

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

THE PROPOSED INYANINGA INTEGRATED HUMAN SETTLEMENT DEVELOPMENT INCORPORATING MULTIMODAL INDUSTRIAL, BUSINESS AND RESIDENTIAL PRECINCTS LOCATED BETWEEN TONGAAT AND THE KING SHAKA AIRPORT, KWAZULU-NATAL

Prepared for:

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PURPOSE OF DOCUMENT

A period of **40 calendar days (03 January 2014 to 13 February 2014)** has been provided for public review of the Draft Environmental Impact Report (EIR). All Interested and Affected Parties (I&APs) as well as State Departments have been notified of this review period.

The Draft EIR contains the following information:

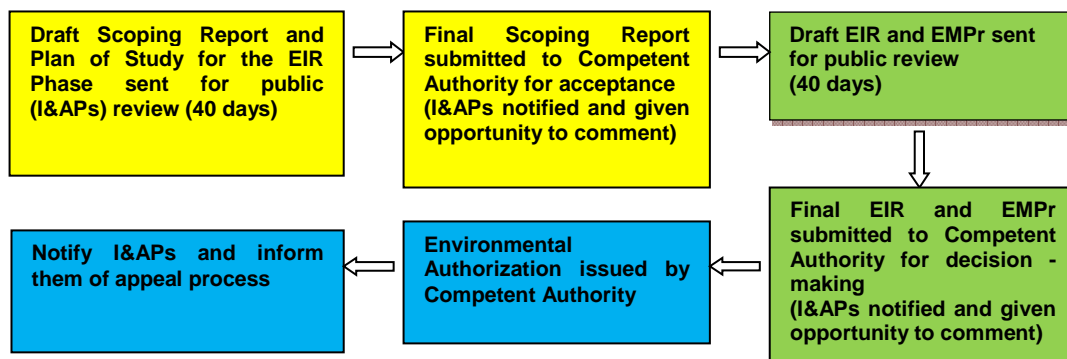
- A description of the project, including project motivation;
- A description of the environment affected by the project;
- The public participation process;
- Discussion of applicable alternatives;
- Assessment of impacts for the construction and operational phases; and
- The EAP's recommendations.

The Draft EIR can be viewed at the following venue:

Name of public venue	Name of Contact Person	Contact Number(s)	Viewing Times
Tongaat Library 1 Victoria Avenue, Tongaat Central, KwaZulu-Natal	Ms. Vigie Padayachee	(032) 944 4734	Mondays (12h00 to 18h00) Tuesdays to Fridays (10h00 to 17h00) Saturdays (08h30 to 12h30)

Should you wish to participate in the S&EIR process by contributing issues of concerns/comments, please register as an I&AP by completing the enclosed Registration and Comment Sheet or you can visit SEF's website at <http://www.sefsa.co.za>. To register as an I&AP or comment on the project, click on "Stakeholder Engagement". Click on the "register" button and complete the compulsory fields to register as an I&AP. On completion of these fields, you will be logged in. Click on stakeholder engagement under categories on the right hand side of the page. Then click the **Draft EIR for Proposed Inyaninga Integrated Human Settlement Development** to view the report and associated appendices. Should you have any problems in obtaining the information from the Internet, please feel free to contact SEF for assistance.

Following the commenting period, the EIR will be updated and submitted to the KwaZulu-Natal Department of Agriculture and Environmental Affairs (KZN DAEA) for consideration. The flow diagram below highlights the phases in the project where I&APs have the opportunity to participate within the process.



PROJECT SUMMARY

Project Name	Proposed Inyaninga Integrated Human Settlement Development
Farm Name and Portions	<p>Sub 148 of the Farm Cotton Lands No. 1575</p> <p>Sub 149 (of 145) of the Farm Cotton Lands No 1575</p> <p>Rem of Sub 16 (of 2) of the Farm Buffels Kloof No. 1267</p> <p>Sub 9 (of 2) of the Farm Klip Fontein No. 922</p> <p>Sub 146 (of 145) of the Farm Cotton Lands No. 1575</p> <p>Sub 144 (of 143) of the Farm Cotton Lands No. 1575</p> <p>Rem of Sub 248 of the Farm Cotton Lands No. 1575</p> <p>Sub 147 of the Farm Cotton Lands No. 1575</p> <p>Sub 24 (of 19) of the Farm Klip Fontein No. 922</p> <p>Sub 140 of the Farm Cotton Lands No. 1575</p> <p>Rem of Sub 14 (of 10) of the Farm Klip Fontein No. 922</p> <p>Sub 15 (of 10) of the Farm Klip Fontein No. 922</p> <p>Sub 16 (of 14) of the Farm Klip Fontein No. 922</p> <p>Sub 13 (of 3) of the Farm Klip Fontein No. 922</p> <p>Rem of Sub 10 (of 2) of the Farm Klip Fontein No. 922</p> <p>Rem of Sub 2 of the Farm Klip Fontein No. 922</p> <p>Sub 130 of the Farm Buffels Kloof No. 1267</p> <p>Sub 15 (of 2) of the Farm Buffels Kloof No. 1267</p> <p>Sub 32 (of 29) of the Farm Buffels Kloof No. 1267</p> <p>Rem of Sub 13 of the Farm Buffels Kloof No. 1267</p> <p>Rem of Sub 6 of the Farm Buffels Kloof No. 1267</p> <p>Sub 30 of the Farm Buffels Kloof No. 1267</p> <p>Portion of Sub 11 (of 3) of the Farm Klip Fontein No. 922</p>
Brief Development Overview	<p>The proposal is to develop, in support of the King Shaka International Airport (KSIA) and particularly in support of the Dube TradePort (DTP), the ability to create a multi-modal logistics hub at Inyaninga, which will be based upon road, rail, air and sea linkages via the existing road and rail networks, DTP and Ports of Durban and Richards Bay. This land use will serve as a support zone for the DTP.</p> <p>The Inyaninga Integrated Human Settlement Development will also incorporate multimodal logistics, industrial and manufacturing opportunities, business parks and service industrial opportunities together with offices and commercial land uses. The proposed development will also provide High Density Residential and Medium Density Residential land use in the north western quadrant of the site and within portions of land surrounding the Tongaat CBD.</p> <p>The multimodal opportunity refers to the potential of integrating rail, road, sea and air linkages. This opens up opportunities and is aimed at providing a competitive advantage from an international investor perspective.</p> <p>The wetlands on site will form part of the extensive open space system on the site. The wetland areas around the Logistics, Residential and General Business uses will be considered as a park(core open space) to serve the immediate needs of the people from the logistics, industrial zones as well as those residential clusters further west of the study area.</p> <p>Social facilities are proposed that contains Primary Schools, Secondary Schools, a Community Hall, Library, Swimming Pool as well as Sports fields. A Community Health-Anti Retro-Viral (ARV) Centre and Police Station will be accommodated as stand-alone facilities. Refer to the Inyaninga Development Framework Plan (<i>Preferred Layout</i>) in Appendix 3 which provides an indication of the location of the proposed land uses.</p> <p>Access to the proposed development will be from the existing R102 in the short term and then</p>

	<p>also from the proposed Eastern Arterial Road, which will allow limited at grade road intersections at well-spaced intervals. There will also be at grade intersections on Vincent Dickens Road to provide access to the western portion of the development. Furthermore, there will be numerous connections to existing lower order streets within Tongaat for some of the developments' minor roads along the northern boundary. The Eastern Arterial will be linked to the future Western Bypass by an interchange and will terminate (<i>in the short-medium term</i>) at the north eastern point at the UShukela (Watson) Highway.</p> <p>The proposed development will take place in phases. Whilst the phasing is not fixed, the intension will be to release parcels according to infrastructure capacity and market demand. There are 4 proposed phases with multiple sub phases. Phase 1a (General Industrial/Logistics) is the most likely to be developed first with the balance of the phases released as and when the need arises.</p>
Development Footprint	The site is approximately 1 063 hectares (ha) in extent. However, the development footprint is approximately 745ha.
Road Improvements	<p>To mitigate the impact of the development-generated and planned regional development's peak hour traffic volumes on the surrounding road network, the development will be released on a phased basis in line with the broader regionally required major road upgrades. The key regional road upgrades that will contribute to the unlocking of the total, ultimate Inyaninga Integrated Human Settlement Development include:-</p> <ul style="list-style-type: none"> • Eastern Arterial (3 lanes per direction at some sections) • Western Bypass (3 lanes per direction at some sections) • Watson Highway (3 lanes per direction at some sections) • P100 extension (3 lanes per direction at some sections) <p>The Eastern Arterial will have the greatest positive impact in the short term with the following more localised upgrades being required to enable Phase 1 of the development to proceed:</p> <ul style="list-style-type: none"> • Inyaninga access roads mostly 2 lanes per direction from the existing R102 and P100 • Signalization and widening of many strategic junctions
Site Photographs	Appendix 2
Confirmation of Supply (refer to the letters from the Ethekewini Municipality in Appendix 8):	
Water	<p>Construction Phase: Water will be sourced from the eThekwini Municipality for construction-related activities.</p> <p>Operational Phase: Water supply to the site will be supplied by the eThekwini Water and Sanitation (EWS) Department. The total water demand for the proposed development is approximately 7.0MI per day. There will be sufficient treated bulk water and supply to cater for the proposed development by 2013/2014.</p> <p>The Industrial/logistics/business/commercial supply node will require the upgrade to the existing Inyaninga water reservoir to provide for an additional 9.5MI reservoir to provide the required storage.</p> <p>The residential section of Inyaninga will require a new 5MI reservoir at a higher elevation, situated on the western boundary of the development area. A pump station at the Inyaninga Reservoir and a new bulk water supply pipeline through the Inyaninga development will be required to deliver bulk water to this new reservoir.</p> <p>Water to each erf will be to municipal pressure standards and each erf will be individually metered. The reticulation will be designed to accommodate fire flows. Sustainability measures including rainwater harvesting should be implemented. Potable water should not be used for irrigation.</p>
Stormwater Attenuation	For each site developed, the stormwater control philosophy will be to restrict post-development flows into the adjacent watercourses to within a 10% variance of that occurring pre-development (<i>cane cultivation</i>) and to facilitate ingress of stormwater into the ground within the existing natural drainage lines.

	<p>All purchases and developers of individual erven, will in terms of sales agreements, be required to implement on-erf stormwater attenuation to attenuate the first 25mm of each rainfall event, and to restrict run-off for the 1:5 year storms to within a 10% variance of pre-development levels. This is to be achieved by a combination of on-site attenuation tanks for roof run-off, permeable paving to parking areas (<i>where viable</i>), the provision of swales, landscaped areas etc. Excess stormwater run-off from greater storms will be accommodated in either the roadway drainage or by piping to the natural watercourses and discharging via energy dissipating outlets.</p> <p>Runoff from the roadways (<i>as well as excess stormwater from the sites, where applicable</i>), will be accommodated in roadside drainage swales situated on both sides of the road reserves. The roadside swales will be sized to accommodate a minimum of 1: 2 year storm. Those swales will however be limited to where road gradients are less than 5% to prevent scour.</p> <p>To cater for large storm events (> 1: 5 year) and where the road reserves and on-site storage facilities would not be able to handle excess flow, roadways will be provided with piped stormwater conduits with inlets designed only to allow flow into the pipes when the swales reach a pre-determined capacity.</p> <p>Piped drainage will also be required across access points and intersections. Energy dissipation measures will be implemented where these pipes discharge into the natural watercourses. Attenuation facilities will be provided in the main watercourses to restrict the flows in larger rainfall events to pre-determined flows. It is proposed that these attenuation facilities be constructed with multiple outlets to closely 'mimic' the natural runoff for different return intervals to the wetlands. The attenuation facilities, together with the on-site attenuation facilities (<i>swales, permeable paving</i>) will have a further advantage in reducing pollution to the existing wetlands. The slow release of runoff from permeable paving (<i>through infiltration</i>) will have the advantage in 'recharging' the existing wetlands.</p> <p>Based on the conceptual stormwater model of the pre-development and post-development runoff, approximately 128 000m³ of attenuation storage would be required to limit runoff to the pre-development scenario. Due to this large requirement, it is recommended that various attenuation facilities be provided throughout the development and situated downstream of the individual development platforms. The location of these attenuation structures with indicative volume requirements are provided on the Drawings included in Appendix 6. Refer to Appendix 6 for typical details of stormwater features.</p>
Sewage	<p>Construction Phase: Portable chemical toilets will be provided for construction workers.</p> <p>Operational Phase: The provision of bulk sewer falls under the jurisdiction of the eThekweni Water and Sanitation Department (EWS). There is currently no bulk sewer infrastructure in the area. It is anticipated that 6MI/day of sewage will discharge from the complete Inyaninga Development. The development site is divided into two catchments for sewerage provision i.e. northern and southern catchments.</p> <p>Northern Catchment: Sewerage (<i>approximately 3.8MI/day</i>) from the land uses such as the proposed logistics park, general business area and high density residential area will gravitate north to the Tongaat Waste Water Treatment Works (WWTW).</p> <p>Construction for the upgrade of the Tongaat WWTW from 10MI/day to 20MI/day should commence in 2014 and the capital costs for the upgrade is in the eThekweni Municipality budget. This upgrade will ensure capacity is available to cater for the northern area of the proposed development.</p> <p>Construction of the new trunk sewer (<i>DTP Trunk Main</i>) which has been designed to take sewer from the DTP area through to the existing Tongaat sewer trunk main should commence in 2014.</p> <p>The following bulk mains are proposed to convey the sewage discharge from the northern areas of the Inyaninga Development to the Tongaat WWTW:</p>

	<ul style="list-style-type: none"> • North Western Tongaat Trunk Main which runs along the southern side of the Hlawe River from the Flamingo Heights Railway Station and eventually tie into the existing bulk main. This bulk main will need to be upgraded to accommodate the Inyaninga Development. • R102 Trunk Main which will run through the east side of Tongaat, initially running parallel with the R102 to join up with the exiting Tongaat Trunk Main. • Dube Trade Port Trunk Main: Bosch Stemele confirmed that this trunk main has been designed to include the sewer discharge from the eastern catchments of the northern area of the Inyaninga Development. <p>In total, approximately 5.6km of new or upgraded main will be required to serve the Inyaninga catchment areas that drain to the north.</p> <p>South Catchment</p> <p>Most of the sewage discharge from the Inyaninga residential development will gravitate to the south (<i>approximately 2.2Ml/day</i>). Several minor pump stations may be required for inter-catchment transfers to adjacent gravity outfall mains. Currently, there is no existing bulk trunk sewer serving this area.</p> <p>The Verulam WWTW currently treats 12Ml/day and has spare capacity of 5Ml/day so it is able to accommodate the sewage discharge from the southern area of the Inyaninga Development.</p> <p>The following bulk infrastructure is improvement, south of Inyaninga, external to the Inyaninga development and is currently underway:</p> <ul style="list-style-type: none"> • The proposed Umdlotti works which will have an ultimate capacity of 50Ml/day. It is understood that EWS are prioritising the design and construction of the new WWTW and will start on the first 15Ml/day Phase of the works as soon as the EA has been received. <p>All sewage will need to be drained via gravity to a point south of the development, from which point the following options are available to drain the sewage discharge from the southern area of the Inyaninga Development:</p> <ul style="list-style-type: none"> • Option 1: The construction of a pump station and a 6km long rising main to a suitable high point then a gravity main to the proposed Umdlotti Regional WWTW situated south of the Umdlotti River; • Option 2: Continue via a gravity main to the Verulam WWTW including a 300m section of elevated pipeline which includes crossing over the Umdlotti River. This route will require additional detailed survey to confirm the possibility of this gravity routing to difficult terrain in some sections; • Option 3: Continue via a gravity outfall main to an existing pump station in Canelands which currently pumps through to the existing Verulam trunk sewer which flows to the existing Verulam WWTW. <p>The sewerage rising main, Option 1 above (<i>if required as an alternative to the gravity outfall main to the Verulam WWTW</i>) may, in the long term, also receive sewage from portions of the KSIA and DTP and hence, would need to be sized accordingly.</p> <p>Reticulation</p> <p>The sewer reticulation will be provided to the boundary of each site and will be designed in accordance with EWS and ‘Red Book’ standards.</p> <p>Refer to Appendix 6 for the Inyaninga Sewer Layout Plan and Bulk Sewer Plans for the northern and southern catchment areas.</p>
<p>Electricity</p>	<p>Construction Phase: Diesel Generators will be used if there is no short term supply available from eThekweni Municipality</p> <p>Operational Phase: The La Mercy major substation (132/11kV) located south of the proposed</p>

	<p>development will supply the initial phases of the development with power. The substation is currently rated at 30MVA and can be upgraded to 60MVA as the electrical demands increase in the area.</p> <p>An existing 132kV overhead line linking the new Tongaat substation to the La Mercy substation traverses through the proposed development site. There is a registered servitude for this overhead line.</p> <p>eThekwini Electricity confirmed that the La Mercy Substation currently has in the order of 23MVA available. However, the availability for this spare capacity at the time of the supply is required for the proposed development is dependent on the timing of other projects in the vicinity of the La Mercy substation i.e. DTP, Ushukela, Hazelmere Dam.</p> <p>The availability of spare electrical capacity will have to be monitored on a regular basis to ensure sufficient capacity remains available for this project.</p> <p>For the proposed bulks, a total load of 140MVA is required. The potential electrical load at the major substations after the diversity factor is applied, will be in the order of 90MVA.</p> <p>The existing 132/11kV 30MVA La Mercy substation will be used to supply the initial phases of the Inyaninga Development. If all the proposed bulks are achieved, it will be essential to construct two additional 132/11kV 60 MVA firm substations (70m x 70m each) to accommodate the entire Inyaninga Development.</p> <p>System strengthening will also be required on the 175/132kV transmission line infrastructure including a new 3150MVA 275/132kV Dube Intake Substation (423m x 357m) and will be located in the vicinity of the proposed development. Furthermore, overhead 132/11kV cables will link it to the new 132/11kV, 60 MVA substations.</p> <p>Transmission line servitudes are required within the development area. This may be overhead or underground subject to the cost/benefit of the land value affected. The eThekwini Municipality is responsible for the construction of these transmission lines. Refer to Appendix 6 for the Bulk Electrical Layout Plan.</p>
Solid Waste	<p>Construction Phase: The Contractor will be responsible for the management and removal of all solid waste (refer to the Environmental Management Programme (EMPr) in Appendix 7.</p> <p>Operational Phase: The development falls within the jurisdiction of eThekwini Municipality, and therefore Durban Solid Waste (DSW) will be responsible for provision of waste collection.</p> <p>The DSW Buffelsdraai Landfill Site with a classification of GLB+ has adequate air-space (capacity) to accept waste generated from the development.</p> <p>There must be a comprehensive solid waste management plan with a focus on waste, minimisation, re-use and recycling.</p>

ENVIRONMENTAL ASSESSMENT PRACTITIONER

Strategic Environmental Focus (Pty) Ltd (SEF) is a privately owned company and was formed in 1997 with the objective of providing **expert solutions to pressing environmental issues. SEF is one of Africa’s largest multi-disciplinary consultancies**, offering sustainable environmental solutions to private and public sector clients. With our integrated services approach in the management of natural, built and social environments; and with over a decade of experience, we bring a wealth of knowledge and expertise to each project.

SEF’s Vision

SEF offers holistic and innovative sustainable solutions in response to global challenges.

SEF’s Mission

SEF is a national sustainability consultancy which provides integrated and innovative Social, Biophysical & Economic solutions while fostering strategic stakeholder relationships, underpinned by SEF’s core values.

SEF has assembled a team of professionals, consisting of a core of environmental experts with extensive experience in dealing with Environmental Impact Assessments (EIAs), Public Participation Processes, Architectural and Landscape Architecture, Mining and Environmental Management. SEF also has a team of specialist practitioners such as specialists in Heritage Impact Assessments (HIA), Wetland Delineation and Functional Assessments; Wetland/ Riparian Rehabilitation, Aquatic Assessments; Ecological (Fauna, Avifauna and Flora) Assessment, Visual Impact Assessments (VIAs), Soils and Agricultural Potential Assessments, Socio-Economic Assessments, etc.

SEF is a Qualifying Small Enterprise and a **Level 2 contributor in terms of the Broad Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003)** and has a procurement recognition level of 135%.

SEF commits itself to comply with the requirements and the implementation of a Quality Management System. The Quality Management System will be reviewed and implemented to continually improve efficiency and effectiveness of the organisation.

SEF uses a “green” approach to anything we embark on. We believe in using technology to our and the environment’s best advantage. We encourage the use of green alternatives such as telephone and video conferencing instead of travelling for workshops and meetings and CDs instead of printed material, where possible.

The following project team members are involved in this S&EIR application process.

Table 1: Project Team Members

Name	Organization	Project Role
Mr. Mark Ryan	SEF	Project Manager
Ms. Natasha Lalie	SEF	Environmental Manager

Mr Mark Ryan

Mr Mark Ryan is an environmental consultant at SEF with seven (7) years' experience in Environmental Impact Assessment. Mark has special interest in EIA, environmental auditing and strategic environmental processes such as Environmental management Frameworks. Mark has a Master of Social Science Degree (M.Soc.Sci) in Geography and Environmental Management from the University of KwaZulu-Natal. Mark is responsible for conducting environmental impact assessments for a wide range of projects that involve wastewater treatment plants, infrastructure such as bridges and roads, bulk water pipeline projects, residential and mixed use developments. Mark has experience in project management and administration as well as the planning and compilation of Scoping Reports, Environmental Impact Reports and Environmental Management Plans. Mark also has experience in environmental auditing of construction activities such as residential developments, office parks and golf courses.

Ms Natasha Lalie

Natasha has an MSc. Environment and Society and has been an Environmental Assessment Practitioner (EAP) for almost ten years. She has undertaken numerous Scoping Reports, Environmental Management Programmes (EMPr's) and Exemption Applications, as required by the Environment Conservation Act, 1989 (Act No. 73 of 1989); Environmental Screening and Feasibility Studies; and S&EIRs as well as Basic Assessments (BAs), as required by NEMA and the EIA Regulations. She has been involved in a wide range of projects, which include waste management, industrial, township establishments, mixed-use development, road upgrades, infrastructure developments, change of land use, lodge developments, proposed bulk water pipelines, proposed transmission power lines, proposed filling stations, shopping centre developments and so on.

Table 2: Contact Details of Environmental Assessment Practitioner

Name	Contact Details
Mr. Mark Ryan	Strategic Environmental Focus (Pty) Ltd Postal Address: PO Box 227, Pavilion, 3611 Tel: 031 266 1277 Fax: 031 266 6880 Email: mark@sefsa.co.za

EXECUTIVE SUMMARY

1 INTRODUCTION

Strategic Environmental Focus (Pty) Ltd as independent environmental consultants were appointed by Dube TradePort Corporation (Project Applicant) to conduct the Scoping and Environmental Impact Reporting (S&EIR) process for the proposed Inyaninga Integrated Human Settlements Development precinct in Tongaat, within the eThekweni Municipality in KwaZulu-Natal. The site is owned by Tongaat Hulett (TH), and the following properties form part of the site that is earmarked for proposed development:

- Sub 148 of the Farm Cotton Lands No. 1575
- Sub 149 (of 145) of the Farm Cotton Lands No 1575
- Rem of Sub 16 (of 2) of the Farm Buffels Kloof No. 1267
- Sub 9 (of 2) of the Farm Klip Fontein No. 922
- Sub 146 (of 145) of the Farm Cotton Lands No. 1575
- Sub 144 (of 143) of the Farm Cotton Lands No. 1575
- Rem of Sub 248 of the Farm Cotton Lands No. 1575
- Sub 147 of the Farm Cotton Lands No. 1575
- Sub 24 (of 19) of the Farm Klip Fontein No. 922
- Sub 140 of the Farm Cotton Lands No. 1575
- Rem of Sub 14 (of 10) of the Farm Klip Fontein No. 922
- Sub 15 (of 10) of the Farm Klip Fontein No. 922
- Sub 16 (of 14) of the Farm Klip Fontein No. 922
- Sub 13 (of 3) of the Farm Klip Fontein No. 922
- Rem of Sub 10 (of 2) of the Farm Klip Fontein No. 922
- Rem of Sub 2 of the Farm Klip Fontein No. 922
- Sub 130 of the Farm Buffels Kloof No. 1267
- Sub 15 (of 2) of the Farm Buffels Kloof No. 1267
- Sub 32 (of 29) of the Farm Buffels Kloof No. 1267
- Rem of Sub 13 of the Farm Buffels Kloof No. 1267
- Rem of Sub 6 of the Farm Buffels Kloof No. 1267
- Sub 30 of the Farm Buffels Kloof No. 1267
- Portion of Sub 11 (of 3) of the Farm Klip Fontein No. 922

The site lies strategically along the north coast, approximately 30km north of the Durban CBD and adjacent to the KSIA/DTP. Inyaninga also lies centrally between the towns of Verulam and Tongaat, located along the R102. The study area measuring 1023ha is a significant Greenfield opportunity within the corridor. Its northern boundary interfaces with Belvedere - Tongaat, whilst its western boundary is contained by the Vincent Dickenson Road which transverses a portion of the study area towards the north western region. The study area's eastern boundary is formed by the Dube Tradeport site which is home to the KSIA. Further east of the airport lies the N2 Freeway, a route of national significance. The site is strategically located immediately adjacent to the King Shaka International Airport and Dube Tradeport which has two major arterials that traverse it (*viz. the P100 and the R102*), and is 1.5km from the National Road (N2). This places this site within the heart of a potentially key economic corridor of the city.

The Scoping Phase for the proposed project has been completed and the Final Scoping Report and Plan of Study for the EIR were submitted to the KwaZulu-Natal Department of Agriculture and Environmental Affairs (KZN DAEA) on 18 April 2011. Approval to proceed to the EIR phase was received on 25 May 2011.

The purpose of this Draft Environmental Impact Report is to provide all interested and affected parties (I&APs) and relevant State Departments with an opportunity to comment and provide input into the process going forward. All comments received during the review and commenting phase will be incorporated into the Final Environmental Impact Report for consideration by the approving authority, KZN DAEA.

2 BRIEF PROJECT DESCRIPTION

The proposal is to develop, in support of the KSIA and particularly in support of the DTP, the ability to create a multi-modal logistics hub, industrial and manufacturing opportunities, business parks and service industrial opportunities together with offices and commercial land uses at Inyaninga. The proposed development will also provide High Density Residential and Medium Density Residential land use in the north western quadrant of the site and within portions of land surrounding the Tongaat CBD.

The multimodal logistics hubs will integrate road, rail, air and sea linkages via the existing road and rail networks, DTP and Ports of Durban and Richards Bay. This land use will serve as a support zone for the DTP.

The wetlands on site will form part of the open space system on the site. The areas around the Logistics, Residential and General Business uses will be considered as a park(core open space) to serve the immediate needs of the people from the logistics, industrial zones as well as those residential clusters further west of the study area.

Social facilities are proposed that contains Primary Schools, Secondary Schools, a Community Hall, Library, Swimming Pool as well as Sports fields. A Community Health-ARV Centre and police Station will be provided on site, as stand-alone facilities.

Access to the proposed development will be from the existing R102 in the short term and then also from the proposed Eastern Arterial Road, which will allow limited at grade road intersections at well-spaced intervals. There will also be at grade intersections on Vincent Dickens Road to provide access to the western portion of the development. Furthermore, there will be numerous connections to existing lower order streets within Tongaat for some of the developments' minor roads along the northern boundary. The Eastern Arterial will be linked to the future Western Bypass by an interchange and will terminate (in the short-medium term) at the north eastern point at the UShukela (Watson) Highway.

The proposed development will take place in phases. Whilst the phasing is not fixed, the intention will be to release parcels according to infrastructure capacity and market demand. There are 4 proposed phases with multiple sub phases. Phase 1a (General Industrial/Logistics) is the most likely to be developed first with the balance of the phases released as and when the need arises.

The following land uses form part of the Proposed Development Framework Plan for the Inyaninga Integrated Human Settlement Development (refer to Table 3). Refer to the Development Framework Plan (*Preferred Layout*) in Appendix 3 for an illustration of the location of the proposed land uses.

Table 3: Land Uses for the Proposed Development Framework Plan

Land Use Category and Quantification			BULK					RESIDENTIAL YIELD	
Use	Gross Developable Area (Ha)	%	Net Developable area @ 60% (less internal roads, steep areas, parks etc) and 90% for logistics	Proposed FAR	Total Bulk	0.2 Commercial Bulk	0.8 Residential Bulk	Residential Density (du/ha)	Yield: No. of units
Medium Density Housing 1 (150m ² site and a 60m ² unit)	108	11	65	0.4	258.174		258174	80	5,163
Medium Density Housing 2 (120m ² site and	20	2	12	0.4	47.910		47910	100	1.198

a 50m ² unit)									
High Density Residential / Mixed Use (80% /20% desired split) 3 to 4 storey walk-ups with 70m ² unit)	13	1	8	2.4	183.614	36.723	146.892	200	1,530
General Business (offices, business park, retail and showroom)	133	13	80	0.4	319.393	319.393			
Commercial	0.86	0.09	1	0.5	2.578	2.578			
General Industrial / Logistics (platform areas)	180	18	162	0.5	807.932	807.932			
Open Space	268	27							
Servitudes	150	15							
Social Facilities	20	2							
Road Reserve	96	10							
Total	989	100	326		1,619,601	1,166,626	452,975		7,891
TOTAL PROPOSED THRESHOLD (4 P/ P/ DU)									31565

a) *Wetlands within the Inyaninga/Ushukela Highway Development Precinct*

The wetland habitat within the study area is approximately 108.4ha, and has been significantly modified by agricultural activities, especially crop production and drainage canals within the wetland habitats. Site limitations, in terms of available space, resulted in the proposed development layout encroaching into the identified wetland habitats. However, due to the levels of modification to the wetland habitat within the KZN region, the proposed development needs to ensure that there is 'no-net-loss' of wetland functioning and integrity. In addition, eThekweni Municipality requires that the habitat provision, represented as the spatial extent of wetland habitat, be considered in defining loss of wetland areas within the landscape.

The loss of wetland habitat (i.e. spatial extent) within the landscape is a particular concern to eThekweni Municipality, even if the impacts on ecosystems functioning and integrity are able to be mitigated onsite in the post-development landscape. However; the transformed nature of the wetlands within the study site and the proposed rehabilitation of these systems within the post-development landscape, ensure that both functioning and integrity are retained and that wetland habitat is gained.

To address the impacts on the wetland habitat, appropriate mitigation activities as suggested by Ground Truth in the Freshwater Ecosystems Wetland Habitat Impact Mitigation Study (Appendix 6) needs to be considered. It is proposed that the impacts on wetland habitat within the landscape be addressed through onsite mitigation activities, focussing on the retention and rehabilitation of 69.8ha of existing wetland habitat. The proposed development will result in the effective gain of 15.7ha of functional wetland area within the landscape, addressing the impacts on the wetland habitat in terms of functioning and integrity. Regular post-development monitoring will be required to ensure that the functioning and integrity of these systems is retained and not reduced through the development. Should a reduction in the functioning and integrity occur, offsite mitigation activities may be required to ensure a 'no-net-loss' is maintained.

b) *Wetlands along the sewer pipeline route*

The wetland and riparian habitat identified within the study area has been significantly modified, with the alteration of the systems' integrity associated with changes in hydrology, vegetation, erosion and channel incision. Despite the modifications to these ecosystems, they are supplying a level of ecosystem services, and

the proposed infrastructure development should therefore attempt to minimize impacts on these systems ensuring “no-net-loss” within the region.

Specific planning and mitigation activities should be adopted to reduce the impacts associated with the installation and operation of the sewerage infrastructure, including:

- Buffer zones;
- Modifications to sewerage infrastructure design;
- Realignment of the infrastructure;
- Prevention of sub-surface flow and erosion; and
- Specific activities incorporated into the EMPr.

Detailed mitigation measures for the 33 HGM units along the sewer pipeline route are provided in the Freshwater Ecosystem Study for the North and South Sewer Pipelines in Appendix 6.

A Traffic Impact Study (refer to Appendix 6) was conducted by Hatch Goba (Pty) Ltd for the proposed development.

It was concluded that 45% of Phase 1a (*represents 34% of the total bulk and will be industrial type uses*) can be accommodated within the next 10 years with some local infrastructure improvements as illustrated in Table 4 below.

Table 4: Road Improvements required for Phase 1a

45% of Phase 1a						
Land Use Type	Description	Commercial Bulk	AM Pcu Trips		Required Improvements	
			Out	In	Immediate	10 years
General Industrial/Logistics	Industrial	253 830m ²	323	2004	4 Junction Signalisations and Widening	4 additional Junction Signalisations and Widening
					Upgrade Gravel Inyaninga Road to 1 lane per direction (to be 2 lanes per direction in future)	
					Construct new 1 lane per direction access road between R102 and Logistics Park Entrance (access to R102 to be closed in future and road to be upgraded to be 2 lanes per direction in future)	

Up to 83% of Phase 1a can be accommodated should the section of the Eastern Arterial be constructed between Watson/uShukela Highway and the R102.

To accommodate the anticipated traffic calculated by the study for the proposed development and the planned regional developments in the area, the following road improvements are recommended into the longer term:

- Eastern Arterial (3 lanes per direction at some sections)
- Western Bypass (3 lanes per direction at some sections)
- Watson Highway (3 lanes per direction at some sections)
- P100 extension (3 lanes per direction at some sections)
- Other Inyaninga access roads mostly 2 lanes per direction
- Signalization and widening of many strategic junctions

Most importantly a very significant shift in public transport use has to take place to accommodate all the future planned developments in the area, the current (trend) public transport split, will not be sufficient. Traffic will have to be monitored on an ongoing basis in the sub region given the uncertainties around development take up and major infrastructure requirements.

3 KEY IMPACTS

The following key impacts were identified during the Scoping Phase and were further investigated and assessed within this EIR.

Biophysical Impacts:

- Impact on ground and surface water due to hydrocarbon spillages during both the construction and operational phases of the development;
- Impact on wetlands and riparian areas due to construction activity;
- Potential for soil erosion due to soil compaction and increased surface water run-off associated with establishment of hard internal surfaces and vegetation clearing during construction and operational phases;
- Impact on loss of flora/fauna as a result of construction activity such as vegetation clearing;
- Impact on geological formations as a result of the proposed development;

Socio-Economic Impacts:

- Potential loss of viable and high potential agricultural land;
- Impact of air pollution caused by dust during construction and industrial activity during the operational phase;
- Impact of noise caused by construction and operational phase activities;
- Impacts on heritage resources and culture;
- Impact on safety and security;
- Impact on existing farm workers and farm operations;
- Potential risks associated with the Transnet gas pipeline;
- Impact on existing commercial nodes of Tongaat and Verulam;
- Impact on provision of housing and community/social facilities;
- Job creation during the construction and operational phases of the proposed project.
- Impacts on localised traffic;
- Impact on existing services;
- Impact on visual character.

Cumulative Impacts:

- Impact on KSIA/DTP and other developments in the area;
- Integration with KSIA/DTP and the broader region;
- Compatibility with the municipal plans;
- Increased loss of viable and high potential agricultural land;
- Increased demand on municipal service infrastructure;
- Economic growth in the region; and
- Increased traffic associated with additional road users.

4 PROJECT ALTERNATIVES

To give effect to the principles of NEMA and Integrated Environmental Management (IEM), an EIA should assess a number of reasonable and feasible alternatives that may achieve the same end result as that of the preferred project alternative. The following alternatives have been identified as part of this EIA:

Site/ Location Alternatives:

The developer owns the site and the current land use i.e. sugar cane production on the site has not been financially viable in the past. No other site alternatives for the proposed development were considered. The

site's proximity to the King Shaka International Airport has been the driving force for tapping into the development potential of the site. There is potential for direct rail access, and the intention is to leverage the opportunities provided by the airport. The proximity to the airport provides an opportunity to unlock the growth and development potential of the greater Tongaat region and the North Urban Development Corridor (NUDC) and meet the objectives of the Provincial Growth and Development Strategy, Provincial Spatial Economic Strategy and the various Local Policies of the eThekweni Municipality.

Land Use Alternatives (refer to the alternative land use layouts in Appendix 3):

Alternative 1: Residential and Commercial Dominant Land Uses

This option is predominantly residential with two potential commercial nodes. There is a general need for housing developments that caters for the middle-low income earners within the eThekweni Municipality. The KZIA/DTP development is a generator of a number of work opportunities and the demand for residential townships in close proximity to the airport has therefore risen. However, in view of the noise contours as a result of the airport, some areas are not suitable for residential development. Furthermore, it does not show good planning principles to provide for residential without considering economic/employment opportunities. It is also noted that the municipality's plans (NSDP and Inyaninga Tongaat Functional Area Plan - FAP) show a mixed use node just south of the Inyaninga development and therefore provision of commercial nodes within this development is taking away the option provided for in the municipal plans.

Alternative 2: Commercial/Business Dominant Land Use (excluding industrial uses)

This alternative includes a commercial and retail node as part of the development. The development would therefore include a total mix of uses and provide the full range of urban amenities, facilities and opportunities.

The inclusion of a commercial/retail node will not however be aligned with the municipality's Local Area Plan nor the Inyaninga Functional Area Plan, both of which indicate the commercial/mixed use/retail node further to the south.

The provision of a large retail component may also impact negatively on the retail nodes of both Verulam and Tongaat.

This type of land use will allow for diversity within the development precinct that is at the same time, multifunctional. The introduction of business-related land uses would be a complementary land use to the airport. Office use has been investigated as the communities living at the site would require additional work opportunities that would be viable for income-generation through job creation. In this way, the community would get maximum benefit from this land use activity.

Alternative 3 Mix of residential, office, retail and industrial uses (Preferred alternative)

Refer to the Development Framework Plan in Appendix 3. This alternative includes the industrial component, with a vastly reduced commercial land use footprint. There is limited land suitable for industrial development within eThekweni. However, Inyaninga is well located from an access perspective, including direct access to rail, as well as having the necessary physical and topographical conditions required for industrial development.

In addition, the close proximity of the site to the airport and DTP as well as the railway line, presents a unique opportunity for the multi-modal logistics hub. This is the preferred alternative as it will have not only regional benefits, but provincial benefits as well.

Sewerage Layout Alternatives:

Sewage Alternatives (refer to the Layout Options in Appendix 6 – Engineering Services Report):

South Catchment

Most of the sewage discharge from the Inyaninga residential development will gravitate to the south (approximately 2.2Ml/day). Several minor pump stations may be required for inter-catchment transfers to adjacent gravity outfall mains. Currently, there is no existing bulk trunk sewer serving this area.

The Verulam WWTW currently treats 12Ml/day and has spare capacity of 5Ml/day so it is able to accommodate the sewage discharge from the southern area of the Inyaninga Development.

The following bulk infrastructure is improvement, south of Inyaninga, external to the Inyaninga development is currently underway:

- The proposed Umdloti works which will have an ultimate capacity of 50Ml/day. It is understood that EWS are prioritising the design and construction of the new WWTW and will start on the first 15Ml/day Phase of the works as soon as the EA has been received.

All sewage will need to be drained via gravity to a point south of the development, from which point the following options are available to drain the sewage discharge from the southern area of the Inyaninga Development:

- Option 1: The construction of a pump station and a 6km long rising main to a suitable high point then a gravity main to the proposed Umdloti Regional WWTW situated south of the Umdloti River;
- Option 2: Continue via a gravity main to the Verulam WWTW including a 300m section of elevated pipeline which includes crossing over the Umdloti River. This route will require additional detailed survey to confirm the possibility of this gravity routing to difficult terrain in some sections;
- Option 3: Continue via a gravity outfall main to an existing pump station in Canelands which currently pumps through to the existing Verulam trunk sewer which flows to the existing Verulam WWTW.

The sewerage rising main, Option 1 above (*if required as an alternative to the gravity outfall main to the Verulam WWTW*) may, in the long term, also receive sewage from portions of the KSIA and DTP and hence, would need to be sized accordingly.

No Development Alternative

The 'no-go' or 'do nothing' alternative would be applicable if the proposed development is not approved by the KZN DAEA and the status quo of the site will remain. This option assumes that a conservative approach would ensure that the environment is not impacted upon any more than is currently the case. It is important to state that this assessment is informed by the current condition of the area. Should the proposed development not be implemented, the study area will not be affected by any construction-related or operational phase impacts. Therefore, the present state of the biophysical, social and economic environment will remain, unaffected.

Sugar cane farming will continue at 'the site'. Poor yields have been experienced in the past 8 years. Even with improved management, especially on irrigated areas, it will be difficult to obtain significantly higher yields due mainly to soil restrictions. However, if irrigation were improved on 180ha (Windermere and Shortlands) and yields of 100 t ha⁻¹ were obtained, the expected profit could rise significantly. There would be no need for the relocation of the staff to another staff compound should the proposed development not be approved. The wetlands and riparian systems on site will continue to be impacted by sugarcane cultivation, application of fertiliser, herbicides, and insecticides, alterations to water flow patterns, erosion, and the encroachment of alien invasive plant species. There would be no impetus for rehabilitation of the on-site wetlands should the development not proceed.

Should the proposed development not take place, the infrastructural investment provided by the airport would remain untapped. As a result, there would be no catalyst to provide employment, economic as well as residential opportunities that exist in the northern region. Hence, the current demand for such, will still exist in the region. In addition, farming in this particular area will become an unviable option due to the operations of the airport and increasing rates as land values increase. This alternative will not improve the socio-economic status of the region. Research has indicated that the socio-economic benefits of urban development over agricultural development are the following - 50:1 for job creation, 588:1 for rates and tax generation and 250:1 for contribution to GGP. This alternative is believed to be not viable and not in line with the economic growth and long term vision for the region and province.

In the absence of the proposed development, there would not be any economic spin-offs such as job creation, skill transfer, supply or demand for local labour and materials during the construction and operational phases. In comparison to the revenue generated from the current land use activity, the proposed development will have higher economic returns for both the public and private sector, but this potential would not be realised if the proposed development is not approved.

The proposed land uses that would form part of the development precinct includes housing provision, which would address the housing backlog and the proposed business park would provide job opportunities, thereby contributing towards Local Economic Development (LED) and increasing the rates revenue for the eThekweni Municipality. The no-go option would limit these opportunities for future growth, increased investment in the province and skills and capacity building.

Should the development not proceed, there would not be any further pressure on the municipality to provide for services infrastructure such as solid waste, water, sewerage and electrical supply. The anticipated road upgrades that are envisaged by Traffic Engineer would not be required, should the proposed development not go-ahead.

The NSDP and other local policies and guidelines have recognised the importance of the Dube Tradeport and its surrounding areas, in particular Inyaninga as key economic generators as well as a city wide development priority and supports the redevelopment of towns such as Verulam and Tongaat as an integral component of Northern Development corridor. Should the proposed development not proceed, there would not be any linkages, support and integration with the KSIA/DTP and no opportunities to uplift the communities of Verulam and Tongaat. Against this background, this alternative would have huge implication for the infrastructure investment already made in the area. There would be underutilisation of the development potential of the area surrounding the 'Aerotropolis'. There is currently a shortage of space for industrial development in the eThekweni area and while a development node exists in northern region, it will be largely untapped.

Failure to construct the proposed development will not unlock opportunities for economic and employment opportunities in the North Urban Development Corridor area and will not contribute to the Dube Aerotropolis¹ development plans.

5 CONCLUSIONS AND RECOMMENDATIONS

In accordance with GN No. 543, the Environmental Impact Phase is aimed at identifying and assessing potential impacts caused by the proposed development. The ability to mitigate any of the identified impacts are also addressed and summarised into a working / dynamic Environmental Management Programme

¹ KSIA is a core piece of infrastructure with access to sea, road and rail linkages, within one of Southern Africa's strongest regional economies.

DTP development strategy will guide the development of the entire Airport City and create significant opportunities for all businesses in surrounding area (www.thdev.co.za/developments/aerotropolis/overview).

An Aerotropolis is a new layout of urban form comprising of aviation intensive businesses and related enterprises extending up to 25 kilometres outward from major airports (<http://en.wikipedia.org/wiki/Aerotropolis>).

(EMPr) for consideration by I&APs and ultimately by the KZN DAEA.

Comments and/or concerns identified by Interested and Affected Parties (I&APs) during the review period of the Draft Environmental Impact Report will be incorporated into the Final Environmental Impact Report which will then be submitted to the KZN DAEA for consideration.

The proposed development is in line with the Provincial and Local Plans for development in the northern corridor of the municipality and the province. The development proposal aims to address new housing, economic and employment opportunities in the greater Tongaat region, to support and integrate with the KSIA/DTP and simultaneously unlock the growth and development potential of the greater Tongaat region.

Globally, “Aerotropolis” caters for a myriad of uses that support airport cities such as, office complexes, hotels, meeting and entertainment facilities, logistics parks, shopping and other commercial activities. Inyaninga which is in close proximity to this catalyst can take advantage of its strategic location and provide support to the Dube Tradeport and thereby create unparalleled economic opportunities that is linked to the surrounding areas much in need of economic opportunity.

It is important, that whilst growing the northern corridor and providing additional commercial and industrial opportunity within the study area that the proposed development compliments the existing towns and their offering. For this reason, Tongaat and Verulam have been identified as towns that potentially could benefit due to its proximity to Inyaninga. Currently both these towns are experiencing processes of urban decline in parts of the town centre and therefore greater connectivity to the R102 and the regional corridor would place these areas in a strategic position to reinvent themselves and offer new social, economic, cultural opportunity complimenting Inyaninga and the Dube Tradeport development.

The development framework consolidates all the policy, precedent and stakeholder needs and provides a framework that integrates with the existing primary centres and introduces new local urban centres along the corridor. The plan is aligned to both the provincial and local policy and spatial plans. The framework provides for a diverse range of opportunities within the corridor and starts building on the concept of an Aerotropolis. The framework has achieved all priorities and envisaged targets i.e. The creation of a diverse mix of housing, economic opportunity with logistic and business uses, integration with towns - all networks are seamlessly connected and more importantly a ‘Next Generation City’ which can become a major new hub for trade and business.

There is an underground methane rich gas pipeline that is buried 1m below the ground level and traverses the north-western portion of the development site, which is owned by Transnet Gas Pipelines. The Development Framework Plan incorporates a 30m buffer on either side of the 9.14 m gas pipeline servitude. The Ethekwini Municipality: Fire Department will be provided with the Risk Assessment for the Transnet Gas Pipeline (Appendix 6) that was conducted by Ishecon Chemical Process Safety Engineers. The Ethekwini Municipality would be required to grant/refuse the construction of the proposed development from a safety perspective.

It is estimated, based on the proposed development layout, that the remaining areas of wetland habitat within the post-construction landscape will cover an area of approximately 60.8ha. The post-development scenario, with the adoption of mitigation activities, includes both positive and negative impacts on the identified wetland systems. The systems’ geomorphic integrity is reduced due to the infilling and deactivation of portions of the wetland, but the overall integrity is marginally improved by the improvements in the hydrological and vegetative components, partially relating to the 30m buffer zone surrounding the wetlands. Overall, with the rehabilitation of the remaining wetland areas onsite, there is gain of 15.7 hectare equivalents. Although there has been a loss to the remaining wetland habitat within the proposed development site, there is nevertheless a gain in hectare equivalents should the appropriate rehabilitation of the wetland be undertaken.

The adoption of mitigation activities, with the remaining areas of wetland habitat on site being rehabilitated and managed to ensure diffuse flow, wetland plant species diversity and the presence of temporary, seasonal and permanent wetness zones, manages the impacts on the wetland habitat. The onsite mitigation contributes significantly to reducing the degree of impact on the wetland habitat, ensuring that there are no residual impacts in terms of loss in wetland integrity.

The Farm Manager's residence and the Inyaninga Barracks will be demolished as a result of the proposed development. Permits for the demolition of these heritage structures will be submitted to Amafa and their approval will be required prior to demolition. The temple on site will be retained in the proposed development.

The visual impact of the proposed development must be mitigated with appropriate lighting, landscaping, and use of sustainable design principles in the architecture.

The proposed development may positively impact on the surrounding community (*especially Tongaat and Verulam*) and the local economy due to possible skills development, informal sector development, poverty alleviation, BEE and SMME business development and income generation.

The loss of agricultural activities on the site does not have a significant impact on food security as Tongaat Hulett has invested in sugar cane production initiatives in ITB land for the upliftment of emerging farmers. The discontinuation of agricultural practises on the site will lead to the relocation of the existing farm workers that reside on the property.

Various road improvements are required to accommodate traffic that will be generated as a result of the proposed development.

The recommendations of the Geotechnical Engineer must be taken into consideration during the construction of the proposed development.

To ensure that identified negative impacts are minimised and positive impacts enhanced, the following clauses are recommended as conditions of the Environmental Authorisation:

- The EMPr is a legally binding document and the mitigation measures stipulated within the document and EIR must be implemented.
- An independent Environmental Control Officer (ECO) must be appointed to manage the implementation of the EMPr during the construction phase. Environmental Audit Reports must be compiled and made available for inspection.

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LIST OF ABBREVIATIONS AND ACRONYMS

AEL	Air Emissions Licence
ARV	Antiretroviral
BID	Background Information Document
BRT	Bus Rapid Transport
BEE	Black Economic Empowerment
BA	Basic Assessment
CRR	Comments and Responses Report
DEA	Department of Environmental Affairs
DAFF	Department of Agriculture, Forestry and Fisheries
DNL	Day Night Average Sound Level
DWA	Department of Water Affairs
DTPC	Dube TradePort Corporation
DTP	Dube TradePort
DSW	Durban Solid Waste
DNSDP	Draft Northern Spatial Development Plan
DNL	Day Night Average Sound Level
EAP	Environmental Assessment Practitioner
EA	Environmental Authorisation
ECO	Environmental Control Officer
EWS	Ethekwini Water and Sanitation
ETA	Ethekwini Transport Authority
EIA	Environmental Impact Assessment
EIR	Environmental Impact Reporting

EMPr	Environmental Management Programme
EKZNW	Ezemvelo KZN Wildlife
EIS	Ecological Importance and Sensitivity
GDP	Gross Domestic Product
GN	Government Notice
ha	Hectares
HIA	Heritage Impact Assessment
HGM	Hydro geomorphic Unit
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
ITB	Ingonyama Trust Board
IDS	Industrial Development Strategy
IHI	Index of Habitat Integrity
KSIA	King Shaka International Airport
KPI	Key Performance Indicator
KZN DAEA	KwaZulu-Natal Department of Agriculture and Environmental Affairs
KZN DoT	KwaZulu-Natal Department of Transport
LAP	Local Area Plan
LED	Local Economic Development
MHI	Major Hazardous Installation
MRO	Maintenance Repair Overhaul
MDR	Medium Density Residential
MAP	Mean Annual Precipitation

MAT	Mean Annual Temperature
ME	Mitigation Efficiency
mm	Millimetres
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NAD	Northern Attenuation Dam
NGO	Non-Governmental Organisation
NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NEMPAA	National Environmental Management Protected Areas Act
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NFEPA	National Freshwater Ecosystem Priority Area
NUDC	North Urban Development Corridor
NSBA	Northern Spatial Biodiversity Act
NSDP	Northern Spatial Development Plan
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PGDS	Provincial Growth and Development Strategy
PSEDS	Provincial Spatial Economic Development Strategy
PES	Present Ecological State
PoS	Plan of Study
QDGC	Quarter Degree Grid Cell
SAHRA	South African Heritage Resources Agency
SEF	Strategic Environmental Focus (Pty) Ltd
SFM	Significance Following Mitigation
S&EIR	Scoping and Environmental Impact Reporting
SDF	Spatial Development Framework

SASA	South African Sugar Association
SASRI	South African Sugar Research Institute
SANRAL	South African National Roads Agency Limited
SAHRA	South African Heritage Resources Agency
SMME	Small Medium Micro Enterprise
TIA	Traffic Impact Assessment
TGC	Thekwini Geo Civils
TH	Tongaat Hulett
THDev	Tongaat Hulett Developments
VIA	Visual Impact Assessment
WOM	Without Mitigation Measures
WM	With Mitigation Measures
WF	Weighting Factor
WWTPP	Waste Water Treatment Package Plant
WWTW	Waste Water Treatment Works

GLOSSARY OF TERMS

Applicant	Any person who applies for an authorisation to undertake an activity or to cause such activity to be undertaken as contemplated in sections 24(5), 24M and 44 of the National Environmental Management Act, 19998 (Act No. 107 of 1998).
Ecology	The study of the interrelationships between organisms and their environments.
Environment	The surroundings within which humans exist and that are made up of – (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.
Environmental Impact Assessment	Systematic process of identifying, assessing and reporting environmental impacts associated with an activity and includes basic assessment and S&EIR.
Environmental Management Programme	A working document on environmental and socio-economic mitigation measures, which must be implemented by several responsible parties during all the phases of the proposed project.
Interested and Affected Party	Any person or groups of persons who may express interest in a project or be affected by the project, positively or negatively.
Key Stakeholder	Any person who acts as a spokesperson for his/her constituency and/or community/organization, has specialized knowledge about the project and/or area, is directly or indirectly affected by the project or who considers himself/herself a key stakeholder.
Stakeholder	Any person or group of persons whose live(s) may be affected by a project.
Study Area	Refers to the entire study area encompassing all the alternatives as indicated on the study area or locality map.
Succession	The natural restoration process of vegetation after disturbance.
State Department	Any department or administration in the national or provincial sphere of government exercising functions that involve the management of the environment.

SECTION A:INTRODUCTION

Strategic Environmental Focus (Pty) Ltd (SEF) has been appointed by Tongaat Hulett Developments (THDev) (Project Applicant) to conduct the Scoping and Environmental Impact Reporting (S&EIR) process for the proposed construction of the Inyaninga Integrated Human Settlement Development located between the KSIA/DTP and Tongaat within the eThekweni Municipality KwaZulu-Natal.

A-1 DESCRIPTION OF PROPOSED ACTIVITY

A-1.1 Locality

The site lies strategically along the north coast, approximately 30km north of the Durban CBD and adjacent to the KSIA. Inyaninga also lies centrally between the towns of Verulam and Tongaat, located along the R102. The study area measuring 1 023ha is a significant Greenfield opportunity within the corridor. The GPS points of the site are approximately 29°35'18.39" south and 31°06'33.63" east. Its northern boundary interfaces with Belvedere - Tongaat, whilst its western boundary is contained by the Vincent Dickenson Road which transverses a portion of the study area towards the north western region. The study area's eastern boundary is formed by the Dube Tradeport site which is home to the KSIA. Further east of the airport lies the N2 Freeway, a route of national significance. The southern boundaries are existing commercial sugarcane plantations. The site falls within the jurisdiction of the eThekweni Municipality.

The site is strategically located immediately adjacent to the King Shaka International Airport and Dube Tradeport which has two major arterials that traverse it (viz. the P100 and the R102), and is a very short distance from the National Road (N2). This places this site within the heart of a potentially key economic corridor of the city.

Refer to the locality map in Appendix 1. The Inyaninga precinct is accessible via the R102 towards the new Airport and the uShukela Highway precinct is accessible via the N2 (uShukela Highway off-ramp).

The following properties form part of the site that is earmarked for proposed development:

- Sub 148 of the Farm Cotton Lands No. 1575
- Sub 149 (of 145) of the Farm Cotton Lands No 1575
- Rem of Sub 16 (of 2) of the Farm Buffels Kloof No. 1267
- Sub 9 (of 2) of the Farm Klip Fontein No. 922
- Sub 146 (of 145) of the Farm Cotton Lands No. 1575
- Sub 144 (of 143) of the Farm Cotton Lands No. 1575
- Rem of Sub 248 of the Farm Cotton Lands No. 1575
- Sub 147 of the Farm Cotton Lands No. 1575
- Sub 24 (of 19) of the Farm Klip Fontein No. 922
- Sub 140 of the Farm Cotton Lands No. 1575
- Rem of Sub 14 (of 10) of the Farm Klip Fontein No. 922
- Sub 15 (of 10) of the Farm Klip Fontein No. 922
- Sub 16 (of 14) of the Farm Klip Fontein No. 922
- Sub 13 (of 3) of the Farm Klip Fontein No. 922
- Rem of Sub 10 (of 2) of the Farm Klip Fontein No. 922
- Rem of Sub 2 of the Farm Klip Fontein No. 922
- Sub 130 of the Farm Buffels Kloof No. 1267
- Sub 15 (of 2) of the Farm Buffels Kloof No. 1267
- Sub 32 (of 29) of the Farm Buffels Kloof NO. 1267

- Rem of Sub 13 of the Farm Buffels Kloof No. 1267
- Rem of Sub 6 of the Farm Buffels Kloof No. 1267
- Sub 30 of the Farm Buffels Kloof No. 1267
- Portion of Sub 11 (of 3) of the Farm Klip Fontein No. 922

The above properties are currently unzoned and currently used for sugar cane cultivation.

The Inyaninga/uShukela Highway site (herein referred to as 'the site') is approximately 1 063 hectares (ha) in extent. The Inyaninga site accommodates farm labourers in various staff compounds/barracks, and they are employed by Tongaat Hulett Sugar. These farm labourers will be provided for within the broader sugar cane industry. Many are migrant labourers who will not be required to return. Others will be incorporated into the existing sugar estates within the region.

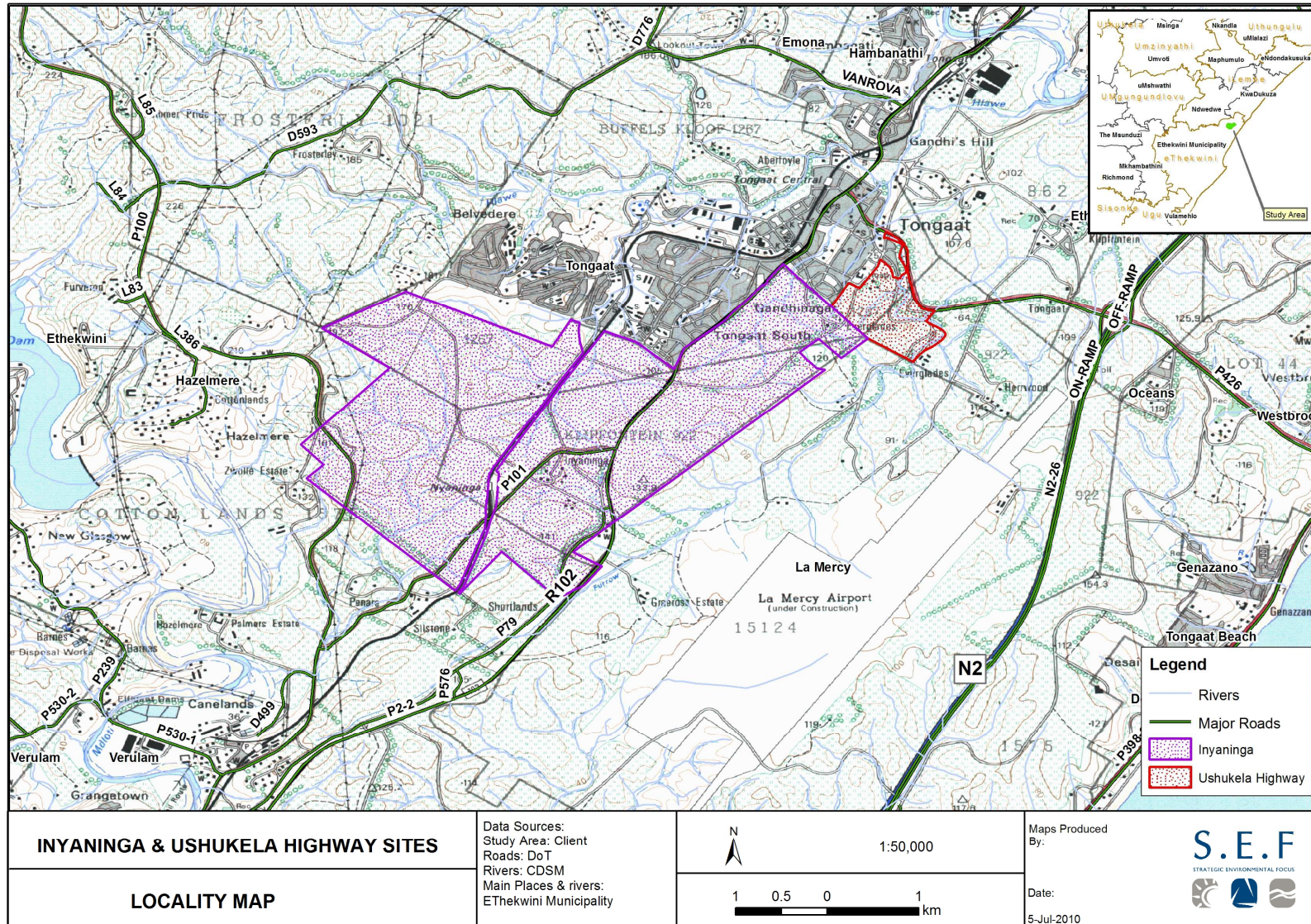


Figure 1: Locality Map of the site

A-1.2 Servitudes on site

The study area is characterised by various servitudes which influence the development of the Framework Plan or Site Development Plan. There are numerous overhead powerline servitudes (*registered in favour of the eThekweni Municipality*) which transverse the site. A future overhead servitude has been identified which transverses the north western quadrant of the site (*and falls within eThekweni Municipality future plans*), however this servitude has not been confirmed. However, it has been reflected on the plan to illustrate its impact, should it be required. These servitudes restrict development and therefore the servitude areas remain largely undeveloped. The other site influences are the Umgeni Water pipeline servitude which runs predominantly along the southern boundary of the site. This servitude eventually ties into the proposed reservoir site within the study area. A railway line cuts through the site in the eastern portion of the Inyaninga precinct.

The other major site influence is a Transnet Gas Pipeline that transverses the site in the north western quadrant of the study area. This has implications for residential development and therefore, due to the risk measures identified by the Ethekeeni Fire Department, a 30m buffer has been offset on either side of the gas pipeline servitude. The extents of the offset will be confirmed by the eThekweni Municipality: Fire Department once they assess the application.

A-1.3 Details of the Project

A-1.3.1 Proposed Inyaninga Integrated Human Settlement Development

The proposal is to develop, in support of the new KSIA and particularly in support of the DTP, the ability to create a multi-modal logistics hub, industrial and manufacturing opportunities, business parks and service industrial opportunities together with offices and commercial land uses at Inyaninga. The proposed development will also provide High Density Residential and Medium Density Residential land use in the north western quadrant of the site and within portions of land surrounding the Tongaat CBD.

The multimodal opportunity refers to the potential of integrating rail, road, sea and air linkages via the existing road and rail networks, DTP and Ports of Durban and Richards Bay. This land use will serve as a support zone for the DTP. This presents a unique opportunity and potential for a competitive advantage from an international investor perspective.

The wetlands on site will form part of the open space system on the site. The areas around the Logistics, Residential and General Business uses will be considered as a park (core open space) to serve the immediate needs of the people from the logistics, industrial zones as well as those residential clusters further west of the study area.

Social facilities are proposed that contains Primary Schools, Secondary Schools, a Community Hall, Library, Swimming Pool as well as Sports fields. A Community Health-ARV Centre and police Station are required as stand-alone facilities.

Access to the proposed development will be from the existing R102 in the short term and then also from the proposed Eastern Arterial Road, which will allow limited at grade road intersections at well-spaced intervals. There will also be at grade intersections on Vincent Dickens Road to provide access to the western portion of the development. Furthermore, there will be numerous connections to existing lower order streets within Tongaat for some of the developments' minor roads along the northern boundary. The Eastern Arterial will be linked to the future Western Bypass by an interchange and will terminate (in the short-medium term) at the north eastern point at the UShukela (Watson) Highway.

The proposed development will take place in four phases with a number of sub-phases. Construction will commence with Phase 1a: General Logistics and Industrial land uses.

Refer to the Inyaninga Development Framework Plan in Appendix 3 which provides an indication of the location of the proposed land uses.

The proposed land uses are discussed in more detail below:

a) Land Use: General Industrial / Logistics

The railway line traversing the study area has presented an opportunity to develop rail served logistic / General Industrial uses. This use comprises the largest allocation of uses within the study area and is primarily proposed to serve as a support zone for the Dube TradePort. The specialised logistics park would contain clean manufacturing and assembly uses and activities. The sites have been tested to determine if a suitable platform can be accommodated. The need to create large uninterrupted platforms that attract the most favourable specialised logistic uses and activities resulted in the need to intrude into wetland areas within this area. It is proposed that the office component of the Logistic /General Industrial uses is ideally located along the main road that ties into the old R102 alignment. The second site identified for Logistic /General Industrial is south of the eastern arterial and adjacent to the KSIA boundary. Given the types of

industry that comprise an ‘Aerotropolis’, this area would complement the activities of the KSIA. The area totals 210ha (gross). This equates to 21% of the total study area with a bulk of 807 932m².

b) Land Use: General Business

Along portions of the eastern arterial, the core interface areas that have visibility, it is proposed for General Business. The General Business Zone will consist predominantly of head offices and offices for regional/national corporations, logistics and warehousing type business parks as well as limited local Commercial/retail requirements.

The total extent of this zone is 133 ha which is 13% of the total area. In addition to this, a relatively low FAR of 0.4 on average is proposed for the General Business Zone with a total bulk of approximately 319 393m².

c) Land Use: Commercial

Commercial uses (*office and business uses with very limited retail*) are proposed along at key entry points within the Tongaat CBD. The total extent of this zone is 0.86ha which is 0.09% of the total area. This zone will contain a total bulk of approximately 2578m².

d) Land Use: High Density Residential/Mixed-Use

The High Density/Mixed Use straddles the area in the vicinity of the Tongaat CBD. It is envisaged that this use would primarily permit residential development with ground floor retail development which would re- enforce the activity spine. It is proposed 3 to 4 storey walk-up development, approximately 70m² units with a 80%/20% residential and retail split respectively. A residential density of 200 du/ha is proposed. The High Density/Mixed Use equates to 1% of the total study area and has a total bulk of 183 614m². Approximately 1530 units are proposed.

e) Land Use: Medium Residential 1 and 2

A large portion of the Inyaninga site has been allocated for residential development particularly Medium Density Residential in the north western quadrant of the site and within portions of land surrounding the Tongaat CBD. There are two types of residential that has been identified i.e. Medium Density Residential 1 which is indicated as a light yellow hatch and Medium Residential 2 which is represented as a darker yellow hatch on the plan to the right. Medium Density Residential 1 (MDR 1)- It is proposed that this use is made up of a 150m² site with a 60m² unit with a residential density of 80du/ha. Medium Density Residential 2 (MDR 2)- It is proposed that this use is made up of a 120m² site with a 50m² unit with a residential density of 100du/ha. The proposed bulk for MDR 1 is 258 174m² and MDR 2 is 47 910m² with 5163 units and 1198units respectively. The total number of units for Medium Residential is 6361.

f) Land Use: Open Space/Landscaping

The Open Space system is a critical component of the development framework. The open space contains the wetlands, and their buffers as well as additional open space created through design. It is also proposed that the open spaces become meaningful areas rather than large tracts of green unused land and therefore the open space fronting the Tongaat CBD should be developed as a Central Park to serve the needs of not only the Tongaat community but other communities created through the design. It is also proposed that the area's around the Logistic, Residential and General Business uses be considered as a park(core open space) to serve the immediate needs of the people from the logistics, industrial zones as well as those residential clusters further west of the study area. A primary boulevard is envisaged from the General Business/logistics area through towards the Tongaat CBD town square. The total extent of open space equates to 27% of the study area.

g) Land Use: Social Facilities

Community facilities are considered essential to ensuring that a ‘complete’ liveable environment. In order to ensure that a compact urban environment is created and given the need to pursue higher densities, it is

imperative that clustering and an appropriate arrangement of facilities (5 minute walking distance) are considered. The social facility approach was extensively work shopped with the municipality for the Cornubia Project. This approach has now been adopted for Inyaninga. The framework achieves approximately 7891 units and a population size of 31 564 people at 4 people per unit with a design population rounded off to 32000 people. This population size will require 3 clusters that contains Primary Schools, Secondary Schools, a Community Hall, Library, Swimming Pool as well as Sports fields. A Community Health-ARV Centre and Police Station are required as standalone facilities. These clusters have been positioned along main routes within the core residential area so they are easily accessible to the immediate communities within the development and those that the development surrounds. In the case of the provision of the Children's Home and Old Age Home, areas have been set aside for these uses. These will be free entry uses and the residential totals have been adjusted accordingly.

A total area of 20ha (i.e. 2% of the study area) is allocated to social facilities.

h) Land Use and Bulk Schedule

In summary, the Inyaninga framework responds to the existing context whilst embracing the future plans for the northern region and development proposals of the Dube Tradeport. The uses proposed re-enforces an activity spine that will complement the existing Towns of Tongaat and Verulam. The breakdown of uses are as follows:

- Residential translates to approximately (141ha-14%) of the study area;
- General Industrial / Logistics is the largest land use contributor (21%-210ha) within the framework.
- The balance of the framework is shared between General Business 133ha- 13%, Commercial 0.86ha- 0.09%, Social facilities 20ha-2% and the balance consisting of Open space, Servitudes and Roads which equates to 514ha-49%.

All the uses combined have a total area of 1019ha.

The total bulk anticipated from the overall development is 1,619,601m². The split of commercial and residential bulk are 1,166,626m² and 452 975m² respectively. It is proposed that the MDR1 use will comprise of 150m² sites with 60m² units which will yield 5163 units. The MDR 2 use will comprise of 120m² sites and 50m² units with an anticipated yield of 1198 units. The High Density Residential /Mixed Use will comprise of 3 to 4 storey walk-ups at 200du/ha with an estimated yield at 1530 units. Combined this translates to 7891 units. Applying a ratio of four people per unit, generates a population estimate of 31 564 people over the 1019 hectare of land.

i) Potential Phasing

Whilst the project phasing is not fixed, the intension will be to release parcels according to infrastructure capacity and market demand. There are 4 proposed phases with multiple sub phases. Phase 1a is the most likely to be developed first with the balance of the phases released as and when the need arises and in line with infrastructural capacities.

The phases are broken down as follows:

- Phase 1a: General Industrial/Logistics
- Phase 1b: Medium Density Residential 1
- Phase 1c: High Density Residential / Mixed Use and Commercial
- Phase 2a: General Industrial/Logistics
- Phase 2b: General Business (Business Park, Office, Retail, Logistics and Mixed-Use)
- Phase 2c: General Business (Business Park, Office, Retail, Logistics and Mixed-Use)
- Phase 3a and 3b: General Business (Business Park, Office, Retail, Logistics and Mixed-Use)
- Phase 4: Medium Density Residential 2

The wetland habitat identified within the study area, approximately 108.4ha, has been significantly modified by agricultural activities, especially crop production and drainage canals within the wetland habitats. Site limitations, in terms of available space, resulted in the proposed development layout encroaching into the identified wetland habitats. However, due to the levels of modification to the wetland habitat within the KZN region, the proposed development needs to ensure that there is 'no-net-loss' of wetland functioning and integrity. In addition, eThekweni Municipality requires that the habitat provision, represented as the spatial extent of wetland habitat, be considered in defining loss of wetland areas within the landscape.

The loss of wetland habitat (i.e. spatial extent) within the landscape is a particular concern to eThekweni Municipality, even if the impacts on ecosystems functioning and integrity are able to be mitigated onsite in the post-development landscape. However; the transformed nature of the wetlands within the study site and the proposed rehabilitation of these systems within the post-development landscape, ensure that both functioning and integrity are retained and that wetland habitat is gained.

To address the impacts on the wetland habitat, appropriate mitigation activities need to be considered. It is proposed that the impacts on wetland habitat within the landscape be addressed through onsite mitigation activities, focussing on the retention and rehabilitation of 60.8ha of existing wetland habitat. The proposed development will result in the effective gain of 15.7ha of functional wetland area within the landscape, addressing the impacts on the wetland habitat in terms of functioning and integrity. Regular post-development monitoring will be required to ensure that the functioning and integrity of these systems is retained and not reduced through the development. Should a reduction in the functioning and integrity occur, offsite mitigation activities may be required to ensure a 'no-net-loss' is maintained.

A-1.4 Health and Safety

There is an underground methane rich gas pipeline that is buried 1m below the ground level and traverses the north-western portion of the development site, which is owned by Transnet Gas Pipelines. A 9.14 m gas pipeline servitude is registered on the site. In order for the proposed development to be granted, a Risk Assessment for the Transnet Gas Pipeline was conducted by Ishecon Chemical Process Safety Engineers (refer to the Risk Assessment in Appendix 6). The eThekweni Municipality: Fire Department will be required to review the Risk Assessment. Approval will be required from the Fire Department prior to construction. Hazards from the pipe have the potential to harm members of the public beyond the site boundaries, and therefore the gas pipeline is classified as 'Major Hazardous Installation' (MHI).

a) Findings of the Risk Assessment

Hazards, such as the accidental releases of fuel gas from the pipeline were identified as potential major hazards that could have a significant effect on the public. As a worst case scenario, should a rupture or leak of the pipe occur, immediate ignition would lead to a jet fire, or once a gas cloud has formed, and then ignited, a fire ball will result. Otherwise, late ignition of the gas cloud will lead to a flash fire, which could flash back and start a jet fire at the release point. A flash fire, or a fire ball could seriously affect the public in the area up to distances of 648 and 142 m respectively. The latter two effect distances would be as a result of the gas pipe rupture. No explosion effects are possible as there is no confinement.

Risks posed by the pipeline to the public do not exceed the target of 1×10^{-6} chance of a fatality per person per year, and can therefore be regarded as acceptable. Risk to employees is not applicable, as this is not a continuously 'manned' installation. Societal risk applies to local communities, or to the society as a whole, and includes the risk to every exposed person, even if they are only exposed on one brief occasion. Societal risk posed by the gas pipeline is acceptable for frequent low severity hazards and tolerable for infrequent high severity hazards. There are no other major hazard installations in the area which can be affected by the gas pipeline. There can therefore also be *no domino* effects.

b) Emergency Response

A comprehensive emergency plan and procedures are in place for dealing with pipeline ruptures or leaks leading to fires. The most effective method to put out high pressure gas fires is closure of the upstream and downstream manual isolation valves. Local emergency services may be required to assist with isolation of the gas supplies, fire extinguishing of nearby buildings, if on fire, applying first aid and medical treatment, and providing an ambulance service to hospitals. In addition, assistance may also be required to warn and evacuate people from nearby industrial premises.

c) Organizational Measures

Adequate measures to minimise the chances of a major hazard occurring, have been provided for the pipeline. In addition, the pipeline has been designed to approved standards, and scheduled visual inspections, are regularly carried out to ensure integrity.

d) Land Use

The land use planning guidelines from the United Kingdom (UK) Health and Safety Executive were followed in making recommendations about separation distances from the pipeline for the proposed development. Since the risk from this pipeline is low, only an outer zone separation distance limit of 140 m could be determined. As no inner and middle zone separation distances could be deduced from the Risk Assessment, because the risk is so low, the start and end of the inner and middle zone distance is 35 m from the pipeline. Similarly the start of the outer zone is 35 m from the pipeline and ends at 140 m from the pipeline. Therefore, following the British code for land use planning, any development is allowed up to 35 m from the pipeline, except there are restrictions for development in the outer zone 35 to 140 m from the pipeline. Thus predominantly open-air developments likely to attract the general public in numbers greater than 1000 people should be avoided.

Similarly, institutions for vulnerable people e.g. hospitals, crèches, schools, old age homes etc. should be located further than 140 m from the pipeline. Gardens, ponds, cemeteries and temporary storage may be located within 35 m, but not closer than 3 m from the pipeline, to allow for pipeline surveillance and maintenance. The recommendations in the guideline can be used to lay out the developments for the different categories of development and sensitivity.

A buffer of 30m has been set aside from the 9.14m gas pipeline servitude on the site.

e) Recommendations

The following recommendations are suggested by Ishecon, 2013:

- The Risk Assessment compiled by Ishecon must be submitted to the local authority for approval of the Inyaninga/uShukela Highway Precinct development.
- The zone separation distances from this risk assessment must be incorporated into the planning and layout of the Inyaninga/uShukela Highway Precinct development.
- The Provincial Director, inspector and local government be formally notified that the risk assessment was completed.
- This risk assessment must be retained, together with Material Safety Data Sheets of the substances handled on the pipeline, for inspection.
- The revision or updating of this risk assessment must be arranged in 2018 or earlier, if the gas pipeline installation is modified by increasing the capacity or operating conditions in excess of the maximum used in this assessment, or if it is converted for handling other materials.
- Transnet must keep a register of all near miss incidents related to the pipeline.
- Transnet must notify the local emergency services and Provincial Director of any incidents which activated the emergency procedures.
- Transnet must review and update the pipeline emergency plan.
- Transnet must test and practise the emergency plan at least once every year.
- Transnet must arrange to sign the emergency plan.

- Transnet must use the emergency plan as a means of making inhabitants of the Inyaninga/uShukela Highway Precinct development aware of the gas pipeline, its dangers and emergency handling aspects.

A-1.4.1 Proposed Bulk Services

Bosch Stemele Consulting Engineers were appointed by THDev to compile the Engineering Services Report for Civil and Electrical Infrastructure (refer to this report in Appendix 6).

a) Water Supply

Water supply to the site will be supplied by the eThekweni Water and Sanitation (EWS) Department. The total water demand for the proposed development is approximately 7.0MI per day. There will be sufficient treated bulk water and supply to cater for the proposed development by 2013/2014.

The Industrial/ logistics/business/commercial supply node will require the upgrade to the existing Inyaninga water reservoir to provide for an additional 9.5MI reservoir to provide the required storage.

The residential section of Inyaninga will require a new 5MI reservoir at a higher elevation, situated on the western boundary of the development area. A pump station at the Inyaninga Reservoir and a new bulk water supply pipeline through the Inyaninga development will be required to deliver bulk water to this new reservoir.

Water to each erf will be to municipal pressure standards and each erf will be individually metered the reticulation will be designed to accommodate fire flows. Sustainability measures including rainwater harvesting should be implemented. Potable water should not be used for irrigation.

b) Stormwater Attenuation

For each site developed, the stormwater control philosophy will be restrict post development flows into the adjacent watercourses to within a 10% variance of that occurring pre-development (cane cultivation) and to facilitate ingress of stormwater into the ground within the existing natural drainage lines.

All purchases and developers of individual erven, will in terms of sales agreements, be required to implement on-erf stormwater attenuation to attenuate the first 25mm of each rainfall event, and to restrict run-off for the 1:5 year storms to within a 10% variance of pre-development levels. This is to be achieved by a combination of on-site attenuation tanks for roof run-off, permeable paving to parking areas (where viable), the provision of swales, landscaped areas etc. Excess stormwater run-off from greater storms will be accommodated in either the roadway drainage or by piping to the natural watercourses and discharging via energy dissipating outlets.

Runoff from the roadways (as well as excess stormwater from the sites, where applicable), will be accommodated in roadside drainage swales situated on both sides of the road reserves. The roadside swales will be sized to accommodate a minimum of 1: 2 year storm. Those swales will however be limited to where road gradients are less than 5% to prevent scour.

To cater for large storm events (> 1: 5 year) and where the road reserves and on-site storage facilities would not be able to handle excess flow, roadways will be provided with piped stormwater conduits with inlets designed only to allow flow into the pipes when the swales reach a pre-determined capacity.

Piped drainage will also be required across access points and intersections. Energy dissipation measures will be implemented where these pipes discharge into the natural watercourses. Attenuation facilities will be provided in the main watercourses to restrict the flows in larger rainfall events to pre-determined flows. It is proposed that these attenuation facilities be constructed with multiple outlets to closely 'mimic' the natural runoff for different return intervals to the wetlands. The attenuation facilities, together with the on-site

attenuation facilities (swales, permeable paving) will have a further advantage in reducing pollution to the existing wetlands. The slow release of runoff from permeable paving (through infiltration) will have the advantage in 'recharging' the existing wetlands.

Based on the conceptual stormwater model of the pre-development and post-development runoff, approximately 128 000m³ of attenuation storage would be required to limit runoff to the pre-development scenario. Due to this large requirement, it is recommended that various attenuation facilities be provided throughout the development and situated downstream of the individual development platforms. The location of these attenuation structures with indicative volume requirements are indicated on the Drawings included in Appendix 6. Refer to Appendix 6 for typical details of stormwater features.

c) Sewerage Provision

Sewerage provision for the proposed development falls under the jurisdiction of Ethekwini Water and Sanitation. There is currently no bulk sewer infrastructure in the area besides the DTP sewerage treatment package plant that is privately run and owned by DTP.

It is estimated that approximately 6.0ML/day of sewage will discharge from the ultimate proposed development. The development site is divided into main catchment areas, namely north and south.

(i) North Catchment

The majority of the sewage (approximately 3.8ML/day) from the proposed logistics park, general business area and high density residential area will gravitate north to the Tongaat Waste Water Treatment Works (WWTW).

The following bulk infrastructure improvements, north of Inyaninga, external to the Inyaninga development are currently underway:

- Augmentation of the existing Tongaat WWTW, which is in the design phase and will result in the upgrading of the WWTW from 10ML/day to 20ML/day. This will ensure sufficient capacity to cater for the northern area of the Inyaninga development. The capital costs for the upgrade is in the Ethekwini budget and construction should commence by 2014.
- A new trunk sewer (DTP Trunk Main) which has been designed to take sewer from the DTP area through to the existing Tongaat sewer trunk main. Construction should commence in 2014.

The following bulk mains are proposed to convey the sewage discharge from the northern areas of the Inyaninga Development to the Tongaat WWTW:

- North Western Tongaat Trunk Main which runs along the southern side of the Hlawe River from the Flamingo Heights Railway Station and eventually tie into the existing bulk main. This bulk main will need to be upgraded to accommodate the Inyaninga Development.
- R102 Trunk Main which will run through the east side of Tongaat, initially running parallel with the R102 to join up with the exiting Tongaat Trunk Main.
- Dube Trade Port Trunk Main: Bosch Stemele confirmed that this trunk main has been designed to include the sewer discharge from the eastern catchments of the northern area of the Inyaninga Development.

In total, approximately 5.6km of new or upgraded main will be required to serve the Inyaninga catchment areas that drain to the north.

(ii) South Catchment

Most of the sewage discharge from the Inyaninga residential development will gravitate to the south (approximately 2.2Ml/day). Several minor pump stations may be required for inter-catchment transfers to adjacent gravity outfall mains. Currently, there is no existing bulk trunk sewer serving this area.

The Verulam WWTW currently treats 12Ml/day and has spare capacity of 5Ml/day so it is able to accommodate the sewage discharge from the southern area of the Inyaninga Development.

The following bulk infrastructure is improvement, south of Inyaninga, external to the Inyaninga development is currently underway:

The proposed Umdloti works which will have an ultimate capacity of 50Ml/day. It is understood that EWS are prioritising the design and construction of the new WWTW and will start on the first 15Ml/day Phase of the works as soon as the EA has been received.

All sewage will need to be drained via gravity to a point south of the development, from which point the following options are available to drain the sewage discharge from the southern area of the Inyaninga Development:

- Option 1: the construction of a pump station and a 6km long rising main to a suitable high point then a gravity main to the proposed Umdloti Regional WWTW situated south of the Umdloti River;
- Option 2: Continue via a gravity main to the Verulam WWTW including a 300m section of elevated pipeline which includes crossing over the Umdloti River. This route will require additional detailed survey to confirm the possibility of this gravity routing to difficult terrain in some sections;
- Option 3: continue via a gravity outfall main to an existing pump station in Canelands which currently pumps through to the existing Verulam trunk sewer which flows to the existing Verulam WWTW.

The sewerage rising main, Option 1 above (if required as an alternative to the gravity outfall main to the Verulam WWTW) may, in the long term, also receive sewage from portions of the KSIA and DTP and hence, would need to be sized accordingly.

(iii) Reticulation

The sewer reticulation will be provided to the boundary of each site and will be designed in accordance with EWS and 'Red Book' standards.

Refer to Appendix 6 for the Inyaninga Sewer Layout Plan and Bulk Sewer Plans for the northern and southern catchment areas.

d) Electricity Supply

The La Mercy major substation (132/11kV) located south of the proposed development will supply the initial phases of the development with power. The substation is currently rated at 30MVA and can be upgraded to 60MVA as the electrical demands increase in the area.

An existing 132kV overhead line linking the new Tongaat substation to the La Mercy substation traverses through the proposed development site. There is a registered servitude for this overhead line.

eThekwini Electricity confirmed that the La Mercy Substation currently has in the order of 23MVA available. However, the availability for this spare capacity at the time of the supply is required for the proposed development is dependent on the timing of other projects in the vicinity of the La Mercy substation i.e. DTP, Ushukela, Hazelmerre Dam.

The availability of spare electrical capacity will have to be monitored on a regular basis to ensure sufficient capacity remains available for this project.

For the proposed bulks, a total load of 140MVA is required. The potential electrical load at the major substations after the diversity factor is applied, will be in the order of 90MVA.

The existing 132/11kV 30MVA La Mercy substation will be used to supply the initial phases of the Inyaninga Development. If all the proposed bulks are achieved, it will be essential to construct two additional 132/11kV 60 MVA firm substations (70m x 70m each) to accommodate the entire proposed development. The proposed substations must be fenced and access controlled to maintenance staff only. The proposed substations will be located on the north western portion of the site.

System strengthening will also be required on the 175/132kV transmission line infrastructure including a new 3150MVA 275/132kV Dube Intake Substation (423m x 357m) and will be located in the vicinity of the proposed development. Furthermore, overhead 132/11kV cables will link it to the new 132/11kV, 60 MVA substations.

Transmission line servitudes are required within the development area. This may be overhead or underground subject to the cost/benefit of the land value affected. The eThekweni Municipality will be responsible for construction of the transmission lines. Refer to Appendix 6 for the Bulk Electrical Layout Plan.

e) Solid Waste

The development falls within the jurisdiction of eThekweni Municipality, and therefore Durban Solid Waste (DSW) will be responsible for provision of waste collection.

The DSW Buffelsdraai Landfill Site with a classification of GLB+ has adequate air-space (capacity) to accept waste generated from the development.

There must be a comprehensive solid waste management plan with a focus on waste, minimisation, re-use and recycling.

f) Proposed Access Road and road upgrades

A Traffic Impact Assessment (TIA) was conducted by Hatch Goba (Pty) Ltd for the proposed development. Refer to the TIA in Appendix 6. To mitigate the impact of the development-generated and planned regional development's peak hour traffic volumes on the surrounding road network, the development will be released on a phased basis in line with the broader regionally required major road upgrades. The key regional road upgrades that will contribute to the unlocking of the total, ultimate Inyaninga Integrated Human Settlement Development include:

- Eastern Arterial (3 lanes per direction at some sections)
- Western Bypass (3 lanes per direction at some sections)
- Watson Highway (3 lanes per direction at some sections)
- P100 extension (3 lanes per direction at some sections)

The Eastern Arterial will have the greatest positive impact in the short term with the following more localised upgrades being required to enable Phase 1 of the development to proceed:

- Inyaninga access roads mostly 2 lanes per direction from the existing R102 and P100
- Signalization and widening of many strategic junctions

Most importantly a very significant shift in public transport use has to take place to accommodate all the future planned developments in the area, the current ("trend") public transport split, will not be sufficient. Traffic will have to be monitored on an ongoing basis in the sub region given the uncertainties around development take up and major infrastructure requirements.

A-1.4.2 Details of the Construction Phase

Subject to receiving Environmental Authorisation (EA) from KZN DAEA, the construction of Phase 1a: General Industry/Logistics land uses will commence in January 2015. The construction period is estimated to be 20 years.

The appointed Contractor will be responsible to prepare a Construction Site Development Plan prior to establishing on site. This plan will indicate the boundaries of the site that encompasses all construction related activities, vehicle and pedestrian access points, laydown area/s, offices, stockpile areas, storage areas, ablution facilities, etc. This Site Development Plan must be approved by the appointed Environmental Control Officer (ECO) as provided for within the Environmental Management Programme (EMPr) (refer to Appendix 7).

The construction programme will reflect the separate work sections, in chronological order, according to the Contractor's intended production sequence, as described on the Construction Site Layout Plan.

Water sourced from the eThekweni Municipality will be used during the construction phase. This water will be used for various activities on site, including dust suppression on dry, windy days.

Diesel generators will be utilised on site and stored within the storage area as far away from the wetland/watercourse boundaries as possible (as indicated on the Construction Site Development Plan).

The Contractor will be responsible for the management and removal of all solid waste from site during the construction phase) to a designated landfill site. A method statement for the management of waste must be drafted and signed off by the ECO prior to commencement of construction activities, as per the attached EMPr (Appendix 7).

A-2 LEGAL REQUIREMENTS APPLICABLE TO THIS APPLICATION

An Application for Authorization was submitted to the KZN Department of Agriculture and Environmental Affairs (KZN DAEA) on 25 August 2009. On 8 September 2009, the KZN DAEARD acknowledged receipt of the abovementioned document and issued the project with reference number DM/0105/09.

The Final Scoping Report and Plan of Study (Pos) for the EIR was submitted to the KZN DAEA on 18 April 2011 and the Final Scoping Report and PoS for EIR was accepted by KZN DAEA on 25 May 2011. Refer to the correspondences to and from KZN DAEA in Appendix 4.

The legislation, guidelines and policies applicable to this project are as follows:

A-2.1 NEMA and the Environmental Impact Assessment Regulations

The EIA Regulations, promulgated under NEMA, focus primarily on creating a framework for co-operative environmental governance. NEMA provides for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by State Departments and to provide for matters connected therewith.

In terms of the EIA Regulations of 2010 and activities listed in GN No. 544 and 546 (requiring a Basic Assessment process) and GN No. 545 (requiring a S&EIR process), the following listed activities are deemed by the EAP to be applicable to the proposed Inyaninga/Ushukela Highway Development Precinct, based on the information provided by the project proponent and their consulting engineers and specialists.

It must be noted that activities requiring a Basic Assessment process, as well as activities requiring a S&EIR process are triggered by the proposed development. Therefore, according to the below listed activities, a situation arises, whereby the legal requirements of the activity listed in terms of GN No. 545 of 2010 supersede those of the activities listed in terms of GN No. 544 and 546 of 2010, and as such **this application has undergone a S&EIR process.**

The listed activities are deemed to include activities that could potentially have a detrimental impact on the social and biophysical state of an area and as such, are required to undergo an environmental impact assessment process.

GN No & Activity Number	Activity Description	Project Description
GN No. 544 of 18 June 2010	<p>The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water:</p> <ul style="list-style-type: none"> i. with an internal diameter of 0,36 meters or more; or ii. with a peak throughput of 120 litres per second or more, <p>excluding where:</p> <ul style="list-style-type: none"> a. such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or <p>where such construction will occur within urban areas but further than 32meters from a watercourse, measured from the edge of the watercourse.</p>	<p>There will be pipelines constructed for the transport of water, sewage and storm water to service the needs of the proposed development that occur within the wetlands and 32m from the edge of the water course.</p>
	<p>The construction of facilities or infrastructure for the transmission and distribution of electricity:</p> <ul style="list-style-type: none"> i. outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or ii. inside urban areas or industrial complexes with a capacity of 275 kilovolts or more. 	<p>To service the needs for electricity supply to the proposed development, two additional 132/11kV 60 MVA firm substations (70m x70m each) will be constructed (and fenced for security reasons) to accommodate the proposed development.</p>
	<p>The construction of:</p> <ul style="list-style-type: none"> (i) canals; (ii) channels; (iii) bridges; (iv) dams; (v) weirs; (vi) bulk storm water outlet structures; (vii) marinas; (viii) jetties exceeding 50 square metres in size; (ix) slipways exceeding 50 square metres in size; (x) buildings exceeding 50 square metres in size; or (xi) infrastructure or structures covering 50 square metres or more <p>where such construction occurs within a watercourse or within 32 meters of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.</p>	<p>The site has water courses running through it and they will be crossed as a result of the proposed buildings and supporting services infrastructure, such as internal sewerage, water, stormwater reticulation, attenuation ponds and reservoirs.</p>

	18	<p>The infilling or depositing of any material of more than 5 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from</p> <ul style="list-style-type: none"> (i) a watercourse; (ii) the sea; (iii) the seashore; (iv) the littoral active zone, an estuary or a distance of 100 meters inland of the high-water mark of the sea or an estuary, whichever distance is the greater <p>but excluding where such infilling, depositing, dredging, excavation, removal or moving</p> <ul style="list-style-type: none"> (a) is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or (i) occurs behind the development setback line. 	<p>There are various water bodies (wetlands and riparian areas) on the site which would require infilling to make way for the proposed services infrastructure and structures for the proposed development, through dredging, excavation, removal or moving of soil, sand, rock and so on.</p>
	22	<p>The construction of a road, outside urban areas,</p> <ul style="list-style-type: none"> i. with a reserve wider than 13.5 meters; or ii. where no reserve exists where the road is wider than 8 meters, or iii. for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice 545 of 2010. 	<p>Internal roads within the site will have to be constructed for the proposed land uses.</p>
	56	<p>Phased activities for all activities listed in this Schedule, which commenced on or after the effective date of this Schedule, where anyone phase of the activity may be below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold.</p>	<p>The proposed development will be constructed in phases which are dependent on market needs. As a result, there would be phased crossing of watercourses with the construction of proposed pipelines, development infrastructure, road upgrades and so on.</p>
GN No. 545 of 18 June 2010	3	<p>The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic meters.</p>	<p>There may be storage of fuel on the site for the various land uses, more especially, the General Industrial/Logistics uses.</p>
	11	<p>The construction of railway lines, stations or shunting yards, excluding railway lines, shunting yards and railway stations in industrial complexes or zones.</p>	<p>The applicant will construct a rail siding within the development footprint. The applicant must obtain approval from Transnet Freight Rail for the proposed rail siding.</p>
	15	<p>Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; except where such physical alteration takes place for:</p> <ul style="list-style-type: none"> i. linear development activities; or ii. agriculture or afforestation where activity 16 in this Schedule will apply. 	<p>The site for the proposed Inyaninga /Ushukela Highway Development Precinct is approximately 1063ha in extent.</p>

GN No. 545 of 18 June 2010	18	<p>The route determination of roads and design of associated physical infrastructure including roads that have not yet been built for which routes have been determined before 03 July 2006 and which have not been authorised by a competent authority in terms of the Environmental Impact Assessment Regulations, 2006 or 2009, made under section 24(5) of the Act and published in Government Notice No. R. 385 of 2006 –</p> <ol style="list-style-type: none"> i. it is a national road as defined in section 40 of the South African National Roads Agency Limited and National Roads Act, 1998 (Act NO.7 of 1998); ii. it is a road administered by a provincial authority; iii. the road reserve is wider than 30 meters; or iv. the road will cater for more than one lane of traffic in both directions. 	<p>To accommodate Phase 1a (proposed General Industrial/Logistics Land Uses), the Inyaninga gravel road would have to be upgraded to one lane per direction (to be 2 lanes per direction in future). A new lane per direction access road between the R102 and the Logistics Park Entrance (access to R102 to be closed in future and road to be upgraded to be two lanes per direction in future).</p>
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In accordance with the EIA Regulations (2010), an EIR must contain all the information that is necessary for the competent authority to consider the application and to reach a decision and must include those points included in Section 31(2) of Regulation 543 which are laid out in the table below. In order to facilitate review by the competent authority, this report is structured around these requirements.

NEMA Regulation 543, Section 31 Requirements	Relevant Section of the Report
Details of the EAP who compiled the report and the expertise of the EAP to carry out an environmental impact assessment	Page v-vi
A detailed description of the proposed activity	Section A
A description of the property on which the activity is to be undertaken and the location of the activity on the property.	Section A
A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity.	Section B
Details of the public participation process conducted including: <ul style="list-style-type: none"> (i) Steps undertaken in accordance with the plan of study; (ii) A list of persons, organisations and organs of state that were registered as interested and affected parties; (iii) A summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments; and (iv) Copies of any representations and comments received from registered and affected parties. 	Section C-4
A description of the need and desirability of the proposed activity	Section A-4
A description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity.	Section E
An indication of the methodology used in determining the significance of potential environmental impacts.	Section D
A description and comparative assessment of all alternatives identified during the environmental impact process.	Section E
A summary of the findings and recommendations of any specialist report or report on a specialised process.	Section G
A description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures.	Section F
An assessment of each identified potentially significant impact.	Section F
A description of assumptions, uncertainties and gaps in knowledge.	Section D
A reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	Section G
An environmental impact statement which contains a summary of the key findings and a comparative assessment of the positive and negative implications.	Section G
A draft environmental management programme	Appendix 7
Copies of any specialist reports and reports on specialist processes.	Appendix 6

A-2.2 National Water Act, 1998 (Act No. 36 of 1998)

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) aims to provide management of the national water

resources to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected as well as integrated management of water resources with the delegation of powers to institutions at the regional or catchment level. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in responsible ways.

Of specific importance to this application is Section 19 of the NWA, which states that an owner of land, a person in control of land or a person who occupies or uses the land which thereby causes, has caused or is likely to cause pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring and must therefore comply with any prescribed waste standard or management practices.

Due to the various streams, wetlands, tributaries and drainage lines that occur on site as well as the construction of the proposed Inyaninga/Ushukela Highway Development Precinct and construction of stormwater attenuation ponds and reservoirs, according to the NWA, the proposed development may trigger the following water uses listed in Section 21:

- (b) storage of water;
- (c) impeding or diverting the flow of water in a watercourse;
- (d) engaging in stream flow reduction activity;
- (g) disposing of waste in a manner which may detrimentally impact on a water resource; and
- (i) altering the bed, banks, course or characteristics of a watercourse.

Accordingly, the proposed Inyaninga Integrated Human Settlement Development requires a water use licence, which is administered by the Department of Water Affairs (DWA). Water Use Licence Applications will be submitted to DWA for the above activities.

A-2.3 National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)

The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA) aims to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development, to provide for specific waste management measures, to provide for the licensing and control of waste management activities, to provide for compliance and enforcement, to name but a few of the purposes of the Act.

A-2.4 Other Legal Requirements

A-2.4.1 Acts

Constitution of the Republic of South Africa

The Constitution of the Republic of South Africa has major implications for environmental management. The main effects are the protection of environmental and property rights, the change brought about by the sections dealing with administrative law, such as access to information, just administrative action and broadening of the locus standing of litigants. These aspects provide general and overarching support and are of major assistance in the effective implementation of the environmental management principles and structures of the NEMA. Section 24 in the Bill of Rights of the Constitution specifically states that:

Everyone has the right -

- To an environment that is not harmful to their health or well-being; and
- To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -
 - Prevent pollution and ecological degradation;

- Promote conservation; and
- Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)

The purpose of the Biodiversity Act is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA and the protection of species and ecosystems that warrant national protection. As part of its implementation strategy, the National Spatial Biodiversity Assessment was developed.

This Act is applicable to this application for environmental authorisation, in the sense that it requires the project applicant to consider the protection and management of local biodiversity.

National Spatial Biodiversity Assessment

The National Spatial Biodiversity Assessment (NSBA) classifies areas as worthy of protection based on its biophysical characteristics, which are ranked according to priority levels.

Protected species – Provincial Ordinances

Provincial ordinances were developed to protect particular plant species within specific provinces. The protection of these species is enforced through permitting requirements associated with provincial lists of protected species. Permits are administered by the Provincial Departments of Environmental Affairs.

National Forests Act, 1998 (Act No. 84 of 1998)

This Act provides for the management, utilisation and protection of forests through the enforcement of permitting requirements associated with the removal of protected tree species, as indicated in a list of protected trees (first promulgated in 1976 and updated since). Permits are administered by the Department of Agriculture, Forestry and Fisheries (DAFF).

National Heritage Resources Act, 1999 (Act No. 25 of 1999)

The National Heritage Resources Act legislates the necessity for cultural and heritage impact assessment in areas earmarked for development, which exceed 0.5 ha. The Act makes provision for the potential destruction to existing sites, pending the archaeologist's recommendations through permitting procedures. Permits are administered by the South African Heritage Resources Agency (SAHRA).

KwaZulu-Natal Heritage Act, 2008 (Act No. 4 of 2008)

KwaZulu-Natal Heritage Act provides for the conservation, protection and administration of both the physical and the living or tangible heritage resources of the Province of KwaZulu-Natal; and to establish a statutory Council to administer heritage conservation in the Province. Amafa / Heritage KwaZulu-Natal is the provincial heritage conservation agency for KwaZulu-Natal. Amafa was established as a statutory body in terms of the KZN Heritage Act of 1997, replaced by the KZN Heritage Act of 2008.

National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)

The purpose of this Act is to provide for the protection, conservation and management of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes.

Subdivision of Agriculture Land Act, 1970 (No. 70 of 1970)

To control the subdivision and, in connection therewith, the use of agricultural land. 'Agricultural land' means any land, except-

(a) land situated in the area of jurisdiction of a municipal council, city council, town council, village council, village management board, village management council, local board, health board or health committee, and land forming part of, in the province of the Cape of Good Hope,

a local area established under section 6 (1) (i) of the Divisional Councils Ordinance, 1952 (Ordinance No. IS of 1952 of that province), and, in the province of Natal, a development area as defined in section 1 of the Development and Services Board Ordinance, 1941 (Ordinance No. 20 of 1941 of the last-mentioned province), and in the province of the Transvaal, an area in respect of which a local area committee has been established under section 21 (1) of the Transvaal Board for the Development of Peri-Urban Areas Ordinance, 1943 (Ordinance No. 20 of 1943 of the Transvaal), but excluding any such land declared by the Minister after consultation with the executive committee concerned and by notice in the Gazette to be agricultural land for the purposes of this Act.

Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)

To provide for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.

Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)

To provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety; and to provide for matters connected therewith.

National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)

The NEMA: Air Quality Act states the following as its primary objective: “To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national forms and standards regulating air quality monitoring, management and control by all spheres of government, for specific air quality measures, and for matters incidental thereto.

Everyone has a right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

- Prevent pollution and ecological degradation;
- Promote conservation; and
- Secure ecologically sustainable development and use of natural resources.

And whereas minimisation of pollution through vigorous control, cleaner technologies and cleaner production practises is key to ensuring that air quality is improved, and whereas additional legislation is necessary to strengthen the Government’s strategies for the protection of the environment, and more specifically, the enhancement of the quality of ambient air, in order to secure an environment that is not harmful the health or well-being of people.

Hazardous Substances Act, 1973 (Act No. 15 of 1973)

The object of the Act is *inter alia* to ‘provide for the control of substances which may cause injury or ill health to or death of human beings by reason for their toxic, corrosive, irritants strongly sensitising or flammable nature or the generation of pressure thereby in certain circumstances, for the control of electronic products, for the division of such substances or products into groups in relation to the degree of danger, for the production and control of such substances.

In terms of the Act, substances are divided into schedules, based on their relative degree of toxicity, and the Act provides for the control of importation, manufacture, sale, use, operation, application, modification, disposal and dumping of substances in each schedule.

Pollution control in South Africa is affected through numerous national statutes, provincial ordinances and local authority by-laws. Only the more significant legislation pertaining to the regulation of water, air, noise and waste pollution is dealt with in this section.

Civil Aviation Act, 2009 (Act No. 13 of 2009)

To repeal, consolidate and amend the aviation laws giving effect to certain International Aviation Conventions; to provide for the control and regulation of aviation within the Republic; to provide for the establishment of a South African Civil Aviation Authority with safety and security oversight functions, to provide for the establishment of an independent Aviation Safety Investigation Board in compliance with Annex 13 of Chicago Convention, to give effect to certain provisions of the Convention on Offences and Certain other Acts Committed on Board Aircraft; to give effect to the Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation; to provide for the National Aviation Security Program; to provide for additional measures directed at more effective control of the safety and security of aircraft, airports and the like; and to provide for matters connected thereto.

Promotion of Access to Information Act, 2000 (Act No. 2 of 2000)

The Act recognises that everyone has a Constitutional right of access to any information held by the state and by another person when that information is required to exercise or protect any rights. The purpose of the Act is to foster a culture of transparency and accountability in public and private bodies and to promote a society in which people have access to information that enables them to exercise and protect their rights.

Planning and Development Act, 2008 (No. 6 of 2008)

To provide for the adoption, replacement and amendment of schemes, to provide for the subdivision and consolidation of land; to provide for the development of land outside schemes; to provide for the phasing or cancellation of approved layout plans for the subdivision or development of land; to provide for the alteration, suspension and deletion of restrictions relating to land; to establish general principles for the permanent closure of municipal roads or public places; to provide for the adoption and recognition of schemes, to provide for compensation in respect of matters regulated by the Act; to establish the KwaZulu-Natal Planning and Development Appeal Tribunal; to provide for provincial planning and development norms and standards; and to provide for matters connected therewith.

The National Building Regulations and Building Standards Act 103 Of 1997

“To promote the promotion of uniformity in the law relating to the erection of buildings in the areas of jurisdiction of local authorities for the prescribing of building standards and for matters connected therewith”.

Extension of Security of Tenure Act, No 62 of 1997

To provide for measures with State assistance to facilitate long-term security of land tenure; to regulate the conditions of residence on certain land; to regulate the conditions on and circumstances under which the right of persons to reside on land may be terminated; and to regulate the conditions and circumstances under which persons, whose right of residence has been terminated, may be evicted from land; and to provide for matters connected therewith.

In line with its set of priorities, Legal Aid South Africa provides legal aid to people affected by the Land Reform (Labour Tenants) Act of 1996 and the Extension of Security of Tenure Act of 1997. Although not restricted to farm labourers, a large number of people affected by the provisions of the Extension of Security of Tenure Act of 1997 are farm labourers and farmers or farm owners.

Prevention of Illegal Eviction from an Unlawful Occupation of Land Act, 1998

To provide for the application of this Act; to prohibit certain acts in respect of unlawful occupation of land and to create offences related to such acts; to provide for procedures for the eviction of unlawful occupiers; to regulate the granting of a court order for eviction; to repeal the Prevention of Illegal Squatting Act, 1951, and

other obsolete laws; and to provide for matters incidental thereto."

Sustainable Development

The principle of Sustainable Development has been in the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) and given effect by NEMA. Section 1(29) of NEMA states that sustainable development means the integration of social, economic and environmental factors into the planning, implementation and decision-making process so as to ensure that development serves present and future generations. Thus sustainable development requires that:

- The disturbance of ecosystems and loss of biological diversity are avoided, or where they cannot be altogether avoided, are minimised and remedied;
- That pollution and degradation of the environment are avoided, are minimised and remedied;
- The disturbance of landscapes and sites that constitutes the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;
- A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- Negative impacts on the environment and on people's environmental rights be anticipated; and, prevented and where they cannot altogether be prevented, are minimised and remedied.

A-2.4.2 Provincial Policies and/or Guidelines

Integrated Environmental Management (IEM)

IEM is a philosophy for ensuring that environmental considerations are fully integrated into all stages of the development process. This philosophy aims to achieve a desirable balance between conservation and development (DEAT, 1992). The IEM guidelines intend encouraging a pro-active approach to sourcing, collating and presenting information in a manner that can be interpreted at all levels.

The Department of Environmental Affairs (DEA) Integrated Environmental Management Information Series guidelines are also considered during this S&EIR application process.

National Spatial Biodiversity Assessment

The National Spatial Biodiversity Assessment (NSBA) classifies areas as worthy of protection based on its biophysical characteristics, which are ranked according to priority levels.

Protected Species – Provincial Ordinances

Provincial ordinances were developed to protect particular plant species within specific provinces. The protection of these species is enforced through permitting requirements associated with provincial lists of protected species. Permits are administered by the Provincial Departments of Environmental Affairs.

Provincial Growth & Development Strategy (PGDS)

The 2011 Provincial Growth and Development Strategy (PGDS) aims to grow the economy for the development and improvement of the quality and life for all people living in the province. The strategy will lay the foundations for attracting and instilling confidence from potential investors and to develop social compacts that address the Provincial challenges.

The following principles were developed to facilitate the overall guidance in the development of the 2011 PGDS (KZN Provincial Commission, 2011):

- Grow the economy to achieve shared growth;
- Harness the provinces assets and endowments;
- Develop the provinces greatest assets, its human capital;

- Harmonise environmental integrity and human and social development with economic development;
- Government must be developmental, competent, caring and facilitating;
- **Private sector must grow a shared economy to provide employment;**
- Organised labour must protect workers from exploitation while promoting labour productivity;
- Civil society must be responsible for shaping its own destiny.

The PGDS Spatial Development Framework (SDF) identifies the areas within the study area for Economic Value Adding and support. The Economic Value adding areas are normally areas where Agriculture, Tourism, Manufacturing and Services sectors are contained and indicates areas where there are a good potential for further expansion. Economic support areas have good economic potential and are considered important for economic support. Based on the SDF, Inyaninga lies within the economic support zone. Therefore Inyaninga will achieve the PGDS objectives as the development is within close proximity from existing centers of demand and is expected to accommodate Mixed Use commercial, logistics and residential.

Provincial Spatial Economic Development Strategy (PSEDS)

The PSEDS is aimed at transforming the structure of the economy and narrowing and eventually eliminating the gap between the first and second economies. The four pillars of the strategy are as follows:

- Increasing investment in the province;
- Skills and capacity building;
- Broadening participation in the economy; and
- Increasing competitiveness.

The PSEDS identifies the sectors of the provincial economy which will drive the growth of the province and address unemployment and poverty as follows:

- Agriculture - including agri-industry (with opportunities to impact considerably on the economic needs of the poor through Land Reform);
- Industry - including heavy and light industry and manufacturing;
- Tourism - including domestic and foreign tourism; and
- Service sector - including financial, social, transport, retail and government.

The logistics and transport sector (including rail) in the services sector are also identified as important subsectors underpinning growth in all four sectors.

The PSEDS also acknowledges that the potential for industrial development in the province is anchored by the nodes of eThekweni and Umhlatuze. The corridors between these two nodes form the primary zone of industrial development in the province.

One of the principles of the PSEDS is that settlements and economic development opportunities should be channeled into activity corridors and nodes that are adjacent to or link the main growth centres. The eThekweni – Umhlatuze development corridor has been identified as having the potential for greatly impacting on economic growth and the development of impoverished areas.

A-2.4.3 Local Policies and/or Guidelines

a) eThekweni Municipality Integrated Development Plan (IDP 2012/13 to 2016/17)

The IDP serves as a tool for transforming local governments towards facilitation and management of development within their areas of jurisdiction. eThekweni Municipality's vision is the following, "By 2030, eThekweni will enjoy the reputation of being Africa's most caring and liveable City, where all citizens live in harmony (eThekweni Municipality IDP 2012/13 to 2016/17)."

Some of the key spatial planning issues summarised from the IDP document are as follows:

A need to unlock infrastructure capacity for new growth, address phasing & costs constraints associated with development

- A need to protect viable agricultural land;
- A need to grow the Municipality's rates base;
- A need to address the housing & infrastructure backlog;
- A need for strategic economic growth and investment;
- A need to protect key environmental assets and services;
- A need to manage development growth; and
- A need for alignment with Municipality strategies.

Inyaninga plays an important role for the city in achieving its spatial objectives and therefore is key to ensure that the development will target the key specific issues indicated above. The IDP indicates that, some of the major development projects planned for the eThekweni Municipality are poised to have a positive impact on the economy during the next ten to fifteen years. One of the strategic projects are the **new developments at the Dube Trade Port** which is expected to play an effective role in placing the Municipality on a firm growth trajectory especially for the local economy and job creation. The initiative above as well as those indicated in the IDP are expected to create a substantial number of temporary and permanent jobs.

b) eThekweni Northern Spatial Development Plan (NSDP)

The Northern Region is dynamic and there is a high demand for development, particularly within the urban corridor. The north has been divided into 6 Local Areas namely; Buffelsdraai, Hazelmere, Ohlanga-Tongati, Northern Suburbs & Umhlanga, Phoenix/ INK, Tongaat & Dube Tradeport, and lastly Verulam/ Cornubia. These local areas will play a role in achieving the broader growth and development objectives of the metropolitan area (eThekweni Municipality IDP, 2012/13).

A number of key areas within the north are development priorities and various projects and initiatives are taking place, including:

- King Shaka Airport and the surrounding Dube Tradeport are being promoted as a key economic node, comprising of a variety of economic and transport related activities;
- To promote town centre redevelopment, the Verulam and Tongaat CBDs and KwaMashu Town Centre are seen as key priorities and being revamped to increase functionality within the broader Northern Urban Development Corridor;
- The emerging industrial and residential components of the Inyaninga area, west of the Airport, are seen as top city-wide development priorities.

Therefore The NSDP recognises the importance of the Dube Tradeport and it surrounding areas in particular Inyaninga as key economic generators as well as a city wide development priority and supports the redevelopment of towns such as Verulam and Tongaat as an integral component of Northern Development corridor.

c) eThekweni Spatial Development Framework - SDF (2012/13)

The eThekweni Municipality's SDF is a critical and integral component of the IDP. It is a strategic framework that shows how the implementation of the IDP should occur in space and guides the overall spatial distribution of current and desirable land uses within a municipality in order to give effect to the vision, goals and objectives of the municipal IDP. The city's SDF represents a long term (20+years) plan, and is revised on a regular basis in line with the IDP 5 year cycles. As identified within the eThekweni IDP, some of the key strategic focus areas for the municipality SDF are as follows:

- The Port of Durban, Dube Trade Port and Cato Ridge as economic investment areas which require major investment;
- Land use to support the Integrated Rapid Public Transport Network (IRPTN) by improving its viability with densification along key transport routes and within major mixed use nodes and corridors; and

- Emphasis on accessibility and convenience in more densely populated urban areas including the provision of priority public transport routes and rail linkages.

The SDF identifies land that surrounds the airport for Business Park and Industrial uses which ties into the overall vision and planning for Inyaninga. In the package of plans the SDF is translated into more detailed level plans such as Spatial Development Plans as can be seen below.

As reflected in the table below, Priority Areas for development have been identified in the next 5 years for each Functional District with Inyaninga featuring strongly as a project in the north.

Table 5: Priority Areas for Development

REGION	STRATEGIC PRIORITY	REGION	STRATEGIC PRIORITY
Central SDP	Port of Durban South Durban Basin Regeneration and Redevelopment Inner City Regeneration Pinetown South Point Waterfront Cato Manor Regeneration	South SDP	Umlazi Illovo Umkomaas/Cragieburn Areas west of Umlazi (including parts of Folweni and Inwabi) Umgababa/Umnini Amanzimtoti
North SDP	Bridge City Canelands and Surrounds Cornubia Dube TradePort and Surrounds (Inyaninga) Redcliffe Tongaat Industrial Tongaat Residential	Outer West SDP	Cato Ridge Hammersdale Bartletts Hillcrest Shongweni Mpumalanga KwaXimba Inchanga Molweni Zwelibomvu uMzinyathi

d) North Urban Development Corridor (NUDC)

The NUDC project which was undertaken by SSI Engineers and Environmental consultants for EtheKwini Municipality in November 2010 aimed to develop the northern corridor for mixed use development which will consolidate existing and anticipated future population and economic growth in the northern metropolitan area. This will reinforce the new airport node as an internationally competitive “Aerotropolis” whilst simultaneously establishing and/or enhancing the roles and characteristics of established and/or new development nodes, spines and neighbourhoods. This would be achieved through the integration of existing development with new opportunities for housing, business, industry, commerce and logistics through an efficient transport oriented urban form and through transportation systems and networks that will be multi modal and will promote the increased use of public transportation and accommodate the efficient movement of freight.

The objective and aim of the study was to; *“Promote, enable and manage existing and future public and private development in the Northern Urban Development Corridor in accordance with the vision of the eThekweni Municipality.”*

The NUDC has outlined Spatial development strategies which are relevant for the Inyaninga project and surrounding land parcels. Under the ‘expansion’ strategy the following statements are relevant, *“Provide for the consolidation of the new airport and trade port installations into a world class “Aerotropolis” through the **identification of land for logistics and industrial and business development which will form a major new development node** in the northern sub-metropolitan area of the municipality”* and under the ‘consolidation’ strategy the following strategies are relevant, *“**Consolidation and redevelopment of the towns of Tongaat and Verulam as identifiable and discrete towns providing balanced living environments for existing and future new residents in the north**”* and *“Provide for the establishment of*

a multi modal transportation network that will respect the integrity of regional traffic movements whilst providing for local traffic movements and that will effectively link the NUDC into the networks of the central, southern and western metropolitan area (SSI, 2010).” Essentially the NUDC proposes the establishment of a new alignment for the R102, to create a new inland mobility route that by passes Tongaat and links into the northern regional movement system. It also recommends the establishment of a new transport orientated multi modal development spine between the “Aerotropolis” and the CBD of Durban and consolidates R102 as a transit orientated multi- modal development spine and enhances east- west transport links.

The NUDC has defined Inyaninga’s primary role as the following (SSI, 2010):

- Local mixed use, mixed density and mixed income urban living areas-expansion zone;
- Metropolitan industrial and logistics expansion zone;
- Protection of urban development line; and
- Local provision of environmental services.

e) *North Urban Development Corridor (NUDC) – Tongaat-DTP Trade Port Local Area Plan (LAP)*

Emanating out of the NUDC project, 3 Local Area plans for the north were developed. One of the Local Area Plans which is relevant to this study, is the Tongaat- DTP local area. The Local Area Plan is a medium term plan that provides direction on development in the Tongaat-DTP local area for the next 20 years to 2030. The purpose of the Local Area Plan are as follows (SSI, 2010):

- Guide public and private development through the identification of priority areas and interventions;
- Make decisions regarding investment in services infrastructure and associated phasing; and
- Give clarity and direction to developers and land owners in the area with respect to the type and intensity of development.

The King Shaka Airport and development of the Dube Trade Port will substantially alter the current status quo of the area. The intension is to develop the area into an “Aerotropolis” which includes business support zones, office parks, agri-processing facilities and logistics and manufacturing parks.

Since the approval of the Dube Trade Port, there has been steady interest shown in the land along the R102 between Tongaat and Verulam. Interest is of a commercial nature and includes queries related to warehousing development, office park or service station developments. There has also been interest shown in establishing a car-holding facility west in the Inyaninga area (SSI, 2010).

The LAP report stated that, “Tongaats is at a stage in its development where it has a wonderful opportunity to reinvent its economy by actively pursuing the opportunities around the new airport. Apart from being well located to provide basic services, the town and district could well take advantage of the opportunities in export-oriented agricultural and horticultural beneficiation. Furthermore it would be an advantageous location for the manufacture of so-called “Knowledge Products” such as electronics, computer software, telephone’s and wireless. This type of industry needs the supply and market service facility of an international airport with overnight airfreight capacity. There appears to be sufficient suitable land in close proximity, which could be rezoned for industrial and transport/logistics purposes, the most notable of which is ***Inyaninga in the South***, Compensation (which falls under Ilembe) in the North, and sections along the Ushukela Drive (Watson Highway)”. Some of the strategies outlined in the LAP report that is applicable to the study area are as follows (SSI, 2010):

- The consolidation and expansion of the town of Tongaat as a “new” town to accommodate expansion of residential and associated economic activity;
- Provide for the consolidation and expansion of the new airport and trade port into a world class “Aerotropolis” through the identification of land outside the Dube Trade Port area for logistics and industrial and business development which will contribute to the formation of a major new development node in the northern sub-metropolitan area of the municipality;

- Provide for improved and additional transportation network elements that will effectively link and integrate the two nodes of Tongaat and the “Aerotropolis”; and
- Provide for an increased and improved public transportation options to serve the town of Tongaat and the “Aerotropolis”

A-3 DETAILS OF THE APPLICANT

The details of the project applicant are:

Name of Applicant	Postal Address	Relevant Numbers
Tongaat Hulett Development Contact Person: Ms. Nonhlanhla Khoza	P.O Box 22319 Glenashley 4022	Tel: (031) 560 1969 Fax: 086 678 7028

A-4 NEED AND DESIRABILITY OF THE PROJECT

Iyer Urban Design Studio was appointed by the applicant to conduct a Development Framework Planning Assessment which informed the Development Framework Plan for the proposed Inyaninga/uShukela Highway Development Precinct. Refer to the Development Framework Planning Report in Appendix 6.

As indicated in Section A2, the proposed development is in line with the Provincial and Local Plans for development in the northern corridor of the municipality and the province. The development proposal aims to address new housing, economic and employment opportunities in the greater Tongaat region, to support and integrate with the KSIA/DTP and simultaneously unlock the growth and development potential of the greater Tongaat region.

A need has been identified to integrate the study area as a vital component of the evolving Northern Corridor. There are spatial legacy and inherent development challenges that exists within the metropolitan context and limited opportunities exist for people living in the inland corridor. The challenge for the city, is the need to:

- Address the geography of poverty;
- Build on urban systems that work;
- Enhance the natural resource base; and
- Create a ‘Next Generation City’.

This is further reinforced in the policy ethos of the city where all levels of planning policies such as the IDPs, SDFs , NSDP’s etc are geared towards restructuring the ‘Apartheid City’ and the creation of economic growth and investment in the north. Key elements in establishing a development corridor is developing an efficient and effective movement system that allows for multiple east/west and north south links, basically a ‘lattice’ that maximises choice and enables a complex set of mixed land uses that supports and enhances a development corridor. Combined with developing a regional northern corridor of opportunity, the Dube Tradeport presents a significant opportunity of creating an ‘Airport City’ that have become magnets for regional headquarters and logistic enterprises.

Globally, “Aerotropolis” caters for a myriad of uses that support airport cities such as, office complexes, hotels, meeting and entertainment facilities, logistics parks, shopping and other commercial activities. Inyaninga which is in close proximity to this catalyst can take advantage of its strategic location and provide support to the Dube Tradeport and thereby create unparalleled economic opportunities that are linked to the surrounding areas much in need of economic opportunity.

It is important, that whilst growing the northern corridor and providing additional commercial and industrial opportunity within the study area that the proposed development compliments the existing towns and their offering. For this reason, Tongaat and Verulam have been identified as towns that potentially could benefit

due to its proximity to Inyaninga. Currently both these towns are experiencing processes of urban decline in parts of the town centre and therefore greater connectivity to the R102 and the regional corridor would place these areas in a strategic position to reinvent themselves and offer new social, economic, cultural opportunity complimenting Inyaninga and the Dube Tradeport development.

A meeting took place with stakeholders from both Tongaat and Verulam and landowners of Inyaninga, the design team and THDev on 20 April 2012 to identify the key issues and challenges that the design team should consider in the Development Framework Plan. The priority themes were as follows:

- 1) Economy- focus on creating new employment opportunities,
- 2) Housing opportunities- the creation of a diverse mix of housing;
- 3) Corridor- developing the northern corridor of regional significance.

The image below is a mind map that was used to formally capture all the issues that emanated out of the consultation with the stakeholders.

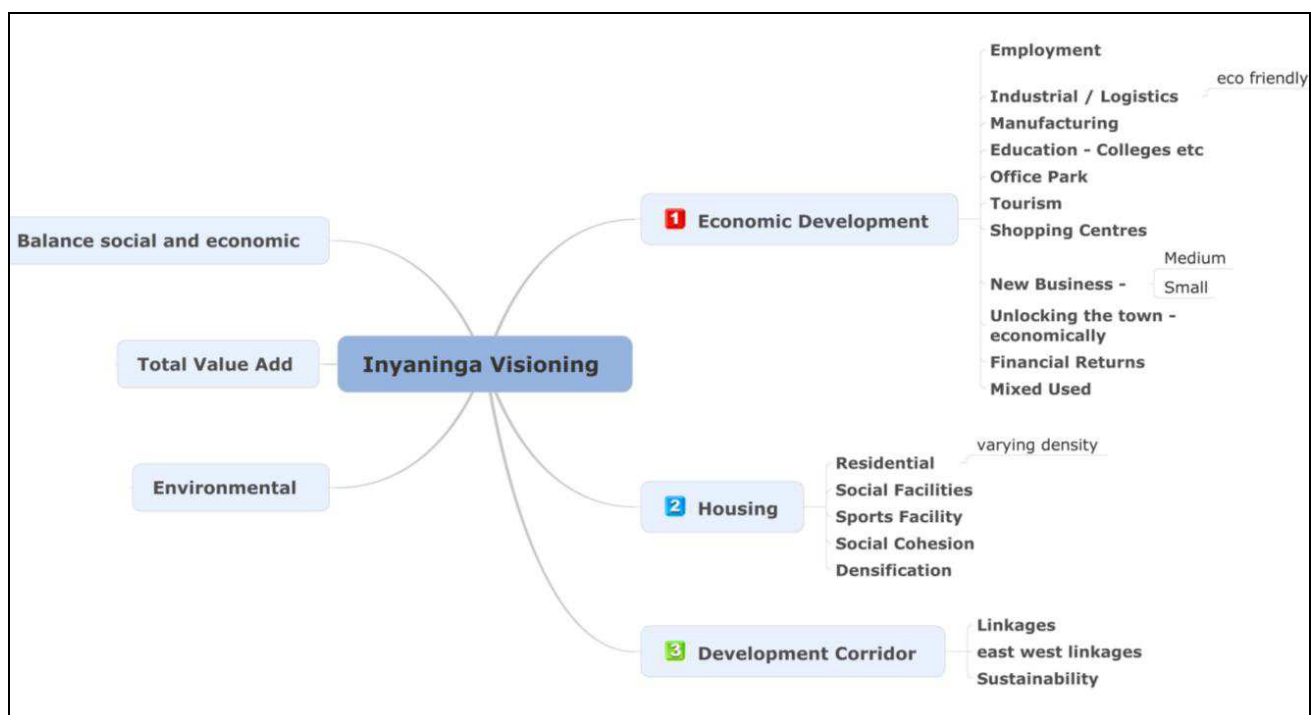


Figure 2: Mind Map of discussions with stakeholders on Development Framework Planning

Essentially the concept involves the integration of Tongaat and Verulam into the planning of Inyaninga thereby benefitting from the diverse activities proposed within Inyaninga. This presents an ideal opportunity for both Town centers to reinvent themselves and to capitalise on the economic opportunities that would be created within Inyaninga.

Overall the development is intended to do the following:

- Create a multifunctional city scale corridor- A corridor that encompasses a number of urban structuring elements, with a wide diversity of uses & activities.
- Integrate existing primary centres - Centres along the R102 such as Verulam and Tongaat serving a complimentary /supportive function along the corridor
- Introduce new local urban centres - At key junctions such as the Inyaninga Station and at important entrances into the Tongaat Town centre new local urban centres will be established.
- Create a compatible globally competitive region - Will re-enforce Dube Tradeport as Africa's first purpose- built 'Aerotropolis' and support a myriad of business, logistics trade and leisure activities.

- Supports Public Transport - The intension will support a range of Public Transport proposals such as Bus Rapid Transport (BRT) and light rail as and when the need arises.
- Provide for a diverse range of opportunities within the corridor - The intension is to create economic, social and recreational opportunity for all people.
- Link/Expansion of the Airport City - The development will enable the growth and expansion of the Airport City and create strategic linkages to the surrounding areas to form a major economic catalyst in the north of Durban.

The development framework consolidates all the policy, precedent and stakeholder needs and provides a framework that integrates with the existing primary centres and introduces new local urban centres along the corridor. The plan is aligned to both the provincial and local policy and spatial plans. The framework provides for a diverse range of opportunities within the corridor and starts building on the concept of an Aerotropolis. The framework has achieved all priorities and envisaged targets i.e. The creation of a diverse mix of housing, economic opportunity with logistic and business uses, integration with towns - all networks are seamlessly connected and more importantly a 'Next Generation City' which can become a major new hub for trade and business.

SECTION B:THE RECEIVING ENVIRONMENT

In order to, with any level of confidence, assess the potential impacts of the proposed development on the receiving environment, one needs to first assess the baseline conditions found over the study area. Using this *Status Quo* one can then, broadly speaking, determine the likely impacts that will emanate from a specific development typology on a well-defined receiving environment.

B-1 BIOPHYSICAL ENVIRONMENT

B-1.1 Geology and Geotechnical Suitability

The Preliminary Geotechnical Investigation for the Inyaninga and uShukela Highway Development Precinct sites were conducted by Thekwini Geo Civils (TGC) Engineers. Refer to Appendix 6.

(a) Inyaninga Site

(i) Site Geology

Three prominent geological formations, namely Vryheid Formation Sandstone/Siltstone, Pietermaritzburg Formation Shales, and Jurassic Age Dolerite occur at the site. The majority of the site is underlain by Pietermaritzburg Formation Shales with Dolerite and Vryheid Formation sandstone/siltstone favouring the eastern boundary. A second less prominent dolerite intrusion was mapped in the western site corner.

Further minor dolerite dykes/sills have intruded the Pietermaritzburg and Vryheid Formation strata as evident at numerous localities. The contact between the Pietermaritzburg Formation Shale (Pp) and Vryheid Formation Sandstone/Siltstone (Pv) is poorly defined, although the Pv is predominantly sandstone and Pp is predominantly shale, they both have subordinate shale or siltstone or fine sandstone lenses common to both formations, especially approaching the contact.

The table below provides a description of the typical soil profile occurring within the study area:

Table 6: Typical Soil Profile within the Inyaninga Precinct

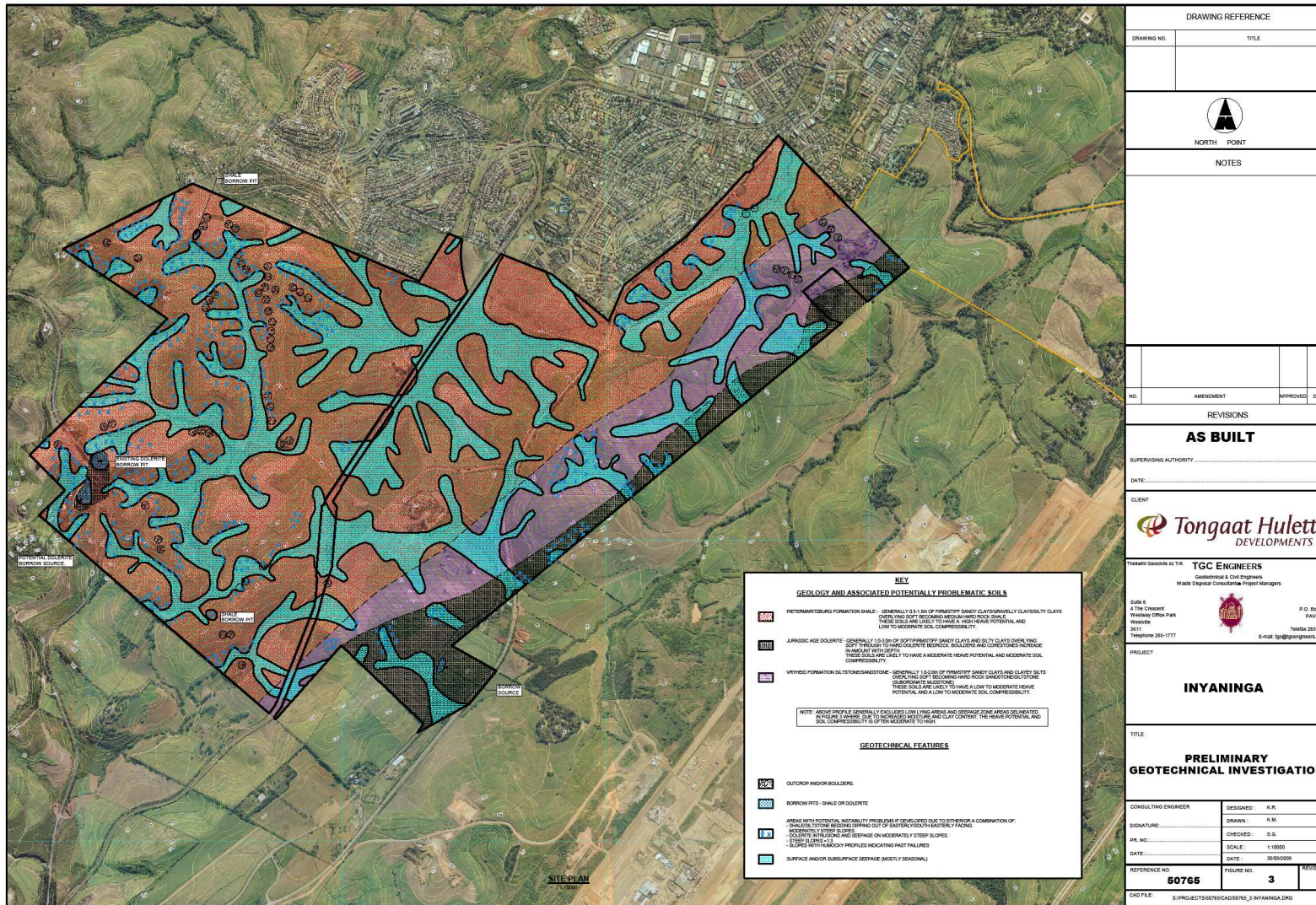
Geological Formation	Depths	Soil Description	Geotechnical Conditions
Vryheid Formation Sandstone/Siltstone	0 – 1,0/2,0m	Brown, orange, yellow, grey, firm/stiff sandy clay and clayey silt, Hillwash and Residuum.	<ul style="list-style-type: none"> The sandy clay and clayey silt Hillwash and Residual Soils are expected to have a low to moderate heave potential and a low to moderate soil compressibility. In essence, the heave potential and compressibility is expected to be moderate to low on hilltops and side slopes where soils are thin and more granular, however a moderate to high heave potential and compressibility is to be expected progressing down into valley bases where thicker, more clayey profiles are anticipated.
	>1,0/2,0m	Yellow, orange, brown, highly weathered to medium weathered with depth, medium to closely jointed, sub-horizontally bedded, soft rock siltstone interbedded with medium hard and hard rock sandstone.	

Geological Formation	Depths	Soil Description	Geotechnical Conditions
			<ul style="list-style-type: none"> • The cohesive soils are expected to have a low to moderate erosion potential. • Slope instability problems are commonly associated with the siltstone/mudstone horizons in the Vryheid formation, particularly where: <ul style="list-style-type: none"> - the bedding dips adversely out of moderate to steep slopes making south east and easterly facing slopes at this site susceptible to potential instability. - moderately to steep slopes are associated with dolerite intrusions and/or subsurface moisture. • The adjacent King Shaka Airport site encountered slope failures on cutting into slopes in the Vryheid Formation under the above conditions. Figure 3 of the Geotechnical Assessment in Appendix 6, highlights areas deemed susceptible to potential instability due to the above factors, together with areas steeper than 1 in 3 generally unsuitable for development. • Soft excavation is anticipated to moderate depth (2-3m) below which intermediate and hard excavation is expected (after SABS 1200D). Bedrock outcrop is localised.
Pietermaritzburg Formation Shale	0 – 0,5/1,5m > 0,5/1,5m	Black, brown, orange, grey, form/stiff, sandy clays/gravelly clays/silty clays. Black, dark grey, highly weathered to medium weathered with depth, medium to closely jointed, sub-horizontally bedded, soft rock shale becoming medium hard rock shale with depth.	<ul style="list-style-type: none"> • The sandy clay/gravelly clay/silty clay Hillwash and Residual soils are expected to have a high heave potential and low to moderate soil compressibility. Exception is in low lying areas where thicker/softer/wetter clayey soils with a moderate to high compressibility are to be expected. • The cohesive soils are expected to have a low erosion potential. • Slope stability problems are

Geological Formation	Depths	Soil Description	Geotechnical Conditions
			<p>well known in the Pietermaritzburg Formation Shale slopes and are evident by the hummocky slope terrain in the shale areas indicating previous failures.</p> <ul style="list-style-type: none"> • As with the Vryheid Formation, the Pietermaritzburg Formation shales are particularly susceptible to potential instability where: <ul style="list-style-type: none"> - the bedding dips adversely out of moderate to steep slopes making south east to easterly facing slopes at this site susceptible to potential instability. - moderately to steep slopes are associated with dolerite intrusions and/or subsurface moisture. • Figure 3 of the Geotechnical Assessment in Appendix 6 highlights areas deemed susceptible to potential instability due to the above factors, together with areas steeper than 1 in 3 generally unsuitable for development. • Soft excavation is anticipated to moderate depth (2,0-3,0m) below which intermediate and hard excavation is expected (after SABS 1200D). Bedrock outcrop is common in steep terrain and along ridge lines.
Jurassic Age Dolerite	<p>0 – 1,0/3,0m</p> <p>> 1,0/3,0m</p>	<p>Brown, red, soft/firm/stiff sandy clay, Hillwash and Residuum.</p> <p>Highly variable form shallow hard rock closely jointed dolerite, to deeply weathered gravelly sand soft rock dolerite, to hard dolerite corestones in a silty/clayey matrix.</p>	<p>Areas underlain by dolerite will vary from deep clays/silts to localised areas of shallow hard bedrock/boulders/corestones. For the most part, areas underlain by dolerite will have deep clayey/silty soil profiles with the following characteristics:</p> <ul style="list-style-type: none"> • A moderate heave potential and moderate soil compressibility. • A low to moderate erosion potential. • A potential for slope instability on moderate to steep slopes, especially

Geological Formation	Depths	Soil Description	Geotechnical Conditions
			<p>when associated with increased moisture.</p> <ul style="list-style-type: none">• Soft excavation is anticipated to considerable depth (>3,0m), below which intermediate and hard excavation is expected (after SABS 1200D). Localised areas of shallow hard excavation and boulder excavation is to be expected.

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Figure 3: Geological Map for the Inyaninga Site

(b) Ushukela Highway Site**(i) Site Geology**

The site geology is generally comprises of the Vryheid Formation Siltstone/Sandstone (subordinate mudstone). A large dolerite dyke has intruded the Vryheid Formation in the west-central portion of the site. Further minor/associated dolerite intrusions are to be expected throughout the Vryheid Formation sandstone/siltstone.

Table 7: Typical Soil Profile within the Ushukela Precinct

Geological Formation	Depths	Soil Description	Geotechnical Conditions
Vryheid Formation Sandstone/Siltstone	0 – 1.0/2,0m	Brown, orange, yellow, grey, soft/firm/stiff sandy clay and clayey silt, Hillwash and Residuum	<ul style="list-style-type: none"> • The sandy clay and clayey silt Hillwash and Residual Soils are expected to have a low to moderate heave potential and a low to moderate soil compressibility. In essence, the heave potential and compressibility is expected to be moderate to low on hilltops and side slopes where soils are thin and more granular, however a moderate to high heave potential and compressibility is to be expected progressing down into valley bases where thicker, more clayey profiles are anticipated. • The cohesive soils are expected to have a low to moderate erosion potential. • Slope instability problems are commonly associated with the siltstone/mudstone horizons in the Vryheid formation, particularly where: <ul style="list-style-type: none"> - the bedding dips adversely out of moderate to steep slopes making south east and easterly facing slopes at this site susceptible to potential instability. - moderately to steep slopes are associated with dolerite intrusions and/or subsurface moisture. • The adjacent King Shaka Airport site encountered slope failures on cutting into slopes in the Vryheid Formation under the above conditions. Figure 1 of the Geotechnical Assessment in Appendix 6 highlights areas deemed susceptible to potential instability due to the above factors, together with areas steeper than 1 in 3 generally unsuitable for development. • Soft excavation is anticipated to moderate depth (2-3m) below which intermediate and hard excavation is expected (after SABS 1200D). Bedrock outcrop is localised.
	>1,0/2,0m	Yellow, orange, brown, highly weathered to medium weathered with depth, medium to closely jointed, sub-horizontally bedded (generally dipping 10-20° SE on 140-160° dip direction), soft rock siltstone/mudstone interbedded with medium hard and hard rock sandstone.	

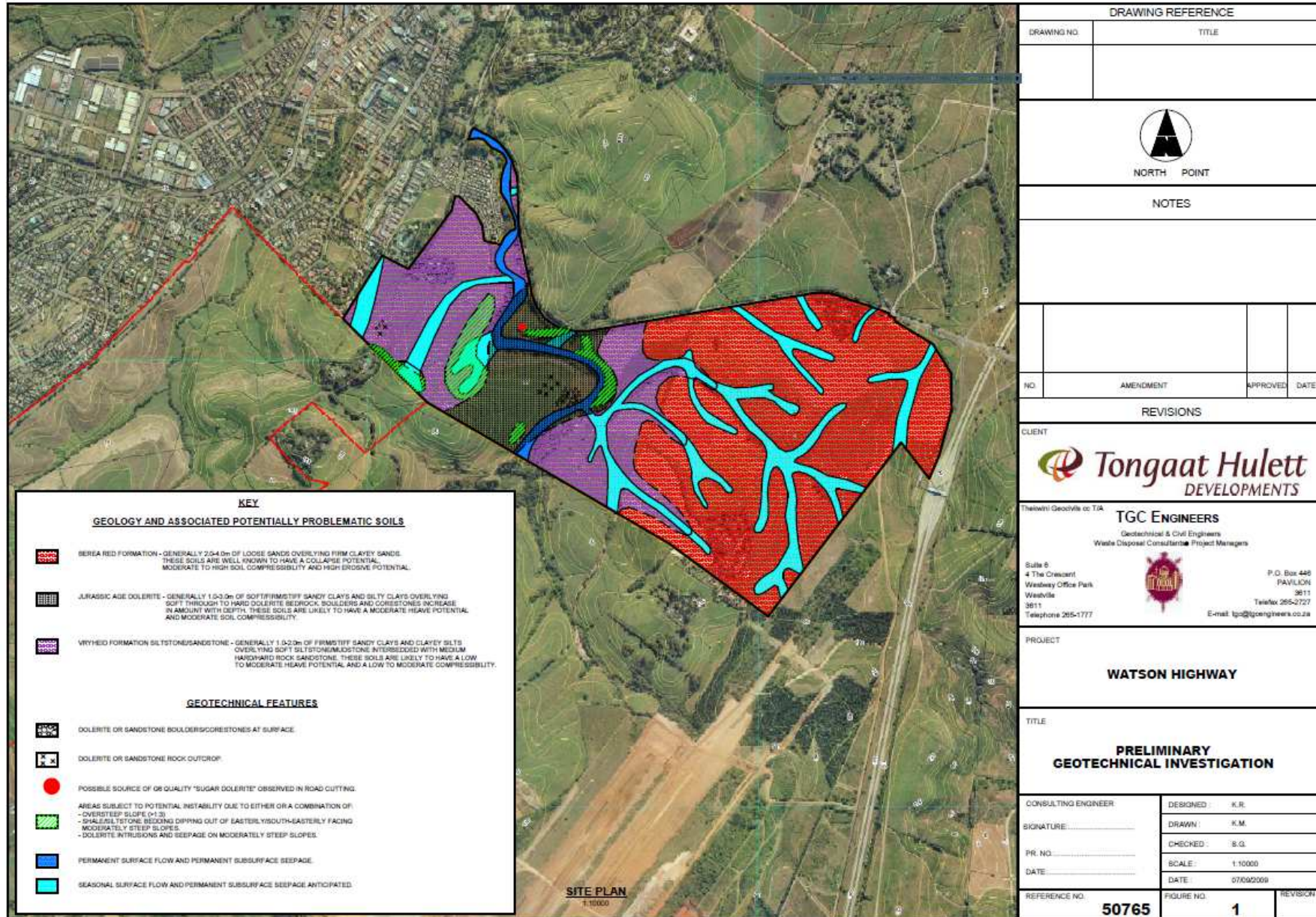


Figure 4: Geological Map for Ushukela Highway Site

B-1.2 Soils and Agricultural Potential

Mottram and Associates cc were appointed by THDev to conduct the Agricultural Potential Assessment for the development site (refer to the Agricultural Assessment in Appendix 6).

The site falls within BioResource Unit (BRU) Ya 14. This Ya14 BRU is found in BioResource Group 1 (BRG subgroup 1.3) that is defined as 'Moist Coastal Forest, Thorn and Palm Veld'. The vegetation consists of bushed grassland and bushland thicket. Indicator species are *Syzygium cordatum* (Water Berry) and *Strelitzia nicolae* (Natal Wild Banana). The terrain comprises of rolling hills to steep slopes with an altitude range from 40 to 182m above sea level and has a potential surface erosion hazard with some of the soils. The soils are predominantly Milkwood (261ha), Shortlands (231ha), Windermere (274ha) and Avoca (285ha) soil, and apart from Shortlands and Milkwood these have poor soil water characteristics and a moderate to low potential in good seasons. Good seasons include well distributed rainfall and sufficient incoming solar radiation.

The site is currently used for sugar cane cultivation. Poor sugarcane yields have been obtained, ranging from 33.7 to 59.2 t ha⁻¹ annum⁻¹ under dryland and irrigated production over the past eight years. There was no significant difference between the irrigated and dryland production except in the dry seasons, over this period. In addition to the soil restrictions this could be due to a number of reasons, high input costs, old and faulty irrigation systems, poor irrigation scheduling, etc.

Canesim (a sugarcane crop growth simulation model adopted by SASRI for crop yield estimation) predicts yields from 107 to 135 t ha⁻¹ annum⁻¹ for dryland and irrigated production provided all growth conditions are met, but due to inherent soil restrictions for crop production, such yields will not be attained. The climate capability rating is C1, where the local climate is favourable for a wide range of adapted crops and an all year round growing season. Low rainfall not well distributed throughout the year, and lack of water resources on the site, are severe limitations on the dryland production areas. There is a supply of water, both fresh and wastewater that is suitable for supplementary irrigation on some 25% of the site.

Land capability on these properties varies between Class III and IV, due to the limitations that exist, and with respect to agricultural land categories these properties fall within Category B and C (Ref KZN Agric Report N/A/2012/11). There is electricity at the site, and the road infrastructure to and from the site is excellent. The in-field road network is very good. There is existing agricultural infrastructure (*sheds, workshops, offices, dwellings for staff, etc.*) at the site, but needs to be maintained and in some cases refurbished. The site is close to local markets, the Dube Trade Port and to the KSIA.

a) Potential for alternate crop production at the site

(i) Bananas

Bananas require a well-drained soil with good soil water retention characteristics. They have a high water requirement throughout the year and thus on this site, supplementary irrigation is essential. This could be possible with the current water resources that exist at the site. However, it is possible that DWA may not issue a license for the additional irrigation from the Hlawe and Tongati Rivers.

(ii) Macadamia Nuts

The site would only be suitable for production of Macadamia nuts if irrigation was installed on all good soils. Extensive windbreaks would have to be established, and an intensive surface drainage system installed. The likelihood of a substantial increase in the rateable value of the site would render this alternative not financially viable.

(iii) Grasses

Most grass species will do well in this climate and on these aspects. Instant lawn is considered as with all the development in the area there is a market in the short and medium term. Instant lawn could be cultivated on

some of the flatter lands that are deeper and with no drainage problems. Sufficient water is available for approximately 10ha. Without irrigation this is not a possibility and it is a short to medium term enterprise. The likelihood of a substantial increase in the rateable value of the site would render this alternative not financially viable.

(iv) Vegetable Crops

Certain vegetable crops, especially in winter months, could be grown at the Estate with irrigation and provided that secure fencing, and wind breaks were installed/established. These crops are reasonably labour intensive and would provide employment to the local populace. It is estimated that 2 labourers would be required for each hectare planted under external conditions. With controlled environments this figure would rise to at least 10 per hectare. Again selection of suitable lands, rotation practices and growing season would significantly affect this enterprise. High value, niche market vegetables could be grown especially under controlled environment conditions. There is a good market for perishable. The likelihood of a substantial increase in the rateable value of the Estate would render this alternative not financially viable.

(v) Medicinal Plants and Trees

The Durban Metropolitan Area is the main regional trading area in addition to a possible small local market. The current demand for the numerous species used in indigenous medicines exceeds supply and as a result several species, e.g. wild ginger and pepper-bark tree have become extinct outside KZN. Little cultivation is carried out due mainly to lack of knowledge of indigenous plant cultivation and the economics of associated markets. From current experience, it will be necessary to have irrigation to establish a small nursery of the selected medicinal plants and to ensure that transplants survive in the ground. Many medicinal plants grow in afforested areas, thus the choice on this Estate is minimal. The growing areas and handling facilities would also have to be secure. Experience has shown to-date that a grower needs to involve at least a herbalist in the operation, to ensure a market. The presentation and marketing of traditional medicine has its own culture and *modus operandi*.

This industry of cultivated medicinal plants is still in relative infancy and one would need to build up a stock in a nursery.

(vi) Cut flowers and potted plants, including indigenous trees

If one has access to land and finance, then the option of growth houses can be utilised on land that is not necessarily suited for open-air cultivation. As this site is not situated in lower lying areas, sturdy structures would have to be erected to contend with wind conditions. A high level of management will be required for production, sanitation, harvesting, packing and marketing. There is potential competition in this market at Dube Trade Port, however if selected niche products were chosen and produced, and finance was not limiting, this could be an option. The likelihood of a substantial increase in the rateable value of the site might render this alternative not financially viable.

b) Tongaat Hulett Agricultural Initiatives

In KZN the land used for sugarcane production has increased over the last 3 years by 17 835ha, an increase of 15% and this includes land taken out for urban development. Thus the impact of urban development on sugarcane production is insignificant. Tongaat Hulett only owns 8% of the total quantum of land that supplies cane to its mills, so even a total loss of this 8% is insignificant. Tongaat Hulett (TH) commenced with new sugarcane areas in 2009 and by the end of the 2012/13 season this will be 29 937ha. TH has made commitments to increase agricultural production, whilst creating new and enhanced agricultural opportunities and a potential revenue base for emerging farmers. The areas invested in have been largely in rural areas and within Ingonyama Trust land where new management models have been created to ensure sustainability of these new plantings. This work has been done in partnership with both National and Provincial government as well as in partnership with the Ingonyama Trust Board (ITB), where it affects ITB land.

By 2017, it is planned to have a total of 68 397ha of new plantings of sugarcane as compared with the 2009 areas. This is extremely significant and apart it is noteworthy that these new areas being developed are in the rural hinterland. It is also pertinent to note that over the past 6 years TH has invested over R8 million in sugarcane supply related projects. This combined with a rural development and food security strategy of new sugarcane development providing an anchor for services, investment, training, etc., allows for other more intensive food related crops to be grown for local consumption.

Thus removing the property from agricultural production will have little or no impact on food security in the region.

c) Impact on adjacent Agricultural Uses

The land surrounding the site is either under urban development, part of Tongaat Hulett's ownership or is privately owned and also under commercial sugar cane. In regard to the former, there is no impact apart from positive due to security and nuisance issues. In regard to adjacent Tongaat Hulett owned agricultural land, there is no major impact as this will continue to be farmed until actual conversion to new development. Portions of farm estates that left over are merely incorporated into adjacent estates or continued to be managed centrally. In regard to adjacent agricultural land owned by other parties, there will be no impact as they are not part of this land, and are managed separately. If they are under sugarcane, they will continue to deliver to the appropriate sugar mill.

B-1.3 Topography and Hydrology

B-1.3.1 Topography

The uShukela Highway Development precinct is generally divisible, according to the topography, into a western half and an eastern half. The western portion generally comprises moderately steep topography with upper convex and lower concave slope conformations. The eastern half generally comprises gently rolling hills with flatter/planar topography.

B-1.3.2 Hydrology (Proposed Inyaninga Integrated Human Settlements Development)

Ground Truth compiled the Freshwater Ecosystems Assessment for the proposed Inyaninga/Ushukela Highway Development Precinct (refer to Appendix 6). The study area falls within two quaternary catchments, namely, U30B that drains into the Mloti River and U30D draining into the Hlawe River.

Three wetland types are present within the study site consisting of channelled valley-bottom, unchannelled valley-bottom, and hillslope seepage wetlands. For the three wetland types, the ecosystem threat status is considered to be critically endangered. The wetland habitat has been transformed as a result of sugarcane cultivation, urban infrastructure development and other impacts have had an adverse effect on the systems integrity and the supply of ecosystem services. This is mostly related to minimal protection this vegetation unit is receiving and the level of transformation that has occurred. It should be noted that Ezemvelo KZN Wildlife (2009) makes reference to the fact that transformed systems, such as the systems within the study site, are weighted differently. The wetlands are supplying the specified ecosystem services at **Intermediate to Moderately High** levels, but these scores are mostly determined by the opportunities that exist for these systems to supply ecosystem services within the landscape rather than the effectiveness. The rehabilitation of transformed wetland systems allows for the provisioning of wetland habitat that previously was non-existent.

According to the available National Freshwater Ecosystem Priority Areas (NFEPA) wetlands coverage, certain wetlands within and directly adjacent to the study site have been classified as NFEPA wetlands, most likely due the presence of natural vegetation within a largely transformed landscape. Two wetlands within and/or adjacent to the study site have been identified as NFEPA wetlands, based on expert identification (Nel *et al.*,

2011). In addition, any developments in close proximity to NFEPA freshwater ecosystems should be given special consideration, relating to the potential impacts that the development may have on these systems. A buffer distance of 30m will be implemented around the freshwater ecosystems.

It should be noted that the Hydro Geomorphic Unit (HGM) within the U30B quaternary catchment drain into the Mdloti River that has been partially classified as a NFEPA river due it is near-natural state ('B' Category – Largely Natural) in its upper reaches. Downstream of the confluence of Mdloti and Black Mhlashini Rivers, the stretch of river associated with the majority of the freshwater ecosystems within the development site, the river loses its NFEPA status (Nel et al., 2011).

The extent of the wetland habitat within the study site is approximately 108.4 ha, as identified during the delineation study. However, the HGM units extend beyond the development site boundary and comprise 160.9 ha⁵. Many of these systems are interlinked by freshwater ecosystems, particularly riparian habitat.

Assessment of riverine habitats that are present onsite highlights that the riparian and in stream habitats associated with these systems have become modified largely as a result of sugarcane cultivation and resulting impacts. Consequently, and from an ecological perspective, the riverine systems are considered to have a Low Ecological Importance and Sensitivity (EIS) with limited potential to support significant biodiversity assets. Results from the Index of Habitat Integrity (IHI) analyses highlights that the riverine systems, in general, are Moderately Modified. Thus in terms of general ecology of the site, the riverine systems have generally maintained higher levels of habitat integrity compared to that of the wetland systems. While these systems are modified, they are supplying ecosystems goods and services that would be important within the post-development landscape. The development planning should therefore attempt to ensure “no-net-loss” of functioning or integrity of the identified freshwater ecosystems. Where possible the development should include the protection, rehabilitation and management of the wetland and riverine habitat to further enhance the level of ecosystem service delivery.

The wetland habitat under current conditions identified extensive historical modification, associated with agricultural activities within the wetlands and surrounding landscape. The impacts on the systems were linked to the following activities, inter alia:

- Croplands sugarcane;
- Alteration to water flow in catchment
- Infrastructure
- Alien vegetation

These activities have resulted in modifications to the systems' ecological integrity. For ease of interpretation the scores for hydrology, geomorphology and vegetation for the current scenario were simplified into a composite impact score for the entire wetland complex by area-weighting the scores obtained for the individual HGM units, as outlined in Macfarlane *et al* (2007). These scores were then used to derive hectare equivalents, which was used as the 'currency' for assessing the loss and gains in wetland integrity (Cowden & Kotze, 2007; Kotze & Ellery, 2009). Based on the extent and intensity of impact of the identified disturbance units on the wetland habitat, the approximately 160 ha of wetland habitat, of which 108.4ha are onsite, was considered to be the equivalent of 46.4 ha of intact wetland habitat.

Table 8: Summary of the overall ecological integrity for the current scenario

	Hydrology	Geomorphology	Vegetation
Impact Scores	8.91	2.11	9.43
Composite Impact Score	7.11		
Present State	E		

Category		
Hectares of Wetland	of	160.9
Hectare Equivalent		46.4

It is estimated, based on the proposed development layout, that the remaining areas of wetland habitat within the post-construction landscape will cover an area of approximately 60.8 ha. It should be noted that although certain HGM units within the post-development landscape appear to be unaffected by the development, many of these systems will most likely undergo some level of modification due to the construction of roads, power lines or other servitudes. In the case of hardened surfaces within the catchment, it is assumed that appropriate mitigation measures will be implemented to ensure the hydrology of the system is not adversely affected.

The ecosystem services scoring **Moderately High** were mostly related to the high opportunity that exists for the systems to supply ecosystem services within the landscape. Within the post-development landscape, the opportunity scores for the provision of ecosystem services by the wetlands within the site is likely to change, with more opportunities existing for flood attenuation, toxicant removal and erosion control. However, without rehabilitation of the wetlands, including the surrounding buffer zones, the effectiveness of these systems within the landscape is unlikely to increase. The rehabilitation of these wetlands is therefore an important consideration, especially if the proposed development consists of residential and business centres, maximising the benefits to the aquatic ecosystems downstream.

It is anticipated that post-development, the HGM units within the study area would supply the specified ecosystem services at **Moderately High to High levels**, except for U30D-106, U30D-107 and U30D-110 as they will be lost entirely in the post-development landscape. It should be noted that U30D-110 is considered to be 'lost' as a result of the proposed servitude running through the identified area. All of the systems are considered to be important in terms of enhancing water quality within the landscape, particularly for nitrate and toxicant removal, sediment trapping and erosion control. The importance of these systems in terms of enhancing water quality is linked to opportunity to 'polish' the runoff from the surrounding development. The effectiveness of these systems to provide these services will be directly related to the hydrological regime and vegetation cover, with the latter improving significantly within the post-development landscape due to the appropriate rehabilitation and re-vegetation of these wetland systems. The systems' provision of direct benefits and services, such as resource harvesting, is limited due to the wetlands being situated within private property with controlled access.

The post-development scenario, with the adoption of mitigation activities, includes both positive and negative impacts on the identified wetland systems. The systems' geomorphic integrity is reduced due to the infilling and deactivation of portions of the wetland, but the overall integrity is marginally improved by the improvements in the hydrological and vegetative components, partially relating to the buffer zone surrounding the wetlands. Overall, with the rehabilitation of the remaining wetland areas onsite, there is gain of 15.7 hectare equivalents.

The adoption of mitigation activities, with the remaining areas of wetland habitat onsite being rehabilitated and managed to ensure diffuse flow, wetland plant species diversity and the presence of temporary, seasonal and permanent wetness zones, manages the impacts on the wetland habitat. The onsite mitigation contributes significantly to reducing the degree of impact on the wetland habitat, ensuring that there are no residual impacts in terms of loss in wetland integrity.

Table 9: Summary of the overall ecological integrity for the post-development scenario

	Hydrology	Geomorphology	Vegetation
Impact Scores	6.6	5.2	6.5

Composite Score	Impact	5.09
Present Category	State	D
Hectares of Wetland		160.9
Hectare Equivalent		62.09

Regular post-development monitoring will be required to ensure that the functioning and integrity of these systems is retained and not reduced through the development. Should a reduction in the functioning and integrity occur, offsite mitigation activities may be required to ensure a 'no-net-loss' is maintained.

B-1.3.3 Hydrology (Proposed Sewer Pipelines)

Ground Truth compiled the Freshwater Ecosystems Assessment for the proposed construction of the north and south sewer pipelines for the proposed Inyaninga/Ushukela Highway Development Precinct (refer to Appendix 6).

According to the findings of the Freshwater Ecosystems Assessment, there are four types of HGM units identified along the 40m corridor of the proposed sewer pipelines. These are as follows:

- Unchannelled valley-Bottom;
- Channelled Valley Bottom;
- Floodplains and its associated depressions; and
- Hill slope seeps.

For the four wetland types the ecosystem threat status is considered to be 'critically endangered'. Further to this, floodplains are considered to be the most endangered of all of the wetland types, with over 80% of South Africa's floodplain not receiving any level of protection. Of this 80%, over 60% of these systems are critically endangered (Nel & Driver, 2012). This is mostly related to minimal protection this vegetation unit receives and the level of transformation that has occurred historically, as is evident within the study site.

The majority of the wetland and riparian systems that the pipeline alignment would cross are in a modified condition and alien invasive plant cover is extensive, as are impacts from urban infrastructure. With the exception of the crossing points across the uMdloti and Hlawe Rivers, (Appendix 2) the remaining crossing points are through wetlands and small or non-perennial streams. However, in accordance with Section 21 of the National Water Act (Act 36 of 1998); any activity resulting in the impeding or diverting of flow in a water course (21c), and altering of bed, banks, course or characteristics of a watercourse (21i) requires a water use licence. The impacts associated with all these crossings are therefore likely to require water use license applications.

a) National Freshwater Ecosystem Priority Areas

According to the available NFEPA coverage, the wetland areas within close proximity to the northern sewer pipeline alignment have been classified as high priority systems. However, the wetland areas within close proximity to the southern sewer pipeline however; were classified as lower priority systems.

The NFEPA classification of the wetlands in close proximity to the northern sewer pipeline alignment was based on the assumption made at a regional NFEPA workshop that the majority of these systems were in a relatively natural condition, as they were beyond areas of sugarcane cultivation, and may contribute towards biodiversity within the landscape. However, the results of this field-based study suggest that the systems are in fact highly modified, and not in a natural condition, thereby suggesting that the system's priority may in fact be low. Regardless of this fact, any development in close proximity to freshwater ecosystems should be given special consideration, in terms of the layout planning, for example, the adoption of buffer zones and mitigation

measures.

b) Wetland/Riparian Delineation within the Study Area of the Sewer Pipelines

A total of thirty three (33) crossings were identified along the proposed sewer pipeline alignments, within the Tongaati and uMdloti Rivers catchments. Twenty (20) of the crossings were assessed as wetlands, and seventeen (17) were assessed as riparian habitat, with two (2) being classified as drainage lines i.e. having neither wetland nor riparian characteristics (refer to Maps GTW317-160813-01 and GTW317-160813-02 in Appendix 6).

c) Level 1 Wetland Health Assessment

Of the 20 identified wetland systems along the sewer pipeline routes, 2 of the sites fell within the 'seriously modified' class, 11 of the sites fell within the 'poor' class, with the remaining 7 systems classed as 'fair'. These generally poor ratings can be attributed to a variety of anthropogenic impacts along the route such as the following:

- The direct utilization of the wetlands for commercial agriculture;
- Modifications to the wetlands' integrity associated with urbanisation;
- An abundance of pollutants such as solid waste, raw sewage and pesticides as a result of surrounding land use activities, resulting in changes in vegetation composition; and
- The clearing of vegetation and the subsequent encroachment of alien invasive plant species within the wetland systems.

d) Riparian Habitat Integrity

The integrity of the instream and riparian habitats were assessed and all of the sites showed some level of disturbance. The IHI assessments indicate that the instream habitats were less modified than the riparian habitats. The instream habitats were mainly impacted by water quality issues and anthropogenic modifications. All riparian habitats were modified to varying degrees with the most prevalent impact being habitat loss through vegetation removal and invasion by exotic flora.

B-1.4 Climate

The site falls within Bioresource Group 1 – Moist Coast Forest, Thorn and Palm Veld. Rainfall in this area is mainly in summer. Dry periods of several weeks can be expected to occur, and this has an effect on the yield of sugar cane. Summers are hot while winters are mild. Frost is very rare and humidity is very high (Camp, 1997).

The table below provides information on the climate data from 2000 to 2008. The climate data was obtained from the South African Sugar Association (SASA) Experiment station in Tongaat.

Table 10: Climate Data from SASA Experiment Station in Tongaat

YEAR	RAIN (mm)	TMX (°C)	TMN (°C)	RHP (%)	EVP (mm/d)	DBA (°C)	WBP (°C)	RHA (%)	RHP (%)	SUN (h)	WND (km/d)
2000	1300.7	25.9	16.1	71	4.5	18.6	20.7	87	71	6.4	149.7
2001	930.8	26.0	16.0	69	4.9	19.2	20.2	83	69	6.5	141.5
2002	950.3	25.9	15.5	64	4.5	19.2	19.9	81	64	6.3	132.4
2003	596.1	25.8	14.7	65	4.4	19.3	19.9	80	65	6.5	144.5
2004	932.1	26.0	15.6	65	4.0	19.5	20.2	79	65	6.5	122.7
2005	685.1	26.4	15.6	65	3.9	19.8	20.2	80	65	6.1	126.7
2006	1307.1	26.3	15.1	66	3.9	19.7	20.2	80	66	6.2	131.5
2007	894.0	26.0	15.4	64	4.4	19.9	19.9	77	64	6.5	145.8
2008	862.9	25.9	15.7	64	4.1	19.7	19.8	79	64	5.9	126.6

Legend:

TMX	Maximum Temperature
TMN	Minimum Temperature
RHP	Relative Humidity 14h00
EVP	A-pan evaporation
DBA	Dry bulk 08h00
WBP	Wet bulb 14h00
RHA	Relative humidity 08h00
RHP	Relative humidity 14h00
SUN	sunshine hours
WND	Wind run

B-1.5 Ecological Assessment

GroundTruth were appointed by THDev to conduct an Ecological Assessment for the proposed development site which focussed on the floral and faunal assemblages on the site. Refer to the Ecological Assessment in Appendix 6. The purpose of this study was to define the natural vegetation of the site, which will inform the condition of available ecological features. This information forms the basis for defining ecosystem components, for example diversity of flora and fauna.

a) Findings of the Terrestrial Ecological Assessment

The study area is largely transformed due to previous land use developments, primarily sugarcane. The only natural habitats available on-site are restricted to a few isolated patches of riparian vegetation along water courses such as drainage lines, streams and rivers (see Appendix 1, Photograph 1 of the Ecological Assessment in Appendix 6). These areas support indigenous woody vegetation (trees, shrubs and herbs), comprising a variety of plant species (~40 species), but also a large number of alien plants (~30 species), which in addition to familiar species includes a number of lesser known garden escapees. Essentially these ecological strips are remnants of riparian habitat that would have occurred here historically. Appendix 2 of the Ecological Assessment in Appendix 6 shows the extent of the extent of natural habitat areas mapped for the protection of remnant available vegetation communities.

b) Floral Species

The remnant riparian habitat present has the potential to support various important flora taxa, which these include the following (after Mucina and Rutherford, 2006):

Grasses – *Cymbopogon caesius*, *C. nardus*, *Digitaria eriantha*, *Hyparrhenia filipendula* and *Panicum maximum*;

Herbaceous plants – *Alepidea longifolia*, *Cephalaria oblongifolia*, *Conostomium natalense*, *Crotalaria lanceolata*, *Cyanotis speciosa*, *Disa polygonoides*, *Dissotis canescens*, *Gerbera ambigua*, *Helichrysum cymosum* subsp. *cymosum*, *Hibiscus pedunculatus*, *Hybanthus capensis*, *Ledebouria floribunda*, *Pachycarpus asperifolius*, *Senecio albanensis*, *Schizocarphus nervosus*, *Sisyranthus imberbis*, *Stachys aethiopica* and *S. nigricans*;

Climbers – *Asparagus racemosus*, and *Smilax anceps*;

Shrubs – *Clutia pulchella*, and *Tephrosia polystachya*; and

Trees – *Acacia natalitia*, *Albizia adianthifolia*, *Antedasma venosum*, *Bridelia micrantha*, *Phoenix reclinata* and *Syzygium cordatum*.

Over 40 species of indigenous plant species were recorded during the site visit; 23 of these comprised tree species, some of which are fairly common to the KZN Coastal Belt, e.g. *Acacia robusta*, *Apodytes dimidiata*, *Bridellia micrantha*, *Syzygium cordatum*, and *Trichilia dregeana* (Appendix 3 of the Ecological Assessment in Appendix 6). However, a significant number of alien plant species (~30 species) were noted on-site, particularly along the Hlawe River.

c) Protected Species

Four notable plant species, protected according to provincial conservation legislation, were recorded on-site, namely herbaceous plants *Scadoxus puniceus* and *Drimiopsus maculata* and trees *Barringtonia racemosa* and *Millettia grandis*. Permits from the KZN Department of Agriculture, Forestry and Fisheries (DAFF) would be required prior to the removal and relocation of these Protected plant species.

d) Ecological Status of Natural Habitat Areas

The indigenous vegetation present within the study area has been severely impacted upon by historical and current agricultural activity which has primarily been the cause of continual disturbance along the habitat edges over a long period. Additional disturbance has occurred due to invasion by alien plants, which are evidently not controlled.

The proportion of indigenous vegetation varies across the site and is significant for certain habitat patches (e.g. greater than 50%). Although the diversity of species is not large, it does include large indigenous trees which are important in terms of other biodiversity components (e.g. mammals, birds, reptiles, insects, etc.). These areas also support herbaceous elements ordinarily found in less disturbed woody vegetation along this part of the KwaZulu-Natal coast. Hence attempts to remove and control alien plants could drastically improve the biodiversity value of the area through ecological restoration whereby the vegetation may recover to a much better state. There are certain areas where the woody vegetation constitutes higher diversity or more uniform growth of indigenous trees (e.g. *Syzygium cordatum*); such areas could be described as forest habitat. This floral diversity is supported by the list of species given in Appendix 3 of the Ecological Assessment in Appendix 6.

The riparian habitat situated along the Hlawe River was found to be heavily impacted by alien plant infestations. Exotic species noted as being particularly problematic along the Hlawe River include large species such as bamboo (*Bambusa* sp.), gum (*Eucalyptus* sp.) and syringa (*Melia azedarach*). Alien eradication efforts have already commenced for certain riparian areas (see Appendix 1, Photograph 3 and 4 of the Ecological Assessment in Appendix 6). Based on the findings regarding the condition of vegetation on-site, the mapped natural habitats shown in Figure 4, were then characterised according to the magnitude of alien plant infestations and distribution of important flora. Consequently, riparian habitat areas that are heavily infested and with no notable plant species present are classed as 'moderate' whereas habitats with limited alien plant infestation and which are known to support important plant taxa are classed as 'good' (Appendix 2 of the Ecological Assessment in Appendix 6).

Despite being classed as highly degraded, the remaining patches of riparian habitat retain reasonable and important ecological value due to the presence of protected plant species but also because of the valuable functions offered by riparian systems (e.g. controlling and regulating hydrological processes, reducing impacts such as erosion and sedimentation of rivers, water quality purification, maintenance of ecological corridors, etc.). Therefore it is important that any future development plans for the site make provision to maintain and restore the ecological integrity of the remaining riparian habitat.

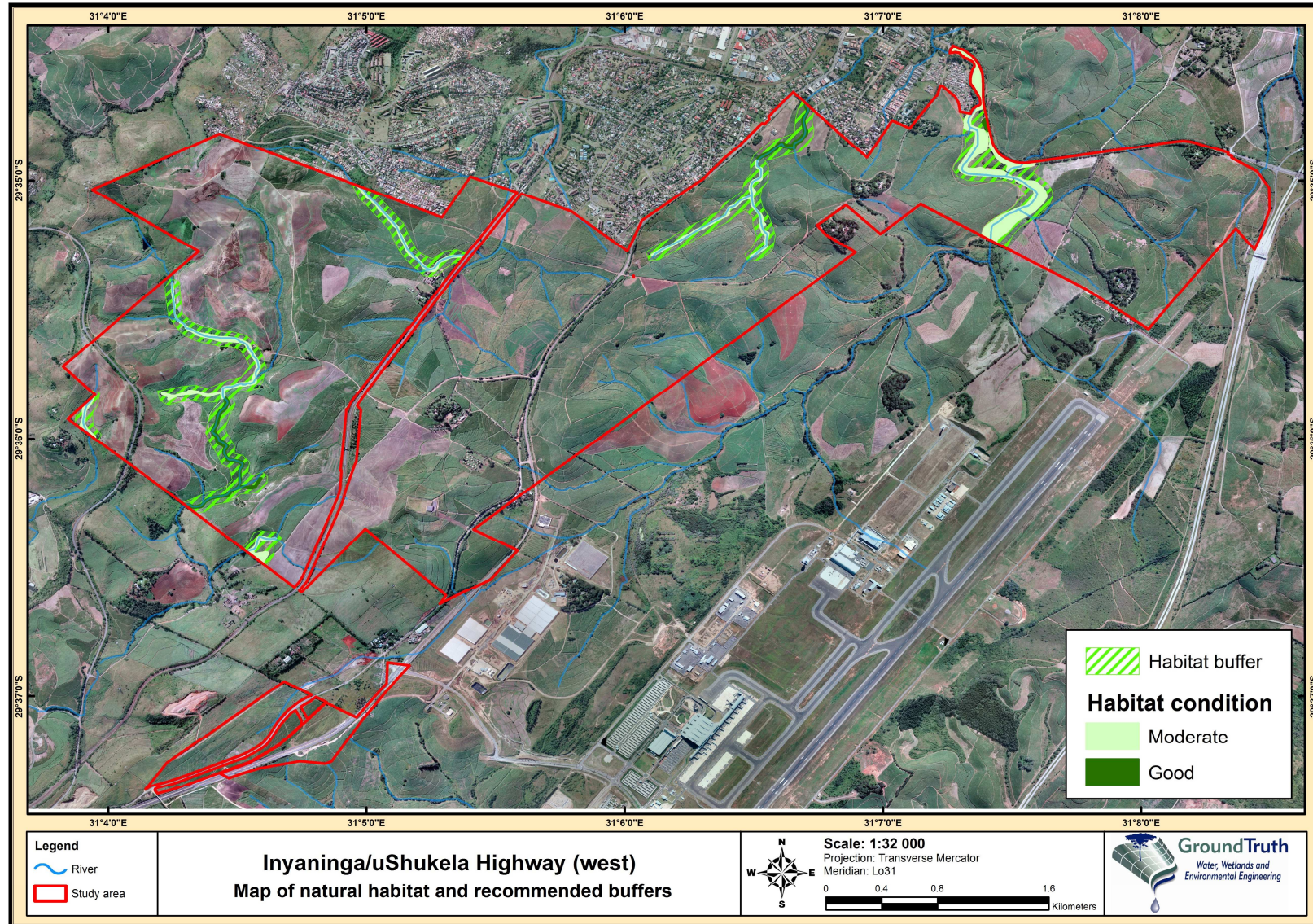


Figure 5: Distribution of natural habitat with recommended buffers for the study area

B-2 SOCIAL ENVIRONMENT

B-2.1 Socio-Economic Environment

Urban-Econ was appointed by THDev to conduct the Socio-Economic Impact Assessment for the proposed development. Refer to Appendix 6 for the Socio-Economic Assessment.

The surrounding areas to the development site that are likely to be the most significantly affected areas by the project are the neighbouring nodes of Tongaat and Verulam. These are identified as the primary impact nodes, as these will experience the greatest socio-economic impact from the development. Further lying areas such as Ndwedwe (greater western rural region), northern eThekweni (including Waterloo, La Mercy, Mt Edgecombe, and Umhlanga) as well as southern KwaDukuza (Ballito) are also anticipated to be affected by the development. These are included in the secondary impact area.

a) Primary Areas: Tongaat and Verulam

The primary impact area includes the nodes of Tongaat² and Verulam due to the geographic proximity and the ease of access along the R102. Tongaat and Verulam act as local service nodes in north eThekweni, serving relatively small populations which account for 1% the total size of eThekweni Metropolitan. Also included in the primary impact area adjacent to Tongaat is the Dube Trade Port/ King Shaka Airport site, which is located on the eastern border of the proposed development. The Airport and Dube Trade Port are of importance to the proposed development with regards to creation of business and industrial activity, as well as employment in the area.

b) Socio-Economic Profile of the Primary Areas, 2012

Overall the primary impact areas have low unemployment rates, and indicate good employment opportunities. The labour force participation are low however, and are indicative of the area's working population having a preference not to be economically active as opposed to a large presence of discouraged workers. The majority of the employed population is skilled, and is indicative of a better educated working population.

c) Household and Population Profile of the Primary Areas

The noted above, the population and households of Tongaat reflect an immediate density of 3 412 persons per km² in Tongaat, with 3.3 persons per household. Locality of the proposed development is well settled and when this is reviewed in conjunction with the employment profile as a significant portion of the area's employed are highly skilled - this indicates that a the development will be well positioned to provide additional space for commercial activity in a community that has the ability to take up the opportunities. Verulam has a lower population density than Tongaat at 2 600 persons per km², also with an average of 3.3 persons per household.

d) Sectorial Employment of the Primary Areas

From the land allocation, it is indicative that large office jobs (*highly skilled employment*), wholesale and retail trade (*skilled to highly skilled employment*), light industry and the limited on-site manufacturing (*skilled and semi and unskilled employment*) enterprises will establish at the proposed development.

The manufacturing industry and wholesale and retail trade, accommodation and catering industry are dominant employers in both Tongaat and Verulam. Finance, insurance and real estate, and general government are the next highest employment industries.

² For the purposes of this report, the node Tongaat includes the bordering township of Hambanathi and the subplace of Emona and Westbrook.

e) Gross Value Added (GVA) of the Primary Areas

In Tongaat, the manufacturing sector contributes the most to gross value added (28%). This reflects on their largely small and medium scale industrial activity (industrial Small Medium Micro-Enterprises - SMMEs). Tertiary services such as finance, insurance, real estate and business services (18%) and wholesale and retail trade, catering and accommodation are the next highest (15%). This trend is likely to remain with the emergences of new light-manufacturing business and tertiary offices, retail and other services at the proposed development. Currently, the existing town centre of Tongaat is highly constrained, and the Inyaninga Development will allow for local businesses to seek prime vacancy space that allows for interaction into a wider market – notably linking Dube Trade Port and the Umhlanga and Ballito nodes to Tongaat.

In Verulam, finance, insurance, real estate and business services (23%), as well as manufacturing (22%) are the highest industries contributing to regional gross value added. The proposed development will further strengthen the dominance of these two industries as businesses likely to develop at the site are within these respective sectors.

f) Social Facilities of the Primary Areas

In particular, there is a need for the following:

- An additional fire station in the primary impact area is necessary- particularly close to, or within Verulam. This is necessary for safety reasons given the amount of industry (much of which is hazardous) in the area, as well as the amount of potential for industry growth.
- While there is sectoral training activity identified in Tongaat, there are no tertiary institutions identified (i.e. FET colleges), which is key for the employability of the northern eThekweni region's population. The Tongaat LED also highlights that one of the challenges identified in the area is a shortage of skills. This is of much concern, particularly given the northern region's forecasted growth through the Dube Trade Port and the proposed development. A lack of skills will mean that much of Dube Trade Port's employment will have to be sourced outside of the primary impact area, because of under employability of the primary impact area's population. This reduces the positive impact of such developments.
- There is a need for more medical institutions in the primary impact area.

g) Other Issues Identified in the Primary Areas

In general, the major issues identified focus on service and facilities backlogs, and the need for (but spatial constraints of) the Tongaat and Verulam economies to grow. The Tongaat LED particularly points out that there is a challenge of growing unemployment, and poverty, and a limited ability to combat this through economic growth.

Issues identified in Verulam have long centred around space - particularly commercial and residential spaces for middle-income earners³. The relatively high and increasing density of Verulam and Tongaat indicates the need for outward expansion to provide such development. The need for facility provision was also equally indicated as an issue - particularly sports facilities and community halls. The need for socio economic development of the node highlights the need for outward expansion.

h) Secondary Areas: Western Rural Region, Southern KwaDukuza and Northern eThekweni

The secondary impact areas include bordering sub-places of the western rural areas (Ndwedwe) as well as Southern KwaDukuza and Northern eThekweni.

³ www.durban.gov.za, Report on Community Zone Meeting in Verulam, 2005

i) Socio-Economic Profile of the Secondary Areas, 2012

Sparse household and population densities are characteristic of a rural region of Ndwedwe. The number of informal households is also high. In the western rural region, the majority of the working population are semi and unskilled individuals. Labour participation rate is low, sitting at 24%. The population that is unemployed is also mostly semi and unskilled. Only 9% of residents are highly skilled. A different picture is presented with Northern eThekweni and Southern KwaDukuza. Herewith, 10% and 8% of the population is unemployed respectively, derived from a base of 49% and 44% labour participation rate. 14% and 8% of labour are highly skilled in northern eThekweni and southern KwaDukuza respectively.

j) Housing and Population Profile of the Secondary Areas

There is a slightly lower household density than Tongaat and Verulam in the remaining northern eThekweni profile of 3.6; and a KwaDukuza indicating density of 3.3. In comparison, the rural hinterland of Ndwedwe is sparsely settled, with only 123 persons per kilometre. The catchment's employment profile reflects a low share of skilled employment (10%); but a high share of semi and unskilled employment is estimated that these communities would be able to access a high share of the semi and unskilled labour requirements in this development, giving due consideration to their proximity in the secondary catchment.

k) Sectoral Employment of the Secondary Areas

From the land allocation it is indicative that large office jobs (highly skilled employment), wholesale and retail trade (skilled to highly skilled employment) and light industry and the limited on-site manufacturing (skilled and semi and unskilled employment) enterprises will be established at the proposed development. The existing sectoral employment profile reflects good levels of manufacturing, retail and logistics employment. There exists a base pool of semi and unskilled labour in these sectors that have clear alignment to the Inyaninga Development.

B-2.2 Heritage

As per the National Heritage Resources Act, 1999 (Act No. 25 of 1999) a Heritage Impact Assessment was conducted for the proposed development site by eThembeni Cultural Heritage for the proposed development in September 2009 (see Appendix 6). An Addendum to the HIA was compiled by eThembeni Cultural Heritage in March 2011 (see Appendix 6).

a) Description of heritage resources and significance assessment**• Places, buildings, structures and equipment**

- (i) The Inyaninga Farm Manager's residence is located at 29°35'53.6" south and 31°05'16.09" east. It was constructed before the 1950's and has been subject to ongoing alteration and refurbishment over the last 25 years. It has low heritage significance at the local level for its social value. This structure will be demolished to make way for the proposed development.
- (ii) Inyaninga Barracks comprise two groups of buildings, with the South Barracks located at 29°36'03.75" south and 31°05'25.8" east and the West Barracks at 29°35'58.05" south and 31°05'16.9" east. The South Barracks were built in 1939 to replace the wood and iron structures originally erected for Indian Indentured labourers. Concomitant construction of a new temple was started (see below). The West Barracks were constructed in the second half of the 20th century. The Barracks have medium heritage significance at the local and regional levels for their historic, social and cultural values. This structure will be demolished to make way for the proposed development.
- (iii) Inyaninga Shree Mariaman Temple is associated with the Inyaninga Barracks and is located at 29°36'04.95" south and 31°05'28.15" east. Mikula *et al* (1982¹) describes the site as follows:

“This is an unassuming little temple which originated in 1896 when the indentured labour community of Inyaninga built their wood and iron structure. In 1939 a more substantial temple was constructed with funds provided by the Tongaat Sugar Company, who also donated the land. Construction work was carried out by a local building contractor whilst the decoration and sculpture work on the front gable was probable executed by one Barasathi Naiker (1872 – 1962)”.

The temple has high heritage significance at the local and regional levels for its aesthetic, spiritual, historic, social and cultural values. The temple will be retained in the proposed development.

Permits for the demolition of the Farm Residence and the Inyaninga Barracks will be submitted post receipt of the EA.

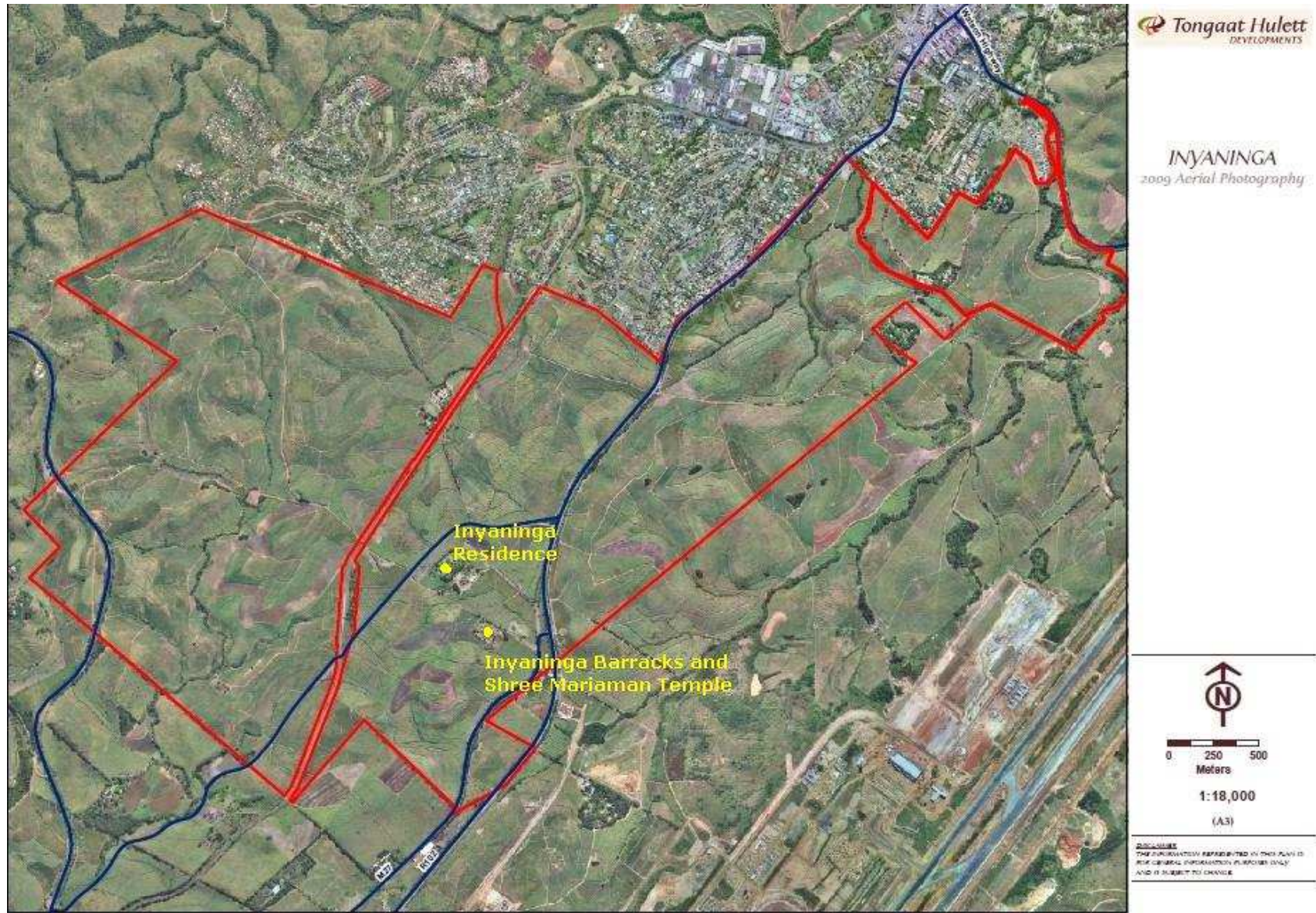


Figure 6: Location of the heritage resources on the study site

B-2.3 Aesthetic Environment

A Visual Impact Assessment (VIA) was conducted by Iyer Urban Design Studios for the proposed development site. Refer to Appendix 6. Two aspects were taken into consideration in the VIA i.e. Visual Impact and Sense of Place.

A Visual Impact is concerned only with the what is visible from particular vantage points around the site, whereas a Sense of Place is concerned with what the development will look like as one moves through it and how this will contribute to the creation of a “sense of place”.

a) Visual Assessment

A visual assessment is concerned with the potential effects that may occur resulting from a proposed development, upon the population likely to be affected. It assesses the change in visual amenity brought about by a proposed development. Different types of visual receptors exhibit different sensitivities – views from residential properties are more sensitive than views from, for example, main roads and rail lines where the viewer passes at speed and the view is not central to the use. Similarly a view from a residential property across an attractive rural landscape is considered to be more sensitive than a view from a similar property towards an industrial estate or major road. Sensitivity is not absolute and relates to the context of a particular site and in some cases to the type of development proposed.

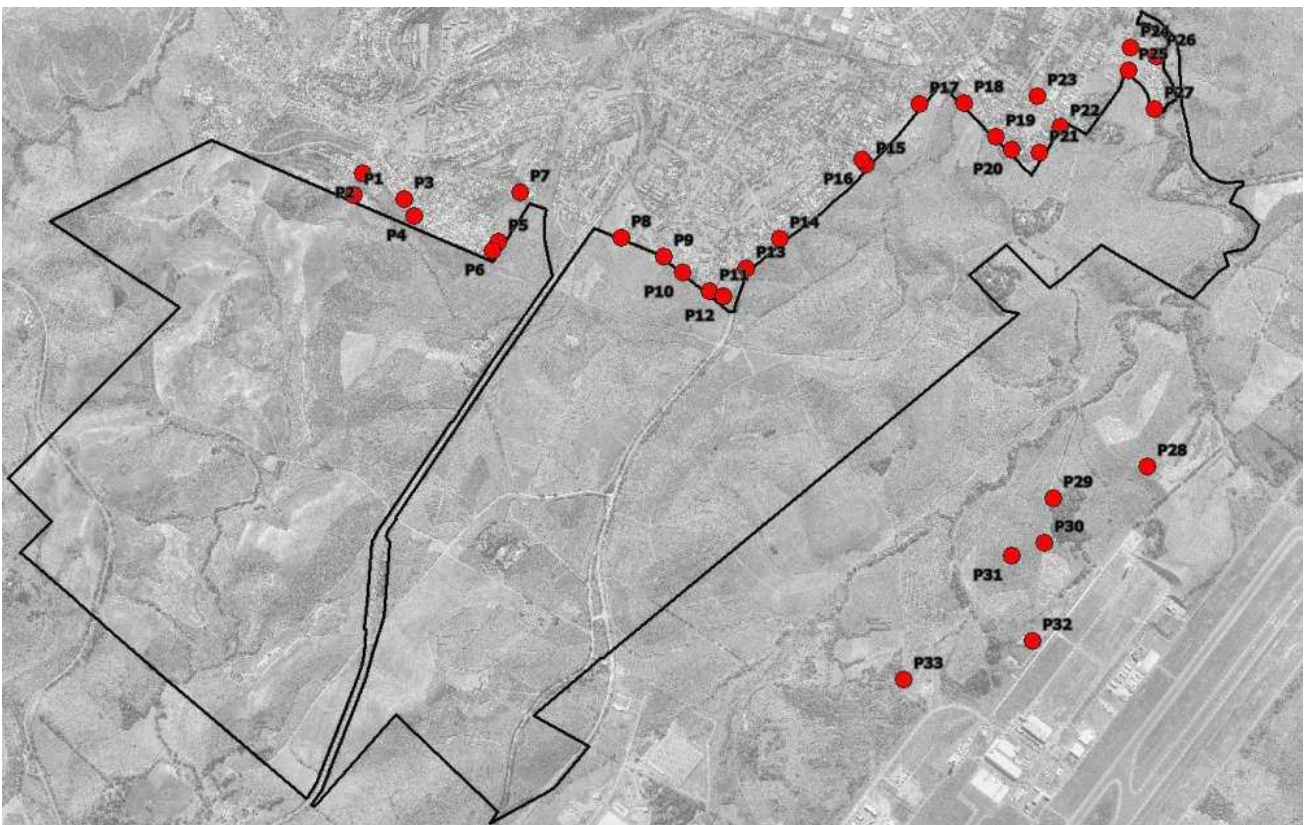


Figure 7: Viewpoints identified around the perimeter of the site

A view shed analysis was performed from selected residential areas in terms of topography, height of the observer at 1.8m, existing built form, existing fences, bush and trees outside the development area and trees and bush inside the development area (which have not been used during the view shed analysis).

The notable viewpoints around the perimeter of the site are as follows:

(i) View from Viewpoint P3 - South East and P3 - West

The visual impact from this viewpoint is regarded as Moderate as there is a wide landscape buffer between the existing edge of Tongaat and the proposed new development which, in the long-term should be planted with indigenous planting to further screen the view.

(ii) View from Viewpoint P10 – South East

The proposed office development is seen from a distance and due to the extent of open space between the existing residential and the office development, the impact is regarded as low to moderate.

(iii) View from Viewpoint P10 – West

The proposed residential development is seen from a distance and due to the extent of open space between the existing residential and the proposed development, the impact is regarded as low from this viewpoint.

(iv) View from Viewpoint P16 – North and South

The proposed mixed-use node on the R102 should be placed closer to the road edge and a colonnade provided to provide protection to the potential retail that could occur at the ground level. The extent of retail is restricted to one node to avoid a shopping strip but to provide facilities for the adjacent development. All parking areas for the mixed-use node should be screened from the R102.

(v) View from Viewpoint P17

The greatest visual impact is likely to be along the north eastern end of the R102 as one approaches Tongaat.

(vi) View from Viewpoint P18 and P22

The proposed housing seen from this viewpoint from the existing residential area is regarded as having a Moderate sensitivity and a Medium magnitude of change as the bulk of the development is hidden behind the hill.

(vii) View from Viewpoint P2

The views from main roads and rail lines, where the viewer passes at speed and where the view is not central to its use is regarded as less sensitive than views from residential properties.

(viii) View Points along the R102

Along the R102, the notable viewpoints are as follows (Refer to the graphic illustrations in the VIA):

(ix) Views from R102 – Viewpoint P2 and Viewpoint P 6 – North East and South East

The views from main roads and rail lines, where the viewer passes at speed and where the view is not central to its use is regarded as less sensitive than views from residential properties. The proposed office buildings which will be seen from this viewpoint will be landscaped and the bulk of the development is able to be integrated into the landscape. A Landmark building should be created on the high point.

Views were taken from three points along Watson Highway. Refer to the illustration of the viewpoints W1 to W3 in the VIA. While partial visibility of the development can be expected from viewpoint W1, viewpoints W2 and W3 are not visible.

b) Sense of Place Assessment

A Sense of Place Assessment favours a more “complex” development option – that, is one that displays diversity and interest and creates a sustainable and visually diverse “sense of place” – an environment that not only engages the visual aspects but also engages the mind through its urban qualities.

Quality place-making is essential for human development, at both a visual and intellectual level and with all these aspects taken into account a mixed-use development is considered to be the best way of creating a

qualitative urban settlement which engages the viewer at a distance but also engages the viewer as he/she moves through, and engages with, the surrounding environment.

The Imageability Analysis on pages 69 and 70 (*with illustrations*) indicates that the proposed development performs well in terms of Imageability which is a prerequisite for the establishment of a sense of place. The Architectural integrity of the development will also add to the sense of place and for this reason it is recommended that design guidelines be prepared to encourage the highest design standards.

The Imageability has been summarised as follows:

As a result of the proposed development, the proposed 'sense of place' will be as follows:

- View along Watson Highway – 'sense of place' retained;
- View south from Tongaat – 'sense of place' created; and
- View south from existing R102 – 'sense of place' created.

Visual quality is greatly influenced by the degree to which visual unity and harmony exists within the architectural and landscape components of a development.

All new housing development should be fragmented and respond to the contours of the site. Substantial indigenous planting should be undertaken to reduce the impact of the development to create a sense of place. The natural open spaces are the wetlands on site which will be retained and these assist in reducing urban sprawl and provide visual relief to the development.

B-2.4 Noise

Tongaat Hulett Development (THDev) utilized the Airports Company South Africa/DTP noise zones and THDev's planning does take the noise zones and flight paths into consideration. Refer to Appendix A of the letter dated 18 April 2011 to KZN DAEA in Appendix 4 for the map illustrating the sensitive noise zones and flight paths in relation to the proposed residential areas on the concept plan.

As mentioned in the Local Area Plan (LAP): Northern Urban Development Corridor (NUDC) for the Tongaat-DTP Local Area (2010), the operations of King Shaka International Airport and Dube Trade Port have a negative impact on neighbouring land uses due to noise. This is particularly applicable to residential neighbourhoods where the ambient noise exceeds acceptable levels. For planning purposes, the Ethekwini Municipality has adopted an 'in-principle' decision to use the noise contours for the 2035 development footprint of the airport as a guideline to directing urban development. Any development within the 55dB DNL (Day Night Average Sound Level)⁴ contour is considered sensitive to noise (SANS 1010) and must adhere to additional development controls if permitted. No permanent residential development is permitted within the 55dB DNL (2035) noise contour i.e. tourist accommodation permissible with sound attenuation.

In view of the close proximity of the proposed development to the airport, it is recommended that the design of the buildings in the area incorporate noise reduction principles to minimize noise impacts on the occupants. However, the proposed development precinct (more especially the proposed residential components) does not occur within the sensitive noise zones of 55dB for 2010, 2015 and 2035.

B-2.5 Air Quality

Changes to the ambient air quality in the immediate vicinity of the project can be expected during the construction and operation phases. During construction, this will primarily be a result of land clearance, construction vehicles travelling on exposed surfaces and earthworks in the form of dust generation.

⁴ DNL is Day Night Average Sound Level – recognised industry standard to measure average aircraft noise levels over a 24 hour period.

During the operational phase, the nuisance aspect of dust may affect the surrounding residents of Tongaat, Buffelsdale, Flamingo Heights, Mitchell Village and Belvedere, which reside on the perimeter of the site. There will be indirect impacts in the form of increased localised emissions from increased vehicular traffic. Should any of the activities at the proposed light industrial facility generate any noxious gas emissions, the responsible tenant must obtain an Air Emissions Licence (AEL) from the eThekweni Municipality prior to commencement of the operation/activity.

SECTION C: ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS

C-1 APPROACH TO THE EIA

An Environmental Impact Assessment (EIA) is an effective environmental planning tool. It identifies the environmental impacts of a proposed project and assists in ensuring that a project will be environmentally acceptable and integrated into the surrounding environment in a sustainable way.

The EIA for this project complies with the requirements of the National Environmental Management Act, 1998 (Act 107 of 1998) [NEMA] and the NEMA EIA Regulations, 2010 of the DEA. The guiding principles of an EIA are listed below.

Definition of the term “environment”

The term “environment” is used in the broadest sense in an environmental impact assessment. It covers the physical, biological, social, economic, cultural, historical, institutional and political environments.

C-2 GUIDING PRINCIPLES FOR AN EIA

The EIA must take an open participatory approach throughout. This means that there should be no hidden agendas, no restrictions on the information collected during the process and an open-door policy by the proponent. Technical information must be communicated to stakeholders in a way that is understood by them and that enables them to meaningfully comment on the project.

There should be ongoing consultation with Interested and Affected Parties (I&APs) representing all walks of life. Sufficient time for comment must be allowed. The opportunity for comment should be announced on an on-going basis. There should finally be opportunities for input by specialists and members of the public. Their contributions and issues should be considered when technical specialist studies are conducted and when decisions are made.

The eight guiding principles that govern the entire process of EIA are as follows (see Figure below):

- **Participation:** An appropriate and timely access to the process for all interested parties.
- **Transparency:** All assessment decisions and their basis should be open and accessible.
- **Certainty:** The process and timing of the assessment should be agreed in advanced and followed by all participants.
- **Accountability:** The decision-makers are responsible to all parties for their action and decisions under the assessment process.
- **Credibility:** Assessment is undertaken with professionalism and objectivity.
- **Cost-effectiveness:** The assessment process and its outcomes will ensure environmental protection at the least cost to the society.
- **Flexibility:** The assessment process should be able to adapt to deal efficiently with any proposal and decision making situation.
- **Practicality:** The information and outputs provided by the assessment process are readily usable in decision making and planning.

A S&EIR process is considered as a project management tool for collecting and analysing

information on the environmental effects of a project. As such, it is used to:

- Identify potential environmental impacts;
- Examine the significance of environmental implications;
- Assess whether impacts can be mitigated;
- Recommend preventive and corrective mitigating measures;
- Inform decision makers and concerned parties about the environmental implications; and
- Advise whether development should go ahead.

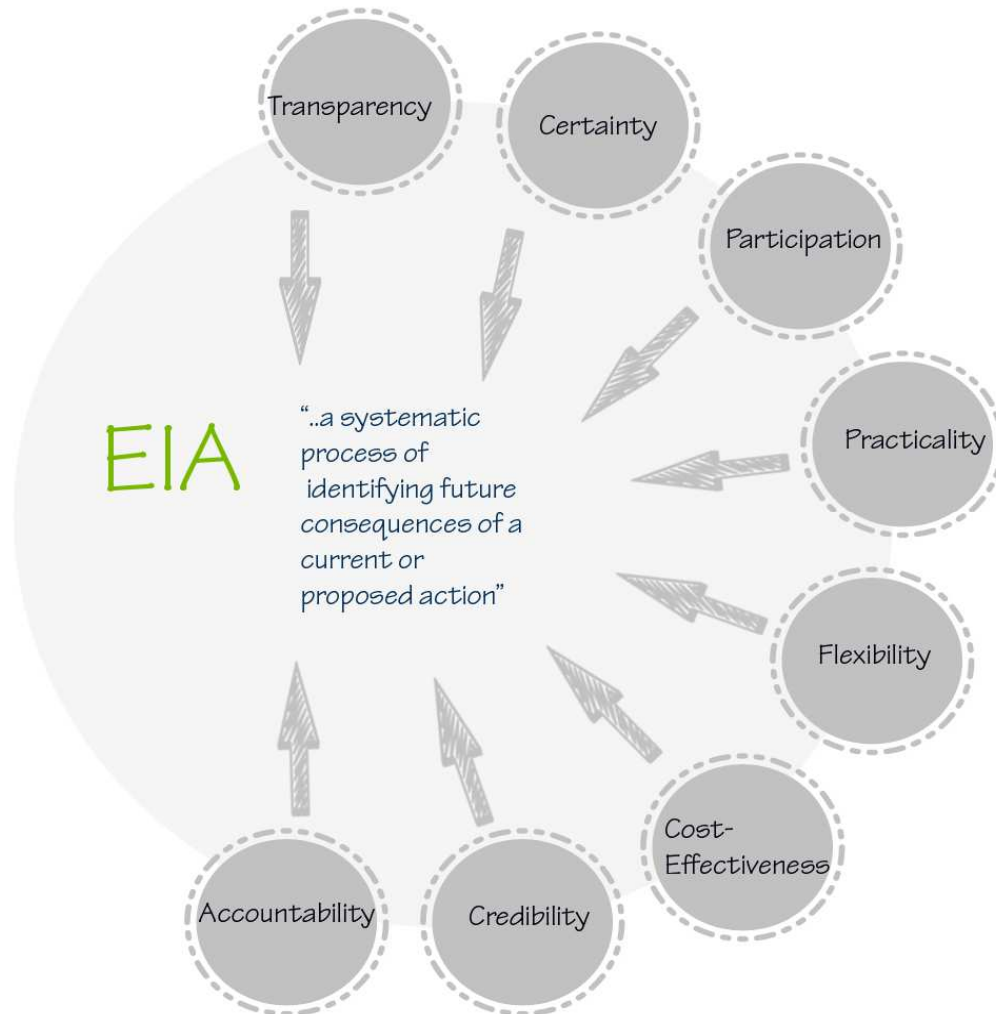


Figure 8: The eight guiding principles for the EIA process

A S&EIR process typically has four phases, as illustrated in the Figure below. The Public Participation process forms an integral part of all four phases and is discussed in greater detail in Section C – 4 of this final Scoping Report.

C-3 S&EIR TECHNICAL PROCESS

This section provides a summary of the technical process to be followed for this S&EIR process.

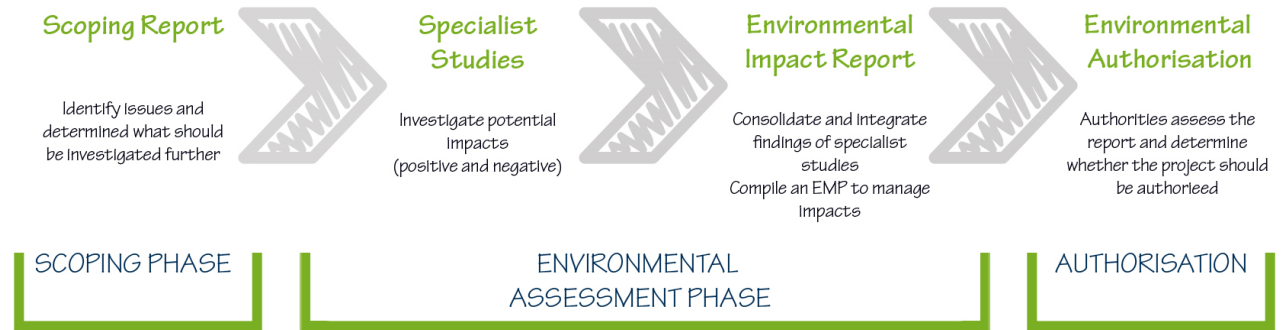


Figure 9: Flow diagram of the Scoping and EIR process

C-3.1 Pre-application Consultation with the KZN DAEA

No pre-consultation meeting was held between SEF and KZN DAEA. The EAP conducting the S&EIR process for the applicant, in support of their application for an environmental authorisation, is deemed to have a good understanding of the information requirements of the Department for the proposed development, such that the Department's specific information requirements are deemed to have been met for the scoping phase of this project.

C-3.2 Application for Authorization

An Application for Authorisation in terms of the National Environmental Management Act: NEMA, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations of 2006 was submitted to the KZN DAEA on 25 August 2009 (see Appendix 4). Following the above registration process, KZN DAEA issued an acknowledgement of receipt of the registration documentation i.e. Application for Authorisation, with reference number DM/0105/09 allocated to the project (see Appendix 4) on 8 September 2009.

The Final Scoping Report and Plan of Study (PoS) for the EIA were submitted to KZN DAEA on 6 October 2010. Following the submission of the Final Scoping Report and PoS for EIA, KZN DAEA, THDev and SEF attended a site visit on 18 November 2010.

A number of key issues were raised at the site meeting (refer to Appendix 4 for the minutes of the site meeting held on 18 November 2010). Subsequent to the site meeting with KZN DAEA, SEF submitted an updated Final Scoping Report and a formal response letter to KZN DAEA dated 18 April 2011, which addressed the issues raised at the site meeting of 18 November 2010. Refer to Appendix 4 for the formal response letter to KZN DAEA dated 18 April 2011.

The updated Final Scoping Report and PoS for EIA were accepted by KZN DAEA in a letter dated 25 May 2011. Refer to Appendix 4. KZN DAEA were kept updated of the finalisation of the specialist studies and Development Framework Plan during the process.

C-3.3 Information Gathering

Early in the EIR process, the technical specialists identified the information that would be required for the impact assessment and the relevant data was obtained. In addition, the specialists sourced available information about the receiving environment from reliable sources, I&APs, previous documented studies in the area and previous EIR Reports.

C-3.4 Specialist Studies

The following specialist studies have been undertaken during the EIR phase:

- Geological and geo-technical investigations;
- Ecological Assessment;
- Wetland Delineation Study and Impact Assessment;
- Development Framework Planning Report;
- Heritage Impact Assessment;
- Agricultural Assessment;
- Socio-Economic Assessment (Quantitative);
- Socio-Economic Assessment (Qualitative, including Economic Assessment of development impacts on Verulam and Tongaat);
- Civil Services Report (including Electrical Services Report);
- Major Hazardous Installation Risk Assessment; and
- Traffic impact assessment and Integrated Transportation Plan.

C-4 PUBLIC PARTICIPATION PROCESS

The principles of NEMA govern many aspects of the S&EIR process, including consultation with I&APs. These principles include the provision of sufficient and transparent information to I&APs on an ongoing basis, to allow them to comment; and ensuring the participation of historically disadvantaged individuals, including women, the disabled and the youth.

The principal objective of public participation is thus to inform and enrich decision-making. This is also the key role in the scoping phase of the process.

C-4.1 Identification of Interested and Affected Parties

Interested and Affected Parties (I&APs) representing the following sectors of society have been identified (see Appendix 5) for a complete I&AP distribution list):

- National, provincial and local government;
- Agriculture, including local landowners;
- Owners and occupiers of land adjacent to the site boundary;
- Landowners that occur within a 100m radius of the site boundary;
- Ward councillors and committees;
- Community Based Organisations;
- Non-Governmental Organisations;
- Business and Civic Organisations;
- Service Providers;
- Research; and
- Other.

C-4.2 Public Announcement of the Project

The Scoping process (Phase 1 of the Public Participation Process) was announced as follows:

- Publication of a media advertisement in the following newspapers:
 - English advertisement in the Mercury on 5 October 2009 (see Appendix 5);
 - Zulu advertisement in the Isolezwe on 5 October 2009 (see Appendix 5); and
 - English advertisement in the Coastal Weekly on 9 October 2009 (see Appendix 5).
- Fifteen (15) site notices were erected on site at visible locations close to the site on 5 October 2009. Refer to Appendix 5 for the Site Notice Text. Photographic evidence of the site notices is included in Appendix 5;
- Distribution of letters, comment and registration sheet and the Background Information Document (BID) by fax/post/email to all organs of state, service providers, Non-Governmental Organizations, Ward Councillors and committees on 5 and 6 October 2009 (see Appendix 5 for reference to the information package consisting of notification letters, BID, locality map, draft land use conceptual map and registration and comment sheet); and
- Letters, Comment and Registration Sheet and BID's were posted to landowners that occur within a 100m radius of the site boundary on 5 October 2009 (see list of I&APs that occur within a 100m radius of the site in Appendix 5).

C-4.3 Public Meetings with I&APs at the Scoping Phase

Public Meetings took place as follows to inform the public of the scoping process being undertaken as part of the proposed development:

- 3 November 2009 at the Mountview Community Hall in Verulam; and
- 5 November 2009 at the Tongaat Town Hall in Tongaat.

In order to notify the public of the public meeting, the following was undertaken:

- An English advertisement was published in the Mercury on 21 October 2009 (see Appendix 5);
- An English advertisement was published in the Coastal Weekly on 23 October 2009 (see Appendix 5); and
- A Zulu advertisement was published in the Isolezwe on 21 October 2009 (see Appendix 5).

In addition, registered I&APs were invited via email, post and fax to attend the public meetings.

The purpose of these meetings was to:

- Provide a background to the project;
- Introduce the Scoping and EIA Process;
- Obtain/identify their initial issues of concern;
- Present the preliminary development concept plan; and
- Encourage ongoing participation.

The power-point presentation which was delivered at the public meetings of 3rd and 5th November 2009 is provided in Appendix 5.

The proceedings/minutes of the public meetings were presented in the format of a Comments and Response Report and distributed to the attendees of the meetings.

The Comments and Response Report (minutes) of the public meeting at the Mountview Community Halls were distributed on 11 November 2009, to the I&APs that attended the meetings (see Appendix 5). They were urged to submit their comments on the minutes to SEF by 17 November 2009. Refer to the attendance register in Appendix 5.

The Comments and Response Report (minutes) of the public meeting at the Tongaat Town Hall were distributed on 27 November 2009, to the I&APs that attended the meetings (see Appendix 5). To date, no comments were received from I&APs on the minutes. Refer to the attendance register in Appendix 5.

C-4.4 Registered I&APs

The registered I&APs are stakeholders that have participated in the Public Participation Process by attending the public meetings, providing comments in writing and through verbal communication. All the government authorities have also been identified as I&APs. Appendix 5 contains the database of registered I&APs.

I&APs registered by completing registration forms and forwarding comments by email, fax, post and telephonically.

Comments received from I&APs were captured on the I&AP database, acknowledged by means of personal letters and forwarded to the relevant environmental specialist for consideration. Refer to Appendix 5 for comments that were received from the I&APs.

I&APs had the opportunity to raise issues either in writing, by telephone or email and during public meetings that were convened on 3 and 5 November 2009 at the Mountview Community Hall in Verulam and Tongaat Town Hall in Tongaat, respectively.

All the issues raised by I&APs during the EIA process were captured in a Comment and Response Report (see Appendix 5), and I&APs received letters acknowledging their contributions.

The above comments were forwarded to the relevant specialists for their consideration.

C-4.5 Draft Scoping Report and Plan of Study for EIR

All the issues raised to date were captured in the Draft Scoping Report, which was available for public review, in English. The EIA Regulations specify that I&APs must have an opportunity to verify that their issues have been captured. A period of 40 days was made available for public comment on the Draft Scoping Report and PoS for EIA. The availability of the Draft Scoping Report was announced as follows:

- Personal letters to all the registered I&APs on the distribution list (refer to Appendix 2.14 for an example of the letter that was sent out).
- The hard copies of the report was posted or hand delivered to all 'organs of state' which included the following:
 - National Department of Agriculture, Forestry and Fisheries (DAFF): Land Use

- and Soil Management;
- Provincial DAFF (Forestry Directorate);
- Provincial Department of Agriculture and Environmental Affairs (KZN DAEA): Land Use and Soil Management;
- Department of Water Affairs (Water Quality and Water Use Licensing Sections);
- Ezemvelo KZN Wildlife (EKZNW); and
- eThekweni Municipality.

The Draft Scoping Report and PoS for EIA were distributed for public comment from 23 March 2010 to 4 May 2010 as follows:

- Verulam Library, 8 Groom Street, Verulam;
- Tongaat Town Hall, 1 Victoria Lane, Tongaat; and
- Posted on SEF's website at <http://www.sefsa.co.za>

The public review of the Draft Scoping Report was extended from 12 May 2010 to 2 June 2010 (21 days) because SEF was informed that the report had been removed from the Tongaat Library, prior to the closure date for review. In order to give a fair chance to the registered I&APs, SEF provided them with written notification letters informing them of the extension period for review of the Draft Scoping Report, which was available for the duration (mentioned above) on the SEF Website: www.sefsa.co.za and at the following venues:

- Verulam Library, 8 Groom Street, Verulam; and
- Tongaat Library, 1 Victoria Avenue, Tongaat Central.

The I&APs were encouraged to send through their comments via post, e-mail, fax or by contacting the SEF office.

C-4.6 Final Scoping Report

The Final Scoping Report incorporated comments that were received from the registered I&APs as well as 'organs of state' upon public review of the Draft Scoping Report. Refer to the Comments and Response Report in Appendix 5.

C-4.7 Public participation during the Impact Assessment Phase

Public participation during the EIR phase revolved around a review of the findings of the EIR and inputs into the Environmental Management Programme (EMPr). The findings are presented in the Draft Environmental Impact Report and the EMPr, as well as the findings of the various specialist studies.

C-4.8 Draft Environmental Impact Report

The findings of the Impact Assessment Phase are presented in this Draft EIR and EMPr (including the specialist studies conducted) and is available for public review and comment. Registered I&APs were informed that the Draft EIR will be available for public review and comment on 11 December 2013.

A period of **40 calendar days (03 January 2014 to 13 February 2014)** has been provided to the **State Departments and registered I&APs** for the review and commenting phase of the Draft Environmental Impact Report (EIR). The availability of the Draft EIR will be announced by means of personal letters to all the registered I&APs on the distribution list.

In addition, the Draft EIR will be distributed for comment as follows:

- Left in a public venue (Tongaat Public Library);
- Hand-delivered/ couriered to the relevant authorities; and
- Posted on SEF's website at <http://www.sefsa.co.za>.

All the comments and concerns raised will be captured in a Comments and Response Report (CRR). I&APs will be sent letters acknowledging their contributions.

C-4.9 Public Meeting at the EIR Phase

Registered I&APs will be notified of dates of the public meeting to present the findings of the Draft EIR in January 2014.

C-4.10 Final Environmental Impact Report

The EIR will be updated with comments and/or concerns raised by I&APs. The CRR will be attached to the Final EIR. The Final EIR will be submitted to the KZN DAEA and registered I&APs simultaneously for review. Registered I&APs will be advised to submit any additional comments on the Final EIR directly to the KZN DAEA for consideration towards an Environmental Authorisation.

SECTION D: ASSESSMENT CRITERIA

D-1 IMPACT IDENTIFICATION AND ASSESSMENT

The assessment criteria must clearly identify the environmental impacts of the proposed development. The environmental impacts identified will be quantified and the significance of the impacts assessed according to the criteria set out below. The EAP must make a clear statement, identifying the environmental impacts of the construction, operation and management of the proposed development. As far as possible, the EAP must quantify the suite of potential environmental impacts identified in the study and assess the significance of the impacts according to the criteria set out below. Each impact will be assessed and rated. The assessment of the data must, where possible, be based on accepted scientific techniques, failing which the specialist is to make judgements based on his/ her professional expertise and experience.

D-1.1.1 Assessment Procedure: Proposed Impact Assessment Methodology

For the purpose of assessing impacts of the proposed development, during the EIR phase, the project will be divided into two phases from which impacting activities can be identified, namely:

Construction Phase:	All the construction related activities on site, until the contractor leaves the site.
Operational Phase:	All activities, including the operation and maintenance of the proposed mine.

The activities arising from each of these phases will be included in the impact assessment tables. This is to identify activities that require certain environmental management actions to mitigate the impacts arising from them. The assessment of the impacts will be conducted according to a synthesis of criteria required by the integrated environmental management procedure.

Extent The physical and spatial scale of the impact.	Footprint	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.
	Site	The impact could affect the whole, or a significant portion of the site.
	Regional	The impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns.
	National	The impact could have an effect that expands throughout the country (South Africa).
	International	Where the impact has international ramifications that extend beyond the boundaries of South Africa.

Duration The lifetime of the impact, that is measured in relation to the lifetime of the proposed development.	Short Term	The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than that of the construction phase.
	Short-Medium Term	The impact will be relevant through to the end of a construction phase.
	Medium Term	The impact will last up to the end of the development phases, where after it will be entirely negated.
	Long Term	The impact will continue or last for the entire operational lifetime of the development, but will be mitigated by direct human action or by natural processes thereafter.
	Permanent	This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.
Intensity Is the impact destructive or benign, does it destroy the impacted environment, alters its functioning, or slightly alter the environment itself?	Low	The impact alters the affected environment in such a way that the natural processes or functions are not affected.
	Medium	The affected environment is altered, but functions and processes continue, albeit in a modified way.
	High	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
Probability The likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time.	Improbable	The possibility of the impact occurring is none, due either to the circumstances, design or experience. The chance of this impact occurring is zero (0%).
	Possible	The possibility of the impact occurring is very low, due either to the circumstances, design or experience. The chances of this impact occurring is defined as 25%.
	Likely	There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of this impact occurring is defined as 50%.
	Highly Likely	It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75%.
	Definite	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100%.

Mitigation – The impacts that are generated by the development can be minimised if measures are implemented in order to reduce the impacts. These measures ensure that the development considers the environment and the predicted impacts in order to minimise impacts and achieve sustainable development.

Determination of Significance – Without Mitigation – Significance is determined through a synthesis of impact characteristics as described in the above paragraphs. It provides an indication of the importance of the impact in terms of both tangible and intangible characteristics. The significance of the impact “without mitigation” is the prime determinant of the nature and degree of mitigation required. Where the impact is positive, significance is noted as “positive”. Significance will be rated on the following scale:

No significance: The impact is not substantial and does not require any mitigation action;

Low: The impact is of little importance, but may require limited mitigation;

Medium: The impact is of importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels; and

High: The impact is of major importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

Determination of Significance – With Mitigation – Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures. Significance with mitigation will be rated on the following scale:

No significance: The impact will be mitigated to the point where it is regarded as insubstantial; Low: The impact will be mitigated to the point where it is of limited importance;

Low to medium: The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels;

Medium: Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw;

Medium to high: The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels; and

High: The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.

Assessment Weighting – Each aspect within an impact description was assigned a series of quantitative criteria. Such criteria are likely to differ during the different stages of the project's life cycle. In order to establish a defined base upon which it becomes feasible to make an informed decision, it will be necessary to weigh and rank all the identified criteria.

Ranking, Weighting and Scaling – For each impact under scrutiny, a scaled weighting factor will be attached to each respective impact. The purpose of assigning such weightings serve to highlight those aspects considered the most critical to the various stakeholders and ensure that each specialist's element of bias is taken into account. The weighting factor also provides a means whereby the impact assessor can successfully deal with the complexities that exist between the different impacts and associated aspect criteria.

Simply, such a weighting factor is indicative of the importance of the impact in terms of the potential effect that it could have on the surrounding environment. Therefore, the aspects considered to have a relatively high value will score a relatively higher weighting than that which is of lower importance (Figure below: Weighting description).

Extent	Duration	Intensity	Probability	Weighting Factor (WF)	Significance Rating (SR)	Mitigation Efficiency (ME)	Significance Following Mitigation (SFM)
Footprint 1	Short term 1	Low 1	Probable 1	Low 1	Low 0-19	High 0,2	Low 0-19
Site 2	Short to medium 2	Low to medium 2	Possible 2	Low to medium 2	Low to medium 20-39	Medium to high 0,4	Low to medium 20-39
Regional 3	Medium term 3	Medium 3	Likely 3	Medium 3	Medium 40-59	Medium 0,6	Medium 40-59
National 4	Long term 4	Medium to high 4	Highly Likely 4	Medium to high 4	Medium to high 60-79	Low to medium 0,8	Medium to high 60-79
International 5	Permanent 5	High 5	Definite 5	High 5	High 80-100	Low 1,0	High 80-100

Figure 10: Description of bio-physical assessment parameters with its respective weighting

Identifying the Potential Impacts Without Mitigation Measures (WOM) – Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned weightings, resulting in a value for each impact (prior to the implementation of mitigation measures).

Equation 1: Significance Rating (WOM) = (Extent + Intensity + Duration + Probability) x
Weighting Factor

Identifying the Potential Impacts With Mitigation Measures (WM) – In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it will be necessary to re-evaluate the impact.

Mitigation Efficiency (ME) – The most effective means of deriving a quantitative value of mitigated impacts is to assign each significance rating value (WOM) a mitigation effectiveness (ME) rating. The allocation of such a rating is a measure of the efficiency and effectiveness, as identified through professional experience and empirical evidence of how effectively the proposed mitigation measures will manage the impact.

Thus, the lower the assigned value the greater the effectiveness of the proposed mitigation measures and subsequently, the lower the impacts with mitigation.

Equation 2: Significance Rating (WM) = Significance Rating (WOM) x Mitigation Efficiency
Or
WM = WOM x ME

Significance Following Mitigation (SFM) – The significance of the impact after the mitigation measures are taken into consideration. The efficiency of the mitigation measure determines the significance of the impact. The level of impact will, therefore, be seen in its entirety with all considerations taken into account.

D-1.1.2 Integration of Specialist's Input

In order to maintain consistency in the impact assessment, it is suggested that all potential impacts to the environment (or component of the environment under review) should be listed in a table similar to the example shown below (more than one table will be required if impacts require assessment at more than one scale). The assessment parameters used in the table should be applied to all of the impacts and a brief descriptive review of the impacts and their significance will then be provided in the text of the specialist reports and consequently in the EIR. The implications of applying mitigation are reviewed in Section D-1.1.3 below.

Table 11: Example of an Impact Table

Impact source(s)		Status	-
Nature of impact			
Reversibility of impact			
Degree of irreplaceable loss of resource			
Affected stakeholders			
Magnitude	<i>Extent</i>		
	<i>Intensity</i>		
	<i>Duration</i>		
	<i>Probability</i>		
Significance	<i>Without mitigation</i>		H
	<i>With mitigation</i>		L
Significance Following Mitigation (SFM)			

D-1.1.3 Mitigation Measures

Mitigation measures will be recommended in order to enhance benefits and minimise negative impacts and they will address the following:

- Mitigation objectives: what level of mitigation must be aimed at: For each identified impact, the specialist must provide mitigation objectives (tolerance limits) which would result in a measurable reduction in impact. Where limited knowledge or expertise exists on such tolerance limits, the specialist must make an “educated guess” based on his/ her professional experience;
- Recommended mitigation measures: For each impact the specialist must recommend practicable mitigation actions that can measurably affect the significance rating. The specialist must also identify management actions, which could enhance the condition of the environment. Where no mitigation is considered feasible, this must be stated and reasons provided;
- Effectiveness of mitigation measures: The specialist must provide quantifiable standards (performance criteria) for reviewing or tracking the effectiveness of the proposed mitigation actions, where possible; and
- Recommended monitoring and evaluation programme: The specialist is required to recommend an appropriate monitoring and review programme, which can track the efficacy of the mitigation objectives. Each environmental impact is to be assessed before and after mitigation measures have been implemented. The management objectives, design standards, etc., which, if achieved, can eliminate, minimise or enhance potential impacts or benefits. National standards or criteria are examples, which can be stated as mitigation objectives.

Once the above objectives have been stated, feasible management actions, which can be applied as mitigation, must be provided. A duplicate column on the impact assessment tables described above will indicate how the application of the proposed mitigation or management actions has reduced the impact. If the proposed mitigation is to be of any consequence, it should result in a measurable reduction in impacts (or, where relevant, a measurable benefit).

D-1.2 Approach to the Assessment of Cumulative Impacts

Cumulative impacts can arise from one or more activities. A cumulative impact may result in an additive impact i.e. where it adds to the impact which is caused by other similar impacts or an interactive impact i.e. where a cumulative impact is caused by different impacts that combine to form a new kind of impact. Interactive impacts may be either countervailing (the net adverse cumulative impact is less than the sum of the individual impacts) or synergistic (the net adverse cumulative impact is greater than the sum of the individual impacts).

Possible cumulative impacts of the project will be evaluated in the EIR. In addition, various other cumulative impacts e.g. other external impacts that could arise from the project will be further investigated in the EIR phase of the project.

The assessment of cumulative impacts on a study area is complex; especially if many of the impacts occur on a much wider scale than the site being assessed and evaluated. It is often difficult to determine at which point the accumulation of many small impacts reaches the point of an undesired or unintended cumulative impact that should be avoided or mitigated. There are often factors which are uncertain when potential cumulative impacts are identified.

D-1.2.1 Steps in Assessing Cumulative Impacts

The assessment of cumulative impacts will not be done separately from the assessment of other impacts. Cumulative impacts however, tend to have different time and space dimensions and therefore require specific

steps. This may even mean that some of the actions in the assessment process, that preceded general impact identification, may have to be revisited after potential cumulative impacts have been identified. This will ensure that the scope of the EIR process is adequate to deal with the identified cumulative impacts.

Three (3) general steps, which are discussed below, will be recommended to ensure the proper assessment of cumulative impacts.

D-1.2.2 Determining the Extent of Cumulative Impacts

To initiate the process of assessing cumulative impacts, it is necessary to determine what the extent of potential cumulative impacts will be. This will be done by adopting the following approach:

- Identify potentially significant cumulative impacts associated with the proposed activity;
- Establish the geographic scope of the assessment;
- Identify other activities affecting the environmental resources of the area; and
- Define the goals of the assessment.

D-1.2.3 Describing the Affected Environment

The following approach is suggested for the compilation of a description of the environment:

- Characterise the identified external environmental resources in terms of their response to change and capacity to withstand stress;
- Characterise the stresses affecting these environmental resources and their relation to regulatory thresholds; and
- Define a baseline condition that provides a measuring point for the environmental resources that will be impacted on.

D-1.2.4 Assessment of Cumulative Impacts

The general methodology which is used for the assessment of cumulative impacts should be coherent and should comprise of the following:

- An identification of the important cause-and-impact relationships between proposed activity and the environmental resources;
- A determination of the magnitude and significance of cumulative impacts; and
- The modification, or addition, of alternatives to avoid, minimize or mitigate significant cumulative impacts.

SECTION E: ALTERNATIVES

E-1 IDENTIFICATION OF ALTERNATIVES

The EIA procedures and regulations stipulate that the environmental investigation needs to consider feasible alternatives for any proposed development. Therefore, a number of possible proposals or alternatives for accomplishing the same objectives should be identified and investigated. During the EIR phase of the project, the identified alternatives will be assessed, in terms of environmental acceptability as well as socio-economic feasibility. To define the term alternatives as per Government Notice No. 543 of the NEMA EIA Regulations 2010 means:

“...in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to:

- (a) The property on which or location where it is proposed to undertake the activity;*
- (b) The type of activity to be undertaken;*
- (c) The design or layout of the activity;*
- (d) The technology to be used in the activity;*
- (e) The operational aspects of the activity; and*
- (f) The option of not implementing the activity.”*

The alternatives below will be further investigated during the EIR phase of the project:

E-1.1 Site/ Location Alternatives

The developer owns the site and the current land use i.e. sugar cane production on the site has not been financially viable in the past. No other site alternatives for the proposed development were considered. The site's proximity to the King Shaka International Airport has been the driving force for tapping into the development potential of the site. There is potential for direct rail access, and the intention is to leverage the opportunities provided by the airport. The proximity to the airport provides an opportunity to unlock the growth and development potential of the greater Tongaat region and the North Urban Development Corridor (NUDC) and meet the objectives of the Provincial Growth and Development Strategy, Provincial Spatial Economic Strategy and the various Local Policies of the eThekweni Municipality.

E-1.2 Land Use Alternatives

E-1.2.1 Alternative 1: Residential and Commercial Dominant Land Uses

This option is predominantly residential with two potential commercial nodes. There is a general need for housing developments that caters for the middle-low income earners within the eThekweni Municipality. The KZIA/DTP development is a generator of a number of work opportunities and the demand for residential townships in close proximity to the airport has therefore risen. However, in view of the noise contours as a result of the airport, some areas are not suitable for residential development. Furthermore, it does not show good planning principles to provide for residential without considering economic/employment opportunities. It is also noted that the municipality's plans (NSDP & Inyaninga Tongaat Functional Area Plan - FAP) show a mixed use node just south of the Inyaninga development and therefore provision of commercial nodes within this development is taking away the option provided for in the municipal plans (*refer to the Residential and Commercial Dominant Land Uses in Appendix 3*).

E-1.2.2 Alternative 2: Commercial/Business Dominant Land Use (excluding industrial uses)

This alternative includes a commercial and retail node as part of the development. The development would therefore include a total mix of uses and provide the full range of urban amenities, facilities and opportunities. The inclusion of a commercial/retail node will not however be aligned with the municipality's Local Area Plan nor the Inyaninga Functional Area Plan, both of which indicate the commercial/mixed use/retail node further to the south.

The provision of a large retail component may also impact negatively on the retail nodes of both Verulam and Tongaat.

This type of land use will allow for diversity within the development precinct that is at the same time, multifunctional. The introduction of business-related land uses would be a complementary land use to the airport. Office use has been investigated as the communities living at the site would require additional work opportunities that would be viable for income-generation through job creation. In this way, the community would get maximum benefit from this land use activity (*refer to this Land Use Alternative in Appendix 3*).

E-1.2.3 Alternative 3: Mix of residential, office, retail and industrial uses (Preferred alternative)

This alternative includes the industrial component, with a reduced commercial land use footprint. There is limited land suitable for industrial development within eThekweni. However, Inyaninga is well located from an access perspective, including direct access to rail, as well as having the necessary physical and topographical conditions required for industrial development.

In addition, the close proximity of the site to the airport and DTP as well as the railway line, presents a unique opportunity for the multi-modal logistics hub. This is the preferred alternative as it will have not only regional benefits, but provincial benefits as well.

This alternative includes a commercial and retail node as part of the development. The development would therefore include a total mix of uses and provide the full range of urban amenities, facilities and opportunities.

The inclusion of a commercial/retail node will not however be aligned with the municipality's Local Area Plan nor the Inyaninga Functional Area Plan, both of which indicate the commercial/mixed use/retail node further to the south.

The provision of a large retail component may also impact negatively on the retail nodes of both Verulam and Tongaat (*refer to this Land Use Alternative in Appendix 3. This is also known as the Development Framework Plan*).

E-1.3 Sewerage Layout Alternatives

South Catchment

Most of the sewage discharge from the Inyaninga residential development will gravitate to the south (approximately 2.2Ml/day). Several minor pump stations may be required for inter-catchment transfers to adjacent gravity outfall mains. Currently, there is no existing bulk trunk sewer serving this area.

The Verulam WWTW currently treats 12Ml/day and has spare capacity of 5Ml/day so it is able to accommodate the sewage discharge from the southern area of the Inyaninga Development.

The following bulk infrastructure is improvement, south of Inyaninga, external to the Inyaninga development is currently underway:

- The proposed Umdloti works which will have an ultimate capacity of 50MI/day. It is understood that EWS are prioritising the design and construction of the new WWTW and will start on the first 15MI/day Phase of the works as soon as the EA has been received.

All sewage will need to be drained via gravity to a point south of the development, from which point the following options are available to drain the sewage discharge from the southern area of the Inyaninga Development:

- Option 1: The construction of a pump station and a 6km long rising main to a suitable high point then a gravity main to the proposed Umdloti Regional WWTW situated south of the Umdloti River;
- Option 2: Continue via a gravity main to the Verulam WWTW including a 300m section of elevated pipeline which includes crossing over the Umdloti River. This route will require additional detailed survey to confirm the possibility of this gravity routing to difficult terrain in some sections;
- Option 3: Continue via a gravity outfall main to an existing pump station in Canelands which currently pumps through to the existing Verulam trunk sewer which flows to the existing Verulam WWTW.

E-1.4 No Development Alternative

The 'no-go' or 'do nothing' alternative would be applicable if the proposed development is not approved by the KZN DAEA and the status quo of the site will remain. This option assumes that a conservative approach would ensure that the environment is not impacted upon any more than is currently the case. It is important to state that this assessment is informed by the current condition of the area. Should the proposed development not be implemented, the study area will not be affected by any construction-related or operational phase impacts. Therefore, the present state of the biophysical, social and economic environment will remain, unaffected.

Sugar cane farming will continue at 'the site'. Poor yields have been experienced in the past 8 years. Even with improved management, especially on irrigated areas, it will be difficult to obtain significantly higher yields due mainly to soil restrictions. However, if irrigation were improved on 180ha (Windermere and Shortlands) and yields of 100 t ha⁻¹ were obtained, the expected profit could rise significantly. There would be no need for the relocation of the staff to another staff compound should the proposed development not be approved. The wetlands and riparian systems on site will continue to be impacted by sugarcane cultivation, application of fertiliser, herbicides, and insecticides, alterations to water flow patterns, erosion, and the encroachment of alien invasive plant species. There would be no impetus for rehabilitation of the on-site wetlands should the development not proceed.

Should the proposed development not take place, the infrastructural investment provided by the airport would remain untapped. As a result, there would be no catalyst to provide employment, economic as well as residential opportunities that exist in the northern region. Hence, the current demand for such, will still exist in the region. In addition, farming in this particular area will become an unviable option due to the operations of the airport and increasing rates as land values increase. This alternative will not improve the socio-economic status of the region. Research has indicated that the socio-economic benefits of urban development over agricultural development are the following - 50:1 for job creation, 588:1 for rates and tax generation and 250:1 for contribution to GGP. This alternative is believed to be not viable and not in line with the economic growth and long term vision for the region and province.

In the absence of the proposed development, there would not be any economic spin-offs such as job creation, skill transfer, supply or demand for local labour and materials during the construction and operational phases. In comparison to the revenue generated from the current land use activity, the proposed development will have higher economic returns for both the public and private sector, but this potential would not be realised if the proposed development is not approved.

The proposed land uses that would form part of the development precinct includes housing provision, which would address the housing backlog and the proposed business park would provide job opportunities, thereby contributing towards Local Economic Development (LED) and increasing the rates revenue for the eThekweni Municipality. The no-go option would limit these opportunities for future growth, increased investment in the province and skills and capacity building.

Should the development not proceed, there would not be any further pressure on the municipality to provide for services infrastructure such as solid waste, water, sewerage and electrical supply. The anticipated road upgrades that are envisaged by Traffic Engineer would not be required, should the proposed development not go-ahead.

The NSDP and other local policies and guidelines have recognised the importance of the Dube Tradeport and its surrounding areas, in particular Inyaninga as key economic generators as well as a city wide development priority and supports the redevelopment of towns such as Verulam and Tongaat as an integral component of Northern Development corridor. Should the proposed development not proceed, there would not be any linkages, support and integration with the KSIA/DTP and no opportunities to uplift the communities of Verulam and Tongaat. Against this background, this alternative would have huge implication for the infrastructure investment already made in the area. There would be underutilisation of the development potential of the area surrounding the 'Aerotropolis'. There is currently a shortage of space for industrial development in the eThekweni area and while a development node exists in northern region, it will be largely untapped.

Failure to construct the proposed development will not unlock opportunities for economic and employment opportunities in the North Urban Development Corridor area and will not contribute to the Dube Aerotropolis5 development plans.

E-2 COMPARATIVE ASSESSMENT

Advantages are marked with a (✓) while disadvantages are marked with (X) under the subsequent headings.

E-2.1 Bulk Sewer Line Layout Alternatives

Southern Catchment

Option 1	Option 2	Option 3
<p>X Construction of this pipeline is dependent on receipt of a positive Environmental Authorisation (EA) for the proposed Umdloti WWTW, after which construction will commence.</p> <p>✓ The route will traverse cane lands mainly.</p>	<p>X The route is adjacent to the railway line for the most part, and the area is therefore mostly transformed.</p> <p>X The route crosses the Umdloti River.</p> <p>✓ The pipeline connects with the existing Verulam WWTW.</p>	<p>X This is the longest route.</p> <p>X It occurs adjacent to the built-up, residential areas and there would be construction-related impacts on the receiving population.</p> <p>✓ The pipeline connects with the existing Verulam WWTW.</p> <p>✓ In the long-term, this option will also receive sewage from portions of the KSIA/DTP and would have to be sized accordingly.</p>

⁵ KSIA is a core piece of infrastructure with access to sea, road and rail linkages, within one of Southern Africa's strongest regional economies.

DTP development strategy will guide the development of the entire Airport City and create significant opportunities for all businesses in surrounding area (www.thdev.co.za/developments/aerotropolis/overview).

An Aerotropolis is a new layout of urban form comprising of aviation intensive businesses and related enterprises extending up to 25 kilometres outward from major airports (<http://en.wikipedia.org/wiki/Aerotropolis>).

E-2.2 Land Use Alternatives

Alternative 1	Alternative 2	Alternative 3
<p>Residential and Commercial Dominant Land Uses</p>	<p>Mixed-Use, Residential, Office and Commercial/Business Dominant Land Uses</p>	<p>Mixed-Use, Residential, Office and Retail (Including Industrial Land Uses)</p>
<p>✓ There is an increased demand for residential development in the northern region due to the key role that KSIA/DTP is playing in the local economy and job creation, as people seek residential areas close to places of employment.</p> <p>✓ Social facilities such as schools, police station and a community health clinic would be accessible on site to complement the residential land use proposed on the site.</p> <p>✗ The inclusion of a commercial/retail node will not be aligned with the municipality's Local Area Plan nor the Inyaninga Functional Area Plan, both of which indicate the commercial/mixed use/retail node further to the south.</p> <p>✗ The site will be affected by the noise contours of the KSIA and permanent residential development is not encouraged in this area.</p> <p>✗ During the stakeholder workshops with key stakeholders in Verulam and Tongaat economic development, residential and regional linkages featured as priorities in the design of the Development Framework Plan for the site.</p> <p>✗ There would be limited job creation through the employment of domestic workers and gardeners. The full potential of the site's location close to the KSIA/DTP would not be realised if residential land uses are the dominant at the site.</p>	<p>✓ Business-related land uses are complementary to the KSIA and Inyaninga lies within the Economic Support Zone, therefore it will be located in close proximity to existing centres of demand.</p> <p>✗ The inclusion of a commercial/business node will not be aligned with the municipality's Local Area Plan nor the Inyaninga Functional Area Plan, both of which indicate the commercial/mixed use/retail node further to the south.</p> <p>✗ This land use does not maximise on the full potential of the site, which is close proximity to the Aerotropolis, rail, roads, air and sea linkages.</p> <p>✓ The provision of a large retail component may also impact negatively on the retail nodes of both Verulam and Tongaat.</p>	<p>✓ The NSDP recognises the KSIA/DTP as a key economic node comprising of a variety of economic and transport related activities, therefore General Industrial/Logistics land uses, in addition to mixed-uses, office and retail are considered as top city-wide development priorities. Residential land uses will be accessible to growing population employed in the northern region.</p> <p>✓ This land use provides diverse opportunities for Tongaat and Verulam to benefit from the supply of goods and services and job creation, industrial activity and business expansion.</p> <p>✓ The full potential of the Provincial Growth and Development Strategy (PGDS) could be attained by including industrial/logistics in the 'Aerotropolis'.</p> <p>✓ This alternative is compatible with the NUDC, since it has defined Inyaninga's primary role as the following: <i>"Local mixed use, mixed density and mixed income urban living areas-expansion zone and Metropolitan industrial and logistics expansion zone"</i>.</p> <p>✓ This land use would support and complement the adjacent KSIA/DTP through the integration of existing development with new opportunities for housing, business, industry, commerce and logistics through an efficient transport-oriented urban form and through transportation systems and networks that will be multi-modal and will promote the increased use of public transportation and accommodate the efficient movement of freight.</p> <p>✓ There is sufficient space for logistics, mixed-use, business, commercial, retail, residential and industrial development at the development site, which surrounds the 'Aerotropolis'.</p> <p>✓ Allows for the expansion and consolidation of the KSIA/DTP through identifying land outside of the DTP area for logistics and business development.</p> <p>✓ The inclusion of industrial/logistics land uses maximises the potential of the site to provide air, road, sea and rail linkages as it is</p>

		<p>connected to the DTP and the adjacent Inyaninga rail station, in close proximity to the harbours and the road networks.</p> <p>✓ The rail traversing the study area has presented an opportunity to develop rail served logistic / General Industrial uses. This use comprises the largest allocation of uses within the study area and is primarily proposed to serve as a support zone for the Dube TradePort.</p> <p>✓ The proposed land uses must incorporate mitigation measures that incorporate noise reduction principles in the design of the buildings within the study area are recommended.</p> <p>✗ This land use will impact on the wetlands that will be destroyed as a result of the location of the General Industrial/Logistics land uses.</p>
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ASSESSMENT OF IMPACTS

E-3 IDENTIFIED IMPACTS

The following issues were identified in the Plan of Study and were investigated as assessed for the proposed development and the preferred alternatives (as discussed in Section E above):

Biophysical Impacts:

- Impact on ground and surface water due to hydrocarbon spillages during both the construction and operational phases of the development;
- Impact on wetlands and riparian areas due to construction activity;
- Potential for soil erosion due to soil compaction and increased surface water run-off associated with establishment of hard internal surfaces and vegetation clearing during construction and operational phases;
- Impact on loss of flora/fauna as a result of construction activity such as vegetation clearing;
- Impact on geological formations as a result of the proposed development;

Socio-Economic Impacts:

- Potential loss of viable and high potential agricultural land;
- Impact of air pollution caused by dust during construction and industrial activity during the operational phase;
- Impact of noise caused by construction and operational phase activities;
- Impacts on heritage resources and culture;
- Impact on safety and security;
- Impact on existing farm workers and farm operations;
- Potential risks associated with the Transnet gas pipeline;
- Impact on existing commercial nodes of Tongaat and Verulam;
- Impact on provision of housing and community/social facilities;
- Job creation during the construction and operational phases of the proposed project.
- Impacts on localised traffic;
- Impact on existing services;
- Impact on visual character.

E-4 IDENTIFIED CUMULATIVE IMPACTS

Cumulative impacts, as illustrated below, occur as a result from the combined effect of incremental changes caused by other activities together with the particular project. In other words, several developments with insignificant impacts individually may, when viewed together, have a significant cumulative adverse impact on the environment (see Figure below).

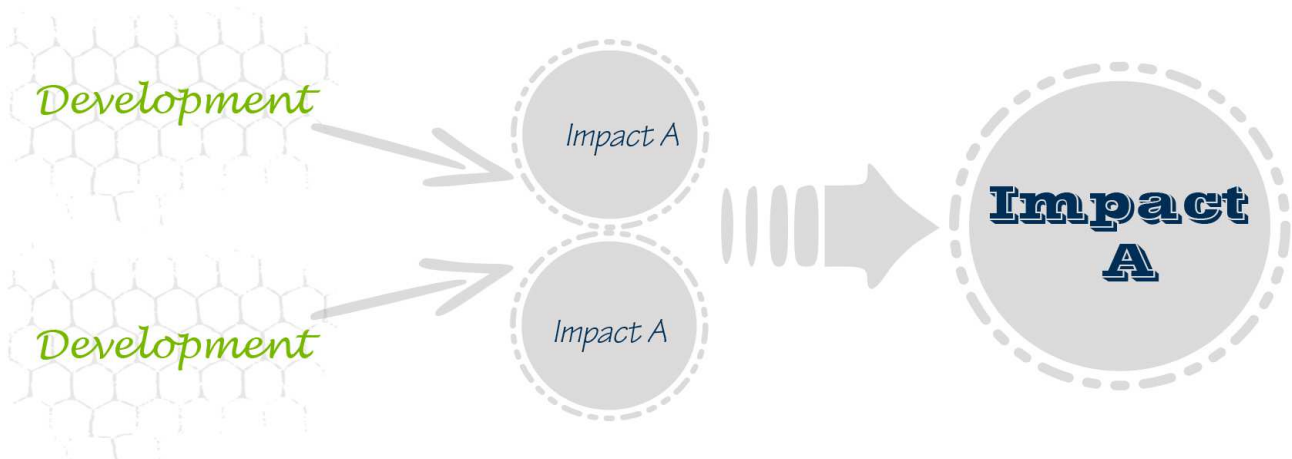


Figure 11: The identification of Cumulative Impacts

The following cumulative impacts have been identified in terms of the proposed development and warrant further investigation during the assessment phase:

Cumulative Impacts:

- Impact on KSI/DTP and other developments in the area;
- Integration with KSI/DTP and the broader region;
- Compatibility with the municipal plans;
- Increased loss of viable and high potential agricultural land;
- Increased demand on municipal service infrastructure;
- Economic growth in the region; and
- Increased traffic associated with additional road users.

E-5 IMPACT ASSESSMENT: CONSTRUCTION PHASE

E-5.1 Biophysical Environment

E-5.1.1 *Soil erosion and silting of the wetlands, riparian areas and drainage lines*

Source and nature of the impact

By clearing the vegetation for preparing the site for construction and the introducing of hard surfaces, such as the construction of the internal roads, laydown areas and contractor's camps, the stormwater run-off from the site will increase in volume and velocity. This may lead to an increased amount of soil erosion resulting in increased volumes of silt entering the wetlands and watercourse system which could impact on functionality. Rainfall and inadequate drainage systems could lead to erosion gullies forming resulting in land degradation and sedimentation of rivers. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully and seeds from proximate alien invasive trees can spread easily into these eroded soil.

Table 12: Soil erosion and silting of the wetland, riparian areas and drainage lines

Impact source(s)	Increased surface area of hard surfaces as a result of construction activities and vehicles		Status	-
Nature of impact	Increased soil erosion and silting of the wetlands, riparian areas and drainage lines			
Reversibility of impact	The impact is reversible through the implementation of adequate stormwater management measures			
Degree of irreplaceable loss of resource	Medium			
Affected stakeholders	Surrounding and downstream land owners			
Magnitude	<i>Extent</i>	Regional -3		
	<i>Intensity</i>	High – 5		
	<i>Duration</i>	Long Term – 4		
	<i>Probability</i>	Highly Likely - 4		
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+5+3+4) \times 4 = 64$ Medium to High		M - H
	<i>With mitigation</i>	$WOM \times ME = WM$ $64 \times 0.4 = 25.6$ Low - Medium		L - M

Mitigation measures

- The buffer of 30m from the wetlands on site must be clearly demarcated on site and construction workers must be made aware that construction work must not encroach into these areas.
- An ecologically-sound stormwater management plan must be implemented during construction and appropriate water diversion systems put in place.
- Erosion must not be allowed to develop on a large scale before effecting repairs.
- Appropriate mitigation measures (in consultation with the ECO) must be implemented at areas susceptible to erosion (either by wind or rain) to decrease and/or cease erosion.
- Existing roads and tracks must be used where feasible, rather than creating new routes through vegetated areas.
- Vegetation and soil must be retained in position for as long as possible, and removed immediately ahead of construction / earthworks in that area (DWA, 2005).
- Runoff from roads must be managed to avoid erosion and pollution problems.
- During the construction and operational phases, measures must be put in place to control the flow of surface water so that it does not impact on the vegetation, i.e., energy dissipaters and canal flow designs must be used to prevent scouring and erosion.

- Stormwater management must be implemented into the construction of internal/access roads such as culverts over the riparian and drainage line crossings. Routes through drainage lines and riparian zones must be avoided wherever possible. Where access through drainage lines and riparian zones is unavoidable, only one road is permitted, constructed perpendicular to the drainage line.
- All areas susceptible to erosion must be protected and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.
- Areas exposed to erosion due to construction should be vegetated with species naturally occurring in the area.
- Surface water or stormwater must not be allowed to concentrate, or flow down cut or fill slopes without erosion protection measures being in place.
- Erosion berms should be installed to prevent gully formation and siltation of the drainage lines/watercourse. The following points should serve to guide the placement of erosion berms:
 - Where the track has a slope of less than 2%, berms should be installed every 50m.
 - Where the track slopes between 2% and 10%, berms should be installed every 25m.
 - Where the track slopes between 10% and 15%, berms should be installed every 20m.
 - Where the track has a slope greater than 15%, berms should be installed every 10m.
 - Vegetation clearing should be kept to a minimum and phased where practical.
- Sheet run-off from paved surfaces and internal/access roads needs to be curtailed.
- Run-off from paved surfaces should be slowed down by the strategic placement of berms.
- As much vegetation growth as possible should be promoted within the proposed development area in order to protect soils. In this regard special mention is made of the need to use indigenous vegetation species to maintain a high level of biodiversity.
- All areas of disturbed and compacted soil need to be ripped and reprofiled before rehabilitation.
- Concurrent rehabilitation must take place throughout the construction phase.

Significance of the impact

Due to the nature of the impact (as described above), the significance of this impact without mitigation, is regarded to be medium to high. Implementation of the mitigation measures will decrease the significance of the impact to low-medium.

E-5.1.2 Surface and ground water contamination

Source and nature of the impact

Hydrocarbons (oil, petrol and diesel) and other chemicals/ liquids will be required during the construction phase. Spills and/or leakages could occur from construction vehicles and/or equipment. These spills could contaminate the surface and ground water should they occur simultaneously with a heavy rainfall event. Uncontrolled dumping of waste material on site will lead to pollution of the natural environment as well as faunal injury and mortality.

Table 13: Surface and ground water contamination

Impact source(s)	Hydrocarbon and other chemical spillages	Status	-
Nature of impact	Contamination of surface and ground water during heavy rainfall events		
Reversibility of impact	The impact is reversible by containing and clearing spills as and when they occur by means of an appropriate spill kit.		
Degree of irreplaceable loss of resource	Low		
Affected stakeholders	Surrounding and downstream land owners		
Magnitude	<i>Extent</i>	Regional – 3	
	<i>Intensity</i>	High – 5	
	<i>Duration</i>	Long Term – 4	

	<i>Probability</i>	Highly Likely – 4	
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+5+4+4) \times 4 = 64$ Medium to high	M - H
	<i>With mitigation</i>	$WOM \times ME = WM$ $64 \times 0.4 = 25.6$ Low to medium	L - M

Mitigation measures

- The buffer of 30m from the wetlands on site must be clearly demarcated on site and construction workers must be made aware that construction work must not encroach into these areas.
- Hazardous waste should be stored in compliance with regional, national and local legislation.
- Water passing through vehicle bays and workshops must pass through oil traps to ensure that all hazardous material is removed.
- The stormwater attenuation facilities must be designed to filter / trap any contaminants prior to water seeping into the ground or drainage lines.
- Construction should preferably take place during the dry season.
- All construction vehicles should be kept in good working condition.
- All construction vehicles should be parked in demarcated areas when not in use and drip trays should be placed under vehicles to collect any spillages/ leaks.
- If hydrocarbon spills occur these should be cleaned using SUNSORB (or similar product) and the contaminated soils removed from site and dispose of at an appropriate registered landfill site.

Significance of the impact

The significance of this impact is regarded as medium to high without mitigation, however, if spillages are effectively mitigated to reduce the likelihood of surface and/or ground water contamination, the significance will be reduced to low to medium.

E-5.1.3 Destruction of natural vegetation and faunal habitat

Source and nature of the impact

The clearing of vegetation and stripping of topsoil in specific areas during the construction phase is inevitable. These areas may include construction of the access road, internal roads, clearing of the site for construction, laydown areas, contractor's yards and the development footprint. Destruction of the natural vegetation and faunal habitat will result in the possible mortality of plants and animals.

Table 14: Destruction of natural vegetation and faunal habitat

Impact source(s)	Vegetation clearance for construction activities and the development footprint		Status	-
Nature of impact	Floral species may be lost and fauna may be displaced due to the removal of vegetation.			
Reversibility of impact	The impact is reversible should indigenous vegetation be planted as soon as site preparation is completed.			
Degree of irreplaceable loss of resource	Low			
Affected stakeholders	Surrounding and downstream land owners			
Magnitude	<i>Extent</i>	Regional -3		
	<i>Intensity</i>	Medium – 3		
	<i>Duration</i>	Long term – 4		
	<i>Probability</i>	Likely – 3		
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+3+4+3) \times 4 = 52$ Medium		M

	<i>With mitigation</i>	$WOM \times ME = WM$ $52 \times 0.4 = 20.8$ Medium	L - M
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Mitigation measures

- Where possible, construction activities should be located outside areas of medium-high ecological sensitivity in terms of the approved layout.
- If any plants of conservation concern or plant species that are provincially protected will be destroyed or damaged during construction activities, these should be removed by a qualified botanist and replanted in a suitable area within the same property or the conservation area just north of the study site;
- The KZN Department of Agriculture, Forestry and Fisheries (DAFF) must be contacted for the relocation and removal of the provincially protected plant species;
- Construction activities through areas containing natural vegetation (such as riparian areas and bush clumps) should commence during the winter months to decrease impacts on breeding faunal species;
- An independent Environmental Control Officer (ECO) should be appointed to oversee all construction activities;
- No open fires should be allowed in areas containing natural vegetation, especially during the dry season; and
- Office areas and associated roads should be landscaped with indigenous plant species that will be beneficial to faunal species such as bats and birds.
- Any faunal species located on the site which cannot relocate themselves (e.g. burrowing mammals), should be moved in an ecologically acceptable manner to a more suitable location. This should be undertaken by a faunal relocation expert.
- Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas.
- All areas affected by construction should be rehabilitated upon completion of the construction phase of the development. Areas should be reseeded with indigenous grasses as required.
- Use of construction vehicles in the riparian areas should be ceased.
- No dirty water run-off must be permitted to reach the riparian areas, wetlands and drainage lines.
- No fires whatsoever should be lit within the subject property.
- Construction workers may not tamper or remove natural vegetation from the surrounding areas and neither may anyone collect seeds from the plants.

Significance of the impact

Due to the large scale removal of vegetation to make space for the development, this impact is regarded as medium without mitigation. Implementation of mitigation measures will decrease the significance of the impact to low to medium.

E-5.1.4 Introduction and spread of alien invasive vegetation

Source and nature of the impact

During construction, vegetation will be removed and soil disturbed. The seeds of alien invasive species that occur on and in the vicinity of the construction area could spread into the disturbed areas. In addition, the construction vehicles and equipment were likely used on various other sites and could introduce alien invasive plant seeds or indigenous plants not belonging to this vegetation type to the construction site.

Table 15: Potential increase in alien invasive vegetation

Impact source(s)	Increase in alien invasive vegetation	Status	-
Nature of impact	Loss of biodiversity and faunal displacement		

Reversibility of impact	The impact is irreversible as the loss of natural vegetation will result in a loss of faunal habitat.		
Degree of irreplaceable loss of resource	High		
Affected stakeholders	Surrounding land owners		
Magnitude	<i>Extent</i>	Regional - 3	
	<i>Intensity</i>	High - 5	
	<i>Duration</i>	Long Term - 4	
	<i>Probability</i>	Highly likely - 4	
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+5+4+4) \times 4 = 64$ Medium to high	M-H
	<i>With mitigation</i>	$WOM \times ME = WM$ $64 \times 0.4 = 25.6$ Low to Medium	L - M

Mitigation measures

- During construction, the construction area and immediate surroundings should be monitored regularly for emergent invasive vegetation.
- Surrounding natural vegetation should not be disturbed in order to minimize chances of invasion by alien vegetation.
- All alien seedlings and saplings must be removed as they become evident for the duration of construction and operational phase.
- Manual / mechanical removal is preferred to chemical control.
- All construction vehicles and equipment, as well as construction material should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the construction site. This should be verified by the ECO.
- An alien invasive eradication and monitoring plan must be compiled and implemented during the construction phase whereby all emergent invasive species are removed during construction.

Significance of the impact

The significance of this impact is regarded as medium to high without mitigation, however, if the spread of alien plant species are effectively mitigated the significance will be reduced to low to medium.

E-5.1.5 Interference with fauna and faunal behavioral patterns

Source and nature of the impact

The presence of the construction site may result in negative faunal interactions that could be associated with construction personnel including poaching, trapping and hunting of faunal species, as well as possible collisions of fauna with construction vehicles. Construction will also result in high levels of noise, vibrations and the operation of floodlights should construction continue in the night. This will disturb the fauna utilising the surrounding vegetation, especially nocturnal species, and could result in a localised decrease in biodiversity as faunal species move away from the disturbance into the surrounding areas. Food and rubbish can attract wildlife to the area, increasing risk of negative interactions.

Table 16: Interference with fauna and faunal behaviour patterns

Impact source(s)	Construction-related activities and conduct of construction personnel	Status	-
Nature of impact	Interference with faunal behaviour patterns		
Reversibility of impact	The impact is reversible if mitigated to a large extent		
Degree of irreplaceable loss of resource	High		

Affected stakeholders	Surrounding land owners		
Magnitude	<i>Extent</i>	Site - 2	
	<i>Intensity</i>	High - 5	
	<i>Duration</i>	Long term – 4	
	<i>Probability</i>	Highly likely – 4	
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(2+5+4+4) \times 4 = 60$ Medium	M-H
	<i>With mitigation</i>	$WOM \times ME = WM$ $60 \times 0.6 = 36$ Low to Medium	L - M

Mitigation measures

- Construction should commence in the winter months in order to minimise the impacts on the breeding activities of the terrestrial floral and faunal species.
- As far as possible, construction should be limited to the daylight hours in order to minimise the need for lights.
- An education programme should be compiled for all contractors, subcontractors and workers to ensure compliance to all aspects of the EMP as well as educating personnel in the safe and proper conduct within areas of natural habitat.
- No wild animal may under any circumstance be handled, removed or be interfered with by construction workers;
- No wild animal may be fed on site.
- No wild animal may under any circumstance be hunted, snared, captured, injured or killed. This includes animals perceived to be vermin. Checks of the surrounding natural vegetation must be regularly undertaken to ensure no traps have been set. Any snares or traps found on or adjacent to the site must be removed and disposed of.
- No domesticated animals must be allowed on site.
- All food should be securely stored away to prevent attraction of faunal species and all rubbish should be disposed of away from the site. Bins located around the infrastructure should have tightly fitting lids to prevent faunal species raiding the bins and thereby becoming habituated to humans.
- To prevent possible collisions with animals, drivers of construction vehicles must remain vigilant to the possibility of animals crossing their paths and a strict speed limit should be adhered to.

Significance of the impact

The significance of this impact is regarded as medium to high without mitigation, however, the impact may be effectively mitigated, in which case, the significance will be reduced to low to medium.

E-5.1.6 Degradation and loss of functionality of the wetlands and riparian areas for the Inyaninga/Ushukela Highway Development Precinct

Source and description of the impact:

Construction activities for site preparation such as excavation, construction of the proposed infrastructure, vegetation clearance, may disturb the hydric soils and hydrophytic vegetation and negatively affect the functionality of the wetlands. Increased siltation could result from construction activities and flooding of construction area, construction vehicles and other construction activities within wetland habitat or wetland catchments.

Table 17: Loss of hydrological function impacting on the wetlands and riparian habitats

Impact source(s)	Construction activities altering the hydrological functioning of the wetland and riparian systems.		Status	-
Nature of impact	Loss of functionality of the wetlands and riparian habitat			
Reversibility of impact	The impact is not reversible			
Degree of irreplaceable loss of resource	High			
Affected stakeholders	Surrounding land owners and downstream users			
Magnitude	<i>Extent</i>	Regional -3		
	<i>Intensity</i>	High – 5		
	<i>Duration</i>	Permanent – 5		
	<i>Probability</i>	Definite – 5		
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+5+5+5) \times 4 = 72$ Medium to high		M - H
	<i>With mitigation</i>	$WOM \times ME = WM$ $72 \times 0.4 = 28.8$ Low to Medium		L - M

Mitigation measures

- There must be physical demarcation of the 30m buffer around the wetlands and riparian areas (by means of red danger tape) to ensure that excavation, earthworks and construction activity do not impact on these sensitive ecological corridors.
- The construction crew must be made aware, at induction, that construction vehicles, equipment and activities must not encroach within the buffer areas.
- Construction will take place in the dry winter months (as far as possible) to minimise the impacts of erosion.
- The proper storage and handling of hazardous substances (hydrocarbons and chemicals) needs to be administered.
- Any erosion gullies/channels created during construction should be filled immediately to ensure silt does not drain into the wetland.
- Ensure that appropriate solid waste disposal facilities are provided on-site during construction and adequate signage is provided.
- Spillages should be cleaned up immediately and contaminants properly drained and disposed of using proper solid/hazardous waste facilities (not to be disposed of within the natural environment). Any contaminated soil from the construction site must be removed and rehabilitated timeously and appropriately.
- Routinely check machinery for oil or fuel leaks before construction begins.
- Clear and completely remove from site all general waste, construction plant equipment, surplus rock, and other foreign materials once construction has been completed.
- A Storm Water Management Plan as per the Engineering Services Report (Appendix 6) is to be implemented by an appropriately qualified hydrologist. It is important that the plan takes into consideration the maintenance of flow volume and rate of the current wetland systems and tries to maintain these as far as possible.
- Energy dissipating gabions will be placed along portions of the banks of the affected riparian systems, in order to reduce the erosion potential of run-off and help prevent scouring around the proposed infrastructure.
- An ecologically-sound stormwater management plan must be implemented during construction phase, to ensure that water quality and/or quantity of the water courses are not affected. Concurrent rehabilitation must take place throughout the construction phase. Remedial action must be taken to rectify any negative impacts to ensure that the water quality is acceptable to DWA.
- A rehabilitation plan to re-instate the watercourses lines must be compiled in consultation with a

suitably qualified engineer.

- The re-vegetation and rehabilitation plan to be implemented, must be compiled in consultation with SANBI, DAFF, KZN DAEA and a suitably qualified botanist.
- An alien invasive plant eradication programme must be implemented in consultation with the above authorities and a suitably qualified botanist. Continuous monitoring and reporting must be undertaken. The KZN DAEA should also be consulted in the compilation of this programme.
- The ECO must oversee the rehabilitation work to ensure that the rehabilitation plan is fully complied with.

Significance of the impact:

The significance of the impact without mitigation is regarded to be medium to high. Implementation of the mitigation measures will decrease the significance of the impact to low to medium.

E-5.1.7 Degradation and loss of functionality of the wetlands and riparian areas for the proposed sewer pipelines for the Inyaninga Integrated Human Settlements Development

Source and description of the impact:

The likely impacts associated with the construction of the pipeline on riparian and wetland crossings are as follows:

- The introduction of foreign materials to the system, such as fuel, cement and other building materials;
- Compaction of the wetland soils from heavy vehicles;
- Modifications to the wetlands, river banks and beds from trenching or installation of vertical support structures for aerial crossings;
- Trench erosion and the diversion of subsurface flow as a result of preferential flow paths having been created;
- Risk of erosion forming upstream of the trench if infilling is not adequately compacted or the longitudinal slope of the wetland system is not maintained;
- Disturbance of vegetation and the encroachment on alien invasive or ruderal wetland plant species;
- The potential impoundment of flows upstream of the infrastructure and desiccation of the systems downstream of the trenching. These conditions could continue post-development depending on how effectively the area has been rehabilitated; and
- Direct loss of portions of the wetland and riparian habitat.
- Impacts on water quality linked to construction activities and soil disturbance.

The main river crossings will be planned as elevated stream crossings, which would greatly minimise the potential impacts on the systems. The primary concern would therefore be accessibility for construction vehicles. Many of the riparian and wetland habitats are dominated by alien plants, with construction activities unlikely to impact on indigenous species and providing opportunity for localised removal of alien invasive vegetation and rehabilitation with indigenous plant species.

Table 18: Loss of hydrological function impacting on the wetlands and riparian habitats

Impact source(s)	Construction activities altering the hydrological functioning of the wetland and riparian systems through erosion, sedimentation, bank modification, pollution, habitat loss and disturbance.	Status	-
Nature of impact	Loss of functionality of the wetlands and riparian habitat		
Reversibility of impact	The impact is not reversible		
Degree of irreplaceable loss of resource	High		
Affected stakeholders	Surrounding land owners and downstream users		
Magnitude	<i>Extent</i>	Regional -3	

	<i>Intensity</i>	High – 5	
	<i>Duration</i>	Permanent – 5	
	<i>Probability</i>	Definite – 5	
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+5+5+5) \times 4 = 72$ Medium to high	M - H
	<i>With mitigation</i>	$WOM \times ME = WM$ $72 \times 0.4 = 28.8$ Low to Medium	L - M

Mitigation measures

- Riparian plant species of conservation significance currently located within the proposed sewer pipeline route would need to be accounted for. The presence of such species must be investigated by a botanical specialist.
- The site-specific mitigation measures for each of the 33 freshwater crossings must be strictly adhered to during the construction of the sewer pipeline (Refer to Appendix 6 of the Freshwater Ecosystem Assessment).
- The sewerage pipeline should ideally be planned beyond a buffer of 20m, where possible.
- Where challenges are foreseen in this regard, it is recommended that the sewerage pipeline be aligned adjacent to existing services, such as roads, within the rivers/wetlands. This would be preferable to installing infrastructure in open or undeveloped portions of the systems.
- In undeveloped/open areas where maintaining a 20m buffer is not feasible, the route should be planned outside the boundaries of the freshwater ecosystems.
- In areas where the boundary of a neighbouring property coincides with the boundary of the freshwater ecosystem and direct encroachment into the system is unavoidable, the infrastructure should be planned outside the macro channel of the freshwater ecosystems as a minimum.
- Manholes should be planned to occur at points along the route that are beyond 30m from the freshwater ecosystems or incorporate design measures to minimise leakages as they are often sources of point source pollution, when the infrastructure is operating inadequately.
- The installation of the sewerage infrastructure using the trenching method within the wetland and riparian habitat needs to be implemented taking into account the following recommendations:
 - Where the proposed alignment of the infrastructure would be parallel to flow direction, the infrastructure should be realigned outside of the identified wetland or riparian habitat;
 - Where the proposed infrastructure crosses the wetland or riparian habitat, the following need to be considered;
 - Crossings should be aligned with existing infrastructure, such as roads or bridges,
 - Sewerage infrastructure should be positioned on the downstream side of a road crossing to negate potential impacts linked to headward erosion and sub-surface impoundment of flow; and
 - Where the infrastructure is unable to be aligned with existing services, the crossing should be planned at a narrow section and be perpendicular to the flow direction, minimising the amount of disturbance to the freshwater ecosystem and the risks of headward erosion.
- In order to mitigate the impacts associated with elevated pipeline crossings, which involve vertical support structures or piers, the following best practice guidelines should be considered:
 - The positioning of the support structures should be beyond a 10m disturbance buffer to protect the freshwater ecosystems from disturbance; and
 - Should the crossing width exceed the feasible spanning distance, the vertical support structures should at a minimum be positioned outside of any active channels or flow paths; and
 - Construction of the supports within the freshwater ecosystems should be subject to specific precautionary measures:
 - ❖ Minimise the construction footprint;

- ❖ Handling of concrete and building material should be in accordance with the Environmental Management Plan (EMPr) for wetland habitat.
- The following mitigation measures must be considered to prevent sub-surface flow channel and erosion, for trenched sections of the proposed pipelines:
 - In those instances where the alignment of the sewerage infrastructure using the trenching method would be unable to avoid the freshwater ecosystems, there would be a risk of erosion or the trench serving as a sub-surface flow channel, especially where a valley-bottom has a lateral slope draining towards the main channel. It is recommended that following additional mitigation measures be adopted:
 - ❖ ‘Trench-breakers’, which are in-trench barriers, should be installed along the length of the trench within the wetland to deactivate the flow of water along the trench;
 - ❖ These barriers would be placed at head-to-toe intervals, where the top of downstream barrier “floods” to the base of next barrier upstream. The intervals of barriers are therefore determined by the slope of the wetland down the length of the trench;
 - ❖ Traditionally, these barriers are constructed using a mix of cement, sand and *in situ* soil, but in this instance, where work will be within the wetland, it is recommended that the barriers be constructed using 20% bentonite and in situ soil mix or impermeable geotextile liners; and
 - ❖ Small-scale diversion berms should be constructed on the surface of the trench, to reduce the risk of the trench becoming a preferred surface flow path. These berms are especially important on steep slopes and long slope lengths approaching the freshwater crossings.
- The following mitigation measures specific to freshwater ecosystems should be adopted:
 - Excavate the crossings in the winter months as this is the driest period for this region;
 - The crossings of the riparian channels should be perpendicular to the direction of flow;
 - The crossings should be designed to ensure that flow patterns along the stream/river channel are not altered or diverted potentially resulting in stream bank erosion;
 - The crossings should be rehabilitated to ensure that no barriers exist within the stream and that in-stream habitat is similar to the natural situation;
 - On slopes draining towards the identified freshwater ecosystems, small-scale diversion berms should be constructed at an appropriate interval on the surface of the pipeline alignment to reduce the risk of the pipeline becoming a preferred surface flow path leading to erosion. The horizontal spacing between the diversion structures will be determined by the gradient of the approach slopes. The number of berms to be constructed should be specified by the Environmental Control Officer (ECO) in consultation with an environmental engineer during construction;
 - The diversion berms should divert the water off the trench towards the downslope side of the freshwater habitat. Care must be taken to discharge water to areas where erosion will be minimised e.g. vegetated areas or existing formal drains;
 - Bio-degradable erosion control blankets should be considered to stabilise the disturbed areas on the steeper approaches to the wetlands where erosion is more likely to occur. The erosion control blankets should be implemented according to the suppliers specification;
 - Remove the top 50cm of the wetland/riparian topsoil and stockpile this material during the construction period, to be replaced once activities have been completed. This is to maintain the existing seed bed and soil profiles as best as possible;
 - During installation, the excavated soil from the trench should be placed on the upslope side of the trench, minimizing the risk of excess sediment entering the downstream areas of the freshwater ecosystems;
 - The pipeline alignment should be rehabilitated, with the wetland and riparian habitat at the crossing points being restored to near-natural conditions. In addition, areas where disturbance adjacent to these ecosystems has occurred should also be rehabilitated. This

- should be done as soon as possible after the pipeline construction activities have ceased.
- The working servitude across the systems must be as narrow as practically possible. i.e. machinery must utilise the same route through the systems at all times so as to avoid unnecessary disturbance;
- In riparian areas, backfilling should occur as soon as possible, compact if possible and reshape river to original levels; and
- For the wetland crossings, it would be preferable if the alignment was within road reserves or downstream of the road crossings where possible, to:
 - ❖ Minimise the risks of headward erosion and
 - ❖ Align the impacts of the pipeline with portions of the wetland habitat deactivated by road crossings.

Significance of the impact:

The significance of the impact without mitigation is regarded to be medium to high. Implementation of the mitigation measures will decrease the significance of the impact to low to medium.

E-5.1.8 Impact of geological formations

Source and description of the impact:

a) Inyaninga Precinct

The majority of the site is suitable for the proposed development. A considerable portion of the higher lying western site regions is anticipated to have potentially unstable slopes attributed to moderately steep and steep south-easterly to easterly facing slopes with:

- Shale bedding dipping out of slope.
- Dolerite intrusions and increased moisture.
- Hummocky profiles evident of past failures.

Soil profiles are expected to be thin on mid to upper slopes where sandy clays/gravelly clays/silty clays with a moderate/high heave potential and low to moderate soil compressibility are expected. Thicker/softer/wetter clayey profiles are anticipated on lower slope area with a moderate/high compressibility and heave potential.

There is a large dolerite intrusion parallels the eastern site boundary. The dolerite is highly variable in profile across the site, however, for the most part, areas underlain by dolerite will have deep clayey/silty soil profiles with a moderate heave potential and moderate soil compressibility. A second relatively large dolerite intrusion was encountered in the western corner of the site with further considerable minor dolerite intrusions intersecting the shale/siltstone/sandstone at numerous localities.

b) Ushukela Precinct

The majority of the site is suitable for the proposed development. In general, a moderate heave potential and moderate soil compressibility is expected. Slopes are also generally moderately sloping requiring cut to fill platforms. The dolerite is however highly variable in profile across the site. Slope instability problems are commonly associated with the siltstone/mudstone horizons in the Vryheid Formation, particularly where the bedding dips adversely out of moderate to steep slopes and/or when associated with dolerite intrusions/subsurface moisture.

Construction activities for site preparation such as excavation, construction of the proposed infrastructure, vegetation clearance, may disturb the hydric soils and hydrophytic vegetation and negatively affect the functionality of the wetlands. Increased siltation could result from construction activities and flooding of construction area, construction vehicles and other construction activities within wetland habitat or wetland catchments.

Table 19: Impacts on geology formations

Impact source(s)	Potential instability, presence of steep slopes, conditions that hamper excavatability, potential for structures to crack	Status	-
Nature of impact	Underlying geotechnical concerns to inform construction of the proposed structures		
Reversibility of impact	The impact is not reversible		
Degree of irreplaceable loss of resource	High		
Affected stakeholders	Surrounding land owners		
Magnitude	<i>Extent</i>	Regional -3	
	<i>Intensity</i>	Low – 1	
	<i>Duration</i>	Short-medium term – 2	
	<i>Probability</i>	Probable – 1	
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+1+2+1) \times 4 = 28$ Low to Medium	L - M
	<i>With mitigation</i>	$WOM \times ME = WM$ $28 \times 0.4 = 11.2$ Low	L

Mitigation measures**a) Inyaninga Precinct**

The majority of structures are anticipated to be founded on gentle slopes underlain by shallow shale/siltstone/sandstone requiring conventional strip or pad footing foundations onto soft rock. Exception to the above is:

- Founding on lower slopes where deeper cohesive profiles (moderate to high heave potential and compressibility) are expected requiring reinforcement/articulation of structures/foundations to allow differential movement or raft/ground beam foundations supported by piles where necessary, (i.e. heavier structures).
- Founding on steeper side slopes with cut to fill platforms (exceeding $\pm 1,0-1,5m$ filling) requiring stiffened rafts/ground beams supported by piles where necessary.

Slopes are also generally moderately sloping requiring cut to fill platforms. Founding in these areas are hence anticipated for the most part to require reinforced/articulated foundations and structures to allow differential movement, or stiffened raft/ground beam foundations supported by piles where necessary (i.e. fills $>1,0-1,5m$ /heavier structures, etc.).

b) Ushukela Precinct

In general, a moderate heave potential and moderate soil compressibility is expected. Slopes are also generally moderately sloping requiring cut to fill platforms. Founding in these areas are anticipated for the most part to require reinforced/articulated foundations and structures to allow differential movement, or stiffened raft/ground beam foundations supported by piles where necessary (i.e. fills $>1,0m$ /compressible soils, etc.). Portions of these western areas will encounter shallow bedrock lending itself to conventional strip footings or pads taken down to stable residuum or bedrock.

The recommendations as suggested by the Geotechnical Engineers, TGC Engineers (Refer to the Geotechnical Assessment in Appendix 6) must be adhered to during the construction phase.

Significance of the impact:

The significance of the impact without mitigation is regarded to be low to medium. Implementation of the mitigation measures as suggested by the Geotechnical Engineer will decrease the significance of the impact to low.

E-5.2 Socio-economic Environment

E-5.2.1 Increase in ambient dust levels

Source and nature of the impact

Construction activities, such as transportation vehicles travelling on exposed surfaces, earthworks as well as wind, will result in elevated ambient dust levels within the area. Increased dust levels may adversely affect persons working and/or residing in the nearby area.

Table 20: Increase in ambient dust levels

Impact source(s)	Transportation vehicles travelling over exposed surfaces, earthworks and the wind	Status	-
Nature of impact	Increased levels of ambient dust		
Reversibility of impact	The impact is irreversible but can be mitigated to a large extent		
Degree of irreplaceable loss of resource	Low		
Affected stakeholders	Surrounding land owners		
Magnitude	<i>Extent</i>	Site - 2	
	<i>Intensity</i>	Medium – 3	
	<i>Duration</i>	Short Term – 1	
	<i>Probability</i>	Likely – 3	
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(2+3+1+3) \times 4 = 36$ Low to Medium	L - M
	<i>With mitigation</i>	$WOM \times ME = WM$ $36 \times 0.4 = 14.4$ Low	L

Mitigation Measures

- Appropriate dust suppression methods must be applied.
- Exposed soil stockpiles shall be covered, kept damp or protected using organic binding agents or alternative techniques that are not water intensive.
- The clearing of vegetation must be kept to a minimum and only where required.
- Avoid unnecessary movement of construction vehicles.
- Vehicles travelling on unsurfaced roads must travel at a speed that creates minimal dust entrainment.

Significance of the impact

The significance of this impact, without mitigation, is regarded to be low to medium. Implementation of the mitigation measures will decrease the significance of the impact to low.

E-5.2.2 Increase in ambient noise levels

Source and nature of the impact

Construction activities and movement of construction vehicles will increase the ambient noise levels within the area during the construction phase. This may impact on the people located at the adjacent properties, as well as sensitive faunal species within the study area.

Table 21: Increase in ambient noise levels

Impact source(s)	Construction activities		Status	-
Nature of impact	Increased level of ambient noise			
Reversibility of impact	The impact is irreversible but can be mitigated to a large extent			
Degree of irreplaceable loss of resource	Low			
Affected stakeholders	Adjacent and surrounding land owners			
Magnitude	<i>Extent</i>	Site - 2		
	<i>Intensity</i>	Low – 1		
	<i>Duration</i>	Short term – 1		
	<i>Probability</i>	Likely – 3		
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(2+1+1+3) \times 3 = 21$ Low to Medium		L-M
	<i>With mitigation</i>	$WOM \times ME = WM$ $21 \times 0.6 = 12.6$ Low		L

Mitigation measures

- Construction times must be restricted to working hours (06:00 – 18:00).
- All construction equipment or machinery should be switched off when not in use.
- Construction equipment must be kept in good working condition.

Significance of the impact

The impact associated with increased ambient noise levels during the construction phase is predicted to be of a low to medium significance, however the implementation of mitigation measures will reduce the significance of the impact to low.

E-5.2.3 Change of visual character**Source and nature of the impact**

The construction activities and camps will alter the current visual character of the area, from one of open sugar cane fields to a construction site associated with people, vehicles and equipment. The construction site may be visible to residents on the northern boundary of the site and motorists along the R102 in the area, however, most of them will have a direct view of the construction activities.

Table 22: Change of visual character of the area

Impact source(s)	Construction activities and placement of construction equipment		Status	-
Nature of impact	Visual character of the area will be altered by construction activities and equipment			
Reversibility of impact	The impact is irreversible but will be less visually intrusive if appropriate mitigation measures are adopted			
Degree of irreplaceable loss of resource	Medium			
Affected stakeholders	Surrounding land owners			
Magnitude	<i>Extent</i>	Regional -3		
	<i>Intensity</i>	Medium – 3		
	<i>Duration</i>	Short to Medium term – 2		
	<i>Probability</i>	Highly likely – 4		
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+3+2+4) \times 4 = 48$ Medium		M

	<i>With mitigation</i>	$WOM \times ME = WM$ 48 x 0.6 =28.80 Low to Medium	L - M
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Mitigation measures

- The construction area must at all times be neat and tidy.
- All litter must be collected and removed (daily) and disposed of appropriately.
- Equipment and construction vehicles must be stored or parked in designated areas.
- The construction camp must be screened with shade cloth.
- If construction is necessary during night-time, light sources should be directed inwards and downwards to prevent obtrusive lighting and light pollution.
- Dust suppression techniques should be implemented especially on windy days. Exposed soil stockpiles shall be covered, kept damp or protected using organic binding agents or alternative techniques that are not water intensive.

Significance of the impact

The visual impact associated with construction activities during the construction phase is predicted to be of a medium significance; however the implementation of mitigation measures will reduce the significance of the impact to a low-medium.

E-5.2.4 Impact on traffic patterns within the area**Source and nature of the impact**

Due to construction activities and associated machinery movement, the traffic patterns of the surrounding roads network will be affected. Peak hour ranges from 07h00 to 08h00.

Table 23: Change in traffic patterns of the area

Impact source(s)	Construction activities and vehicle movement		Status	-
Nature of impact	Traffic patterns of the surrounding area will be affected			
Reversibility of impact	The impact is irreversible but will be less intrusive if appropriate mitigation measures are adopted			
Degree of irreplaceable loss of resource	Low			
Affected stakeholders	Surrounding land owners and road users			
Magnitude	<i>Extent</i>	Regional -3		
	<i>Intensity</i>	High – 5		
	<i>Duration</i>	Medium Term - 3		
	<i>Probability</i>	Definite - 5		
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ (3+5+3+5) x 5 = 80 Medium - High	M - H	
	<i>With mitigation</i>	$WOM \times ME = WM$ 80 x 0.6 =48 Medium	M	

Mitigation measures

- Avoid movement of construction vehicles and machinery on main access roads during peak times (7:00 – 9:00) & (16:00 – 18:00).
- If the above is unavoidable – implement traffic control measures such as points men at busy intersections.

Significance of the impact

The impact that construction related traffic would have on this the current traffic patterns is predicted to be of a

medium to high significance without mitigation measures, however, this impact can be reduced to a medium significance if appropriate measures are adopted.

E-5.2.5 Impacts on heritage resources

Source and nature of the impact

1. Inyaninga Farm Manager’s Residence

The Inyaninga Farm Manager’s residence is located at 29°35’53.6”south and 31°05’16.09”east. It was constructed before the 1950’s and has been subject to ongoing alteration and refurbishment over the last 25 years. It has low heritage significance at the local level for its social value. It will be destroyed as a result of the proposed development.

2. Inyaninga Barracks

Inyaninga Barracks comprise two groups of buildings, with the South Barracks located at 29°36’03.75” south and 31°05’25.8” east and the West Barracks at 29°35’58.05”south and 31°05’16.9” east. The South Barracks were built in 1939 to replace the wood and iron structures originally erected for Indian Indentured labourers. Concomitant construction of a new temple was started (see below). The West Barracks were constructed in the second half of the 20th century. The Barracks have medium heritage significance at the local and regional levels for their historic, social and cultural values. It will be destroyed as a result of the proposed development.

3. Inyaninga Shree Mariaman Temple

Inyaninga Shree Mariaman Temple is associated with the Inyaninga Barracks and is located at 29°36’04.95” south and 31°05’28.15” east. Mikula *et al* (1982¹) describes the site as follows:

“This is an unassuming little temple which originated in 1896 when the indentured labour community of Inyaninga built their wood and iron structure. In 1939 a more substantial temple was constructed with funds provided by the Tongaat Sugar Company, who also donated the land. Construction work was carried out by a local building contractor whilst the decoration and sculpture work on the front gable was probable executed by one Barasathi Naiker (1872 – 1962)”.

The temple has high heritage significance at the local and regional levels for its aesthetic, spiritual, historic, social and cultural values. The temple will be retained in the proposed development.

Table 24: Impacts on heritage resources

Impact source(s)	Construction of the proposed Inyaninga/Ushukela Highway Development Precinct		Status	-
Nature of impact	Impacts on the heritage resources (Farm Manager’s Residence and Barracks as listed above)			
Reversibility of impact	The impact is irreversible			
Degree of irreplaceable loss of resource	Low			
Affected stakeholders	Inyaninga Ex-residents Association, families associated with the farm manager’s residence and the barracks			
Magnitude	<i>Extent</i>	Site – 2		
	<i>Intensity</i>	High – 5		
	<i>Duration</i>	Permanent – 5		
	<i>Probability</i>	Definite - 5		
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(2+5+5+5) \times 3 = 51$ Medium		M
	<i>With mitigation</i>	$WOM \times ME = WM$ $51 \times 0.4 = 20.4$ Low to Medium		L - M

Mitigation measures

THDev must apply to Amafa's Built Heritage Committee for a demolition permit for the destruction of the Estate Manager's House, at which time, the committee will issue instructions for further mitigation requirements, if any, such as full documentation of the structure.

Given the significance of the Inyaninga Barracks, any envisaged changes to their *status quo* should proceed with wide stakeholder participation. THDev should initiate and bear the cost of such participation, which should aim to conserve all structures *in situ* as the preferred option.

THDev should seek advice from Amafa and / or a suitably qualified Built Heritage Specialist to develop an Integrated Conservation Management Plan for the precinct as a whole. This plan should include recommendations for the creation of a management team, research, documentation and conservation requirements, use of and access to the precinct, disaster management and implementation and review of the plan.

Should the heritage resources be destroyed or altered in any way, permits from Amafa would be required.

Construction activities should be limited to the proposed development boundary. If the size of the footprint is increased at a later stage, a heritage specialist should be involved in order to assess how the increase in the size of the footprint will affect heritage resources.

If it is believed that the heritage resources identified outside the study area will be affected by the development, permit applications must be logged with Amafa.

Should any archaeological artefact be exposed during foundation excavation, the construction in the vicinity of the findings must be stopped. Under no circumstances shall any artefact be destroyed. Such an archaeological site must be marked and fence off, and Amafa must be contacted.

Upon receipt of such notification, the Environmental Control Officer (ECO) must arrange for the excavation to be examined by an Archaeologist. Under no circumstances must archaeological artefacts be removed, destroyed or interfered.

Any archaeological sites exposed during demolition or construction activities must not be disturbed prior to authorisation by Amafa.

Significance of the impact

The impact associated with construction of the proposed Inyaninga/Ushukela Highway Development Precinct on the destruction of heritage resources during the construction phase is predicted to be of a medium significance without mitigation measures, however, this impact can be reduced to a low to medium significance if appropriate measures are adopted.

E-5.2.6 Impacts on safety (Transnet Gas Pipeline) and security**Source and nature of the impact**

A Transnet gas pipeline carrying methane rich gas is buried 1m below the ground level and traverses the north-western portion of the development site. It is considered a Major Hazardous Installation (MHI). A 9.14m servitude exists on either side of the gas pipeline. Potential hazards may arise should there be no induction on the presence of the gas pipeline to the construction crew and the subsequent construction activity within or in close proximity to the pipeline.

There is potential for an increase in criminal activities during construction phase, as there will be increased

movement of people through the area.

Any construction or development activity which causes movement/migration of people has the potential to increase the spread of diseases. Potential health risks which may stem from the construction may be:

- Increased incidence of communicable diseases resulting from an increase in local population, due to induced migration.
- Occupational health risks associated with work on a construction site.
- Increased risk of the spread of Sexually Transmitted Diseases and HIV/AIDS.

In this case, one of the most important of these is HIV/AIDS. Induced migration, as well as the movement of contractor construction workers from elsewhere in the country, can potentially increase the spread of HIV/AIDS.

Construction camps are renowned for activities such as prostitution and varying levels of promiscuity. This could lead to scenarios where an infected construction worker coming into the area spreads the disease through unprotected intercourse with sex trade workers or local individuals, who, in turn, will spread it locally. However, it is not only the immediate areas surrounding the proposed pipeline alignment, which may be affected. Uninfected construction workers could become infected through unprotected intercourse locally and, on return to his/her place of origin and spread the disease there.

One development alone cannot solve the HIV/AIDS problem of the country. However, it is the responsibility of all citizens to contribute towards a solution.

Table 25: Impacts on safety and security

Impact source(s)	Construction activity within or close to the Transnet Gas Pipeline Potential rise in criminal activity Potential increase in the spread of HIV/AIDS and other diseases	Status	-
Nature of impact	Impacts on the safety and security		
Reversibility of impact	The impact is irreversible		
Degree of irreplaceable loss of resource	Low		
Affected stakeholders	Adjacent landowners, residents and surrounding landowners		
Magnitude	<i>Extent</i>	Regional – 3	
	<i>Intensity</i>	Medium – 3	
	<i>Duration</i>	Short – medium term – 2	
	<i>Probability</i>	Likely - 3	
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+3+2+3) \times 3 = 33$ Low to Medium	L-M
	<i>With mitigation</i>	$WOM \times ME = WM$ $33 \times 0.4 = 13.2$ Low	L

Mitigation measures

- The Risk Assessment compiled by Ishecon (Appendix 6) must be submitted to the local authority for approval of the Inyaninga/uShukela Highway Precinct development.
- The 30m buffer on either side of the 9.14m wide Transnet gas pipeline servitude must be physically demarcated on the site (north-western portion of the site) to make construction workers aware of its presence and that this area is out of bounds for construction-related activity. All construction workers must be made aware of the dangers of the gas pipeline and emergency handling aspects, at the Induction Session to be presented by the ECO prior to the commencement of construction activities.

- Implement efficient security and access control, to ensure that only construction workers enter the camp.
- It is suggested that people from the local workforce be employed.

To ameliorate the potentially negative impacts associated with the potential increase in the spread of HIV/AIDS and other diseases, the following mitigation measures are suggested:

- Where possible, appoint local labour, thereby reducing the number of external construction workers required.
- Ensure sufficient water and sanitation is provided at the construction camp.
- Ensure that refuse management and removal is done properly.
- Include an HIV/AIDS awareness component in the induction programme of all construction workers coming onto site.
- An on-going HIV/AIDS awareness campaign should be implemented with the workforce and communities neighbouring the site, and adequate access to HIV/AIDS-related information and condoms, for all construction employees.
- Condoms should be made available to all construction workers, with the active encouragement of their use.

Significance of the impact:

The significance of the impact without mitigation is regarded to be low to medium. Implementation of the mitigation measures will decrease the significance of the impact to low.

E-5.2.7 Temporary Job creation

Construction is anticipated to take place over 20 years. Temporary employment opportunities will be created during the construction phase, via construction related activities such as:

- Construction of roads and structures that comprise the proposed development and services infrastructure; and
- Fencing of the site boundary area.

Gabhisa Planning and Investments conducted the Socio-Economic Impact Assessment for the proposed development (refer to Appendix 6). The outcomes of this Assessment, based on an empirical study were as follows:

- Employment - site preparation, and construction and construction-related jobs that will directly be created by Inyaninga development are estimated to be approximately 262,530 over the construction period (on average this translates to approximately R26, 256 per annum).
- These direct jobs are created through on-site construction and construction-related economic activities carried out at the proposed Inyaninga development. These include but are not limited to employing construction-related labor, purchase of locally produced goods and services (workers spending their salaries/wages), and contracting for construction and capital improvements, etc. The number of indirect/induced jobs that will be created through the multiplicative effect of Inyaninga development in the local economy of eThekweni Metropolitan is estimated to be approximately 178,473 during the construction period (on average this translates to approximately 17,847 indirect/induced jobs per annum).
- These indirect/induced jobs are the consequences of off-site construction and construction related economic activities that supply to Inyaninga development businesses. These include but are not limited to off-site development business activities associated with the Inyaninga development throughput (i.e. the local economy of eThekweni Metropolitan and the rest of South Africa's suppliers of building/construction materials, hospitality industry, retail industry, tourism, agencies, etc), or the impacts resulting from successive rounds of spending in the local communities in eThekweni area.

Therefore, the total number of (direct and indirect/induced) jobs that will be created and sustained throughout the ten years of construction is estimated to be approximately 441,003 new sustainable job opportunities (on average this translates to approximately 44,100 per annum).

- Due to its geographic location, it is assumed that the project will source a substantial portion of its labor from Inanda, Ndwedwe, Phoenix, and Tongaat, hence making an inroad in decreasing the high level of unemployment and poverty. Similarly, the project will provide a source of income for the communities in these poverty stricken areas.
- The project will be used from the start to train people and transfer skills as far as possible. The tender specifications for any construction work on the project will include a compulsory utilisation of a certain percentage of local labour and the compulsory training of local labour.

In light of the above, the project will positively impact on the surrounding community and local economy due to possible skills development and income generation. This impact is predicted to have a **high positive significance**.

E-6 IMPACT ASSESSMENT: OPERATIONAL PHASE

E-6.1 Biophysical Environment

E-6.1.1 Surface and ground water contamination

Source and nature of the impact

Due to the nature of the development (commercial and industrial) hydrocarbons (oil, petrol and diesel) and other chemicals/ liquids will be required during the operational phase and will be stored at a fuel storage facility in bunded areas at the General Industrial/Logistics area. Although unlikely, spills and/or leakages could occur and enter the stormwater management system and thus potentially contaminate surrounding surface and ground water resources.

Table 26: Surface and ground water contamination

Impact source(s)	Hydrocarbon and other chemical spillages		Status	-
Nature of impact	Contamination of surface and ground water during heavy rainfall events			
Reversibility of impact	The impact is reversible by containing and clearing spills as and when they occur by means of an appropriate spill kit			
Degree of irreplaceable loss of resource	Low			
Affected stakeholders	Surrounding and downstream land owners			
Magnitude	<i>Extent</i>	Regional -3		
	<i>Intensity</i>	High – 5		
	<i>Duration</i>	Permanent - 5		
	<i>Probability</i>	Definite – 5		
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+5+5+5) \times 2 = 36$ Low to medium		L - M
	<i>With mitigation</i>	$WOM \times ME = WM$ $36 \times 0.4 = 14.4$ Low		L

Mitigation measures

- The stormwater attenuation facilities must be designed to filter / trap any contaminants prior to water seeping into the ground or adjacent drainage lines.
- To limit the impacts of stormwater runoff on the freshwater ecosystems, the discharge of stormwater runoff into the identified systems should be managed by means of:
 - Multiple discharge points that are reasonably spread out across the development adjoining the wetland habitat;
 - Flow through the buffer zone should be via diffuse flow and concentrated flow should be avoided (Cornelius-Carolina, 2004; Valparaiso City, 2004). This would assist in reducing the concentration of flows and hence the risks of erosion and further degradation of the receiving environments;
 - Accompanying each discharge point should be suitable baffle structures (e.g. gabion mattresses) that will dissipate the energy of storm flow and encourage infiltration, thus reducing the likelihood of erosion;
 - The runoff entering the buffer zone should not exceed 1.5m/sec as this is considered to reduce the pollutant removal performance of the buffer area (Valparaiso City, 2004); and
 - It is also recommended that these outflow points incorporate a best management practice approach to trap excess suspended solids and other pollutants originating from the proposed development before entering the freshwater ecosystems. These will need to be regularly serviced and maintained to ensure adequate functioning and efficacy.

- If a hydrocarbon spillage occurs these should be cleaned using SUNSORB (or similar product) and the contaminated soils/ materials removed from site and dispose of at an appropriate registered landfill site.
- All spilled hazardous substances must be contained in impermeable containers for removal to a licensed hazardous waste site, (this includes contaminated soils, and drenched spill kit material).
- The fuel storage areas must be clearly demarcated and restricted to designated staff only. The fuel storage area must be adequately bunded to ensure that no contamination of underground water and catchment areas occurs.
- The transport, handling and storage of hazardous substances must comply with all the provisions of the Hazardous Substances Act, 1973 (Act No. 15 of 1973), associated regulations as well as SANS 10228 and SANS 10089 codes.
- A Spill Contingency Plan must be compiled post authorisation and approval must be obtained from the relevant authorities. The Spill Contingency Plan must be in place, in case of leakages or spillages which are not detected and then lead to the contamination of underground water.
- Leak detectors on pressure systems must be included.
- Monitoring of volumes of the tanks must take place on a daily basis to detect unexplained losses due to leakages.
- In the event of a spill, hazardous material may be generated. Such material must be disposed of at a suitably licensed waste disposal facility, with chain of custody documentation supplied as proof of end recipient.
- Hazardous and flammable substances must be stored and used in compliance with the applicable regulations and safety instructions.

The following mitigation measure must be adhered to, with regard to the proposed sewerage pipeline:

- Manholes should be planned to occur at points along the route that are beyond 30m from the freshwater ecosystems or incorporate design measures to minimise leakages as they are often sources of point source pollution, when the infrastructure is operating inadequately.

In order to minimize risks and alleviate existing challenges associated with the operation of sewage infrastructure, alternate designs for the sewerage infrastructure within each property should be considered as a potential 'best practice' to reduce the risk of misuse or abuse of the infrastructure. For example, the following design has been implemented in residential areas in India (Parikh, 2009):

- An alternate design for the final manhole at the outlet from each house incorporates a solid waste gully trap, similar to an S-bend trap that would serve to trap any blockages before connection to the street mainline;
- Waste water from bathrooms and kitchens would pass through a PVC grating to catch paper, vegetable cuttings, debris and other solid rubbish; and
- This design thus assists in transferring responsibility for blockages onto each household, and anything carelessly discharged into the sewerage system would be stopped within the property and would need to be cleared out by the occupants to prevent the clogging of the infrastructure within the property (Parikh, 2009).
- Combined with promoting awareness amongst users regarding avoiding blockages and system management, innovative designs would assist in managing the threats posed by sewage infrastructure to freshwater ecosystems and the water resources.

Significance of the impact

The significance of this impact is regarded as low to medium without mitigation, however, if spillages are effectively mitigated and stormwater attenuation facilities maintained, the significance will be reduced to low.

E-6.1.2 Soil contamination

Source and nature of the impact

The use of hazardous materials such as synthetic herbicides and pesticides to control weeds and pests in the planted area could contaminate ground water and soil in the study area and immediate surrounds. Herbicides and pesticides often contain glyphosphate which is very poisonous to various faunal species including tadpoles and frogs. These herbicides are often used in alien plant control.

The release of grey water into the environment, especially for irrigation should be carefully controlled to prevent contamination of the environment by detergents and soaps. Hazardous materials used during aviation activities have the potential to contaminate soils, watercourses and ground water.

Table 27: Soil contamination

Impact source(s)	Use of pesticides and herbicides containing hazardous materials Release of grey water into the environment Spillage of hazardous material	Status	-
Nature of impact	Contamination of the soil, surface and groundwater resources		
Reversibility of impact	The impact is irreversible if hazardous materials area used.		
Degree of irreplaceable loss of resource	Low		
Affected stakeholders	Surrounding and downstream land owners		
Magnitude	<i>Extent</i>	Regional -3	
	<i>Intensity</i>	High – 5	
	<i>Duration</i>	Permanent - 5	
	<i>Probability</i>	Highly likely – 4	
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+5+5+4) \times 2 = 34$ Medium - Low	M-L
	<i>With mitigation</i>	$WOM \times ME = WM$ $34 \times 0.4 = 13.6$ Low	L

Mitigation measures

- Where possible mechanical removal of unwanted plant species is favoured over chemical control.
- Should chemical control be required, only biodegradable agents should be permitted.
- The use of ecologically acceptable biological control agents is favoured over chemical pest control.
- The use of indigenous plant species for the project will minimise the need for pest control.
- Spillages should be dealt with as soon as possible.
- Hazardous waste should be stored in compliance with regional, national and local legislation.
- Water passing through vehicle bays and workshops must pass through oil traps to ensure that all hazardous material is removed.

Recommendations for use of grey water

The use of grey water can drastically reduce the amount of white water required by the project and the following is recommended:

- Water from hand basins, showers and washing machines should be captured and redirected to flush toilets.
- If grey water from basins, showers or washing machines are to be used for irrigation, all detergents used must be 100% biodegradable to prevent negative impacts on the environment.
- Rainwater can be captured by fitting tanks to roof gutters and the water can be used for either irrigation or flushing of toilets.
- Grey water should be used immediately to prevent contamination.

Significance of the impact

The significance of this impact is regarded as medium to low without mitigation, however, if the use of pesticides and herbicides and grey water are effectively mitigated the significance will be reduced to low.

E-6.1.3 Rehabilitation of wetlands on site**Source and nature of the impact**

Considering the loss of wetland habitat within KwaZulu-Natal, the best practice is to adopt a 'no-net-loss' approach, in terms of ecosystem functioning and integrity, when planning and implementing proposed developments. One of the options for the proposed development, is to rehabilitate the remaining wetland habitat within the study area.

The loss of wetland habitat (i.e. spatial extent) within the landscape is a particular concern to eThekweni Municipality, even if the impacts on ecosystems functioning and integrity are able to be mitigated onsite in the post-development landscape. However; the transformed nature of the wetlands within the study site and the proposed rehabilitation of these systems within the post-development landscape, ensure that both functioning and integrity are retained and that wetland habitat is gained.

a) Wetland Rehabilitation

The proposed development layout will retain 60.8 ha of the original 108.4 ha of wetland habitat within the study site. In addition to retaining this area of wetland habitat within the development site, the wetland would be rehabilitated and enhanced by:

- Rehabilitating the remaining wetland areas within the development site, promoting the effectiveness and opportunity for the system to provide benefits and services, including:
 - Deactivation of the numerous drainage channels, ridge and furrows, and the incised channel (where applicable), promoting more diffuse flows across the wetland habitat;
 - Maximising the extent of the seasonal and permanent wetness zones within the wetland habitat; and
 - Eradication of alien invasive plant species within the wetland and surrounding development site.
 - Maintaining hydrological linkages;
 - Active re-vegetation of the wetland habitat with appropriate wetland species, promoting biodiversity, emergent vegetation and nutrient uptake;
 - On-going management of the wetland to promote the provision of benefits and services within the landscape; and
 - Appropriate management, including the removal of alien vegetation, of the approximately 196.7ha of buffer zones surrounding the wetland habitats. In addition, the approximately 45ha of open space will require the same level of management to ensure there is no spread of alien vegetation across the site.

The impact of rehabilitation of the wetlands on site will have a positive impact on ecological integrity. However, further mitigation measures as outlined below will be required to enhance the positive impact.

b) Development Considerations

The design of the development may greatly influence the functionality and integrity of the remaining wetlands in the study site. The hydrology of a wetland system is the main biophysical driver, and may greatly influence the vegetation composition and the geomorphology component. These systems are largely dominated by groundwater recharge, and thus the infiltration of storm water into the surrounding landscape is essential in maintaining these systems. This may be achieved through appropriate solutions including but not limited to:

- Porous pavements;
- Attenuation of storm flows;
- Trapping of waste material within the storm water runoff; and

- Trapping of sediments, nitrates and toxicants within the storm water runoff.

c) Wetland Rehabilitation Monitoring and Evaluation

- The monitoring includes the collection of baseline and routine monitoring information in order to enable the evaluation of the rehabilitation effectiveness two years (two growing seasons) after completion of the rehabilitation activities.
- Pre- and post-implementation photographs must be recorded for the wetlands. These should be collected in the form of fixed-point photographs, as outlined in WET-Rehab Evaluate, to allow repeated monitoring to be undertaken.
- The ecological integrity of the wetlands should be monitored with:
 - WET-Health, collected during the planning process being used as the baseline; and
 - Subsequent monitoring being undertaken approximately two years (growing seasons) after completion of the rehabilitation strategy using WET-Health assessments, to provide the final assessment of the benefits and effectiveness of the rehabilitation activities.
- All of the above-mentioned monitoring should be used to inform the evaluation of the effectiveness of the wetland rehabilitation. This would be undertaken once the required monitoring information has been collected, two years following the completion of the wetland rehabilitation activities.
- The management of the surrounding landscape would need to be modified to promote the functioning and integrity of the remaining wetland habitat. The management would also need to incorporate the maintenance of the rehabilitation interventions within the wetland area. A significant component of the maintenance would be to monitor the effectiveness of the interventions, potentially including weir, chute, and/or earthen berms. The management recommendations within the following section have been derived from Ezemvelo KZN Wildlife's Biodiversity Stewardship programme guideline documents (Kotze & Cowden, 2009; Camp & McCulloch, 2009).
- The management of the surrounding landscape would need to be modified to promote the functioning and integrity of the remaining wetland habitat. The management would also need to incorporate the maintenance of the rehabilitation interventions within the wetland area. A significant component of the maintenance would be to monitor the effectiveness of the interventions, potentially including weir, chute, and/or earthen berms. The management recommendations within the following section have been derived from Ezemvelo KZN Wildlife's Biodiversity Stewardship programme guideline documents (Kotze & Cowden, 2009; Camp & McCulloch, 2009).

d) Control of Emerging alien invasive plant species

- Emerging alien invasive plant species clearing will have to take place with the initial rehabilitation of the systems, after which follow-up activities are required to eradicate emerging seedlings or coppicing stumps. The implementation of follow-up operations is essential in order to reach maintenance levels in terms of controlling alien invasive plants within the development site.
- It is recommended that the follow-up alien plant clearing activities adopt the following approach:
 - Manual activities, including hand-pulling of seedlings, to reduce the risk of the translocation of herbicide;
 - Frequent follow-up operations, with four operations being undertaken per year, and
 - Where necessary foliar application of herbicide to emerging coppice.

The retention and rehabilitation of wetlands on site will result in a gain of 15.7ha of functional wetland area within the landscape, addressing the impact on wetland habitat in terms of functioning and integrity. This will have a **medium positive impact** on no net loss of wetlands

E-6.2 Socio-economic Environment

E-6.2.1 Increase in ambient noise levels

Source and nature of the impact

The operations of King Shaka International Airport and Dube Trade Port may have a negative impact on the proposed development's land use (*especially the proposed General Business land use*) due to noise. This land use falls within the noise contours for the 2035 development footprint. For planning purposes, the Ethekewini Municipality has adopted an 'in-principle' decision to use the noise contours for the 2035 development footprint of the airport as a guideline to directing urban development. Any development within the 55dB DNL (*Day Night Average Sound Level*)⁶ contour is considered sensitive to noise (SANS 1010) and must adhere to additional development controls if permitted. The residential land uses do not fall within the 55dB DNL (2035) noise contour.

Table 28: Noise Impact

Impact source(s)	Aircraft noise from the KSIA/DTP		Status	-
Nature of impact	Noise impacts on the proposed development			
Reversibility of impact	The impact is irreversible if sound abatement measures are in place.			
Degree of irreplaceable loss of resource	Low			
Affected stakeholders	Visitors, workers and residents at the proposed development site			
Magnitude	<i>Extent</i>	Site – 2		
	<i>Intensity</i>	High – 5		
	<i>Duration</i>	Permanent - 5		
	<i>Probability</i>	Definite – 5		
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(2+5+5+5) \times 2 = 34$ Medium - Low		M-L
	<i>With mitigation</i>	$WOM \times ME = WM$ $34 \times 0.4 = 13.6$ Low		L

Mitigation measures

In view of the close proximity of the proposed development to the airport, it is recommended that the design of the buildings in the area incorporate noise reduction principles to minimize noise impacts on the occupants.

Significance of the impact

The significance of this impact is regarded as medium to low without mitigation, however, with the use of sound abatement measures in the design of the proposed development's buildings, the impact will be effectively mitigated and the significance will be reduced to low.

E-6.2.2 Permanent change of visual character

Source and nature of the impact

The greatest visual impact is likely to be along the northern end of the R102 as one approaches Tongaat. The views from main roads and rail lines, where the viewer passes at speed and where the view is not central to its use is regarded as less sensitive than views from residential properties.

The visual impact from the adjacent residential areas along the northern boundary of the development site is

⁶ DNL is Day Night Average Sound Level – recognised industry standard to measure average aircraft noise levels over a 24 hour period.

regarded as moderate as there is wide landscape buffer between the existing edge of Tongaat and the proposed new development which, in the long-term should be planted with indigenous planting to further screen the view.

Table 29: Visual Impact

Impact source(s)	Establishment of the proposed structures at the development site	Status	-
Nature of impact	Visual impacts on the proposed development on the visual receptors		
Reversibility of impact	The impact is irreversible if sound abatement measures are in place.		
Degree of irreplaceable loss of resource	Low		
Affected stakeholders	Surrounding land owners, motorists on R102 and Ushukela Highway		
Magnitude	<i>Extent</i>	Regional -3	
	<i>Intensity</i>	High – 5	
	<i>Duration</i>	Permanent - 5	
	<i>Probability</i>	Highly likely – 4	
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+5+5+4) \times 2 = 34$ Medium - Low	M-L
	<i>With mitigation</i>	$WOM \times ME = WM$ $34 \times 0.4 = 13.6$ Low	L

Mitigation measures

The following mitigation measures must be considered to mitigate visual impacts along the northern end of the R102:

- The proposed office buildings which will be seen from the R102 must be landscaped and the bulk of the development must be integrated into the landscape. A Landmark building should be created on the high point.
- Consider the establishment of a landscaped boulevard along the northern end of the R102 leading into Tongaat to ensure that an elegant approach to Tongaat is achieved.
- Create a safe pedestrian sidewalk along the northern end of the R102.
- Ensure that there is no vehicular access off the R102 onto properties and no parking on the verges.
- Create a three storey height restriction on the frontages along the northern end of the R102 if possible.

It is recommended that the road reserve be widened on the eastern edge to create a wide boulevard with substantial landscaping to create a dignified sense of arrival into Tongaat. It is also recommended that the slope of the site be used to reduce the height of the buildings to a maximum of three storeys along the R102 street frontage wherever possible and to avoid buildings with long frontages (i.e. the sites should have their narrowest frontage on the R102). This would be a more compatible form of development in relation to the single and double storey residential development on the western side of the R102. The pedestrian sidewalk along this stretch of the R102 should also have edge planting to give the pedestrian a sense of safety as the vehicle speeds along this route is quite high.

Large scale Logistics structures should be substantially screened by landscaping to reduce their impact and vertical modulation of the facades will reduce the apparent bulk of the structures – this item should be addressed in the Design Code for the Logistics areas of the development.

The housing proposed needs to be fragmented in form, and respond to the contours of the site. The creation of platform and banks should be avoided. Substantial indigenous planting should be undertaken to reduce the impact of the development to create a sense of place. The natural open spaces are being retained and these assist in reducing urban sprawl.

It is recommended that a Green Design Code be prepared to guide the implementation of sustainable design principles.

All landscaping should be chosen from indigenous/endemic plant material and the landscape design of individual sites should be coordinated with the overall Landscaping Plan prepared by Landscape Architects.

Environmental sustainability should be applied as a guiding principle of the overall development.

Commercial buildings on fast-moving vehicular routes tend to maximise visibility through their scale, and by using signage which can often result in a visually cluttered environment. It is, therefore, essential to ensure that signage is controlled and that open parking areas are adequately landscaped.

It is recommended that a Design Code should be established to provide guidance to Developers & their design professionals to ensure that the development potential & real estate value of the overall site is maintained. The design code should require a strong and cohesive statement to be made by the Development as a whole and should ensure that the necessary architectural guidelines are set out to ensure that these objectives are achieved. The purpose of the design code should be to create an overall integrity to the development. In this way address value can be created which will, in turn, lead to appreciating property values. A Design Review Panel should also be established to scrutinize all proposals on individual sites.

It is recommended that the following aspects should be included in the Design Code –

- The lighting system installed in the buildings should be designed to reduce the extent of light fitting used throughout the building and the amount of light spilling from the building at night.
- Efficient 'smart lighting' which deactivates lights when external natural light levels are sensed should be introduced into suitable areas of the building.
- Timers should also be incorporated to ensure lighting is not activated at times when it is not required.
- Energy efficient light fittings should also be used in the proposed buildings.
- Landscaping should be used to 'soften' the buildings and to reduce glare from surfaces.
- Wall surfaces should be treated in grey toned colours and roofs are to be designed to reduce glare.
- Flat concrete roofs should be landscaped to assist with thermal insulation and storm water run-off and to reduce glare.
- Roof overhangs should be used to protect the building from solar gain and to create shaded surfaces and these should be integrated with the building design and responsive to orientation.
- Windows should be of clear glass or only very lightly tinted – no reflective glass should be allowed.
- All glazing should incorporate integrated UV protection. No reflective solar film should be allowed.
- All shade ports should be designed so as to compliment the design of the building and to blend in with the natural landscape.

Most of the individual sites within the Development will require varying degrees of re-contouring to achieve gentle falls over wide areas. While earth platforming is necessary in respect of individual sites, this should be undertaken within the following guidelines:

- Platforms should be confined to the building footprint as far as possible. In general, the natural ground level of each individual site should be disturbed or altered as little as possible;
- Any changes of level within individual sites to achieve trucking dock facilities, covered parking and visual screening of service, plant, parking and loading areas should be exploited;
- Earth retaining structures should be broken down into several smaller changes in level each, ideally, no higher than 1,5m;
- Retaining walls should be amply planted to screen them;
- Excavations for basements or semi basements should be designed in sympathy with the adjacent public and private environments. Where basements protrude beyond the footprint of the building

and rise above natural ground level, such basements must either be designed as a conscious part of the building's plinth (provided the Review Panel is satisfied that such plinth forms an integral part of the overall building), or the natural ground level must be re-shaped to redefine a new ground level (while making provision for natural ventilation).

- No open air storage or working areas should be allowed outside the confines of the designated service yards in the case of warehouses & such service yards shall be screened from view.
- Any structure erected to provide cover to service areas must be of a substantial nature & in keeping with the overall integrity of the development.
- All surface parking should be suitably screened on all sides by berms and landscaping to a maximum height of 1,8m;
- No cover to surface parking should be permitted save where such structures are of a substantial nature and designed as an integral part and extension of the building;
- The blending of surface parking into the general landscape should be achieved as far as possible through the use of grassblock surfaces, the planting of shade trees and the contouring of the surface into the berms & landscaping surrounding the parking areas;
- Refer to the EMPr in Appendix 7 for guidelines on landscaping, lighting, signage.

Significance of the impact

The significance of this impact is regarded as medium to low without mitigation, however, with appropriate landscaping, signage, building design and other mitigation measures as indicated herein, the significance will be reduced to low.

E-6.2.3 Impact on existing farm workers and farm operations

Source and nature of the impact

As a result of the change of land use for the proposed development, there would be permanent loss of sugar cane production at the site. The poor yields experienced in the past and the high cost inputs required to increase profitability suggests that the continuation of farming operations is not financially viable. The impact on loss of farming activity is therefore not significant. In addition, the existing farm workers would be accommodated at other sugar estates that are not affected by development, as the barracks will be demolished to make way for construction at the proposed development site.

Table 30: Impact on existing farm workers and farm operations

Impact source(s)	Establishment of the proposed structures at the development site	Status	-
Nature of impact	Relocation of farm workers and closure of farm operations		
Reversibility of impact	The impact is irreversible		
Degree of irreplaceable loss of resource	Low		
Affected stakeholders	Existing farm workers		
Magnitude	<i>Extent</i>	Site -3	
	<i>Intensity</i>	High – 5	
	<i>Duration</i>	Permanent - 5	
	<i>Probability</i>	Definite – 5	
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+5+5+5) \times 2 = 36$ Low to medium	L - M
	<i>With mitigation</i>	$WOM \times ME = WM$ $36 \times 0.4 = 14.4$ Low	L

Mitigation Measures

As indicated above, the loss of agricultural production at the site will not impact on TH milling operations.

TH's investment in agricultural production in rural areas owned by the ITB has shown its commitment to uplifting emerging farmers, developing skills, and catering for the intensive food related crops to be grown for local consumption.

The farm labourers must be accommodated at other sugar estates that are not affected by development.

Significance of the impact:

The significance of the impact without mitigation is regarded to be low to medium. Implementation of the mitigation measures will decrease the significance of the impact to low.

E-6.2.4 Permanent job creation

Source and nature of Impact

The proposed development will facilitate large-scale business establishment in the area, beneficial to employment creation. An estimated 13 289 permanent jobs are likely to be sustained as a result of residential housing, and the economic (business and industrial operations) and social facilities to be developed at the site. This is aligned to a significant potential impact on the levels of unemployment in the impact regions (Urban – Econ, 2013).

The proposed development will be a likely place of employment for the greater Ethekewini Regional Area (including Cornubia, Tongaat, Verulam, Ndwedwe, Umhlanga, Ballito, Waterloo, La Mercy, Mt Edgecombe, Durban). There would be a reduction in poverty through reduction in unemployment levels and opportunities for skills development, upliftment of SMME and Black-Owned Enterprises through the new employment opportunities that the proposed development would generate. Domestic workers and gardening maintenance workers will be employed for the proposed residential land uses.

It is anticipated that the distribution of new employment to the proposed development will be as follows:

- Tongaat: Assuming that with the development's employment capture, 20% comes from Tongaat. Employment capture is likely to be low, semi-skilled and skilled labour.
- Verulam: Assuming that with the development's employment capture, 20% comes from Verulam. Employment capture is likely to be low, semi-skilled and skilled labour.
- Rural Western Region: Assuming that with the development's employment capture, 7% comes from western rural region. This is largely due to the fact that low skilled jobs at the development will largely come from the western rural regions.
- Southern KwaDukuza: Assuming that with the development's employment capture, 20% comes from southern KwaDukuza. Employment capture is estimated to be largely skilled to highly skilled jobs coming from southern KwaDukuza.
- Northern Ethekewini: Assuming that with the development's employment capture, 30% comes from northern eThekewini. This is because the highly skilled jobs are likely to emanate from nodes such as Umhlanga, La Lucia, Durban North, Mt Edgecombe and La Mercy. Employment capture is estimated to be largely skilled to highly skilled jobs. The anticipated Cornubia development across the R102 from Mt Edgecombe is set to house 100 000 households from low to middle income households. The migration of such households will likely influence northern eThekewini's unemployment rate, with employment possibilities for such residents at the proposed development providing powerful prospects with low-skilled, skilled and highly skilled job opportunities.
- Remaining Ethekewini: With the development, unemployment is not expected to decrease with significant impact – largely due to a low anticipated employment capture from these regions. Employment capture is estimated to be highly skilled who can warrant long distance of travel to the development.

a) Impact on Tongaat and Verulam

The existence of new economic opportunities in the proposed development will provide opportunities for Black owned enterprises to enter markets, or to enter a competitive location (next to highly marketed Dube Trade Port). This is also true for existing black business/ investors in Tongaat and Verulam, who wish to expand, as is indicated in the Tongaat LED, or relocate.

b) Informal Sector Development

The Tongaat informal sector will be positively impacted. The Tongaat informal sector is relatively small. Informal sector employee salaries form 7% of both formal and informal salaries. Still, the Tongaat informal sector compensation for employees (salaries) are currently increasing at a compounded real rate of 6.39% per annum-faster than that for formal unskilled, semi-skilled, skilled and highly skilled labour. This indicates that the informal sector of Tongaat is growing in either profit per business, or per employment figures. An increase in employment in the development will result in higher public transport utilisation (particularly on the current R102 and the current railway) to the development and back to Tongaat. As a result of informal transport economic activity, an increase in vendors and informal traders around these areas is expected. The informal sector will therefore grow in size and magnitude.

The Verulam informal sector is a central part of the Verulam economy, and will be positively boosted by the proposed development. An increase in employment in the development will result in higher public transport utilisation (taxis), particularly on the current R102 and the current railway, to the development, and back to Verulam and Durban. As a transient route to central eThekweni, the public transport route will be busier than that within Tongaat. As a result of informal transport economic activity, an increase in vendors and informal traders around these areas is expected, more than those in Tongaat. The informal sector will also therefore grow in size and magnitude.

Western Rural Areas: Informal business is expected to be boosted due to increased activity in and around Ndwedwe and Driefontein Taxi Ranks on traffic routes to and from the development. There will be an increase in trading activity, as well as increased customers for taxi operators. This will positively increase informal business activity. Informal Ndwedwe businesses are also expected to migrate in and around the proposed development, perceiving greater business opportunities.

Northern Ethekeweni and Southern KwaDukuza: The impact on the regional informal sector will notable mainly as a positive impact on and around the taxi industry. There are expected to be new taxi routes developed, with the proposed development area as a destination, resulting in a significant boost in business activity for regional taxi ranks offering trips to the development. Informal traders will increase accordingly in all regional taxi ranks.

c) Skills Development

Tongaat: Opportunities for skills development are also notable. The development will create further opportunity for the strengthening and developing of existing skills development in Tongaat. In Tongaat's Industrial Park there currently exists skills development through Sectoral Education and Training Authorities (SETAs) including the Transport SETA, services SETA; and safety and security training - all of which are relevant to the proposed development. The existence of large scale industrial activity in the proposed development therefore creates the opportunity for links between the Tongaat SETAs and other training programmes and the proposed development's industrial business operations - through internships and in service training. This then contributes to the employability of Tongaat's youth in the long run through skills development, which assists in decreasing Tongaat's unemployment rate.

Verulam: The development will create opportunities to strengthen skills development in Verulam, therefore having a positive effect. Thus the working age of Verulam will be more employable, also therefore contributing to poverty alleviation.

Western Rural Areas: It is expected that there would be a permanent improvement in mainly elementary skills levels, as Ndwedwe residents are employed in proposed development in the western rural areas.

Northern eThekweni and Southern KwaDukuza: The proposed development provides pressure (and therefore opportunities) for the development of tertiary institutions in northern eThekweni and southern KwaDukuza, such as FET Colleges. In addition, the region will also become a national priority in terms of the provision of Sectoral Education and Training Centres. This will assist to develop practical skills through internships and practical in service training. In general the proposed development will provide opportunity for more skills acquisition to ensure adequate employment.

As can be seen from the above, the proposed development will positively impact on the surrounding community and local economy due to possible skills development, informal sector development, poverty alleviation, BEE and SMME business development and income generation. This impact is predicted to have a **high positive significance**.

E-6.2.5 Impact on Existing Commercial Nodes of Tongaat, Verulam

Source and nature of Impact

The project has significant positive impacts on nodal and regional economic development and expansion impact, which are as follows.

- It was found that Tongaat and Verulam have been spatially restricted from further social, industrial and commercial development. The project also aligns to the Tongaat LED Plan and thus meets the local LED objectives for the Tongaat area. The proposed development provides much needed unlocking of land required for this expansion. The proposed Inyaninga Development will provide Tongaat and the greater impact area with the opportunity to access new industrial and commercial space and thus promote their much needed growth.
- The proposed development was found to provide opportunity for the expansion of existing businesses through enabling the creation of value chains and business links between the proposed development and existing businesses, and increasing the exposure of existing business to a growing market.
- The R102 corridor was identified as being key in drawing a growing market to both eThekweni and KwaDukuza; linking Ballito to Umhlanga through the development of this bridging corridor to Dube Trade Port. The proposed development was found to be aligned with broader eThekweni and provincial economic development policy. These include the KZN Provincial Growth and Development Strategy (PGDS), the eThekweni Integrated Development Plan (IDP), the eThekweni Northern Spatial Development Framework (NSDP), and the Industrial Development Strategy (IDS). For example, the eThekweni IDP has outlined that “the emerging industrial and residential components of the Inyaninga area, west of the King Shaka Airport, are seen as top city-wide development priorities” (eThekweni Municipality IDP (5 year plan) 2012/2013 to 2016/17).

The proposed development has the potential to introduce complementary businesses into an area currently stagnating due to the lack of available zoned land, in effect, acting as a stimulus to the existing local business sector and promoting new markets in Tongaat, Verulam, Northern eThekweni, southern KwaDukuza, and the western rural areas.

The proposed development is in alignment with eThekweni’s Draft North Spatial Development Framework, which states the development of an economic node is a north spatial development priority. The proposed development also positively impacts the region by reducing the strain on current eThekweni available commercial and industrial zoned land, due to the shortage of industrial land in the City and province. The proposed development is expected in time to become the a major driver of economic growth within the north-most region of eThekweni, supporting the service nodes of Tongaat and Verulam, both of which benefit from the proposed Inyaninga Development’s proximity and associated market pull.

There will be potential for Tongaat and Verulam businesses to benefit from new firms in the proposed development by supplying their start up and operational materials. This will result in the creation of new value chains, and the reduction of industrial/ business expenditure leakage outside of the region to larger nodes.

a) Impact on commercial node (retail and light commercial) of Tongaat

In the short term, Tongaat businesses are expected to experience a boost and increase in revenue. This is particularly true for Tongaat's retail, food, and convenience stores, which will notice boosts in revenue as the development starts to develop.

Due to the distance of the proposed development from Tongaat CBD (minimum 1 km, maximum 7 km), as well as the easy access along the R102, those who will be employed within the proposed development are expected to utilise Tongaat's convenience shopping facilities with ease. This includes individuals employed in the proposed development, commuting to and from Ndwedwe through Tongaat. This will be noteworthy during construction phase, as a large portion of the construction workers are anticipated to come from the rural western region. The impact of the proposed development on Tongaat businesses is therefore expected to be notably positive, in the short run.

In the medium to long term, there will be some emerging commercial development in the Inyaninga Development however this component of the development is small scale; it will serve a localised area within the development and will have a negligible impact on businesses in Tongaat. In the long term it is expected that the town centres will adapt by specialising, such that Tongaat retailers eventually serve a localised region, and supply specialised facilities, while the proposed development shopping facilities are small scale, and general and serve the immediate Inyaninga Development area.

b) Impact on commercial node (retail and light commercial) of Verulam

The impact on Verulam's existing businesses is expected to be slightly different from that of Tongaat, in that Verulam's businesses will initially benefit from convenience shopping expenditure (therefore most likely being convenience/ lunch time expenditure). Transient traffic between Durban and Inyaninga will create demand for petrol filling stations and surrounding convenience stores and retail stores, as well as for businesses located around taxis connecting to areas in and around Verulam and Durban. Its impact is long term, and will be strengthened by the growth in the development as businesses in the Verulam area may experience a steady increase in their markets, and greater exposure to potential buyers. Although the development has commercial component, it is significantly it is very small in comparison to the commercial developments in Verulam and will have a negligible impact on the Verulam area. Therefore impact of the commercial component of the development will therefore be minimal as it will serve a localised demand.

c) Impact on commercial node (retail and light commercial) of Western Rural Areas

The impact of the proposed development on the existing businesses in the western rural areas is not expected to be notable, or significant. This is again due to the distance between the western rural businesses (albeit few), and the proposed development.

d) Impact on Industrial Activity in Tongaat

Industrial activity in the proposed development is expected to boost supportive industrial activity in Tongaat (e.g. suppliers, industrial repairs and maintenance).

Due to close proximity and easy access, there will be significant opportunities for the creation of industrial value chains and linkages between particularly Tongaat Industrial Park and the proposed development industrial / business Park/ offices businesses. There may be competition between support suppliers which will eventually develop in the proposed development, and in Tongaat Industrial. Some existing Tongaat industrial businesses may require more marketing and upgrading. Where large scale supplies are not required, Tongaat industrial businesses are expected to be more competitive, due to lower rental costs.

There is expected to be short term competition of existing industrial businesses by newly relocated industrial companies to the area. Similarly retail businesses existing Tongaat businesses will have the opportunity to expand, or relocate, and in the long run, specialisation between the two industrial centres is inevitable.

Worth noting in assessing the effect of the proposed development on industrial activity, is the key issue identified in the Tongaat LED, of a shortage of industrial land in and around Tongaat. Tongaat industrial stakeholders strongly felt that the non-development of surrounding Tongaat-Hulett land resulted in Tongaat being constrained in its development - this therefore restricting/ stifling industrial activity. The Tongaat LED notes that investors expressed their frustration at their restriction to expand or invest in further industrial activity in Tongaat. These investors reported that they would prefer cheaper industrial land near Dube Trade Port. However it must be noted that although there is land available for development within the Dube Trade Port vicinity is largely reserved for air related development. The effect of the proposed development on industrial activity is therefore largely to create opportunity for industrial expansion, by increasing the land in Tongaat zoned for industrial use by just under 3 times. This will encourage investment in the region in the long term.

e) Impact on Industrial Activity in Verulam

Industrial activity in Verulam will be similarly impacted by the proposed development as Tongaat, in that supporting industrial businesses will benefit initially for the proposed development's business establishing costs. It is expected that there will be partial competition in industrial activity between Verulam and the proposed development. However, it is felt that the market for industrial operations in the proposed development (industry which does not require immediate transportation as air freight; industrial activity which needs to be in close proximity to air transportation, but cannot be based in Dube Trade Port as land is reserved for air related activities) is different from that in Verulam (industrial activity in Verulam is of a significantly smaller scale, is largely informal and is of less sophisticated processes than that expected within the proposed development). The competition between the proposed development's industrial activity and that which exists in Verulam therefore is not expected to be significant.

f) Impact on Industrial Activity in Western Rural Areas

There is currently no identified notable industrial activity in the western rural areas, within close proximity and therefore no impact.

g) Impact on Industrial Activity at DTP

In the short run, the effect of the proposed development on DTP industrial activity will be negative in that those industries/ companies which need to be near cargo aircraft, but do not need to be located directly on their premises may opt to rent space in the proposed development, as opposed to renting in the DTP as the market take-up of land adjacent to the DTP has been high already, mostly fuelled by the perception that rentals within DTP will be at a premium. There is anticipation that proposed development may be more affordable for medium sized enterprise. In the long run, both trade/ logistics zones are expected to adapt, in that those operations which immediately require proximity to cargo aircraft will remain at DTP, while that do not require direct access to aircraft will be in the proposed development.

The main negative impacts are as follows:

- Possible lower profits for businesses in Tongaat and Verulam industrial businesses (as a result of short and medium term competition between proposed development and Tongaat and Verulam industrial activity and the proposed development industrial activity);
- Potentially less than anticipated profits for businesses – due to short (and medium) term competition in industrial activity between proposed development and other industrial nodes such as Dube Trade Port and some industrial firms in Tongaat and Verulam;
- In the long term, more informal settlements are expected on the outskirts of the Ndwedwe by low income workers seeking to live close to place yet unable to afford housing in nearby Tongaat or

Verulam;

- There is expected to be significant economic migration from surrounding areas (particularly in the form of informal settlements) and sub places as a result, which, in the long run may reduce the initial impact of a reduction in poverty;
- Potential strain on proximate hospitals and fire stations by increasing population.

The positive impacts of the development are of high significance to the socio-economic well-being of the region, and significantly outweigh the anticipated negative impacts. The Inyaninga Development will enable the northern eThekweni region, and Tongaat and KwaDukuza in particular, to access a vast range of economic opportunities that complement the existing logistical infrastructure of the Dube Trade Port and King Shaka Airport, and thus positively enhance the regional competitiveness.

Table 31: Impact on businesses in Tongaat and Verulam

Impact source(s)	Establishment of the proposed general industrial land uses at the development site		Status	-
Nature of impact	Potential lower profits for businesses in Tongaat and Verulam Industrial Businesses (as a result of short and medium term competition between the proposed development and Tongaat and Verulam Industrial activity and the proposed development industrial activity); Potentially less than anticipated profits for businesses – due to short (and medium) term competition in industrial activity between proposed development and other industrial nodes such as DTP and some industrial firms in Tongaat and Verulam			
Reversibility of impact	The impact is irreversible			
Degree of irreplaceable loss of resource	Low			
Affected stakeholders	Commercial and industrial businesses in Tongaat and Verulam			
Magnitude	<i>Extent</i>	Regional -3		
	<i>Intensity</i>	High – 5		
	<i>Duration</i>	Permanent - 5		
	<i>Probability</i>	Highly likely – 4		
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+5+5+4) \times 2 = 34$ Medium - Low		M-L
	<i>With mitigation</i>	$WOM \times ME = WM$ $34 \times 0.4 = 13.6$ Low		L

Mitigation Measures

- Those which are with regards to less profits due to competition, are seen as being offset in the long run by the positive effects of exposure to a larger market, and increased revenue from potential business partnerships with the proposed development's new businesses. However, it must be noted that there may be some businesses in the existing nodes, currently running at break point, which may not be able to adapt and therefore survive competition, even in the short run.
- With regards to competition between Dube Trade Port, and the proposed development, it is expected that in the long run businesses will adjust through specialisation.
- There must be the creation of incentives for new businesses in the proposed development to source start up supplies from Tongaat firms.
- Initiating and encouraging business linkages are recommended as a mitigating measure. It is recommended that there be discussions between the proposed development's steering committee, and local businesses (e.g. Tongaat Business Chamber of Commerce and Industry), about the creation of incentives packages for new businesses in the proposed development, if they source start up supplies from Tongaat and surrounds. This will encourage expenditure in the catchment area by the proposed development's businesses. It is also recommended that the eThekweni Business Support Unit be included to address potential linkages with weaker businesses (SMMEs). This will

encourage long term business partnerships and linkages between existing business and the proposed development, and reduce or completely offset negative impacts of competition.

- Support for business linkages and networks for new businesses in the proposed development to source start up supplies from local firms to create linkages between new (within development) and existing businesses (within catchment area) where possible; this could take the form of a business expansion and retention programme or a buy-local campaign.

Significance of the impact:

The significance of the impact without mitigation is regarded to be medium to low. Implementation of the mitigation measures will decrease the significance of the impact to low.

E-6.2.6 Impact on provision of housing and community/social facilities

Source and nature of impact

The proposed development will provide for both medium density and high density housing. The development will therefore address the backlogs of low income (priced) houses in eThekweni Metropolitan area which needed to be addressed. The development will be a substantial addition to the assets of the city in terms of the provision of affordable housing and this is therefore a **high positive impact**.

In the short run, residential demand is expected to be high in the region. Residential demand in the region is generally high, due to the construction of the Dube Trade Port, and its corresponding impact on the demand for holiday homes, retirement estates, and general housing. The construction of the proposed development therefore adds pressure to an increasingly high demand for residential accommodation. When the proposed development constructs the residential components, the demand for residential housing on the region will be ease.

During the stakeholder engagement workshop with the Planning Team on 20 April 2012, the creation of more housing opportunities featured as a significant priority on the development of the northern corridor.

The following can be noted:

- Most social facilities, as per provisions of the eThekweni Municipality, are adequately covered by the proposed development.
- Although a small facility provision for hospitals and fire stations is required, due to the significant population intended to reside at the development and the growth of commercial and industrial activity at the development, capacity constraints may be witnessed on proximate existing hospitals and fire stations. This is a negative impact.
- Tongaat Hulett Development has indicated that 0.5 ha will be set aside in medium density residential area for a children's home when demand arises. This will be a free entry use. This adequately caters for the threshold demand required for crèches.

The provision of social facilities on site such as Primary Schools, Secondary Schools, a Community Hall, Library, Swimming Pool as well as Sports fields, a Community Health-ARV Centre and Police Station will be accommodated in the proposed development. These facilities will be accessible to the communities within the proposed development and those that the development surrounds. This will have a **high positive impact** as it will alleviate the pressure on the local municipality to provide these facilities.

Table 32: Impact on provision of social facilities (hospitals and fire station)

Impact source(s)	Increased need for hospitals for residents. Increased need for a fire station due to industrial and commercial land uses.		Status	-
Nature of impact	Increased capacity constraints of proximate hospitals and fire stations in the Ethekwini Municipality			
Reversibility of impact	The impact is irreversible			
Degree of irreplaceable loss of resource	Low			
Affected stakeholders	Fire stations and hospitals in eThekweni			
Magnitude	<i>Extent</i>	Regional -3		
	<i>Intensity</i>	High – 5		
	<i>Duration</i>	Permanent - 5		
	<i>Probability</i>	Highly likely – 4		
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+5+5+4) \times 2 = 34$ Medium - Low		M-L
	<i>With mitigation</i>	$WOM \times ME = WM$ $34 \times 0.4 = 13.6$ Low		L

Mitigation Measures

- There must be consultation regarding alternate plans on building new hospitals and capacity constraints need to be explored.
- Consultation with local hospitals and fire stations must take place to ensure whether capacity constraints would be problematic due to the increasing population.

Significance of the impact:

The significance of the impact without mitigation is regarded to be medium to low. Implementation of the mitigation measures will decrease the significance of the impact to low.

E-7 CUMULATIVE IMPACTS

Cumulative impacts are those impacts that are created as a result of the combination of the impacts of the proposed project, with impacts of other projects or operations, to cause related impacts. These impacts occur when the incremental impact of the project, combined with the effects of other past, present and reasonably foreseeable future projects, are cumulatively considerable. The assessment of cumulative impacts on a site-specific basis is however complex – especially if many of the impacts occur on a much wider scale than the site being assessed and evaluated.

E-7.1.1 Impact on Localized Traffic during the operational phase**Source and nature of the impact**

Due to the operational activities and associated movement (i.e. delivery vehicles and trucks), the traffic patterns of the surrounding roads network will be affected (refer to the Traffic Impact Study in Appendix 6).

Table 33: Increase of traffic during the operational phase

Impact source(s)	The proposed development in conjunction with other proposed projects in the NUDC	Status	-
Nature of impact	Cumulative increase of traffic volumes		
Reversibility of impact	The impact is irreversible but can be mitigated through the upgrade of existing intersections and the surrounding road network		
Degree of irreplaceable loss of resource	N/A		
Affected stakeholders	Surrounding land owners and road users		
Magnitude	<i>Extent</i>	Regional -3	
	<i>Intensity</i>	High – 5	
	<i>Duration</i>	Permanent - 5	
	<i>Probability</i>	Highly likely - 4	
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+5+5+4) \times 5 = 85$ High	H
	<i>With mitigation</i>	$WOM \times ME = WM$ $85 \times 0.4 = 34$ Low - Medium	L - M

Mitigation measures

A Traffic Impact Assessment was conducted by Hatch Goba and a number of recommendations were suggested to mitigate the impact of increased traffic volumes on the local road network, as a result of the proposed development.

The Ultimate Inyaninga Development plus the planned regional developments can be accommodated with major infrastructure improvements, mainly:

- Eastern Arterial (3 lanes per direction at some sections);
- Western Bypass (3 lanes per direction at some sections);
- Watson Highway (3 lanes per direction at some sections);
- P100 extension (3 lanes per direction at some sections);
- Other Inyaninga access roads mostly 2 lanes per direction; and
- Signalization and widening of many strategic junctions.

Traffic will have to be monitored on an ongoing basis in the sub region given the uncertainties around development take up and major infrastructure requirements.

Significance of the impact

The cumulative impact of an increase in traffic volumes caused by the proposed development, in conjunction with other proposed projects in the area, would be high. This impact, however, can be mitigated to have a low-medium impact through the road improvements as suggested above.

E-7.1.2 Potential loss of viable and high potential agricultural land**Source and nature of the impact**

Between 2004 to 2011, poor yields were experienced for dryland sugar cane. The mean yields under irrigation are not significantly higher than dryland production indicating possible lack of scheduling, poor irrigation management and / or system inefficiency. Forty percent of the irrigation occurs on Windermere soils and these are good irrigation soils. Yields of > 100 ton per hectare per annum should be attained under correctly designed and well managed irrigation on these soils, which could increase profits significantly.

Apart from the restrictions due to poor soil water characteristics on most soils, on the site, lack of nutrition and disease are the other factors that affected yield.

The potential for planting alternative crops such as bananas, macadamia nuts, grasses, medicinal plants and trees, cut flowers and potted plants would not render these alternatives as financially feasible.

Having considered the inherent limitations associated with cropping (high input costs and moderate to poor sugarcane yields) and the land use options (need for development in the growth NUDC), or the site, the proposed development could achieve the following:

- Fulfil the planned expansion of the Northern Node of eThekweni Municipality;
- Provide infill development in this node;
- Comply with Provincial and Municipal strategic planning;
- Comply with local planning;
- Make effective and efficient use of existing infrastructure and resources; and
- Create positive employment and socio-economic benefits.

The KZN DAEA has recognised the need for development in growth corridors and would like to ensure that it is appropriately managed. Together with TH they are working toward understanding the agricultural potential in the Western and Northern corridors. In KZN the land used for sugarcane production has increased over the last 3 years by 17 835ha, an increase of 15% and this includes land taken out for urban development. Thus the impact of urban development on sugarcane production is insignificant.

Tongaat Hulett only owns 8% of the total quantum of land that supplies cane to its mills so even a total loss of this 8% is insignificant.

TH has made investments in increasing agricultural production whilst creating new and enhanced agricultural opportunities and a potential revenue base for emerging farmers. In this regard, Tongaat Hulett has, since 2009/10 invested in the planting of nearly 30 000 hectares of land to sugar cane. The areas invested in have been largely in rural areas and within Ingonyama Trust land where new management models have been created to ensure sustainability of these new plantings. This work has been done in partnership with both National and Provincial government as well as in partnership with the Ingonyama Trust Board where it affects ITB land.

By 2017, it is planned to have a total of 68 397ha of new plantings of sugarcane, as compared with the 2009 areas. This is extremely significant and apart it is noteworthy that these new areas being developed are in the rural hinterland. It is also pertinent to note that over the past 6 years TH has invested over R8 million in sugarcane supply related projects. This combined with a rural development and food security strategy of new sugarcane development providing an anchor for services, investment, training, etc., allows for other more intensive food related crops to be grown for local consumption.

This will have a very positive impact on food security especially in the rural areas. This significant expansion should be compared against the 'presumed loss', over a number of decades, of approximately 8 600 hectares of land currently under agriculture and, which is owned by Tongaat Hulett and located in the primary growth and development corridors of the KZN Province with significant potential to also assist in the more urban challenges of housing, inequality and unemployment.

Thus removing the property from agricultural production will have little or no impact on food security in the region. **In terms of agricultural activities and current land use, the impacts of the land use change is considered to be negligible.**

E-7.1.3 Impact on municipal infrastructure

Source and nature of the impact

With the increased demand placed on development within the northern region of the municipality, there would

be increased demand placed on the existing municipal services to provide adequate road infrastructure, civil and electrical services for the developments in the pipeline and the proposed development.

Table 34: Impact on municipal infrastructure

Impact source(s)	Proposed development and other developments in the northern region	Status	-
Nature of impact	Increased demand on municipal infrastructure		
Reversibility of impact	The impact is irreversible but can be mitigated through environmentally sensitive planning		
Degree of irreplaceable loss of resource	N/A		
Affected stakeholders	eThekweni Municipality Surrounding land owners Environmental activists		
Magnitude	<i>Extent</i>	Regional -3	
	<i>Intensity</i>	High – 5	
	<i>Duration</i>	Permanent – 5	
	<i>Probability</i>	Definite - 5	
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+5+5+5) \times 5 = 90$ High	H
	<i>With mitigation</i>	$WOM \times ME = WM$ $90 \times 0.4 = 36$ Low - Medium	L-M

Mitigation measures

- The surrounding road network must be upgraded with the introduction of additional lanes to accommodate the proposed development and additional developments in the future. Additional capacity and funding must be provided to accommodate these road improvements.
- Two reservoirs i.e. 9.5MI and 6MI must be constructed to meet the water demands for the proposed development.
- Rainwater harvesting must be encouraged and potable water should not be used for irrigation.
- Additional pump stations, sewerage pipelines and WWTW must be proposed to cater for sewerage needs generated by the proposed development.
- There must be on-site attenuation tanks for roof run-off, permeable paving to parking areas, will provision of swales and landscaped areas to restrict run-off.]
- Roadways, access points and intersections must be provided with piped stormwater conduits with inlets designed onto to allow flow into the pipes when the swales reach a predetermined capacity.
- Energy dissipation measures must be implemented where these pipes discharge into the natural watercourse.
- Attenuation features must be provided in the main water courses to restrict the flows in larger rainfall events to pre-development flows.
- The attenuation feature together with on-site attenuation facilities (swales, permeable paving) must reduce pollution (through infiltration) and also assist in 'recharging' the wetlands.
- The La Mercy major substation (132/11kV) must be upgraded to meet the electricity demands of the area. Two additional 132/11kV 60MVA substations will have to be constructed to accommodate the proposed development.
- System strengthening on the 275/132kV transmission line would be required including a new 3150MVA 275/132kV Dube Intake substation to be located in the vicinity of the proposed development.
- Transmission lines (overhead/underground) are required within the proposed development site that will be undertaken by the eThekweni Municipality.
- A Waste Management Strategy must be in place that optimises waste minimisation, recycling and

re-use.

Significance of the impact

The cumulative impact of the need for upgrading of municipal infrastructure to increase capacity is high. Through the implementation of mitigation measures such as the above, the impact will be low to medium.

E-7.1.4 Impact on KSIA/DTP

Source and nature of the impact

In the short term, the effect of the proposed development on DTP industrial activity will be negative in that those industries/ companies which need to be near cargo aircraft, but do not need to be located directly on their premises may opt to rent space in the proposed development, as opposed to renting in the DTP as the market take-up of land adjacent to the DTP has been high already, mostly fuelled by the perception that rentals within DTP will be at a premium. There is anticipation that proposed development may be more affordable for medium sized enterprise. In the long term, both trade/ logistics zones are expected to adapt, in that those operations which immediately require proximity to cargo aircraft will remain at DTP, while those that do not require direct access to aircraft will be in the proposed development.

Table 35: Impact of proposed development on KSIA/DTP

Impact source(s)	Diversification of markets between KSIA/DTP and the proposed development		Status	-
Nature of impact	Competition between the proposed development and KSIA/DTP			
Reversibility of impact	The impact is irreversible but can be mitigated through specialisation of operations at the KSIA/DTP and the proposed development site			
Degree of irreplaceable loss of resource	N/A			
Affected stakeholders	KSIA/DTP ACSA			
Magnitude	<i>Extent</i>	Regional -3		
	<i>Intensity</i>	High – 5		
	<i>Duration</i>	Permanent – 5		
	<i>Probability</i>	Definite - 5		
Significance	<i>Without mitigation</i>	$(Extent + Intensity + Duration + Probability) \times WF$ $(3+5+5+5) \times 5 = 90$ High		H
	<i>With mitigation</i>	$WOM \times ME = WM$ $90 \times 0.4 = 36$ Low - Medium		L-M

Mitigation measures

- With regards to competition between Dube Trade Port, and the proposed development, it is expected that in the long term, businesses will adjust through specialisation of their operations.
- The Inyaninga Development will enable the northern eThekweni region, and Tongaat and KwaDukuza in particular, to access a vast range of economic opportunities that complement the existing logistical infrastructure of the Dube Trade Port and King Shaka Airport, and thus positively enhance the regional competitiveness.

Significance of the impact

The cumulative impact of the construction of the proposed development, in conjunction with the KSIA/DTP would be high. This impact, however, can be mitigated to have a low to medium through specialisation of operations between KSIA/DTP and the development site.

E-7.1.5 Impact of Integration with KSIA/DTP and the broader region

Source and nature of the impact

The site is strategically located between the town of Tongaat and the KSIA/DTP and forms part of the larger NUDC. Due to the ongoing growth and development of the northern corridor, there is increasing pressure to develop the land surrounding KSIA/DTP (the Aerotropolis). The proposed development could have a **high positive impact** on the northern corridor through the provision of new housing, economic and employment opportunities in the Greater Tongaat Region, to support and integrate with the KSIA/DTP and simultaneously unlock the growth and development potential of the Greater Tongaat Region. The KSIA/DTP is a key economic node comprising of various economic and multi-modal transport related activities that promotes the increased use of public transport and accommodates the efficient movement of freight. The DTP will offer facilities for trade and cargo, hotel and retail and passenger airfreight. Therefore, due to the proximity of the site to the KSIA/DTP, the proposed development would offer support facilities to the 'Aerotropolis' through the various land uses proposed i.e. industrial and transport/logistics and general business. A series of 24m roads, primarily located around the Tongaat Town Centre are proposed and the study area will therefore be linked with the DTP TradeZone and thereby compliment and support the uses proposed within this zone.

Globally, "Aerotropolis" caters for a myriad of uses that support airport cities such as, office complexes, hotels, meeting and entertainment facilities, logistics parks, shopping and other commercial activities. Inyaninga which is in close proximity to this catalyst can take advantage of its strategic location and provide support to the Dube Tradeport and thereby create economic opportunities that is linked to the surrounding areas much in need of economic opportunity.

It is important, that whilst growing the northern corridor and providing additional commercial and industrial opportunity within the study area that the proposed development compliments the existing towns and their offering. For this reason, Tongaat and Verulam have been identified as towns that potentially could benefit due to its proximity to Inyaninga. Currently both these towns are experiencing processes of urban decline in parts of the town centre and therefore greater connectivity to the R102 and the regional corridor would place these areas in a strategic position to reinvent themselves and offer new social, economic, cultural opportunity complimenting Inyaninga and the Dube Tradeport development.

The proponent has engaged with key stakeholders in Verulam and Tongaat in the Development Planning Framework, to ensure that they benefit from the diverse activities proposed at the site. Stakeholders from both these areas have indicated that the priority is the economy- where the focus is on creating new employment opportunities. The creation of more housing opportunities is also viewed as a significant priority with the third priority focusing on the development of the northern corridor.

The areas around the Inyaninga station is proposed for specialised logistics, whereas the areas around the interchange of the eastern and western arterial, is proposed commercial/retail opportunity. Mixed Use/commercial is proposed along portions of the R102 with high density residential in proximity to the Tongaat CBD. The uses proposed enforce an activity spine that will complement the existing towns of Tongaat and Verulam.

The rail traversing the study area has presented an opportunity to develop rail served logistic / General Industrial uses. This use comprises the largest allocation of uses within the study area and is primarily proposed to serve as a support zone for the Dube TradePort. It is proposed that the office component of the Logistic /General Industrial uses ideally located along the main road that ties into the old R102 alignment. The second site identified for Logistic /General Industrial is south of the eastern arterial and adjacent to the KSIA boundary. Given the types of industry that comprise an 'Aerotropolis", this area would complement the activities of the KSIA.

In light of the need to develop the NUDC for economic development, the proposed development will have a **positive impact of high significance** through its integration with the KSIA/DTP and the broader region.

E-7.1.6 Increased loss of viable and high potential agricultural land

Source and nature of the impact

The current land use is predominantly sugarcane production. The agricultural potential of the site is medium to high depending the soil depth and slope. The sugar cane yield potential is 40 tons per hectare for the shallow and sandy soils and approximately 60 tons per hectare for the structured soils on lower slopes. This is also due to the increased water availability to the crop on lower slopes. The Swartland soils (and other pedocutanic soils on the site) are prone to erosion. Production of sugarcane takes place on large areas with slopes in excess of 10 %. These sloped areas pose significant risks in terms of tillage and crop production induced erosion. The erosion pressures on the site are evident in the massive erosion effects observed in the stream and drainage channels. Crop production on duplex soils on steep slopes exacerbates erosion risks. This is a particularly relevant risk for the north eastern section of the site. The drainage features are eroded and show signs of high energy pulses of water moving through the landscape. This is a function of high levels of runoff.

The current land use in the form of dryland sugarcane production is the optimal use for the land. Although other crops can be produced on the red structured soils their production potential will be limited on the shallower and duplex soils (dominating the specific site). Irrigated land uses are not advised for most of the site as the slopes are such that distinct erosion is predicted. The duplex and shallow soils are prone to erosion and cultivation of these soils should only continue in the presence of a dedicated land management plan in terms of erosion control and mitigation.

The impacts of road construction activities on agricultural production on the site are large as a significant portion of the land has already been altered. In addition, these activities isolate areas that formed a unit in the past leading to detrimental impacts on site management and hampered sugarcane production. **In terms of agricultural activities and current land use, the impacts of the land use change is considered to be negligible on the surrounding areas.**

E-7.1.7 Economic growth in the region

The socio-economic impacts of this development will extend to business development, job creation, incremental returns in tax revenues, and empowerment of the communities in the local economy of eThekweni Municipality and will spill-over to KwaZulu-Natal province, and South Africa at large.

a) Additional Public Sector Revenues from Taxes (constant 2010 prices)

According to the Socio-Economic Impact Assessment by Gabhisa in 2010 (Appendix 6), the following is anticipated:

In terms of the public sector's (including eThekweni Municipality's) potential revenues and financial implications, it is anticipated that outlays in the proposed Inyaninga/Ushukela Highway Development Precinct, will be more than defrayed by tax receipt streams. It is expected that the VAT raised (indirect taxes) during the ten years of construction phase alone would likely yield approximately R2.24 Billion in tax receipts. It is expected that tax on income/payroll and workforce would likely yield approximately R1.28 Billion throughout the ten years of construction in tax receipts. It is expected that, the company tax incidence on profits of building/construction companies supplying the Inyaninga development would likely yield approximately a further R800 Million throughout the ten years of construction in tax receipts. It is expected that once fully developed, the property rates incidence on the properties would likely yield approximately an additional R573

Million throughout the ten years and accumulate over the life span of the Inyaninga's development based on the property rates applicable in eThekweni Municipality. Adding on all above tax receipts, the total tax receipts that will accrue to the public sector (including eThekweni Municipality) and would likely yield approximately R5 Billion over the ten years of construction phase (on average this translates to 500 Million per annum).

Other public revenues deriving from the Inyaninga development such as municipality services and levies, user charges, property taxes, administrative fees, and bulk utilities including electricity, water supply and sanitation, sewage services, amongst others are also likely to be very substantial and will contribute to defray all the public sector's outlays including eThekweni Metropolitan during the construction phase and beyond.

b) Additional Payroll

It is expected that Inyaninga project when fully developed would generate an annual payroll of approximately R22 Billion paid as salaries and wages that will be available for households to spend in the local economy of eThekweni Municipality and that would recur yearly over the life span of the Inyaninga development.

The above tax revenues and fiscal implications for the public sector (including eThekweni Municipality) encompass anticipated permanent tax on income/payroll and workforce (of permanent jobs), company tax, property rates and substantial redistributable rates income that will recur yearly as well as other public receipts (administrative fees, electricity, water supply and sanitation, sewage services, levies, and other utilities) that will be boosting the local economy⁷ of eThekweni Municipality. This is anticipated to present a continued flow of expenditures to the local economy of eThekweni that will extend over the life span of the Inyaninga development.

The proposed development will substantially contribute positively towards the economy of eThekweni Municipality, employment and other income stream benefits. The development amongst other benefits is likely to unlock over R97 billion as purchase of goods and services during the construction period. The project will generate 441,003 direct and indirect/induced jobs over the ten years. Out of these jobs approximately 175,299 will be permanent (construction and construction related) and approximately 192,807 will be temporary (construction and construction related) jobs. Nonetheless, approximately 72,897 will be secondary (construction and construction related) jobs. In addition, the development is anticipated to generate approximately R22 Billion as salaries and wages which will likely to be spent within the eThekweni Metropolitan economy. Finally, the development is also anticipated to generate approximately R33.559 Billion to the eThekweni Metropolitan's GDP (Gross Output) during the construction period which translates to R3.356 Billion per annum.

Indirect and induced impacts will be the consequences of off-site economic activities that supply goods on the proposed development's businesses (off-site construction and construction-related activities). These include but not limited to off-site development business activities associated with the proposed development' throughput (i.e. eThekweni Metropolitan and the rest of South Africa suppliers of building/construction materials, hospitality industry, retail industry, tourism, agencies, etc.), or the impacts resulting from successive rounds of spending and re-spending over and over again in the local community.

The Inyaninga development as a whole has the potential of skilling and improving the welfare of prospective workers. It is likely to make a positive contribution to skills development in a number of sectors in the local economy of eThekweni Metropolitan. If some of the envisioned services materialize, it will provide employers (particularly those from Inanda, Ndwedwe and Tongaat) with opportunities to improve their skill levels so as to meet their job demands.

⁷ Local government finance statistics have been related directly to national accounting concepts which allow quantifying government revenues and used in the macro-econometric model to simulate revenues implications.

c) Impact on local economy

The Inyaninga development, construction, and operations will create a ripple effect in the local economy of eThekweni Metropolitan. That is, its contribution will consist of annual direct expenditures for new development and construction and annual expenditures to operate existing infrastructure, buildings, and services. Additional important economic benefits – which are also known as the ripple effect – will also be derived from the continuous spending of salaries and wages supported by direct construction and operating outlays, and purchases of construction-related materials and services from vendors and supporting industries. The combination of these direct and indirect (induced) outlays will constitute the total output or contribution to the local economy of eThekweni Municipality bringing with it an array of incremental returns through rates and taxes, job growth among others that will accumulate over the life span of these buildings.

Since the proposed development is earmarked to support the KSIA/DTP Development Precinct, this will impact have a **positive impact of high significance** on the economy of the province, through an increase of employment opportunities, skills transfer, capacity building, spending power, tax revenues and business development.

SECTION F: CONCLUSIONS AND RECOMMENDATIONS

In accordance with the EIA Regulations (GN No. 543), this section provides a summary of the key findings of the EIA and a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives. This section also provides a reasoned opinion as to whether the activity should or should not be authorised and conditions that should be made in respect of that authorisation, as necessary.

F-1 SUMMARY OF THE KEY FINDINGS OF THE EIA

It is the opinion of the EAPs that should the project proceed, impacts on the surrounding natural areas can be minimised through the careful adherence to suggested mitigation measures. It is also recommended that the possible impacts on the wetlands and downstream hydrological systems are monitored throughout the duration of the project.

The proposed development is in line with the Provincial and Local Plans for development in the northern corridor of the municipality and the province. The development proposal aims to address new housing, economic and employment opportunities in the greater Tongaat region, to support and integrate with the KSIA/DTP and simultaneously unlock the growth and development potential of the greater Tongaat region.

Globally, “Aerotropolis” caters for a myriad of uses that support airport cities such as, office complexes, hotels, meeting and entertainment facilities, logistics parks, shopping and other commercial activities. Inyaninga which is in close proximity to this catalyst can take advantage of its strategic location and provide support to the Dube Tradeport and thereby create unparalleled economic opportunities that is linked to the surrounding areas much in need of economic opportunity.

It is important, that whilst growing the northern corridor and providing additional commercial and industrial opportunity within the study area that the proposed development compliments the existing towns and their offering. For this reason, Tongaat and Verulam have been identified as towns that potentially could benefit due to its proximity to Inyaninga. Currently both these towns are experiencing processes of urban decline in parts of the town centre and therefore greater connectivity to the R102 and the regional corridor would place these areas in a strategic position to reinvent themselves and offer new social, economic, cultural opportunity complimenting Inyaninga and the Dube Tradeport development.

The proposed development will contribute towards job creation, economic growth, poverty reduction, community development, skills development and capacity building.

The findings of the specialist studies undertaken together with the broader environmental assessment conclude that there are no fatal flaws that should prevent the project from proceeding. However, the following key impacts have been identified which will require the application of site and activity specific mitigation measures. These mitigation measures are included within the EMP to ensure that they receive the necessary attention.

Table 36: Summary of the significance of identified impacts without and with mitigation measures

Impact	Significance	
	Without Mitigation	With Mitigation
Construction Phase		
<i>Biophysical Environment</i>		
Soil erosion and silting of the wetlands, riparian areas and drainage lines	Medium to high	Low to Medium

Surface and ground water contamination	Medium to High	Low to Medium
Destruction of natural vegetation and faunal habitat	Medium	Low to Medium
Interference with flora and fauna behavioural patterns	Medium to High	Low to Medium
Introduction of spread of alien and invasive vegetation	Medium to High	Low to Medium
Loss of hydrological functionality for the Inyaninga/Ushukela Highway Development Precinct	Medium to High	Low to Medium
Loss of hydrological functionality for the construction of sewerage pipelines	Medium to High	Low to Medium
Impact of geological formations	Low to Medium	Low
Socio Economic Environment		
Increase in ambient dust levels	Low to Medium	Low
Increase in ambient noise levels	Low to Medium	Low
Impact on safety (Transnet Gas Pipeline) and security	Low to Medium	Low
Change of visual character	Medium	Low - Medium
Impact on traffic patterns within the area	Medium to High	Medium
Impacts on heritage resources	Medium	Low to Medium
Temporary employment opportunities	High Positive	
Operational Phase		
Biophysical Environment		
Surface and ground water contamination	Low to Medium	Low
Soil contamination	Low to Medium	Low
Impact of Rehabilitation of Wetlands on site	Medium Positive Impact	
Socio Economic Environment		
Increase in ambient noise levels	Low to Medium	Low
Permanent change of visual character	Low to Medium	Low
Impact on existing commercial nodes of Verulam and Tongaat	Low to Medium	Low
Impact on existing farm workers and farm operations	Low to Medium	Low
Permanent employment opportunities	High Positive	
Impact on provision of housing and social facilities	High Positive	
Impact on existing social facilities (hospitals and fire stations)	Low to Medium	Low
Cumulative Impacts		
Increase traffic within the surrounding area	High	Low to Medium
Impact on municipal services	High	Low to Medium
Impact of integration with KSIA/DTP and broader region	High positive	
Impact on KSIA/DTP	High	Low to Medium
Loss of Agricultural Potential Land	Not significant	
Increase in economic growth	High positive	

The development framework consolidates all the policy, precedent and stakeholder needs and provides a framework that integrates with the existing primary centres and introduces new local urban centres along the corridor. The plan is aligned to both the provincial and local policy and spatial plans. The framework provides for a diverse range of opportunities within the corridor and starts building on the concept of an Aerotropolis. The framework has achieved all priorities and envisaged targets i.e. The creation of a diverse mix of housing, economic opportunity with logistic and business uses, integration with towns - all networks are seamlessly connected and more importantly a 'Next Generation City' which can become a major new hub for trade and business.

The negative impacts identified are not considered highly significant and with appropriate mitigation can be reduced to low or medium-low significance. The positive impacts are considerable in that the proposed

development will stimulate the local economy and provide additional employment opportunities greatly needed in Tongaat and Verulam and surrounding areas within the eThekweni Municipal area.

F-2 RECOMMENDATIONS

There is an underground methane rich gas pipeline that is buried 1m below the ground level and traverses the north-western portion of the development site, which is owned by Transnet Gas Pipelines. The Development Framework Plan incorporates a 30m buffer on either side of the 9.14 m gas pipeline servitude. The Ethekewini Municipality: Fire Department will be provided with the Risk Assessment for the Transnet Gas Pipeline that was conducted by Ishecon Chemical Process Safety Engineers. The Ethekewini Municipality would be required to grant/refuse the construction of the proposed development from a safety perspective.

It is estimated, based on the proposed development layout, that the remaining areas of wetland habitat within the post-construction landscape will cover an area of approximately 60.8 ha. The post-development scenario, with the adoption of mitigation activities, includes both positive and negative impacts on the identified wetland systems. The systems' geomorphic integrity is reduced due to the infilling and deactivation of portions of the wetland, but the overall integrity is marginally improved by the improvements in the hydrological and vegetative components, partially relating to the 30m buffer zone surrounding the wetlands. Overall, with the rehabilitation of the remaining wetland areas onsite, there is gain of 15.7 hectare equivalents. Although there has been a loss to the remaining wetland habitat within the proposed development site, there is nevertheless a gain in hectare equivalents should the appropriate rehabilitation of the wetland be undertaken.

The adoption of mitigation activities, with the remaining areas of wetland habitat onsite being rehabilitated and managed to ensure diffuse flow, wetland plant species diversity and the presence of temporary, seasonal and permanent wetness zones, manages the impacts on the wetland habitat. The onsite mitigation contributes significantly to reducing the degree of impact on the wetland habitat, ensuring that there are no residual impacts in terms of loss in wetland integrity.

The Farm Manager's residence and the Inyaninga Barracks will be demolished as a result of the proposed development. Permits for the demolition of these heritage structures will be submitted to Amafa and their approval will be required prior to demolition. The temple on site will be retained in the proposed development.

The visual impact of the proposed development must be mitigated with appropriate lighting, landscaping, and use of sustainable design principles in the architecture.

The proposed development may positively impact on the surrounding community (especially Tongaat and Verulam) and the local economy due to possible skills development, informal sector development, poverty alleviation, BEE and SMME business development and income generation.

The loss of agricultural activities on the site does not have a significant impact on food security as Tongaat Hulett has invested in sugar cane production initiatives in ITB land for the upliftment of emerging farmers. The discontinuation of agricultural practises on the site will lead to the relocation of the existing farm workers that reside on the property.

Various road improvements are required to accommodate traffic that will be generated as a result of the proposed development.

The recommendations of the Geotechnical Engineer must be taken into consideration during the construction of the proposed development.

To ensure that identified negative impacts are minimised and positive impacts enhanced, the following clauses are recommended as conditions of the Environmental Authorisation:

- The EMPr is a legally binding document and the mitigation measures stipulated within the document and EIR must be implemented.
- An independent Environmental Control Officer (ECO) must be appointed to manage the implementation of the EMPr during the construction phase. Environmental Audit Reports must be compiled and made available for inspection.

SECTION G: REFERENCES

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SECTION H:APPENDICES

Appendix 1: Locality Map

Appendix 2: Site Photograph plate

Appendix 3: Development Framework Plan and other Land Use Layout Plans

Appendix 4: Authority Correspondence

Appendix 5: Public Participation

Appendix 6: Specialist Studies

Appendix 7: Environmental Management Programme

Appendix 8: Letters from eThekweni Municipality regarding Services Provision