of inter-basin transfers due to hydrotesting,	In the absence of accidents, no significant impacts on aquatic fauna were assessed (see 'Major Accidents' below).

Impact	Construction Phase	Operational Phase
	Habitat impacts on aquatic fauna due to direct disturbance were rated to be of low significance, with construction sites generally removed from aquatic habitats. Inter-basin transfer of water from the barrier lakes or Govuro River into the coastal streams was regarded as a potentially highly significant impact, which should be prohibited as a precautionary measure, since the origin of the water in the two catchments was significantly different, potentially resulting in differences in species composition (although not found in the field studies). Release of hydrotest water treated with biocides and corrosion inhibitors into local water bodies was also considered to be a highly significant impact unless monitored and managed. Subject to appropriate management, impacts could be reduced to low levels of significance. **Mitigation:** Recommendations included prohibition of water transfer between the Govuro River and the coastal stream catchments, and the use of water from the barrier lakes for construction purposes. Hydrotest water is to be contained and tested for bio-toxicity before release, using recognised bio-assay methodologies. If residence times of the hydrotest water can be minimised, biocides and corrosion inhibitors should not be used.	

Impact	Construction Phase	Operational Phase
Socio-Economics (5th Gas Train, LPF, and Wells and Flowlines)	Construction will cause a wide range of impacts, both positive and negative. Benefits include employment (unskilled and semi-skilled construction employment of up to 1,800 people for 2 years), resulting in impacts of moderate significance. There will be some local procurement of goods and services but benefits are likely to be limited and impacts will be of low significance. Negative impacts include a range of social issues associated with the introduction of large construction teams into local communities, including disrespect for local people; population influx; increased cost of living; loss of land (no resettlement will be required, but an estimated 25.4 ha of agricultural land will be lost mainly along the flowlines/access roads - replacement land nearby will be available in all cases); potential loss of livelihood in the event of a major spill (well blowout); impacts on women and other vulnerable groups. **Mitigation:** Most negative impacts can be reduced to low levels of significance and positive impacts enhanced, subject to the mitigation proposed, which included extensive general and specific measures.	The project will provide a major economic contribution to the country through taxes and royalties, a large Mozambican workforce, commitment to increasing levels of local employment during operation, a firm local procurement policy and substantial CSI initiatives, which will expand Sasol's existing contribution to improving economic statistics locally and regionally. Sasol's continued support to education, health services and water supply will benefit many people in project-affected areas.
Health (5th Gas Train, LPF, and Wells and Flowlines)	Construction impacts on health included increased community risks of STD's, vector-related diseases, respiratory diseases (TB), traffic and other accidents. At regional level, the increased risk of HIV/Aids was considered to be of moderate significance, with increased vector-related diseases (mainly malaria) of moderate significance and accidents of low significance (mainly due to local communities' awareness of heavy traffic in the area). **Mitigation:** Extensive mitigation proposed to minimise the increased risk of STD's caused by contractor personnel, including ongoing training, separation of personnel from local communities, closed camp policy, freely available condoms, support for voluntary testing and counselling, and other measures for STD's, vector-related diseases and accidents. Residual impact significance is assessed as low.	Negative health impacts during the operational phase of the project were assessed to be of low significance.
Tourism (Wells and Flowlines)	None of the construction activities were expected to impact on areas that would affect existing tourism along the coast or on the adjacent islands of the Bazaruto Archipelago National Park.	An area of significant tourism potential has been defined between Vilanculos and Inhassoro, with the assistance of the IFC, as an Anchor Tourism Site, which has subsequently been proclaimed as a Zone of Tourism Interest (ZIT). Further planning has included the preparation of a detailed development layout for a portion of the ZIT. INATUR are the Government Agency responsible for the ongoing planning, development and management of the ZIT. The Development Plan overlaps with the area defined for the Critical Habitat, described above. The project description for the EIA (Golder, 2014) included 1 well (I-G6PX-4) within the ZIT. The changes made and addressed in the EIA Addendum (Golder, 2015), included an additional well (I-G6PX-7). In the workshops held to discuss ways of accommodating the various competing land uses in the area, it was agreed that a compromise would need to be reached, and that the proposed Sasol wells and access roads within the boundaries of the ZIT were acceptable, since they were outside of the two areas defined for use in the Tourism Development Plan. It was also agreed that Sasol's activities (existing and future) should be restricted in the vicinity of the coastline, including a total restriction on all activities within 500 m of the coast and a partial restriction on activities between 500 m and 1,000 m from the coast. Tourism impacts were assessed to be moderately significant without mitigation (due to the location of I-G6PX-6 within the 1,000 m buffer), but of low significance after mitigation.

Impact	Construction Phase	Operational Phase
		Mitigation: The EIA recommended relocating well I-G6PX-6 westward to a location close to the existing I-6 well, and outside of the 1,000 m buffer along the coastal belt.
Cultural Heritage (5th Gas Train and Wells and Flowlines)	Some 45 sites including pottery fragments from the Lumbo Tradition, iron age pottery scatter, pottery sherds of the Matola tradition in the early iron age, late iron age shell middens, graves and cemeteries, medicinal plants and sacred trees were found in the study area. Most of these were sufficiently far from proposed construction activities to avoid risk of damage. A few were nearby, for which mitigation could be required, including cemeteries along the gravel road between Inhassoro and Vilanculos and on the edge of the EN-1, sacred trees near Mangungumete/Mangaralane and pottery scatter at various locations potentially affected by the project access roads and wells. In these instances, the risks of damage was rated to cause impacts of moderate significance. There was also a risk of chance finds resulting in impacts of moderate significance in the absence of mitigation. All impacts could be reduced to low significance, subject to mitigation. **Mitigation:** Avoidance of directly affected archaeologic sites with pottery scatter, where possible, and other heritage sites including cemeteries was recommended. Otherwise, preparation of a chance find procedure and targeted test pitting to collect material and determine sub-surface significance of any sites affecting archaeological remains was recommended.	Indirect impacts on sense of place, with increasing numbers of migrants in the area, may alter the sense of place of the project-affected areas for local people, resulting in impacts of moderate significance. **Mitigation:** The mitigation for this impact is to ensure that local people derive benefits from the project as a result of development, improved services and infrastructure. Sasol can contribute to this through its CSI initiatives.
Major Accidents (Wells and Flowlines)	The risk of major accidents was assessed in relation to a loss of well control (a ‘blowout’) during drilling. While the probability of a blowout is very low, the consequences, particularly for the wells near the coast or close to drainage lines, was assessed to be severe. Modelling of a potential spill was undertaken using a PHAST v. 6.7 for the multicomponent simulations of the flash fractions, with the evaporation pool radii calculated using the EFFECTS v. 9.0.18 model. Specific blowout pressures and conditions were provided by Sasol. Risks included possible impacts on biodiversity, local communities and tourism. Modelling suggested that most of the flow from a blowout would vaporise, except in circumstances where it ignited. While overall biodiversity and tourism consequences of a blowout could be severe, overall impact was rated as moderate due to the low probability of an accident occurring. **Mitigation:** Recommendations included increased distance from the oil wells to drainage lines and wetlands (distances specified), and the preparation of a Well Control Contingency Plan as a part of the Emergency Plan. The Emergency Plan is to include Tier 3 response capability, which is for a very rarely anticipated oil spill of major proportions but which could possibly require national and international resources to assist in control, clean-up and protection of vulnerable areas.	While loss of well control is possible under operational conditions, it is more likely during drilling and was assessed as a part of the construction phase. The worst case risk associated with accidents in the operational phase was considered to be a pipeline failure, resulting in direct spillage to surface water. A break of the pipeline crossing the Govuro River was assumed and downstream impacts modelled, using the General NOAA Oil Modelling Environment (GNOME) model. Impacts extended for 3.6 km downstream, varying in the extent of lethality to wetland and aquatic life. Impacts (given the low probability) were considered to be of moderate significance under typical operating conditions, and low significance subject to additional management control. **Mitigation:** A range of additional control measures were proposed, including design considerations (eg: increasing the depth of the pipeline on the approach to the Govuro River from the west, where there is intensive subsistence agriculture), early leak detection (eg: increasing surveillance and water quality monitoring), emergency management and response measures (eg; development of an Emergency Response Plan and maintenance of appropriate emergency response materials and equipment on site) and public and authority awareness (eg: increased communication with local authorities about spill risks and involving local communities in spill monitoring).

APPENDIX C

Summary Significance Ratings of Impacts identified by the PSA Development and LPG Project EIA (Golder, 2014)

Table C-1: Summary of environmental significance ratings for the construction phase

Potential impact	Environmental significance	
	Before mitigation	After mitigation
SPECIALIST STUDY 1. AIR QUALITY IMPACT ASSESSMENT		
PSA Liquids and LPG Plant and 5th Gas Train		
Impact of construction activities on air quality in surrounding communities		
Impact of Nitrogen dioxide (NO_2)	L	L
Impact of Sulphur dioxide (SO_2)	N	N
Impact of Total Suspended Particulates (TSP)	L	L
Wells (Construction and Drilling)		
Impact of drilling activities on air quality in surrounding communities		
Impact of Nitrogen dioxide (NO_2)	M	L
Impact of Sulphur dioxide (SO_2)	N	N
Impact of Total Suspended Particulates (TSP)	M	L
Flowlines and Access Roads		
Impact of construction traffic on air quality along access roads and at flowline work sites		
Impact of Total Suspended Particulates (TSP)	M	L
Impact of PM_{10}	M	L
Impact of Dust Fallout	M	L
SPECIALIST STUDY 2, NOISE IMPACT ASSESSMENT		
PSA Liquids and LPG Plant and 5th Gas Train		
Impact of construction noise on surrounding communities	L	L
Well Sites		
Impact of drilling noise on surrounding communities	M	L
SPECIALIST STUDY 3, GEOHYDROLOGY IMPACT ASSESSMENT (GROUNDWATER) AND SPECIALIST STUDY 6, WASTE IMPACT ASSESSMENT		
PSA Liquids and LPG Plant and 5th Gas Train		
Impact on groundwater caused by generation of domestic wastewater	M	L
Impact on groundwater caused by generation of solid and liquid construction wastes	M	N
Impact of abstraction of groundwater for potable and construction plant use	L	L
Wells		
Impact on groundwater caused by disposal of drilling muds and completion fluids and burn pit contamination	M	L
Impact on groundwater caused by accidental spills of hazardous materials and wastes	M	L
Impact on groundwater caused by domestic waste and domestic wastewater	L	L
Flowlines and Access Roads		
Impact on groundwater caused by spillage of domestic and hazardous construction waste	L	L
SPECIALIST STUDY 4. SURFACE HYDROLOGY IMPACT ASSESSMENT (SURFACE WATER) AND SPECIALIST STUDY 6, WASTE IMPACT ASSESSMENT		
PSA Liquids and LPG Plant and 5th Gas Train		
Impact on surface water caused by potentially contaminated site drainage	L	L
Impact on surface water caused by domestic wastewater	M	L
Wells, Flowlines and Access Roads		
Impact of physical pollution (sedimentation)	L	L
Impact of chemical pollution (hydrotest water)	H	L
SPECIALIST STUDY 5. SOILS IMPACT ASSESSMENT AND SPECIALIST STUDY 6, WASTE IMPACT ASSESSMENT		
PSA Liquids and LPG Plant, 5th Gas Train, Wells, Flowlines and Access Roads		
Impact of soil erosion and compaction	L	N
Impact of physical and chemical soil pollution	M	L
Impact caused by disposal of drilling muds, drilling waste water, completion fluids and burn pit contamination	M	L
SPECIALIST STUDY 8. RISK (WELL BLOWOUT)		
Impact of a major oil spill due to a well blowout	M	L
SPECIALIST STUDY 9. BOTANICAL BIODIVERSITY AND HABITAT IMPACT ASSESSMENT		
PSA Liquids and LPG Plant, 5th Gas Train, Flowlines, Access Roads and Wells		
Impact on overall habitat loss	L	L
Impact on vegetation units		
Impact on the Govuro River floodplain	L	L
Impact on Coastal Streams	L	L
Impact on Ephemeral Drainage Lines	L	L
Impact on Barrier Lakes	N	N
Impact on Mangrove Swamps	N	N
Impact on Coastal Forests	L	L
Impact on Hummock Dune Communities	N	N
Impact on Dune Forests	N	N
Impact on Tall Forest Patches on Termite Mounds	M	L
Impact on area of Critical Habitat (IFC)	L	L

Potential impact	Environmental significance	
	Before mitigation	After mitigation
Impact on Plant Species of Conservation Concern	H	L
Impact on Living Natural Resources of Economic Value	L	L
Impact of Water Supply, Construction-Related Pollution and Interbasin Water Transfer	H	N
SPECIALIST STUDY 10. TERRESTRIAL FAUNA IMPACT ASSESSMENT		
PSA Liquids and LPG Plant and 5th Gas Train		
Impact of loss of habitat on faunal populations and Red Data species	L	L
Impact of faunal disturbance, hunting and persecution	L	N
Impact of construction-related pollution	L	N
Wells, Flowlines and Access Roads		
Impact of loss of habitat	L	L
Impact of faunal disturbance (noise and dust)	L	N
Impact on construction-related pollution	L	N
Impact of hunting and persecution	L	N
Impact of road and open trench kills	M	L
Impact of bush fires	M	L
Impact on Red Data fauna and sensitive habitats	M	L
SPECIALIST STUDY 11. AQUATIC ECOLOGY IMPACT ASSESSMENT		
Wells, Flowlines and Access Roads		
Impact of Sediment Generation	L	N
Impact of Hydrotesting	H	L
Impact of Water Use from the Barrier Lakes and Coastal Streams	L	L
Impact of Interbasin Water Transfer	H	L
Impact of Construction Disturbance, Hunting and Persecution	L	L
SPECIALIST STUDY 12. SOCIO-ECONOMIC IMPACT ASSESSMENT		
Disrespect for local people	M	L
Employment opportunities	M+	M+
Unfair recruitment practices	M	L
Population influx into the local area	M	M
Increased local cost of living	L	L
Loss of livelihoods as a result of a well blowout	L	N
Loss of land/resettlement	M	L
Impacts on women and other vulnerable people	L	L
Procurement of local goods and services	L+	L+
Relations between company and community	M	M+
SPECIALIST STUDY 12. HEALTH IMPACT ASSESSMENT		
Increase in sexually transmitted diseases	M	L
Increase in vector-related diseases	M	L
Increase in respiratory disease	L	L
Traffic and machinery/ equipment accidents	L	N
SPECIALIST STUDY 13. CULTURAL HERITAGE IMPACT ASSESSMENT		
Change of land surface	M	L
Impact of Ground pollution	L	L
Impact of changes in environmental setting	M	L
Impact of changes in demographics	M	L

Table C-2: Summary of environmental significance ratings for the operational phase

Potential impact	Environmental significance	
	Before mitigation	After mitigation
SPECIALIST STUDY 1. AIR QUALITY IMPACT ASSESSMENT		
PSA Liquids and LPG Plant/5th Gas Train		
Impact of operational activities on air quality in surrounding communities		
Impact on nitrogen dioxide (NO_2)	L	L
Impact on sulphur dioxide (SO_2)	L	L
Impact on Total Suspended Particulates (TSP)	L	L
Impact on PM_{10}	L	L
Impact on Carbon monoxide	L	L
Impact on VOCs	L	L
SPECIALIST STUDY 2, NOISE		
CPF, PSA Liquids and LPG Plant and 5th Gas Train		
Impact of operational noise	L	L
SURFACE WATER AND GROUNDWATER		
Impact of additional water supply	L	L
Impact of wastewater treatment and disposal*	M	L
Impact of solid waste management	M	N
Impact of disposal of produced water	M	N
SOIL		
PSA Liquids and LPG Plant		
Impact of air pollution on soils	L	L
BOTANICAL BIODIVERSITY AND HABITAT IMPACT		
Improved Access in Sensitive and Critical Habitats	H	To be determined
OIL SPILL		
Flowlines		
Impact of a major spill in the Govuro River	M	L
SPECIALIST STUDY 12, SOCIO-ECONOMIC IMPACT ASSESSMENT		
Impact on Employment	L+	L+
Impact on Improved access	M+	M+
Impact of Sasol CSI Program	M+	M+
Impact of Local Procurement	L+	L+
Impact of Sasol's Economic contribution (National)	H+	H+
Loss of livelihoods as a result of an oil leak	N-	N-
SPECIALIST STUDY 12: HEALTH AND EDUCATION IMPACT ASSESSMENT		
Impact of Sasol's CSI program on health and education	H+	H+
Impact of Diseases	M	M
SPECIALIST STUDY 13, CULTURAL HERITAGE IMPACT ASSESSMENT		
Accidental disturbance of cultural heritage	M	L
Impact of Ground pollution	L	L
Impact of changes in environmental setting	M	L
Impact of changes in demographics	M	L
TOURISM		
Oil Wells		
Impact on tourism potential	M	L

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