Draft
Environmental Impact Report
For the Proposed uShukela Highway Development

eThekwini Municipality
July 2013

EIA Number: 12/12/20/2013

Conceptual design for the proposed uShukela Highway Development.

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The information in this report is based on information supplied by the clients, Tongaat Hulett Developments and Dube TradePort Corporation. All information is given in good faith, however, no physical testing or chemical analyses were performed by Kerry Seppings Environmental Management Specialists cc during the course of this assessment.

Although every effort was made to request and obtain all pertinent information for this assessment Kerry Seppings Environmental Management Specialists cc cannot be held accountable or accept responsibility for any discrepancies in this information or for the disclosure or review of information which has not been presented to the consultant. All reports presented to the consultant for review have been referenced.

As per Regulation 31 (2) (a) of the NEMA EIA regulations herewith (ii) the expertise of the EAP to carry out an environmental impact assessment;

Expertise to Conduct Scoping and EIAs

Kerry Seppings Environmental Management Specialists cc (KSEMS) has been based in KZN since 1998. The consultancy is responsible for numerous Environmental Impact Assessments per annum and all consultants managing our EIAs have a minimum of a Master degree in the Environmental Sciences. In early 2008 the business was converted to a closed corporation (cc). In the new organisation each project is reviewed by at least 3 qualified staff. The increased staff component has allowed for specialised staffing in the following areas; linear EIAs, large developments, ecological expertise, coastal and estuarine ecology, ECO provision, petrol stations, roads development and industrial development. There is also a legal expertise to complement all work done by KSEMS cc.

Integrity and Independence:

Our ethos is that our independence in assessing environmental impact is key to running a successful project. We support sustainable development and believe that as independent consultants our role is to represent the interest of the environment first and foremost.

Environmental Legal Knowledge:

Kerry has extensive environmental legal knowledge regarding not only the EIA process and requirements but also with regards to all other legislation at a national, provincial and local level and how these affect environmental management issues. Stephanie has her Masters in Environmental and Marine Law. KSEMS has compiled a number of environmental legal registers for several industries in the chemical, paint and manufacturing sector as well as for companies involved in green fields developments. Kerry has also carried out several environmental legal audits and as such is conversant with a wide range of legislation relating to various aspects of industry and development.

Specialist Training:

Kerry has been extensively involved in implementing ISO 14001 Environmental management systems for a number of industries and has good industrial knowledge as well as sound ecological experience when it comes to green fields development. Kerry is an ecologist by training and has experience in terrestrial and estuarine environments having obtained her honours degree working on the St Lucia estuary. She wrote her Masters thesis on Environmental Management and Open Space Planning Thesis and is also experienced at handling public participation and conflict resolution. Kerry has also been certified as an Environmental Assessment Practitioner by the EAPSA.

Detailed CV's and proof of certifications and degrees are available on request.

Major Clients and Projects:
KSEMS cc is involved with the full range of environmental assessments from a client developing a site for a single resident to some of the nation's biggest corporations.

Key Projects Include:
Transmission and powerline installation, Gas pipelines and metering stations, Filling stations development, Retail centre and multi–use complex development - EIA and ECO work, Harbour Widening ECO work for major construction companies, Development of rural roads – EIA, Waste management EIAs, Pier redevelopment and waste management EIAs, Management of specialist studies.

As per Regulation 31 (2) (a) of the NEMA EIA regulations herewith details of (i) the EAP who compiled the report;

AUTHORS

This Report was prepared by *Kerry Seppings Environmental Management Specialists cc*

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Tertiary Education:	University of Cape Town, Cape Town BSc (Hons) - Botany (Major), Zoology and Ecology. MPhil Marine and Environmental Law
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Detailed CVs and proof of certifications and degrees are available on request.

Prepared By: Stephanie Williams
Reviewed By: Kerry Seppings

EXECUTIVE SUMMARY

Dube TradePort Corporation and Tongaat Hulett Developments propose to develop a Logistics, Industrial and Business Park on 134ha of currently undeveloped land north of King Shaka International Airport (KSIA) within the eThekwini Municipality. The proposed development is strategically located, providing support to the Dube TradePort and KSIA promoting trade and development on a national scale positively contributing to the emerging Aerotropolis. Bulk services associated with the proposed development are considered in the Environmental Impact Report (EIR) and include sewer connection, water supply, electricity supply and the upgrading/construction of relevant road intersections.

The applicants initially identified three layout alternatives. Two of the layout alternatives included a petrol filling station. Since the Scoping Report, there has been a reduction in available bulk area and an increase in green open space as recommended by the wetland specialist. Due to the fact that it is not possible to accurately forsee the most likely site that will be the most appropriate for petrol filling stations and that the details of such are not available. The final proposed layout excludes the petrol filling station sites. The alternatives that included such a use in the Scoping Report have therefore fallen away. The applicants are therefore proposing one layout alternative which is compared with the "no-go" option in the EIR. After consultations with wetland specialists, the applicants have developed a sustainable layout creating an economically practical Logistics, Industrial and Business Park retaining key environmental services currently provided by the wetland system on the site.

An application for environmental authorisation was submitted to the national Department of Environmental Affairs (DEA) on the 20th August 2010. Notification of interested and affected parties (I & APs) commenced on the 22nd September 2010 and the relevant adverts placed as required by the 2010 EIA regulations in terms of Chapter 5 of the National Environmental Management Act, 1998 as amended. A public meeting was held at the Tongaat Town Hall on the 13th October 2010. The Draft Scoping Report was submitted to I & APs for review and comment on 19th November 2010. The Final Scoping Report was submitted to the DAE along with all comments received on 09th February 2011. The DAE approved the Scoping Report on 13th April 2011. After receiving all specialist reports and input on the various aspects of the proposed development, the Draft EIR was compiled and submitted to I & APs for comment on the 08th July 2013. Once all comments have been received, the Final EIR will be submitted to the DAE for environmental authorisation.

The proposed uShukela Highway Development layout is provided in Figure 1 of the EIR. The applicants propose to develop the 134ha site into eight different sub-precincts or "Tradezones". Infrastructure established in these zones will largely consist of warehousing and offices. The Tradezones vary in size from 33 412m^2 to 286 786m^2. One of the sub-precincts (48 072m^2) will be used as a conference venue for management and offices. The proposed layout includes 219 603m^2 of rehabilitated habitat, which will be managed as a functional wetland system retaining the services currently provided by the wetland system on the site. The majority of the open space runs through the centre of the site from west to east as a "green corridor" incorporating seasonal wetlands and acts as a buffer to the environmentally sensitive areas. Approximately 10% of any development on the site will use soft landscaping to control stormwater preventing flooding and increasing infiltration into the groundwater. The layout has incorporated modern engineering solutions as a fresh approach to monitor and manage the wetland system.

The various specialists have concluded that the proposed development will have a number of positive socio-economic impacts by creating jobs throughout the construction and operational phases as well as contributing to the growth of the economy. The EAP is of the opinion that the proposed activity should be granted environmental authorisation provided that the conditions listed in section 10 of the EIR are upheld. The preferred layout, as illustrated in Figure 1, provides a sustainable footprint whereby the applicant's economic requirements are fulfilled, significant environmental services conserved and a substantial contribution made to the neighbouring nodes of Tongaat, Dube TradePort, Ballito, Verulam, Waterloo and Ndwedwe Rural.

The attached Environmental Management Programme (EMPr) should be adhered to during all phases of development: pre-construction, construction and operational. Specialist input provided during the Environmental Impact Assessment has been incorporated in the EMPr to ensure that the potential impacts of the proposed development are minimized, mitigated against or prevented. Of particular importance is the Stormwater Management Plan (Appendix 4) which has includes all stormwater infrastructure within the open space and road reserves as well as infrastructure connecting the open spaces and road reserves.

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ACRONYMS

ACSA	Airports Company of South Africa
ARI	Average Recurrence Interval
BID	Background Information Document
BMP	Best Management Principles
DAEA	Department of Agriculture and Environmental Affairs
DEA	Department of Environmental Affairs
D'MOSS	Durban Metropolitan Open Space System
DoT	Department of Transport
DTPC	Dube TradePort Corporation
DWA	Department of Water Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
ESR	Engineering Service Report
EWS	eThekwini Water and Sanitation
GDP	Gross Domestic Product
GGP	Gross Geographic Product
HGM	Hydrogeomorphic
I & AP	Interested and Affected Party
IDP	Integrated Development Plan
IHI	Index of Habitat Integrity
KSEMS	Kerry Seppings Environmental Management Specialists cc
KSIA	King Shaka International Airport
LOS	Level of Service
LRI	Land Resources International
MRG	Methane Rich Gas
NEMA	National Environmental Management Act 107 of 1998
NUDC	Northern Urban Development Corridor
PGDP	Provincial Growth and Development Plan
PGDS	Provincial Growth and Development Strategy
PES	Present Ecological State
SDF	Spatial Development Framework
SUDS	Sustainable Urban Drainage Systems
SWMP	Stormwater Management Plan
THD	Tongaat Hulett Developments
WCS	Wetland Consulting Services
WTW	Water Treatment Works
WWTW	Waste Water Treatment Works

1.0 Introduction

1.1 Description of the Proposed Activity [Regulation 31 (2b)]

The two applicants, Dube TradePort Corporation (DTPC) and Tongaat Hulett Developments (THD) propose to develop a logistics, industrial and business park on 134ha of strategically located, currently undeveloped land at the northern end of the existing Dube TradePort and King Shaka International Airport (KSIA). The proposed development is adjacent to uShukela Drive which is on its northern boundary and has therefore been labelled as the "uShukela Highway Development". The sites strategic location is further entrenched due to its visibility from, proximity and accessibility to the national highway (N2) and situation vis a vis the town of Tongaat and the rural hinterland. The uShukela Highway development should be seen as a natural extension of the Dube TradePort and tradezone precincts and will be accessed off the same link road that is currently under construction.

Kerry Seppings Environmental Management Specialists cc (KSEMS) were appointed by DTPC and THD to conduct an Environmental Impact Assessment (EIA) for the proposed industry and logistics development. Please refer to Table 7, which lists the activities that trigger environmental authorisation.

The preferred alternative is to develop the 134ha site into eight different sub-precincts. It is unknown what the tenant composition will be at this stage and therefore seven of the eight sub-precincts have been broadly allocated a Tradezone/logistics/light industrial land use. A Tradezone or logistics park includes the organisation and management of local and international goods. Infrastructure established in these zones will therefore largely consist of warehousing and offices. Light industry involves the manufacturing of small consumer goods and typically has less environmental impact than activities associated with heavy industry[1]. The uShukela Highway Development Tradezones vary in size from 33 412m^2 to 286 786m^2. The eighth sub-precinct will utilise (renovate) the existing farmstead and may be used as a conference venue for management and offices (48 072m^2). Please see section 4.5 for more details on associated heritage features on the site.

Significantly, over 215 000m^2 of the site are to be totally rehabilitated into a functioning and managed natural habitat. The required new road network within the development footprint will cover an area of 263 890m^2. The proposed development layout is illustrated in Figure 1.

The proposed development layout has acknowledged and responded to the existing physical and natural conditions on site as well as the site's strategic location in the broader region. The logistics, industrial and business park will provide linkage, integration and support to the Dube TradePort as well as the KSIA stimulating trade in the area with the potential to stimulate trade and development on a national scale and hence provide a significant contribution to the emerging new Aerotropolis which has been identified as a key strategy towards regional growth and development and competitive advantage. The proposed development is furthermore directly aligned with both provincial and municipal spatial planning policies and government objectives. The need and desirability of the project is discussed in section 1.3.

The uShukela Highway Development takes into consideration sustainable principles as defined in the National Environmental Management Act 107 of 1998 (NEMA) as: "the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations". In achieving this sustainable development, the applicants have included 219 603m^2 of open space into the layout with the majority of the open space running through the centre of the site from west to east. This "green corridor" specifically functions to incorporate the seasonal wetlands on site, acting as a buffer to this environmentally sensitive area. Please note that the wetlands on site are further discussed in more detail in section 4.2.3.

On top of the open space system proposed, the uShukela Highway Development is also proposing to incorporate a number of sustainability measures towards mitigating potential climate change impacts. These measures are aimed around water management, energy demand reduction and alternative energy sources, waste management and recycling and appropriate indigenous landscaping. The proposed development will be closely integrated with open spaces together with accessible links for pedestrians and cyclists. All roads will have open drainage swales with soft landscaping and rehabilitated green spaces will only use indigenous and endemic plants. At least 10% of any development on site shall be soft landscaping including roof gardens, planter decks and retention ponds/areas. An attenuation pond located in the north-east of the site (Figure 1) will form part of the landscaped area to collect and store rain water. This will function to control stormwater preventing flooding, capturing sediments and storing water for possible irrigation purposes.

[1] Planning Partners in association with Du Plessis and Hofmeyr Attorneys Dr P.E. Claassen (2004): *Western Cape Provincial Zoning Scheme Model By-Law*, page 61.

The rehabilitation and management of sections of open space will have a positive environmental impact as well as creating new employment and economic opportunities. In this regard, over 4 000 permanent jobs will ultimately be provided through the development with more than 17 000 construction related jobs being created during the development's land preparation phase. This figure will more than double with the top structure construction phase. Ultimately, the total investment to be made as a result of the development will be more than R4 billion.

Since the current land use on the site is sugarcane farming, there is a general lack of services available in terms of water, waste and electrical services. It is however noted that a new, high order link road between the uShukela Highway and Dube TradePort is currently under construction which will provide the primary point of access for the development. A new gravity sewer main will link into the existing reticulation in Tongaat is due to be constructed in the short term. A small, temporary sewer pump station will be required for a small portion of the development and is included in the scope of this study. Bulk service requirements are discussed further in section 3.1.

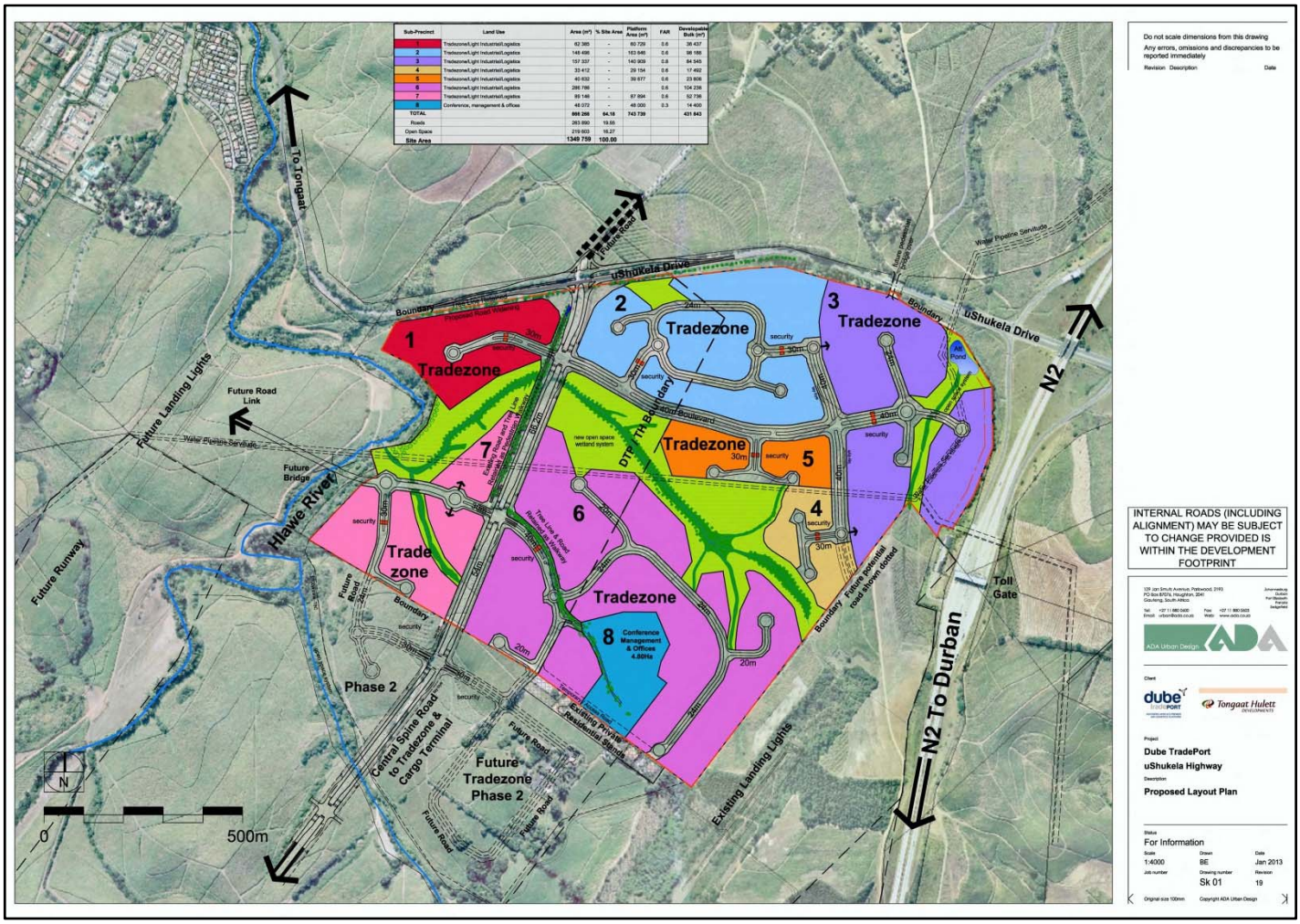
The existing properties within the Herrwood community directly adjacent to the developments south boundary are directly affected from an access perspective. As indicated in the layout at Figure 1, road access provision has however been made in order to ensure continued access to these properties through the development. An additional new access road will also be required from the R102. A section of the existing Brake Drive will be upgraded and a new access road constructed linking Brake Drive with the Link Road currently under construction within the development footprint (shown in Figure 1). The new road access will cross the Hlawe River and is included in this scope of study. Traffic and roads are discussed in section 3.1.1 of the Environmental Impact Report (EIR).

In regard to the other required services, the applicants will be introducing all these to the area (all described in section 3.1 of the EIR), contributing to development within the immediate boundaries of the KSIA. This increase in services should also attract further investment, development and trading in the area. From an electrical perspective, an electricity demand of 24MVA will be required for the total bulk area. During the initial stages of the development (short-term) electricity will be supplied by the Tongaat electrical substation but for the ultimate, overall development and the greater area surrounding KSIA new substations will be required. Electrical requirements are discussed further in section 3.1.5.

A water pipeline and new reservoir will be required for the proposed development and is included in this scope of study. The locality of the pipeline and reservoir has been illustrated in Figure 1 below as well as Figure 3. The water pipeline will be within an existing Umgeni water pipeline servitude and the new reservoir will be built next to the existing La Mercy Airport Reservoir. The water pipeline and reservoir are discussed in more detail in the bulk services section of the EIR (section 3.1).

The environmental, social and economic impacts are discussed throughout the EIR and a summary of all the potential impacts is provided in Table 10 under section 6.

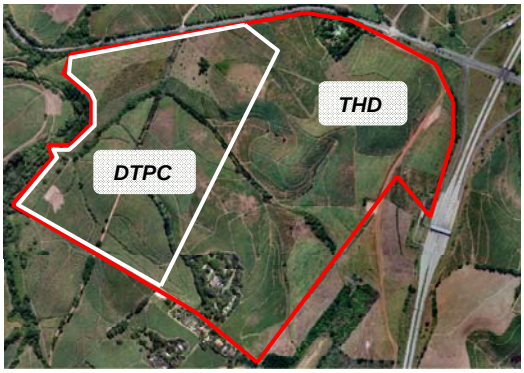
Figure 1: Layout for the proposed uShukela Highway Development. The Hlawe River is shown in blue to the west of the site and the N2 Highway to the east. The route of the proposed water pipeline is evident to the east of the site, crossing the N2 Highway before heading south (dashed black line). The position of the new access road is indicated to the west of the development (source: ADA Urban Design: Proposed Layout Plan, January 2013).



1.2 Description of the property on which the activity is to be undertaken and the location of the activity on the property [Regulation 31 (2c)]

The property on which the proposed development will be located is approximately 40km out of the Durban Central Business District and is within the eThekwini Municipality. Co-ordinates for the centre of the site are 29°35'08.15"S 31°08'00.61"E. The proposed development footprint (red in Figure 2), is 137 hectares and comprises of five land parcels, four of which are owned by THD and one owned by DTPC as indicated in Figure 2. The effect is that the uShukela Highway Development is a joint-venture based upon the different properties as follows:

Figure 2: The proposed site outlined in red with DTPC land ownership shown in white.



DTPC ownership - Rem of Portion 77 of the of the Farm Klipfontein No.922 (a consolidation of Rem of Ptn 3 and Ptn 11 (of 3) both of the Farm Klipfontein No.922)

THD ownership - Ptn 80 of the Farm Klipfontein No 922 (a consolidation of Rem of Sub 18 (of 5) and Ptn 79 (of 77) both of the Farm Klip Fontein No. 922)
- Rem of Lot 77 No. 1523
- Rem of Sub 8 of Lot 49 No. 862

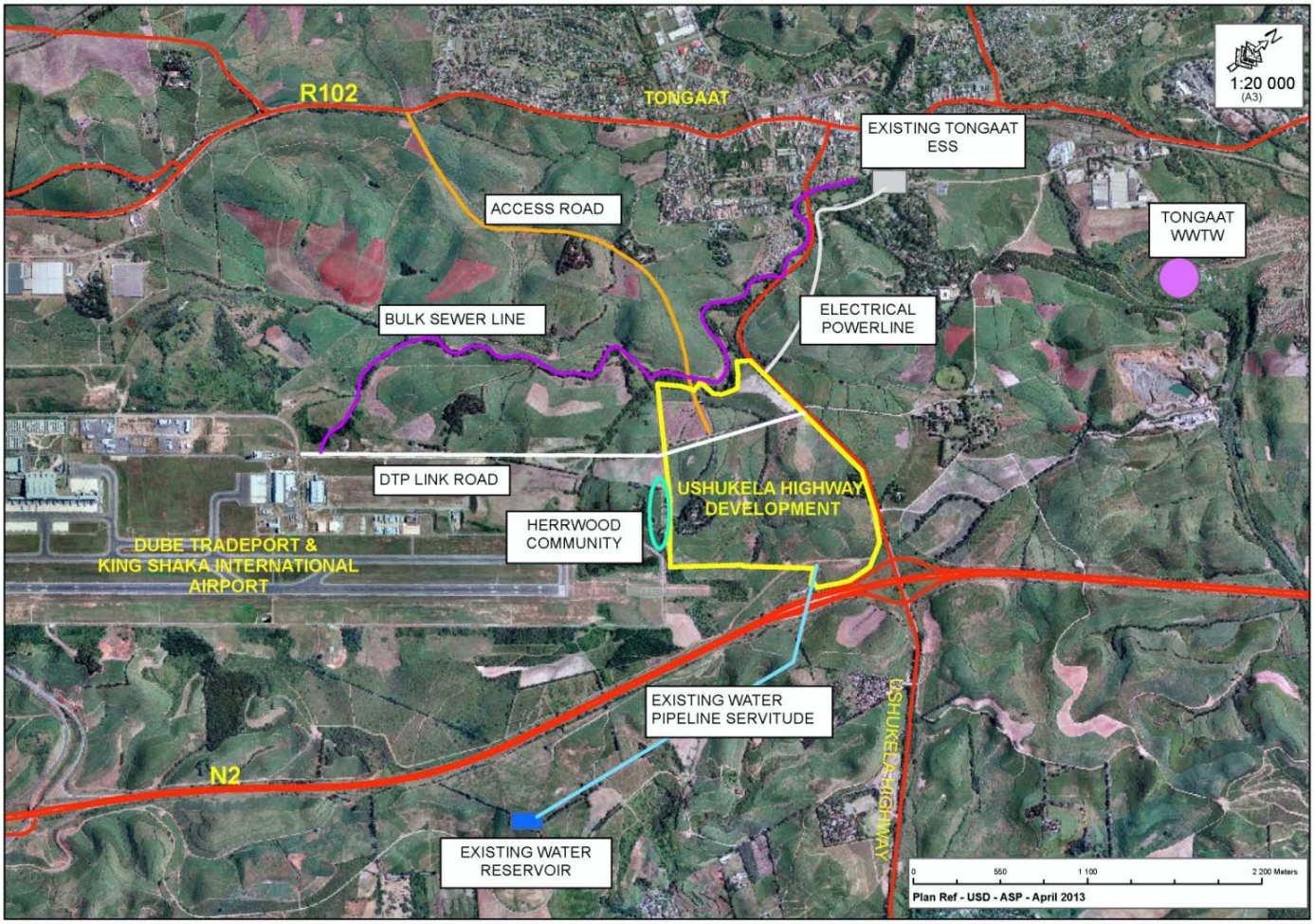
The site is to be rezoned from agricultural to business/light industry and is currently being used for commercial sugar cane farming. The west of the site is bordered by sugar cane

plantations and the Hlawe River, east by the N2 highway, south by the Herrwood Community and the KSIA and the north is bordered by uShukela Drive. Tongaat town is located approximately 600m to the west of the proposed site. Figure 3 below illustrates the development footprint, associated roads and other services.

The proposed water pipeline and new reservoir will be constructed in existing servitudes with the new reservoir located adjacent to an existing reservoir. The water pipeline crosses through various portions of properties owned by Tongaat Hulett (portions of Lot 77 No. 1523, Lot No. 1570 and portion 6 of Farm Klipfontein No.922.) The new reservoir is located on Farm La Mercy Reservoir No. 15692, which is owned by Umgeni Water. There will be a new access road connecting the proposed development with the R102. A section of an existing road, Brake Drive, will be upgraded and a new access road constructed linking Brake Drive with the DTP Link Road (white in Figure 3). The proposed access road traverses portions of Farm Klipfontein No. 922 and Farm Buffels Kloof No. 1267. South African National Road Agency Limited (SANRAL) own two portions of the land and have been notified of the proposed road upgrade.

Specific topographical details of the proposed site and a description of the existing environment are included under section 3 of the EIR.

Figure 3: Service map illustrating the location of the proposed uShukela Highway Development site (yellow), proposed water pipeline route (blue), new reservoir location (dark blue), the proposed access road (orange), the Herrwood Community (circled in green), the main roads (red), the Tongaat WWTW's and the bulk sewer line (purple). The electrical powerline and existing Tongaat ESS are shown in grey. The DTP Link Road is currently under construction.



1.3 Description of the Need and Desirability [Regulation 31 (2) (f)]

The new DTPC incorporating the KSIA not only provides for an increased number of passengers and direct international flights, but critically, a new trade and logistics gateway for Southern Africa. It is therefore important to ensure that this foundation and the associated significant investment that has been made is fully utilized and supported. The proposed development will significantly contribute to this existing platform that has been created and will provide critical mass over time towards supporting the ultimate freight handling capacities of the Dube TradePort. Furthermore, the development will also utilize and support the much needed new link road that is currently under construction between uShukela Drive and the Dube TradeZone.

With good visibility and accessibility to the major road networks, this development offers a wide range of opportunities from a potential expansion of the TradeZone to Business Park and service industrial opportunities, commercial as well as office park opportunities. The proposal is to develop, in support of the KSIA, industrial and manufacturing opportunities, business parks, warehousing and service industrial opportunities together with offices opportunities. There are also opportunities for the creation of a "Brain Port" which can be viewed as a hub of a high technology region with a network of companies, knowledge centres and service industries. It would rely on intensive and innovative co-operation amongst organisations in the sharing and developing of new ideas, concepts and technologies that lead to new inventions, production and sale of innovative products, services, systems and machines.

By the nature of the land uses proposed for this development i.e. Tradezone/ Light Industrial/ Logistics, the uShukela Highway development will result in job creation both in the short and long term. eThekwini also has a shortage of suitable land available for industry and business parks, as noted in the report prepared by Ken Davies in 2008 titled "The eThekwini Industrial/ Business Park Land Market and its Implications For The Planned Developments Of Moreland (Davies 2008) and the eThekwini Industrial Spatial Strategy (2009)".

Within the eThekwini Industrial Spatial Strategy (2009) a scenario is painted whereby eThekwini would become a modern and efficient international gateway city with world class intermodal transport/logistics capability including substantial freight handling capacity. Air freight is critical to the development of this vision. The local industrial market would more than double the present level, expanding strongly along the western and northern corridors beyond the municipal limits. DTP and Back of Airport would become an essential contributor to this level of growth and would underpin the City's status as a modern international trade gateway. Durban would become firmly entrenched as both a trade hub and a travel hub. This proposal forms part of such a vision and is therefore desirable in contributing to the process of achieving it.

The site is well located with regards to the existing road network and all bulk services will be in place. As such, the 135 hectare development will be able to come on stream very quickly. This also means that there will be no significant impact on servicing requirements by the Municipality (see section 3.1 of the EIR for more information). The proposed development area falls within the 55 LRDn noise contour, and as such is a suitable land use for the site. There is also no significant development (other than the airport) in close proximity to the site, and this combined with the fact that the land use proposed will be clean industry/logistics and business park uses, means that there will be minimal impact on the surrounding land by way of noise and pollution. The development will have positive socio-economic impacts as it will be creating jobs and contributing to the growth of the economy.

Transportation is detailed in section 3.1 of the EIR however it should be noted that primary access to the proposed development area will be via a road linking uShukela Highway to the TradePort access road. This road is shown as a key linkage in the Integrated High Priority Public Transport Network (C8) as well as a key local access road within the local area plan that is critical to the movement of freight to the Cargo terminal from surrounding industrial areas.

Another important point to consider is the importance of the compact city and nodal approach. This approach promotes the densification around nodes, from both a servicing cost perspective, and from an environmental protection perspective. This proposal falls in line with the desired compact city approach by densifiying development on land where it is appropriate i.e. in close proximity to a massive government investment in infrastructure in the form of the new airport and the TradePort, thus actually assisting in environmental protection and keeping servicing costs down.

The greater Tongaat region located just north of the KSIA has, for some time, been identified for new housing, investments, economic and employment opportunities. The development proposal aims to unlock some of these opportunities. The development will provide an alternative new product offering options for airport and TradeZone related activities and users which are not able to do boundary (leasehold) rental agreements within the airport site.

The uShukela Highway development furthermore offers the opportunity to extend the immediate "inner ring" of the emerging Airport City and Aerotropolis that is centred around the Dube TradePort and KSIA. This is significant in that the ability for an airport to grow and expand is one of the critical success factors for any such Airport City and Aerotropolis. The site's proximity to the airport will provide a natural, uninterrupted extension of the airport boundary and enable an integrated and holistic master plan development over time.

The Aerotropolis, being pursued by Provincial government as a fundamental new driver for regional economic growth and development is in its infancy but, as is evidenced globally, offers a significant opportunity to enhance and strengthen a region's competitive advantage and ability to attract much needed new investment and

development which will create new employment opportunities and new economic opportunities for the communities in the region.

At the heart of the Aerotropolis model is the need for an effective and efficiently functioning logistics gateway which the Dube TradePort provides but which must be supported by sufficient associated land for business and operational activities. The uShukela Highway Development goes a long way towards providing such ability.

Increasingly it is recognised that airports are generators of economic growth. This is based on new business realities (speed and agility; e-commerce; networks and supply chains; sell to anyone anywhere in the world; flexibility and customization; corporations increasingly operate internationally; higher value to weight ratios; Just-in-time; global sourcing and sales; built to order; customers won't wait; time is money). Within this context quick international access is critical. These drivers of international business have resulted in the role of airports changing dramatically from points of arrival and departure to leading urban growth generators often referred to as an Airport City or Aerotropolis. The purpose of an aerotropolis/airport regional development is to use public sector investment to leverage private investment into a configuration that yields enhanced business efficiency and competitiveness in the global arena, and in so doing yield maximum returns in terms of sustainable jobs, taxes and other public benefits. Spatially the aerotropolis development is characterised by distinct clusters and spines of aviation-linked business radiating outward from airport for up to 20 to km's. These clusters include both passenger and freight related activities such as logistics and business parks, time sensitive and high value, light weight product, manufacturing and repair, information and communications technology complexes, air-intensive and air-related office, research, education and health related activities, convention and exhibition facilities, hotels and residential, wholesale and retail, leisure and entertainment developments where people can live, work and recreate. The proposed development considered in this report forms one such cluster along the northern access spine from the Cargo and Passenger terminals.

The recently held BRICS Summit in Durban saw two strategic partnerships being formalised between the KZN Provincial Government and Indian and Chinese companies both of which are directly related to the airport and aerotropolis opportunities around industrial and office activities. One fundamental shortcoming highlighted at the Summit is the current lack of zoned, industrial land, especially within the aerotropolis and this development will at least provide some opportunities in this regard.

The investments being made and to be made into infrastructure including the DTP Link Road and bulk sewer will also be able to be fully utilised and the returns on investment maximised. This is a critical component in a context of ever increasing pressure on less and less available resources.

The development proposal is in line with the Provincial Growth and Development Strategy and Plan as well as the eThekwini Municipality IDP and Spatial Development Framework and Local Area Plan (discussed further in section 4.1.1). There is therefore a large degree of planning certainty and guidance which provides a clear indication of the intentions for the site.

1.4 Purpose and Structure of this Report

The Environmental Impact Assessment (EIA) process is a planning tool that assists with the assessment of social, economic and environmental impacts through independent specialist input and public participation. The role of the Environmental Assessment Practitioner (EAP) is to provide independent specialist input, manage the public participation and consolidate all relevant information culminating in the EIR and Environmental Management Programme (EMPr) [Regulation 32 (2) (o)].

The purpose of the EIR is to assess environmental impacts as identified during the scoping phase and illustrate significance according to the extent, intensity and duration, taking into account specialist input and Interested and Affected Parties (I&APs) comment. All of this is done with the intent of making recommendations to reduce or avoid the negative impacts of the proposed development. Ultimately a statement on whether or not the project should go ahead is made (section 9). Another important function of the EIR is the inclusion of an EMPr. The EMPr is a document where the findings of the EIR have been translated into measurable actions that must occur during construction and operation in order to mitigate identified environmental impacts. The EMPr (Appendix 24) is intended as a stand-alone, public document that becomes legally binding should the EIA be approved and the activity go ahead.

This EIR has been structured according to the requirements of the NEMA (107 of 1998) EIA 2010 regulations. The proposed project is subject to a two phase EIA. The initial Scoping Report was completed in 2011 with this EIR being compiled for the second phase of the assessment process. Section 1.5 below provides an overview of the scoping process indicating key issues that were identified, raised and investigated. Through each of the following

sections leading up to the table of assessment of impacts in section 6.2, impacts that have been identified have been highlighted in *italics* to ensure that all impacts have been included in the table for assessment. Where specific issues for assessment have been newly identified as a result of specialist report reviews or due to further investigation, these have been added to the impacts identified in the scoping phase and are shown in the table in section 6.2 in purple.

In section 3.0 the development proposal including associated aspects such as management of stormwater, sewage, water and electricity supply as well as traffic impacts are described and discussed. Once again potential environmental risks identified in each section are listed for review and assessment in section 6.2. Section 4.0 describes the environment of the site in terms of physical, biological, social, economic and cultural characteristics. Throughout this section, potential environmental risks are identified for further assessment and rating under section 6.0. Valuable independent specialist input is also provided in this section to enable the EAP and authorities to make an informed decision on the proposal.

Public participation carried out during scoping is included in section 5.0 and comments raised are discussed throughout the report in the relevant sections. In section 5.4, the reader is directed to the comments and responses tables which are provided in Appendix 25.9. Section 6.0 commences with the identification and assessment of issues and impacts, identifying the underlying principles used to determine the importance of certain impacts identified and how these are rated once the mitigation measures have been taken into account.

Finally the report concludes by identifying assumptions gaps and uncertainties in terms of information used in the assessment (section 8.0), ending with an Environmental Impact Statement intended to summarise significant impacts (section 9.0) with the conclusion and opinion on authorisation provided in section 10.0. A copy of the specialist reports has been included in volume two of the EIR.

1.5 Summary of Scoping Process

The final scoping report was submitted to the national Department of Environmental Affairs (DEA) on 09 February 2011. The DEA accepted the report on 13 April 2011. Due to the potential impact the development could have on the wetlands on the site and associated consultations with the wetland specialist, the submission of the draft EIR has been delayed. This delay has been essential in creating a sustainable layout option for the proposed development where both development and environmental considerations have been met. Confirmation that the project was still active was sent to the assessing officer on 19th December 2011, 15th November 2012 and the 14th May 2013. Since the Scoping Report was accepted, specialists have been commissioned by the applicants to compile relevant reports and have been reviewed by the EAP. The specialist reports are summarised in section 3.0 and 4.0 of the EIR.

Below is a summary of the process followed to date:

EIA PROCESS

The current application is undergoing a full Scoping and EIR and as such the following steps have or will be followed:

An application form was submitted to the National Department of Environmental Affairs (DEA) on the 20 August 2010.

The application has been advertised in a local (North Coast Courier) and regional newspaper (Isolezwe) on the 22nd September 2010 and notices were place around the site on the 21st September 2010. Notices were handed out to adjacent neighbors on the boundary of the site on the 21st September. The advertised public meeting was held at the Tongaat Town Hall on the 13th of October 2010. At the public meeting a concern was raised regarding the distribution of the local newspaper with Tongaat Town. Notice of Application was re-advertised in the Coastal Weekly Newspaper on the 4th November 2010.

The scoping report and plan of study for EIR was compiled detailing impacts to be investigated. This was made accessible to all registered I &APs and to the authorities for comment and review on the 19 November 2010.

I&AP Input

I & APs were requested to provide comment within 40 days. All comments received were included in a final Scoping Report which was submitted to DEA for approval on the 09 February 2011.

DEA approved the final scoping report on the 13 April 2011.

Current status

KSEMS proceeded with the draft EIR which has been submitted to all I&APs and authorities for review on the 08th July 2013. This report assesses the impacts identified during the scoping phase and investigates mitigation measures.

I&AP Input

Once the 40 day comment period ends on the 19th August 2013, all comments received will be considered and responded to with the final EIR being submitted to the DEA for environmental authorisation or rejection.

1.6 Key Amendments / Clarification of Information Provided in Scoping Report

The following key amendments or clarifications of information provided during the scoping phase should be noted:

Due to the size and requirements of the development the Engineering Services Report (discussed fully in section 3.1) it was concluded that a new water reservoir and associated pipes are required. The new reservoir will be on the same site as an existing reservoir and the pipes will run within the existing servitudes. Please refer to Figure 3 above, where the water reservoir and pipes have been included in blue..

To accommodate for the increase in open space, there has been a reduction in area of bulk from 536 000m^2 to approximately 431 000m^2. After discussions with the Department of Transport (DoT), a new road access link from the R102 into the site has been proposed with the removal of the previously 2nd proposed access road onto uShukela. Please refer to Figure 1 above for more detail on the revised layout. The Traffic Impact Assessment and recommended road upgrades are detailed in section 3.1.1 below. Figure 4 below provides for a visual depiction of the key roads affected by the proposed uShukela Highway Development.

The newly proposed access road, water pipeline and reservoir were originally not included in the description of the proposed activity in the Scoping Report as these two activities were identified in the Engineering Service Report during the EIR phase. An amendment to the original application form was therefore submitted in May 2013 to include the new portions of land that will be crossed. These portions of land have been discussed in more detail in section 1.2 above. Whilst Tongaat Hulett owns the majority of all the land, two new landowners were notified of the proposed activities. These land owners are the South African National Road Agency Limited (SANRAL) and Umgeni Water. Proof of notification was attached to the amended application form and the landowners included in the Interested and Affected Parties (I & APs) register. The impact of the access road, water pipeline and reservoir has been included in this EIR and construction of these services will be required to adhere to the attached EMPr (Appendix 24).

The construction of the water reservoir has triggered an additional activity listed in Government Notice No. 544 of 18th June 2010 (activity 12): "the construction of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000m^2 or more". The activity has been included in Table 7 and is highlighted in bold.

Responding to queries raised at the public meeting held on 13 October 2010, socio-economic impact assessments were undertaken by the relevant specialists (Urban-Econ: Development Economists and Ghabisa Planning and Investments). The reports outline how the proposed development will fit into the Tongaat Business Economy as well as discussing site-specific socio-economic impacts. The report is summarised further in section 4.0 of the EIR and all socio-economic reports are attached as Appendices 18 through 21.

Initially, there was the potential to incorporate a Petrol Filling Station into the design of the proposed development. Although the market feasibility report concluded that it would be feasible and would not significantly impact the neighbouring petrol filling stations, the applicants have decided to negate the incorporation of the facility into the updated layout until the development has been put to the market to confirm the most appropriate location. Using the Western Cape Department of Environmental Affairs and Development Planning (DEA & DP) guidelines, layout alternatives 3 and 4 outlined in the Scoping Report have been excluded. A full discussion of alternatives is included in section 7 of the EIR. A future application for a petrol filling station on a specific site within the development should not be precluded.

2.0 Legislation and Guidelines Considered in Developing this Environmental Impact Report

The following sub-sections contain a list of relevant legislation, guidelines and regulations that were consulted during the EIA process.

2.1 Legal Requirements and Legislation

This section aims to provide an overview of the key legal requirements that apply to the proposed development. Legislation will be addressed in terms of its relevance to environmental protection and conservation, water use and protection, health and safety, waste management, noise management, as well as the activities requiring an impact assessment under the National Environmental Management Act 107 of 1998 (NEMA) regulations.

2.2 Environmental Protection and Conservation

Environmental legislation provides for the effective protection and controlled use of the environment and its services. Although development is seen as key to economic growth, it has the potential to negatively impact the environment through altering biological functions and affecting fauna and flora. Table 1 provides a list of applicable legislation to the proposed development in terms of environmental protection and conservation.

Table 1: List of Legislation Key to Environmental Protection and Conservation.

National Environmental Management Act, 1998	This Act places an onus on all levels of government to ensure that risk to the environment is identified and where it cannot be avoided, is minimised and mitigated against. Should there be any impact on the environment during or after construction, DTPC and THD, as the responsible parties, have a responsibility to take measures to address these impacts and undertake the necessary clean up and mitigation measures. There are natural areas such as the Hlawe River and wetland habitats on the site that need to be protected. Mitigation measures are required to be implemented to ensure that these resources are protected.
National Environmental Management: Biodiversity Act, 2004	The Act lists critically endangered, vulnerable and protected species. Historically the site was comprised of habitats typical of the KZN Coastal Belt (endangered) however 85% has been transformed to sugarcane and the remaining indigenous vegetation is limited to isolated patched along the drainage lines and river. Please refer to section 4.3.1.1 for a summary of the specialist's

	ecological report.
National Heritage Resources Act, 1999	The Act provides protection of and management of conservation worthy places, areas and objects by heritage authorities, by means of registration and the implementation of certain protections. A heritage impact assessment has confirmed that there are currently two existing dwellings on site that are of heritage significance. The impact of the development on the heritage resources are assessed in section 4.5.1 of the EIR.
Environment Conservation Act, 1989	The act empowers government authorities to prohibit any action which, in their opinion, may cause serious damage to the environment, or to instruct responsible parties to any take steps that they deem fit to remedy or rectify the situation. The Act also provides for declaration of conservation areas and protected natural environments.
Conservation of Agricultural Resources Act, 1983	The Act contains measures for the prevention of soil erosion, the development of soil conservation schemes, the protection of wetlands and associated vegetation, the utilisation and protection of the veld, the prevention of the spread of declared weeds and invader plants and grazing management. During both the construction and operational phase of this development provision has been made for the protection of wetland areas and removal of declared weeds and alien invader plants. An Agricultural Potential Assessment was carried out to examine the transformation of viable agricultural land to a commercial land use. The significance of this impact is outlined in section 4.2.5.
National Forests Act, 1998	The Act prohibits the destruction of natural forests as an ecosystem. An emergency procedure is included to protect trees threatened with immediate harm. In KZN, the Act is supplemented by the Policy Guidelines for Development Affecting Natural Forests in KZN and the Memorandum of Understanding signed between the former Departments of Water Affairs and Forestry, Agriculture and Environmental Affairs and Ezemvelo KZN Wildlife to give effect to the guideline document. There are a number of indigenous tree species located on the site; however these are mainly restricted to the drainage lines and areas immediately adjacent to the existing dwellings. Provision has been made for the inclusion of the majority of these trees within the open areas on site. However, should there be a requirement to remove or damage any of these trees the necessary permits will need to be obtained. Section 4.3.1.1 refers to the vegetation on site.
Natal Nature Conservation Ordinance (No. 15 of 1974)	The aim of this Ordinance is to consolidate laws relating to nature conservation and to provide for matter incidental thereto. Chapter XI on indigenous plants is subject to the

	provisions of the Forest Act. As per specialist recommendations, although the two species are widespread and common an application may be required to be submitted to Ezemvelo KZN Wildlife for the removal and/or relocation of *Drimiopsis maculata* and *Scadoxus puniceus* as they are protected under this Natal Nature Conservation Ordinance.
Relevant International Environmental Conventions	
Kyoto Protocol to the United Nations Framework Convention on Climate Change	Requires developed country signatories to implement and/or further elaborate policies and measures in order to achieve quantified emission limitation and reduction commitments in order to promote sustainable development. The proposed development will be centred around sustainable principles including the potential for Green buildings, "green" infrastructure, rehabilitated and managed open space, which will contribute to an overall reduction in the carbon footprint of the proposed activity.
Bonn Convention on the Protection of Migratory Species of Wild Animals	The Convention aims to conserve terrestrial, aquatic and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the guidance of the United Nations Environment Programme. It is concerned with the conservation of wildlife and habitats on a global scale and the need to take steps to prevent them from becoming endangered. It is acknowledged that a significant population of migratory birds (Barn Swallows) are located in the Mount Moreland area south of the KSIA. The avifaunal specialist findings and recommendations are outlined in section 4.3.1.2 of the EIR.
Paris Convention for the Protection of the World Cultural and Natural Heritage	Imposes an obligation on State Parties to ensure that effective and active measures are taken for the protection, conservation and presentation of the cultural and natural heritage situated on its territory. The heritage resources identified on site by the heritage specialist will be managed in accordance with the recommendations in the report (Appendices 22 and 23). During construction, should any artefacts or buildings of historical significance be discovered, these will be managed according to the National Heritage Resources Act, 1999.

2.3 Water Use and Protection

According to the Department of Water Affairs (DWA), water in South Africa is viewed as a national asset. In global terms, South Africa's water resources are scarce and extremely limited, and poor spatial distribution of rainfall means that the natural availability of water across the country is also highly uneven. However, provided South Africa's water resources are judiciously managed and wisely allocated and used, sufficient water of appropriate quality will be available to sustain a strong economy, high social standards and healthy aquatic ecosystems for many generations. Legislation such as the National Water Act of 1998, provide regulations to govern the use, management and protection of water. Table 2 provides a list of legislation that applies to the proposed new development in terms of water use and protection.

Table 2: List of Legislation Key to Water Use and Protection.

Legislation	*Description*
National Water Act, 1998	Aims to ensure that water resources are protected, used, developed, conserved, managed and controlled in a sustainable manner, for the benefit of everyone in South Africa. Section 19 includes various requirements to prevent and control water pollution. Water use is defined broadly and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities, altering a water course and removing water from underground. Unless the water use is for basic human needs, is an existing lawful use or is permitted under general authorisation, it must be licensed. Given that there will be a variety of tenants operating on the site, duty of care must be undertaken to ensure that measures are in place to reduce the velocity of stormwater runoff and ensure that no contaminated runoff is allowed to flow into the adjacent Hlawe River. A section 21 Water Use License will be required for the development encroaching into the wetlands. The regulations relating to the requirements for a Water Use License are discussed in Table 8.
National Water Resources Strategy, 2004	Describes how the water resources of South Africa will be protected, used, developed, conserved, managed and controlled in accordance with the requirements of the National Water Policy and the National Water Act. The water resources (wetlands, drainage line, and Hlawe river) in and around the proposed sites must be protected. Retention of portions of these water resources is required to ensure that these areas are sufficiently protected.

2.4 Health and Safety

Regulations in terms of the Occupational Health and Safety Act, 1993, address the health and safety of the employer and workers during both construction and operation of the proposed development. Table 3 provides a list of legislations that apply to the proposed uShukela Highway Development in terms of health and safety.

Table 3: Health, Safety and Major Hazardous Installations Regulations.

Legislation	*Description*
Occupational Health and Safety Act, 1993	Main objective is to provide for the health and safety of persons at work, including aspects which are hazardous to health and safety. In terms of major hazardous installation, the regulations shall apply to employers, self employed persons and users, who have on their premises, either permanently or temporarily, a major hazard installation or a quantity of a substance which may pose a risk that could affect the health and safety of employees and the public. During both the construction and operational phase of this development all the requirements of Occupational Health and Safety Act 1993 will need to be adhered to.

Hazardous Chemical Substance Regulations, 1995	These regulations stipulate requirements for storage and handling of hazardous chemical substances and provide guidelines for training of staff. Any hazardous chemical substances used during construction must be identified, stored used and disposed of in accordance with this legislation.
Environmental Regulations for Workplaces, 1987	These regulations specify optimal working conditions for staff including thermal conditions, illumination requirements, requirements for ventilation; noise levels etc and also specify requirements for housekeeping.
General Administrative Regulations, 2003	These regulations stipulate the administration of the various Occupational Health and Safety regulations incusing designation of health and safety committees, reporting and recording of incidents and occupational diseases.
Construction Regulations, 2003	These Regulations apply to any persons involved in construction work and are therefore applicable to the construction phase. The regulations provide guidelines for safe operation during construction.

2.5 Noise Management

There is a potential for the generation of noise during both the construction of the proposed business, industrial and logistics park. Additionally, the proposed development is adjacent to an operational airport and therefore must take cognisance of the cumulative noise levels that will impact on the development itself. The Environment Conservation Act of 1989 has included a regulation pertaining to noise management. Table 4 lists this regulation and other by-laws which apply to the current project in terms of noise management.

Table 4: Legislation Applicable to Noise Management.

Legislation	Description
Environment Conservation Act, 1989	The Act outlines general prohibitions for noise control. It is also specifies noise management during construction. Specifically section 3(i) states that no person shall use any power tool or power equipment for construction, earth drilling or demolition works, or allow it to be used, in a residential area during the following periods of time: (i) Before 06:00 and after 18:00 from Monday to Saturday; and ii) at any time on any Sunday, Good Friday, Ascension Day, Day of the Covenant and Christmas Day, or any other day as may be determined by a local authority; The provisions of the regulations may not apply if any person may by means of a written application, in which the reasons are given in full, apply to the local authority concerned for exemption from any provision of these Regulations.
eThekwini Municipality by-laws (General By-laws)	The by-law outlines actions that may be viewed as a nuisance. Specifically, Section 3 states: 3.1.1 (1) A person commits an offence if in a street or public place or on premises he by act or omission causes or creates a nuisance or allows a nuisance to arise or exist in circumstances which are under his control; provided that the a foregoing shall not apply to the extent that a person acts lawfully in the exercise of

	a right or in the performance of a duty. 2. Without limiting the generality of the provisions of subsection (1) the following shall constitute nuisances thereunder: (a) the reproduction of noise or vibration which arises from or is caused by the operation or use of equipment or machinery.
National Standards (SANS10103:2003)	Specifies the maximum ambient noise level acceptable in various land use type zones.
Noise induced Hearing Loss Regulations 2003	These regulations specify safe working conditions in environments where noise levels exceed safe levels and gives guidelines for assessment of noise, training measures, provisions of information to staff etc.

2.6 Air Quality Management

There is a potential impact on air quality during both the construction and operational phase of the development. There is also the potential cumulative impact on air quality given the emissions released by both vehicles and aeroplanes that service the KSIA south of the proposed development; this impact is governed by the Air Quality Act of 2004. Table 5 lists the legislation and provides a description of the act.

Table 5: Air Quality Management Legislation

Legislation	Description
National Environmental Management: Air Quality Act, 2004	Aim is to reform the law regulating air quality in order to protect and enhance the quality of air in the South Africa. The potential cumulative impact of this development on air quality will need to measured against the standards outlined in this act.

2.7 Waste Management

During construction and operation, the production of wastes, either liquid, solid or and/or hazardous, will require that they be adequately disposed of. To regulate waste disposal and management several legislations and regulations have been formulated. Table 6 provides a list of these as well as a short description.

Table 6: Legislation for waste management which applies to the current project

Legislation	Description
Environment Conservation Act, 1989	Section 31A provides that the Minister of Environmental Affairs or the Administrator, local authority or government institution concerned may take specified action if any person performs any activity or fails to perform any activity as a result of which the environment is or may be seriously damaged. Section 20(6) of the Act states that, subject to the provisions of any other law, no person shall discard waste or dispose of it in any manner, except at a disposal site for which a permit has been issued, and in a manner or by mean of a facility or method and subject to such conditions as the Minister may prescribe. All waste generated during both the construction and operational phase of the development must be disposed of appropriately and is outlined in the EMPr.

National Environmental Management Act, 1998	Outlines principles that serve as the general framework within which environmental management and implementation plans must be formulated: "4 (iv) that waste is avoided, or where it cannot be altogether avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner;" The proposed development will be centred around sustainable principles including the potential for Green buildings, "green" infrastructure, rehabilitated and managed open space, such initiatives will include the basic waste management principles such as reduce; reuse and recycle.
National Environmental Management: Waste Act (Act No.59 of 2008)	To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; institutional arrangements and planning matters; national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; the licensing and control of waste management activities; the remediation of contaminated land; the national waste information system and to provide for compliance and enforcement measures. The proposed development must comply with the requirements of this Act in terms of the waste management on site. The regulations relating to the requirements for a waste license are discussed in Table 8.
eThekwini Municipality by-laws (Solid Waste By-law)	The By-law specifies the appropriate management, removal and control of solid, hazardous and industrial waste. These requirements will need to be adhered to in both the construction and operational phase of the development.

2.8 Environmental Impact Assessment

NEMA (107 of 1998) requires that the potential impact on the environment, socio-economic conditions and cultural heritage of activities that require authorisation or permission by law, and which may significantly affect the environment must be considered, investigated and assessed prior to implementation. The proposed new uShukela Highway Development is undergoing a full scoping and EIR assessment. NEMA regulations specify which activities require environmental authorisation prior to construction. The activities which apply to the current project and for which environmental authorisation is being sought are listed in Table 7 below.

Table 7: List of activities requiring impact assessment identified for the proposed uShukela Highway Development project.

Government Notice No.	Activity No(s)	Description
Government Notice No. 545 of 18th June 2010	15.	*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:*

		i) linear development activities; or *ii) agriculture or afforestation where activity 16 in this Schedule will apply.* The proposed site is 137ha of undeveloped land. It is the applicants' intent to develop the area for the purpose of light industry, warehousing, business park, trade zone and offices.
Government Notice No. 545 of 18th June 2010	3.	*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 metres.* Depending on the tenant composition of the proposed office and business park, there may be a requirement to store in excess of 500m^3 of hazardous materials on the site.
Government Notice No. 545 of 18th June 2010	8.	*The construction of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex.* The proposed development requires the upgrading and construction of additional electrical infrastructure to support the new land use.
Government Notice No. 545 of 18th June 2010	18.	*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,-* *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 metres; or* *iv) the road will cater for more than one lane of traffic in both directions.* Multiple access roads will be required to service the proposed development.
Government Notice No. 544 of 18th June 2010	9.	*The construction of facilities or infrastructure exceeding the 1000 metres in length for the bulk transportation of water, sewage or stormwater-* *i) with an internal diameter of 0.36 metres or more; or* *ii) with a peak throughput of 120 litres per second or more,* *Excluding where:* *a. such facilities or infrastructure are for bulk transportation of water, sewage or stormwater drainage inside a road reserve; or* *b. where such construction will occur with urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.* Infrastructure relating to stormwater control and management of sewage will be required to support the proposed development. A water reservoir (to be built on an existing reservoir site) and associated pipeline will extend from the east of the site and run along an existing servitude.

Government Notice No. 544 of 18th June 2010	10.	*The construction of facilities or infrastructure for the transmission and distribution of electricity-* *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.* Infrastructure relating to electrical distribution will be required.
Government Notice No. 544 of 18th June 2010	**12**	***The construction of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000m^3 or more.*** A new water reservoir is required to service the uShukela Highway Development. It will be constructed adjacent to the existing La Mercy Airport reservoir and is discussed in more detail in section 3.1 of the EIR.
Government Notice No. 544 of 18th June 2010	22.	*The construction of a road, outside urban areas,* *i) with a reserve wider than 13.5 metres or,* *ii) where no reserve exists where the road is wider than 8 metres, 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.* Multiple access roads will be required to service the proposed development.
Government Notice No. 544 of 18th June 2010	11.	*The construction of:* *i) canals;* *ii) channels;* *iii) bridges;* *iv) dams;* *v) weirs;* *vi) bulk stormwater outlet structures;* *vii) marinas;* *viii) jetties exceeding 50 square metres in size;* *ix) slipways exceeding 50 square metres in size;* *x) building exceeding 50 square metres in size;* *xi) infrastructure or structures covering 50 square metres or more* *Where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.* The proposed development will require the construction of bulk stormwater outlet structures and/or infrastructure within 32 metres of a watercourse, measured from the edge of a watercourse.
Government Notice No. 544 of 18th June 2010	18.	*The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from:* *i) a watercourse;* *ii) the sea;* *iii) the seashore;* *iv) the littoral active zone, an estuary or a distance of 100m inland of the high-water mark of the sea or an estuary, whichever distance is the greater-*

		but excluding where such infilling, depositing, dredging, excavation, removal or moving *i) is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority;* *ii) occurs behind the development setback line.* The construction phase of the development will require the infilling or depositing of material of more than 5 cubic metres into a watercourse (i.e. wetland).
Government Notice No. 544 of 18th June 2010	37.	*The expansion of facilities or infrastructure for the bulk transportation if water, sewage or stormwater where:* *a) the facility or infrastructure is expanded by more than 1000 metres in length; or* *b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more-* *excluding where such expansion:* *i) relates to transportation of water, sewage, or stormwater within a road reserve; or* *ii) where such expansion will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.* The expansion of infrastructure for the bulk transportation of water, sewage and stormwater will be required for this development.
Government Notice No. 544 of 18th June 2010	38.	*The expansion of facilities for the transmission and distribution of electricity where the expanded capacity will exceed 275 kilovolts and the development footprint will increase.* The proposed development may require the expansion of existing infrastructure for the distribution of electricity.

2.9 Mitigation of Environmental Impacts

Section 28 of NEMA (107 of 1998) places a duty of care on every person who causes, has caused or may cause pollution or degradation of the environment to take responsible measures to prevent, minimise and rectify such pollution or degradation. Such measures may include the investigation, assessment and evaluation of the impact on the environment; informing and educating employees about the environmental risk of their work and the manner in which the task must be performed to avoid causing significant pollution or degradation of the environment; modifying or controlling any activity causing the pollution or degradations; containing or preventing the movement of pollutants or the cause of degradation; eliminating any source of the pollution or degradation; or remedying the effects of the pollution or degradation.

In terms of the Section 19 of the National Water Act of 1998, the owner of land, person in control of land or person who occupies or uses any land in which any activity or processes performed or undertaken which causes or may cause pollution a water source, must take all reasonable measures to prevent such pollution from occurring, continuing or recurring. Such measures may include modifying or controlling the act or process causing the pollution; complying with any prescribed waste standards or management practice; containing or preventing the movement of pollutant; eliminating any source of the pollution; remedying the effect of the pollution; and remedying the effect of any disturbance to the bed and banks of a water course.

2.10 Permit Requirements

Table 8 summarises the permits and authorisations that will be required for the construction of the proposed development. Only permits pertaining to the environmental impact assessment of the current project are included in this section.

Table 8: Permit and authorisation requirements for the proposed uShukela Highway Development.

Permit/Authorisation	Description
General Environmental Authorisation	Authorisation required under regulations GNR 545 and GNR 544 of the 18th June 2010 in terms of the National Environmental Management Act 1998. In the current project, authorisation will be issued by the national Department of Environmental Affairs.
Water Use Licence in terms of Section 21 of The National Water Act, 1998 (No 36 of 1998)	In terms of section 21 of the National Water Act, the proposed development will require a Water Use License for: 1. Impeding or diverting the flow of water in a watercourse [s21 (c)] 2. Disposing of waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit [s21 (f)] 3. Altering the bed, banks or characteristics of a watercourse [s21 (i)]
Abstraction of Water	A permit is required from the Minister of Water Affairs and Forestry for the abstraction of water from a public stream in excess of 50 000 cubic metres a day if this is required during construction. If water is to be abstracted from the river of which the rights of use belong to private landowners, it will be necessary to establish whether their water user rights are still valid in terms of the provisions of the National Water Act, negotiate with relevant landowners and then to obtain a permit from DWA in terms of Sections 21, 40 and 41 of the National Water Act (No 36 of 1998).
Protected Plants	In terms of the KZN Nature Conservation Ordinance 17 of 1974, under schedule 12, an application may be required to be submitted to Ezemvelo KZN Wildlife regarding the removal and/or relocation of two herbaceous species present on the site, *Drimiopsis maculata* and *Scadoxus puniceus*. Please refer to section 4.3.1.1 for more details of the vegetation on site.
Protected Plants	In terms of section 15 (1) of the National Forest Act, 1998, *Barringtonia racemosa* (Powder Puff Tree) was declared a protected species in 2007. A license would therefore be required to cut, disturb, damage, destroy or remove this protected tree.
Waste Disposal	Domestic and other wastes generated during the construction of the project may be disposed of to appropriately licensed sites in terms of section 20 of the Environment Conservation Act, 73 of 1989. Relevant provincial legislation must be taken note of in this regard.
Graves and Archaeological Sites	Before any grave or archaeological site is damaged or destroyed by construction of the proposed business and office park a permit must be obtained from the South African Heritage Resources Agency (Section 38.1 of the National Heritage Resources Act). The Heritage Impact Assessment identified one grave adjacent to the proposed site, which will require a permit should it be disturbed by construction activity or removed.
Application for additions, alterations or demolition	In terms of the KwaZulu -Natal Heritage Act No.10 of 1997 (Section 26 (1)(a), a permit is required prior to demolition or alteration of any structure or part thereof which is older than 60 years. The Heritage Impact Assessment identified two structures older than 60 years old on the site. A permit for the destruction and/or alteration of these structures will be submitted to AMAFA for approval.

3.0 Proposed Activity

Section 3 provides a detailed description of the activity in terms of the bulk services that are currently available and what will be required. Potential environmental risks have been identified and are included in italics below the descriptions. These risks have been summarised in Table 10 in section 6 of the EIR. A comparison of all proposed alternatives is also provided in this section. The alternative comparison includes the effect that the identified alternatives may have on the environment and the surrounding communities.

The majority of the development (85%) will take place on existing cultivated farmland. The area is relatively undulating with a number of small tributaries mainly draining into the Hlawe River, a tributary of the Tongati River[2]. The site can be divided into two sub-catchments: one draining north and the other west. A smaller sub-catchment drains to the east which eventually links up to the northern wetland. The delineation, functionality and impact of the development on the wetlands are described in section 4.2.3. The underlying geology of the site can also be divided into two main sections with Berea Red Formation existing in the eastern section of the site and Vryheid Formation Siltstones/Sandstone underlying the western portion[3]. The findings of the Geotechnical Investigation are discussed in more detail in section 4.2.1.

There are two estate residences that are currently within the development footprint. These include the old Estate Mangers house in the north and the Saunders Residence to the south (both within the THD owned portions of the site). The uShukela Highway Development will incorporate the Saunders Residence into the layout design however alterations may be made to the building. The Estate Managers house will be required to be demolished entirely. A phase two heritage impact assessment has been commissioned to describe the historical and architectural significance of the buildings. The initial heritage impact assessment is summarised in the subsequent section.

Identified environmental risk for assessment: likely increase in storm water runoff from the change in land use from agricultural to commercial.

3.1 Bulk Services

In this section the services required for the proposed development are outlined. Preliminary Engineering Services Reports (ESR) were prepared by Stemele Bosch Africa (Pty) Ltd with a more detailed report being conducted in March 2013 (all reports included in Appendix 2). The reports outline the existing bulk services available in the area, the requirements to serve the development and proposals for the provision of these services. The services identified include the use and upgrade of roads, stormwater control, sanitation, water, electricity and solid waste. In order to provide a more detailed investigation on certain services in the area, additional specialists were commissioned to report on their specific area of expertise. The additional specialist studies include details on the roads/traffic (Aurecon), stormwater (Stemele Bosch Africa Africa) and electrical (Bosch Projects) services.

The sections below are dedicated to each of the bulk services required. Findings from the specialist ESR are included in the sections and where the additional specialists have provided input; their reports have also been included in the summary.

3.1.1 Traffic and Roads

The ESR noted that access to the development can be obtained from uShukela Drive (north of the proposed development, as illustrated in Figure 4 below), which has been approved by the KZN Department of Transport. The road is a provincial main road and is currently comprised of a single carriageway in each direction. The Traffic Impact Assessment, conducted by Aurecon in December 2012 was commissioned to determine, amongst other things, the need for increasing the capacity of the uShukela road and intersections. The main access road will traverse the site and will be the spine road linking uShukela Drive to the Dube TradePort and KSIA. This road was granted environmental authorisation and is currently being constructed. The roads will be surfaced with pavement structure designed to accommodate heavy vehicles.

A secondary access will also be ultimately required. This access will be from the existing R102 just south of the town of Tongaat and will utilise an existing dirt road (Brake Drive) which provides access to a number of smallholdings/residences and an institutional facility (see Figure 3 for the proposed new road layout). **This access will only be required once the development has reached a certain threshold and may be superseded by the development of the Eastern Arterial**, a municipal high order route that is part of the eThekwini Municipality Local Area Plans.

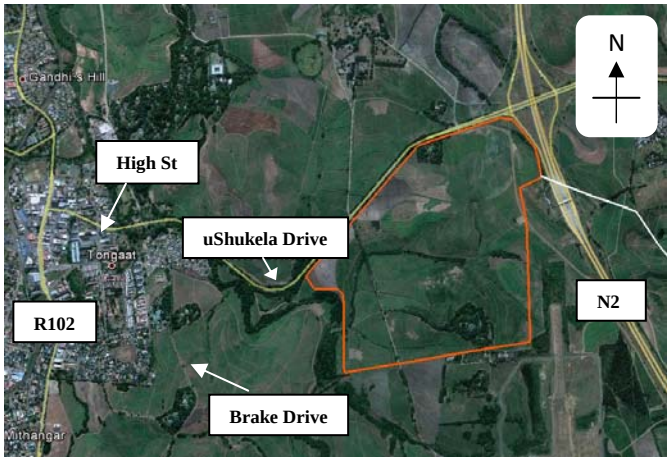
[2] Wetland Consulting Services, *Watson Highway Light Industrial and Office Park Development Site: Wetland and Riparian Assessment Report* (2010).
[3] TGC Engineers, *Preliminary Geotechnical Investigation Report for Watson Highway Commercial and Residential Development* (2009).

It is noted that access provision for the existing Herrwood Community has been provided in the layout and hence there is no change to the status of those properties. Internal roads will be single or dual carriageway as determined by the Traffic Impact Assessment and designed to accommodate heavy vehicles. A typical cross section of the internal roads is illustrated in Annexure 2 of the ESR (Appendix 2). The drawing shows the incorporation of the grass swales and shallow rooted trees adjacent to the road.

3.1.1.1 Summary of Findings of Specialist Traffic Assessments [Regulation 31 (2) (j)]

A Traffic Impact Assessment was conducted by Aurecon in December 2012 to determine the existing levels of services on the surrounding road network, determine and quantify the impact of the additional traffic generated by the proposed development, propose mitigation recommendations and upgrades, evaluate the geometric design requirements, consider all future planning for the study area and liaise with the relevant stakeholders to ensure integrative planning for the area (Appendix 3).

Figure 4: Aerial photograph illustrating associated roads effected by the proposed activity.



The development has the potential to generate high traffic volumes with access to the site being constrained by the KSIA and Dube TradePort in the south, the Hlawe River in the west and the N2 freeway in the east. This resulted in the planning of two access roads off uShukela Drive (previously Watson Highway). KZN DoT however agreed to only permit one access intersection on uShukela Drive, the western one.

A number of pre-existing traffic problems were identified:
- uShukela Drive and the R102 are running close to capacity at a Level of Service (LOS) rated 'E' (A represents best operating conditions while F represents the least desirable conditions).
- The west to south right turn movement of the N2 interchange eastern intersection is running close to capacity at LOS E.
- The intersection of uShukela Drive and High Street is running close to capacity at a LOS E in the peak hours.
- The other intersections within the study area currently operate at fairly acceptable levels of service.
- No pedestrian activity was observed in the study area.
- The road safety conditions were deemed to be acceptable within the study area.

Due to the large size of the proposed development, two access points are required. The primary access will be at the intersection of the proposed spine road through the uShukela Development and uShukela Drive (approximately 1.28km from the N2 interchange). The secondary access road will come off the R102 approximately 2.7km south of the existing R102/uShukela Drive intersection and will follow the existing alignment of Brake Drive. This new road will traverse towards the Hlawe River where it will cross the watercourse by means of a bridge and traverse further east into the uShukela Development.

A 5, 10 and 15 year traffic forecast (including development generated traffic) was carried out on potentially effected roads and intersections as listed below:
1. uShukela Drive
2. R102
3. N2 interchange (eastern intersection)
4. N2 interchange (western intersection)
5. uShukela Drive & High Street Intersection
6. uShukela Drive & R102 Intersection
7. R102 & Brake Drive Intersection
8. uShukela Drive & uShukela Development Main Spine Road
9. uShukela Main Spine Road & New Brake Drive Link Intersection

The analysis of the 5 year forecasted traffic volumes reveals that the R102 and uShukela Drive links will experience severe congestion even before any development-generated traffic is imposed onto the road network. The conclusion to this is that each of these roads will need to be upgraded to dual carriageway in the short term.

Furthermore, the inclusion of the Brake Drive access on the R102 south of Tongaat in the 5 year horizon will be highly beneficial as the uShukela Development generated traffic volumes from the south will utilise this access and not enter Tongaat as in previous scenarios. The recommended upgrades

Recommended upgrades according to the five year forecasted traffic volumes:
- uShukela Drive upgraded to dual carriageway with two lanes in each direction.
- R102 upgraded to dual carriageway with two lanes in each direction.
- Brake Drive must be upgraded/constructed to provide access to uShukela Development from the south. A new link road will be required linking Brake Drive and the Main Spine Road through the uShukela Development.
- N2 interchange (eastern intersection) will have to be signalized and a left slip lane added to the northern approach.
N2 interchange (western intersection) will have to be signalized and a left slip lane added to the southern approach.
- uShukela Drive/High Street intersection all approaches require slip lanes and an additional lane required in the eastbound direction.
- uShukela Drive/ R102 intersection, a left slip lane is required on the northern approach and an exclusive right turning lane on its southern approach.
- R102/Brake Drive intersection must be signalized and upgraded to the layout as shown in Table 44 of the Traffic Study.
- uShukela Drive & Main Spine Road intersection constructed as shown in Table 44 of the Traffic Study.
- New Access Link off Brake Drive and Main Spine Road constructed as shown in Table 44 of the Traffic Study. It is important to note that the proposed Brake Drive link into the development will be highly beneficial in the 5 year horizon as this link will alleviate the pressure on the road network within Tongaat.

All recommendations hereafter are based on the assumption that these upgrades are in place.

Recommended upgrades according to the ten year forecasted traffic volumes:
- uShukela Drive/High Street intersection must be upgraded to the layout as shown in Table 45 of the Traffic Study.

Recommended upgrades according to the fifteen year forecasted traffic volumes:

- The N2 Interchange (western interchange), uShukela Drive & High Street intersection as well as the Brake Drive and R102 intersection must all be upgrades to the layout as shown in Table 46 of the Traffic Study.

The specialist concluded that the intersections within the study area display signs of distress in the 5 year horizon due to the natural growth in traffic volumes. Once the generated traffic from the uShukela Development and the Dube Tradeport are considered in the 5 year horizon, certain intersections will encounter high levels of congestion. The R102 and uShukela Drive intersection in particular will require major upgrading however this is not possible due to the space constraints adjacent to this intersection. Only minor upgrades to this intersection will be possible. Therefore, the introduction of the Brake Drive link will be highly beneficial in the 5 year horizon as this link will certainly alleviate the pressure on the road network within Tongaat. Furthermore, the terminal intersections at the N2 interchange will also operate at poor levels of service and will require upgrading.

The intersection of uShukela Drive and High Street will be the only intersection within the study area that will require capacity upgrades in the 10 year horizon. The analysis of the 15 year horizon revealed that 4 intersections within the study area will not have the capacity to cope with the demand required. It is recommended that 3 of the 4 intersections be upgraded in the 15 year horizon. The link roads within the study area will have sufficient capacity and therefore will not require any upgrading.

It was further recommended that public transport usage in and through the uShukela Development be given serious consideration into the future as this could drastically reduce the private vehicle flows discussed in the analyses tabled in this report. Please see Table 44, 45 and 46 in the Traffic Study (Appendix 3) for a diagrammatic summary of the recommended five, ten and fifteen year upgrades.

Identified environmental risk for assessment: social impact resulting from an increase in the traffic volume on the already the congested road network resulting in the essential need for recommended road upgrades.

3.1.2 Stormwater

With the majority of the site draining toward the Hlawe River, a tributary to the uTongati River, the stormwater control philosophy will be to restrict post development flows to less than 110% of pre-development levels and to facilitate ingress of stormwater into the ground to replenish the wetlands in the natural drainage lines. In order to achieve this, sustainable urban drainage systems (SUDS) principles will be actively applied such as on-site

attenuation tanks for roof run-off and permeable paving, etc. All purchasers and developers of individual sites will be required to implement on-erf stormwater attenuation to attenuate the first 25mm of each rainfall event and to restrict run-off for 1:5 year storms to 110% of pre-development levels. This can be achieved by combining an on-site attenuation tanks for roof run-off, permeable paving in parking areas and unpaved areas etc.

Excess stormwater run-off will be accommodated in either the roadway drainage or by piping to the natural watercourses and discharged via energy dissipating outlets. Roadside drainage swales will be sized to accommodate a minimum of 1:2 year storm. To cater for greater storm events, roadways and intersections will also be provided with piped stormwater drainage with inlets designed only to allow flow into the pipes when the swales reach a pre-determined capacity. Energy dissipation measures will be implemented where these pipes discharge into the natural watercourse. Additional attenuation facilities will be provided in the main watercourse to restrict flows. Further details of storm water management are provided for in the Stormwater Management Plan (Appendix 4) and the proposed bulk and internal stormwater layout is provided in Annexure C of the ESR.

The secondary access route across the Hlawe River will require the construction of a bridge structure structure with sufficient capacity to accommodate a 1:10 year storm without over topping. The crossing proposal illustrating the 1:100 year floodline is attached as Annexure G of the ESR.

3.1.2.1 Summary of Findings of Specialist Stormwater Report [Regulation 31 (2) (j)]

A Stormwater Management Plan (SWMP) was prepared by Stemele Bosch Africa in March 2013 to provide a guideline policy for the holistic management of stormwater for the overall development of the site. The current development will take place on existing cultivated farmland. It is characterized by a number of small tributaries, with the bulk of them draining to the Hlawe River. The site is mostly divided into two primary sub-catchments which drain north and west to existing wetland features. A smaller sub-catchment drains to the east which eventually links up to the northern wetland. The eThekwini Municipality design guidelines and policy for the design for Stormwater Drainage and Stormwater Management Systems (May 2008) have been incorporated into this Management Plan.

In terms of management responsibilities, the applicants will develop the bulk stormwater infrastructure including all infrastructure within the open spaces and road reserves as well as infrastructure connecting road reserves to open spaces via servitudes. On completion of the developments bulk stormwater infrastructure will be handed over to eThekwini Municipality who will then become responsible for their operation and maintenance. Tenants of the individual sites will be responsible for construction of the on-site stormwater facilities to the standards of the applicants and approved by eThekwini Municipality. eThekwini will then assume responsibility for the stormwater discharge from the site. A management association for the entire development will be constituted by the applicants when the conditions of establishment of the first phase are met. This association may, in agreement with eThekwini Municipality, perform operations and management functions (including stormwater management monitoring on the individual properties and outside the individual properties).

The major risks for the uShukela Highway Development site include:
- potential flooding (on and off-site as a result of increased “hardening” of the area)
- erosion (increased run-off)
- pollution (hydrocarbons from vehicles, total suspended solids, domestic waste and construction material)
- sedimentation of wetland
- environmental impacts (i.e. insufficient wetland recharge)

The design philosophy of the SWMP takes cognisance of the impacts of both minor and major stormwater systems.
Minor: all measures to address runoff from individual sites and road reserves, buildings and car parking lots (e.g. kerbing gutters and channels). These stormwater systems deal with low/medium rainfall events with high occurrence intervals. All sites are to be designed to handle 1:5 year storm events.
Major: consists of natural waterways, wetlands, streams and attenuation dams. The major stormwater systems control stormwater runoff for high rainfall events with low occurrence intervals and a high risk of flooding. For this development, these major stormwater systems are to be designed to handle 1:50 year storm events.

Taken the above into account, the stormwater design philosophy aims to:
- Reduce stormwater flow to within a 10% increase of the pre-development flows using attenuating devices such as attenuation dams/structures or infiltration devices,
- Prevent the concentration of stormwater runoff at any point where erosion is a possibility (i.e. roof structures, large surfaced areas, embankments). This will be prevalent near areas with high impermeability and embankments,
- Avoid ponding on site,
- Avoid destabilisation of existing and proposed embankments,
- Ensure compliance to local authority standards,

- Construction of pollution reducing systems,
- Ensure that the construction of stormwater control systems is executed in a safe and acceptable manner, and
- Design philosophy to cater for the recharging of the natural wetlands.

Due to the layout of the individual site platforms, it is suitable to manage minor storm events instead of direct discharge directly into wetlands and stream. Recharging of the natural streams is to be taken into account as well. The specialist recommends that runoff from individual sites be limited to within an increase of less than 10% of the predevelopment runoff for a 1:5 year storm event. Allowance is to be made to retain the first 25mm of precipitation for any storm event on the individual sites for infiltration and recharging of the wetlands and stream using various approved attenuation devices (storage tanks, impermeable paving etc). Runoff in excess of the above requirements is to be routed to defined points exiting the sites on roadways and streams, and attenuated to pre-development levels via attenuation devices.

In order to control the amount of pollution entering the surrounding wetlands and stream, the specialist recommends that measures should include bio-attenuation swales, artificial wetlands and infiltration measures. These are required to be applied at point source of the individual site/road reserve as far as possible.

Parameters used to formulate the conceptual stormwater model include rainfall data, storm frequencies, runoff generation (based on individual sites consisting of 60% hard surfaces, 30% parking and 10% soft landscaping) and subcatchment runoff. More details and the findings are outline in section 5.4 of the report with results tabulated in Annexure B, C and E of the SWMP (Appendix 4). In terms of the runoff generated, Bosch Stemele compiled a report to provide mitigation measures to manage the post-development hydrology as well as retain upland catchment infiltration, such that seepage to central stream channels and wetlands are maintained and to prevent any further soil erosion from the site.

Bosch Stemele's October 2010 report titled "An Analysis of Site Catchment Hydrology and Influences of Development of Catchment Storage and Surface Run-off" is included in the SWMP (Annexure E) and is included in this summary.

The SWMP proposed the following Attenuating Measures:

- **Attenuation Ponds**. Drawings illustrating the stormwater management (including drainage proposals and positioning of attenuation ponds) are included in Annexure D of the SWMP. It is proposed that the attenuation ponds will be constructed using gabion type structures or concrete masonry and lined with gunnite for additional protection providing a "natural looking" appearance. A summary of the attenuation pond requirements is indicated in Table 3 (page 9 of the SWMP).
- **Infiltration Measures** on the platform sites (permeable surfacing and soakaways). eThekwini Municipality guidelines for soakaways for $1m^3$ of storage per $40m^2$ of hardened land will sufficiently allow infiltration of the required 25mm of precipitation into the platforms. Based on the conceptual 60% hardening to roof structures, this equates to $225m^3$ of storage for each hectare of hardened area. The specialist further recommends that interception of roof runoff be retained within the paving areas via permeable paving. Based on a 30% voids ratio, this equates to a 250mm stone layer thickness. These measures are for minor storm events.
- Major Stormwater **Runoff Control**. Prevention of erosion where embankments are constructed. No run off from the platform down the embankment face should be permitted. In this regard it is recommended that kerbing is constructed upstream of embankment slopes to divert flow away to an underground conduit or stabilised channel and on to the existing major stormwater system. The outlet to the major stormwater system will only be allowed at developer specified outlet points. Energy dissipaters will be required where erosion is a possibility.
- **Roadways**. Due to the large open nature of the development, the road reserves form a relatively small portion of the total area and thus do not contribute significantly to runoff. Runoff will however be directed to roadside swale for infiltration.

Please refer to Drawing 0243/203/027 in Annexure D of the SWMP Report for an overall layout showing the conceptual attenuation ponds, swales and internal stormwater pipework.

An assessment was carried out by the stormwater specialist to determine the impact that the proposed development will have on groundwater and surface water recharge of existing wetlands and stream. The assessment was based on a storm event with 25mm precipitation over 24hours. It was concluded that nearly 80% of runoff from minor storm events will infiltrate into the soil to the wetlands within a 24-hour period. The remaining 20% will enter the wetlands area via overland flow.

Careful consideration must be given so that the soakaways are not constructed on a perched water table unless outlets to the soakaways can be constructed to drain towards areas with higher infiltration potential.

Special Considerations:
- Subcatchment RPF4B drains towards uShukela Drive with the proposed development increase runoff leading to the road. Attenuation ponds with a capacity of approximately 1449m^3 will be required next to the highway to reduce the flow of water to pre-development runoff.
- Due to the sandy nature of the soil on site, there is a high erosion potential of embankment faces. Even with kerbing or a berm, embankments are required to be stabilised as soon as possible during construction.

The specialist describes general conditions that must be adhered to and maintained during different phases of the project. These conditions are summarized below and have been included in the EMPr attached as Appendix 24.

Site Establishment and Preliminary Activities:

- Existing Stormwater Systems

All existing drainage systems (streams, channels) are to be maintained by the main developer in accordance with normal agricultural soil conservation practices and local authority guidelines as far as possible (except where the town planning layout makes provision for the development of land over existing drainage systems).

- Access Routes

Access routes to the construction site must follow the existing access roads as far as possible. Should new access roads be required these must be constructed in a way to minimise concentrated flow runoff and pollution to the existing wetlands.

- Contractors Site Camp

The clearing of vegetation for the contractor's site camp is to be limited to the site camp area only. The creation of hardened surfaces within the site camp area is to be kept to a minimum and is to be agreed to by the Engineer prior to construction. Any soil or topsoil stockpiles created during site establishment are to be maintained as flat as possible, with no side slope greater than 1 in 4. The stockpiles are to be covered with cut brush found on site to provide wind screening and prevent soil loss.

Construction Phase:

- Programming

Stripping of vegetation to allow commencement of construction of the earthworks platform shall only be undertaken immediately prior to that element of construction commencing. Construction of the embankment shall be done in segments up to full height, before moving on to the next area, clearing vegetation, and constructing embankment, etc. The construction of internal stormwater piped systems is to be programmed for construction immediately on completion of the bulk earthworks for the road works.

- Stockpiles

Any soil or topsoil stockpiles created during the construction phase are to be maintained as flat as possible, shall not exceed 6m in height. Materials from stockpiles are to be used as soon as is practically possible or spread and spoiled in designated areas.

- Haulage and Temporary Access Roads on Site

Construction vehicles must be restricted to demarcated access routes and turning areas.

- Exposed Surfaces

To minimize the time that an area is exposed, the stripping of vegetation is to be carried out progressively and immediately prior to commencement of construction activities in a particular area. Topsoiling and re-vegetation of exposed surfaces is to commence immediately after the completion of all construction activity. All embankments or cut slopes, unless otherwise directed by the Engineer, shall be protected by a cut off drain to prevent water from cascading down the face of the slope.

- Stormwater Systems

No dumping of construction rubble or spoil is to occur in completed stormwater drains, pipes, channels or natural drainage lines (existing wetland, stream, & riparian zone). Weekly checks are to be carried out. These are to be repaired or cleared of silt if required.

- Contract Completion

All undeveloped surfaces hardened due to construction activities are to be ripped, topsoiled and vegetated as soon as possible.

Operational Phase:

The specialists prescribed a Stormwater Operation, Maintenance and Monitoring Plan attached in Annexure F of the SWMP. The Plan was prepared in accordance with accepted Best Management Principles (BMP's) for Stormwater Management and eThekwini Municipality's Guidelines and Policy for the Design of Stormwater Drainage and Stromwater Management Systems (May 2008). The objective of the plan is to ensure that the stormwater infrastructure is achieving its intended design objective, to promote BMP's, to minimize the risk of pollution to the natural wetlands and streams and develop a database for comparison and trend analysis for future developments. A description of the stormwater systems on site is provided and a breakdown of the management responsibilities.

A Stormwater Facility Inspection Procedure is also detailed. This includes safety relating to stormwater infrastructure, field inspection equipment and a description of the maintenance required. Inspection of individual sites should include the kerb inlets, piped systems, permeable surfacing, embankments and pollution monitoring. Inspection checklists for the retention ponds and wetlands are provided as well as a facility specific operation and maintenance plan.

An Analysis of Site Catchment Hydrology and Influences of Development of Catchment Storage and Surface Run-off was conducted by Stemele Bosch Africa (Pty) Ltd, in March 2013 (Annexure E of the SWMP attached as Appendix 4 of the EIR). The concern of the wetland specialist was that the change in land use will intercept rainfall that was previously intercepted by vegetation/stored in the soil profile and converted to surface runoff resulting in a number of consequences including:

- Increased volume and rate of runoff
- Extensive erosion of sandy soils
- Development of erosion gullies and unsightly donga systems
- Widespread alien plant infestations
- Exacerbated sediment deposition downstream
- Potential flooding of downstream properties.

The purpose of the analysis was to provide a more detailed hydrological assessment to report how runoff will be dealt with on site. The objective of the report was to show how the mitigation measures can be used to manage post-development hydrology to within 10% variance of the pre-development scenario, retain catchment infiltration and prevent further soil erosion.

There are two areas where stormwater is controlled on the site:

1. Individual sites

All roof runoff will be directed to soakaways with 1m^3 of clear volume to drain every 40m^3 of roofed area. All paved areas to use permeable paving thereby attenuating and encouraging infiltration. Any overflows from large storm events will be piped down embankments slopes and discharged at natural water course levels or pipes to the formalized stormwater reticulation system within the road reserves. Energy dissipating structures will be utilized when stormwater is discharged into the natural water course. Annexure E2 illustrates typical dissipating structures that can be placed at stormwater system outfalls.

2. Road reserves

50% of the road reserve will be made up of impermeable surface with the other 50% consisting of soft landscaping. Formalised stormwater swales will collect runoff from the road wher is will drain to the attenuation/infiltration structures located at strategic points within the “open spaces” within the development. As above, energy dissipaters will be utilized.

To determine the catchment hydrology, the main factors that affect surface run-off and infiltration were assessed using analytical methods (computer simulation modelling), sub-catchment boundaries, hydrological soil group for the sub-catchment, land cover classification within the sub-catchment, overall SCS Curve Number for estimating run-off, and design rainfall and intensity distribution type. The report described all the listed factors used and indicates assumptions made for each factor.

The analysis found that for the catchments draining to the Hlawe River, the total run-off volume will increase from the pre-development scenario of 11 600m^3 to 24 200m^3, with the balance, 12 600m^3 needing to be taken up by attenuation structures. For the 1:2 year storm event the runoff figure increases from 19 331m^3 to 36 498m^3. Considering the precipitated volume for the catchment, the specialist considers the results as “reasonable” with the additional volume required for attenuation being accommodated at the outlets of each of the sub-catchments draining this area and retention facilities. One solution is to design the permeable paving car parks within this catchment to accept ponding of up to 60mm depth for the large storm events.

The analysis found that for the catchments draining to the Tongaat River (WH1 and WH2), the total run-off volume will also increase from the pre-development scenario of 800m^3 for both catchments to 2 300m^3 and 2 200m^3 respectively. For the first catchment (WH1), interception/infiltration volumes have decreased from the 9 600m^3 at pre-development stage to 8 000m^3 at post-development stage (17% decrease). As mentioned above, by designing the permeable paving in the sub-catchment to accept some ponding, allowing for further storage from road reserves in roadside swales and attenuation of roof runoff in soakaways, the target of 10% is achievable. For the second catchment (WH2), interception/infiltration volumes have decreased from 16 900m^3 at pre-development stage to 15 600m^3 at post-development stage (8% decrease, which is within the target of 10%).

From the results of the rainfall interception/infiltration in the SWMM model, it can be seen that the volume has decreased by 25% of pre-development volumes during a 25mm precipitation stormwater event. This is outside the target of 10%. Taking into consideration further infiltration via the proposed swales in the road reserve and runoff storage from roofs into the soakaways, infiltration can be increase to 82% of the pre-development infiltration volumes. Using attenuation facilities, the target of 10% will be achieved. A summary of the required attenuation facilities from the SWMM model that will be required for each catchment have been tabulated on page 13 of Annexure E of the SWMP. A total attenuation requirement of 17 332m^3 was calculated. The position of these attenuation facilities would be ideally located in the open space wetland areas.

For full recommendations please refer to the Site Catchment Hydrological Assessment in Annexure E of the SWMP (Appendix 4). The recommendations have been summarised below:

- Attenuation of structures should be considered at the discharge point of each sub-catchment or where ideally located. These structures should be designed to attenuate the post-development discharge peak to within 10% of the pre-development discharge peak.
- Permeable paving throughout the development should be designed to allow for ponding of up to 30mm for all design rainfall depths greater than 50mm.
- Soakaways to intercept and retain roof runoff be installed as per the eThekwini Municipality's requirements.
- Swales be installed in road reserve to intercept and retain runoff from impermeable road surfaces.

Identified environmental risk for assessment: increase risk in flooding on and off-site with an increase in run-off and decrease in rainfall interception/infiltration, increased potential for erosion, increased pollution of surrounding watercourses, a build up of sedimentation within the wetlands and an environmental impact of reduced wetland recharge. All these risks can be greatly reduced with proper management of stormwater on site and adhering to the conditions prescribed.

3.1.3 Sewage

The proposed development will be provided with waterborne sewage reticulation as the site falls within the catchment of the Tongaat Wastewater Treatment Works (WWTW). The development will generate approximately 1.8Ml/day of effluent if full use is made of the proposed "bulk" (i.e. 431 850m^2 when complete). The Tongaat WWTW has a rated capacity of 12Ml/day and is currently operating near full capacity with inflows of 10Ml/day. eThekwini Water and Sanitation (EWS) have indicated that the current works will therefore not be able to accommodate further inflows from the new developments. EWS have however commenced with detailed designs to upgrade the capacity of the Tongaat WWTW's to 24Ml/day. Construction of the upgrade is budgeted to commence in 2013/2014 eThekwini financial year with the upgrade being complete by the end of 2014. The upgraded WWTW's will therefore have the capacity to accept and treat the sewer effluent generated by the proposed development. EWS already has a permit to treat up to 45Ml/day at this works (Appendix 5).

Effluent will be carried from the development to the WWTW by the proposed Hlawe River gravity outfall main. This is currently still in preliminary design phase and environmental authorization has been applied for as part of a separate application. A small temporary pump station will need to be provided for the northern portion of the site as this area naturally drains to the north of uShukela Drive. Initially effluent from the catchment will need to be pumped to the Hlawe outfall main. As soon as the area north of the uShukela Highway is developed the pump station can be decommissioned and use can be made of the gravity system in the northern area. The bulk sewer is illustrated in Annexure D of the March 2013 ESR in Appendix 2 of EIR.

Identified environmental risk for assessment: increase in sewage to Tongaat WWTWs which has already been earmarked for other future developments.

3.1.4 Water Provision

Water supply falls within the authority of eThekwini Water Services (EWS). Tongaat Water Treatment Works (WTW), operated by EWS and Hazelmere WTW, operated by Umgeni Water currently supplies bulk water to the surrounding areas. The Tongaat WTW generally supplies Tongaat and the Mamba Ridge reservoir to the north of the development (A in Figure 5). Hazelmere WTW supplies the Inyaninga reservoir (serves airport and is inland from the R102; B in Figure 5), the La Mercy Airport reservoir (east of the N2; C in Figure 5) and the Westbrook reservoir (further east). Please refer to Annexure E in the March 2013 ESR (Appendix 2) for an accurate depiction of the location of reservoirs.

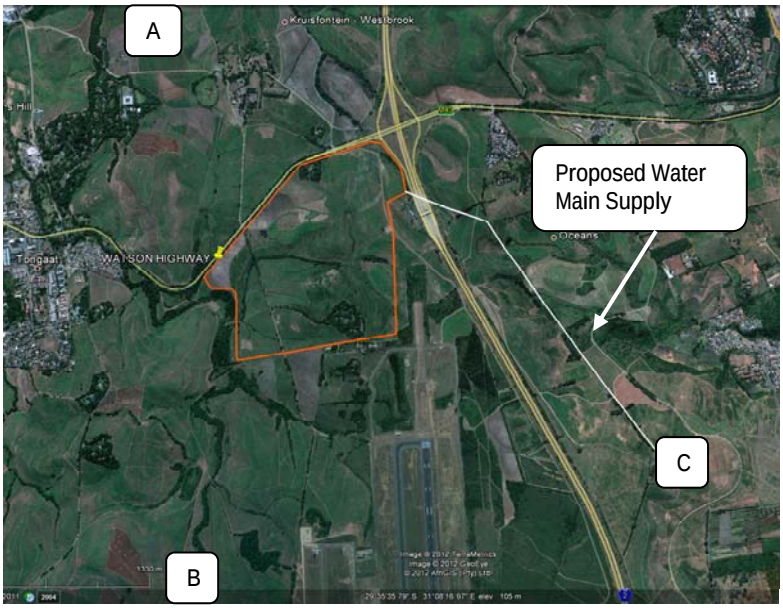
The report notes that at present, the 'spare capacity of treated water from the Hazelmere source is very limited. Umgeni Water is planning to increase the capacity of the Hazelmere in the first half of 2013. Doubling up of the Umgeni supply main through the uShukela Highway Development is currently under construction, alleviating

potential supply line restrictions. By 2014/2015 there will be sufficient treated bulk water to supply the development proposals in the area.

In terms of long-term raw water supply, the DWA is in the process of planning to raise the Hazelmere Dam. Umgeni Water is also well advanced in their planning to abstract water from the Tugela River to supply the KwaDukuza environs. As the KwaDukuza area is currently supplied by Hazelmere, this will release further water capacity for use by developments in the uShukela/Inyaninga/KSIA areas.

The total water demand for the proposed development is in the order of **2.15Ml/day**. To achieve this, 48 hour storage would require a storage capacity of an additional 4.3Ml/day.

Figure 5: Aerial photograph showing the location of the proposed water supply main and new reservoir at location C.



The development requires a highest supply level of 114m and therefore to supply the 24m pressure required throughout the development and to allow for head losses in the supply main, a minimum reservoir elevation level of approximately 140m is required to ensure it is fully supplied by gravity. Three different reservoirs have been considered in the report namely the Mamba Ridge reservoir, the Inyaninga Reservoir and the La Mercy Airport Reservoir.

The **Mamba Ridge reservoir** has an elevation of approximately 100m and would only serve the western 20% of the site by gravity. It is therefore not suitable to serve the proposed development. The **Inyaninga Reservoir** has a top water supply level of approximately 139m and is therefore just sufficient to provide the full gravity supply. This reservoir has been sized to supply the KSIA as well as the Dube Tradeport. This reservoir has a capacity of 6Ml and will have to be augmented to provide that additional storage required to serve the development. A 5km long supply main will be required from this reservoir to the development. A restriction on using the Inyaninga reservoir to supply uShukela is that it will, in the future, have to supply a considerable area of potential Inyaninga development which will require construction of future reservoirs of the site. The La Mercy Airport Reservoir has a top water level of 155m and has sufficient elevation to provide the total gravity supply to the development. At present the **La Mercy Airport Reservoir** capacity of 5Ml is fully allocated and a second reservoir will need to be constructed in the same location. The link supply from this reservoir would comprise of approximately 2.5km of 400mm diameter main running adjacent to the existing pipeline supplying water to the reservoir within an existing servitude. The La Mercy Airport Reservoir is owned and operated by Umgeni Water however negotiations are underway between Umgeni and eThekwini for the transfer of ownership of this reservoir to EWS. The decision on which option to utilize will ultimately rest with EWS however the La Mercy Airport Reservoir is the preferred EWS option subject to the purchase of this reservoir from Umgeni Water and increased reservoir capacity being constructed.

An interim supply from the Inyaninga reservoir could be considered.

According to the report, water to each erf will be supplied according to the municipal pressure standard and each erf will be individually metered (bulk water layout plan contained in Annexure E of the March 2013 ESR in Appendix 2 of the EIR). The reticulation will be designed to accommodate fire flows. Any additional requirements for individual erven over and above 'Red Book' standards will have to be provided by the developer of the individual erf. Sustainability measures including rain-water harvesting (where this does not impact upon groundwater seeping), water quality control, use of alternative water sources and recycling of water will be included in the Building Design Guidelines to ensure implementation. Potable water will not be used for irrigation but sourced from contained stormwater run-off and complimented by supplies from current sugarcane irrigation raw water supply.

EWS have confirmed that bulk water can be made available to the development subject to the upsizing of the existing reservoir and associated pipework as described above (Appendix 5). Since the pipeline will be constructed in an existing servitude, large areas of vegetation will not need to be cleared however the EMPr has included measures to manage the pipeline construction so that any environmental impacts will be minimized.

Identified environmental risk for assessment: increased pressure on existing water services in surrounding area, impacts associated with the new water pipeline including vegetation clearing outside the development footprint and the potential for the pipeline to cross drainage lines.

3.1.5 Electrical

The uShukela Highway Development will, without factoring in any sustainability measures, demand 29.4 MVA and accounting for diversity 24MVA.

A preliminary specialist report on the electrical load requirements was initially prepared by Bosch Projects in November 2010 and a further detailed electrical service report compiled in February 2013 (both reports included in Appendix 6 of the EIR).

3.1.5.1 Summary of Findings of Specialist Electrical Report [Regulation 31 (2) (j)]

The report electrical service report (February 2013) covers existing electrical infrastructure and comments on the projected electrical load required by the uShukela Highway Development in the short and long term. Additional electrical infrastructure that will be required is also included.

- Existing

No 275kV sub-transmission line servitudes exist within the development area. There are currently no 275/132kV substations located in the vicinity of the proposed development. There is an existing overhead line with a registered servitude linking the new Tongaat substation the La Mercy substation. This line traverses just north of the proposed development. The Tongaat 132/11kV substation is newly built and commissioned. It is rated at 60MVA firm. This was built to take over the load of three existing 33/11kV substations as well as to cater for future load growth in close proximity to the substation. The current available spare is 18MVA which can be used to supply the initial phases of the uShukela Highway Development. The spare capacity will be used on a first come, first serve basis for developments in close proximity to the substation. In terms of distribution, there is electrical supply at 11kV available near the site however this cannot support the demand of the development. There is electrical supply at 400V available within the proposed development area however it also cannot support the demand of the development. No street lighting currently exists within the boundaries of the development.

- Requirements

The 431 850m^2 'bulk' translates to an electrical demand of 29.6MVA. The system will be designed to accommodate the failure of any single MV cable. No 275kV sub-transmission lines will be required. A new 3150MVA 275/132kV substation is required to support the electrical demand for the greater area surrounding KSIA. This substation will be located adjacent to the proposed Inyaninga Development and a separate EIA will be required. This new substation will feed several new 132/11kV substations that will be required to be built for the greater development area. One of the new substations will be used to feed to the uShukela Highway in the future. 11kV supplies will be taken from this substation and fed into a series of Distribution Substations which are positioned in key locations throughout the development. Cable routes will run in road reserves adjacent or in close proximity to each proposed site. Internal reticulation will be undertaken by each individual site owner to meet their specific requirements. THD will be responsible for the costs of the 11kV bulk supply to the boundary of these developments.

No 132kV sub-transmission lines and servitudes are required within the development boundary.

The existing 132/11kV 60MVA Tongaat substation will be used to supply the initial phases of uShukela Highway (please see Appendix 6 for service provider confirmation). It will however be essential to construct two new 132/11kV 60MVA firm substations for the broader subregion including Inyaninga and uShukela. Provision is made for street lighting and public open space lighting.

The applicants have acknowledged the need to manage energy use and to utilise sustainable sources of energy and limitations are to be imposed on all developments through the Building Design Guidelines.

Identified environmental risk for assessment: initial pressure on the Tongaat substation however, with the establishment of the new substation, this pressure can be mitigated, positive impact from the installation of street and public open space lighting.

3.1.6 Solid Waste

Durban Solid Waste (DSW) will be responsible for provision of waste collection. The DSW Buffelsdraai landfill site has adequate capacity to accept the additional waste generated by the development. Other collection models could be implemented such as 'contracted out' collection or facilities for waste separation for recycling. Initiatives around recycling of waste are however also being considered and will also be included in the Building Design Codes for

each development. Waste management promoting the separation of waste types and recycling is included in the EMPr for the construction phase of the development.

Identified environmental risk for assessment: nominal increase in pressure on the landfill.

3.2 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 [Regulation 31 (2) (g)]

The Western Cape Department of Environmental Affairs and Development Planning (DEA & DP) guideline[4] on alternatives has been used as a guide to the identification of feasible alternatives to the proposed activity. The NEMA EIA Regulations define alternatives as a "*different means of meeting the general purpose and requirements of the activity*".

Alternatives to the proposed activity were identified according to the following criteria:

i. Is the alternative feasible and reasonable?
ii. Does the alternative suit the general purpose of the proposed activity?
iii. Does the alternative align with the need and desirability considerations of the proposed activity?
iv. Is the alternative designed to prevent and minimise negative impacts and to maximise benefits?
v. Does the alternative compromise the integrity of the proposal?
vi. Does the alternative comply with policy and legal requirements?

Based on the above, three layout alternatives were identified for further investigation in the Scoping Report. Since the final Scoping Report was accepted there have been numerous discussions with the wetland specialists to formulate a layout compromise to retain a significant amount of the existing wetland ecosystem. Two of the initial proposed alternatives involved the specific positioning of potential petrol filling stations but given the fact that the position of the petrol filling station requires specific market related input, it has been removed from the layout. It is not part of this EIA to assess the preferred location of the petrol filling station within the site and therefore the initially proposed alternatives are no longer feasible to include in this assessment. This does not however imply that Petrol Filling Stations are not appropriate for the development nor that they won't be developed at some stage in the future following the appropriate applications.

Due to careful consultations between the applicants, architects and wetland specialists the applicants are proposing one layout option (as illustrated in Figure 1). The "no-go" option has been included in the assessment as a baseline study. The potential impacts of the "no-go" alternative are used to compare the impact of the other alternatives against.

1. Alternative 1:

The preferred alternative is to develop the 134ha site into eight sub-precincts as per the layout plan in Figure 1. The eight land uses are comprised of seven Tradezone/Logistics/Light Industry, one Conference Venue, Management and Offices and over 21 hectares of rehabilitated open space. The open space includes the rehabilitation of an existing, degraded wetland system on site. A range of mitigation measures have been outlined by the wetland specialist throughout the wetland impact assessments, described in detail in section 4.2.3. These were specifically considered when designing the layout proposed in Alternative 1 (Figure 1).

This is the most feasible alternative from the applicant's perspective in order to sufficient suit the general purpose of the activity. The aim of the activity is to utilize the newly constructed link road from the KSIA in order to stimulate trade and logistics in Southern Africa. The applicants and wetland specialists have worked closely together to formulate a compromise minimising the environmental impact of the development on the sensitive aquatic resources on site. This layout therefore takes into account the wetlands and ecological linkages on the site achieving a viable development alternative. Dividing the site into Tradezones allows for improved stormwater control and infiltration, ensuring wetland recharge.

2. The "no go" alternative:

The site would remain undeveloped and commercial sugarcane farming would continue. Infrastructure including services would not be upgraded on the site and the new link road between the Cargo Terminal and Watson Highway would be underutilized. The link road was designed to accommodate more traffic with the intention of drawing further development into the area.

[4] Source: DEA&DP (2009). *Guideline on Alternatives, NEMA EIA Regulations Guideline and Information Document Series.* Western Cape Department of Environmental Affairs & Development Planning (DEA&DP).

Table 9 summarises the main advantages and disadvantage of the two alternatives.

Table 9. Advantages and disadvantages of the proposed alternative for the uShukela Highway Development.

	Advantages	***Disadvantages***
Alternative 1	▪ The proposed development will provide local employment and business opportunities which will be a positive economic impact. ▪ The proposed development is in line with provincial and municipal spatial planning policies. ▪ The preferred alternative compliments the vision for the Dube TradePort and potential development of the region through the creation of a viable, balanced and sustainable development. ▪ The preferred alternative is aligned and integral to the concept of an Aerotropolis development that is being actively pursued by the Province as a key means towards regional economic growth, development and competitive advantage towards attracting new foreign investment. ▪ Important link between the ports of Durban and Richards Bay harbour. ▪ Potentially positive impact on the property value in surrounding area. ▪ This alternative incorporates green open space aiming to retain onsite wetlands functionality. ▪ A Tradezone / Business Park is within the narrow scope of alternative land uses for that particular site due to the close proximity of the airport and the associated noise levels. ▪ Opportunity for wetland rehabilitation enhancing the current state of the degraded wetlands. ▪ Opportunity for a sustainable model for managing the open space habitat. ▪ Upgrade of water, electrical and stormwater services in the area. ▪ Potential economic development and expansion of Tongaat's Central Business District. ▪ Upgrading of surrounding road infrastructure.	▪ The activities associated with both the construction and operation of the proposed development will potentially lead to an increase in the amount of noise generated from the site although this is tempered by the fact that it is directly adjacent to the airport. ▪ During the construction and operation of development there will be an increase in traffic in the surrounding areas. ▪ Likely increase in erosion and sedimentation of the existing wetlands and Hlawe River. ▪ Loss of visual open space.
The "no-go" Alternative	▪ There would be no increase in traffic associated with this development. ▪ The existing land use would continue and thus there would be no increase in the amount of noise generated from the site. ▪ There would be no significant impact on the economic conditions on site with commercial sugarcane farming continuing. ▪ Given that the site would remain unaltered there would be no loss of open space. ▪ The entire wetland system on site will not be disturbed at this stage. ▪ New Link Road through the proposed site will be underutilised. ▪ Loss of large areas of agricultural land which currently act as a carbon sink.	▪ The site would remain unchanged and continue to operate as a commercial sugarcane farm. There is therefore no requirement to upgrade the infrastructure on site or in the surrounding area. ▪ From a biodiversity perspective, the monoculture (sugar cane) farming and irrigation from wetlands will further aggravate the functional condition of the wetlands. ▪ Lost opportunity to provide a sustainable means to rehabilitate and maintain a new open space habitat. ▪ Alien vegetation will continue to invade the site and water courses. ▪ Increased demand for a trade/logistic zone in this area. ▪ No new jobs created or opportunity for new investment.

4.0 Description of environment and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity [Regulation 31 (2) (d)]

The National Environmental Management Act (107 of 1998) states that the "environment" is 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 inter-relationships among and between them; and
(iv) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

This section aims to describe the various aspects of the environment that may be affected by the proposed development. The physical and biological characteristics of the proposed site are therefore discussed utilizing specialist reports which were commissioned to identify potential impacts that the proposed development could have on the environment as well as recommending mitigation measures to minimize or alleviate these impacts. Social, economic and cultural features within and surrounding the site has all been assessed to reach a holistic description of the environment that the proposed uShukela Development is located in.

4.1 Surrounding Land Use

The site is currently being used for commercial sugarcane farming but will be rezoned from agricultural to business/light industry/logistics. The site is boarded to the west by the Hlawe River and additional sugarcane plantations across the river. Tongaat town is roughly 4km North West of the development. The N2 highway and uShukela Drive (M43) run adjacent to the eastern and northern borders respectively. The Herrwood Community and KSIA lie directly to the south of the site. Access to the existing Herrwood Community properties will be impacted upon but the preferred layout does provide suitable access to these properties.

The node of Verulam lies to the far south of the site (10km south east). Dube TradePort Corporation is located to the South West. Another strategically located parcel of land known as "Inyaninga" is located south west of the proposed uShukela Highway site and has been earmarked for future development. The position of the Inyaninga land portion in relation to the uShukela site is illustrated in Figure 6 below. Figure 7 shows the surrounding land-uses, as demarcated by the eThekwini Municipality.

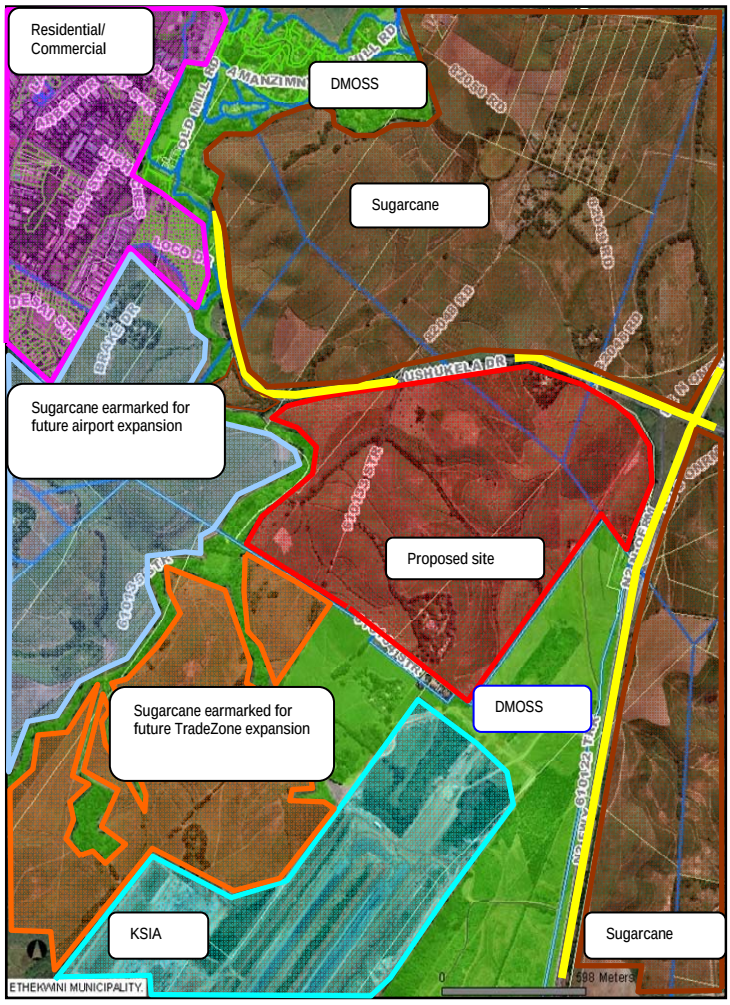
The proposed uShukela Development has the potential to effect other developments in the general area both positively and negatively. It is anticipated that the proposed activity will compliment future land uses or developments adjacent to the airport, promoting further trade and growth within the greater eThekwini area and could well contribute to a national economic improvement[5]. Due to the close proximity to the airport, infrastructure within the development will be required to comply with the Civil Aviation Regulations 2010 in terms of building height restrictions and activities within or adjacent to the flight path. It is expected that the proposed activity will have a positive economic impact on the Tongaat and Verulam nodes[6]. The specialist socio-economic impact assessments has been fully summarised in section 4.5 below.

Identified environmental risk for assessment: loss of agricultural land, potentially positive socio-economic impact on surrounding areas (KSIA and the Tongaat Central Business District). Potential negative visual and noise impact on the immediately adjacent Herrwood Community, cumulative impact of the change in land use from agricultural to commercial with specific reference to the proposed Inyaninga Development south-west of the site.

[5] Phipson: *Agricultural Potential Assessment: The farms described as Inyaninga and Watson Highway* (2009).
[6] Urban-Econ Development Economists: *Socio Economic Impact Assessment of the Development on Tongaat and Verulam – Update* (2012).

Figure 6: Location of the Inyaninga land portion (blue) south-west of the Watson Highway land parcel (yellow) wherein the proposed uShukela site is located.

Figure 7: Aerial photograph illustrating the surrounding land uses of the area (source: eThekwini Maps).



4.1.1 Summary of Findings of Specialist Planning Report [Regulation 31(2)(j)]

A Specialist Planning report (Appendix 7) has been compiled by The Planning Initiative which outlines the spatial planning assessment of the potential impact of the proposed uShukela Highway development. The planning assessment assessed the synergies between the strategic spatial development plans and strategic government objectives of the various authorities and the proposed development and also considered the need and desirability of the proposed development. This latter issue has been included in Section 1.3 above.

The relevant National and Provincial policy documents, legislation and local government spatial plans that have been utilised in the assessment include:

- National Development Plan of the National Planning Commission (2011)
- The New Growth Path Framework for South Africa launched on 23 November 2010
- The Provincial Growth and Development Strategy (2011)
- eThekwini Integrated Development Plan and Spatial Development Framework (2011)
- eThekwini Northern Spatial Development Plan (2011)
- Northern Urban Development Corridor (2011)

To assess the planning impact of the proposed development, three potentially affected areas were identified and described. These were the eThekwini Metropolitan area and wider region, the iLembe District (north of the site) and the site itself including its immediate surrounds. The site is strategic located 40km north of Durban's CBD, immediately adjacent to the major north-south axis (N2) and is within the corridor between the two largest Ports in South Africa (Durban and Richards Bay). It is also located directly adjacent to KSIA and Dube TradePort, another major development corridor within the Province and the country.

Various pieces of spatial planning legislation that have to be complied with or taken into account are discussed and the relevant sections summarised in section 3 of the report. The proposed development is required to align with the various spatial planning frameworks prepared for National, Provincial and Local Government. The relevant frameworks that are to be taken into account are provided in section 4 of the planning report. The National Development Plan: Vision 2030 was launched in November 2011 and is the overarching framework for development in South Africa over the next 20 years. Key elements of the National Development Plan that relate to the proposal were highlighted. The New Growth Path Framework for South Africa launched on 23 November 2010 emphasizes economic growth and development through job creation. The proposed development is in line with the New Growth Path Framework as it promotes job creation through light industry, business and service type development.

At a provincial level, the Kwazulu-Natal Provincial Growth and Development Strategy (2011) which consistently refers to Dube TradePort as being "a key driver in the economic growth of the province". Strategic Objective 1.2 focuses on enhancing industrial development through trade, investment and exports. The proposed development contributes to fulfilling this strategy. The importance of logistics and transportation in stimulating growth is also highlighted. uShukela Highway Development will not only create job opportunities but has the potential to attract local and foreign investors. Within the Spatial Development Framework, Dube TradePort and its surrounds are described as an "Economic Value Adding Area" adding economic value at a provincial level.

Locally, the eThekwini Integrated Development Plan (IDP) and Spatial Development Framework proposes a long-term vision for eThekwini Metropolitan to be "Africa's most caring and liveable City, where all citizens live in harmony". Dube TradePort features strongly in this spatial development framework as one of the key spatial drivers determining economic investment in the City. To summarise, the Dube TradePort area has been identified as a key driver of investment in the city. Since the uShukela Highway Development is a natural extension of the TradePort, it falls in line with the Integrated Development Plan. The proposal is also in line with eThekwini's Northern Spatial Development Plan (NSDP, 2009) as the site falls within the area allocated "Mixed Use". The site is also indicated as a Future Industrial Opportunity Area. The Northern Urban Development Corridor (NUDC, 2011) was prepared in response to the NSDP strengthening the development corridor that is already emerging. Dube TradePort was identified as an economic node requiring expansion and therefore the proposed development satisfies this expansion.

Finally, the Tongaat-Dube TradePort Local Area Plan (LAP) has been developed as a key component of the NUDC and will "be developed as a mixed use development corridor which will consolidate existing and anticipated future population and economic growth in the northern metropolitan area into a spatial pattern that reinforces the new airport node as an internationally competitive "Aerotropolis". The proposed developed therefore promotes the corridor and node concept by clustering economic activities to maximise the use of resources. The LAP also notes the road between uShukela Highway Development and Dube TradePort as a key linkage in the eThekwini integrated rapid Public Transport Network.

The Spatial Planning Impact Assessment found that in all instances, the proposed development aligns with the relevant spatial planning proposals and the following concluding findings were stated:-

- The proposed development has the potential to strengthen the economic hub of the Dube TradePort and therefore aligns with the National Development Plan and New Growth Path, as well as the Provincial Growth and Development Strategy, all of which highlight the role of the TradePort in improving international connectivity and contributing to National economic growth.
- The eThekwini IDP (2011) identifies the Dube TradePort area as a priority area in terms of infrastructure investment and economic growth. This proposal falls in line with this priority in that it will strengthen the core created by the airport and TradePort. This then further strengthens the Municipal IDP's requirement for a compact city approach.
- The eThekwini Municipality's NSDP (2010) shows this development as a natural extension of the airport TradeZone (i.e. it is termed future industry in the NSDP). The development is a direct extension of the Tradezone, and its land use is the same as depicted in the Municipal plans.
- The eThekwini Municipality's NUDC and Tongaat-Dube TradePort LAP (2011) shows the development as light industry, and although it is not stated, it is shown on all the plans as a natural extension of the Tradezone, which also contains similar land uses.

It is therefore clear that the development as proposed is perfectly aligned to national, provincial and local authority strategic objectives and spatial plans. Furthermore, the expansion of the Tradezone, as shown in the regional plans will have a positive impact on the local economy, and conceivably the broader economy, as it will enhance the value offered by KSIA and Dube TradePort.

4.2 Physical

The general topography of the proposed site is flat with gently undulating hills. A geotechnical study was conducted to ascertain the underlying geology of the site and identified any potential risk areas. The report found that there is a distinct division between the east and west of the site in terms of underlying geology and surface / subsurface drainage. The soils in the eastern portion of the site have the potential to collapse however the specialist concluded that the majority of the site is suitable for the proposed development. Please refer to section 4.2.1 below for a full summary of the findings of the Geotechnical report. One of the most important physical characteristics of the site is the aquatic resources that are present throughout the portion of land.

The layout (Figure 1) was developed based on a number of layouts and hydrological models to achieve an ecological and economically sustainable trade-off. Broadly speaking, it was found that subsurface seepage is an important dominant driver for the wetland systems on the eastern portion of the site and as such impacts are likely to be more severe in these sandy soils. The majority of the drainage lines form part of the Hlawe River catchment draining from east to west. The green-corridor system positioned in the centre of the site, aims at sustaining this natural drainage line to reduce the environmental impact that the development will have on the Hlawe River.

It was ascertained by the Assessment of the Freshwater Ecosystems (GroundTruth, 2010, Appendix 8) and reiterated in the Wetland Assessment (Wetland Consulting Services, 2010 [Appendix 9]) that currently, the majority of the wetland system has already been largely modified. This is a result of past and current farming practises (ridge and furrow irrigation) resulting in rapid drainage of water from the vicinity thereby reducing the water table considerably. The proposed development will result in a further decrease in the water table. If the wetland distribution and functionality is not taken into cognisance the development has the potential to significantly alter the hydrology of the entire system. The degraded state of the wetland does however provide an opportunity for wetland rehabilitation to take place improving the current state of the system. Detailed wetland delineations and assessments have been carried out in order to gain a better understanding of the physical nature of the drainage system on site. The proposed layout incorporates the wetland specialist's recommendations, which are described in more detail in section 4.2.2 below. It will be important to note that these recommendations and mitigation measures have been incorporated into the EMPr, attached as Appendix 24 (please also refer to section 3N in the EMPr).

Taking into account all specialist reports summarised in sections 4.2 below, recommendations have been proposed to reduce the impact that the uShukela Highway Development will have on the physical environment. The most accepted recommendations state that the post-development hydrology should be managed to within a 10% variance of the predevelopment modelled flows, the importance of stormwater ingress into the ground to replenish wetlands was emphasized, the requirement to prevent any further soil loss (to reduce the risk of erosion), the need to retain the lateral seepage into the central stream channel to maintain the riparian trees and that rehabilitation of the on-site wetlands should take place.

The R102/Brake Drive intersection is located to the west of the proposed development. Currently, the portion of Brake Drive that is to be upgraded traverses sugarcane fields and mainly consists of a dirt road (Figure 8A). The new access road will cross the Hlawe River via a bridge (Figure 8B). Wetlands were delineated by Land Resources International (LRI) and show that the upgrading of the existing road as well as the construction of the new access road should not impact directly on any wetlands or drainage lines.

The proposed new bulk water pipeline runs from west to east through the development footprint, crossing the central drainage area at two locations. The proposed new pipeline will run in an existing water pipeline servitude adjacent to an existing pipeline supplying water to the La Mercy Airport Reservoir. The 400mm diameter pipeline will cross underneath the N2 Highway, north of the Tongaat Toll Plaza. Shortly after crossing the highway, the gradient increases and the route passes directly through three sections of wetland (as delineated by LRI and illustrated in Figure 9). The wetlands drain in a west to east direction towards the coast line. The new 50 000m^3 water reservoir will be constructed adjacent to an existing reservoir, on a level area of land (green in Figure 9).

Figure 8: Photographic map illustrating the existing portion of Brake Drive that will require upgrading (in red) and the new access road (in yellow). Wetlands delineated by LRI have been indicated in blue.

8A – Photograph of a section of Brake Drive looking in a easterly direction.

8B – Photograph of the current bridge over the Hlawe River which will be upgraded.

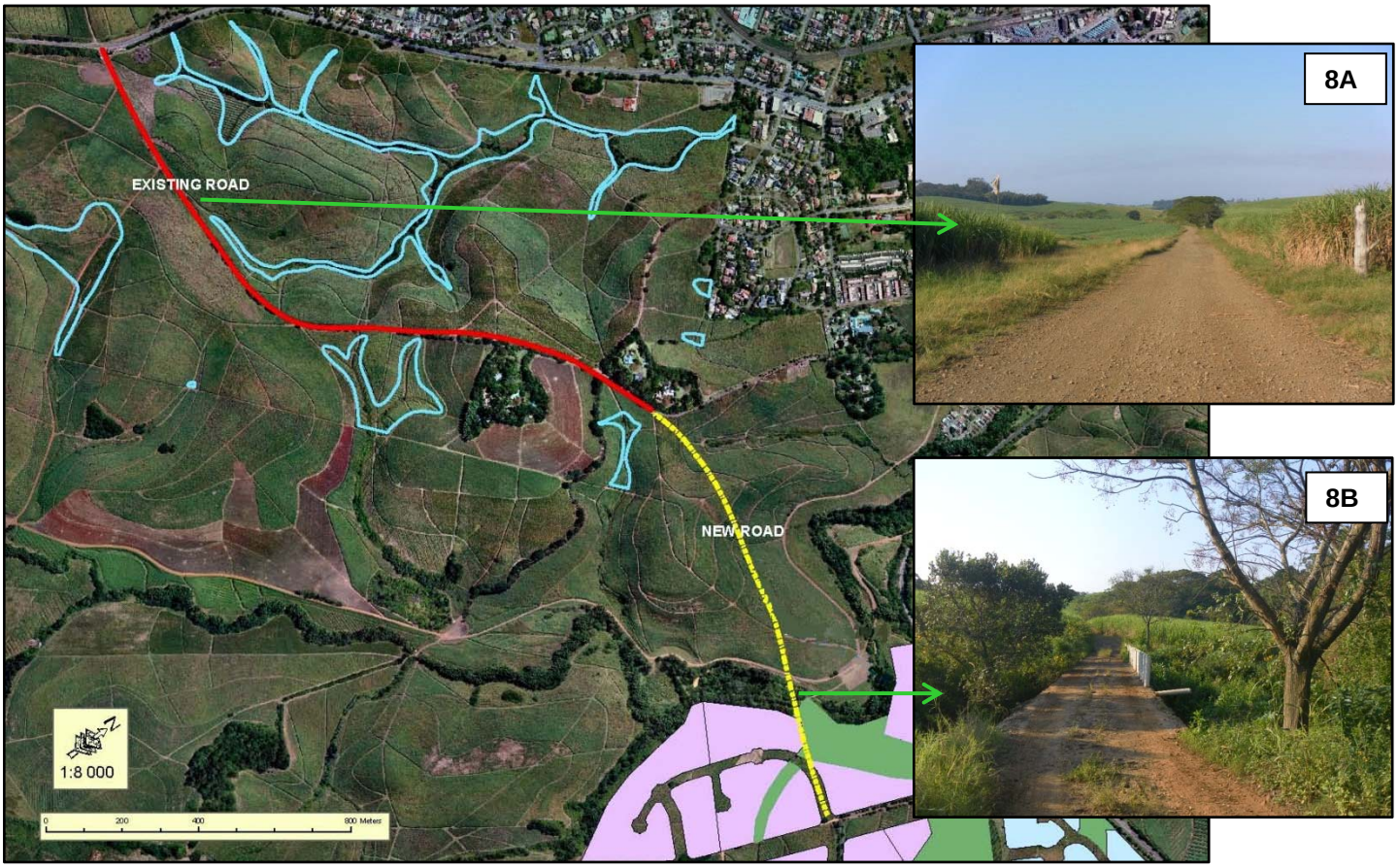
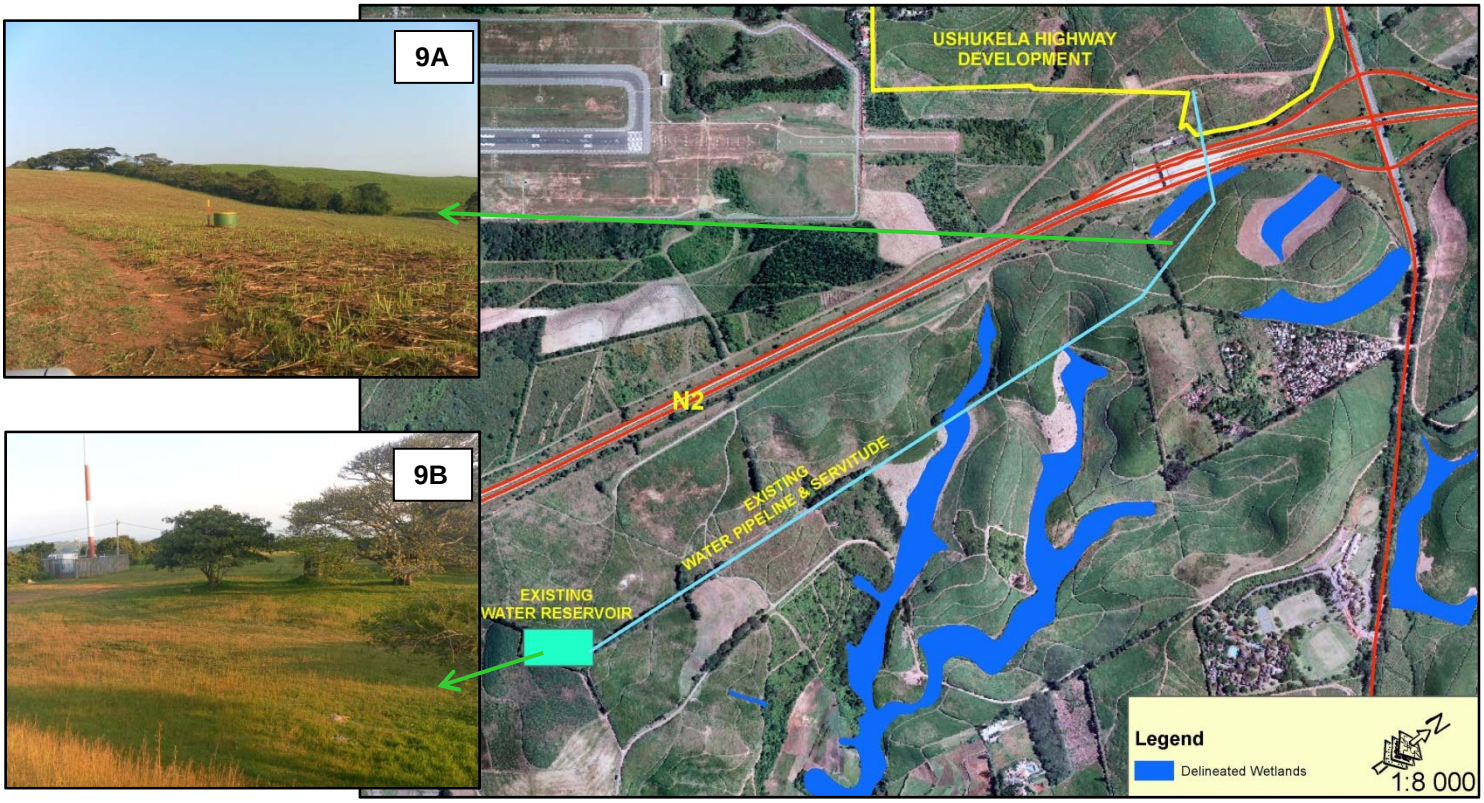


Figure 9: Delineated wetlands south of the proposed uShukela Highway Development shown in blue (source: LRI).
9A – Photograph taken in a south-westerly direction of the sugarcane fields where the water pipeline will run within an existing servitude adjacent to the existing pipeline.
9B – Photograph of the existing La Mercy Reservoir site where the new water reservoir will be located.



Identified environmental risk for assessment: loss in wetland buffer zone and increase in run-off into drainage lines with change in land use, potential impact on the high water table and subsurface seepage overlying the permeable clayey sands in the eastern portion of the site, positive influence on the degraded drainage system if the applicant rehabilitates, increase in pollution entering the wetlands and river, potential increase in sedimentation if construction and operational activities are not monitored efficiently and increase risk of flooding due to increased runoff. Where the new access road crosses the Hlawe River, there is the potential that the longitudinal flow may be restricted and soil mobilised from the river banks during construction. The proposed new bulk water pipeline could potentially impact on the drainage in the central green corridor resulting in gully erosion.

4.2.1 Summary of Findings of Specialist Geotechnical Report [Regulation 31 (2) (j)]

A preliminary Geotechnical Investigation was conducted by TGC Engineers in September 2009 (Appendix 12) to determine the geotechnical stability of the site. A desktop study of available maps and literature review was undertaken. A site visit was also conducted to obtain an indication of the subsurface geology relative to topography by viewing available exposures as well as to identify features likely to be associated with potential geotechnical problems.

The investigation found that the eastern portion of the site is underlain by Berea Red Formation sands and clayey sands which have the potential to collapse and have moderate to high soil compressibility. According to the report, perched water tables are common in the sands overlying the less permeable clayey sands. G7-G9 quality material is anticipated to be obtainable from the upper sands (TGC, 2009).

The western portion of the site is underlain by Vryheid Formation sandstone/siltstone and dolerite. The specialist noted that in general, a moderate heave potential and moderate soil compressibility is anticipated in these soils (becoming high in lower valley slopes). However, in this case the dolerite is highly variable in profile across the site. The specialist also noted that 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. A localised area of G6 quality “sugar dolerite” may be encountered in the west central large dolerite intrusion; however this will be confirmed during the detailed geotechnical phase (TGC, 2009).

The majority of the site was found to be suitable for the proposed development. A map has been produced highlighting areas where there are seepage zones, steep slopes and potentially unstable slopes not recommended for development and is attached in Appendix 1 in the Geotechnical Report (Appendix 12 of EIR). It is recommended that detailed geotechnical investigations should be undertaken on a site-by-site basis prior to the commencement of construction activities on that site.

4.2.2 Summary of Findings of Specialist Freshwater Ecosystems Assessment [Regulation 31 (2) (j)]

An assessment of the freshwater ecosystems was conducted by GroundTruth in December 2010 (Appendix 8) to assess the current health status of the identified freshwater ecosystems within the development site. An initial site visit was conducted to collect field data after which the wetlands and riverine systems were divided into hydrogeomorphic (HGM) units.

In order to assess the wetland habitat within the study area, assessment techniques from the Water Research Commission's Wetland Management Series were adopted to assess the Ecological Importance and Sensitivity (EIS) and Present Ecological State (PES). To quantify the level of functioning of the wetland systems, and to highlight their relative importance in providing ecological benefits and services at a landscape level, a WET-EcoServices assessment was performed for each HGM unit. To determine the level of ecological integrity, a WET-Health assessment was also performed for each HGM unit to get an indication of the deviation of the system from the wetland's natural reference condition for the hydrology, geomorphology and vegetation.

Appropriate methodology developed specifically for river systems was employed in order to assess the EIS and PES. EIS information as derived from the classification of Quaternary Catchments within KZN was used to define, from a regional perspective, the importance and sensitivity of the river systems within the study area. The determinants used to determine regional EIS were then adopted in order to determine the EIS on a local scale. This procedure was informed using information obtained from desktop analyses and observations noted during the site visit. The Index of Habitat Integrity (IHI) method was used to assess PES based on impacts from present drivers and pressures based on the intensity and extent of anthropogenic activities. Separate IHI assessments were conducted for each of the river systems and their respective catchments defined according to the study area. Each IHI assessment is based on the assessment of several metric groups (e.g. hydrological, physico-chemical, bed, bank, and connectivity modification) with distinction between in-stream and riparian habitats.

The specialist study found that from the abovementioned assessments of the wetland and riverine habitat, the freshwater ecosystems within the study area have been modified. The assessment of ecological importance and sensitivity, however, suggests that these systems are nevertheless providing valuable ecological goods and services within the landscape and to downstream systems. The PES score illustrates that the ~54 ha of wetland habitat assessed is considered to be the equivalent to ~18 ha of intact wetland habitat.

Since the Freshwater Ecosystem Assessment, Wetland Consulting Services (Pty.) Ltd (WCS) were commissioned to carry out a number of wetland impact assessment prescribing detailed recommendations for the proposed uShukela Highway Development. Recommendations were given by GroundTruth in the Freshwater Ecosystem Assessment however the recommendations and mitigation measures prescribed by WCS are more relevant, site specific and accurate. The wetland impact assessments that were carried out as well as all recommendations have been summarised in the following sub-section.

Identified environmental risk for assessment: further loss of wetland system and riparian habitat, impact on the large continuous valley bottom system within the landscape, increased stormwater run-off entering the wetland system, overall change in on-site hydrology, exasperation of erosion on site and an increase in wetland and river sedimentation.

4.2.3 Summary of Findings of Specialist Wetland Reports [Regulation 31 (2) (j)]

The main environmental impact that the proposed development will have, will be on the wetlands system currently existing on the site, noting the fact that the majority of the wetland system is under sugar cane cultivation and hence highly modified. The applicants have consulted with Wetland Consulting Services (Pty.) Ltd (WCS) to assess the impact of the development on the existing wetland system, to recommend appropriate and adequate mitigation measures towards ensuring that the wetlands are managed efficiently on site by retaining their functionality. The proposed uShukela layout has been amended according to the wetland specialist's recommendations in order to reach a solution which is sustainable from all perspectives.

An initial Wetland and Riparian Assessment was conducted by WCS in October 2010 to provide a detailed assessment of the current wetland and riparian habitat potentially impacted on by the proposed development (Appendix 9). A further assessment was carried out in July 2012 (Appendix 10) to explore a number of alternative

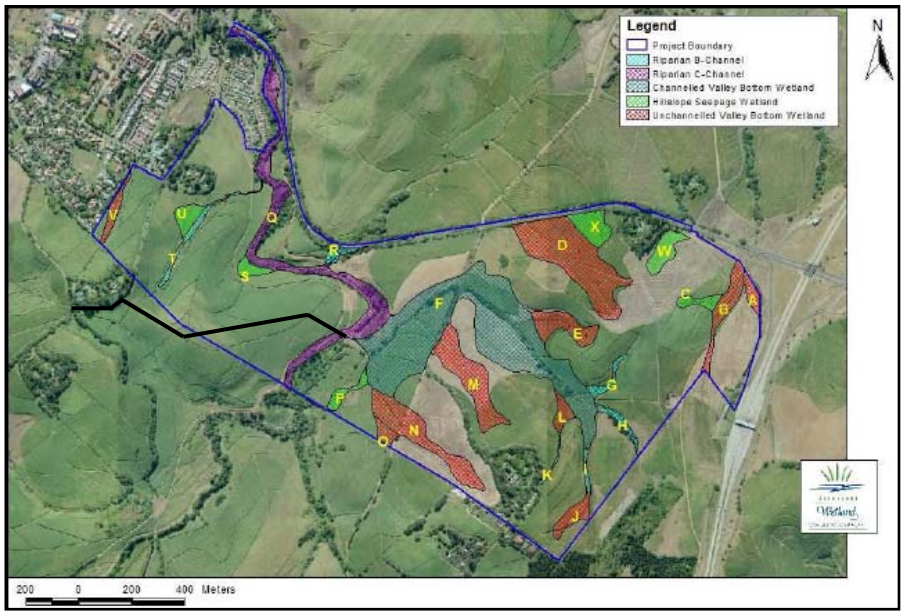
layout and mitigation scenarios aimed at minimising the environmental impact of the development on the aquatic resources, while at the same time achieving a potentially viable development. A final report was compiled in April 2013 (Appendix 11), which reviewed the effectiveness of the modified development layout (as depicted in Figure 1 of the EIR) taking into account the findings of the other two previous reports. Relevant information drawn from all reports has been summarised below.

The October 2010 objectives were as follows:

- Assess the ecological functions performed by each identified wetland hydrogeomorphic (HGM) unit, and determine their importance within a landscape context;
- Assess the current ecological integrity of the riparian tributaries;
- Consider the nature of the potential impacts of the development on the various aquatic systems;
- Provide recommendations for the mitigation of the projected impacts of the proposed development on the receiving environment.

Wetlands and riparian habitats occupy an area of approximately 54 ha with wetlands comprising 43ha of this 54ha. Figure 10 shows the location of all the HGM units identified by the specialist. The Hlawe River is the main watercourse associated with the project. This is an important tributary of the Tongati River, a regionally important and heavily impacted water resource with which it confluences approximately 2km to the north of the site. The primary ecological driver for these wetlands is subsurface seepage. All wetlands, and therefore the level of ecosystem delivery, have been severely compromised by historic disturbances associated with the current land use (sugarcane farming). Ecological services across the wetlands ranged from low to intermediate. The **dominant common ecological services provided by the wetland network are flood attenuation, stream flow augmentation, provision of clean water, sediment trapping and soil erosion control.** It was suggested that the most important riparian unit from a hydrological perspective is the perennially flowing tributary to the Hlawe River. Table 3.1 in the October report supplies the ratings for each ecosystem service provided by all the identified wetlands.

Figure 10: Wetland delineation within the uShukela development footprint including a rough indication of the location of the access road in black (source: Wetland Consulting Services, October 2010).



A wetland functional assessment and riparian ecological integrity assessments were carried out (methods outlined in section 2 of the October 2010 report). HGM F, M and J (as shown in Figure 10) were ranked the highest in terms of ecosystem benefits and services. HGM Q (the Hlawe River) was rated as the most important riparian unit from a hydrological perspective. All HGM units have however been largely modified with the major consistent impact being the removal of indigenous riparian vegetation.

Data from a past study (Codner *et al.* 1988) found that average runoff from an urban catchment was six times that from a rural catchment and the peak flow from a one year Average Recurrence Interval (ARI) event was ten times as large. The consequences of the increase in hardened surfaces within the development site are likely to be:

- Increased runoff volumes and flow rates, both into the wetland and through the wetland. This may result in further erosion, gully incision and an overall loss in wetland functioning;
- Increased erosion within the riparian units as the greater flow volumes and velocities manifest themselves in the form of channel scouring;
- Increased point-source erosion from road culverts and storm-water discharge points, which may not-only contribute to the elevated flow velocity within the receiving environment, but also result in exacerbated lateral gully erosion within the highly erodible soils particularly on the eastern side of the study area;
- Elevated sediment deposition into the *Tongati* estuary, with the associated detrimental impacts on estuarine ecosystem functioning;

- A potential decrease in water quality of water entering the wetland systems from hydrocarbons washed in from the road network;

In considering the impacts of the development, and ways in which to mitigate them, it is necessary to note the following:

- The impacts are likely to be more severe on the wetlands in the sandy soils of the eastern half of the development site because subsurface seepage is a dominant driver of these systems;
- The water within the development will have to be carefully managed if the objective is to maintain these wetlands in their current state; and
- The wetlands are currently severely degraded. They therefore provide a valuable opportunity for rehabilitation to improve the overall degree of ecological functioning within the landscape. Again, the water within the site must be carefully managed.

The 2010 report suggested a number of alternatives which included the use of buffer zones, permeable pavement reducing the amount of runoff and associated pollutants leaving the area, the use of grassed swales in association with infiltration trenches, construction of wet detention ponds to create areas of extended wetness, grass lined channels to absorb runoff from road surfaces and stone filled infiltration ditches. The specialist noted that there is potential for wetland rehabilitation which is likely to result in a substantial increase in most of the biological benefits provided by wetlands, if not the social benefits. More feasible alternatives were, however provided in the 2012 report and therefore the alternatives listed above are not outlined in detail.

A further assessment was carried out in July 2012 (Appendix 10) to summarise a number of alternative scenarios aimed at minimising the environmental impact of the development on the aquatic resources, while at the same time achieving a potentially viable development.

The 2012 report focussed on investigating a number of alternative scenarios aimed at minimising the environmental impact of the development on the aquatic resources, while at the same time achieving a potentially viable development. The economic consequences of the different options were communicated in meetings convened specifically to identify a compromise between the area of the development and the impact that this would have on the water resources. It was recognised early during the process that the risk that the environmentally degrading proposed change in land use would have on the on-site and downstream water resources relate primarily to the increased erosion of the water courses associated with higher flow rates, higher peak flows and increased frequency of bank full events, typically associated with urbanised and industrialized catchments.

New development alternatives were developed in order to reach a compromise between the area of the development and the impact that this would have on the water resources. The primary factors that were used to guide the outcome were:

- The zoning of the area being a natural extension of the Dube Trade Zone closely associated with King Shaka International Airport including the new link road between the Tradeport and Ushukela Highway.
- The impact that the change in land use would have on the hydrological characteristics of the site.
- The condition of the water resources on the site based on the WCS assessment.
- The overall intentions of the Water Act which recognises the balance between responsible water management and economic development.

<u>Alternative 1:</u> Restrict Development activities to 30m outside wetland boundaries.
This alternative is widely accepted by most environmental authorities where the wetland boundaries are delineated, and a 20 or 30m buffer zone placed around them, with the remainder of the site being available for development (Figure 3 in specialists report, Appendix 10). The advantage of this approach is that it is administratively simpler to evaluate, absolves the need for a Water Use Licence (unless access roads and service servitudes are constructed across the wetlands) and is considered by the authorities to represent a reasonable compromise to maintain wetland functioning and biodiversity.

The rationale and argument for buffer zones however was difficult to support due to a variety of reasons listed on page 6 of the wetlands report (Appendix 10). A predetermined buffer zone is unlikely to cover the full extent of the area that comprises the source of water of such wetlands. It is therefore inappropriate where the change in land cover is associated with a change in hydrological regime. It is the opinion of the specialist, and supported by observations in urban catchments, that the simple adoption of buffer zones, while bureaucratically expedient, is inappropriate to achieve wetland and/or watercourse protection in this scenario where a change in hydrology is the main concern.

<u>Alternative 2:</u> Off-site mitigation

The possibility of applying offsite mitigation entailing the rehabilitation of wetlands was considered to compensate for the loss of any wetlands as a consequence of the development. The "wetlands" on site however, bear no resemblance to their original state, with the soil characteristics, the drains and the landscape position being the only features that lead to the areas being classified as "wetlands". The advantage of this approach is that it is "secures" wetlands and wetland related functions which are interpreted as being of benefit to society however a number of disadvantages are also outlined by the specialist on pages 7 and 8 of the report. One of the disadvantages is the dis-association of wetlands from the catchments and broader catchment related processes in which they exist. Draft guidelines have recently been released that present an approach that could be considered if this option were to be pursued. (Macfarlane et al 2012).

Alternative 3: On-site mitigation
This would entail isolating individual catchments or a large part of a catchment and maintaining existing land use/land cover and/or restoring these to pre-current land use conditions within these isolated catchments. The option of targeting the central drainage line and its associated catchment was considered from a biodiversity and functional perspective. The "value" derived from this would likely compensate for the loss of wetlands in the remaining sub catchments.

This option was however not considered to be feasible as it divided the development into two sections. This created a number of associated risks including security and investor issues. (Please note that since the release of this wetland assessment report, the applicants have successfully managed to incorporate a central green corridor through the site as illustrated in Figure 1 of the EIR).

Alternative 4: Economically/Environmentally Sustainable Land-use Compromise Option (Preferred)
Integrating hydrological controls throughout the proposed development was proposed as a means of meeting the goals of the proposed development with an acceptable "cost" to the water resources on the site. This approach was recommended based on the assessment of the site and the proposed change in land use. A variety of other factors were taken into account such as drainage through the current valley bottom foot slope seepage systems is formed by the construction of herring bone drainage systems. Of the 43ha of wetlands delineated on the site only 1% or approximately 4 ha was not planted to sugar cane and the vegetation in the wetlands is sugar cane.

In order to reduce the risks posed by any land cover/land use change on site to the water resources identified on the site the following goals were proposed which would to a large extent compensate for the proposed rezoning of the land from Agriculture to Industrial, and meet the overall aims of the National Water Act:
- Manage the post-development hydrology to within 10% variance of the predevelopment modelled flows;
- To facilitate the ingress of stormwater into the ground to replenish wetlands;
- Prevent any further soil loss (reduce the erosion risk) from the site;
- Ensure that there is no net-loss of wetland functioning from the site;
- Retain the lateral seepage into the central stream channel in order to maintain the riparian trees that have established and are stabilising the stream channel and banks.
- Improve the overall biodiversity of the site.

Using the above as the guiding principles a layout was developed, based on a number of layouts/hydrological modelling iterations, until and an ecological/economically "sustainable" option was developed. This option was accepted as being a compromise between all the options that preceded this layout and which had a high probability of meeting the hydrological and environmental objectives.

The requirement to compensate for:
- the loss of wetlands;
- the loss of biodiversity associated with the wetlands;
- the reduction in the capacity of the site to intercept rainfall;
- the loss of evapotranspiration capacity (carbon sequestration through photosynthesis);
- the requirement to reduce the time to concentration of flows has been partially met in the overall landscape development plan, the details of which are covered in a separate report (Stormwater Management Plan Appendix 3 and the Landscape Master Plan Philosophy Appendix 13, while the hydrological aspects have been accommodated within the overall layout).

The result is that the post development landscape will comprise the following mix of habitats: open spaces (21.6 ha), areas along roads for swales/green infiltration/ indigenous planting (11.5 ha) and embankments (14 ha). This totals 47 ha compared to the pre-development landscape where a total of 54 ha of wetland and riparian habitat was recorded. Provisions have been made within the development itself to manage post-development hydrology to within 10% of pre-development flows. Individual property developers will be required to manage the first 25mm of rainfall on their own properties.

The impact of stormwater runoff is mitigated by the creation of a greater number of smaller, localized catchments, depressions or check facilities (landscaping, fences, walls, road kerbing etc) and longer, more complex drainage lines in the urban environment. The details of the stormwater management plan are presented in Stormwater Management Plan (Appendix 4) as summarised in section 3.1.2.

The concept of "hydrological landscaping" was introduced during the development of the current layout, as illustrated in Figure 1 of the EIR. The concept is defined as "*a landscape that provides a range of societal benefits including economic returns linked to the presence of water, including productivity, biodiversity support, flow regulation, biogeochemical processes at the soil level as inferred from the presence, extent, type and condition of wetlands, which does not compromise the condition of the immediate downstream reach*".

An impact assessment based on key elements was conducted to obtain a rating (high, medium and low) for the various environmental effects. The key elements used included the probability of the impact occurring, the consequence of the impact and the significance level of the risk posed (synthesis of the probability of occurrence and consequence of occurrence).

The approach adopted in this study recognises that local land cover/land use within a catchment will affect the hydrological processes on this site, but that the loss of water dependant ecosystems is compensated for by benefits gained by society together with ensuring the maintenance of the hydrological characteristics of the transformed site in a way that does not compromise the water (flow duration and availability) and the water dependant ecosystems immediately downstream of the site.

A number of construction related and operational impacts were identified, each with associated mitigation possibilities which lowered the significance of the impact. The identified impacts included:

- the direct loss of wetland and associated fauna and flora (55% of the wetland area lost),
- disruption of hydrology including the interception of perched water,
- erosion/increased sedimentation in the stream sections and
- contamination of water.

The specialist recommended that should a change in land use and its associated land cover be authorised, that method statements be developed covering the complete range of activities proposed for the site, and the sequence in which the activities will take place.

The final April 2013 wetland management report (Appendix 11) should be seen as an addendum to the July 2012 report. The major concerns were reiterated as well as the key environmental achievements for the site. Applicable considerations were also outlined. All this information has been included in the above summary. Further attention is drawn to the importance of the soils within the catchment to determine water storability. The soils function as a reservoir and slow decant mechanism for rainfall reducing erosion and influencing baseflow in the Hlawe River. The water storability lost by the introduction of impervious surfaces would need to be replaced either through attenuation ponds or storage facilities. Modelling the hydrology of the site taking into account storage and interflow based on the soils was recommended by the wetland specialist. Subsequently, Bosch Stemele prepared a modelling report titled "Analysis of Site Catchment Hydrology and Influences of Development of Catchment Storage and Surface Run-off" and is summarized in section 3.2.1 (Annexure E of the Stormwater Management Plan in Appendix 4 of the EIR).

After reviewing this report, the wetland specialist recommends that a protocol be designed to ensure that the means to quantitatively measure the discharge rates into the receiving environment in the post-development landscape, as well as the volume of flow leaving the site. This should form part of the monitoring programme.

The specialist notes that the development layout has changed appreciably since the initial meetings. The layout, as shown in Figure 1 of the EIR, is a result of careful consideration of all environmental, social and economic factors thereby representing a compromise. Two adjustments to the layout proposed in July 2012 are the access bridge over the Hlawe River and the construction of the water pipeline through the centre of the central drainage line. The wetland specialist provided the following comments on the two new activities:

Bridge across the Hlawe River

Unlikely to significantly impact the environment provided that:

- There is no impediment to longitudinal flow;
- The height and dimensions of the bridge consider 1:100 year flood lines;
- No soil is mobilised from the river banks during and subsequent to construction and
- The environment within the structures sphere of influence should remain stable.

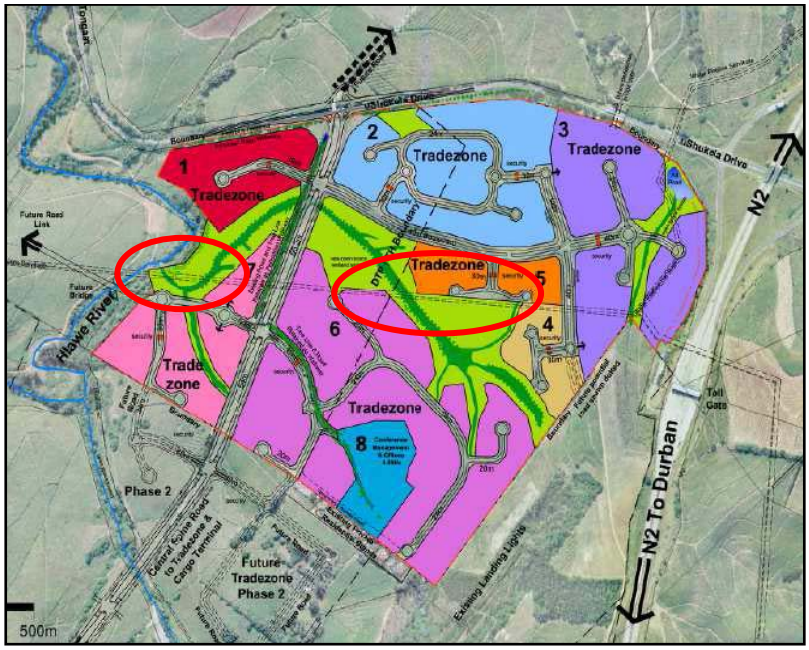
There are likely to be ample opportunities adjacent to the bridge to offset any negative impacts on the vegetation at the point of crossing.

Water pipeline

The existing Umgeni Water pipeline crossing poses a problem in that it obliquely crosses the central drainage area at two localities (circled in red on Figure 11). Possible environmental problems are:

- The impediment to longitudinal flow and poor control of discharge downstream;
- Preferential points of flow discharge, which may increase the erosion threat by confining flow;
- Confinement of flow, particularly in the western section. The oblique nature of the crossings introduces conditions where water may accumulate and flow preferentially along the length of the pipeline, potentially resulting in gully erosion.

Figure 11: Red circles illustrating where the proposed bulk water pipeline obliquely crosses the central drainage canal (source: Wetland Consulting Services, April 2013).



In terms of the pipeline route, extending to the east of the developing to the La Mercy Airport Reservoir site, this pipeline was recently upgraded with the necessary environmental authorisation. One can therefore assume that all necessary wetland impacts were taken into consideration.

The main environmental management goal as a result of the change in hydrology on site is:
"To ensure that the functions associated with the original wetlands are maintained in order to protect downstream reaches from the impacts associated with the changes in the catchment and to continue to afford habitat to support biodiversity" (WetCS, 2013).

The post-development site objectives are:

- Ensure that flow rates off the site do not exceed by more than 10% the pre development flows for the average annual return event storm,
- Ensure that the water quality leaving the site is conforms with the quality associated with pre development quality
- The species richness of the system is improved upon compared to that in the pre-development condition
- To retain the lateral seepage into the central stream channel in order to maintain the riparian trees that have established and are stabilising the stream channel and banks
- To prevent any further soil erosion from the site

Recommendations to achieve these objectives include:

- Replace the loss of storability of the soils as a consequence of the increase in impervious areas within the catchment, with surface storage.
- Manage, across the property, storm water discharges with consideration for both water quality and flow rates
- Introduce a range of techniques at all levels of the development with the objective of reducing both the volumes and rate of runoff from the developments proposed on the site itself and,
- In addition to the above it is important to include in the overall objective of the storm water management plan opportunities for supporting biodiversity.

Strategies to fulfil the recommendations:

- Channels/swales to convey storm water from their point of discharge safely across the property. These have been incorporated into the development plan;
- Maximising the permeable surface area within the site. Permeable areas have been designed to cope with inundation, and hence will also form an attenuation function;

- Wet detention ponds to serve both an attenuation function as well as to provide habitat for biodiversity. These have been mentioned in the stormwater report, but will require modification from the standard attenuation pond design
- Bio retention areas linked to the proposed infrastructure to intercept, store and treat storm water runoff generated on the site itself. These would in effect replace the proposed 30m buffer by providing a similar function, including that of biodiversity support. These would be key to ensuring that the objective of maintaining subsurface flow to the riparian vegetation in the central system is met.

Further site specific recommendations were outlined.

1. Swales and Drains

Storm water drains and other drains that discharge water onto the site should formally connect to the central drainage system via purposefully designed channels to prevent soil erosion, improve water quality and create habitat. Runoff off the road surface should be directed into grass lined channels, stone filled infiltration ditches etc. rather than into an underground piped systems. The side slopes could be sloped and lined with indigenous trees/grasses however the bottom of the channel should be protected to prevent soil erosion. The developer intends to line the channels with permeable, scour-resistant material such as grass blocks where flow velocities are expected to exceed the design norms of the natural material. The advantages are outlined in the report but the combination of vegetated swales and infiltration trenches, generally lead to slow storm water run-off, trap pollutants, promote infiltration and reduce flow velocity.

2. Wetland Attenuation Features

The design would entail a wet detention pond that consists of several levels, or terraces. The bottom would contain permanent open water, fringed by reeds and sedges, with a retention time for 1:2 year return event storms in the order of 48 hours. This extended detention is advised to assist in meeting the water quality objectives. The release system could be a series of siphons or alternatively a staged release system to ensure that downstream velocities do not exceed by more than 10% modeled pre development flows.

Retention systems can provide both water quantity and quality control by mimicking a natural pond or lake ecosystem. The main pollutant removal mechanism in retention systems is sedimentation. The depth and area of the attenuation features would have to be factored into the attenuation calculations, but the rationale is that it should be maintained at a depth too great for *Typha capensis* to colonise during the wet season, so possibly 1m.

The wetland specialist further describes a sequence of terraces (of any width) that could be constructed, progressing outwards with each height increase. This feature would enhance wetland biodiversity considerably by creating a wetland vegetation community mosaic, attenuate flows from the development and contribute to water quality enhancement.

3. Bioretention Area

Bio retention areas consist of flow-regulating structures that process inflow passing through a shallow depressed planted area containing ground cover (low-lying plant growth or an organic mulch), a planting soil supporting a range of facultative plant types, and a bottom support soil layer. Each of these features has a specific role in storm water pollutant removal. Figure 4 in Appendix 11 illustrates the function of a bioretention area. The bio retention areas have a variety of unique features making them attractive for use, such as the ability to fit in existing grassy areas along parking lots or the benefits they provide for stormwater management.

The specialist recommends that bio retention areas be constructed at the interface between the platforms that border on the central drainage line or 10m measured horizontally from the 1:100 year floodline whichever is the greater. The seepage passing via these features would be important for maintaining the riparian tree community that has developed along, and is stabilising the sides of, the central drainage system.

The specialist **concluded** that since the area is going to be rezoned from agricultural to commercial/light industry, a change in land-use is unavoidable and it is not feasible to expect the wetland hydrogeomorphic units to remain unchanged in the future. A linear buffer may not be effective in meeting the environmental objectives of the site but rather the application of a variety of measures aimed specifically at fulfilling the same functions as the wetlands currently do. The main concern related to the decrease in water storage capacity of the deep sands increasing flow velocity and volume of water leaving the site. The project hydrologist there performed additional studies to ensure that they can meet the objective of ensuring that flows leaving the site will be maintained within a 10% variance of the current flow regime. It is likely that the incorporation of bioretention areas, swales and wetland attenuation features will be adequate to replace the hydrological functions currently being performed by the wetlands. However, it is recommended that a mechanism be put in place to quantitatively measure flows leaving the site following development. Should any form of environmental degradation be identified, the developer should commit

to implementing immediate remedial measures. The wetland specialist is confident that, with the appropriate design and implementation, wetland biodiversity will be substantially improved compared to the current scenario.

Irreplaceable wetland functions include biodiversity, water supply to the landscape and water quality. Since the wetlands on site have been totally transformed, engineering alternatives that perform the following wetland functions should be feasible provided the hydrological modeling is correct:

- Water storage - attenuation features, through infiltration encouraged by the network of swales, the permeable surfaces and bioretention ponds, and increased evapotranspiration from trees and vegetation planted within the site;
- Flood attenuation - attenuation features and bioretention ponds
- Flow regulation - attenuation features and bioretention ponds
- Enhancement of water quality - attenuation features
- Sediment trapping and soil erosion control- swales and attenuation facilities
- Enhancement of biodiversity - across the site through introduction of indigenous wetland and forest vegetation communities.

Prior to the development commencing, specific method statements for each mitigation structure and measure should be compiled, as stated in July 2012 Wetland Impact Assessment. While the reports and recommendations have been summarised above, the full recommendations can be found in the Wetland and Riparian Assessment reports in Appendix 9, 10 and 11.

Identified environmental risk for assessment: due to the change in land use the main identified risk is the change in hydrology on site. Impacts potentially more severe in the eastern portions of the site. Potential impacts identified by the wetland specialist include an increase in runoff volumes and flow rates resulting in erosion, gully incision and an overall loss in wetland functioning, increased erosion within the riparian units including channel scouring, increased point-source erosion from road culverts and storm-water discharge points exacerbating lateral gully erosion, elevated sediment deposition into the Tongati estuary, pollution entering the wetland systems decreasing water quality and a direct loss of wetland and associated fauna and flora.

4.2.4 Summary of Findings of Specialist Agricultural Potential Assessments [Regulation 31 (2) (j)]

The aim of the agriculture assessment was to evaluate the consequences of the change in land use on site. The significance of altering the existing agricultural usage to commercial/mixed use development was investigated. An initial Agricultural Potential Assessment was conducted by J.S. Phipson, Agribusiness Consultant, in December 2009 (Appendix 14) to study agronomic and agribusiness issues.

The methodology used in this study included an interview and drive around with the respective farm managers. A desktop study was conducted of BRU data, Soil Parent Materials and Soil Systems common to the area and in addition, a geological history of this sub-region. In compliance with the KZN DAEA requirement for the assessment of standing sugarcane of one observation pit per 50 ha, a route for the digging of 32 observation pits was mapped out. Pits were excavated to a typical depth of 1.5 m using a TLB. Slope was measured using an Abne Level. A further drive through was undertaken accompanied by a member of the DAEA Land Usage team.

The agronomic assessment found that the farm is currently suitable for sugarcane production but in the medium to long term will become progressively less viable. Steep slopes, shallow soils, heavy clays and wetness severely limit the choice for other crops, and in particular annually cultivated row crops. The intelligent use of well funded resources and the meticulously planned application of good agricultural practices have led to gratifying yields from mediocre soils. The agronomic assessment took into consideration the locality, geology, the BioResource Unit, Climaticalogical data, inspection pits, slopes, soil texture, rooting depths, wetness, permeability, rockiness, land capability class, water, 50m radius and indigenous flora.

The agribusiness assessment found that urbanization has had an impact on planting and milling geography, but in terms of industry production the subsequent loss of sugarcane is of minimal significance. While capacity at the mills currently operating in KZN appears to have stabilized, cane production has declined. Industry emphasis and investment is moving away from dry land farming in KZN to irrigated production further north and, more particularly, outside of RSA.

The report concludes that the impact of the change of use from agriculture to commercial/industrial development needs to also take into account the loss of cane production from land currently leased from Airports Company of South Africa (ACSA). During the cutting season the estate currently employs between 200 and 300 personnel, many of whom are low grade seasonal workers. The commercial/industrial development of this site will present numerous employment opportunities during both the development and operational phases.

Due to the proposed sites close proximity to the KSIA and the Dube Trade Port the strategic importance of the development was evaluated further in a second Agricultural Potential Assessment carried out by Roy Mottram in December 2012 (Appendix 15).

The aim of the second phase agricultural assessment was to determine the current and future agricultural potential of the site. The report recognizes development within identified growth corridors from a socio-economic perspective as well as the importance of the agricultural sector. The proposed site is strategically located within the planned expansion of the Northern Node of eThekwini however is currently farming sugarcane. The proposed sites agricultural potential was therefore assessed to ascertain whether the proposed development should go ahead or whether the land should be retained for agricultural purposes.

From an agricultural perspective, the KZN Provincial Growth and Development Strategy (PGDS) and Plan (PGDP) outline some relevant government objectives including the need to promote agriculture and rural development whilst at the same time recognizing the need to promote investments in the Dube TradePort, KSIA and northern corridors of the province. One of the applicants, Tongaat Hulett is directly involved with rural, agricultural and urban development focusing on agriculture and rural development due to extensive sugarcane planting. Tongaat Hulett's focus is within the rural areas where there has been a major disinvestment in agriculture over the past 2 decades. The approach therefore enables the potential to release appropriate land for urban growth pressures such as housing or commercial whilst increasing the land under sugar cane.

The uShukela site is extremely well located with respect to existing and future development and trading opportunities. The specialist found that the proposed development will have no impact on adjacent agricultural uses.

The agricultural assessment included a basic soil survey based upon the requirements of the DAEA as well as a survey of all relevant crops that could be cultivated on the land to ascertain the most viable and sustainable crops. The site falls within the BioResource Unit Ya 14 defined as "Moist Coastal Forest, Thorn and Palm Veld". In assessing the agricultural potential for the site, the specialist took into account the soils, plants, climate, water resources and terrain.

The site was found to have a moderate agricultural potential. The specialist found that sugarcane production over the past eight years is well below simulated yield amounts. The site currently yields 56 to 76 t ha^{-1} $annum^{-1}$. With current costs and price of sugarcane the economic break-even yield for this Estate is estimated at 55 t ha^{-1} $annum^{-1}$, and with irrigation this increases significantly tending toward 80 t ha^{-1} $annum^{-1}$.

Since the beginning of the twentieth century, the contribution of agriculture to the national Gross Domestic Product (GDP) has decreased significantly from 20 to 4%. Construction and real estate development has however increased significantly over this time. These developments create a large number of employment opportunities and rates income for the Municipality.

The benefits associated with the change in land use from agriculture to development was estimated:
- 50:1 job creation
- 588:1 rates
- 250:1 turnover (contribution to GDP)

In regard to the loss of agricultural land, from a Tongaat Hulett perspective, the assessment report provides a clear indication of the fact that the impact of urban development on the loss of sugar cane has been insignificant. In fact, 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% to urban development would be insignificant.

In the 2011/12 year, 486 000 tons of sugar was produced in South Africa (KZN) from 137 652 hectares of land that was under cane (note only a portion of this land is cultivated each year). Significantly, the land used for cane in 2009 was 119 817 hectares, in 2010 the land under cane was 123 907 hectares and in 2011 the land used for cane was 129 513 hectares. There has therefore been an increase in land under cane by some 17 835 hectares over the past 3 years – an increase of some 15% and this includes land that was taken out of cane for new urban development.

For the 2012/13 year, a further 9 506 hectares of land was brought under cane with a further 10 000 hectares expected in 2013/14 and a further 7000 in 2014/15. Therefore at the end of the next 3 years an additional 26 506 hectares will be planted to cane which represents an increase of 44 341 hectares from 2009 – a 37% increase.

Significantly, the new planting has been occurring in rural areas where it is making a significant contribution to rural livelihoods and food security through acting as an anchor for food crops.

The minor loss of cane is therefore being more than mitigated by Tongaat Hulett with positive impacts on food security.

The specialist concluded that development of the uShukela site will:

- Fulfil the planned expansion of the Northern Node of eThekwini 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
- Create positive employment and socio-economic benefits

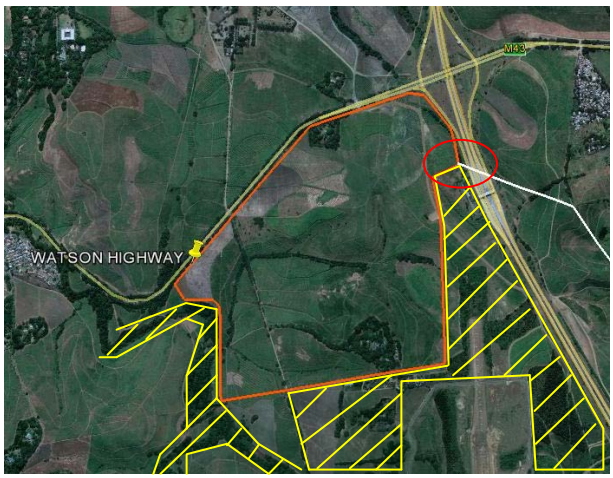
4.3 Biological

In terms of the biology of the site, the area has been significantly transformed for agricultural purposes with 85% of the proposed uShukela Highway Development footprint currently being used for sugarcane plantations. There is therefore very little vegetation of conservation significance. The road and water pipeline also traverse sugarcane fields and therefore little indigenous vegetation will be impacted on during construction and operation of the two proposed activities. As discussed in depth above, the proposed development footprint is anticipated to impact the existing drainage lines, associated wetlands and stormwater system.

The proposed site is boarded by portions of land that have been demarcated by the eThekwini Municipality as part of the Durban Metropolitan Open Space System (D'MOSS) however it is important to note that there is **no D'MOSS on the site itself** (Figure 12). The aim of D'MOSS is to preserve the city's ecological diversity and enhance living environments. A network of open space conservation and recreation areas, linked by open space corridors was created in municipal areas aiming to provide a range of open space services. These services include sustaining habitats and ecological systems as well as providing human life support requirements in the form of clean air, fresh water and flood attenuation. The proposed central open space corridor within the development will be directly linked into a broader open space system.

Identified environmental risk for assessment: Potential impact on environmentally sensitive areas such as drainage lines, potential wetlands and D'MOSS areas including the Hlawe River.

Figure 12: Aerial photograph showing the location of the D'MOSS areas. The red circle shows where the proposed water pipeline will leave the site on route to the La Mercy Airport Reservoir



4.3.1 Fauna and Flora

Apart from a few small mammal species associated with the sugarcane plantations (such as rodents), indigenous fauna are confined to portions of indigenous vegetation. Indigenous vegetation itself is limited on site and therefore there should not be any significant populations of fauna affected by the development. An ecological report was carried out to assess the natural habitat existing on site taking into account the fauna and flora. A separate specialist report was commissioned to ascertain the sites potential for avifaunal habitats. Both reports have been summarised below.

The biological areas of importance that were identified include the narrow strips of riparian habitats which contain a few protected plant species as well as the majority of bird species. The strips of vegetation are also valuable in terms of maintaining the riparian system as a whole. Both reports recommend that alien vegetation eradication take place and that during construction, the vegetation should be closely monitored and managed to ensure that impacts on the riparian habitats are limited. *Delonix regia* (Flamboyant) and *Trichilia dregiana* (Natal Mahogany), two commonly planted street trees, were found lining a portion of the existing Brake Drive (Figure 13). The majority of the trees are on the southern side and therefore the EAP recommends that the road is expanded towards the northern side of the road so these two species of trees are not completely removed. It should be noted that prior to the construction of the road the design will attempt to retain as many of the existing trees as possible. There is an existing house where the new access road begins (see Figure 8). Gardens are on the northern side of Brake Drive (Figure 14) and therefore this section of Brake Drive can be widened to the south in order to reduce the impact on the existing vegetation in this area.

As stated above, the pipeline navigates underneath sugarcane fields and crosses three wetlands (Figure 9 and 15). There is a large amount of alien vegetation such as Castor Oil plant (*Ricinus communis*) currently growing in the drainage lines as shown in Figure 15. The pipeline is unlikely to significantly impact on any existing vegetation due to the small size of the trench that will be required for the 400mm diameter pipe. The new reservoir is to be constructed adjacent to the existing La Mercy Reservoir and therefore the site is already cleared and maintained (Figure 9B). The EMPr (Appendix 24) includes specific mitigation measures to ensure that any potential impacts are prevented or minimized.

Figure 13: Photograph of *Delonix regia* (foreground) and *Trichilia dregiana* (background) lining the southern side of Brake Drive.

Figure 14: Photograph of the vegetation surrounding the existing house on the northern side of Brake Drive.

Figure 15: Photograph of the sugarcane fields where the water pipeline will cross with a section of weeds in the foreground illustrating the location of a drainage line.

Identified environmental risk for assessment: potential impact on riparian habitat which will have a knock on effect by potentially impacting the fauna associated with this habitat, positive impact associated with the removal of any alien invasive vegetation on and off site. Potential to impact existing Delonix regia and Trichilia dregiana lining the existing Brake Drive as well as the vegetation surrounding an existing house.

4.3.1.1 Summary of Findings of Specialist Ecological Assessment [Regulation 31 (2) (j)]

A Terrestrial Ecological Study was conducted by GroundTruth in December 2010 (Appendix 16) to identify and highlight ecologically significant areas for the site. A desktop assessment was carried out to determine the reference vegetation for the area as well as the land cover and natural habitat extent. A site visit was also conducted.

The study concluded that the site would historically have comprised of habitats typical of that of the KZN Coastal Belt vegetation type. However, 85% of the site currently consists of sugarcane. The area was found to be largely transformed and as such the habitat supporting local ecological functionality has been reduced to narrow longitudinal strips restricted to water courses. The riparian habitats also have become invested by alien plant species. However, it should be noted that the remaining patches of riparian habitat retain reasonable and important ecological value due to the presence of protected plant species and valuable functions offered by the riparian systems (GroundTruth, 2010). Therefore the specialist notes that it is important that any future development plans for the site must make provision to maintain and restore the ecological integrity of the remaining riparian habitat.

The recommendations have been summarised below and the full recommendations can be found in the Ecology report in Appendix 16.

- Alien plant eradication for the riparian areas situated within the Watson Highway and Inyaninga properties.
- It may be useful to engage with neighbouring landowners regarding upstream and downstream alien plant eradication to ensure that the effort on site are not in vain.
- Re-vegetation with indigenous plant species is crucial to ensure that rehabilitated areas are properly vegetated in order to improve the local biodiversity and ecological processes on site, and limit any further alien plant encroachment.
- The indigenous plant species should already be occurring onsite as well as species which could occur with the riparian areas that have been lost due to the site's particular disturbance history.
- A buffer of at least a 40m should be maintained in order to protect the riparian habitats.

4.3.1.2 Summary of Findings of Specialist Avifaunal Assessment [Regulation 31 (2) (j)]

An Avifauna Assessment was conducted by James Harvey in September 2009 (Appendix 17) to assess and describe the avifauna associated with the study area, with particular emphasis on rare and threatened species. The aim of the assessment was also to identify potential impacts of the development on avifauna and to recommend mitigation measures.

A site visit was conducted as well as a review of literature, databases and other available information. All rare and threatened species occurring or potentially occurring were identified and the importance of the site for these species was evaluated.

The assessment found that the habitats available on the site included sugarcane, riparian forest and thicket, aquatic habitats, grassland, and planted trees. The specialist notes that based on previous surveys conducted, a total of 214 bird species have been recorded for the area. During the site visit, 52 species were recorded on site. However, the specialist expected that the site will have 90-100 species occurring regularly. Several rare and threatened species occur within the study area, 11 of these were recorded on the adjoining property prior to construction of the KSIA. Several Red Data species are known to occur in the vicinity of the study area. However, the majority of these will not occur or are highly unlikely to occur on site as most require fairly extensive forest, grassland or aquatic habitats, habitat types which are either too limited, disturbed or completely lacking on site.

Only four species, all currently listed as Near Threatened, may use the site with any regularity. These species include the Woolly-necked Stork, Lanner Falcon, Hal-collard Kingfisher and the Black-throated Wattle-eye. One non-Red listed species that is uncommon in South Africa, the Palmnut Vulture, was recorded, with a pair observed in vegetation along the Hlawe River. However, the KZN population is peripheral to a large population occurring through much of central and western Africa, and the local population is not considered of conservation significance.

According to Harvey (2009) the site is of relatively low value for avifauna, given that much of it is covered by sugarcane fields. The loss of the grassland patch is not considered a problem as it is too small and fairly isolated from other areas of natural habitat to be of much avifaunal importance. However, the natural and semi-natural vegetation along the Hlawe River and its tributaries would maintain the most important areas for birds on site.

Assuming that impacts are actively mitigated against, the overall effect on the local avifauna can be kept to acceptably low levels, and the avifaunal value of the site could even be improved, if appropriate steps are taken. The avifaunal specialist proposed a range of recommendations which included recommendations relating to wetland conservation/protection. The recommendations specific to avifaunal conservation have therefore been summarised below and the full recommendations can be found in the Avifauna Assessment in Appendix 17. Recommendations relating to the wetland system have been prescribed by the wetland specialist and have been summarised in section 4.2.3 above.

- Areas of natural vegetation along the Hlawe River and its tributaries should be kept undeveloped and managed for their biodiversity (and other) values. Appropriate buffers along these systems must be set and strictly adhered to.
- An appropriate SWMP must be implemented to prevent changes to the hydrology of the receiving aquatic ecosystems.
- Sugarcane currently growing in the buffers should be cordoned off and not harvested prior to or during the construction phase, so as to provide a vegetated buffer. Once other storm management systems are in place, the sugarcane can be removed and rehabilitation can take place.
- During construction, all efforts must be made to minimise disturbance to these open areas – no waste of any kind must be allowed to enter the open areas during construction and erosion prevention measures must be put in place to prevent sediment from entering the aquatic ecosystems.
- There is opportunity to improve the avifaunal value of the open areas by encouraging the expansion of woody riparian vegetation away from the drainage line re-establishing the gap between the two areas of woody vegetation along this drainage line.
- Although the grassland patch is not currently considered of value specifically for grassland specialist birds, it could be linked to the riparian area ca 60m south of it, as this area does have established natural vegetation which would contribute to the rehabilitation and general ecological functioning of the open area system.
- An alien plant control programme (including monitoring) should be designed and implemented for the open area system and should rely strongly on mechanical removal; if the use of chemicals is necessary, the chemicals used must be confirmed to have no negative effects on any indigenous biodiversity by an appropriate expert prior to their use.
- Indigenous plants (preferably locally indigenous) should be used as far as possible in the landscaping of the developed portions of the property.

Identified environmental risks for assessment: Potential reduction in woody riparian vegetation habitat that is associated with four near threatened species - Woolly-necked Stork, Lanner Falcon, Hal-collard Kingfisher and the Black-throated Wattle-eye.

4.4 Social and Economic

There are three main communities which the uShukela Highway Development has the potential to affect from a social and economic perspective. Firstly, the node of Tongaat located approximately 600m North West of the proposed site has a total population of 112 677[7]. The relatively low levels of education, fairly high rates of unemployment and lower to middle income of the residents suggest a moderate to low quality of life on the Tongaat South and Tongaat central areas[8]. The second community of Herrwood have been residing within the study area south of the proposed site for approximately five generations. The social impacts associated with any construction (such as noise and dust), will have to be closely monitored to ensure that the Herrwood community is not negatively affected. The required upgrade of infrastructure for the development could however potentially benefit this existing community. Finally, the town of Verulam is located roughly 10km South East of the site with a population of over 63 000. In terms of economy, it is also important to note that the broader eThekwini Metropolitan will also benefit from the development in terms of job creation and private investment. Other neighbouring nodes that will be impacted by the proposed development will be Ballito/KwaDukuza South, Waterloo and Ndwedwe Rural.

The relevant specialist reports summarised below include a socio-economic impact assessment for the proposed uShukela Highway Development as well as assessing the socio-economic impacts that are likely to affect the nearby nodes of Tongaat and Verulam.

It can be concluded from the findings in all the reports that the uShukela Highway Development would be highly beneficial to the neighbouring nodes as well as the eThekwini Metropolitan in general because of the high levels of job creation and turnover that the park is expected to generate.

The impact on the Herrwood Community revolves around the construction nuisances of noise and traffic which will be mitigated through the EMPr, access, which has been provided for in the layout and land use compatibility. This latter issue is dealt with to an extent due to the proposal to retain the existing farmstead and renovate as a conference/hotel/office precinct which would be in-keeping with this existing residential community. Whether or not this community will continue to reside in this location in the long term is not part of this study but, given the likely

[7] Kwa-Zulu Natal Department of Health (http://www.kznhealth.gov.za/tongaatchc.htm) last edited on 12 February 2013.
[8] Environmental Impact Report: The construction of the Dube TradePort: Multi Modal Logistics Platform on the farm La Mercy No. 15124 in Durban, KwaZulu Natal, North Coast.

growth of the airport as well as the fact that the properties will ultimately be surrounded by logistics and warehousing industries, it is submitted that such a use is not appropriate in its current location.

Identified environmental risk for assessment: the development is likely to have both positive and negative social and economic impacts on all three communities.

4.4.1 Summary of Findings of Specialist Socio-Economic Assessment [Regulation 31 (2) (j)]

URBAN-ECON: Development Economists conducted a Socio-Economic Impact Assessment of the proposed development on the neighbouring Tongaat and Verulam nodes in December 2010 (Appendix 18), revised in July 2012 (Appendix 19) and updated in March 2013 (Appendix 20). Gabhisa Planning and Investments undertook an empirical study to identify and consider the extent of direct and relevant indirect socio-economic impacts that the proposed development will have on the local economy of eThekwini and the economic growth that the development may cause in a local situation (Appendix 21). Cumulatively, the reports consider both the socio-economic impacts of the development on the region as well as the more direct impacts upon the neighbouring towns of Verulam and Tongaat.

The URBAN-ECON March 2013 socio-economic impact assessment identified major impacts likely to effect the neighbouring nodes of Tongaat, Dube TradePort and Ballito/ KwaDukuza South as well as the secondary nodes of Verulam, Waterloo and Ndwedwe Rural. The study examines and provides an economic context for the range of social impact areas identified.

The report isolated the impact of the development on the following major socio-economic indicators:

- employment/ unemployment,
- commercial and business activity,
- poverty,
- skills development,
- black economic empowerment, and
- SMME development.

Due to their close proximity, the report identified Tongaat and Dube TradePort/ King Shaka International Airport as the first order impact zones (core focus of the assessment). To provide a regional context, the impact on the northern precinct of eThekwini, southern KwaDukuza and Ndwedwe/western rural area has also been provided. A variety of information was used and is listed on page 5 of the report (Appendix 20).

The implications of the proposed development was applied within the context of each impacted location respectively, and potential resulting negative and positive impacts were identified assuming their current socio-economic status quo. All identified potential impacts were rated by means of the Impact Rating Method. Where details on the development are not known yet, assumptions made are reflected in the text.

Using the associated capital investment on the site, **employment** implications were calculated. The specialist concluded that the proposed development will result in significant growth in job opportunities and business activity. During the initial readiness phase, 1920 temporary jobs will be created through the infrastructure related capital expenditure phase of the proposed development. In addition, it is estimated that 17 243 employment opportunities in the construction sector will be become available. This includes 10 785 directly within the construction supply chain and a further 8378 in indirect related supply chains. An anticipated 4026 permanent jobs are anticipated upon successful establishment of on-site businesses at the proposed development.

In terms of geographical impact areas, the primary impact areas identified were Tongaat, northern eThekwini and southern KwaDukuza including the Dube Trade Port and King Shaka Airport. The secondary nodes are Verulam, Ndwedwe/western rural and Waterloo, Umhlanga, and greater La Mercy). Tongaat is a primary node due to its close proximity to the site and its ease of access along Watcon Highway. DTP and KSIA are of importance to the proposed development with regards to creation of business and industrial activities as well as employment. Northern eThekwini and southern KwaDukuza will be the prime source of skilled labour to the proposed development. They also form an existing activity corridor that links the business parks of Umhlanga to the tertiary sector in Waterloo and onwards to Ballito.

Overall the primary impact areas have a low unemployment rate and indicate good employment opportunities. The labour force participation is low however, and is 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. In terms of the secondary impact areas, sparse household and population densities are characteristic of a rural region. The number of informal

households is also high. The majority of the working population is semi and unskilled individuals. The population that is unemployed is also mostly semi and unskilled with only 9% of residents being highly skilled.

The socio-economic impact assessment was conducted on the following criteria:

- Existing social facilities
- Existing businesses (retail and light commerce)
- Industrial activity
- Residential Demand
- Property Values
- Poverty
- BEE and SMME Development
- Informal Sector Development
- Skills Development

Tongaat

Existing social facilities – no strain anticipated. Increased use of the police services in Tongaat and back-up services of fire fighting stations

Existing businesses – in the short term businesses are expected to experience a boost and increased revenue due to the construction phase where workers require fuel and convenience retail.

Industrial and commercial activity – proposed development is expected to boost supportive industrial activity (suppliers, repairs and maintenance). There is an opportunity for creation of industrial value chains and linkages between Tongaat industrial Park, the proposed development, DTP and eThekwini. During operation, there will be more competition between suppliers with industry in Tongaat potentially requiring upgrading. Tongaat industrial stakeholders felt that the under-development of surrounding Tongaat-Hulett owned land resulted in Tongaat being constrained in its development. The proposed development is therefore creating the opportunity for industrial expansion encouraging investment in the region in the long term.

Property values – increase in residential property values. Business property values will depend on the existing businesses ability to remain competitive with new entrants located at the proposed development. If existing businesses remain competitive, their property values are likely to increase.

Poverty – decrease due to employment opportunities and general economic activity.

BEE & SMME development – provide opportunity for black-owned enterprises and existing black businesses/ investors in Tongaat to enter markets / competitive location next to highly marketed DTP.

Informal sector development – positive impact. Commuting workers to the proposed development will result in higher usage of public transport and access to informal service providers at commuting points. Increase in vendors and informal traders. There will be a considerable expansion in public transport network along uShukela Highway along with the DTP link road and planned revamp of the commuter rail in eThekwini north. There will therefore be numerous opportunities for economic growth in the public transport sector.

Skills development – numerous opportunities for strengthening and expanding existing skills.

A summary table is provided on page 25 of the report (Appendix 20).

Greater North eThekwini/South KwaDukuza Region

Existing social facilities – no pressure anticipated.

Existing businesses – the proposed uShukela Highway Development is aligned with the Northern Spatial Development Framework (NSDF) of the eThekwini Municipality, encouraging densification of development in northern eThekwini. All northern eThekwini/southern KwzDukuza nodes are expected to benefit from the growth of the entire northern eThekwini region due to increase exposure and market size. Long term positive impact. It is expected that the proposed development will become a large regional node serving the region between Umhlanga and Ballito.

Industrial and commercial activity – significant increase. According to both the iLembe and eThekwini Draft Industrial Development Strategy (2010), there is a significant recent shortage of industrial land in eThekwini and iLembe. As a result, the growth in rental price for zoned industrial land has been significant. The proposed development is expected to result in regional competition in commercial activity in the short run, and in the long run, it is expected to encourage regional specialisation in each light industrial node supporting the regional commercial value chains through clean and business focused production.

Dube TradePort – potential to impact tenants, industries / companies which need to be near cargo aircraft but do not need to be located directly on the DTP premises. There is anticipation that proposed development may be more affordable for medium-sized light industrial enterprise. DTP value-offering is specifically targeted, whereas the uShukela development has no specific parameters in place for potential tenants.

Poverty – positive impact through employment opportunities and economic migration.

Informal sector development – positive on and around the taxi industry with new taxi routes and ranks being developed offering more opportunity for informal traders.

Skills development – the proposed development will provide sectorial education and training centres to assist development of practical skills through internships and practical in-service training.

A summary table is provided on page 28 of the report (Appendix 20).

Verulam

Existing social facilities – no strain anticipated. Increased use of the police services in Tongaat and back-up services of fire fighting stations.
Existing businesses – similar to Tongaat in that businesses are expected to experience a boost and increased revenue in the short term due to the construction phase where workers require fuel and convenience retail. The duration of the impact of the proposed development on Verulam businesses, particularly those along the R102 corridor, is long term as this activity corridor will be linked to the M4 via the uShukela Highway Development.
Industrial and commercial activity – competition between proposed development's light industry and that which exists in Verulam is not expected to be significant.
Property values – increase in residential property values. Demand and therefore property values for commercial and industrial property in Verulam will also increase.
Poverty – positive impact through employment opportunities.
BEE & SMME development - provide opportunity for black-owned enterprises and existing black businesses/ investors in Verulam to enter markets / competitive location next to highly marketed DTP.
Informal sector development – positively boosted. Higher public transport utilization and opportunity for new taxi and bus routes.
Skills development – the proposed development will create opportunities to strengthen skills development in Verulam.

A summary table is provided on page 32 of the report (Appendix 20).

Western Rural Areas

Existing social facilities – no strain anticipated.
Existing businesses – no pressure expected.
Industrial activity – no identified or notable light industry in the western rural areas.
Property values – not expected to change.
Poverty – living standards are expected to be positively impacted particularly during construction when low skilled jobs are available.
BEE & SMME development – no impact on the formal BEE and SMME development in the western rural areas.
Informal sector development – positively boosted. Due to increased activity in and around Ndwedwe and both Driefontein Taxi Ranks. There will be an increase in trading activities and customers for taxi operators increasing informal business activities. Ndwedwe businesses are also expected to migrate in and around the proposed development.
Skills development – permanent improvement in skills levels for semi- and unskilled occupations.

A summary table is provided on page 35 of the report (Appendix 20).

The impacts were then quantitatively assessed by means of an impact rating method described in section 5 of the socio-economic report (Appendix 20). The overall significance of the impact was determined by considering consequence and probability using a rating system where the impact is rated as insignificant, very low, low, medium, high or very high.

Tongaat

The highest and most positive impact is the drop in unemployment. Another positive impact is the increase in property values and increased demand on the residential market. Negative impact associated with the competition between local firms and those within the proposed development. This will adapt in the long run developing more efficient systems and there will be greater exposure resulting in business growth. The full table of rated impacts is included on page 40 of the report (Appendix 20).

eThekwini & KwaDukuza Corridor

The highest and most positive impact is the proposed development functioning as regional link between Umhlanga, Ballito and Tongaat. There will be a positive impact associated with local increased circulation of revenue within the region as value chains deepen and more investment is attracted into the area. There will be a significant drop in unemployment in the long term. The full table of rated impacts is included on page 46 of the report (Appendix 20).

Verulam

Transport opportunities linking the KwaDukuza – Umhlanaga Corridor to the R102 corridor thereby promoting accessibility for commercial activity linking Business Park to Umhlanga Ridge via the uShukela Highway. There will be an opportunity for the development of more efficient/ customer focused operating systems due to competition. There will initially be an increase in commercial rental demand in the short term, as first movers seek adjacency to the development. This will result in higher profits for property owners and rental agencies. The full table of rated impacts is included on page 50 of the report (Appendix 20).

Western Rural Areas

There will be permanent opportunities for the expansion of BEE and SMME companies. The most important impact was the opportunity for these companies to enter larger markets, and grow. Another positive impact was the improvement in base skills level through the opportunities created in the development for unskilled labour absorption. The full table of rated impacts is included on page 55 of the report (Appendix 20).

Overall, impact of the proposed development is primarily positive, with the negative impacts mostly offset by the positive impacts. There were 13 main positive impacts, which include:

- The reduction of poverty through the long term drop of unemployment (Tongaat and Verulam).
- A significant reduction in regional poverty due mainly to a large supply of jobs.
- The reduction of poverty through the medium long term increase of employment in the region.
- Overall growth of Tongaat businesses (particularly those located along/ near uShukela Highway link to M4 corridor).
- Linkages to the M4 Commercial Services Corridor linking Umhlanga to Tongaat and KwaDukuza
- Higher prioritisation of the northern region by eThekwini, due to proposed development becoming regional node and the subsequent promotion of suitable densification within eThekwini's boundary.
- The opportunity for expansion of currently constrained economies of Tongaat and Northern eThekwini/ Southern KwaDukuza
- Reduction of leakage of economic revenue, due to the establishment of new regional industrial value chains.
- The growth of the regional economy, through encouraged commercial investment (due to the increase in supply of zoned land).
- Regional opportunities for the expansion of BEE and SMME companies.
- Permanent regional growth of the regional taxi/ public transport industry.
- Increase in employability of regional population through skills development through employment.
- Opportunity for a long term increase in employability of the regional population, (due to an increased pressure for tertiary institutions).

There are three identified possible negative impacts:

- Short and medium term competition between proposed development and existing regional commercial activity may experience lower profits.
- Possible lower profits for businesses for existing local businesses (as a result of short and medium term competition between proposed development existing commercial activities). Potentially less than anticipated profits for businesses –due to short (and medium) term competition in industrial activity between proposed development and other commercial nodes such as Dube Trade Port.
- There is expected to be economic migration from surrounding areas and subplaces outside of the catchment areas, which, in the long run may reduce the initial impact of a reduction in unemployment in the region.

With regards to fewer profits due to competitiveness, in the long run, the exposure to larger markets and increased revenue from potential business partnerships with the proposed developments new businesses can be seen as an offset. There may be some existing businesses however that are currently running at break point and 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. While the negative impacts are of low significance, they are still identified as requiring careful mitigating attention.

Mitigating measures include:

1. Create incentives for new businesses in the proposed development to source start up supplies from local firms. There should be discussions between the proposed developments steering committee and the local businesses (e.g. Tongaat Business Chamber of Commerce and Industry).
2. Developing a hire-local policy for construction phase will mitigate the expected economic migration from surrounding areas and sub places. In addition the existing skills profile of the area reflects the ability of the local community to take up skilled and semi-skilled employment opportunities as they arise in uShukela.

In summary, the proposed development will not only have a significantly positive impact on the primary and secondary impact areas, but provides a much needed unlocking of land resources required for their further economic development in a currently constrained area.

There are two significant positive impact areas:

- **Nodal and regional economic development and expansion** (provision of access to zoned land as well for further industrial and commercial use by existing businesses, and the expansion of the northern most region of eThekwini to the business corridor along the M4 to KwaDukuza);
- **Nodal and regional poverty reduction** (reduction and alleviation of poverty in the impact areas through the reduction in nodal unemployment levels and thus within the region. There is an increase in household earnings anticipated as employment opportunities are taken up within these areas).

These positive impacts are supported by the keys goals and strategies of the Tongaat LED (reviewed in Table 9 of the report)

There are two main negative impact areas:

- **Potentially reduced revenue of existing businesses due to competition** (possibility of mainly inefficient existing businesses not surviving competition. Here it is recommended that there be dialogue with business chambers and forums about the creation of incentives packages which encourage business linkages between existing business and the proposed development's new firms).
- **Influx of job-seekers to the region increase in surrounding informal settlements due to economic immigration** (increase in the potential for the establishment of informal households from job seekers migrating towards the development site. Developing a hire-local policy for construction phase will mitigate against this influx issue. Additionally, it should be noted that the existing skills profile of the primary and secondary impact area specifically, reflects the ability of the local community to take up skilled and semi-skilled employment opportunities as they arise in uShukela Development).

The most significant impacts are as follows:-

- The development will see new investment of over R4 billion into the local economy once all infrastructure and buildings have been completed.
- The proposed development will facilitate large-scale business establishment in the area, beneficial to employment creation.
- An estimated 1920 temporary jobs will be created during the site's capital expenditure phase for site's infrastructure readiness development alone.
- In addition during the development of on-site structures and buildings, based on the proposed developmentable bulks, it is estimated that 17 243 employment opportunities in the construction sector will be become available. This includes 10 785 directly within the construction supply chain and a further 8378 in indirect related supply chains
- An estimated 4026 permanent jobs will be created by business operations on-site. This was derived from the associated density ratios of employment on the proposed land-use areas.

The specialist concludes by stating that 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 uShukela Development will enable the northern eThekwini region, and Tongaat and KwaDukuza in particular, to access a vast range of economic opportunities that complement the existing logistical infrastructure of the Dube TradePort and KSIA, and thus positively enhance the regional competitiveness.

Identified environmental risk for assessment: construction related and operational labour opportunities, purchasing of locally produced goods and services, contracting for construction and capital improvements, potentially stimulate off-site development business activities associated with the intended development and investment in the local economy. Potential to effect existing businesses in the area due to competition and there may be an increase in surrounding informal settlements due to an influx of workers.

4.5 Cultural

As mentioned above, the site is already highly modified due to commercial sugarcane farming with the majority of the site having been cleared and ploughed. This land-use transformation is expected to have occurred approximately 150 years ago and thus it is unlikely that any small objects of historical significance will be found on the site during construction. There is however dwellings existing on the site which were identified as historically significance as a result of their age (over 60 years old). The specialist also identified an unmarked grave on the immediate western boundary of the site.

Identified environmental risk for assessment: damage to artefacts/heritage buildings of historical significance, disturbance to adjacent graves.

4.5.1 Summary of Findings of Specialist Heritage Assessment [Regulation 31 (2) (j)]

A Heritage Impact Assessment was initially conducted by eThembeni Cultural Heritage in November 2009 to identify and map all heritage resources as well as assessing the significance of such resources and provided plans for mitigation of any adverse effects during and after construction of the proposed development (Appendix 22). A site visit was conducted and various provincial databases were consulted.

According to eThembeni Cultural Heritage, various buildings dating back to the 1960's are located in Tongaat. These building are listed on AMAFA's Conserva database as having medium heritage significance with regards to aesthetic, architectural, historic and social values. Although these will not be affected directly by the proposed development, the view from these heritage resources could be affected. The specialist recommends that AMAFA's Built Environmental Committee should make recommendations to minimize the impact on the view from the historic buildings caused by the proposed development.

Four heritage resources were identified:

- the estate manager's residence (low heritage significance at the local level)
- the "Saunders Residence" (low heritage significance)
- various buildings in Tongaat listed in AMAFA's database as having heritage significance (medium at the local and regional level)
- grave of an unknown person immediately adjacent to proposed development (high heritage significance, Figure 16)

eThembeni Cultural Heritage stated that should the development footprint extend across the Hlawe River, the grave will require exhumation and reinterment in accordance with specifically prescribed procedures The management of the grave should be in accordance with the THS Graves and Cemeteries Policy. It is not expected that the proposed development will interfere with the graves however they have been included in the EMPr as a precautionary measures to ensure contractors are aware of their location.

Figure 16: Example of one the graves on the western side of the Hlawe River, adjacent to the proposed uShukela site.

A second phase Architectural Impact Assessment (Appendix 23) was commissioned to further identify the architectural, historical and social importance of the two existing buildings on site that are older than 60 years. The report is summarised in the sub-section below. As previously stated, the applicants intend to demolish the estate manager's house, located in the north of the site but will incorporate the Saunders Residence into the eighth sub-precinct (i.e. the conference venue for management and offices). In both cases however a permit is required from AMAFA, the provincial heritage agency for the demolishment and alterations.

4.5.2 Summary of Findings of Specialist Architectural Impact Assessment [Regulation 31 (2) (j)]

A Phase II Architectural Impact Assessment was carried out by Debbie Whelan of Archaic Consulting on the current Estate Manager's House (29° 34'935S 31°8'215E) and the Herrwood House/Saunders Residence (29°35'385S 31°7'915E). The specialist conducted a site visit, consulted the Land Registers at the Deeds office in Pietermaritzburg and the Provincial Archives Repository. Christopher Saunders published material on the history of the Tongaat Hulett Company was also consulted. Both buildings are dated to around the 1950's and were rated by eThembeni Cultural Heritage as having "low heritage value".

Much of Klipfontein has been associated with the Saunders family for nearly 150 years. Percy Starling developed the current "Herrwood Farmstead". The history of Klipfontein and Herrwood House is described by the specialist in section 3 and the history of Lot 49 and Estate Manager's house in section 4.

The **Herrwood House** is a simple Georgian Revival structure, loosely defined as "Gwelo Colonial". The entrance is through a formal portico in the style of Ivan Mitford-Barberton. The architecture is simple and straightforward with

the symmetry being intentionally asymmetrical typical of the early modernists. Internally, the house has little diagnostic material and has most likely been redecorated over the years. Closely associated with the main house are a number of outbuildings including the office which is situated at the entrance court to the main house. The office as well as a cottage overlooking the putting green is strongly suspected of being constructed recently.

The stable block is currently used as a garage space and is well maintained. There are also a variety of staff quarters and labour cottages forming a functional part of a historically operating farmstead. The well designed garden consists of indigenous trees with selected exotic species which wraps around the main house. The gardens separated the house from its position in the middle of the cane fields.

The artist and architect that designed much of the fabric of the Tongaat village in the early 1930's was Robert Gwelo Goodman. The Herrwood House is significant from a variety of aspects:

- The property is strongly associated with both Percy Starling and the Saunders family who were and are pivotal members in the establishment of the sugar industry in South Africa.
- Possibilities of association with Wood, an interpreter to the Zulu and present at the killing of Piet Retief and his men.
- Most likely associated with both Robert Gwelo Goodman (design of building) and Ivan Mitford Barberton (sculptures on the tympanum of the main entrance to the house). Both artists carried out well publicised and similar work on public buildings in Tongaat Village. If the sculptures are, indeed by Ivan Mitford-Barberton, then this places the house as an important part of the South African national historical and technical record.
- The gardens are well established.
- The new buildings, although pastiche and historicist, are carefully designed to blend into the fabric of the homestead and thus create uninterrupted spatial systems that complement the whole of the homestead.

The specialist therefore rates the Herrwood House significance as follows:

Significance	**Local**	**Regional**	**National**	**International**
Architectural	High	Medium	Medium	Low
Social	High	High	Medium	Low
Technical	High	High	High	Low
Historical	High	High	Low	Low
Scientific	Low	Low	Low	Low

Demolition of this property and surrounding gardens is therefore not an option. The entire site should be utilised as office space or corporate headquarters. Although reuse of the existing house is possible, should alterations be required, the services of an appropriately qualified heritage architect be retained to carry out the work. The specialist recommends that the outbuilding remain extant however if demolition permits for the labour cottages below the stable block are required, this could be considered. The brick paving leading from the main road to the house be retained in memory of the house.

The **Estate Manager's House** originated in early to mid 20th century as an estate manager's house. The house is a much altered utilitarian cottage also situated in an established garden. It was possibly constructed in the 1920s but little diagnostic material exists to assist in dating it. The house has little heritage significance on any level and should be demolished as requested. The gardens could however, possibly be included in the new development.

Figure 17: Herrwood House/ Saunders Residence (source: Archaic Consulting, Architectural Impact Assessment, 2013).

Figure 18: Estate Manger's House (source: Archaic Consulting, Architectural Impact Assessment, 2013).

4.6 Specialist studies [Regulation 31 (2) (q)]

The following specialist studies were conducted and have been summarised in the above sections:

1. Preliminary Geotechnical Investigation Report for Watson Highway Commercial and Residential Development (TGC Engineers, September 2009).
2. Watson Highway Light Industrial and Office Park Development Site: Wetland and Riparian Assessment Report (Wetland Consulting Services (Pty) Ltd, October 2010).
3. Ushukela Highway Development: Wetland Impact Assessment and Recommendation for Mitigation of Impacts (Wetland Consulting Services (Pty) Ltd, July 2012).
4. Layout review: Ushukela-Watson Highway Development (Wetland Consulting Services (Pty) Ltd, April 2013)
5. Specialist Planning Report (Planning Initiative, February 2013).
6. Ushukela Landscape Masterplan Philosophy (CNdV Africa, May 2012).
7. Ushukela – Watson Highway Development Site Stormwater Management Plan (Stemele Bosch Africa, March 2013).
8. Ushukela Highway Engineering Services Report (Stemele Bosch Africa, May 2012).
9. uShukela Highway: Engineering Services Report (Stemele Bosch Africa, November 2010)
10. uShukela Highway: Engineering Services Report (Stemele Bosch Africa, March 2013)
11. Heritage Impact Assessment of Inyaninga / uShukela Highway Mixed Use Development, Tongaat, KwaZulu-Natal, South Africa (eThembeni Cultural Heritage, November 2009 and associated letter March 2011).
12. Architectural Impact Assessment for properties affected by the proposed Tongaat Hulett uShukela Highway Project, Tongaat, eThekwini Metropolitan Council (Archaic Consulting, April 2013).
13. Terrestrial Ecological Study for Tongaat Huletts Development: uShukela Highway (eastern portion) (GroundTruth, December 2010).
14. Assessment of Freshwater Ecosystems, uShukela Highway – Eastern Portion (GroundTruth, December 2010).
15. Specialist Avifauna Assessment for the Proposed uShukela Highway Business and Office Park Development (Harvey, September 2011).
16. Agricultural Potential Assessment: The Farms Described as Inyaninga and Watson Highway: In Extent 1160ha (Phipson, December 2009).
17. Agricultural Potential of Rem of Ptn 16 of Farm Buffels Kloof No 1267, Ptn 15 of Farm Buffels Kloof No 1267, Rem of Ptn 18 of Farm Klipfontein No 922, Ptns 9 and 13 of Farm Klipfontein No 922 (uShukela)(Roy Mottram and Associates cc; Report 12 of 2012).
18. uShukela Development: Preliminary Services Report – Electrical (Bosch Projects, November 2010).
19. uShukela Developments Services Report – Electrical Revision 06 (Bosch Projects, February 2013).
20. Traffic Study for the Proposed uShukela Drive Precinct Development in the Greater Tongaat Area (Aurecon, December 2012).
21. uShukela Highway Development: Socio Economic Impact Assessment of the Development on Tongaat and Verulam (Urban-Econ Development Economists, December 2010).
22. uShukela Highway Development: Socio Economic Impact Assessment of the Development on Tongaat and Verulam – Update (Urban-Econ Development Economists, July 2012).
23. uShukela Highway Development: Socio Economic Impact Assessment of the Development on Tongaat and Verulam – Update (Urban-Econ Development Economists, March 2013).
24. Socio-Economic Impact Assessment of the uShukela Highway Development (Gabhisa Planning and Investments, December 2010).

As per Regulation 31 (2) (q), copies of the reports have been provided in full in appendices 2 through to 23.

5.0 Public Participation Process [Regulation 31 (2) (e) and [Regulation 54, 55, 56]

(e) details of the public participation process conducted in terms of subregulation (1), including – (i) steps undertaken in accordance with the plan of study;

As per the plan of study, Interested and Affected Parties (I&APs) were given the opportunity to provide comment on the Draft Scoping Report and Draft EIR.

5.1 Timeline for Public Participation

Activity	Date
Submission of Application to DEA	20th August 2010
Notification of application to Authorities and Community groups	22nd September 2010
Notification of neighbours adjacent to the site boundary	21st & 22nd September 2010
Placement of site notices	21st September 2010
Placement of adverts in the Isolezwe (regional paper) and North Coast Courier (community paper)	22nd September 2010
Additional Newspaper placed in the Coastal Weekly Newspaper	4th November 2010
Notification of time and venue for public meeting	6th October 2010
Distribution of BID	6th October 2010
Public meeting	13th October 2010
Distribution of meeting minutes	27th October 2010
Notification of release of draft scoping report	19th November 2010
Scoping report placed at Tongaat Library and submitted to authorities	23rd November 2010
40 day comment period ended	31st January 2011
Submission of final scoping report to DEA	09th February 2011
Acknowledgement of receipt (2 weeks)	23rd February 2011
Acceptance of scoping report	13th April 2011
Notification of release of Draft EIR	05th July 2013
EIR placed at Tongaat Library and submitted to authorities	08th July 2013
40 day comment period ends	19th August 2013
Submission of Final EIR to DEA	-
Acknowledgement of receipt (2 weeks)	-
Assessment of EIR (60 days)	-
Compilation of EA (45 days)	-

5.2 Notification

54. (2) The person conducting a public participation process must take into account any guidelines applicable to public participation and must give notice to all potential interested and affected parties of the application which is subjected to public participation by –
(a) fixing a notice board at a place conspicuous to the public at the boundary or on the fence of -
(i) the site where the activity to which the application relates is or is to be undertaken; and
(ii) any alternative site mentioned in the application;
(4) A notice board referred to in subregulation (2) must –
(a) be of a size at least 60cm by 42cm; and
(b) display the required information in lettering and in a format as may be determined by the competent authority.

Three site notices (60cm by 42cm) in both English and isiZulu were placed at the entrance to the proposed site off uShukela Drive on 21st of September 2010. Proof of notice placement is provided in Appendix 25.4.

54. (2)(b) giving written notice to –
(i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
(ii) occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
(iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site;
(iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represents the community in the area;
(v) the municipality which has jurisdiction in the area; and
(vi) any organ of state having jurisdiction in respect of any aspect of the activity;

Neighbours/occupiers/land owners adjacent to the property were notified by hand delivered notice (see Appendix 25.1). Where possible, people were requested to sign a register indicating that they had received the notice.

All relevant authorities as well as the various community interest groups and ward councillor were notified by phone and email on the 22nd September 2010 (Appendix 25.1).

Background Information Documents (BID) were sent to DWA, DEA, EKZN Wildlife, eThekwini Municipality, AMAFA, WESSA, Rate Payers Association, Tongaat Business Forum, Tongaat Civic Association, Herrwood Community Representative, the Ward Councillor and registered interested and affected parties on the 06th October 2010 (Appendix 25.3)

54. (2)(c) placing an advertisement in –
(i) one local newspaper; or
(ii) any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations; and
(d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in subregulation (c)(ii).

An advert was placed on the community paper, the North Coast Courier on the 22nd September 2010 and a regional paper, the Isolezwe on the 22nd September 2011 (Appendix 25.4). Due to concerns raised at the public meeting regarding the circulation of community newspaper within Tongaat Town itself an additional advert has been placed in the Coastal Weekly on the 4th November 2010 (Appendix 25.4).

54. (3) A notice, notice board or advertisement referred to in subregulation (2) must –
(a) give details of the application which is subjected to public participation; and
(b) state –
(i) that the application has been or is to be submitted to the competent authority in terms of these Regulations, as the case may be;
(ii) whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation;
(iii) the nature and location of the activity to which the application relates;
(iv) where further information on the application or activity can be obtained; and
(v) the manner in which and the person to whom representations in respect of the application may be made.

All notices, signboards and advertisements (Appendix 25.1, 25.2 and 25.3) stated that the application in question is subject to scoping and EIA and that it had been submitted to DEA. Each notice also stated the nature and location of the activity along with a brief description. The contact details for the company (phone, fax and e-mail) were provided where further information could be obtained.

54. (7) When complying with this regulation, the person conducting the public participation process must ensure that
(a) information containing all relevant facts in respect of the application is made available to potential interested and affected parties; and
(b) participation by potential interested and affected parties is facilitated in such a manner that all potential interested and affected parties are provided with a reasonable opportunity to comment on the application.

56. (2) Before the EAP managing an application for environmental authorisation submits a report compiled in terms of these Regulations to the competent authority, the EAP must give registered interested and affected parties access to, and an opportunity to comment on the report in writing.

56. (3) Reports referred to in subregulation (2) include –
(c) scoping reports;
(d) scoping reports amended and resubmitted in terms of regulation 30 (3);
(e) specialist reports and reports on specialised processes compiled in terms of regulation 32;
(f) environmental impact assessment reports submitted in terms of regulation 31; and
(g) draft environmental management plans compiled in terms of regulation 33.

All parties who registered for the process by contacting KSEMS were provided with copies of the BID on the 06th October 2010 (Appendix 25.3). A public meeting date was set for 13th October 2010 and registered I &APs were given details of the time and venue on the 06th October 2010 (Appendix 25.5). The meeting was held as proposed and a presentation was given. All I & APs who attended were given hard copies of the BID and copies of the presentation. Minutes from the meeting were prepared and submitted to the I &APs on the 27th October 2010 (Appendix 25.5). I &APs were afforded the opportunity to comment on the minutes of the meeting. The Draft Scoping Report was prepared and I &APs were notified of its availability at the Tongaat library on the 23rd November 2010. Hard copies of the Draft Scoping Report were couriered or hand delivered to the following bodies:

Name	Authority / Group / Company
P. Reddy	DWA
A. Blackmore	EKZN Wildlife

D. van Rensburg	eThekwini Municipal planning contact
S. Makhanya	AMAFA
C. Schwegmann	WESSA
M. Nozimbomvu	Ward councillor
R. Ryan	DoT
K. Govender	Herrwood Community Representative
Tongaat Library	Registered I&APs

I &APs were instructed that they had 40 days to comment on the Draft Scoping Report with comment period ending on the 31st January 2010. A Final Scoping Report including all comment received by the 31st January 2010 was submitted to DEA in early February 2011 by courier (proof of distribution of the Draft and Final Scoping Report is provided in Appendix 25.6). Official acknowledgment of receipt was received on the 23rd February 2010. The report was accepted by the DEA on the 13th April 2010 (Appendix 25.7).

The Draft EIR was prepared and I &APs have been notified of its availability at the Tongaat library. Hard copies of the Draft EIR have been couriered or hand delivered to the above list of authorities/groups/companies.

I &APs have **40 days** to comment on the Draft EIR with the comment period ending on the 19th August 2013 A final EIR including all comment received by the 19th August 2013 will be submitted to the DEA.

5.3 Register of Interested and Affected Parties [Regulation 31 (2) (e) (ii); 55 and 56]

55. (1) An EAP managing an application must open and maintain a register which contains the names and addresses of –
(a) all persons who, as a consequence of the public participation process conducted in respect of that application in terms of regulation 54, have submitted written comments or attended meetings with the applicant or EAP;
(b) all persons who, after completion of the public participation process referred to in paragraph (a), have requested the applicant or the EAP managing the application, in writing, for their names to be placed on the register; and
(c) all organs of state which have jurisdiction in respect of the activity to which the application relates.
(2) An applicant or EAP managing an application must give access to the register to any person who submits a request for access to the register in writing.

Regulation 31 (2) (e) ii- a list of persons, organisations and organs of state that were registered as interested and affected parties;

A register of all I &APs who registered for the project as well as organs of state with jurisdiction in respect of the activity was maintained and is provided in Appendix 25.2.

5.4 Registered Interested And Affected Parties Entitled To Comment On Submissions (Regulation 56 & 57) Comments Of Interested And Affected Parties To Be Recorded In Reports Submitted To Competent Authority (Regulation 56) and Regulation 31

56. (1) A registered interested and affected party is entitled to comment, in writing, on all written submissions made to the competent authority by the applicant or the EAP managing an application, and to bring to the attention of the competent authority any issues which that party believes may be of significance to the consideration of the application, provided that –
(a) comments are submitted within –
(i) the timeframes that have been approved or set by the competent authority; or
(ii) any extension of a timeframe agreed to by the applicant or EAP;
(b) a copy of comments submitted directly to the competent authority is served on the applicant or EAP
(c) the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.

57. (1) The EAP managing an application for environmental authorisation must ensure that the comments of interested and affected parties are recorded in reports.

Regulation 31 (2) (e) (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, objections and comments received from registered interested and affected parties;

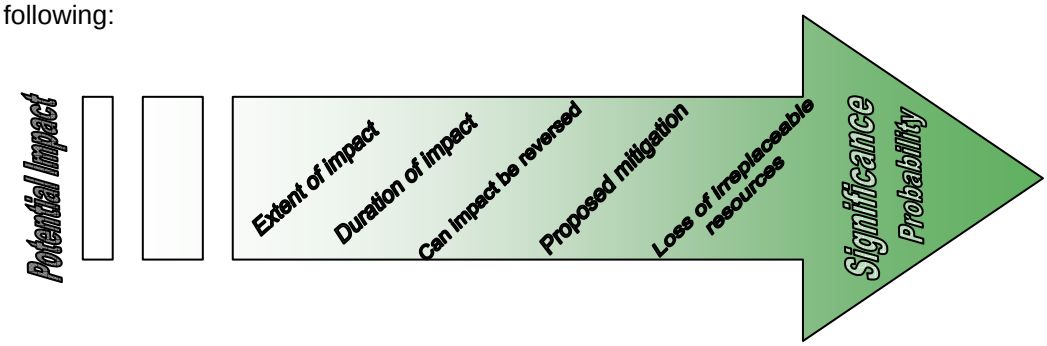
Comments on the Scoping Report received from I &APs have been summarised and included in a comments and response table in Appendix 25.9. All comments received have also been included in full in Appendix 25.9. Comments were considered and used to establish the list of identified impacts for further investigation in the

Scoping Report. All comments received on the Draft EIR will be included in the Final EIR, which will be submitted to the DEA.

6.0 Environmental Issues and Investigation of Potential Impacts

6.1 Methodology Used In Determining Significance of Potential Environmental Impacts [Regulation 32 (h)]

In terms of how impacts have already been assessed in the Scoping Report, aerial photos and the 1:50 000 map for the area have been reviewed. Site visits have been conducted during which information on the surrounding environment as well as photographs of the affected areas has been gathered. The professional judgment of the EAP based on previous EIA experience in the industrial and ecological fields has been used. The potential impacts associated with the proposed development have been identified and rated in terms of their significance in a table, looking at the following:



As demonstrated above the significance of an impact is established using a progressive process whereby a potential impact is investigated using a number of parameters. ***Potential impact*** describes the potential environmental impact that might be associated with a specific aspect of the project i.e. without taking into account mitigation measures, extent of impact duration, or intensity of the impact. All of these factors have to be considered before the significance and probability of an impact can be established.

The extent or area of impact should the impact occur without mitigation measures i.e. will it have a regional or local impact or will it be an impact specific to the site only, will it affect people and the environment at a broader scale or just those in the immediate vicinity of the impact?

Duration of the impact i.e. this looks at how long the potential impact would continue for without mitigation measures i.e. will it be a long term medium term or short term impact, will it be restricted to the construction or operational period.

Can the impact be reversed i.e. either through rehabilitation after the fact or managed, i.e. through application of certain mitigation measures i.e. can it be prevented from occurring?

Proposed mitigation measures include details of proposed measures that will mitigate against the potential impact.

Application of mitigation measures

Will irreplaceable resources be lost, taking into account the application of the proposed mitigation measures?

The **significance** of the impact is evaluated taking into account the effect of the mitigation measures on the impact by looking at the following:

1. Probability of the impact occurring with the mitigation measure in place.
2. Significance of the impact taking into account the mitigation measures i.e. will it be high, medium or low.

In addition, the following DEA (formerly known as DEAT) guideline has been used to assess impacts and Alternatives *"DEAT (2006) Guideline 5: Assessment of Alternatives and Impacts in support of the Environmental Impact Assessment Regulations, 2006. Integrated Environmental Management Guideline Series, Department of Environmental Affairs and Tourism (DEAT), Pretoria".*

6.2 Description Of Environmental Issues Identified, 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 [Regulation 31 (2) (h, k)]

The following impacts were identified for further investigation during the scoping phase and all potential impacts have been listed showing where these can be mitigated against. Additional potential impacts identified through the impact assessment phase and review of the specialist reports have been added and are shown in purple in the table below.

Table 10 provides an assessment of each identified potential impact (construction and operational phase), which includes:

(i) the nature of the impact;
(ii) the extent of the impact (i.e. spatial area that may be affected by the impact);
(iii) duration of the impact (long-term / short-term, construction / operation);
(iv) the probability of the impact occurring before and after mitigation, i.e. the likelihood of impact occurring with or without any mitigation measures in place = low/medium/high);
(v) the degree to which the impact can be reversed;
(vi) the degree to which the impact may cause irreplaceable loss of resources; and
(vii) the degree to which the impact can be mitigated, i.e. the ***mitigatory potential*** which has been classified as follows:

- Low (little or no mitigation measure exists to mitigate negative impacts),
- Medium (mitigation measures exists however some negative effects cannot be fully mitigated)
- High (can be fully mitigated);

The assessment into potential impacts also considered the type of impact i.e. is the impact direct or indirect; whereby the definition is as follows:

Direct Impact: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity, e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

Indirect Impact: Induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

The significance of each impact after mitigation has also been evaluated according to the following criteria:

(i) Will the impact result in an alteration to the environment?
(ii) Does the level of public concern (including both norms and values) influence the impact?
(iii) Is there scientific and professional evidence against/for the impact?
(iv) Will there be environmental loss or degradation?
(v) Will the environmental impact result directly or indirectly in social change?
(vi) What is the likelihood and acceptability of the residual risk?

Based on the above criteria, ***significance of the impact after mitigation*** has been classified as follows:

- low (little or no residual negative impact occurs after mitigation; probability of impact occurring after mitigation is low)
- medium (residual impact is acceptable to society but has an undesirable effect – impact can be further reduced through rehabilitation / abatement measures; impact will occur to a lesser extent after mitigation)
- high (impact cannot be mitigated and will result in alteration of environment impact will definitely occur even after mitigation; potential investigation into offsets or alternative designs/proposals)
- very high (impact results in loss of irreplaceable resources even after mitigation i.e. protected areas, world heritage sites, etc.)

Table 10: Assessment of identified potentially significant impact [Regulation 31 (2) (k, l) i-vii]

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
SOIL										
Erosion of stockpiled material (stone, sand and gravel).	Direct	Local	Construction phase (short-term)	Yes, the impact can be managed.	No	Medium	High	Material must be stocked in such a way that it cannot fall or cause injury or damage to properties or the natural environment. Stockpiles must not exceed 6m in height and must be covered if exposed to heavy wind or rain. Alternatively, low walls or berms must be constructed around the stockpiles. Materials from stockpiles are to be used as soon as is practically possible or spread and spoiled in designated areas. An Environmental Management Programme (EMPr) has been designed to manage construction activities and is attached under Appendix 24. The stormwater specialists recommend that stockpiles should be covered with cut brush found on site to provide wind screening and prevent soil loss.	Low	Low
Risk of contamination to soil during concrete mixing.	Direct	Local	Construction phase (short-term)	Yes, the impact can be prevented.	No	High	High	Concrete mixing will need to take place on a hard surface or concrete mixing trays will need to be used. Concrete mixing will not be permitted to occur where run off can enter stormwater drains. Construction will be monitored by an Environmental Control Officer (ECO) who will ensure compliance with the construction EMPr.	Low	Low
Potential onsite erosion of exposed soil before rehabilitation is	Direct	Local	Construction phase (short-term)	Yes, the impact can be managed	No	Medium	High	As a general principle, contractors must limit vegetation clearing to the platform site only. The contractor must stabilise cleared areas to prevent and control	Low	Low

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
completed.								erosion and/or sedimentation. Only vegetation that's needs to be removed to accommodate the development should be removed in a phased and controlled manner. The construction of the internal stormwater piped systems is to be programmed for construction immediately on completion of the bulk earthworks for the road works (Stormwater Management Plan, 2013)		
Extensive earthworks resulting in the creation of unstable slopes and erosion.	Direct	Local	Construction phase (short-term)	Yes, the impact can be prevented.	No	Medium	High	Stockpiles are to be maintained as flat as possible and not exceed 6m in height according to the Stormwater Management Plan (SWMP). Earthworks contractors are to refer to the Geotechnical report (Appendix 12), which identifies areas of instability namely the eastern portion of the site and sections of siltstone/mudstone horizons located in the western portion of the site. Vegetation must not be cleared on steep slopes unless it can be fully integrated within an existing erosion control conservation system to prevent erosion.	Medium	Medium
Compaction of the soil on site.	Direct	Local	Operational phase (long-term)	No	No	High	n/a	The entire site will be required to be compacted excluding the central green corridor and areas dedicated to "open space" as shown in Figure 1 of the proposed layout.	High	Low
Excess soil mobilized from the Hlawe River banks during the construction of	Direct	Local	Construction phase (short-term)	Yes – the impact can be managed.	No	Medium	High	Necessary temporary stormwater control structures precautions must be taken into account to prevent erosion which should include the implementation of silt	Low	Low

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
the new bridge across the Hlawe River.								fences, sandbags or straw bales if required. During construction of the bridge the ECO is to monitor the banks to ensure no impact occurs.		
Destabilization of existing and proposed embankments (Stormwater Management Plan, 2013).	Direct	Local	Construction and operation phase (long-term)	Yes, the impact can be managed.	No	Medium	High	The design philosophy outlined in the SWMP takes into account the stabilisation of existing and proposed embankments. As such, the management features and principles outlined in the SWMP and summarised in section 3.3.2.1. ensure that embankments are stable. Vegetation clearing should be limited and bare soil should not be exposed for long periods of time. New embankments should be re-vegetated as soon as possible, unless otherwise stated by the Engineer. These mitigation measures have been included in the attached EMPr.	Medium	Low
GEOTECHNICAL STABILITY										
Possible instability problems associated with siltstone/ mudstone horizons in western portion of site (Geotechnical report, 2009).	Direct	Local	Construction and operational phase (long-term)	Yes, the impact can be prevented and managed.	No	Medium	Low	The geotechnical specialist has identified areas which have a high collapse potential and high erosion potential. Precaution should be taken in these areas specifically during the earthworks phase. An additional detailed geotechnical study was recommended.	Medium	Medium
GROUNDWATER										
Decrease in subsurface seepage overlying the clayey sands in the eastern portion of the site,	Direct	Local	Operational phase (long-term)	Yes, the impact can be partially managed.	No	High	Medium	While the development will reduce the subsurface seepage, the wetland specialist has stated that the impact can be partially mitigated through the use of attenuation features and bio-	Medium	Medium

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
reducing water quantity to wetland (Wetland Impact Assessment, 2010).								retention ponds in order to regulate the flow into the central open space canal. Engineering features to promote infiltration such as permeable paving should be incorporated into the development plan.		
Decrease in soil water storage ability (Wetland Impact Assessment, 2010).	Direct	Local, with the potential to affect the estuary.	Operational phase (long-term).	Yes, the impact can be managed.	No	High	High	The wetland specialist has stated that attenuation features, infiltration enhances such as grass swales network, permeable surface, bio-retention ponds and increased evapotranspiration from the trees and vegetation re-planted on site. These features have been incorporated into the SWMP, which will be utilised on site during construction and operation.	Medium	Medium
STORMWATER										
Increase in stormwater runoff due to the increase in hard surfaces resulting in onsite and offsite flooding.	Direct	Local	Construction and operation phase (long-term)	Yes, the impact can be managed.	No	High	Medium	The Stormwater Management Plan outlines a number of mitigation measures to decrease stormwater runoff. These mitigation measures are specific to the different phases of the proposed development including site establishment, construction and operational. Please refer to section 3.3.2.1 for a detailed list of these measures but include enhanced infiltration features and attenuation ponds.	Medium	Low
Increased pressure on existing stormwater services in the area (Engineering Services Report, 2010).	Direct	Local	Construction and operational phase (long-term)	Yes, the impact can be managed.	No	High	High	The engineering specialist recommended that during the site establishment and preliminary activity phase, all existing drainage systems (streams, channels) are to be maintained by the developer in accordance with normal agricultural soil conservation	Medium	Low

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								practices and local authority guidelines. Existing access routes to the construction site must follow the existing access roads as far as possible. Should new access roads be required these must be constructed in a way to minimise concentrated flow runoff and pollution to the existing wetlands.		
Polluted / contaminated stormwater from the site entering the neighbouring river/wetland systems (Wetland Impact Assessment, 2010).	Direct	Local	Construction phase (short-term)	Yes, the impact can be prevented and managed.	No	High	High	Pollution has been considered in the mitigation measures described in section 4.2.3. According to the avifaunal specialist, no waste of any kind should be allowed to enter the prescribed buffer areas.	Low	Low
Poor stormwater management during construction can lead to erosion, gully incision and loss of soil (Stormwater Management Plan, 2012).	Direct	Local	Construction phase (short-term)	Yes, the impact can be managed.	No	High	High	The Stormwater Management Plan recommends that stripping of vegetation should only commence immediately prior to construction commencing and that the time that an area is exposed should be minimised. All embankments/cut slopes, unless otherwise directed by the engineer, shall be protected by a cut drain to prevent water cascading down the face of the slope.	Medium	Low
Stormwater structures and discharge points resulting in point-source erosion.	Direct	Local	Operational phase (long-term).	Yes, the impact can be managed.	No	High	High	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. Accompanying each discharge point should be suitable “baffle structures” (e.g. gabion mattresses) that will dissipate the	Medium	Low

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								energy of storm flow and encourage infiltration, thus reducing the likelihood of erosion. Outflow points should 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 (Freshwater Ecosystem Assessment, 2010).		
Stormwater features accumulating litter/excess vegetation.	Indirect	Local	Operational phase (long term).	Yes, the impact can be managed and prevented.	No	High	High	The Operational Stormwater Management Plan attached under Annexure F of the Stormwater Management Plan (Appendix 4) lists this impact as a potential concern. Mitigation measures include frequent inspection and maintenance of the stormwater facilities. A checklist is included in the Operational SWMP to ensure this is not over looked.	Medium	Low
FLORA										
Loss of agricultural land (Agricultural Potential Assessment, 2009).	Direct	Local	Operational phase (long-term).	Yes, the impact can be reversed.	No	High	High	Notwithstanding the fact that in the medium to long term, the farm will become less viable for sugarcane production, Tongaat Hulett has/is facilitating a net 37% increase in new agricultural production.	High	Medium
Further loss of riparian vegetation within KwaZulu Natal's coastal zone (Ecological Impact Assessment,	Direct	Regional	Operational phase (long-term).	Yes, the impact can be reversed.	Yes	High	Medium	While the vegetation will be lost across the site, the rehabilitation of the allocated open spaces on site (22ha) will be re-vegetated with indigenous riparian vegetation aiming to increase the biodiversity on site and stabilize embankments. Alien species that	Medium	Low

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
2010).								have encroached into the area will be required to be eradicated.		
Increase in erosion within the riparian unit.	Direct	Local	Construction phase (short-term).	Yes, the impact can be managed.	No	High	High	Erosion is a direct result of increased storm water runoff, which will be managed according to the SWMP (Appendix 4). If water on site is being drained into the central open space corridor, as per the wetland specialist's recommendations, discharge will need to be controlled via grass swales and attenuation ponds. Stormwater discharge is required to be tightly monitored in the EMPr.	Medium	Low
Risk of further alien invasive encroachment on site and in the Hlawe River riparian zone.	Direct	Local	Operational phase (long-term).	Yes, the impact can be managed.	No	High	Medium	The open space area on site is required to be maintained during the operational phase to ensure alien species occupation is eradicated. All exposed soils on site requiring rehabilitation will be re-vegetated with indigenous vegetation typical of KZN's coastal riparian zone that should naturally be occurring there (as identified by the Freshwater Ecosystems specialist.	Medium	Low
Additional vegetation cleared for the establishment of the Contractor's site camp.	Direct	Local	Construction phase (short-term).	Yes, the impact can be prevented.	No	High	High	The clearing of vegetation for the contractor's site camp is to be limited to the site camp area only. The creation of hardened surfaces within the site camp area is to be kept to a minimum and is to be agreed to by the Engineer prior to construction. The construction camp should be marked out with the approval of the ECO to ensure the least environmental impact is created.	Low	Low
Damage and removal of	Direct	Local	Construction phase (short-	Yes – the impact can be	No	Medium	High	The two routes traverse sugarcane fields owned by the applicant and	Low	Low

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
existing vegetation within the water pipeline route and access road upgrading /construction.			term)	prevented.				therefore these sections of the routes will not be significant. Large tree species currently lining sections of the existing Brake Drive road as well as the riparian vegetation associated with the Hlawe River crossing should be avoided where practically possible during the design and construction phases. Brake Drive should be expanded to the northern side of the road to avoid the *Delonix regia* and *Trichilia dregiana* species. Where Brake Drive passes existing houses, the road should be expanded to the southern side in order to avoid impacts on the existing vegetation. There are opportunities adjacent to the bridge to offset any negative impacts on the vegetation at the point of crossing (Wetland Impact Assessment, 2013).		
Potential loss of sections of indigenous vegetation (Ecological Impact Assessment, 2010).	Direct	Local	Operational phase (long-term)	Yes, the impact can be prevented and managed.	No	High	High	The layout has been designed to include the incorporation of the central open space corridor functioning to retain riparian vegetation associated with the existing wetlands on site. No alien vegetation should exist in the corridor during the operational phase. The riparian vegetation is important to ensure stream and bank stabilization.	Low	Low
Potential impact on the Durban Open Space System (D'MOSS) as demarcated by the eThekwini	Direct	Local, with the potential to affect the larger D'MOSS	Construction and Operational phase (long-term)	Yes, the impact can be managed.	No	Medium	High	The primary open space corridor in the development will be directly linked into the D'MOSS along the Hlawe River. Demarcated solid waste management areas should reduce the amount of litter on site during construction and operation	Low	Low

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
Municipality adjacent to the site (Ecological Impact Assessment, 2010).		area.						of the proposed development park. These waste management areas should not be located near the D'MOSS area. Workers on site will be required to stay out of the D'MOSS area.		
Impact on the provincially protected herbaceous plant species, *Drimiopsis maculata* and *Scadoxus puniceus* (Ecological Impact Assessment, 2010).	Direct	Local	Operational phase (long-term)	Yes, the impact can be prevented.	No	High	High	The species will be identified and marked on site to ensure they are not destroyed, cut or damaged. Alternatively, if the species cannot be conserved, permission from Ezemvelo KZN Wildlife will be required. The vegetation specialist has noted however that despite these plants legal protection, they are not rare (page 8 of Ecological Report, Appendix 16).	Medium	Medium
Positive influence on the degraded drainage system once rehabilitation has taken place within the central open space corridor.	Direct	Local	Operational phase (long-term)	Positive impact						
FAUNA										
Potential disturbance to animals present in area with increased risk of poaching.	Indirect	Local	Construction phase (short-term)	Yes, the impact can be prevented.	Yes	Medium	High	Poaching will be prohibited. No animals are to be disturbed unnecessarily and no animals are allowed to be shot, killed, trapped or caught for any reason. The Ecological report (Appendix 16) did not however identify any significant fauna species on site.	Low	Medium
Impact on the four near threatened bird species identified in the area (Avifaunal	Direct	Local	Operational phase (long-term)	Yes, the impact can be managed.	No	Medium	Medium	The avifaunal specialist rated the site to have low avifaunal value with the threatened species being confined to the Hlawe River corridor. During construction a	Medium	Medium

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
Assessment, 2011).								section of sugarcane should be retained where possible as part of a vegetation buffer alongside the Hlawe River corridor. It is expected that the birds will utilize the open space corridor once construction is complete and stormwater is being managed efficiently on site.		
SENSITIVE ENVIRONMENTAL AREAS										
Sedimentation build up in the surrounding wetlands (Wetland Impact Assessment, 2010).	Direct	Local with the potential to affect the estuary.	Construction phase (short-term)	Yes, the impact can be prevented.	Yes	High	High	There is a high potential for run-off from the site to transports soil and other sediments into the drainage corridor and surrounding wetlands. The wetland specialist noted that uncontrolled runoff could result in sedimentation build up in the Tongati Estuary. The Stormwater Management Plan has also identified sedimentation as an impact and the mitigation measures listed in section 3.1.2.1 above therefore apply. Stormwater is required to be closely monitored to ensure excess sediments are not being washed into the surrounding wetlands.	Medium	Low
Potential increase in nitrates entering the Hlawe River with the removal of wetland segments (Wetland Impact Assessment, 2010).	Indirect	Local with the potential to affect the estuary.	Operational phase (long-term)	Yes, the impact can be managed.	No	Medium	High	The wetland specialist indicated that the wetlands currently function to filter nitrates out the soil. Excess nitrates in the soil however are a result of fertilizer being added to the soil for the sugarcane. Due to the change in land use, fertilizer will no longer be used on such a large scale. Nitrate levels entering the river should therefore not change.	Low	Low
Decrease in wetland recharge due to decreased	Indirect	Local	Operational phase (long-term)	Yes, the impact can be managed.	No	Low	High	Infiltration measures such as permeable surfaces and soakaways are required to be	Low	Low

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
infiltration having an impact on the high water table (Wetland Impact Assessment, 2010).								installed. Controlled stormwater release into the wetland systems will be possible through attenuation features and bio-retention ponds. The increase in run-off has the potential to compensate for the loss in recharge area, provided it is controlled. Annexure F of the Stormwater Management Plan contains a Stormwater Maintenance & Monitoring Plan for the operational phase of the propose development. The post-development discharge peak should be within the 10% of the pre-development peak.		
Loss in wetland buffer zone on the site thereby reducing protection to the Hlawe River drainage line and associated riparian habitat (Wetland Impact Assessment, 2013).	Direct	Local with the potential to affect the estuary.	Operational phase (long-term)	No	No	High	Low	Although a buffer zone may be important for protecting the wetland and river systems from pollution, it was the opinion of the wetland specialist that the adoption of buffer zones is inappropriate to achieve wetland and/or watercourse protection in this scenario where a change in hydrology is the main concern. The proposed development will inevitably result in an overall decrease in buffer zone however a buffer zone is included around the 22ha of wetlands that will be preserved on site (as indicated in the proposed layout). The wetland specialist recommends that that stormwater discharge be managed across the property considering water quality and flow rates and outlines a number of mitigation measures as discussed in the SWMP (section 3.1.2.1 of the	High	Medium

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								EIR).		
Change in wetland input from diffuse to point source water input (Assessment of Freshwater Ecosystems, 2010).	Direct	Local	Operational phase (long-term)	No	No	High	High	With the change in land-use, stormwater will be tightly managed on site. Stormwater will be directed into stormwater drains and outlets which will drain directly into the wetland. Water draining off site will have to be controlled via attenuation ponds, soakaways, permeable paving and energy dissipators to slow the velocity of flow, decrease sedimentation input and prevent erosion.	High	Low
Decrease in water quality due to hydrocarbons washed in from road network (Wetland Impact Assessment, 2010).	Direct	Local	Operational phase (long term)	Yes, the impact can be managed.	No	High	High	Attenuation features and constant monitoring will reduce the potential of this impact occurring. The use of grass swales to trap sediments and hydrocarbons will be effective as well as bio-retention ponds. The Management Association will be responsible for monitoring the site according to the EMPr. Hydrocarbons are specifically controlled under section 3J of the EMPr (Appendix 24)	Low	Medium
Change in wetland hydrology adding pressure to the Hlawe River, ultimately draining into the Tongati Estuary.	Direct	Local with the potential to affect the estuary	Operational phase (long-term)	Yes, the impact can be managed.	No	High	High	A change in hydrology is inevitable with the change in land use and increase in hard surfaces. The hydrology change will be directly associated with stormwater management. As mentioned above, attenuation features will be implemented on site to ensure that the post-development hydrology is within 10% variance of the pre-development scenario (as per the wetland specialist recommendation). The development will aim to retain the lateral seepage in the central open space corridor to stabilize the	Medium	Low

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								hydrology.		
Impact on the biodiversity on site.	Direct	Local	Operational phase (long-term)	Yes, the impact can be reversed.	No	High	High	The wetland specialist has stated that due to land transformation, the site currently has little biodiversity value (Wetland Impact Assessment, 2013). Alien invasive species will however be required to be removed across the site and the open space areas rehabilitated with indigenous vegetation to stimulate and enhance biodiversity. The proposed development will in fact aim to improve species richness on site compared to that of predevelopment condition.	Low	Low
General loss of wetland area (55%) on site including associated fauna and flora.	Direct	Local	Operational phase (long-term)	Yes, the impact can be managed.	No	High	High	The site consists of approximately 54ha of wetland and riparian ecosystems with 43ha comprising of wetlands. The development plan incorporates green corridors thereby retaining 45% of the wetlands. The wetlands will be retained as bio-retention areas ensuring wetland and stream stability. Riparian vegetation associated with these systems on site will also benefit from these areas.	High	Medium
High flow rates, peak flows and increased bank full events resulting in increased erosion (gully scour) within the wetland channel and Hlawe system (Wetland Impact Assessment,	Direct	Local	Operational phase (long-term)	Yes, the impact can be managed.	No	High	High	The wetland specialist has taken this impact into account and outlined mitigation measures, which are included in the SWMP. Attenuation and bio-retention ponds will function to decrease the flow rates as well as reducing peak flows and therefore erosion. Erosion will also be controlled through the grass swales network. During construction constant erosion monitoring will be	Medium	Low

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
2012).								required.		
Discontinuation of the valley bottom system within the landscape (Assessment of Freshwater Ecosystems, 2010).	Direct	Local	Operational phase (long-term)	Yes, the impact can be prevented.	No	High	High	The revised development layout takes into account the system connectivity by incorporating the central open space corridor concept.	Low	Low
Degradation of the river system from deposited of construction sediment and rubble.	Direct	Local	Construction phase (short-term)	Yes, the impact can be prevented.	No	High	High	The Hlawe River will be avoided where possible. The proposed development footprint lies directly adjacent to the river and therefore no stockpiling/dumping of construction materials should occur within 50 meters of the watercourse. Stockpiles should also not be more than 6 meters in height. No dumping of construction rubble or spoil is to occur in completed stormwater drains, pipes, channels or natural drainage lines (existing wetland, stream, & riparian zone). Weekly checks are to be carried out during construction. These are to be repaired or cleared of silt if required.	Low	Low
Loss of ecological corridors associated with the sensitive drainage lines and associated vegetation.	Direct	Local	Operational phase (long-term)	Yes, the impact can be partially managed and prevented.	No	High	High	The layout has been designed to incorporate the central open space corridor functioning to retain riparian vegetation associated with the wetlands on site.	Low	Medium
WASTE										
Improper storage of hazardous waste i.e. used oils from vehicles; old cement bags	Direct	Local	Construction phase (short-term)	Yes, the impact can be prevented.	No	High	High	Hazardous waste must be stored on a hard surface within a bunded area and must not be allowed to enter storm water drains and the surrounding environment. Waste	Low	Low

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
etc. resulting in possible contamination to the surrounding environment.								must be disposed of regularly by a reputable contractor. Hazardous waste such as oils, contaminated rags etc. must be disposed of at a hazardous class landfill. Safe disposal certificates must be provided.		
Potential for improper storage and disposal of waste materials generated during construction resulting in possible contamination to the surrounding environment.	Direct	Local	Construction phase (short-term)	Yes – can be prevented.	No	High	High	Waste must be stored in the bins within the waste collection area in the construction camp and must not be allowed to blow around the site, be accessible by animals, or be placed in piles adjacent the skips / bins. Separate waste bins for each of the waste streams generated must be provided. The waste containers must be appropriate to the waste type contained therein and where necessary should be lined and covered. Waste must not be allowed to accumulate on site but should be disposed of regularly by a reputable contractor and must be disposed of at an appropriate landfill site.	Low	Low
Littering around the site.	Direct	Local	Construction phase (short-term)	Yes, the impact can be managed.	No	High	High	Littering will not be permitted on the site and general housekeeping will be enforced. Sufficient clearly marked waste bins/drums are to be provided. Construction will be monitored by an ECO who will manage compliance with the construction EMPr (Appendix 24).	Low	Low
Improper disposal of rubble i.e.: burying or neglecting building rubble resulting in direct mechanical	Direct	Local	Construction phase (short-term)	Yes, the impact can be prevented.	No	Low-Medium	High	All excess material and rubble must be removed from the site so not to restrict the rehabilitation process. All excess material and rubble must go to an approved, designated landfill and a safe disposal certificate must be	Low	Low

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
damage to surrounding vegetation and untidiness of the site.								obtained.		
Potential for construction waste to be disposed of at incorrect landfill resulting in contamination at the landfill site.	Indirect	Local	Construction phase (short-term)	Yes, the impact can be prevented.	No	Low-medium	High	Recycling should be undertaken where possible to limit waste added to the landfill site. Waste to be sent to registered landfills and safe disposal certificates must be retained for hazardous waste.	Low	Low
HAZARDOUS CHEMICALS / FUELS										
Bulk storage of dangerous fuels i.e. spillage of diesel during construction potential contaminating groundwater and surrounding environment.	Direct	Local	Construction phase (short-term)	Yes, the impact can be prevented.	No	High	High	Cement mixing will need to take place on a hard surface or cement mixing trays will need to be used. If the creation of a permanent bunded area is not feasible, these materials must be stored on drip trays capable of holding at least 110% of the spilled volume. Any construction equipment that could leak oil must be placed on a drip tray. All equipment must be in good working order to reduce the likelihood of oil leaks occurring. Any re-fuelling of equipment must occur on a hardened surface, within a designated re-fuelling area where any spills can be contained. A designated hazardous store will be set up which must be located within a bunded area on a hardened surface and under cover. Construction will be monitored by an ECO who will manage compliance with the construction EMPr.	Low	Low
Risk of spills from	Direct	Local	Construction	Yes, the impact	No	High	High	As mentioned above, a designated	Low	Low

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
construction equipment (oils, fuels etc) contaminating soil and stormwater.			phase (short-term)	can be prevented.				re-fuelling area is required to contain spills, cement mixing is to take place on a hardened surface and a designated hazardous store will be set up within a bunded area capable of holding at least 110% of the spilled volume.		
Improper storage of hazardous waste i.e. used oils from vehicles, old cement bags, contaminated soil etc.	Direct	Local	Construction phase (short-term)	Yes, the impact can be managed.	No	Medium	High	A separate bin dedicated to the storage of hazardous waste will be required. The bin should be clearly labelled as such and frequently emptied with the contents being disposed of at a registered hazardous landfill site. Safe disposal records are required to be kept on site for audit purposes. The hazardous storage area will be monitored according to the EMPr by an independent ECO.	Low	Low
NOISE										
Noise generated by construction workers, machinery and construction vehicles disturbing surrounding residents (specifically the Herrwood Community).	Direct	Local	Construction phase (short-term)	Yes, the impact can be managed.	No	Medium	Medium	It is noted that the site is directly adjacent to the airport and in the flight path however excessive noise must be controlled on site. Workers will be trained regarding noise on site and construction hours will be kept to working hours (07h00 to 18h00). The construction will need to be monitored by an ECO who will ensure compliance with the construction EMPr. All precautions must be taken to ensure that noise generation is kept to a minimum. If excessive noise is expected during certain stages of the construction, residents must be notified prior to the event. The EMPr has been designed to manage construction activities and is attached under Appendix 24. It	Low	Low

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								is however noted that the site is directly adjacent to the airport and in the flight path. Given the anticipated uses that will be developed, there is every likelihood however that there will be activities and business operations throughout the day and night.		
AIR QUALITY										
Emissions generated from construction vehicles	Direct	Local	Construction phase (short-term)	Yes, the impact can be managed.	No	Medium	Low	The only emissions that will be generated will be from construction vehicles which are expected to be minimal and are not expected to significantly affect the surrounding communities or the environment. Air emissions should be monitored daily by the onsite ECO and a complaints register available to surrounding communities.	Medium	Low
Dust generated from construction vehicles and other on site activities impacting on-site workers as well as surrounding communities and road networks.	Direct	Local	Construction phase (short-term)	Yes, the impact can be managed.	No	High	Medium	Dust control measures (the use of water cart/ truck) must be used to wet exposed soil thereby maintaining low dust levels. The dust levels must be kept below the required SANS Standards to ensure minimal impact on the surrounding community and environment. The ECO should monitor the dust levels daily.	Low	Low
RESOURCE USE & CONSERVATION										
Sourcing of raw materials i.e.: (gravel, stone, sand, cement and water) from unsustainable sources resulting in illegal sand winning and	Indirect	Potential to be regional	Construction phase (short-term)	Yes, the impact can be prevented.	Yes, potential loss of irreplaceable soil and water resources.	Medium	High	Materials are to be sourced on site where possible (see Geotechnical report, Appendix 12). All sourced materials must be obtained from a registered and sustainable source and all delivery notes and slips must be made available to the ECO e.g. mined material such as stone must only be obtained from	Low	Medium

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
mining operations causing significant environmental damage.								permitted quarries.		
TRAFFIC										
Increase in traffic disruptions on surrounding access roads during construction.	Direct	Local	Construction phase (short-term)	Yes, the impact can be managed.	No	High	High	Points man in attendance to control traffic where road disruption is most likely. Alert traffic department if road closure is required, conduct road closures during off peak hours and place notices of intent in advance. Construction vehicles to comply with the speed limits.	Medium	Medium
Increase in the volume of traffic on the congested roads during the operation of the proposed business park.	Indirect	Local	Operational phase (long-term)	Yes, the impact can be managed.	No	High	High	According to the five year forecasted traffic analysis, the traffic impact report identified five intersections/roads requiring upgrade (listed in section 3.1.1.1 above). Once the upgrades are complete, the road network should cope with the predicted flows.	Low	Low
Potential for the link road within the development to become a means to bypass the existing toll plaza.	Indirect	Local	Short-term	No	No	Medium	High	The eThekwini Transport Authority have advised that the link road should not be connected to the passenger terminal and access road to the N2 but should stop at the trade zone.	Low	Low
Impact on surrounding communities (Tongaat and the Herrwood Community) with the upgrading of nearby roads as recommended by the Traffic Specialist.	Indirect	Local	Construction phase (short-term)	Yes, the impact can be managed.	No	High	Medium	Excavation to take place in road reserves where possible and avoid excavating in the road itself. Keep points man in attendance to control traffic where road disruption is most likely. Alert traffic department if road closure is required, conduct road closures during off peak hours and place notices of intent in advance.	Medium	Medium

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
INFRASTRUCTURE & SERVICES										
Damage to existing services (electricity, water, etc.); Potential impact on power lines due to mechanical damage or obstruction to power line.	Direct	Local	Construction phase (short-term)	Yes, the impact can be prevented.	No	High	High	This impact can be fully mitigated against by identifying services prior to construction and avoiding damage to existing services. Alternatively, if service disruption is unavoidable, the parties affected must be notified in advance.	Low	Medium
Pressure on existing Tongaat Waste Water Treatment Works.	Direct	Local	Operational phase (long-term)	Yes, the impact can be managed.	No	Medium	High	eThekwini Water and Sanitation have confirmed that the Tongaat WWTW's is being upgraded and can therefore handle sewerage from the proposed development (Appendix 5).	Low	Low
Potential impact on existing water pipeline that runs east to west across the site.	Direct	Local	Construction phase (short-term)	Yes, the impact can be prevented.	Yes	High	High	The water pipeline and servitude has been identified by the developers and engineers. Care will be taken not to impact the water pipeline. Alternatively, if service disruption is unavoidable, the parties affected must be notified in advance.	Low	Medium
Litter and solid waste accumulating on site due to delay in servicing by Durban Solid Waste (DSW).	Direct	Local	Construction phase (short-term)	Yes, the impact can be managed.	No	Medium	High	Contractors on site are to manage the waste efficiently and ensure DSW have sufficient time to collect waste. The Engineering Services Report has stated Buffelsdraai landfill site will be utilised.	Low	Low
Increase pressure on water services in the Tongaat/La Mercy area.	Direct	Local	Operational phase (long-term)	Yes, the impact can be prevented.	No	High	High	eThekwini Water and Sanitation Unit have confirmed that bulk water can be made available to the development subject to the upsizing of the existing reservoir and associated pipework and the upsizing of the reticulation network to the site (Appendix 5). According to the Engineering Services	Low	Medium

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								Report, new reservoir will be installed immediately adjacent to the existing La Mercy Airport Reservoir (see section 3.1.4).		
Increased pressure on existing Tongaat substation.	Direct	Local	Operational phase (long-term)	Yes, the impact can be managed.	No	Medium	High	The newly constructed Tongaat substation will be used to supply the initial phase (up to 75%) of the development (Appendix 6). However a new 132/11kV substation will need to be constructed in close proximity to the proposed development. This will relieve pressure off the Tongaat substation.	Medium	Low
Positive impact with the installation of street lighting and public open space.	Indirect	Local	Operational phase (long-term)	Positive Impact						
Over development of the area	Indirect	Local	Operational phase (long-term)	Yes, the impact can be partially prevented.	No	Medium	Low	The change in land use from agricultural to business/logistics/ light industry will see development occurring in the area and therefore this impact is inevitable for the general area. The floor area ratio's anticipated are however not excessive. There will also be strong Building Design guidelines that will include architectural and aesthetic issues as well as sustainability measures. The layout does also incorporate open space, which aims to reduce the development extent however this cannot be fully mitigated.		
Potential positive impact on surrounding property values.	Indirect	Local	Operational phase (long-term)	Positive impact.						
VISUAL										

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
Loss of open space.	Direct	Local	Operational phase (long-term)	No.	No	High	Low	There will be a loss of open space previously associated with the sugarcane fields however the layout has incorporated 219 603m^2 of open space into the development footprint. The site will allow pedestrian and cyclist access.	High	Medium
SOCIO-ECONOMIC										
Small loss of temporary agricultural employment (Agricultural Potential Assessment, 2009).	Indirect	Local	Operational phase (long-term)	Yes, the impact can be reversed.	No	High	High	The development of the proposed business park will provide alternative employment opportunities during both the construction and operational phase. Permanent employment will become available as opposed to seasonal as previously offered by the site.	High	Low
Unauthorised access to property.	Indirect	Local	Construction phase (short-term)	Yes, the impact can be prevented.	No	Medium	High	The applicants are the landowners and thereby will authorize access to the property. The entire site should however be fenced so ensure workers do not cross boundary lines particularly where the development footprint runs adjacent to the Herrwood Community.	Low	Low
Potential for an associated increase in crime due to the influx of workers into the area.	Direct	Local	Construction phase (short-term)	Yes, the impact can be managed.	No	High	High	As mentioned above, the entire site should be fenced to prevent workers from accessing adjacent properties. Security personnel on site should be strategically positioned at exit and entry points as well as paying attention to the neighbouring Herrwood Community.		
Change in the sense of place associated with the open space of the agricultural	Indirect	Local	Operational phase (long-term)	No	No	High	Low	The proposed development will completely change the sense of place that is currently associated with the open sugarcane fields. The development layout has	High	Medium

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
land-use								however incorporated areas of open space to retain elements of the pre-development sense of place.		
Positive impact on the economic development and expansion of the Tongaat node.	Indirect	Local	Operational phase (long-term)	As indicated in the Urban-Econ Socio-Economic Impact Assessment (December, 2010), the proposed development will have a positive impact on the neighbouring Tongaat node.						
Positive impact for temporary and permanent local employment opportunity access to skilled and un-skilled employment opportunities in nearby towns.	Direct	Local	Construction and Operational phases (long-term)	Opportunity for employment during the construction phase as well as the operational phase specifically for the neighbouring communities of Tongaat and Verulam. It will be the responsibility of the contractor to appoint a Community Liaison Officer.						
Possibility of stimulating tourism in the area.	Indirect	Regional	Operational phase (long-term)	Positive impact						
Synergy between the overall spatial development plans for the area and the proposed development.	Indirect	Regional	Operational phase (long-term)	Positive impact as indicated in the Gabhisa Planning and Investments 2010 Socio-Economic Assessment.						
Need and desirability of the development in relation to the overall demand for such land uses, within the broader region.	Direct	Regional	Operational phase (long-term)	Positive impact						
Increase in purchasing of locally produced goods and	Indirect	Regional	Operational phase (long-term)	Positive impact as identified by the Gabhisa Planning and Investments 2010 Socio-Economic Assessment.						

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
services.										
CULTURAL										
Potential unearthing and damage to items of cultural or historical significance.	Direct	Local	Construction phase (short-term)	Yes, the impact can be prevented.	No	Low	High	Heritage Impact Assessments have been conducted and are included in Appendices 22 and 23. During the construction phase, should any culturally significance artifacts be discovered, construction is to cease immediately and the heritage authority contacted (AMAFA).	Low	Low
Potential disturbance to unidentified grave to the west of the site.	Direct	Local	Long term as once disturbed remedial actions would be required.	Yes, the impact can be prevented.	No	Low	High	It is unlikely that the development will impact the graves, as they are located approximately 130m south west of the preferred site boundary. The contractors are to be made aware of the graves, which should b demarcated as a no-go area.	Low	Low
Unintentional damage to the two culturally significant buildings on site (Estate Managers House & Saunders Residence). Both are over 60 years old.	Direct	Local	Construction phase (short-term)	Yes, the impact can be prevented.	Yes	High	High	The applicant proposes to demolish the Estate Managers House in the north however the Saunders Residence will be retained in the south. The Saunders Residence will however require some upgrades and alterations. An application will be lodged with AMAFA for the demolition, alteration or alteration to a structure which is over 60 years old.	Low	Low
HEALTH & SAFETY										
Speeding construction vehicles resulting in safety issues for surrounding residents.	Direct	Local	Construction phase (short-term)	Yes, the impact can be prevented.	No	High	High	Speeding will be prohibited. Speed warning signs of 30kph speed limits to be set.	Low	Low
Safety concerns related to the operation of the	Direct	Local	Operational phase (long-term)	Yes, the impact can be managed.	Yes	Medium	High	Strict speed limits will be prescribed within the development. The layout also provides for	Low	Medium

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
new roads within the development.								pedestrian walkways ensuring that pedestrians do not have to walk directly on the roads.		
Lack of toilet facilities resulting in unsanitary conditions.	Direct	Local	Construction phase (short-term)	Yes, the impact can be prevented.	No	High	High	Adequate toilet facilities will be provided for all staff members as standard construction practice.	Low	Low
Improper disposal of toilet waste from chemical toilets resulting in contamination of the surrounding environment.	Direct	Local	Construction phase (short-term)	Yes, the impact can be prevented.	No	High	High	The chemical toilets to be provided must be from a registered company and all sewage must be disposed of at an appropriate facility. Safe disposal certificates must be kept on record.	Low	Low
Potential impact to Aviation Safety.	Direct	Local	Operational phase (long-term)	Yes, the impact can be prevented.	Yes	Low	High	Although the proposed development is within close proximity to the KSIA, the potential of the development to impact on the aviation safety is minimal. Buildings within the development are required to comply with the Civil Aviation Regulations 2010 in terms of building height restrictions and activities within or adjacent to the flight path.	Low	Low
IMPACTS OF THE NO-GO OPTION										
Lack of upgraded services in the area.	Direct	Local	Long-term	No	No	n/a	n/a	Increased pressure on existing water, sanitation and electrical services with the inevitable increase in development and population in the area. The proposed development will include an additional bulk water connection and future electrical substation.	n/a	n/a
Risk of further alien invasive encroachment along the wetland and river catchment.	Direct	Regional	Long-term	No	No	n/a	n/a	The wetland system has already been classified as “degraded” by the wetland specialist. Alien vegetation will continue to establish along the drainage lines without attention.	n/a	n/a

Nature of Impact (potential)	Direct or Indirect	Extent of Impact	Duration of Impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory Potential	Mitigation measure	Probability after mitigation	Significance after mitigation
Farming on this site will continue	Direct	Local	Long-term	No	No	n/a	n/a	The farming will be segmented due to the newly authorised and partially constructed Link Road through the centre of the site, reducing productivity.	n/a	n/a
Associated wetlands and drainage lines not disturbed.	Direct	Local with the potential to affect the estuary.	Long-term	No	No	n/a	n/a	The system will continue to be colonised by alien vegetation and functionality will be reduced over time. The potential to rehabilitate the remaining wetland system has been identified as a positive impact.	n/a	n/a
Lack of utilisation of the newly constructed link road travelling through the site.	Indirect	Local	Long-term	No	No	n/a	n/a	The Link Road has undergone a separate EIA process and received environmental authorisation on the 09 December 2011. Construction has begun. The new road links the Dube TradePort with the N2 highway.	n/a	n/a
Increase in demand for a TradeZone similar to this development.	Indirect	Regional	Long-term	No	No	n/a	n/a	The proposed future Inyaninga and TradeZone 2 developments will decrease the demand for TradeZone style development in the area however, due to the prime location of the uShukela site; the proposed activity would be highly suitable for trading purposes.	n/a	n/a

From the assessment of impacts identified, the most important impacts that the proposed development will have are those where specialists cannot fully provide mitigation measures. These impacts include the inevitable compaction of soil on site, a change in sense of place associated with the current open space and there will be a direct loss in wetland area. Early on in the scoping process, the wetland system on site was identified as the major environmental consideration for the proposed uShukela Highway Development. To ensure that the overall impact on the wetland system was assessed entirely and accurately Wetland Consulting Services provided specialist input breaking down the individual functions of the existing wetland system and Hlawe River. The section labelled "sensitive environmental areas" in table 10 above includes a list of these functions and describes mitigation measures for each. The wetlands main functions are flood attenuation and water quality control. As emphasized by the wetland specialists, the change in hydrology on site as a result of surface hardening poses the biggest challenge to retaining the wetland system.

Mitigation measures and recommendations provided by the wetland specialist aim to promote water infiltration on the site and reducing peak flows of water entering the wetlands. These include the incorporation of swales and drains, wetland attenuation features and bioretention areas. The proposed uShukela development will however result in a direct loss in the buffer area reducing the wetland's "defence" area making the drainage lines and river more susceptible to pollutants and an increase in sediments from any runoff. The EAP is however satisfied that during the post-construction phase, the engineering solutions prescribed by the specialist will significantly decrease the impact of a change in hydrology that will occur. It is during the construction phase that potential sediment input, stormwater runoff and pollution will have to be tightly monitored to ensure no permanent damage is done to the wetland system during this stage of the project. Specific wetland monitoring is included in the construction section of the Environmental Management Programme (EMPr) and will therefore be included in the Environmental Control Officers (ECO) audits submitted to the Department of Environmental Affairs.

It is important to note that Wetland Consulting Services are confident that the project hydrologists have acknowledged and addressed the main concerns (water storage capacity of soil, increase flow velocity and volume of water leaving the development site). With the appropriate design and implementation, wetland diversity will be **substantially improved** compared to the wetland systems current state.

The vast majority of vegetation and avifauna identified as susceptible to the proposed development by the relevant specialists are directly associated with the wetland systems. By ensuring that the wetlands are not significantly affected pre- and post-construction as discussed above, the vegetation and avifauna should be preserved. This impact is also important to monitor throughout the construction process, where the probability of the impact is significantly higher.

It is clear that the proposed site is strategically located in terms of the KwaZulu Natal Spatial Development Framework and eThekwini Municipality's IDP, SDF, SDP and LAP's (Specialist Planning Report, 2013). The development of the site will create a link between the Durban harbours and Richards Bay. It is also directly adjacent to KSIA and the Dube TradePort. Since both agricultural specialists rated the site as having a moderate agricultural potential decreasing over time as well as the predicted future increase of 37% of agricultural land, the direct loss of this portion of agricultural land is well compensated for and hence insignificant.

The majority of positive impacts that the proposed development will have are associated with the surrounding communities. These include the increase in local property values, promotion of economic expansion and development of Tongaat, the creation of temporary and permanent jobs and a potential to increase tourism in the area. The development will see more than R4 billion new investment being invested into the area, a significant benefit to the region.

As stated above, the proposed activity is in line with the Spatial Development Framework for the eThekwini Municipality stimulating development not only in KwaZulu Natal but potentially contributing to national development. There is also a positive potential for the rehabilitation of the degraded drainage system on site. The rehabilitation of the post-development wetland area together with landscaping philosophy and stormwater management plan should compensate for the wetland area lost by the development footprint.

Table 9 above has confirmed that the majority of identified construction related impacts can be fully mitigated and have been included in the EMPr.

6.3 Draft Environmental Management Programme [Regulation 31 (2) (p) and 33]

An Environmental Management Programme (EMPr) in accordance with EIA Regulation 33 has been compiled and is included as Appendix 24. The objective of the EMPr is to provide measures to mitigate and manage construction, operation and decommissioning activities in order to minimize potential negative impacts on the

surrounding environment. The EMPr serves as a standalone document required to be kept on site during the construction phase. It typically forms the basis for monitoring compliance with the Environmental Authorisation during the construction and operational phase.

An independent Environmental Control Officer (ECO) will be required to ensure that the applicants as well as all contractors on site comply with the requirements of the EMPr. Frequent audits will be conducted and submitted to the Department of Environmental Affairs. Due to the magnitude of the proposed development as well as the requirement for frequent monitoring, the EAP proposes that weekly audits be carried out.

6.4 Determination and Assessment of Cumulative impacts [Regulation 32 (2) (l) (i)]

The NEMA EIA regulations define cumulative impact as follows:

> *"the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area;"*

The DEA guideline on the assessment of alternatives and impacts identifies two types of cumulative impacts:

(1) Additive cumulative impact, i.e. where the identified potential impact adds to the impact which is caused by other similar impacts; or

(2) Interactive cumulative impact, i.e. where a cumulative impact is caused by different impacts that combine to form a new kind of impact. Interactive impacts can be further classified:

   a. Counterveiling: the net adverse cumulative impact is less than the sum of the individual impacts; or

   b. Synergistic: the net adverse cumulative impact is greater than the sum of the individual impacts.

Table 11 provides an assessment of potential cumulative impacts that may arise from the development proposal:

Table 11: Assessment of potential cumulative impacts for the proposed uShukela Highway Development.

Nature Of Impact	Extent of Impact	Duration of Impact	Type of Cumulative Impact	Mitigatory Potential	Mitigation Measure	Probability after mitigation	Significance after mitigation
The development will place added pressure on existing services in the area, namely electricity, water, sanitation and the road network.	Local (Traffic) & Potential regional impact if services are impacted.	Operational phase (long-term)	Additive	High	The Engineering Services report (Appendix 2) has indicated that an additional bulk water supply main has been constructed as well as another water reservoir located adjacent to the current La Mercy Airport Reservoir (see section 3.1.4 of the EIR). The Tongaat Waste Water Treatment Works have confirmed that there will be sufficient capacity to handle the additional sewage from the proposed development. The existing Tongaat Substation will be utilised for the initial (up to 75%) phase of the development thereafter a new 132/11kV substation will be required (Electrical report, Appendix 6). The applicants have been working very closely with the eThekwini Municipality around the broader development plans for the wider region and to ensure that infrastructural plans are undertaken for the region as a whole. The applicants have also ensured that all specific development infrastructure needs are aligned and integrated with the ultimate regional requirements. The Traffic Impact Assessment (Appendix 3) has confirmed that although the proposed development will increase the traffic congestion in the area, a number of strategic road upgrades were prescribed that will decrease the traffic impact.	Medium	Low
Change in land use with specific reference to the proposed Inyaninga Development	Regional	Operational phase (long-term)	Interactive: synergistic	Low	The uShukela development is aligned with the SDF and NUDC plans of the eThekwini Municipality. The NUDC plan presents the Municipality's strategic spatial planning intent for the broader northern region. The uShukela Highway Development as well as the proposed Inyaninga Development in the same general area (Figure 6) will have a cumulative change in land use impact. Both areas are currently used for agricultural purposes and therefore are associated with a sense of open space. The Inyaninga area of land has also been earmarked for future development opportunities. This impact cannot be fully mitigated however green areas of open space have been incorporated into the uShukela Highway Development layout which aims to retain a sense of open space within the site.	High	Medium
Socio-economic impact on surrounding communities.	Local	Construction and operational phases	Interactive: synergistic	This is a positive impact. According to the social specialist, the development will increase job availability, increase private investment in the area and stimulate expansion of existing businesses. The Tongaat node was identified as the primary impact area as well as Dube TradePort and the KSIA (please refer to section 4.4 of EIR).			

Nature Of Impact	Extent of Impact	Duration of Impact	Type of Cumulative Impact	Mitigatory Potential	Mitigation Measure	Probability after mitigation	Significance after mitigation
		(long-term)					
Increase in noise levels with regards to the neighbouring KSIA.	Local	Construction and operational phase (long-term)	Additive	Low	The proposed development is immediately adjacent to the residential settlement of Herrwood. Due to the close proximity of the airport and associated noise, noise during construction is required to be tightly monitored. Excessive noise will be controlled on site, notwithstanding the airport related noise. Workers will be trained regarding noise on site and construction hours will be kept to working hours (07h00 to 18h00). The construction will need to be monitored by an ECO who will ensure compliance with the construction EMPr. If excessive noise is expected during certain stages of the construction, Herrwood residents must be notified prior to the event. From an operational perspective however there is every likelihood that there will be activity operating around the clock and as development and air traffic movement increases and intensifies the desirability of residing in the area will diminish significantly	Medium	Medium
Increased pressure on environmental services in the area.	Local with potential regional impact on the estuary.	Operational phase (long-term)	Additive and interactive: synergistic	Medium	There is a possibility that the change in land use and therefore on site hydrology, if not carefully managed, will result in a negative impact on the environmental services provided by the site. The variety of previously described engineering solutions (e.g. bio-retention areas and surfaces promoting infiltration) and rehabilitation interventions specifically in the green open space central corridor aim to ensure that the remaining open space onsite provides sufficient environmental services to offset the loss of services lost to the proposed development. The wetland specialist has highlighted flood attenuation and water quality control as the two important services provided by the wetland system. Construction and post-construction management and monitoring, outlined in the EMPr is required to ensure these services are not significantly disturbed. Please note that the NUDC plans incorporated environmental requirements at the broader level and these are enhanced at the local level with new developments providing new areas of habitat to be integrated into the broader open space environment.	Medium	Medium
Cumulative impact on the water quality within the Hlawe River	Local with potential regional impact on the estuary.	Operational phase (long-term)	Additive	High	The increase in hardened surfaces and increased amount of stormwater runoff leaving the site has the potential to decrease the water quality draining into the Hlawe River. Stormwater attenuation will be tightly monitored according to the stormwater management plan (Appendix 4) outlined in the EMPr (section 3B of Appendix 24). The wetland specialist has prescribed further mitigation measures to control pollutants and sediments potentially entering the Hlawe River drainage lines. These include grass swales, attenuation ponds and bio retention areas (Wetland	Medium	Low

Nature Of Impact	Extent of Impact	Duration of Impact	Type of Cumulative Impact	Mitigatory Potential	Mitigation Measure	Probability after mitigation	Significance after mitigation
					Impact Assessment, 2013; Appendix 11).		
Potential decrease in air quality	Local	Operational phase (long-term)	Additive	Low	The site is located immediately adjacent to the KSIA and therefore there may be a cumulative decrease in the air quality of the area. The only emissions that will be generated will be from construction vehicles which are expected to be minimal and should not significantly affect the surrounding communities or the environment. Air emissions will however be monitored daily by the onsite ECO and a complaints register available to surrounding communities.	Medium	Low
Loss in hectares of wetland located in the Hlawe River drainage catchment.	Local with the potential to impact regionally	Operational phase (long term)	Additive	n/a	The uShukela Highway Development will result in the direct loss of 23.7 hectares of wetland. Taking into account other developments in the area such as the Dube TradePort and Agrizone, which have eliminated large areas of wetlands that drain into the Hlawe River catchment, there will be a further cumulative loss in wetlands in this area. The applicants propose to retain and rehabilitate approximately 22 hectares of wetland ecosystem on site. The Freshwater Ecosystem Assessment stated that although the site contains 54 hectares of wetland habitat, the Present Ecological State score considers this to be equivalent to approximately18 hectares of intact wetland.	High	High
Positive Impact of upgrading access roads to improve services in the area.	Local	Operational phase (long-term)	Additive	The impact is positive. Once construction is complete the road network will be upgraded to withstand an increase in traffic.			

All cumulative impacts identified in table 11 above can be sufficiently mitigated. As discussed above, it will be during the construction phase that the majority of identified cumulative impacts will have the greatest effect. The cumulative impact that the development will have on the environmental services will specifically be more significant during construction as there is a greater potential for pollutants and sediments to enter the drainage system with the stormwater during this phase. The applicants and on site contractors are required to commit to the EMPr which is designed to ensure that these cumulative impacts do not have adverse effects to the local communities or the immediate environment.

The potential cumulative noise level increase and air quality decrease are also mainly associated with the construction phase of the proposed uShukela Highway Development. Construction vehicles and an increase in traffic will be the main cause of the noise and pollution increase. During the operational phase it is unlikely that the current noise and air quality levels will significantly differ from pre-construction levels.

There are two identified positive cumulative impacts. These are the socio-economic effect that the proposed development will have on the surrounding communities of Tongaat and the Dube TradePort as well as improving the road services in the local area.

7.0 Comparative assessment of all alternatives identified during the environmental impact assessment process including the advantages and disadvantages that the proposed activity may have on the environment and the community that may be affected by the activity [Regulation 31 (2) (i) and (g)]

As discussed in section 3.2 on the above, the applicants initially identified three layout alternatives for the proposed uShukela Highway Development. Two of the layout alternatives included a petrol filling station. Since the Scoping Report, there has been a reduction in available bulk area and an increase in green open space as recommended by the wetland specialist. Due to the fact that it is not possible to accurately forsee the most likely site that will be the most appropriate for petrol filling stations and that the details of such are not available. The final proposed layout excludes the petrol filling station sites. The alternatives that included such a use in the Scoping Report have therefore fallen away. The applicants are therefore proposing one layout alternative which will be compared to the "no-go" option in the table below. Environmental advantages and disadvantages are included. This will easily assist I & APs to compare the different options.

Please note that information used in the comparison tables in this section are for the long-term operation phase of the proposed development. Section 6 above included all potential impacts (construction and operational) and proposed mitigation measures. It was concluded that the majority of construction related impacts could be fully managed or avoided by utilising the attached EMPr.

Table 12: No Go Option vs Alternative
Advantages and disadvantages are clearly labelled. If not stated as being advantageous or disadvantageous, the point can be interpreted as both depending on one's point of view.

	No Go	Alternative
Environmental impacts	- Sugarcane will continue to be farmed with fertilizers being added to the soil for additional nutrient input (disadvantage). - Existing degraded wetland system on site will continue to function, albeit in a minor manner, reducing localised flooding and filtering water before it enters the Hlawe River and Tongati Estuary - The theoretically wetland system could be rehabilitated to close to full functionality (advantage).	- Loss in 55% of the degraded wetland ecosystem that current exists on site (disadvantage). - Change in hydrology with regards to infiltration rate, quantity & quality of water entering wetland (disadvantage). - Reduction in wetland buffer area (disadvantage). - Impact on fauna (including avifauna) associated with the wetland ecosystems affected on the site (disadvantage). - Removal of alien invasive species & planting of indigenous KZN Coastal Belt vegetation enhancing biodiversity in the area (advantage).
Environmental opportunities	- The land owners will continue to farm sugarcane reducing the potential for environmental opportunity however in its present state, the crops are sequestering carbon. - The potential to create, manage and effectively maintain meaningful a functioning natural habitat will be very limited (disadvantage).	- Rehabilitation of the currently degraded wetland system on site (advantage). - Example of an innovative, modern approach to stormwater management on site taking into account wetland rehabilitation including stormwater attenuation and controlled input into the wetlands using engineering solutions (advantage). - Ability to rehabilitate as close to full functionality

		as possible and to maintain, sustainably into the future, an extensive open space, wetland habitat and stimulate biodiversity (advantage).
Economic Feasibility	- The agriculture assessments have shown that the land will decrease in agricultural potential over time with the area producing less yields. It is therefore less economically feasible to retain the land for agricultural purposes (disadvantage).	- Temporary jobs to be created during the construction phase with the opportunity for permanent employment during operational (advantage). - Potential for the surrounding property values to increase (advantage). - Economic development and expansion of the neighbouring Tongaat Node (advantage). - Currently there is a high demand for logistics/ trading zones, which increases the economic feasibility of the proposed activity (advantage).
Economic Opportunity	- Decreasing viability of sugar cane farming as development occurs in the region (disadvantage).	- Substantial new investment into local region (advantage). - Creation of substantial number of new job opportunities (advantage). - Creation of new economic opportunities either within the development or in service industries/enterprises in areas such as Tongaat and Verulam in support of the development (advantage). - Substantial rates and taxes benefits to government.
Compliance with Policy or legal requirements	- Not in line with Provincial and Municipal spatial planning policies nor with the Aerotropolis model for regional growth and development. (disadvantage).	- There are a number of environmental permits and licenses that may be required before certain phase of the development take place. These include a Water Use License for constructing in a watercourse as well as a heritage permit from AMAFA for demolishing/altering structures older than 60 years of age. Please see Table 8 for identified permits and authorisation requirements. - Aligns with provincial and municipal spatial planning policies as well as with the Aerotropolis development strategy.
Social implications	- Surrounding communities will retain their sense of place associated with the agricultural land use (advantage). - Herrwood Community will remain isolated from development - Estate Managers House and Saunders Residence to remain untouched. - Temporary agricultural employment will continue (advantage).	- It is proposed that the Estate Managers House will be demolished to make way for the future TradeZone. - Alterations will be made to the Saunders Residence which will be incorporated into the management precinct. - Water, electrical and road networks will be upgraded promoting further development in the area (advantage). - Provide large employment opportunities for a variety of skilled and semi-skilled people (temporary & permanent) (advantage). - Provision has been made for access for the Herrwood Community. - Herrwood residences will be surrounded by development and increasing airport related activity.
Planning	- There will remain a demand for logistic/ tradezone development in the area (disadvantage). - It is expected that other similar development proposals will be submitted in the future due to the land having been rezoned from agriculture to commercial/light industry. - Lack of utilisation of the newly development link road traversing the proposed site (disadvantage).	- The proposed development is strategically located within the Provincial goals and frameworks, eThekwini Municipality Spatial Development Framework and Local Area Plan (advantage). - The close proximity of the KSIA and Dube TradePort as well as the central position between Durban Harbours and Richards Bay harbour make the position of the uShukela Highway Development ideal (advantage). - The TradeZones will utilize the newly constructed link road which runs directly through the centre of the site from north to south (advantage). - Stimulation of a cumulative change in land use

		in the area with surrounding pieces of agricultural land being earmarked for commercial/light industry purposes.
Positive impacts (all advantageous)	-This section of the Hlawe River will not be exposed to potential pollution during the construction phase.	- In line with planning frameworks in the area (local, regional and national). - Opportunity to incorporate modern environmental good practise recommendations into a Business Park to act as an example to similar future developments. - Increase in purchasing and stimulating locally produced goods and services.

7.1 Rating of the identified potential alternatives according to how the proposed activity may impact the environment and the community that may be affected by the activity [Regulation 31 (2) (g)]

Each identified alternative was reviewed by a matrix system using the following criteria:

a) Which alternative is more suitable from an environmental services / biological perspective at least in terms of the site itself?
b) Which alternative is more feasible from the perspective of the environmental services / biological perspective from a regional perspective?
c) Which alternative is more suitable from the perspective of the surrounding communities / businesses in terms of services or benefits they may receive?
d) Which alternative is more suitable from the perspective of the surrounding communities / businesses in terms of impacts i.e. traffic, that may affect them?
e) Which alternative is more economically feasible and also more viable for the developer?

In selecting the criteria for the matrix, the impacts and benefits from an environmental, social and economic perspective, as listed in table 12 above, have all been considered with a view to ensuring that no aspect is unfairly weighted.

Table 13: Rating of Alternatives
Key: 0 = not viable (or may cause impact); 1 = less viable (or impact can be mitigated); 2 = most viable (or no impact caused);

	No Go	Alternative
Environmental Services / Biological – on site	2	1
Environmental Services / Biological – regional	2	2
Surrounding Communities / Businesses – services / benefits / positive impacts	1	2
Surrounding Communities / Businesses – negative impacts i.e. traffic	2	1
Economic Feasibility & Viability For the developer	0	2

Based on the above ratings above it is clear that the proposed uShukela Highway Development is more economically viable than the no-go option with the development being in line with local. Regional and national planning frameworks and therefore strategically situated for effective trading opportunities. From a social perspective, the operational phase of the proposed activity will benefit the neighbouring nodes (i.e. Tongaat and Verulam[9]) because of employment opportunities and service development in the area. This includes the additional water reservoir that will be constructed, the proposed additional electrical substation and the upgrading of roads in the surrounding areas. Although the proposed activity has more opportunity to impact the surrounding communities and businesses positively, not developing the land (i.e. the no-go option) will not negatively impact the surrounding communities but there will also not be any positive improvements. Trade and local businesses will continue to function as they currently do. Environmentally, many of the impacts listed in table 10 can be mitigated against using the EMPr attached and therefore on site, the proposed alternative

[9] Urban-Econ Development Economists: *Socio Economic Impact Assessment of the Development on Tongaat and Verulam – Update* (2012)

was rated '1', where impacts can be mitigated. There will understandably be much fewer impacts on the environmental services on site if the land is not developed and therefore the no-go option was rated as '2'. In both cases, the EAP is of the opinion that the proposed development will not affect environmental or biological services on a regional scale. Both were therefore rated as '2', no impacts caused.

8.0 Assumptions, Uncertainties and Gaps in Knowledge [Regulation 31 (2) (m)]

The EAP is satisfied that sufficient information has been made available to allow for assessment of this proposal. The opinion of the EAP has been based on the number of specialist studies listed in section 4.6 of the EIR. It is unknown at this point who the tenants of the different TradeZones will be and therefore individual tenants will be responsible for their own waste license applications if necessary. At this stage the activity as a whole does not require a waste license.

9.0 Environmental impact statement with summary of key findings and comparative assessment of the positive and negative implications of the proposed activity and identified alternatives [Regulation 31 (2) (o) i-ii]

Tongaat Hulett Developments and Dube TradePort Corporation propose to construct a business/logistics and industrial development comprising of eight sub precincts separated by a main green open space corridor. The site is 134 hectares in total and is situated to the west of the N2 highway and north of the KSIA. The proposed development will function as a new trade and logistics gateway for Southern Africa and will also utilize and support the new link road that is currently under construction between uShukela Drive and the Dube TradeZone. It has been discussed throughout the report how well positioned the proposed site is in terms of local, regional and national framework planning. The existing wetland system was however identified early in the process as the main environmental risk present on site. Chapter one of the National Environmental Management Act 107 of 1998 as amended (NEMA) outlines the main principles underlying the Act with Principle 3 allowing for development which is socially, environmentally and economically sustainable. This section summarises the key findings of the EIR, addressing all three of these factors with regards to the proposed uShukela Development. Positive and negative implications associated with the proposed development are discussed as part of the environmental impact statement.

As mentioned above, the current wetland and riparian habitat occupying an area of 54ha, was initially identified as being the largest potential environmental impact for the proposed development. Wetland Consulting Services delineated the wetlands on site (43ha) and determined the limited services that the wetlands are currently performing. The wetland specialist as well as other specialist reports stated that the wetland system in its current state is degraded and significantly modified due to the current agricultural land use[10]. Nevertheless the wetlands store water, control flooding, regulate flow, enhance water quality, trap sediments, prevent erosion and promote biodiversity.

The stormwater management plan has included the wetland specialist recommendations to provide a solution to the change in land use resulting in a change in on-site hydrology. The engineering solutions include attenuation features, networks of swales, permeable surfaces to encourage infiltration, bio-retention ponds and rehabilitation with indigenous riparian vegetation. The wetland specialist is confident that these modern engineering solutions are "undoubtedly the future for wetland management". This fresh approach aiming to imitate wetland services could serve as an example "framework for integrating good environmental management into all development activities" as desired by NEMA[11]. The green open space corridor, occupying an area of approximately 22ha and traversing the site from east to west, aims to retain the wetland systems services thereby creating a sustainable layout option for the development. Therefore there are both positive and negative impacts associated with the wetlands on site. There will ultimately be a loss in wetland area with the development but there are also opportunities for rehabilitation of the wetlands that are retained for the creation of a new biodiverse habitat and enhancement of the wetland systems functions. Recommendations and mitigation measures proposed by the specialist's, including the SWMP have been incorporated into the EMPr for monitoring.

Other potential environmental impacts that the proposed activity may have are associated with indigenous flora and fauna on site. Since 85% of the site is sugarcane, the vegetation requiring conservation is confined to drainage lines and riparian ecosystems. While vegetation will be removed from site during construction, the applicants propose to have an overall green style, rehabilitating the open spaces with indigenous vegetation

[10] GroundTruth: *Assessment of the Freshwater Ecosystems* (2010)
[11] Preamble of the National Environmental Management Act 107 of 1998 as amended.

and promoting biodiversity. Indigenous fauna could potentially move through the green corridors during the developments operational phase. It should be required that the open space within the application area is monitored and maintained regularly to ensure that local birds and other fauna revisit the site post-construction.

Apart from specialists identifying potential impacts that the proposed development would have on the environment, social and economic specialists have reported on how the development could impact on the surrounding communities from a socio-economic perspective. Urban-Econ: Development Economists identified primary, secondary and tertiary impact areas and concluded that the uShukela Highway Development would impact Tongaat, Dube Trade Port, KSIA and Verulam positively. Employment opportunities created by the proposed development could extend beyond these nodes as well. The development will also directly benefit the eThekwini Metropolitan in terms of Gross Geographic Product (GGP) through additional employment and other income stream benefits. Currently, during the sugarcane cutting season, the entire estate employs 200-300 people. Only a portion of this seasonal employment will fall away however significant new employment opportunities will arise with the development including over 4000 permanent jobs. Of particular significance is the more than R4 billion total investment that the development will unlock into the local economy the ability for many existing and new businesses in the surrounding towns to benefit through supporting the new activities and industries.

Development of the agricultural fields will however change the current “sense of place” that people associate with the site at present. The development will also arguably be less aesthetically pleasing for some however the green style concept and open space will significantly contribute to the aesthetics. Potential cumulative noise and air pollution impacts will be restricted to the construction phase and can be tightly controlled according to the EMPr.

The EAP is of a similar opinion to the wetland specialist who concluded that since the area aligns with provincial and municipal planning policies and will be rezoned from agricultural to business/light industry, a change in land-use is inevitable and it is not feasible to expect the wetland hydrogeomorphic units to remain unchanged in the future. The applicants have altered the uShukela Highway Development layout considerably to take into account and conserve a significant portion of the drainage system on site. The proposed activity can therefore be considered a sustainable development option that has taken into account the environment, is economically feasible and has a positive impact on surrounding communities and businesses.

10.0 Reasoned opinion on authorization and conditions for authorization [Regulation 31 (2) (n)]

When deciding whether the activity should or should not be authorised, the EAP has evaluated and considered all identified impacts as listed in table 10 as well as the cumulative impacts listed in table 11. Where impacts cannot be avoided, the significance of these impacts was measured. Trade-offs were also considered such as the prescribed rehabilitation of the remaining wetland on site. The EAP has included specialist recommendations and prescribed mitigation measures into the EMPr. Provided that the applicants and contractors adhere to the specifically designed EMPr (Appendix 24), the EAP is of the opinion that environmental authorisation should be granted for the construction and operation of the uShukela Highway Development.

Taking into account the above mentioned factors, a number of conditions for environmental authorisation can be prescribed. These conditions include:

1. The applicants must ensure that mitigation measures and controls specified in the EMPr are adhered to. The construction of the uShukela Highway Development must be monitored by an independent ECO who should ensure compliance with the construction EMPr. Please see the EMPr attached as Appendix 24 for further details on the management of the site during construction.
2. It is recommended that the environmental construction audits be conducted on a weekly basis by an independent ECO in addition to a pre-construction and post-construction audit (PCA).
3. The contractor and his staff must attend an environmental awareness training course, presented by the ECO or a suitably qualified EO from the engineers / contractors, prior to construction commencing. The environmental awareness training course should cover the following key aspects: (a) basic awareness and understanding of key environmental features of the work site and the surrounding environment, (b) understanding the importance of, and reasons why, the environment must be protected, (c) ways to minimize environmental impacts, and (d) requirements of the Environmental Authorisation and EMPr.
4. Adequate chemical toilet facilities must be provided for all staff members as standard construction practice. The chemical toilets must be from a registered company and all sewage must be disposed of

at an appropriate facility. Safe disposal certificates must be kept on record. The toilets are to be situated further than32m away from any watercourse.

5. Existing infrastructure (i.e. electricity lines, water pipelines) must be identified prior to construction.
6. Drainage line, stream, rivers and wetlands must be protected from contamination at all times.
7. Any alien vegetation found within, or surrounding, the construction site must be cleared to ensure that invasion of disturbed areas does not occur.
8. The removal of natural vegetation should be kept to a minimal thus reducing the loss of indigenous vegetation, the establishment potential of alien invasive species and minimising potential for soil erosion.
9. There may not be hunting or fishing of wildlife on the site and no setting of snares or traps. No animals are to be harmed or harassed. Hunting or poaching must be prohibited.
10. Cement mixing must take place on a hard surface or on cement mixing trays. Cement mixing will not be permitted to occur where run off can enter the watercourse. In addition cement and fuels must be stored within bunded and hard surfaced areas. If the creation of a permanent bunded area is not feasible, these materials must be stored on drip trays capable of holding at least 110% of the spilled volume.
11. All materials must be obtained from a registered and sustainable source and all delivery notes and slips must be made available to the Environmental Control Officer (e.g. mined material such as stone must only be obtained from permitted quarries).
12. Littering must not be permitted on the site and general housekeeping must be enforced.
13. Waste must be stored in the bins within the waste collection area in the construction camp and must not be allowed to blow around the site, be accessible by animals, or be placed in piles adjacent to the skips / bins and must be disposed of at an appropriate land fill site.
14. If there is any hazardous waste, it must be stored on a hard surface within a bunded area and must not be allowed to enter watercourses and the surrounding environment.
15. All excess material and rubble must be removed from the site so as not to restrict the rehabilitation process. All excess material and rubble must go to an approved, designated landfill and a safe disposal certificate must be obtained.
16. Recycling should be undertaken where possible to limit waste added to the landfill site
17. The Hlawe River may not be used as a water source by staff unless water abstraction is approved and permitted by DWA.
18. Water usage during construction must be monitored and recorded.
19. A spill response procedure must be designed to manage spills during construction. Suitable spill kits must be available and staff must be made aware of the spill response procedure.
20. In the event of Heritage resources or artefacts being uncovered during construction, activities around the site must cease immediately and AMAFA must be contacted to investigate the finding.
21. All contractors must be cognisant of noise pollution and must notify neighbours when excessive noise is expected. Normal construction hours must be adhered to (07:00-18:00h from Monday to Saturday and 08:00-17:00h on Sunday if required).
22. Hessian, shade cloth or sheeting to be used as fencing around the south-east section of the construction site (where dust is liable to affect the Herrwood community) if complaints are received regarding an increase in dust levels. The wetting of dust sources should occur when necessary, (without excessive wetting), to reduce dust at source.
23. Temporary access restrictions should be implemented during construction for health and safety reasons.
24. Construction vehicle access should not disrupt traffic on uShukela Drive. If disruption to traffic is perceived to occur, flagmen must be present to ensure the efficient flow of traffic along uShukela Drive.
25. A board with contact details for complaints should be placed at the entrance to the site. The board should include emergency contact numbers.
26. Sustainability measures including rain-water harvesting (where this does not impact on groundwater seeping), water quality control, use of alternative water sources and recycling of water must be included in the Building Design Guidelines to ensure implementation.
27. A permit must be obtained for the destruction/alteration of the Estate Managers House and Saunders Residence. This permit will be applied to with AMAFA Built up Environmental Section.
28. A section 21(c) and (f) and (i) Water Use License should be obtained before construction commences.
29. Permission must be obtained from the relevant personnel regarding the removal/relocation of the protected species on site.
30. A pre-construction survey for any protected flora species that may be on the site should be conducted and any species found are to be retained and returned to the rehabilitated area once construction is complete.

31. The applicants should ensure that on-going assessments are carried out for the green open spaces areas to ensure that it functions effectively and efficiently as is proposed.
32. A Rehabilitation Plan for the open space areas should be developed and approved by the relevant authorities before construction commences. The Rehabilitation Plan should outline achievable goals take into account specialist recommendations and provide time lines for phased rehabilitation.
33. An operational Environmental Management Programme (OEMPr) is to be developed prior to construction to ensure on-going maintenance and management of the green system.
34. The proposed open space areas have to be retained as indicated in development layout illustrated in Figure 1 of the EIR.
35. Contractual fines must be imposed by the applicants on the contractor for continuous non-compliances with the EMPr and EA.
36. The independent ECO has the discretion to issue a work stoppage if serious environmental damage is caused by a contractor during construction. Once the ECO is satisfied that the damage has been suitably rectified work can continue.

11.0 References

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3. TGC Engineers, Preliminary Geotechnical Investigation Report for Watson Highway Commercial and Residential Development (2009).
4. CNdV, uShukela Landscape Masterplan Philosophy (2012).
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7. Urban-Econ Development Economists: Socio Economic Impact Assessment of the Development on Tongaat and Verulam – Update (2012)
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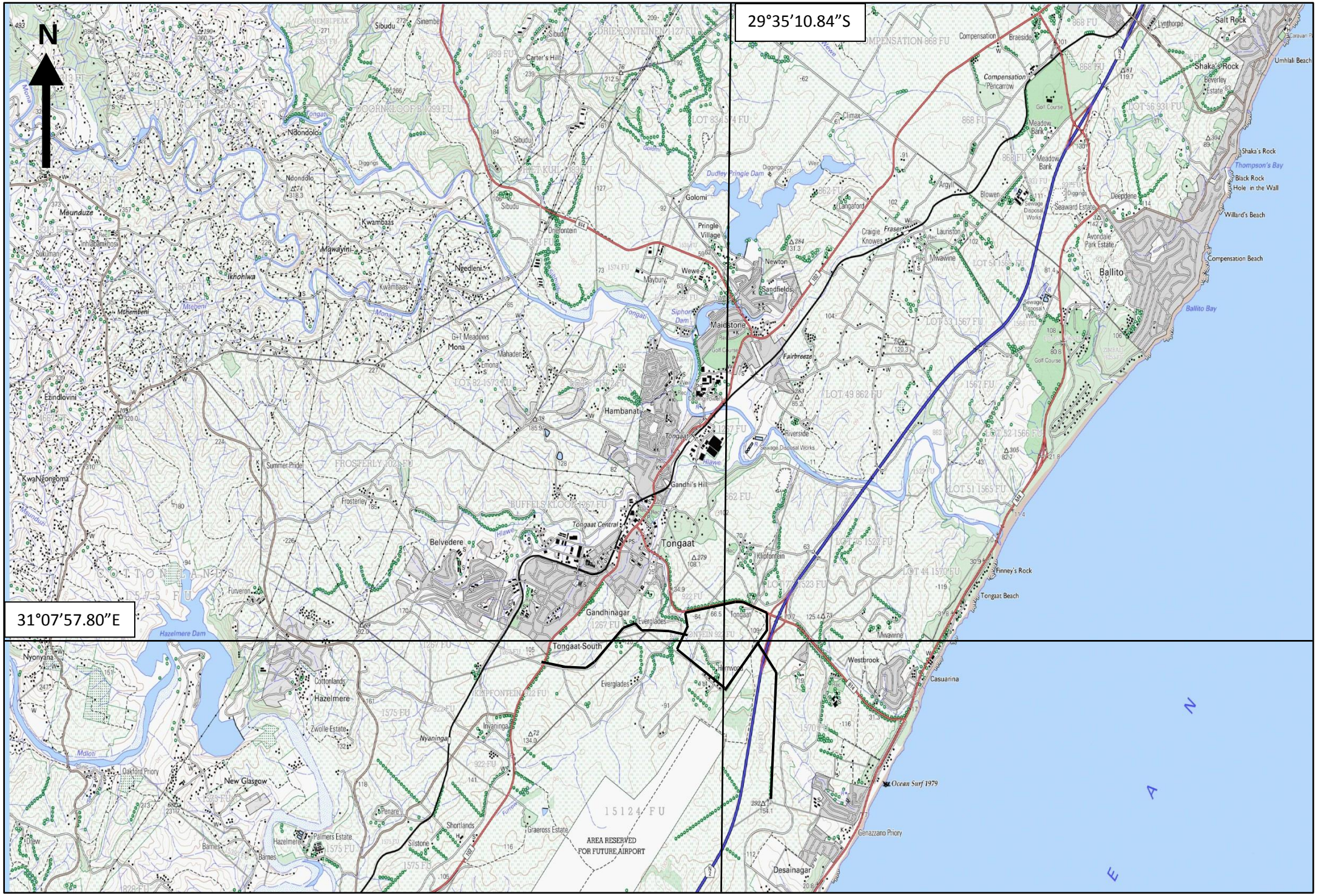
9. Environmental Impact Report: The construction of the Dube TradePort: Multi Modal Logistics Platform on the farm La Mercy No. 15124 in Durban, KwaZulu Natal, North Coast.
10. Urban-Econ Development Economists: Socio Economic Impact Assessment of the Development on Tongaat and Verulam – Updated (2013).
11. GroundTruth: Assessment of the Freshwater Ecosystems (2010)
12. Preamble of the National Environmental Management Act 107 of 1998 as amended.

Appendix 1: Topographical Map

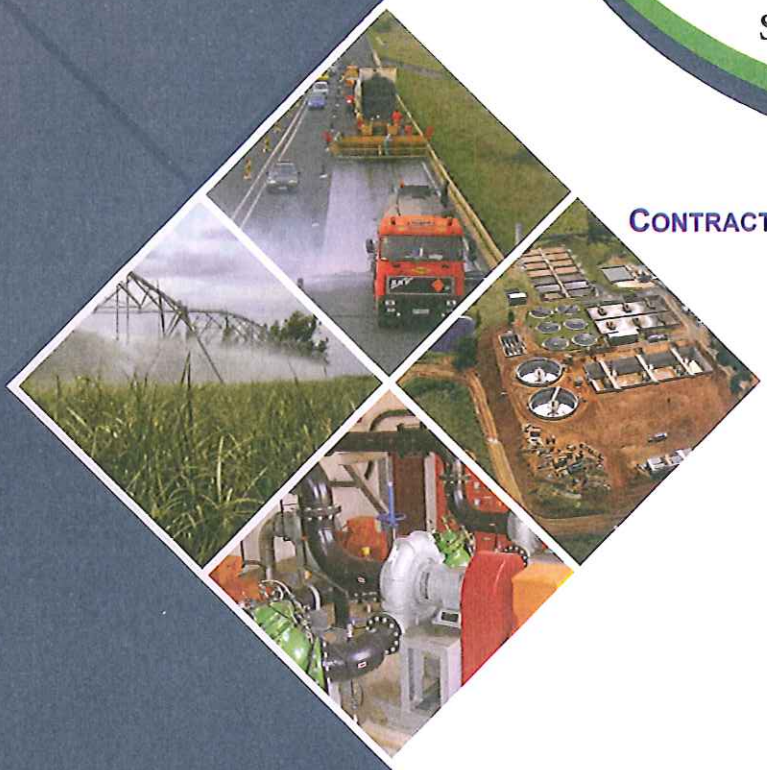
Locality map illustrating the uShukela Highway Development outlined in black with the new access to the west and the new water pipeline to the east of the development.



Appendix 2: Ushukela Highway Engineering Services Report

SBA

STEMELE BOSCH AFRICA
(Pty) Ltd



CONTRACT NO. 243/203 NOVEMBER 2010

USHUKELA HIGHWAY

ENGINEERING SERVICES REPORT

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USHUKELA HIGHWAY

ENGINEERING SERVICES REPORT

1. INTRODUCTION

The uShukela Highway development is situated at the northern end of the King Shaka International Airport. It is bounded by the N2 freeway and Toll Plaza to the east, uShukela Drive (Watson Highway) to the north, and the Hlawe River in the west.

The site measures approximately 140ha in extent and is currently under cultivated sugar cane. The terrain is relatively gentle for the area.

Tongaat Hulett Developments and Dube TradePort currently own the land making up the development area and propose to jointly plan the development of the land.

The proposed development will comprise light industrial, office parks and retail opportunities. The development is expected to yield a total floor area (bulk) of approximately 600 000m2 when completed.

This report outlines the existing bulk services available in the area, the requirements to serve the development, and proposals for the provision of the services.

2. ROADS

Access to the development will be obtained from uShukela Drive. This is an existing provincial main road under the control of the KZN Department of Transport, who will be required to approve the access points.

This road currently comprises a single carriageway in each direction. The traffic impact assessment (TIA) currently being undertaken will determine the necessity for increasing the capacity in this roadway, as well as the form of the intersections.

The main access traversing the site will be the spine road leading to Dube TradePort. This road is currently undergoing planning and environmental processes under the auspices of Dube TradePort.

A second more easterly access route is planned with the potential to link to the land lying to the east of KSIA and west of the N2.

The internal roads to the development will be either single carriageway or dual carriageway roads as determined by the TIA. All roads will be surfaced with road pavement structure being designed to accommodate the anticipated heavy vehicles.

3. STORMWATER

A majority of the site drains toward the Hlawe River to the west. The Hlawe River is a tributary to the iThongathi River.

The stormwater control philosophy will be to restrict post development flows in the Hlawe River as far as possible to those occurring pre-development (cane cultivation).

All purchasers and developers of individual erven will, in terms of sales agreements, be required to implement on-site stormwater attenuation to restrict run-off to pre-development levels. This can be achieved by on-site attenuation tanks, permeable paving, etc. Excess stormwater run-off will be accommodated in roadway drainage and in the natural watercourses.

Run-off from the roadways will as far as practical be accommodated in roadside drainage swales. Where necessary, piped drainage systems will be utilised. Energy dissipation measures will be implemented where these pipes discharge into the natural watercourses.

Additional attenuation facilities will be provided in the main water courses.

4. SANITATION

The uShukela Highway development will be provided with full waterborne sewage reticulation. The development falls within the catchment of the Tongaat Wastewater Treatment Works (WWTW).

This development will generate approximately 2Mℓ/day of effluent if full use is made of the proposed 'bulk'.

The Tongaat WWTW has a rated capacity of 12Mℓ/day, and current inflows average in excess of 10Mℓ/day. eThekwini Water and Sanitation (EWS), under who's authority the sanitation services fall, have indicated the current 'spare' capacity has already been earmarked for developments due to come on stream in the short term.

EWS have however commenced preliminary planning for the upgrading of the Tongaat WWTW to a rated capacity of 25Mℓ/day. Budget provision has been made for construction in the 2012/13 financial year. EWS already has a permit to treat up to 45Mℓ/day at this works.

The effluent will be carried from this development to the WWTW by the proposed Hlawe River gravity outfall main. This main is being design by others and has been sized to accommodate the outfall from uShukela Highway. It is currently in the preliminary design phase and environmental approval is currently being sought separately for its construction.

A large majority of the site drains by gravity to the Hlawe outfall main. The north-eastern portion of the site will however have to be provided with a temporary pumpstation as its natural drainage path is to the north of uShukela Drive.

The effluent from this catchment will in the interim be pumped to the Hlawe outfall main until such time as the area north of uShukela Highway (Amanzimnyama) is developed. At that juncture the pumpstation can be decommissioned, and use made of the gravity system in the northern area.

5. WATER

The water supply in the development area falls under the authority of EWS. Bulk water supply into the area is from two sources, i.e. the Tongaat WTW operated by EWS, and the Hazelmere WTW, operated by Umgeni Water.

The Tongaat WTW generally supplies the Tongaat environs, and includes in its supply area the Mamba Ridge reservoir to the north of the development.

The Hazelmere WTW includes in its supply area the Inyaninga reservoir (which serves the airport and is inland of the R102), the La Mercy Airport reservoir to the east of the N2, and the Westbrook Reservoir which is again further east.

The La Mercy Airport Reservoir is owned and operated by Umgeni Water, and the Inyaninga and Mamba Ridge reservoirs falls under the jurisdiction of EWS.

At present the 'unallocated' water supply spare capacity from the Hazelmere source is very limited. The department of Water Affairs is currently in the process of finalising planning to raise Hazelmere Dam, with this expected to be completed in 2012. This will increase the 'firm' raw water supply.

Umgeni Water also plans to concurrently increase the capacity of the Hazelmere WTW, with completion planned shortly thereafter. By 2013/14, there would be sufficient treated bulk water provided to cater for the development proposals in the area.

Doubling up of the Umgeni supply main through the uShukela Highway development is due to commence construction shortly, alleviating potential supply line restrictions.

The development requires a highest supply level of 114m, and therefore to supply the 24m pressure required throughout the development, and to allow for head losses in the supply main, will require a minimum reservoir elevation of approximately 140m to ensure it is fully supplied by gravity.

The Mamba Ridge reservoir (elevation of approx 100m) would only serve the western 20% of the site by gravity. The rest of the site would require an extensive pump-pressurised high level system, which is in-efficient and un-economical in the medium to long term. This reservoir is therefore not suitable to serve the proposed development.

The Inyaninga Reservoir has a top water supply level of approximately 139m, which implies that it is just sufficient to provide a full gravity supply. The supply main from this reservoir to the development would be in the order of 5km long (route dependant).

With a top water level of 155m, the La Mercy Airport reservoir will have sufficient elevation to provide a total gravity supply to the development. This reservoir is located approximately 2.5km from uShukela Highway.

The total water demand for the development is in the order of 2.4Mℓ/day per day, so to achieve 48hrs storage would require a storage capacity of an additional 4.8Mℓ/day.

At present the La Mercy Airport reservoir capacity of 5Mℓ is fully allocated, implying that a second reservoir will have to be built at the same location.

The Inyaninga Reservoir has been sized to supply the KSIA as well as the Dube Tradeport. This reservoir has a capacity of 6Mℓ, and will have to be augmented to provide the additional storage required to serve the development.

The decision on which option to utilise will require further investigation and cost assessments, and will ultimately rest with EWS.

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. Any additional requirements for individual erven over and above 'Red Book' standards will have to be provided by the developer of the individual erf (e.g. booster connections, on site tanks, etc).

Sustainability measures including rain-water harvesting and recycling of grey water will also be considered.

6. ELECTRICITY

The existing electrical infrastructure is divided into the following categories shown below:

Sub-Transmission (132/11 kV)

There are currently two 132/11kV 60MVA firm major substations that are located on the south side and north side of the proposed development.

The La Mercy Substation which is located to the south of the proposed development is located quite some distance away and as a result can not be used to service the proposed development. Furthermore, the available capacity at the La Mercy substation has been earmarked for the airport and development around the airport including the Dube Trade Port.

The Tongaat Substation which is located to the north of the proposed development is newly built and is currently in the process of being commissioned. This substation has been built to take over the load of three existing 33/11kV substations which will be de-commissioned, as well as to cater for future load growth in close proximity to the substation for which eThekwini Electricity have already received applications. It is therefore highly unlikely that any available capacity at the Tongaat substation will be used to service the proposed development in view of the large 47MVA that is required.

Sub-Transmission Line Servitudes

No sub-transmission line servitudes exist within the development area.

Distribution (11kV)

No electrical supply (at 11kV) is available within the boundaries of the project.

Development Requirements

The 'bulk' proposed for uShukela Highway translates to an electricity demand of 47MVA. The proposed future electrical infrastructure is covered under the headings below:

Sub-Transmission (132/11 kV)

It will be required to construct a new 132/11kV 60MVA firm substation in close proximity to the proposed development. There are 2 options available whereby the proposed new substation can be supplied:

- The Tongaat substation will have to be extended to include two new line bays which will be used to service the proposed new substation.
- A T-off from the existing 132kV line between the La Mercy substation and Tongaat substation can be created, feeding the new substation located near the development.

Please refer to the attached drawing for clarity on the two available options.

Sub-Transmission Line Servitudes

Should it not be possible to locate the 133/1kV substation outside the development area, then sub-transmission line servitudes will be required within the development area.

Distribution (11kV)

11kV supplies will be taken from the proposed new 132/11kV major substation and be fed into a series of Distribution Substations. Distribution substations are planned and positioned in key locations throughout the development. 11kV cable routes will be planned to run adjacent or be in close proximity to each proposed site allowing sales and transfers of sites to take place.

Reticulation

In most instances the internal electrical reticulation will be undertaken by each individual erf developer to meet his specific requirements. The developer will be responsible for the costs for the 11kV bulk supply to the boundary of these individual erven.

7. SOLID WASTE

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

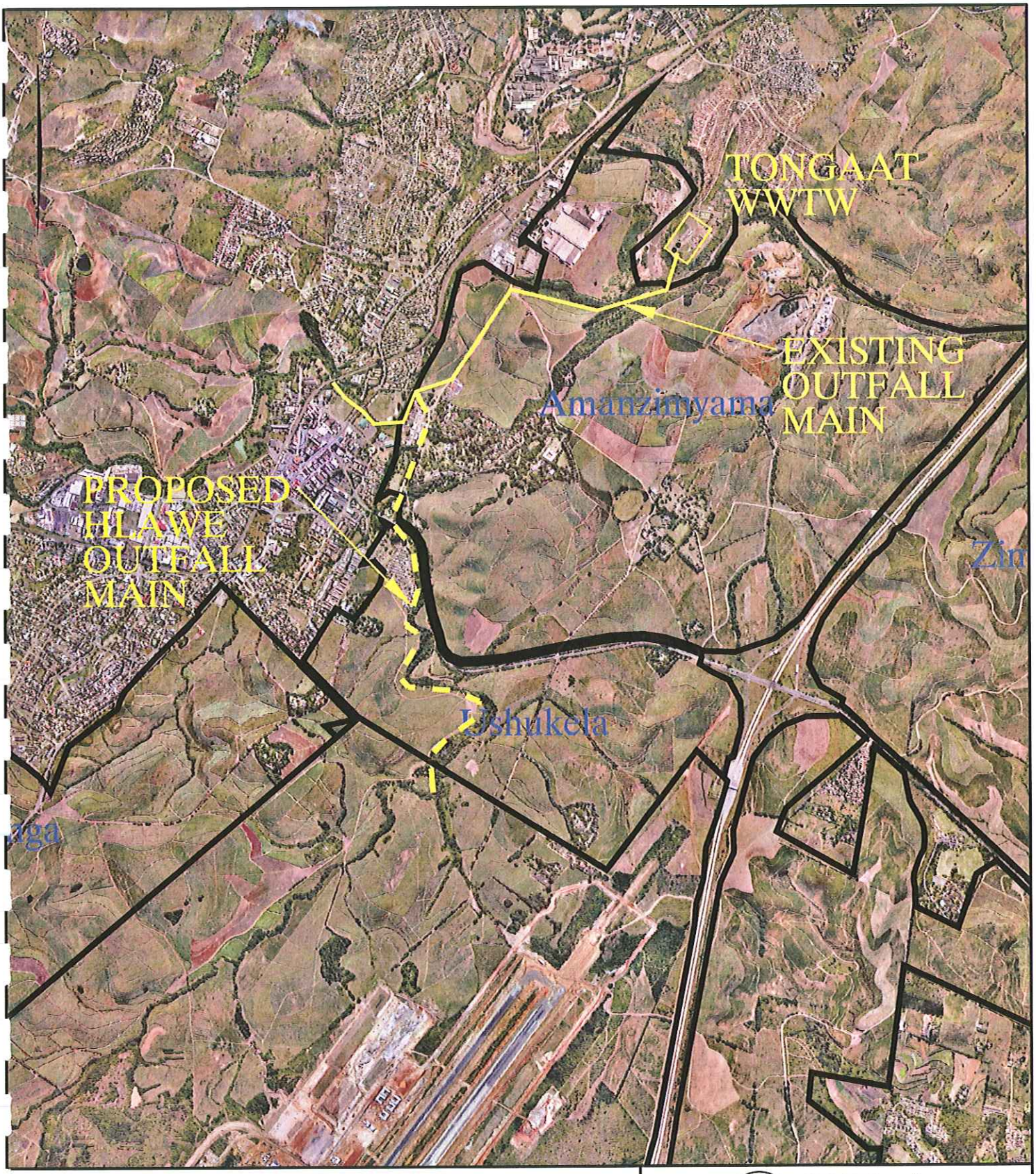
Other waste collection models could be implemented, which could include 'contracted out' collection, facilities for waste separation for recycling, etc.

The Buffelsdraai landfill site has adequate capacity to accept waste generated from the development.

Prepared by

C P KROEGER
For Stemele Bosch Africa (Pty) Ltd

DRAWINGS



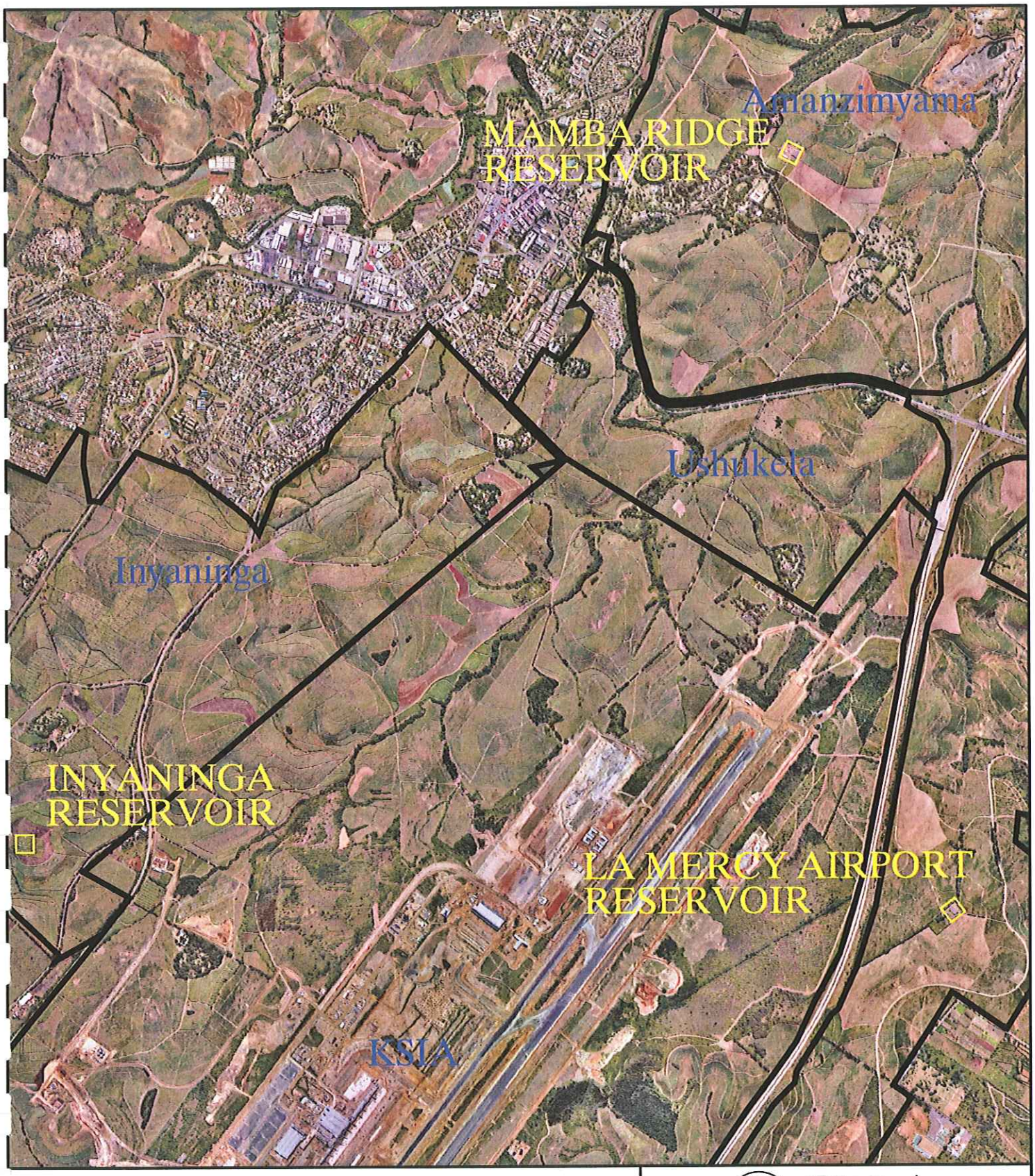
TONGAAT HULETT DEVELOPMENTS
uSHUKELA HIGHWAY

BULK SERVICES PLAN

SEWER

STEMELE BOSCH AFRICA
(Pty) Ltd
Consulting Engineers & Project Managers

DESIGNED	N.M.	APPROVED	
DRAWN	N.M.		
CHECKED		DRAWING No.	REV
SCALE	1:30000	243/203/004	1
DATE	NOV'10		



TONGAAT HULETT DEVELOPMENTS
uSHUKELA HIGHWAY

BULK SERVICES PLAN

WATER

STEMELE BOSCH AFRICA
(Pty) Ltd
Consulting Engineers & Project Managers

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DRAWN	N.M.		
CHECKED		DRAWING No.	REV
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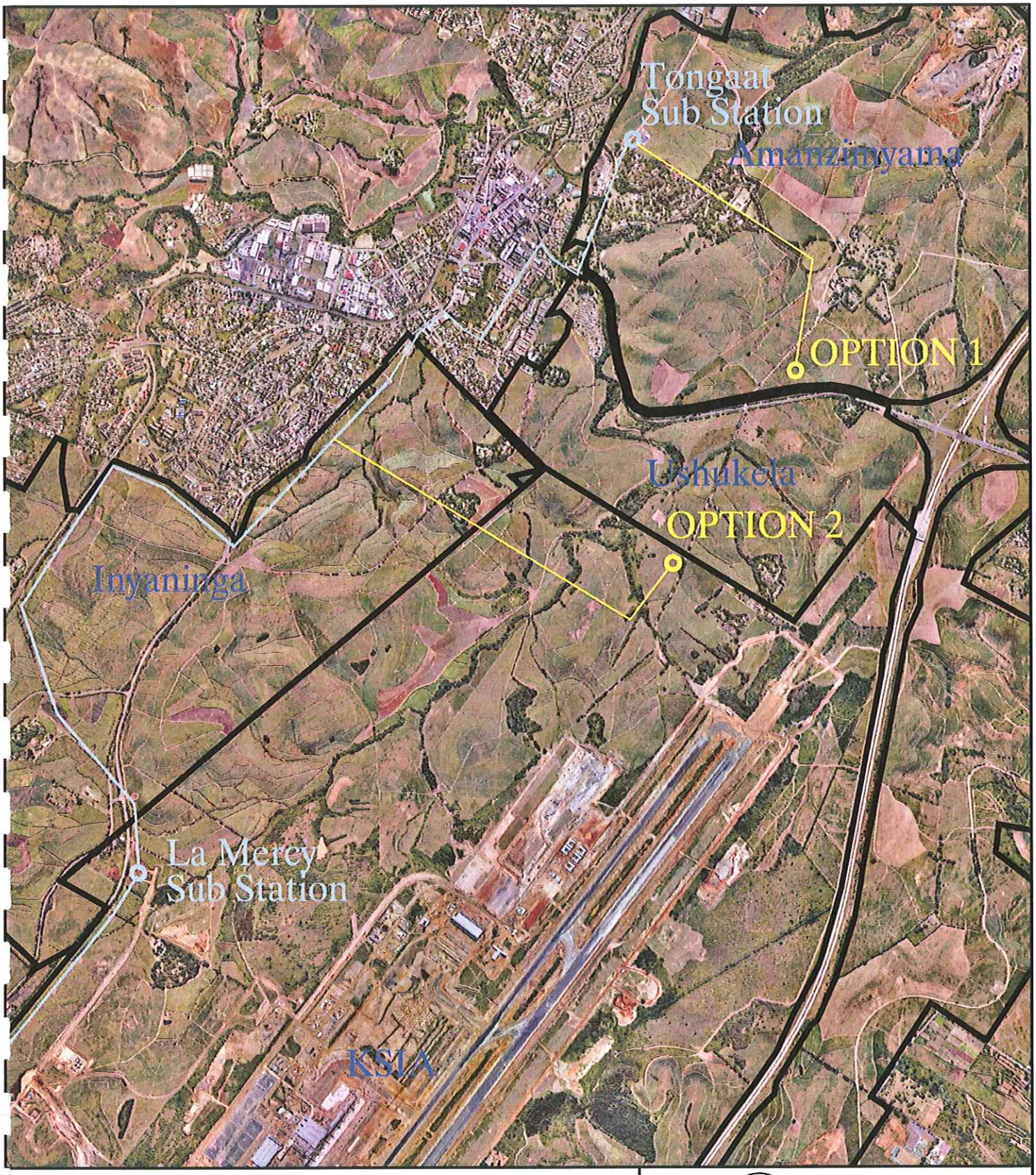

TONGAAT HULETT DEVELOPMENTS
uSHUKELA HIGHWAY

BULK SERVICES PLAN

ELECTRICITY

STEMELE BOSCH AFRICA
(Pty) Ltd
Consulting Engineers & Project Managers

DESIGNED	N.M.	APPROVED	
DRAWN	N.M.		
CHECKED		DRAWING No.	REV
SCALE	1:30000	243/203/002	1
DATE	NOV'10		

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CONTRACT NO. 243/203

MAY 2012

Tongaat Hulett DEVELOPMENTS

uSHUKELA HIGHWAY

ENGINEERING SERVICES REPORT

Tongaat Hulett DEVELOPMENTS

uSHUKELA HIGHWAY

ENGINEERING SERVICES REPORT

PROJECT No. : 243/203	**DATE:** May 2012
CONSULTING ENGINEERS: Bosch Stemele (Pty) Ltd PO Box 2009 Durban 4000 Tel : +27 31 535-6000 Fax : +27 31 535-6011	**COMMISSIONED BY:** Tongaat Hulett Developments (Pty) Ltd 305 Umhlanga Rocks Drive La Lucia 4051 Tel : +27 31 560-1900 Fax : +27 31 456-1998
AUTHORS: C P KROEGER	**CLIENT CONTACT PERSON(S):** MR G VEERASAMY
DISCIPLINE: ENGINEERING SERVICES REPORT	

BOSCH STEMELE

• Consulting Engineers • Project Managers

QUALITY VERIFICATION

This report has been prepared under the control of the Bosch Stemele Quality Management System which meets the requirements of ISO 9001:2008 as independently certified by international auditors (Certificate No. 20705704/1)

Verification	Capacity	Name	Signature	Date
Checked by:	Lead Engineer	**C P Kroeger**		21/5/12
Reviewed by:	Project Manager/Director	**C P Kroeger**		21/5/12
Accepted by:	Client Authorised Representative	**G Veerasamy**		
Accepted by:	Client Authorised Representative			

uSHUKELA HIGHWAY

ENGINEERING SERVICES REPORT

I N D E X

Page No.

uSHUKELA HIGHWAY

ENGINEERING SERVICES REPORT

1. INTRODUCTION

The uShukela Highway development is situated at the northern end of the King Shaka International Airport. It is bounded by the N2 freeway and Toll Plaza to the east, uShukela Drive (Watson Highway) to the north, and the Hlawe River in the west.

The site measures approximately 135ha in extent and is currently under cultivated sugar cane. The terrain is relatively gentle for the area.

Tongaat Hulett Developments and Dube Trade Port currently own the land making up the development area and propose to jointly plan the development of the land.

The proposed development will comprise light industrial, office parks and retail opportunities. The development is expected to yield a total floor area (bulk) of 536 100m2 when completed. The proposed layout is shown on drawing Sk01 Revision 18 (refer to Annexure A).

This report outlines the existing bulk services available in the area, the requirements to serve the development, and proposals for the provision of the services.

2. ROADS

Access to the development will be obtained from uShukela Drive. This is an existing provincial main road under the control of the KZN Department of Transport, who will be required to approve the access points.

This road currently comprises a single carriageway in each direction. The traffic impact assessment (TIA) currently being undertaken will determine the necessity for increasing the capacity in this roadway, as well as the form of the intersections.

The main access traversing the site will be the spine road leading to Dube Trade Port. This road is about to be constructed.

A second more easterly access route is planned with the potential to link to the land lying to the east of KSIA and west of the N2.

The internal roads to the development will be either single carriageway or dual carriageway roads as determined by the TIA. These are indicated on the layout plan in Annexure A.

Typical cross sections of the various road carriageway classes are indicated in Annexure B. All roads will be surfaced with road pavement structure being designed to accommodate the anticipated heavy vehicles.

3. STORMWATER

A majority of the site drains toward the Hlawe River to the west. The Hlawe River is a tributary to the uThonghati River.

The stormwater control philosophy will be to restrict post development flows into the Hlawe River to within 10% of that occurring pre-development (cane cultivation), and to facilitate ingress of stormwater into the ground to replenish the wetlands in the natural drainage lines.

In order to achieve this, the application of sustainable urban drainage systems (SUDS) principles will be actively applied.

All purchasers and developers of individual erven will, in terms of sales agreements, be required to implement on-site stormwater attenuation to restrict run-off for 25mm storms to pre-development levels. This is to be achieved by on-site attenuation tanks for roof run-off, permeable paving to parking areas, and unpaved 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.

Run-off from the roadways (as well as excess stormwater from the sites where applicable) will be accommodated in roadside drainage swales on situated on either side of the road. The swales will be sized to accommodate a minimum of a 1:2 year storm, and these will increase times of concentration of stormwater flow and encourage infiltration.

To cater for greater storm events, roadways will also be provided with piped stormwater drainage 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 intersections, etc. Energy dissipation measures will be implemented where these pipes discharge into the natural watercourses.

Additional attenuation facilities will be provided in the main water courses to restrict the flows in larger rainfall events. These will be designed to encourage feeding water into the wetlands.

Further details of the stormwater management system are contained in the Stormwater Management Plan, and application of the concepts is illustrated in the stormwater layout plan and integrated landscape planning in Annexure C.

4. SANITATION

The uShukela Highway development will be provided with full waterborne sewage reticulation. The development falls within the catchment of the Tongaat Wastewater Treatment Works (WWTW).

This development will generate approximately 2Mℓ/day of effluent if full use is made of the proposed 'bulk'.

The Tongaat WWTW has a rated capacity of 12Mℓ/day, and current inflows average in excess of 10Mℓ/day. eThekwini Water and Sanitation (EWS), under who's authority the sanitation services fall, have indicated the current 'spare' capacity has already been earmarked for developments due to come on stream in the short term.

EWS have however commenced preliminary planning for the upgrading of the Tongaat WWTW to a rated capacity of 25Mℓ/day. Budget provision has been made for construction in the 2012/13 financial year. EWS already has a permit to treat up to 45Mℓ/day at this works.

The effluent will be carried from this development to the WWTW by the proposed Hlawe River gravity outfall main. This main has been designed by others and has been sized to accommodate the outfall from uShukela Highway. It is currently in the preliminary design phase and environmental approval is currently being sought separately for its construction.

A large majority of the site drains by gravity to the Hlawe outfall main. The north-eastern portion of the site will however have to be provided with a temporary pumpstation as its natural drainage path is to the north of uShukela Drive.

The effluent from this catchment will in the interim be pumped to the Hlawe outfall main until such time as the area north of uShukela Highway (Amanzimnyama) is developed. At that juncture the pumpstation can be decommissioned, and use made of the gravity system in the northern area.

The layout of the bulk sewers is illustrated in Annexure D.

5. WATER

The water supply in the development area falls under the authority of EWS. Bulk water supply into the area is from two sources, i.e. the Tongaat WTW operated by EWS, and the Hazelmere WTW, operated by Umgeni Water.

The Tongaat WTW generally supplies the Tongaat environs, and includes in its supply area the Mamba Ridge reservoir to the north of the development.

The Hazelmere WTW includes in its supply area the Inyaninga reservoir (which serves the airport and is inland of the R102), the La Mercy Airport reservoir to the east of the N2, and the Westbrook Reservoir which is again further east.

The La Mercy Airport Reservoir is owned and operated by Umgeni Water, and the Inyaninga and Mamba Ridge reservoirs falls under the jurisdiction of EWS.

At present the 'unallocated' water supply spare capacity from the Hazelmere source is very limited. The department of Water Affairs is currently in the process of finalising planning to raise Hazelmere Dam, with this expected to be completed in 2014. This will increase the 'firm' raw water supply.

Umgeni Water also plans to concurrently increase the capacity of the Hazelmere WTW, with completion planned shortly thereafter. By 2014/15, there would be sufficient treated bulk water provided to cater for the development proposals in the area.

Doubling up of the Umgeni supply main through the uShukela Highway development is currently under construction, alleviating potential supply line restrictions.

The development requires a highest supply level of 114m, and therefore to supply the 24m pressure required throughout the development, and to allow for head losses in the supply main, will require a minimum reservoir elevation of approximately 140m to ensure it is fully supplied by gravity.

The Mamba Ridge reservoir (elevation of approx 100m) would only serve the western 20% of the site by gravity. The rest of the site would require an extensive pump-pressurised high level system, which is in-efficient and un-economical in the medium to long term. This reservoir is therefore not suitable to serve the proposed development.

The Inyaninga Reservoir has a top water supply level of approximately 139m, which implies that it is just sufficient to provide a full gravity supply. The supply main from this reservoir to the development would be in the order of 5km long (route dependant).

With a top water level of 155m, the La Mercy Airport reservoir will have sufficient elevation to provide a total gravity supply to the development. This reservoir is located approximately 2.5km from uShukela Highway.

The total water demand for the development is in the order of 2.15Mℓ/day per day, so to achieve 48hrs storage would require a storage capacity of an additional 4.3Mℓ/day.

At present the La Mercy Airport reservoir capacity of 5Mℓ is fully allocated, implying that a second reservoir will have to be built at the same location.

The Inyaninga Reservoir has been sized to supply the KSIA as well as the Dube Trade Port. This reservoir has a capacity of 6Mℓ, and would also have to be augmented to provide the additional storage required to serve the development.

The decision on which option to utilise will require further investigation and cost assessments, and will ultimately rest with EWS, as they will have to negotiate the purchase of this reservoir from Umgeni Water. The La Mercy Airport reservoir option is preferred, subject to the increased reservoir capacity being constructed.

The link supply from the La Mercy Airport reservoir would comprise approximately 2.5km of 400mm diameter main. This would run adjacent to the existing pipeline supplying water to the reservoir.

Water to each erf will be to municipal pressure standards and each erf will be individually metered. The bulk water layout plan is contained in Annexure E.

The reticulation will be designed to accommodate fire flows. Any additional requirements for individual erven over and above 'Red Book' standards will have to be provided by the developer of the individual erf (e.g. booster connections, on site tanks, etc).

Sustainability measures including rain-water harvesting will be implemented. Potable water will not be used for irrigation. This will be sourced from contained stormwater run-off, and be complemented by supplies from the current sugarcane irrigation raw water supply.

6. ELECTRICITY

The existing electrical infrastructure is divided into the following categories shown below:

Sub-Transmission (132/11 kV)

There are currently two 132/11kV 60MVA firm major substations that are located on the south side and north side of the proposed development.

The La Mercy Substation which is located to the south of the proposed development is located quite some distance away and as a result can not be used to service the proposed development. Furthermore, the available capacity at the La Mercy substation has been earmarked for the airport and development around the airport including the Dube Trade Port.

On the north side, the Tongaat 132/11kV Substation is newly built and commissioned. It is rated at 60MVA firm. This substation has been built to take over the load of three existing 33/11kV substations namely Truroland, Maidstone and old Tongaat, as well as to cater for future load growth in close proximity to the substation for which eThekwini Electricity have already received applications. The current available spare capacity is 18 MVA. This spare capacity will be used on a first come first served basis for developments in close proximity to the substation.

Sub-Transmission Line Servitudes

No sub-transmission line servitudes exist within the development area.

Distribution (11kV)

No electrical supply (at 11kV) is available within the boundaries of the project.

Development Requirements

The 536 100m^2 'bulk' proposed for uShukela Highway translates to an electricity demand of 36.5MVA. The proposed future electrical infrastructure is covered under the headings below:

Sub-Transmission (132/11 kV)

It is anticipated that the roll out of the project will span eight years, with the load requirements being phased in at an initial rate of 6MVA per annum.

The existing 132/11kV 60MVA Tongaat substation could therefore be used to supply the initial phases of the development, subject to there being no other developments to take up the spare capacity in the interim.

It will in time however, be essential to construct a new 132/11kV 60MVA firm substation in close proximity to the proposed development. There are 2 options available whereby the proposed new substation can be supplied:

- The Tongaat substation will have to be extended to include two new line bays which will be used to service the proposed new substation.

- A T-off from the existing 132kV line between the La Mercy substation and Tongaat substation can be created, feeding the new substation located near the development. This will require a footprint of approximately 60m x 60m, but this may not be situated in the flight path of the existing or future runways. The location of this substation would be dependent on load requirements of adjacent developments.

Sub-Transmission Line Servitudes

Should it not be possible to locate the above potential 132/11kV substation outside the development area, then sub-transmission line servitudes to get power to the substation will be required within the development area.

Distribution (11kV)

11kV supplies will be taken from the proposed new 132/11kV major substation and be fed into a series of Distribution Substations. Distribution substations will be positioned in key locations throughout the development, and will be located on individual erven. 11kV cable routes will be planned to run adjacent or be in close proximity to each proposed site allowing sales and transfers of sites to take place.

Reticulation

In most instances the 'on-site' electrical reticulation will be undertaken by each individual erf purchaser to meet his specific requirements. The developer (THD/Dube Tradeport) will be responsible for the costs for the 11kV bulk supply to the boundary of these individual erven.

7. SOLID WASTE

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

The DSW Buffelsdraai landfill site has adequate air-space (capacity) to accept waste generated from the development.

Other waste collection models could be implemented, which could include 'contracted out' collection, facilities for waste separation for recycling, etc.

Prepared by
C P KROEGER
for Bosch Stemele (Pty) Ltd

ANNEXURE A

Sub-Precinct	Land Use	Area (Ha)	% Site Area	FAR	Bulk (Ha)
1	Business Park - offices & showrooms	9.78	-	0.6	4.06
2	Retail Park - offices, showrooms, retail, warehousing	14.19	-	0.6	8.51
3	Mixed Use - offices, showrooms, service retail, hotels	15.10	-	0.8	12.08
4	Business Park - offices & showrooms	2.98	-	0.6	1.79
5	Business Park - offices & showrooms	4.06	-	0.6	2.43
6	Tradezone - offices, light/clean industry, warehousing, distribution, manufacturing	28.67	-	0.6	17.20
7	Tradezone - offices, light/clean industry, warehousing, distribution, manufacturing, Mixed Use - offices, showrooms, service retail	9.57	-	0.6	5.62
8	Conference, management & offices	4.90	-	0.3	1.44
TOTAL		89.59	64.12		53.61
Roads		28.50	19.45		
Open Space		21.32	16.26		
Site Area		134.98	100.00		

Do not scale dimensions from this drawing

Any errors, omissions and discrepancies to be reported immediately

Revision	Description	Date

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Client

dube TradePORT

Tongaat Hulett DEVELOPMENTS

Project

Dube TradePort

uShukela Highway

Description

Proposed Layout Plan

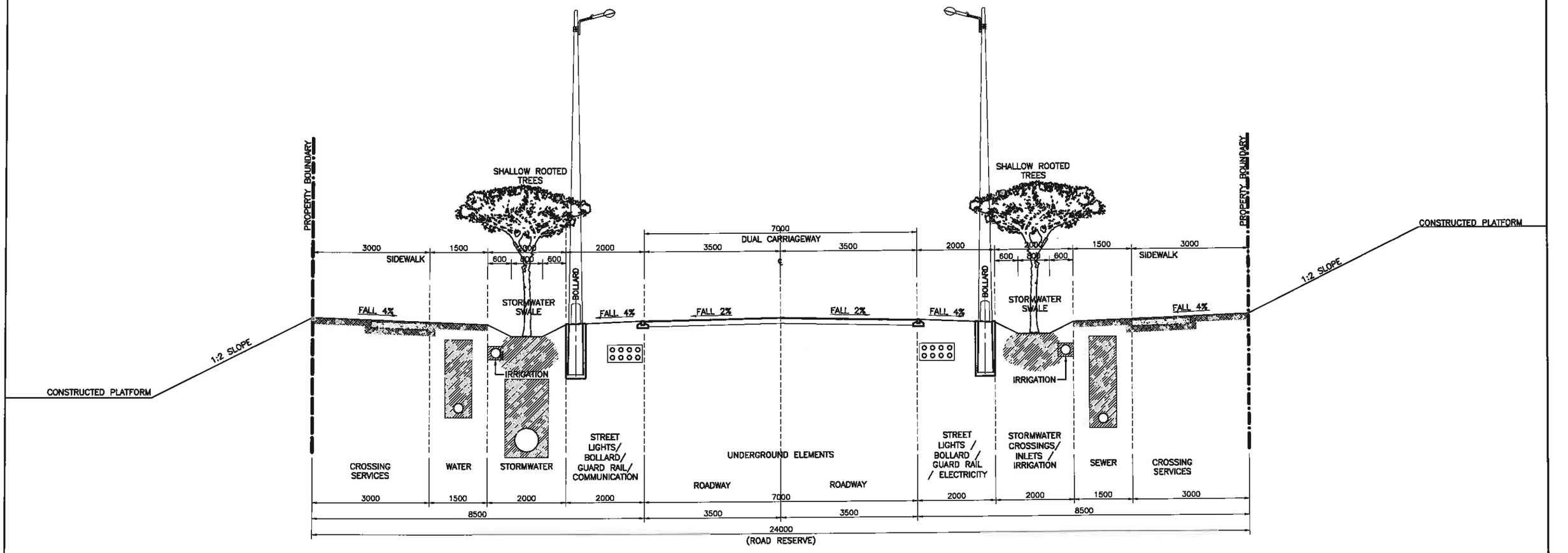
Status

For Information

Scale	Drawn	Date
1:4000	SMO	May 2012
Job number	Drawing number	Revision
	Sk 01	18

Original size 100mm

ANNEXURE B



TYPICAL 24m ROAD CROSS SECTION

SCALE 1:100

REV.	DESCRIPTION	DATE	APPR'D
1	FOR INFORMATION	22/05/12	

DESIGNED N.M.
DRAWN R.C.
CHECKED

APPROVED
PROJECT MANAGER
DIRECTOR

SCALE: AS SHOWN
DATE: 22/05/12

TONGAAT HULETT DEVELOPMENTS
USHUKELA HIGHWAY SOUTH DEVELOPMENT

TYPICAL 24m ROAD CROSS SECTION

DRAWING NUMBER 0243/203/014 | A3 | REVISION 1

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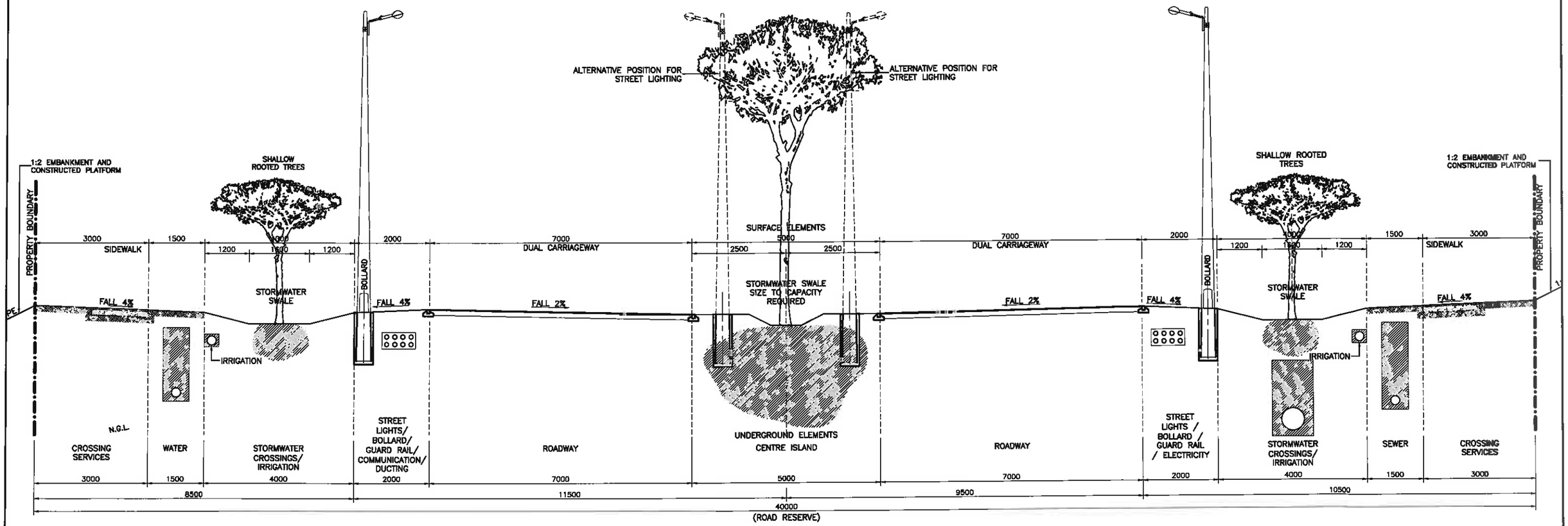

TYPICAL 40m ROAD CROSS SECTION

SCALE 1:100

REV.	DESCRIPTION	DATE	APPR'D
1	FOR INFORMATION	22/05/12	

DESIGNED N.M.
DRAWN R.C.
CHECKED

APPROVED
PROJECT MANAGER
DIRECTOR

SCALE AS SHOWN
DATE 22/05/12

TONGAAT HULETT DEVELOPMENTS
USHUKELA HIGHWAY SOUTH DEVELOPMENT

TYPICAL 40m ROAD CROSS SECTION

DRAWING NUMBER 0243/203/016 | A3 | REVISION 1

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ANNEXURE C

MAISON HIGHWAY

WADDINGTON ROAD

SW PIPE CULVERT (BY OTHERS)

SW ATT. POND

ATTENUATION POND

FOCAL FEATURE

AVENUE

BOULEVARD

STILLING POND

PATHS

SW MEADOW

LOOK OUT POINT

SWAMP FOREST

GRASSLAND

BOARDWALK

BRIDGE CULVERT FEATURE

1:12 SLOPE FOR ACCESS PATH

LEGEND

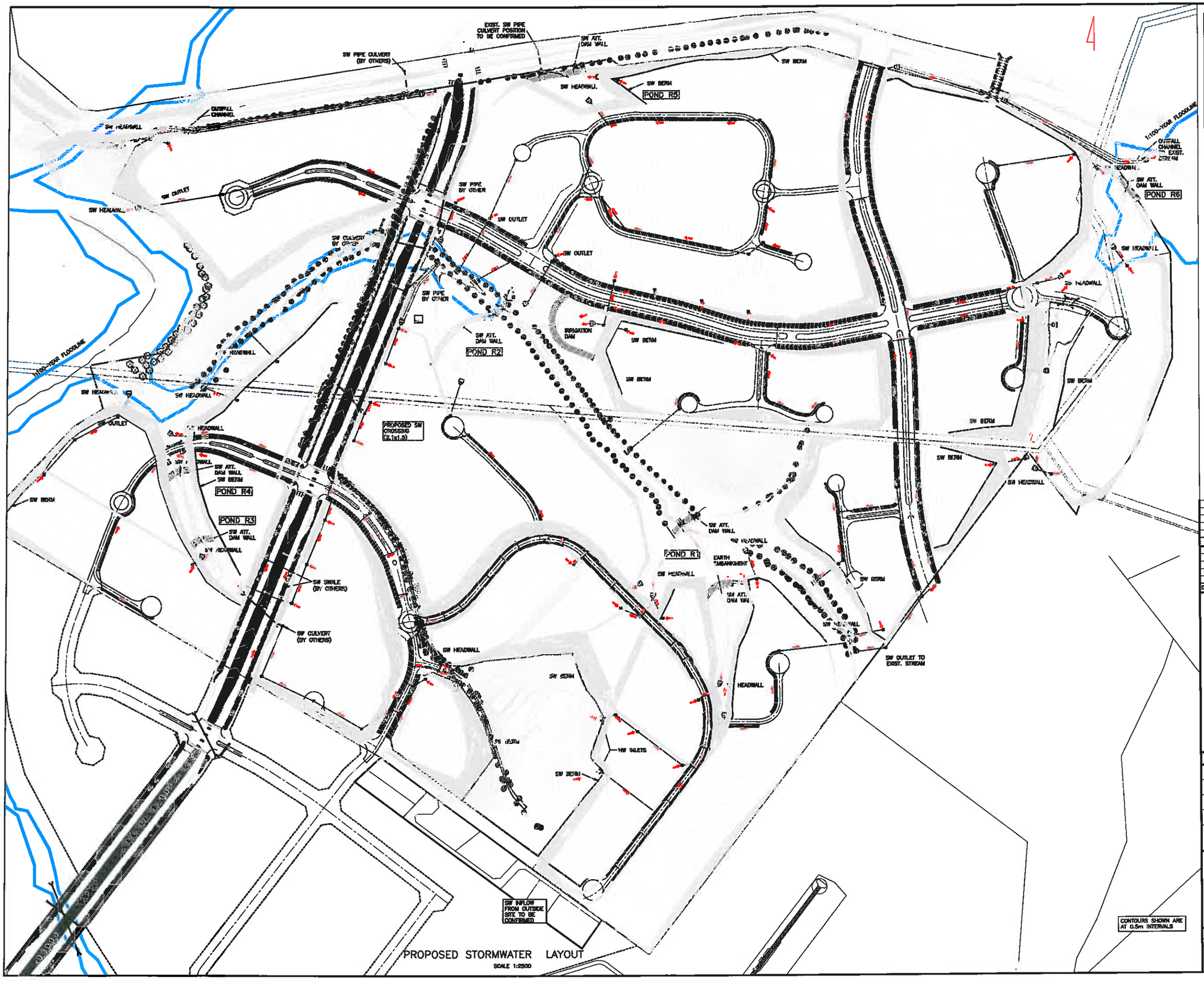
- EXISTING TREES
- PROPOSED TREES
- PROPOSED ATTENUATION AREAS/WETLANDS
- PROPOSED PATH WAYS
- POSSIBLE PAVING TO ROADS
- "BRIDGE" CULVERT FEATURE

Tongaat Hulett DEVELOPMENTS

dube tradeport

CNdV africa

USHUKELA PRECINCT
LANDSCAPE MASTERPLAN



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LEGEND:

- PROPOSED SW PIPE
- PROPOSED SW CP/MH
- PROPOSED SW HW OUTLET & STILLING BASIN
- PROPOSED SW INLET
- PROPOSED SW SWALE
- PROPOSED SW CHANNEL
- PROPOSED SW BERM(KERB)
- 1:100-YEAR FLOODLINE
- DIRECTION OF FLOW

REV.	DESCRIPTION	DATE	APPR'D
0	FOR REPORT.	16/5/12	

DRG. No. | REFERENCE DRAWING

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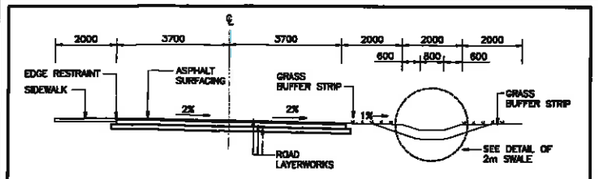
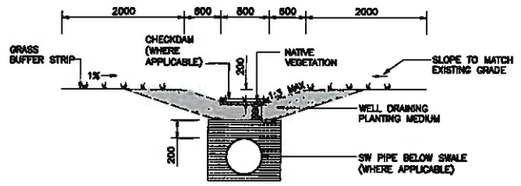
CHECKED		CIVIL ENGINEER	
STRUCTURAL ENGINEER		MECHANICAL ENGINEER	
ELECTRICAL ENGINEER		CO-ORDINATION ENGINEER	
APPROVED	PROJECT MANAGER		DIRECTOR

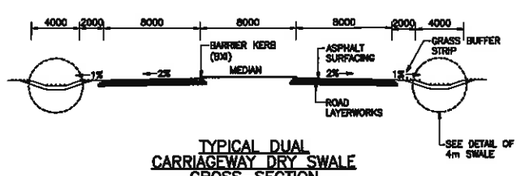
TONGAAT HULETT DEVELOPMENTS
USHUKELE HIGHWAY SOUTH DEVELOPMENT

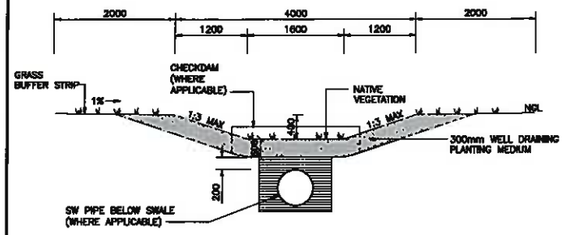
PROPOSED BULK & INTERNAL STORMWATER LAYOUT

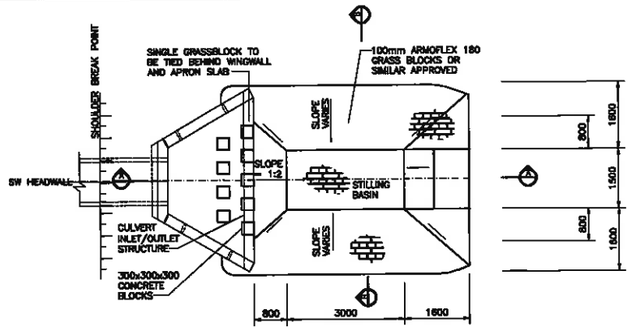
SCALE 1:2500		DATE 15/05/2012	
DRAWING NUMBER 243/203/27	A1	REVISION 0	

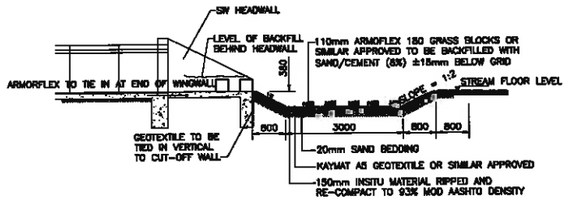


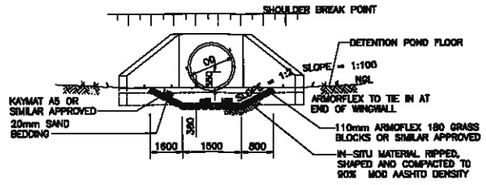


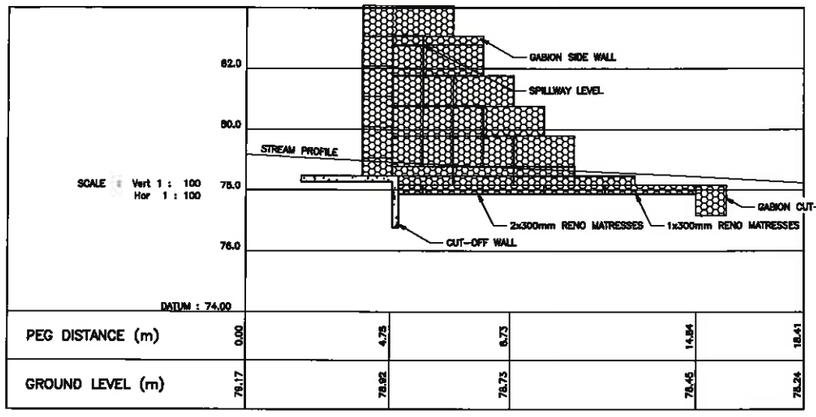


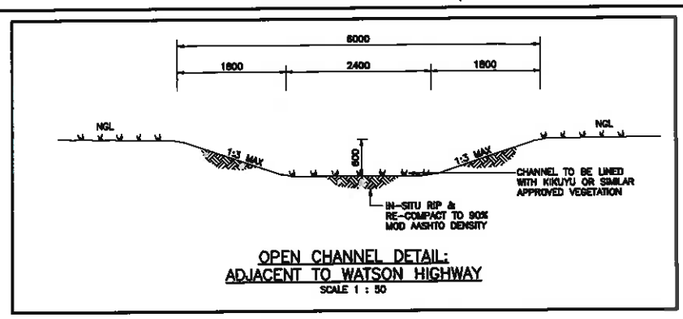


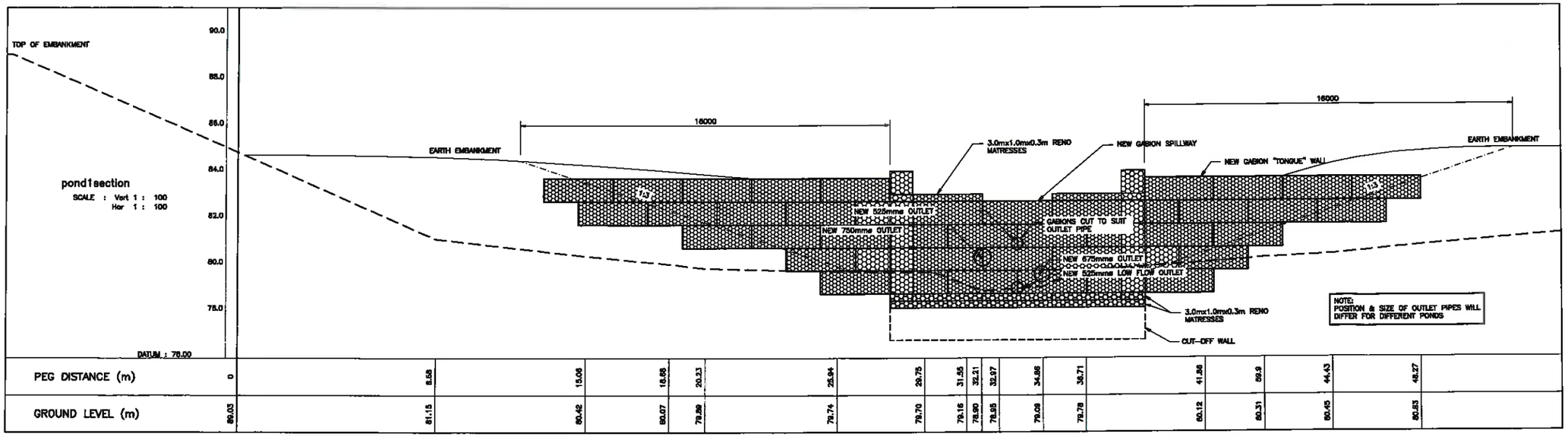












TYPICAL SINGLE CARRIAGEWAY SWALE CROSS-SECTION
SCALE 1 : 100

2m SWALE DETAIL
SCALE 1 : 50

TYPICAL SINGLE CARRIAGEWAY SWALE CROSS-SECTION & DETAIL

TYPICAL DUAL CARRIAGEWAY DRY SWALE CROSS-SECTION
SCALE 1 : 250

4m SWALE DETAIL
SCALE 1 : 50

TYPICAL DUAL CARRIAGEWAY DRY SWALE CROSS-SECTION & DETAIL

HEADWALL & STILLING BASIN DETAIL
SCALE 1: 75

NOTE:
STILLING BASIN DIMENSIONS FOR PIPES UP TO 750mmø

TYPICAL STILLING BASIN DETAIL UPSTREAM OF LOW FLOW CHANNEL
SECTION B
SCALE 1: 75

TYPICAL LOW-FLOW CANAL SECTION
SECTION B
SCALE 1: 75

TYPICAL HEADWALL STILLING BASIN DETAIL (PIPES UP TO 750mmø)

PEG DISTANCE (m)	0.00	4.75	8.73	14.84	18.41
GROUND LEVEL (m)	79.17	78.92	78.73	78.45	78.24

TYPICAL SECTION THROUGH ATTENUATION POND CENTRE SECTION (POND R1)
SCALE: SEE ABOVE

OPEN CHANNEL DETAIL:
ADJACENT TO WATSON HIGHWAY
SCALE 1 : 50

NOTE:
POSITION & SIZE OF OUTLET PIPES WILL DIFFER FOR DIFFERENT PONDS

PEG DISTANCE (m)	0	8.58	15.06	18.68	20.23	25.94	29.75	31.55	32.21	32.97	34.86	38.71	41.86	59.9	44.43	48.27
GROUND LEVEL (m)	89.03	81.15	80.42	80.07	79.89	79.74	79.70	79.16	78.90	78.95	79.09	79.78	80.12	80.31	80.45	80.83

TYPICAL FRONT ELEVATION OF ATTENUATION POND (POND R1)
SCALE: SEE ABOVE

REV.	DESCRIPTION	DATE	APPR'D
0	FOR REPORT.	15/08/12	

DRG. No.	REFERENCE DRAWING

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ISO 9001:2008 CERTIFIED

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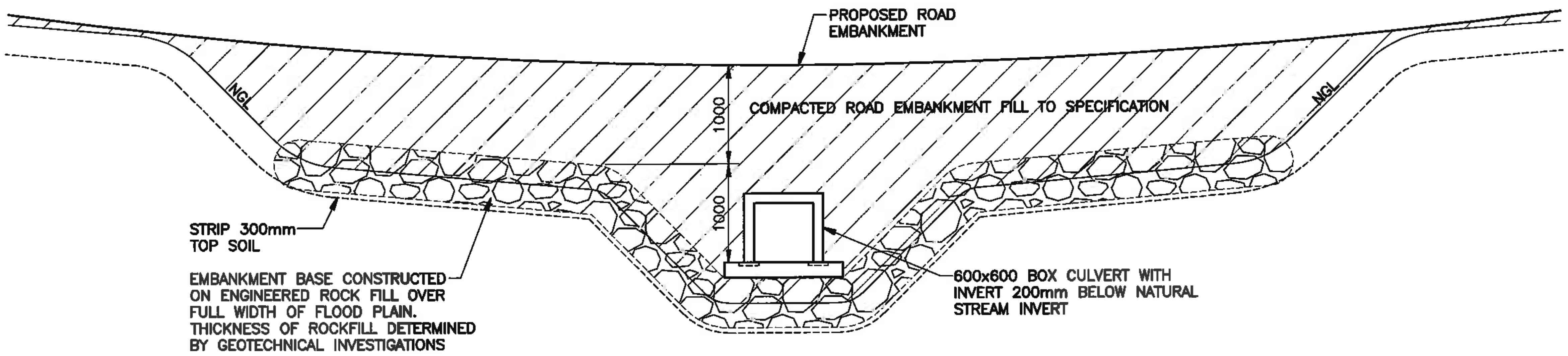
STRUCTURAL ENGINEER		MECHANICAL ENGINEER	
ELECTRICAL ENGINEER		CO-ORDINATION ENGINEER	
APPROVED	PROJECT MANAGER		DIRECTOR

TONGAAT HULETT DEVELOPMENTS
USHUKELE HIGHWAY SOUTH DEVELOPMENT

TYPICAL STORMWATER INFRASTRUCTURE DETAILS

SCALE	1:2500	DATE	28/03/2012
DRAWING NUMBER	243/203/28	A1	REVISION 0



TYPICAL LONG SECTION OF ROAD EMBANKMENT OVER WETLAND CROSSING

REV.	DESCRIPTION	DATE	APPR'D
0	FOR INFORMATION.	21/05/12	

DESIGNED A.M.K.

DRAWN H.W.

CHECKED

APPROVED

PROJECT MANAGER

DIRECTOR

SCALE 1 : 50

DATE MAY 2012

TONGAT HULETT DEVELOPMENTS
DUBE TRADE PORT
LEHUKELA WATSON HIGHWAY DEVELOPMENT

TYPICAL ROAD CROSSING OVER STREAM LINES
RSTR8B AND RSTR9

DRAWING NUMBER 243/203/29 A3 REVISION 0

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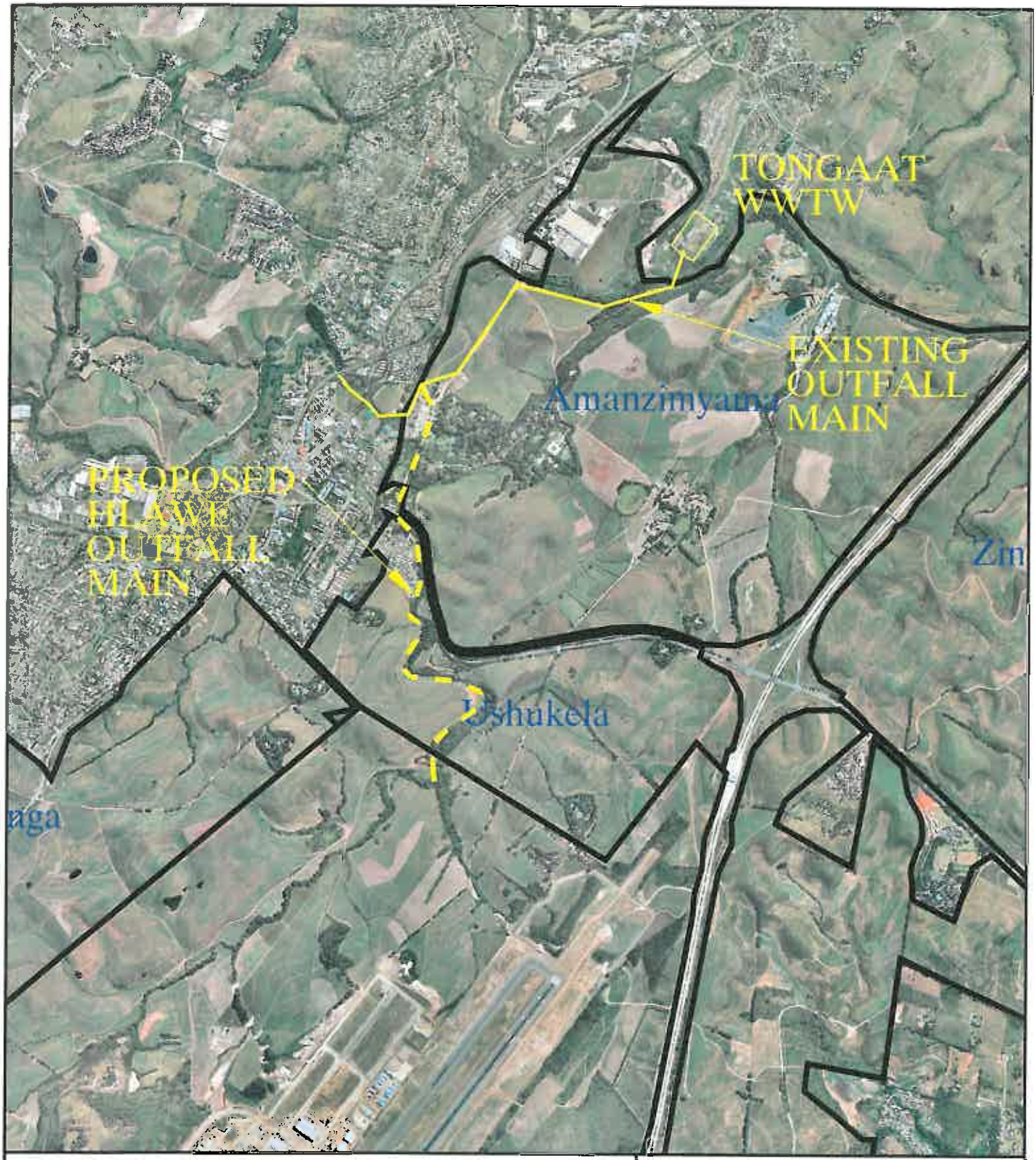
ANNEXURE D



TONGAAT HULETT DEVELOPMENTS
uSHUKELA HIGHWAY

BULK SERVICES PLAN

SEWER

BOSCH STEMELE
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DESIGNED	N.M.	APPROVED	
DRAWN	N.M.		
CHECKED		DRAWING No.	REV
SCALE	1:30000	243/203/004	1
DATE	NOV'10		

LEGEND
SEWER RISING MAIN
SEWER MAIN
CONNECTION POINT

uShukela Drive
Boundary
Tree Line Retained
Proposed Road Widening
1
Business Park
30m
security
2
Retail Park
24m
30m
security
3
Mixed Use
40m
24m
Boundary
uShukela Drive
Att Pond
open space system
N2
future p
bridge o
Proposed EIA Line
HLAWE RIVER SEWER TRUNK MAIN
Water Pipeline Servitude
Hlawe River
7
Existing Road and Tree Line Retained as Walkway
66.1m
Management
30m
new open space wetland system
DTP / TH Boundary
40m Boulevard
Business Park
30m
security
5
40m
security
lay-bye
Water Pipeline Servitude
20m Building Line Relaxation
6
20m
4
security
30m
Tree Line & Road Retained as Walkway
40m
security
Mixed Use
24m
Trade zone
Future Road
Boundary
security
lay-bye
30m
Tradezone
8
Conference Management & Offices
4.80Ha
20m
Future Road
Boundary
N2 To Durban
1:100yr flline - TBC
open space system
Phase 2
Central Spine Road to Tradezone & Cargo Terminal
lay-bye
security
Temporary Access Road
Existing Private Residential Stands
Future Road
Future Tradezone Phase 2
SITE LAYOUT
SCALE 1:2500
ng Landing Lights

REV.	DESCRIPTION	DATE	APPR'D
1	FOR CLIENT REVIEW	12/03/12	
DRG. No.	REFERENCE DRAWING		

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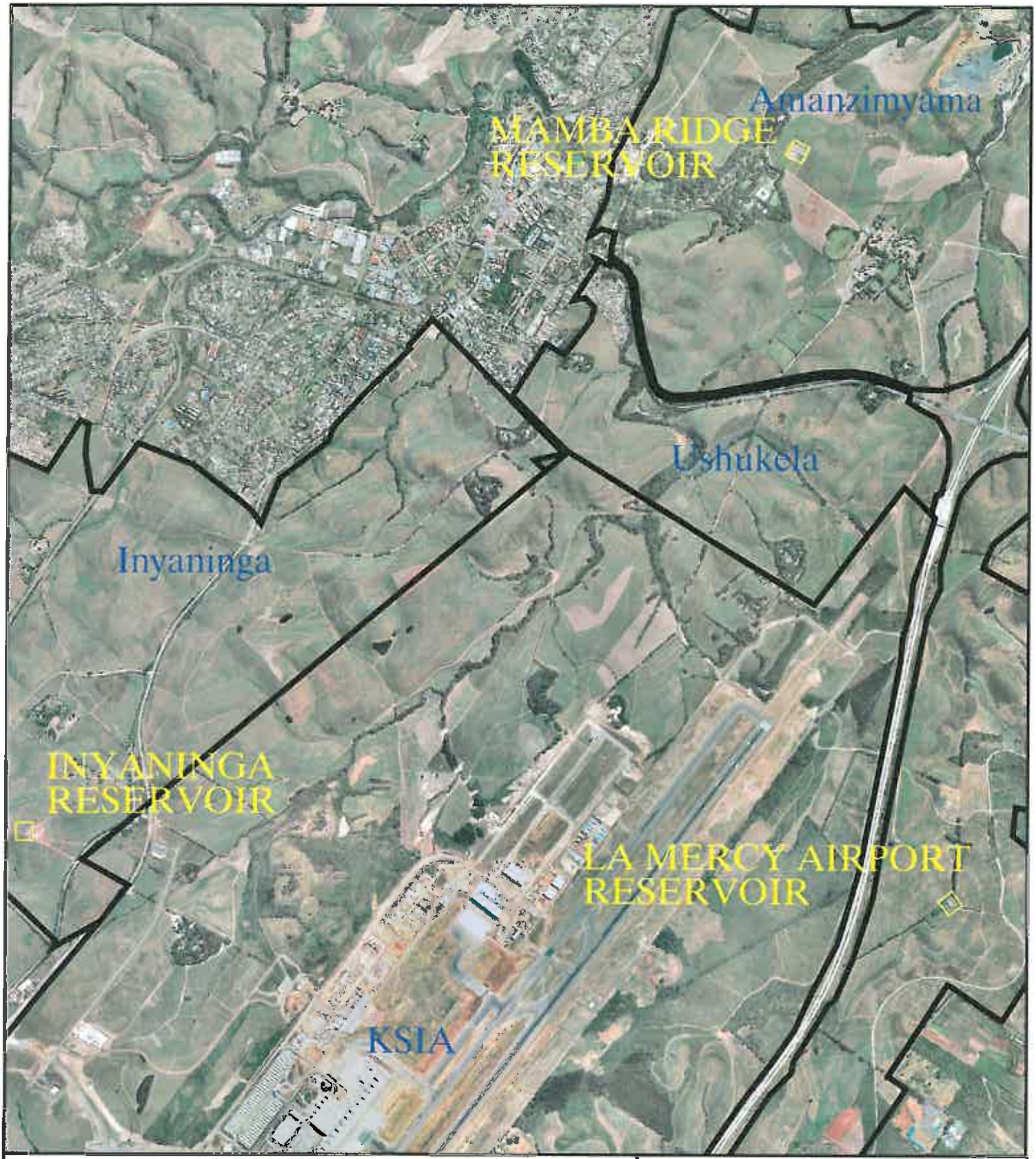
STRUCTURAL ENGINEER		MECHANICAL ENGINEER	
ELECTRICAL ENGINEER		CO-ORDINATION ENGINEER	
APPROVED	PROJECT MANAGER		DIRECTOR

TONGAAT HULETT DEVELOPMENTS
USHUKELA HIGHWAY SOUTH DEVELOPMENT

PROPOSED SEWER OVERALL LAYOUT

SCALE	1:2500	DATE	12/03/2012
DRAWING NUMBER	0243/203/0017	A1	REVISION 1

ANNEXURE E



TONGAAT HULETT DEVELOPMENTS
uSHUKELA HIGHWAY

BULK SERVICES PLAN

WATER

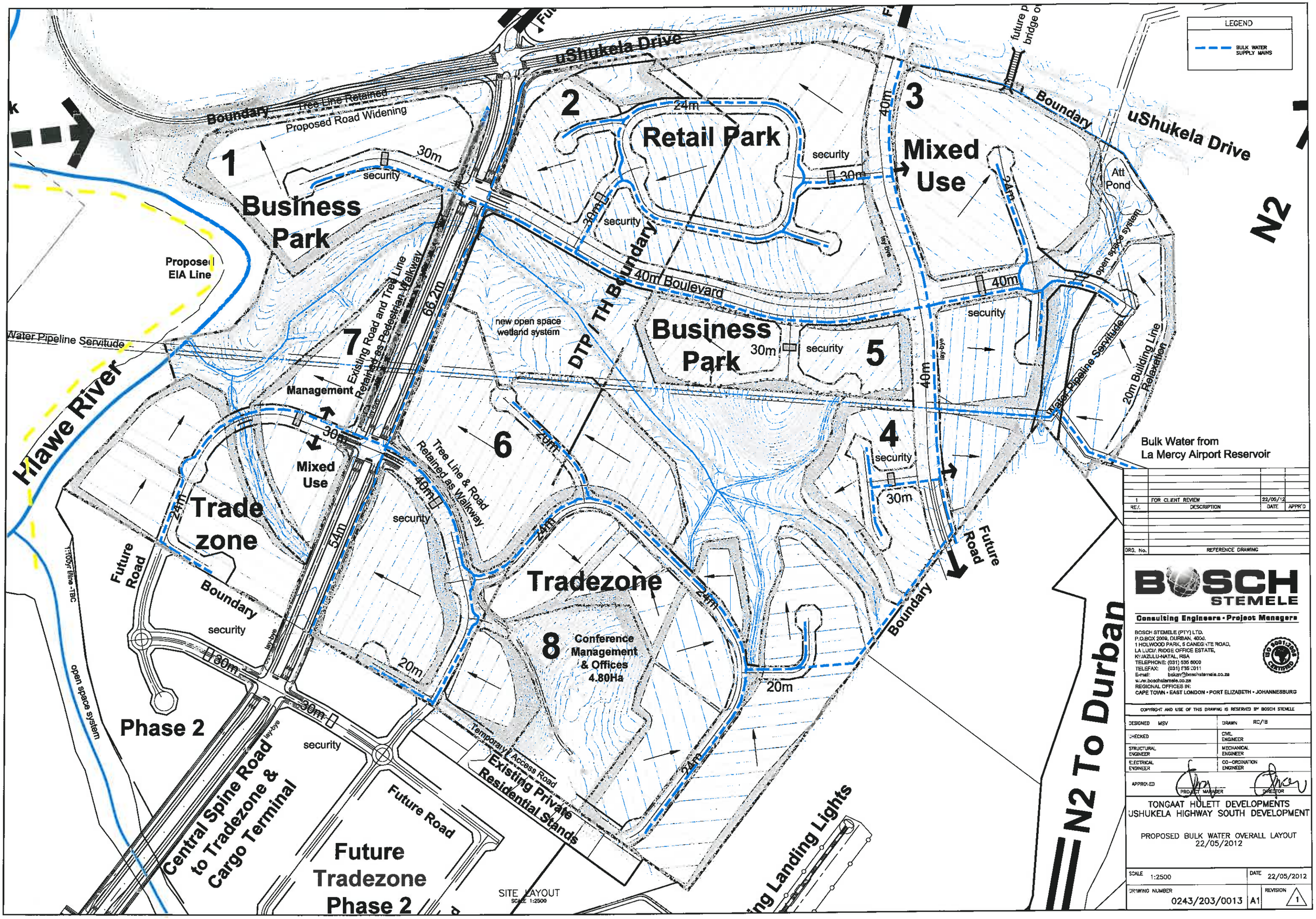
BOSCH STEMELE
Consulting Engineers · Project Managers

DESIGNED	N.M.
DRAWN	N.M.
CHECKED	
SCALE	1:30000
DATE	NOV'10

APPROVED

DRAWING No. 243/203/003

REV 1



1	FOR CLIENT REVIEW	22/05/12	
REV.	DESCRIPTION	DATE	APPR'D
DRG. No.	REFERENCE DRAWING		

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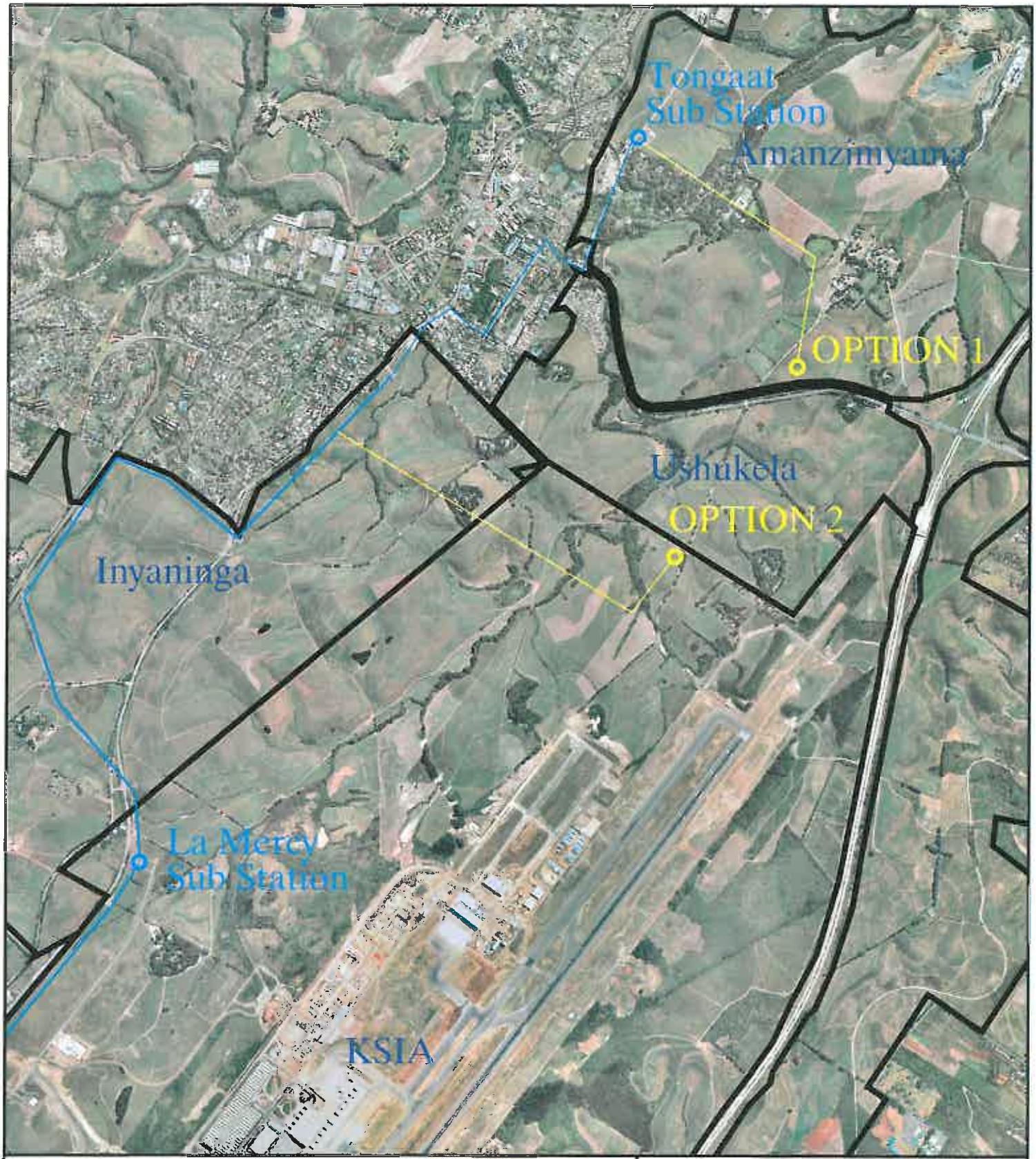
STRUCTURAL ENGINEER		MECHANICAL ENGINEER	
ELECTRICAL ENGINEER		CO-ORDINATION ENGINEER	
APPROVED	PROJECT MANAGER		DIRECTOR

TONGAAT HULETT DEVELOPMENTS
USHUKELA HIGHWAY SOUTH DEVELOPMENT

PROPOSED BULK WATER OVERALL LAYOUT
22/05/2012

SCALE	1:2500	DATE	22/05/2012
DRAWING NUMBER	0243/203/0013	A1	REVISION 1

ANNEXURE F



TONGAAT HULETT DEVELOPMENTS
uSHUKELA HIGHWAY

BULK SERVICES PLAN

ELECTRICITY

BOSCH STEMELE
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DESIGNED	N.M.	APPROVED	
DRAWN	N.M.		
CHECKED		DRAWING No.	REV
SCALE	1:30000	243/203/002	1
DATE	NOV'10		

BOSCH STEMELE

CONTRACT NO. 243/203 MARCH 2013

Tongaat Hulett DEVELOPMENTS

dube tradePORT

uSHUKELA HIGHWAY

ENGINEERING SERVICES REPORT REVISION 4

Tongaat Hulett DEVELOPMENTS

dube tradePORT

uSHUKELA HIGHWAY

ENGINEERING SERVICES REPORT
REVISION 4

PROJECT No. : 243/203	**DATE**: March 2013
CONSULTING ENGINEERS: Bosch Stemele (Pty) Ltd PO Box 2009 Durban 4000 Tel : +27 31 535-6000 Fax : +27 31 535-6011	**COMMISSIONED BY**: Tongaat Hulett Developments (Pty) Ltd 305 Umhlanga Rocks Drive La Lucia 4051 Tel : +27 31 560-1900 Fax : +27 31 560-1998
AUTHORS: C P KROEGER	**CLIENT CONTACT PERSON(S)**: N NKOPODI
DISCIPLINE: **ENGINEERING SERVICES REPORT**	

BOSCH STEMELE

• Consulting Engineers • Project Managers

QUALITY VERIFICATION

This report has been prepared under the control of the Bosch Stemele Quality Management System which meets the requirements of ISO 9001:2008 as independently certified by international auditors (Certificate No. 20705704/1)

Verification	Capacity	Name	Signature	Date
Checked by:	Lead Engineer	**C P Kroeger**		17/4/13
Reviewed by:	Project Manager/Director	**C P Kroeger**		17/4/13
Accepted by:	Client Authorised Representative	**N Nkopodi**		
Accepted by:	Client Authorised Representative			

uSHUKELA HIGHWAY

ENGINEERING SERVICES REPORT

REVISION 4

INDEX

Page No.

uSHUKELA HIGHWAY

ENGINEERING SERVICES REPORT

REVISION 4

1. INTRODUCTION

The uShukela Highway development is situated at the northern end of the King Shaka International Airport. It is bounded by the N2 freeway and Toll Plaza to the east, uShukela Drive (Watson Highway) to the north, and the Hlawe River in the west.

The site measures approximately 135ha in extent and is currently under cultivated sugar cane. The terrain is relatively gentle for the area.

Tongaat Hulett Developments and Dube TradePort currently own the land making up the development area and propose to jointly plan the development of the land.

The proposed development will comprise mainly trade zone, light industrial, and logistics opportunities, with a minor element of conference and management use. The development is expected to yield a total floor area (bulk) of 431 850m^2 when completed. The proposed layout is shown on drawing Sk01 Revision 19 (refer to Annexure A).

This report outlines the existing bulk services available in the area, the requirements to serve the development, and proposals for the provision of the services.

2. ROADS

Primary access to the development will be obtained from uShukela Drive. This is an existing provincial main road under the control of the KZN Department of Transport, who have approved the access point.

uShukela Drive currently comprises a single carriageway in each direction. The traffic impact assessment (TIA) currently being undertaken will determine the necessity for increasing the capacity in this roadway, as well as the form of the intersections.

The main access traversing the site will be the spine road leading to Dube Trade Port. This road is currently being constructed.

A secondary western access route is planned, with the potential to link to the R102 and the Inyaninga area to the west of the development.

The internal roads to the development will be either single carriageway or dual carriageway roads as determined by the TIA. These are indicated on the layout plan in Annexure A.

Typical cross sections of the various road carriageway classes are indicated in Annexure B. All roads will be surfaced with road pavement structure being designed to accommodate the anticipated heavy vehicles.

3. STORMWATER

A majority of the site drains toward the Hlawe River to the west. The Hlawe River is a tributary to the uTongati River.

The stormwater control philosophy will be to restrict post development flows into the Hlawe River to less than 110% of that occurring pre-development (cane cultivation), and to facilitate ingress of stormwater into the ground to replenish the wetlands in the natural drainage lines.

In order to achieve this, the application of sustainable urban drainage systems (SUDS) principles will be actively applied.

All purchasers 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 1:5 year storms to 110% 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, and unpaved 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.

Run-off from the roadways (as well as excess stormwater from the sites where applicable) will be accommodated in roadside drainage swales situated on either side of the road. The swales will be sized to accommodate a minimum of a 1:2 year storm, and these will increase times of concentration of stormwater flow and encourage infiltration.

To cater for greater storm events, roadways will also be provided with piped stormwater drainage 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 intersections, etc. Energy dissipation measures will be implemented where these pipes discharge into the natural watercourses.

Additional attenuation facilities will be provided in the main water courses to restrict the flows in larger rainfall events. These will be designed to encourage feeding water into the wetlands.

Further details of the stormwater management system are contained in the Stormwater Management Plan, and application of the concepts is illustrated in the stormwater layout plan and integrated landscape planning in Annexure C.

The planned secondary western access route crosses the Hlawe River. This will require the construction of a drainage structure (culvert/bridge) with sufficient capacity to meet the Ethekwini requirements of accommodating a 1:10 year storm without overtopping.

Details of the crossing proposal are contained in Annexure G.

4. SANITATION

The uShukela Highway development will be provided with full waterborne sewage reticulation. The development falls within the catchment of the Tongaat Wastewater Treatment Works (WWTW).

This development will generate approximately 1.8Mℓ/day of effluent if full use is made of the proposed 'bulk'.

The Tongaat WWTW has a rated capacity of 12Mℓ/day, and it is currently operating near full capacity, with inflows in excess of 10Mℓ/day. eThekwini Water and Sanitation (EWS), under who's authority the sanitation services fall, have indicated the current works will therefore not be able to accommodate further inflows from new developments.

EWS have however already commenced detailed design to upgrade the capacity of the Tongaat WWTW to 24Mℓ/day. Construction of the upgrade is budgeted to commence in the 2013/14 Ethekwini financial year, and the upgrade is programmed to be complete by the end of 2014.

The upgraded works will therefore have the capacity to accept and treat the sewer effluent generated by uShukela. EWS already has a permit to treat up to 45Mℓ/day at this works.

The effluent will be carried from the uShukela development to the WWTW by the proposed Hlawe River gravity outfall main. This main has been designed by others and has been sized to accommodate the outfall from uShukela Highway. It is the preliminary design phase and environmental approval is currently being sought separately for its construction.

A large majority of the site drains by gravity to the Hlawe outfall main. The north-eastern portion of the site will however have to be provided with a temporary pumpstation as its natural drainage path is to the north of uShukela Drive.

The effluent from this catchment will in the interim be pumped to the Hlawe outfall main until such time as the area north of uShukela Highway

(Amanzimnyama) is developed. At that juncture the pumpstation can be decommissioned, and use made of the gravity system in the northern area.

The layout of the bulk sewers is illustrated in Annexure D.

5. WATER

The water supply in the development area falls under the authority of eThekwini Water Services (EWS).

Bulk Water Supply

Bulk water supply into the area is from two sources, i.e. the Tongaat WTW operated by EWS, and the Hazelmere WTW, operated by Umgeni Water.

The Tongaat WTW generally supplies the Tongaat environs, and includes in its supply area the Mamba Ridge reservoir to the north of the development.

The Hazelmere WTW includes in its supply area the Inyaninga reservoir (which serves the airport and is inland of the R102), the La Mercy Airport reservoir to the east of the N2, and the Westbrook Reservoir which is again further east.

At present the spare capacity of treated water from the Hazelmere source is limited. Umgeni Water are currently addressing this by increasing the capacity of the Hazelmere WTW, with construction planned to commence in the first half of 2013.

Doubling up of the Umgeni supply main through the uShukela Highway development is currently under construction, alleviating potential supply line restrictions.

By 2014/15, there would therefore be sufficient treated bulk water to cater for the development proposals in the area.

From a long term raw water supply perspective, the Department of Water Affairs is currently in the process of planning to raise Hazelmere Dam. Umgeni Water is also well advanced in their planning to abstract water from the Tugela River to supply the KwaDukuza environs. As this KwaDukuza area is currently supplied by Hazelmere, this initiative will release further water capacity for use by developments in the uShukela/Inyaninga/KSIA areas.

Reservoirs and Supply Mains

The total water demand for the development is in the order of 2.15Mℓ/day per day, so to achieve 48hrs storage would require a storage capacity of an additional 4.3Mℓ/day.

The development requires a highest supply level of 114m, and therefore to supply the 24m pressure required throughout the development, and to allow for head losses in the supply main, will require a minimum reservoir elevation of approximately 140m to ensure it is fully supplied by gravity.

The Mamba Ridge reservoir (elevation of approx 100m) would only serve the western 20% of the site by gravity. The rest of the site would require an extensive pump-pressurised high level system, which is in-efficient and un-economical in the medium to long term. This reservoir is therefore not suitable to serve the proposed development.

The Inyaninga Reservoir has a top water supply level of approximately 139m, which implies that it is just sufficient to provide a full gravity supply. The supply main from this reservoir to the development would be in the order of 5km long (route dependant).

The Inyaninga Reservoir has been sized to supply the KSIA as well as the Dube Trade Port. This reservoir has a capacity of 6Mℓ, and would also have to be augmented to provide the additional storage required to serve the development.

A restriction on using the Inyaninga reservoir to supply UShukela is that it will in future have to supply a considerable area of potential Inyaninga development, which will require construction of future reservoirs on the site. This capacity would then be fully utilised for the Inyaninga and KSIA areas.

With a top water level of 155m, the La Mercy Airport reservoir will have sufficient elevation to provide a total gravity supply to the development. This reservoir is located approximately 2.5km from uShukela Highway.

At present the La Mercy Airport reservoir capacity of 5Mℓ is fully allocated, implying that a second reservoir will have to be built at the same location.

The La Mercy Airport Reservoir is owned and operated by Umgeni Water. Negotiations are currently underway between Umgeni and Ethekwini for the transfer of ownership of this reservoir to EWS.

The decision on which option to utilise will ultimately rest with EWS. The La Mercy Airport reservoir is the preferred EWS option, subject to the purchase of this reservoir from Umgeni Water, and increased reservoir capacity being constructed.

The link supply from the La Mercy Airport reservoir would comprise approximately 2.5km of 400mm diameter main. This would run adjacent to the existing pipeline supplying water to the reservoir, and within an existing servitude.

An interim supply from the Inyaninga reservoir could be considered.

Reticulation

Water to each erf will be to municipal pressure standards and each erf will be individually metered. The bulk water layout plan is contained in Annexure E.

The reticulation will be designed to accommodate fire flows. Any additional requirements for individual erven over and above 'Red Book' standards will have to be provided by the developer of the individual erf (e.g. booster connections, on site tanks, etc).

Sustainability measures including rain-water harvesting will be implemented. Potable water will not be used for irrigation. This will be sourced from contained stormwater run-off, and be complemented by supplies from the current sugarcane irrigation raw water supply.

6. ELECTRICITY

Existing

The existing electrical infrastructure is divided into the categories shown below.

275kV Sub-Transmission Lines & Servitudes

No 275kV sub-transmission line servitude exist within the development area.

Sub-Transmission Major Substations (275/132 kV)

There are currently no 275/132kV substations located in the vicinity of the proposed development.

132kV Sub-Transmission Lines & Servitudes

An existing 132kV overhead line linking the new Tongaat substation to the La Mercy substation traverses just to the north of uShukela development. There is a registered servitude for this overhead line.

Sub-Transmission Major Substations (132/11 kV)

The Tongaat 132/11kV Substation is newly built and commissioned. It is rated at 60MVA firm. This substation has been built to take over the load of three existing 33/11kV substations namely Truroland, Maidstone and old Tongaat as well as to cater for future load growth in close proximity to the substation for which eThekwini Electricity have already received applications. The current available spare is 18 MVA, which can be used to supply the initial phases of the uShukela Highway development. This spare capacity will be used on a first come first served basis for developments in close proximity to the substation.

Distribution (11kV)

There is electrical supply at 11kV available near the proposed development area. However it cannot support the demand of the development.

Reticulation

The 11kV lines feed to existing 400V installations in the area. These feed small housing elements, pumpstations, etc. These 400V installations can also not support the demand of the development.

Development Requirements

The 431 850m^2 'bulk' proposed for uShukela Highway translates to an electricity demand of 29.6MVA. In formulating the load, good engineering practice and load factors as Per Annex B of NRS 069: 2004 are used which are approved by eThekwini Electricity. The system will be designed to cater for the failure of any single MV cable, i.e. electrical load can be transferred via switching in the event of a fault occurring.

The proposed future electrical infrastructure is covered under the headings below:

275kV Sub-Transmission Lines & Servitudes

No 275kV sub-transmission lines or servitudes will be required in the uShukela area.

Sub-Transmission Major Substations (275/132 kV)

Electrical demand for the greater area surrounding KSIA will require the construction of a new 3150MVA 275/132kV substation. This will be located in the vicinity of the adjacent proposed Inyaninga development. An Environmental Impact Assessment will be required to confirm the position of the proposed substation.

This new substation will be used to feed several new 132/11kV substations that will be required to be built for the greater development area. One of the new substations will be used to feed the uShukela Highway in the future.

132kV Sub-Transmission Lines & Servitudes

No 132kV sub-transmission lines and servitudes are required within the development boundary.

Sub-Transmission (132/11 kV)

The existing 132/11kV 60MVA Tongaat substation will be used to supply the initial phases of uShukela Highway. It will in time however, be essential to construct two new 132/11kV 60MVA firm substations within the adjacent proposed Inyaninga development area. The sites will have to be selected in conjunction with eThekwini Electricity.

Distribution (11kV)

11kV supplies will be taken from the 132/11kV major substation and be fed into a series of Distribution Substations. Distribution substations are planned and positioned in key locations throughout the development. 11kV cable routes will be planned to run in the road reserves adjacent or in close proximity to each proposed site, allowing sales and transfers of sites to take place.

Reticulation

The internal electrical reticulation will be undertaken by each individual site owner to meet his specific requirements.

Street Lighting

Provision is made for both street lighting as well as public open space lighting. It is recommended that lighting form part of a separate report due to the aesthetic requirements of the urban architecture.

Schematic representation of the bulk electrical service is contained in Annexure F.

7. SOLID WASTE

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

The DSW Buffelsdraai landfill site has adequate air-space (capacity) to accept waste generated from the development.

Other waste collection models could be implemented, which could include 'contracted out' collection, facilities for waste separation for recycling, etc.

Prepared by
C P KROEGER
for Bosch Stemele (Pty) Ltd

ANNEXURE A

Sub-Precinct	Land Use	Area (m²)	% Site Area	Platform Area (m²)	FAR	Developable Built (m²)
1	Tradezone/Light Industrial/Logistics	62 385	-	60 729	0.5	36 437
2	Tradezone/Light Industrial/Logistics	148 496	-	163 846	0.6	98 188
3	Tradezone/Light Industrial/Logistics	157 337	-	140 909	0.6	84 545
4	Tradezone/Light Industrial/Logistics	33 412	-	29 154	0.6	17 492
5	Tradezone/Light Industrial/Logistics	40 632	-	39 677	0.6	23 806
6	Tradezone/Light Industrial/Logistics	286 786	-		0.6	104 238
7	Tradezone/Light Industrial/Logistics	89 146	-	87 894	0.6	52 736
8	Conference, management & offices	48 072	-	48 000	0.3	14 400
TOTAL		866 268	64.18	743 739		431 843
Roads		263 890	19.55			
Open Space		219 603	16.27			
Site Area		1349 759	100.00			

Do not scale dimensions from this drawing

Any errors, omissions and discrepancies to be reported immediately

Revision	Description	Date

INTERNAL ROADS (INCLUDING ALIGNMENT) MAY BE SUBJECT TO CHANGE PROVIDED IS WITHIN THE DEVELOPMENT FOOTPRINT

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Johannesburg
Durban
Port Elizabeth
Pretoria
Sedgefield

ADA Urban Design

Client

dube tradePORT

Tongaat Hulett DEVELOPMENTS

Project

Dube TradePort

uShukela Highway

Description

Proposed Layout Plan

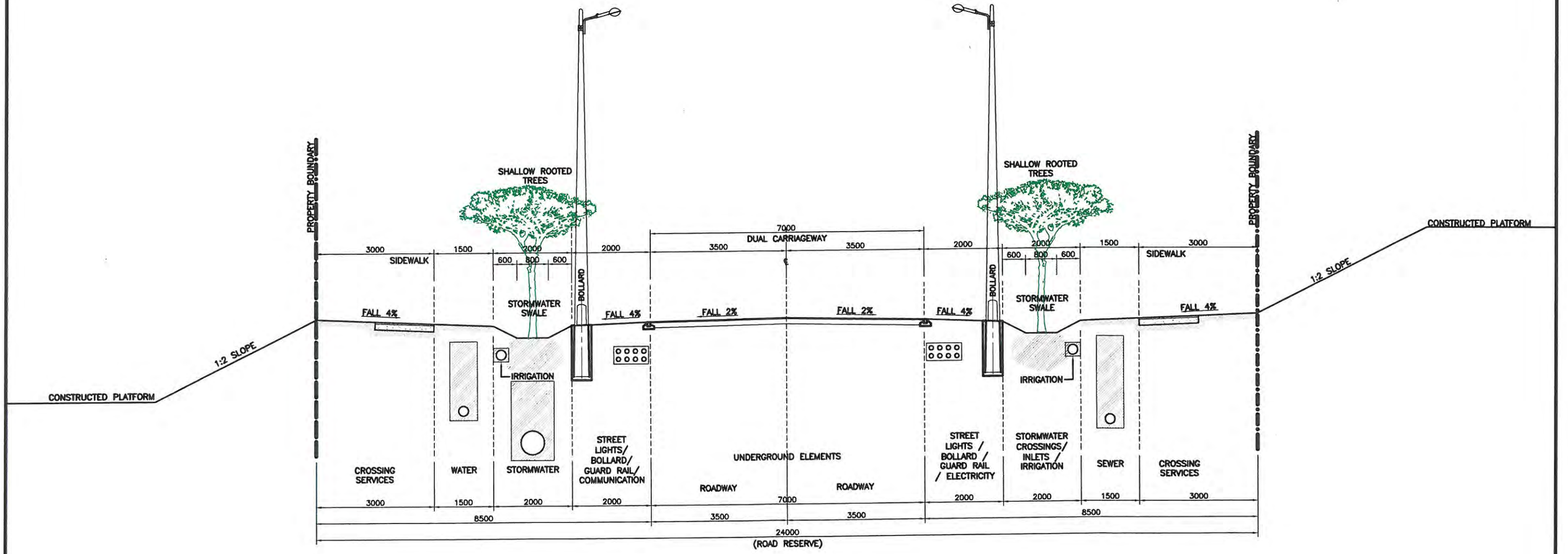
Status

For Information

Scale	Drawn	Date
1:4000	BE	Jan 2013
Job number	Drawing number	Revision
	Sk 01	19

Original size 100mm

ANNEXURE B



TYPICAL 24m ROAD CROSS SECTION

SCALE 1:100

REV.	DESCRIPTION	DATE	APPR'D
1	FOR INFORMATION	22/05/12	

DESIGNED N.M.
DRAWN R.C.
CHECKED

APPROVED
PROJECT MANAGER
DIRECTOR

SCALE AS SHOWN
DATE 22/05/12

TONGAAT HULETT DEVELOPMENTS/
DUBE TRADEPORT
USHUKELA HIGHWAY

TYPICAL CROSS SECTION FOR 24m ROAD RESERVE

DRAWING NUMBER 0243/203/014 | A3 | REVISION 1

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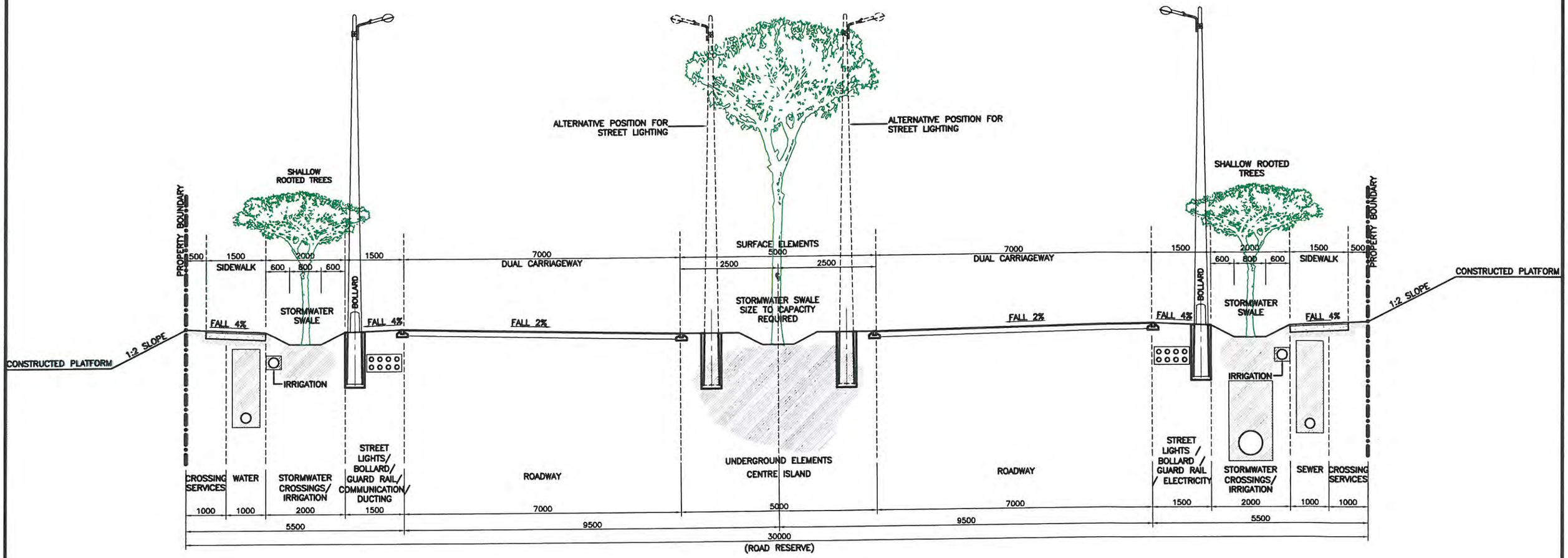

TYPICAL 30m ROAD CROSS SECTION

SCALE 1:100

REV.	DESCRIPTION	DATE	APPR'D
1	FOR INFORMATION	22/05/12	

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APPROVED
PROJECT MANAGER
DIRECTOR

SCALE AS SHOWN
DATE 22/05/12

TONGAAT HULETT DEVELOPMENTS/
DUBE TRADEPORT
USHUKELA HIGHWAY

TYPICAL CROSS SECTION FOR 30m ROAD RESERVE

DRAWING NUMBER 0243/203/015 | A3 | REVISION 1

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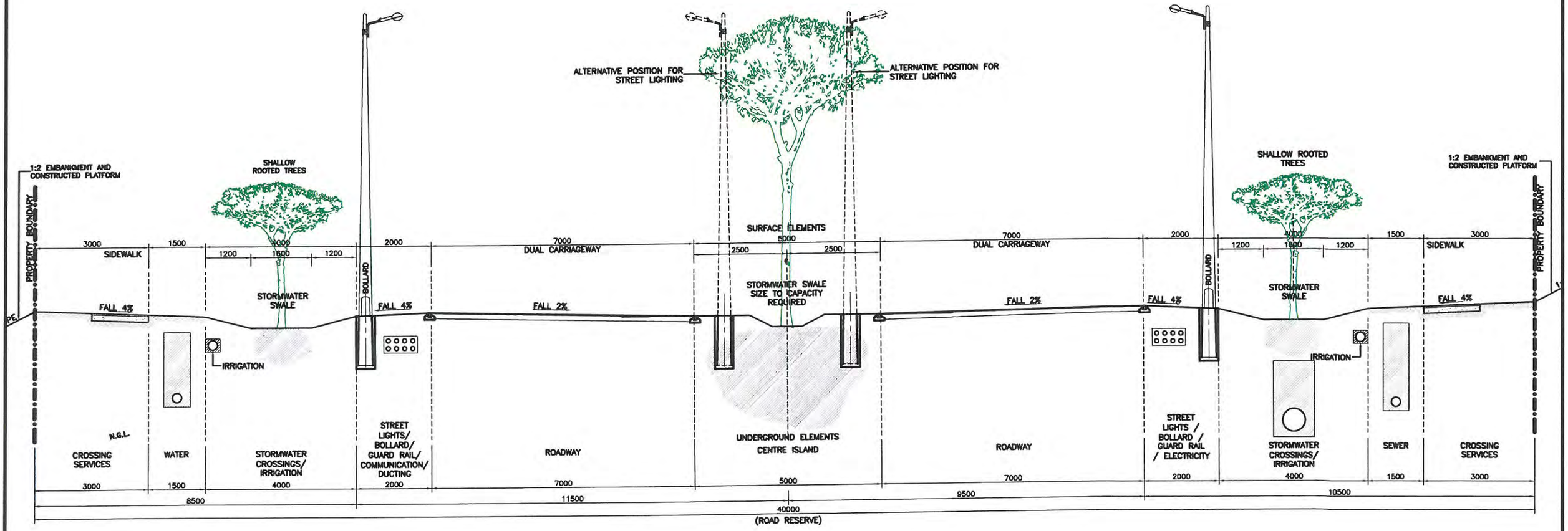

TYPICAL 40m ROAD CROSS SECTION

SCALE 1:100

REV.	DESCRIPTION	DATE	APPR'D
1	FOR INFORMATION	22/05/12	

DESIGNED N.M.
DRAWN R.C.
CHECKED

APPROVED
PROJECT MANAGER
DIRECTOR

SCALE AS SHOWN
DATE 22/05/12

TONGAAT HULETT DEVELOPMENTS/
DUBE TRADEPORT
USHUKELA HIGHWAY
TYPICAL CROSS SECTION FOR 40m ROAD RESERVE

DRAWING NUMBER 0243/203/016 | A3 | REVISION 1

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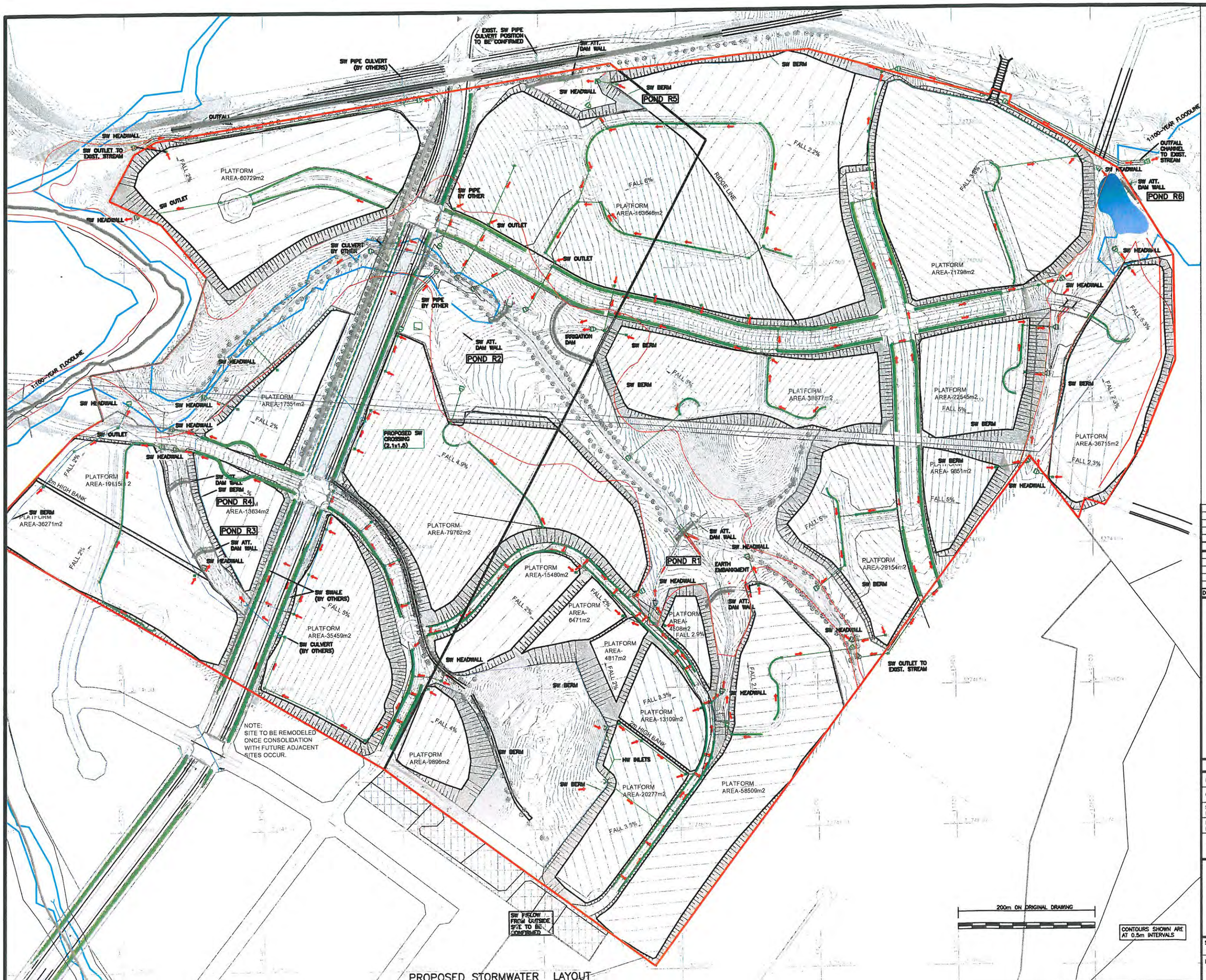
ANNEXURE C



PROPOSED STORMWATER LAYOUT
SCALE 1:2500

LEGEND:

- PROPOSED SW PIPE
- PROPOSED SW CP/MH
- PROPOSED SW HW OUTLET & STILLING BASIN
- PROPOSED SW INLET
- PROPOSED SW SWALE
- PROPOSED SW CHANNEL
- PROPOSED SW BERM(KERB)
- 1:100-YEAR FLOODLINE
- DIRECTION OF FLOW

REV.	DESCRIPTION	DATE	APPR'D
01	FOR REPORT	07/02/13	
0	FOR REPORT.	15/5/12	

DRG. No. | REFERENCE DRAWING

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DESIGNED LS	DRAWN RC
CHECKED	CIVIL ENGINEER
STRUCTURAL ENGINEER	MECHANICAL ENGINEER
ELECTRICAL ENGINEER	CO-ORDINATION ENGINEER
APPROVED	PROJECT MANAGER / DIRECTOR

TONGAAT HULETT DEVELOPMENTS/ DUBE TRADEPORT uSHUKELA HIGHWAY

PROPOSED BULK & INTERNAL STORMWATER LAYOUT

SCALE	1:2500	DATE	15/05/2012
DRAWING NUMBER	243/203/027	A1	REVISION 01

LEGEND

- EXISTING TREES
- PROPOSED TREES
- PROPOSED ATTENUATION AREAS/WETLANDS
- PROPOSED PATH WAYS
- POSSIBLE PAVING TO ROADS
- "BRIDGE" CULVERT FEATURE

dube tradePORT

Tongaat Hulett DEVELOPMENTS

USHUKELA PRECINCT
LANDSCAPE MASTERPLAN

CNdV africa
DWG NO: 2047-03.LM-REV 02 SCALE 1:2500 @ A1 MAR 2013
CNdV africa LANDSCAPE ARCHITECTS
Tel : 021 424 5022 Fax : 021 424 6837
landscape@cndv.co.za www.cndv.co.za

ANNEXURE D

REV.	DESCRIPTION	DATE	APPR'D
01	FOR REPORT	19/02/13	
1	ISSUE TO CLIENT	01/10/12	

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APPROVED
PROJECT MANAGER
DIRECTOR

SCALE 1 : 20 000
DATE SEPT. 2012

TONGAAT HULETT DEVELOPMENTS/ DUBE TRADEPORT uSHUKELA HIGHWAY

BULK SERVICES PLAN SEWER

DRAWING NUMBER 243/203/004 | A3 | REVISION 01

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ANNEXURE E

REV.	DESCRIPTION	DATE	APPR'D
01	FOR REPORT	19/02/13	
2	ISSUE TO CLIENT	01/10/12	

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APPROVED
PROJECT MANAGER
DIRECTOR

SCALE 1 : 20 000
DATE SEPT. 2012

TONGAAT HULETT DEVELOPMENTS/ DUBE TRADEPORT uSHUKELA HIGHWAY

BULK SERVICES PLAN WATER

DRAWING NUMBER 243/203/003 | A3 | REVISION 01

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1	ISSUE TO CLIENT	01/10/12	

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DIRECTOR

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DATE SEPT. 2012

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BULK SERVICES PLAN ELECTRICITY

DRAWING NUMBER 243/203/002 | A3 | REVISION 01

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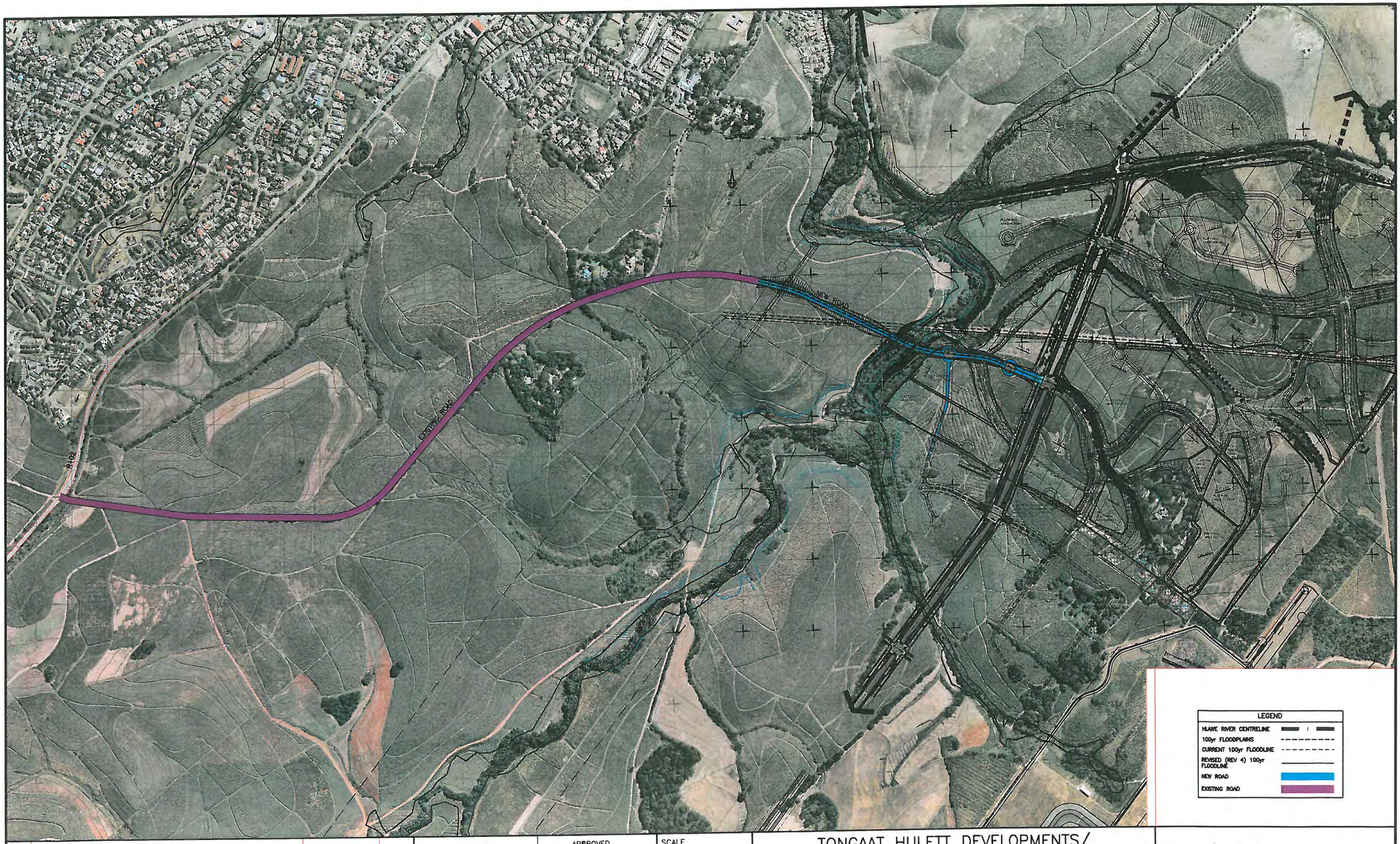
ANNEXURE G



LEGEND

- HLAWE RIVER CENTRELINE
- 100yr FLOODPLAINS
- CURRENT 100yr FLOODLINE
- REVISED (REV 4) 100yr FLOODLINE
- NEW ROAD
- EXISTING ROAD

REV.	DESCRIPTION	DATE	APPR'D
1	ISSUE TO CLIENT	17/04/13	

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CHECKED

APPROVED
PROJECT MANAGER
DIRECTOR

SCALE 1 : 10 000
DATE APR 2013

TONGAAT HULETT DEVELOPMENTS/ DUBE TRADEPORT uSHUKELA HIGHWAY

WESTERN ACCESS ROAD

DRAWING NUMBER 243/203/060 | A3 | REVISION 1

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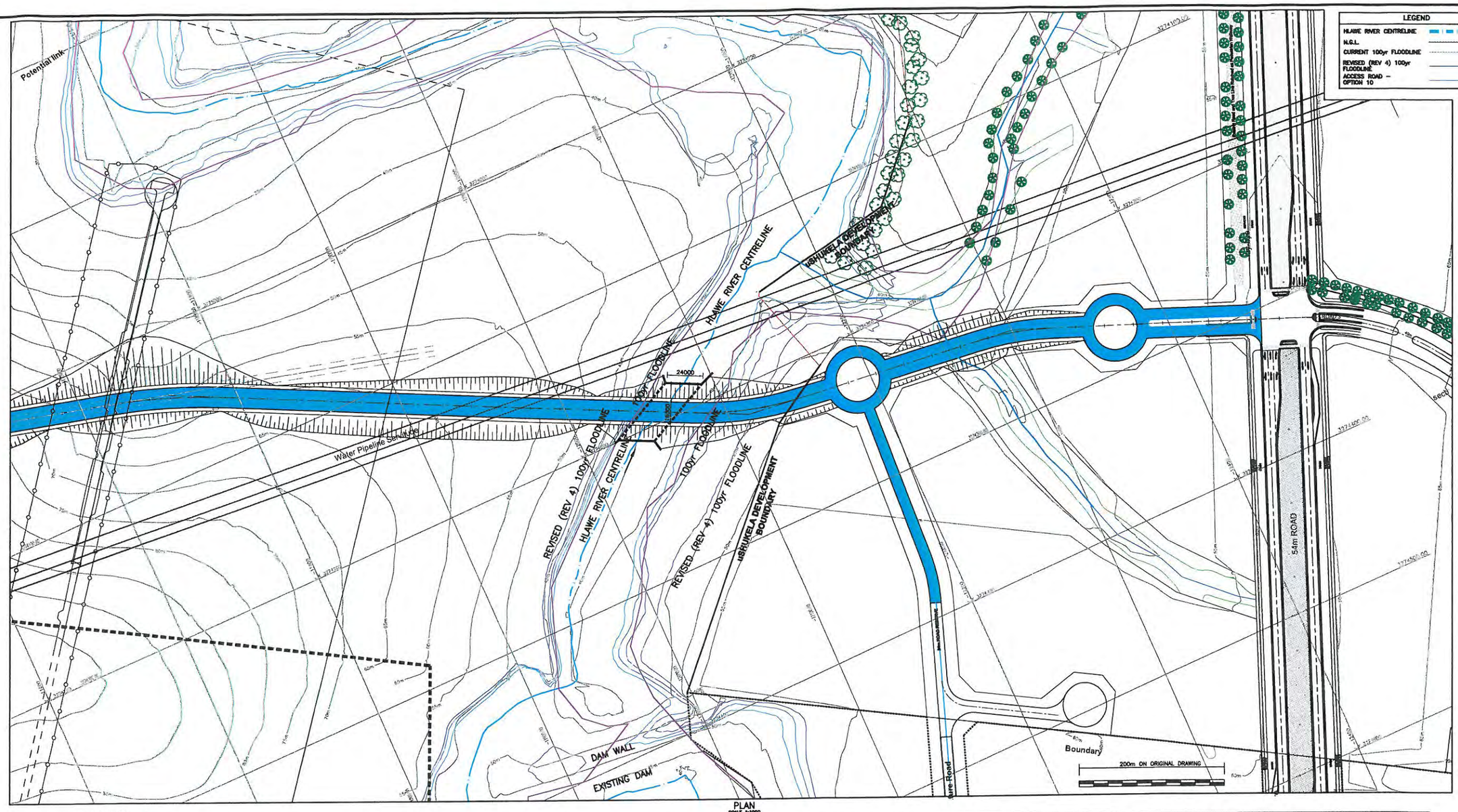

PLAN
SCALE 1:1000

LONGSECTION AT RIVER CENTRELINE
SCALE 1:500

OPTION 10
SCALE: VERT 1: 500
HOR 1: 500

Peg Distance (m)	260	270	280	290	300	310	320	330	340	350	360	370	380	390	400	410	420	430	440	450
Ground Level (m)	60.62	60.36	60.04	59.67	59.25	58.94	58.48	58.07	57.50	56.70	55.72	54.57	53.30	51.43	48.94	45.80	44.32	42.05	39.77	37.50
Design Level (m)	56.02	55.49	54.93	54.35	53.76	53.14	52.50	51.84	51.15	50.46	49.80	49.22	48.70	48.25	47.87	47.55	47.31	47.14	47.03	47.00

Peg Distance (m)	460	470	480	490	500	510	520	530	540	550	560	570	580	590	600
Ground Level (m)	38.98	39.94	40.63	41.34	42.23	43.90	45.51	46.56	47.72	48.99	48.91	48.83	48.76	48.68	48.60
Design Level (m)	47.00	47.00	47.00	47.00	47.00	47.00	47.00	47.00	47.00	47.00	47.00	47.00	47.00	47.00	47.00

Peg Distance (m)	610	620	630	640	650	660	670	680	690	700	710	720	730
Ground Level (m)	48.52	48.44	48.36	48.05	42.82	42.92	43.70	44.46	48.07	52.44	52.55	52.75	52.95
Design Level (m)	47.03	47.12	47.27	47.48	47.75	48.06	48.47	48.92	49.43	50.00	50.63	51.32	52.04

Grade (%) -6.923 0.000 0.000 7.197

Vertical Alignment V-cl 140.000 K-val 47.895 340 350 V-cl 100.000 K-val 14.444 450 470 V-cl 100.000 K-val 0.000 570 600 V-cl 120.000 K-val 16.674 720

Horizontal Alignment Rad Tan H-cl 296.21.56 296.09.31 470.44 CURVE 3 LEFT 230.000 38.630 76.563 547.01 277.05.09 671.27 CURVE 4 RIGHT 200.000 26.264 52.229 723.49 292.02.53

Road Profile (+) 0 (-) L R

ROAD LONG SECTION
SCALE 1:500

REV.	DESCRIPTION	DATE	APPR'D
0	FOR REPORT	11/02/13	
1	FOR DISCUSSION PURPOSES	28/01/13	

DRG. No.	REFERENCE DRAWING

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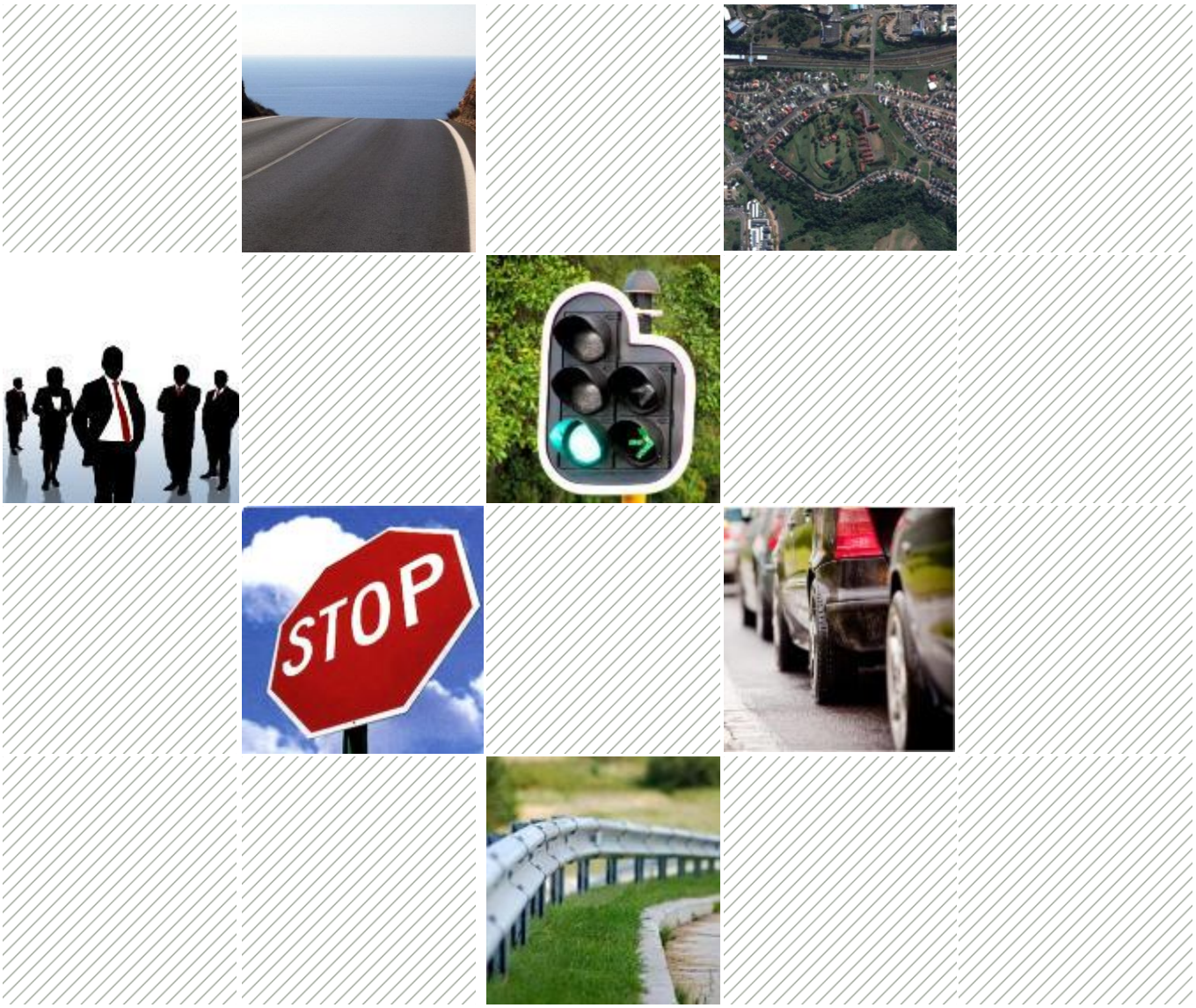
CHECKED		CIVIL ENGINEER	
STRUCTURAL ENGINEER		MECHANICAL ENGINEER	
ELECTRICAL ENGINEER		CO-ORDINATION ENGINEER	
APPROVED	PROJECT MANAGER		DIRECTOR

TONGAAT HULETT DEVELOPMENTS/
DUBE TRADEPORT
uSHUKELA HIGHWAY

ACCESS ROUTE OVER HLAWE RIVER
PROPOSED ACCESS ROAD (OPTION 10)
PLAN AND LONGSECTION

SCALE AS SHOWN
DATE 28/01/13
DRAWING NUMBER 0243/203/059 A0
REVISION 0

Appendix 3: Traffic Study for the Proposed uShukela Drive Precinct Development in the Greater Tongaat Area



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TRAFFIC STUDY FOR THE PROPOSED uSHUKELA DRIVE PRECINCT DEVELOPMENT IN THE GREATER TONGAAT AREA

Submitted by:
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T: +27 71 6877 131 **F:** +27 31 702 0287
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Submitted to:
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Glenashley
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Contact Person:
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Traffic Report
106521/uShukela Precinct/TIA Report Draft 5

Report No: 5671/106521/04

Submission date: December 2012

Project Title				Project Number
Traffic Study for the Proposed uShukela Drive Precinct Development Located in the Greater Tongaat Area				106521_uShukela Precinct Traffic Study
Document Title	Traffic Study for the Proposed uShukela Drive Precinct Development Located in the Greater Tongaat Area			
File Reference	106521_uShukela Precinct Traffic Study			

Version	**Date (dd/mm/yy)**	**Filename**	uShukela Precinct Report January2-11_RS_1st Draft		
1	Sept 2011	**Description**	Traffic Study for the Proposed uShukela Drive Precinct Development Located in the Greater Tongaat Area.		
			Prepared by	**Reviewed by**	**Approved**
		Name	R Sahadew	K Louw	M van Tonder
		Signature			
Version	**Date (dd/mm/yy)**	**Filename**	uShukela Precinct Report January2-11_RS_2nd Draft		
2	Oct 2011	**Description**	Traffic Study for the Proposed uShukela Drive Precinct Development Located in the Greater Tongaat Area Revised the document to include comments from the client.		
			Prepared by	**Reviewed by**	**Approved**
		Name	R Sahadew	D Kellock	M van Tonder
		Signature			
Version	**Date (dd/mm/yy)**	**Filename**	uShukela Precinct Report January2-11_DK_3rd Draft		
3	Nov 2011	**Description**	Traffic Study for the Proposed uShukela Drive Precinct Development Located in the Greater Tongaat Area Revised the document to include amended sub precinct areas.		
			Prepared by	**Reviewed by**	**Approved**
		Name	D Kellock	D Kellock	M van Tonder
		Signature			
Version	**Date (dd/mm/yy)**	**Filename**	uShukela Precinct TIA Report – Dec2012_ Draft4.docx		
4	Dec 2012	**Description**	Traffic Study for the Proposed uShukela Drive Precinct Development Located in the Greater Tongaat Area Revised the document to include amended sub precinct areas and change in landuse		
			Prepared by	**Reviewed by**	**Approved**
		Name	R Sahadew	D Kellock	M van Tonder
		Signature			

Executive Summary

Contents

Figures

Tables

List of Acronyms

ETA	eThekwini Transport Authority
KZN DOT	KwaZulu Natal Department of Transport
LOS	Level of Service
Veh/h	Vehicles per Hour
DTP	Dube Tradeport
KSIA	King Shaka International Airport
IRPTN	Integrated Rapid Public Transport Network
evu	Equivalent Vehicular Units
BRT	Bus Rapid Transit

Executive Summary

Tongaat-Hulett Developments and Dube Tradeport have formed a joint venture to develop a portion of land, approximately 431 000 m^2 of bulk area. The land is currently jointly owned by both companies. The proposed development is commonly referred to as the uShukela Drive Precinct Development. The uShukela Drive Precinct Development will be a multi-faceted development that will comprise of nine Trade Zones and a Conference Centre. Each Trade Zone will effectively comprise of offices, light industry, warehousing, distribution and manufacturing land use types.

It is the primary intent of the developers of this project to symbiotically develop the land and the transportation system simultaneously such that the development can improve the economy, shape development patterns and influence the quality of life in the Tongaat area. It is envisaged that by 2017 the proposed uShukela Development will be 10% complete. By 2022 the development will attain 40% of its developmental potential. By 2027 the uShukela Development should be fully 100% complete.

This study has shown that currently the majority of the intersections within the study area are operating at acceptable levels of service in the base year. The west to south right turn movement at the eastern intersection of the N2 interchange is however showing signs of congestion, indicating that this intersection needs to be signalised. The western intersection at this interchange should be signalised simultaneously to match the eastern one.

The intersections within the study area display signs of distress in the 5 year horizon due to the natural growth in traffic volumes. Once the generated traffic from the uShukela Development and the Dube Tradeport are considered in the 5 year horizon, certain intersections will encounter high levels of congestion. The R102 and uShukela Drive intersection in particular will require major upgrading however this is not possible due to the space constraints adjacent to this intersection. Only minor upgrades to this intersection will be possible. Therefore, the introduction of the Brake Drive link will be highly beneficial in the 5 year horizon as this link will certainly alleviate the pressure on the road network within the Tongaat CBD. Certain intersections within the study area display signs of distress in the 5 year horizon. The analysis of the 5 year horizon confirms that capacity upgrades are required on the surrounding road network.

The analysis of the combined development-generated traffic volumes and the forecasted 10 year traffic volumes show that most of the surrounding road network will have the capacity to handle the envisaged volumes of traffic. The intersection of uShukela Drive and High Street will be the only intersection within the study area that will require capacity upgrades in the 10 year horizon. The analysis of the 15 year horizon revealed that a few intersections within the study area will not have the capacity to cope with the demand required and need to be upgraded in the 15 year horizon. The link roads within the study area will have sufficient capacity and therefore will not require any upgrading.

In conclusion, the uShukela Development can be developed to 100% over a 15 year period however capacity upgrades on the existing infrastructure and a new link via Brake Drive will be required.

The recommended infrastructure improvements need to be implemented in the time horizons recommended in this study to prevent the level of service on the surrounding road network from deteriorating to unacceptable standards.

1. Introduction and Background

Tongaat-Hulett Developments and Dube Tradeport have formed a joint venture to develop a portion of land, approximately 431 000 m^2 of bulk area. The land is currently jointly owned by both companies. The proposed development is commonly referred to as the uShukela Drive Precinct Development. The uShukela Drive Precinct Development will be a multi-faceted development that will comprise of nine Trade Zones and a Conference Centre. Each Trade Zone will effectively comprise of Offices, Light Industry, Warehousing, Distribution and Manufacturing land use types.

Land use and transportation are symbiotic: development density and location influence regional travel patterns, and, in turn, the degree of access provided by the transportation system can influence land use and development trends. Hence, Aurecon was commissioned by the joint venture to undertake a Traffic Study for the proposed development. The objectives of this study are as follows:

- Determine the existing levels of service on the surrounding road network.
- Determine and quantify the impact of the additional traffic generated by the proposed development on the surrounding road network.
- Propose mitigating recommendations and upgrades to address any safety and capacity issues that may be identified on both the internal and external road networks.
- Propose recommendations on access requirements.
- Evaluate the geometric design requirements.
- Consider all possible future planning for the study area.
- Liaise with the relevant stakeholders to ensure integrative planning for the area.

2. Location and Surrounding Road Network

The proposed development is located on a tract of land to the east of Tongaat and west of the National Route 2 (N2). Tongaat is a town to the north of Durban that has a strong heritage in the sugar cane industry. The town has since diversified from its origins and boasts a range of manufacturing, retailing and service outlets. Businesses within Tongaat provide employment for a fair share of the residents however many residents are employed in neighbouring towns.

The proposed development is located adjacent to the N2 and uShukela Drive (formerly Watson Highway) also commonly known as Provincial Road P426 or Metro Route M43. The western boundary of the site is the Hlawe River while the southern periphery of the site borders the King Shaka International Airport/ Dube Tradeport complex. The location

of the proposed development in relation to the surrounding area is shown on the Locality Plan, **Figure 1**.

Figure 1: Locality Plan

The precinct comprises of two portions of land. The eastern portion is owned by Tongaat-Hulett Developments (THD) while the western portion is owned by Dube Tradeport (DTP). The proposed development will be a "greenfields development" since there is no existing infrastructure on the proposed site as the land is presently used for sugar cane cultivation.

uShukela Drive traverses the study area in an east-west direction from the eastern seaboard to the town of Tongaat in the west. uShukela Drive crosses under the N2 at a grade-separated diamond interchange located at the north-east corner of the study area. In the vicinity of this interchange uShukela Drive is a dual carriageway road with two lanes in each direction. As uShukela Drive proceeds away from this interchange in both directions, the road tapers down to a single carriageway road with a single lane in each direction. uShukela Drive has a lane width of approximately 3.5m and a shoulder width of approximately 1,0m, with a fairly wide verge on either side of the road. The geometry of uShukela Drive within the

study area can be described as rolling with gentle curves. The speed limit on this section of uShukela Drive is 80km/h.

The N2 is a dual carriageway freeway with two lanes in each direction and it traverses the study area in a north-south direction. The geometry of the N2 within the study area can be described as rolling with gentle horizontal curves and a speed limit of 120km/h. The on and off ramps are all single lane ramps. The two intersections located to the east and west on this grade separated interchange are both unsignalised. The N2 Tongaat Toll Plaza is located just south of the uShukela Drive interchange.

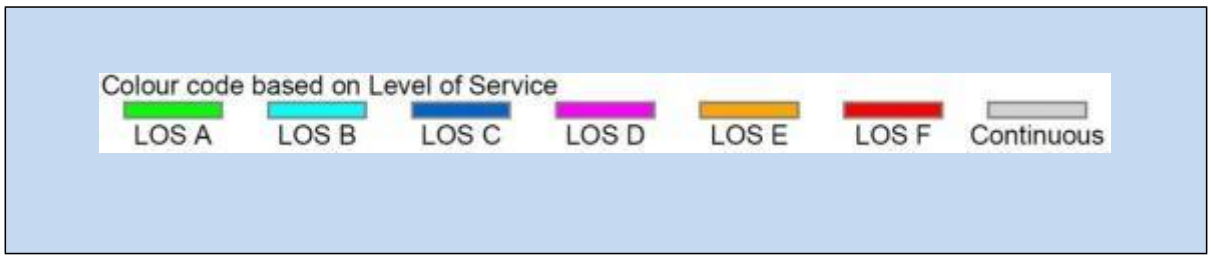
As part of the broader transportation plan for this area, a new major public transport corridor will traverse through the proposed development in a north-south direction and will be constructed in the near future. This corridor will connect the King Shaka International Airport (KSIA) and Dube Tradeport (DTP) to the proposed uShukela Precinct Development. The long term vision is to link this corridor to the proposed Cornubia development to the north of Mt. Edgecombe. This new north-south public transport corridor will form an integral link in the greater integrated rapid public transport network (IRPTN) that is proposed for the area. The IRPTN will use either Bus Rapid Transit (BRT) or light rail.

Transportation systems affect community character, the natural and human environment and economic development patterns. As such, it is the primary intent of the developers of this project to symbiotically develop the land and the transportation system simultaneously such that the development can improve the economy, shape development patterns and influence the quality of life in the Tongaat Area.

3. Existing Traffic Conditions

Level of Service (LOS) is defined as a qualitative measure of the operational conditions within a traffic stream as perceived by road users. This definition generally describes these traffic conditions in terms of speed, travel times, freedom to manoeuvre, traffic interruptions, comfort, convenience and safety. There are six levels of service used to describe the quality of travel on the road network. Each of these levels is given a letter designation from A to F, with LOS A representing the best operating conditions while LOS F represents the least desirable conditions.

The road network surrounding the proposed uShukela Development will be analysed in detail and the current levels of service on the existing road network will be discussed in detail in this Chapter. The levels of service at each intersection will be presented schematically. The following legend will be used to depict the LOS of each movement at the intersections.



3.1 Data Source

The base year background traffic or existing traffic refers to the traffic volumes currently on the road network in the year that the traffic study is undertaken before the development-generated traffic is added. The proposed uShukela Development is expected to generate peak traffic on a typical weekday during both the morning and afternoon peak hours, hence these two peak periods will be analysed. The existing traffic volumes on the road network surrounding the site were obtained from classified traffic counts undertaken by Bala Survey & Research at the following intersections on Tuesday 16 November 2010:

- uShukela Drive and N2 Interchange – Eastern intersection.
- uShukela Drive and N2 Interchange – Western intersection

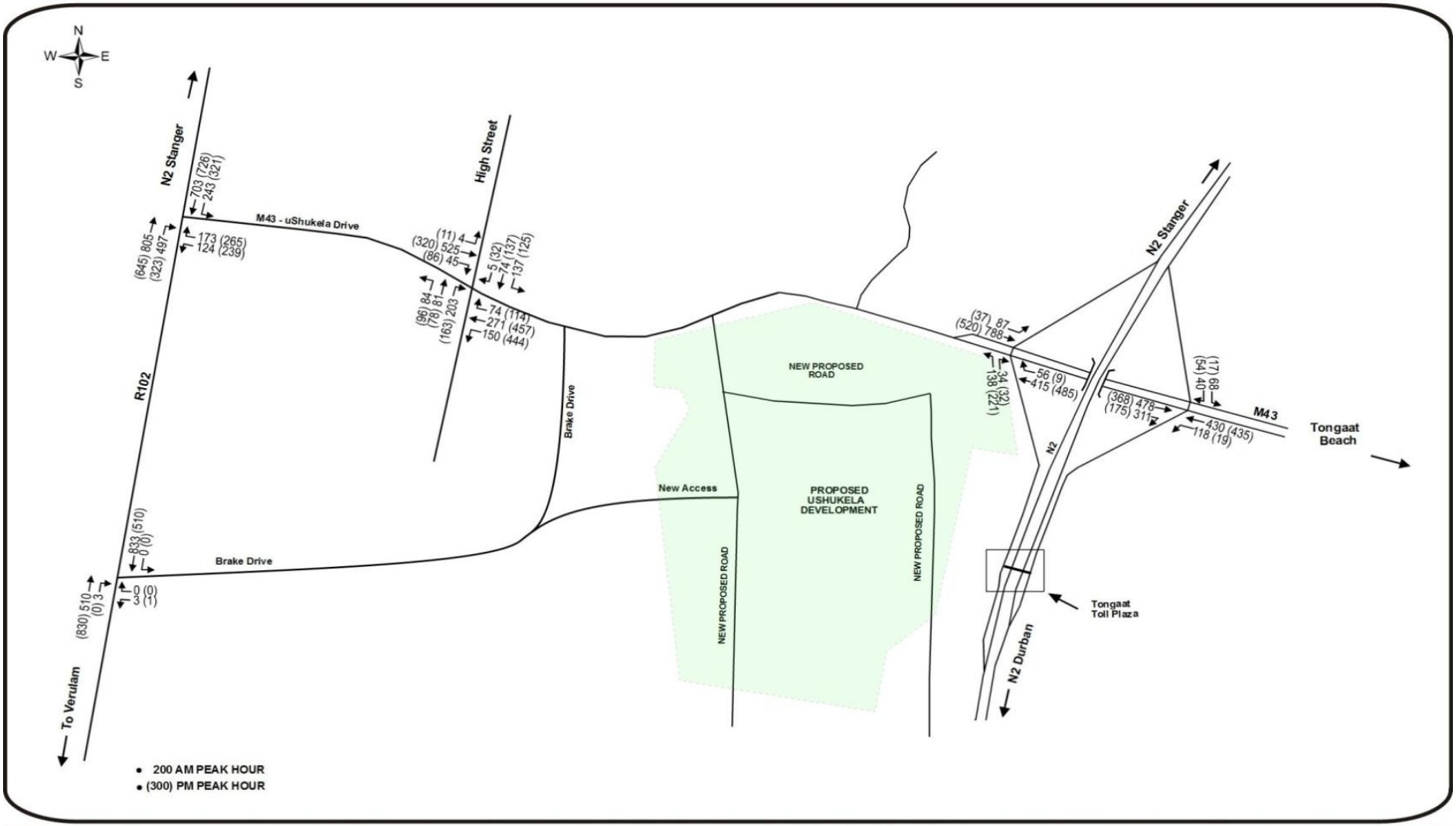
It is envisaged that a substantial volume of the generated traffic will originate from the west of the study area either from Tongaat or the surrounding towns, therefore it was prudent to analyse the following intersections located to the west of the study area:

- uShukela Drive and R102
- uShukela Drive and High Street
- R102 and Brake Drive

Classified traffic counts for the two uShukela Drive intersections on the Tongaat side of the study area were obtained from the eThekwini Transport Authority (ETA) who commissioned the classified counts in 2008. A four year growth factor was applied by Aurecon on the data supplied by the ETA to ascertain their equivalent 2012 values.

The R102 / Brake Drive intersection was an additional intersection that was added to the above counts. Bala Survey and Research counted the traffic at this location on 27 August 2012.

The existing AM and PM peak hour traffic volumes on the surrounding road network are shown on **Figure 2**.



aurecon Leading. Vibrant. Global.	EXISTING WEEKDAY AM & PM PEAK HOUR TRAFFIC VOLUMES Proposed uShukela Drive Precinct Development in the Tongaat Area	PROJECT: 106521
		FIGURE: 2
November 2012	AURECON (PTY) LTD	SCALE: Not to Scale

Figure 2: Existing Weekday AM and PM Peak Hour Volumes

3.2 Existing Level of Service on uShukela Drive

uShukela Drive is a two lane rural highway with a single lane in each direction. The existing AM peak hour two way traffic is 1 418 veh/h while the existing PM peak hour two way traffic is 1 314 veh/h. Unlike multi-lane freeways, traffic operations on two-way, two lane rural highways are unique as lane changing and passing are only possible in the face of opposing traffic. The ability to overtake is hindered as the volume of opposing traffic increases. The capacity of a typical two lane highway is 2 800 veh/h two way under ideal conditions. Ideal conditions are defined as a highway with no restrictive geometric, traffic and environmental characteristics.

Due to the existing geometric, traffic and environmental conditions that limit the mobility on uShukela Drive, the theoretical capacity of this highway segment is approximately 2 000 veh/h two way. An analysis of this section of highway revealed that uShukela Drive is presently operating at level of service E (LOS E) in both the AM and PM peak hours, given that this road is presently conveying high volumes of traffic in both the peak hours. Level of Service E is deemed to be unacceptable by the statutory authorities.

3.3 Existing Level of Service on the R102

The R102 traverses along the western periphery of the study area in a north-south direction and serves as the main arterial road through the Tongaat CBD. Within the Tongaat CBD, the R102 is a dual carriageway road with two lanes in each direction. As the R102 travels southwards out of the CBD it becomes a two lane rural highway with a single lane in each direction. The dual carriageway section of the R102 within Tongaat conveys in excess of 1300 veh/h two way in each of the peak periods and currently operates at a LOS E. Level of service E represents unacceptable operating conditions that are very close to capacity.

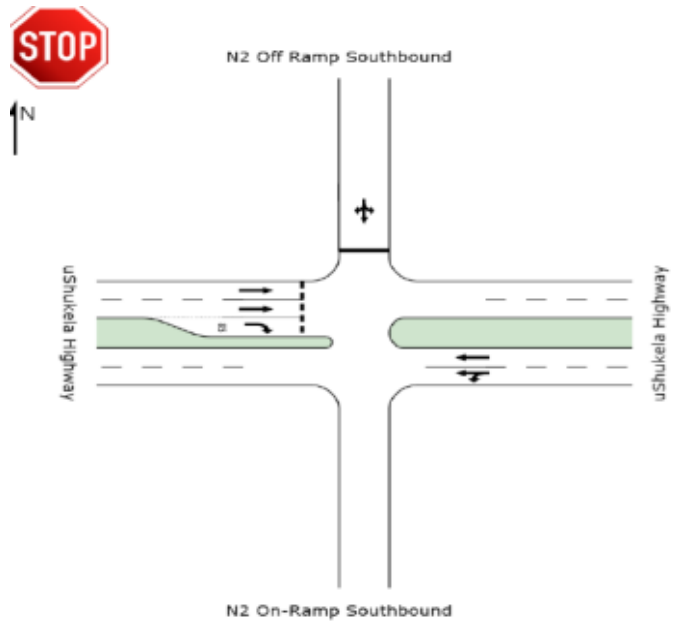
3.4 N2 Interchange - Eastern Intersection

uShukela Drive crosses under the N2 at a diamond interchange just to the north of the Tongaat Toll Plaza. The eastern intersection at this interchange services the southbound traffic. In the vicinity of this intersection, uShukela Drive is a dual carriageway road with two lanes in each direction however, as the road proceeds east towards Tongaat Beach it tapers down to a single carriageway road with a single lane in each direction. The on and off ramps are single lane ramps and the intersection is priority controlled with the off ramp having a Stop control. The southbound off-ramp has a ramp plaza located approximately midway along its length.

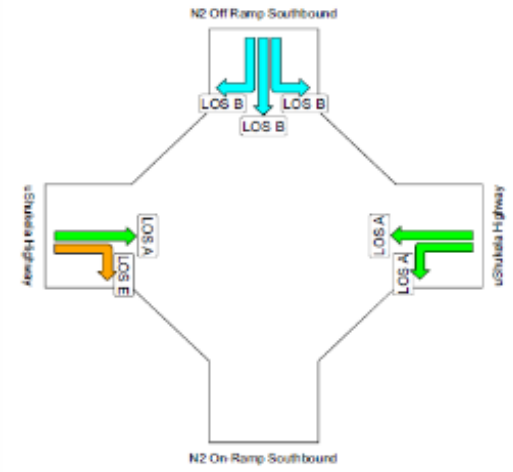
The eastern intersection was analysed using the SIDRA analysis software during the AM and PM weekday peak hours. The geometric layout of the eastern intersection and the LOS schematics for the AM and PM weekday peak hours are shown in **Table 1**.

The SIDRA analysis revealed that the eastern intersection currently operates at a good level of service during both the AM and PM peak hours under the existing traffic conditions. Minor congestion is encountered at the right turning movement on the western approach from

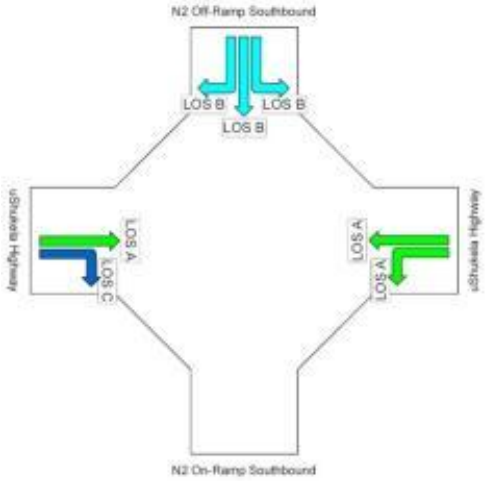
uShukela Drive onto the southbound on-ramp to the N2 which operates at an unacceptable LOS E. In general, the through traffic on uShukela Drive is unimpeded by traffic on the ramps. The westbound traffic turning left onto the southbound on-ramp operates freely. The average delays during the AM and PM peak hours are 10,8 and 3,7 seconds respectively. The average queue lengths during the AM and PM peak hours are 62,5 and 16,7 metres respectively.



Eastern Intersection Geometric Layout



AM Peak – LOS Schematic



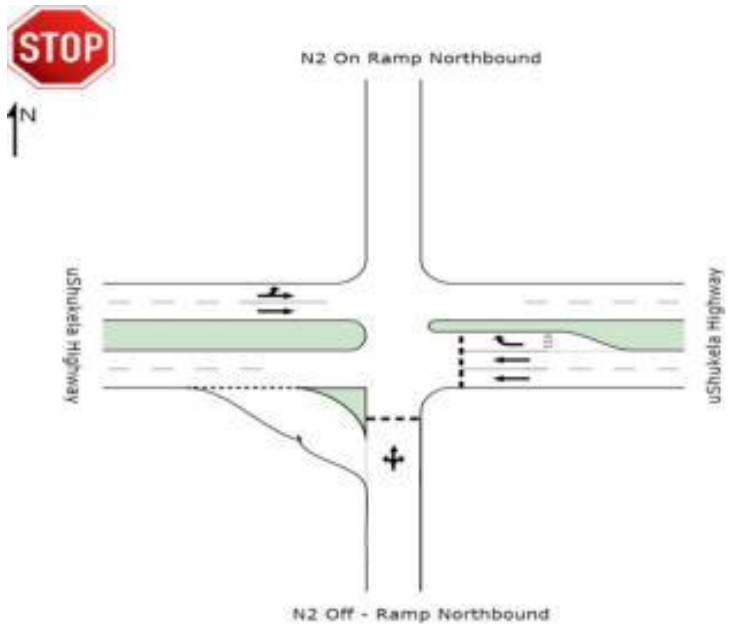
PM Peak – LOS Schematic

Table 1: N2 Interchange – Eastern Intersection, Existing Traffic

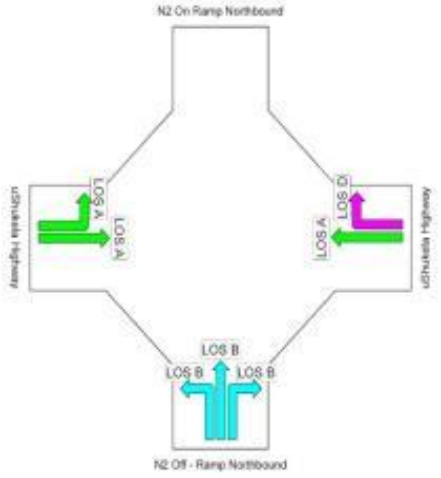
3.5 N2 Interchange – Western Intersection

In the immediate vicinity of the western intersection, uShukela Drive is still a dual carriageway road with two lanes in each direction but it tapers down to a single carriageway with a single lane in each direction as the road proceeds towards the Tongaat CBD. There is a single lane on each ramp in the northbound direction and there is a toll ramp plaza approximately halfway along the northbound on ramp.

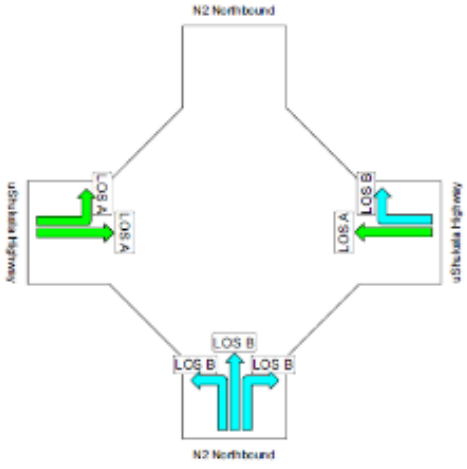
A SIDRA analysis confirmed that this intersection operates at a good level of service during the AM and PM peak hours with minor congestion encountered at the right turning movement on the eastern approach from uShukela Drive onto the northbound on-ramp to the N2. The geometric layout of this intersection and the LOS Schematics are shown in **Table 2**.



Western Intersection Geometric Layout



AM Peak – LOS Schematic

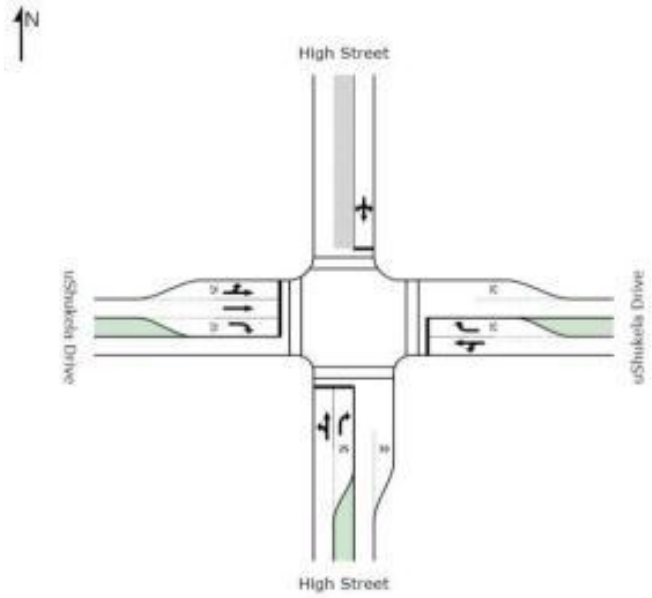


PM Peak – LOS Schematic

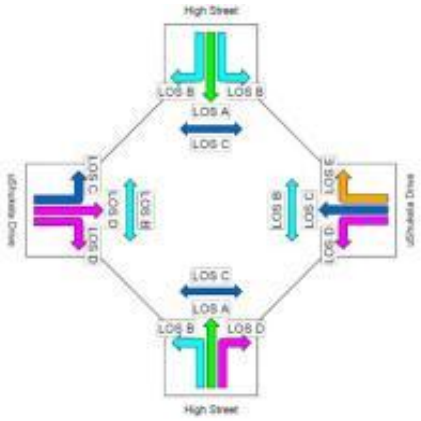
Table 2: N2 Interchange – Western Intersection, Existing Traffic

3.6 uShukela Drive and High Street Intersection

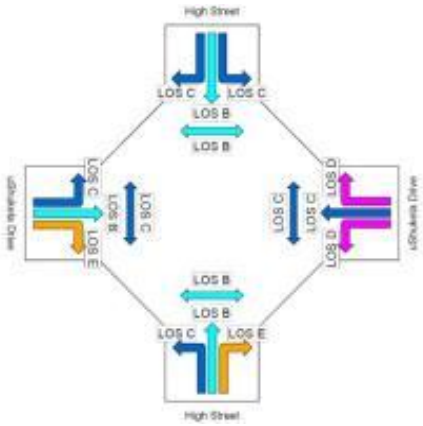
As uShukela Drive traverses west into the Tongaat CBD it intersects with High Street at a signalised intersection. High Street predominantly conveys residential traffic in a north- south direction and uShukela Drive crosses High Street in an east-west direction. uShukela Drive and High Street are both single carriageway roads with one lane in each direction. Dedicated turning lanes are provided on uShukela Drive. An analysis on this intersection revealed that this intersection is operating at an overall LOS C in both the AM and PM peak hours. The influence of congestion is noticeable, particularly along uShukela Drive and several movements are operating at LOS E which is unacceptable. The queue lengths encountered along the eastern approach of uShukela Drive are particularly lengthy, at approximately 259m. This occurs as a result of the short right turning lane which is a pre-existing problem at this intersection. The geometric layout and the LOS schematics are shown in **Table 3**.



Intersection of uShukela Drive and High Street



AM Peak – LOS Schematic

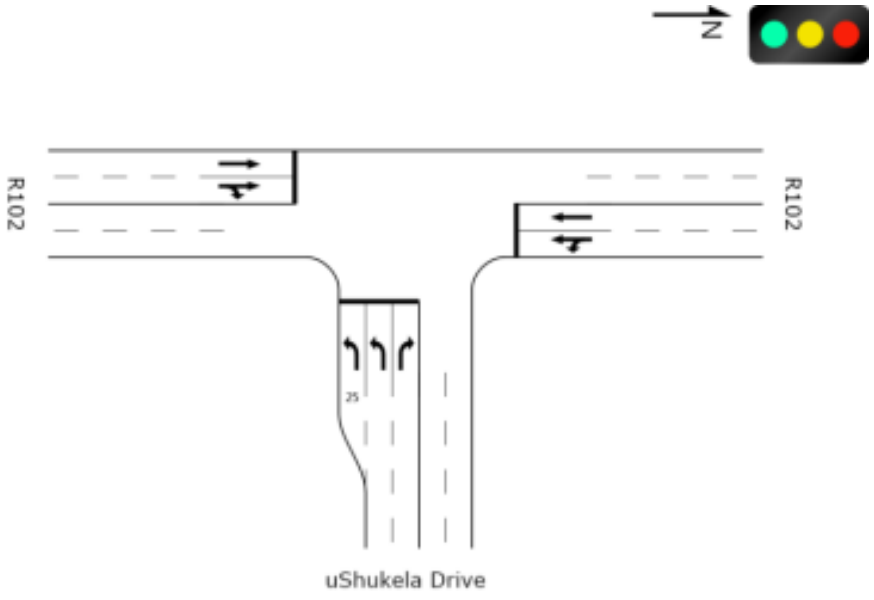


PM Peak – LOS Schematic

Table 3: uShukela Drive and High Street Intersection, Existing Traffic

3.7 uShukela Drive and R102 Intersection

uShukela Drive terminates at a signalised junction with the R102 in the Tongaat CBD. The R102 in the vicinity of this intersection is a dual carriageway road with two lanes in each direction. uShukela Drive is a dual carriageway road with two lanes in each direction with a designated left turning embayment on the eastern approach to this intersection. The signals at this intersection change from two phases to three phases during the peak periods. Table 4 reveals that this intersection is operating at a good LOS in both the AM and PM periods. In general, this intersection operates relatively freely, with minor congestion encountered at the turning movements. The average queue lengths and delays are acceptable and no severe delays were observed on site. The geometric layout and the LOS schematics are shown below in **Table 4**.



Intersection of uShukela Drive and R102

AM Peak – LOS Schematic

PM Peak – LOS Schematic

Table 4: R102 and uShukela Drive Intersection, Existing Traffic

In summary, the following pre-existing problems were identified:

- uShukela Drive is running close to capacity at a LOS E.
- The single carriageway section of the R102, south of Tongaat, is running close to capacity at a LOS E
- The west to south right turn movement at the N2 interchange eastern intersection is running close to capacity at a LOS E.
- The intersection of uShukela Drive and High Street is running close to capacity with three right turn movements operating at a LOS E in the peak hours.

3.8 Existing Pedestrian Activity

No pedestrian activity was observed on the section of uShukela Drive in the immediate vicinity of the study area due to its rural nature. As uShukela Drive proceeds into the Tongaat CBD, there is a notable increase in pedestrian activity, especially on the section of uShukela Drive from High Street to the R102. However, pedestrians are adequately catered for in this section as sidewalks are present along both sides of the road. Designated pedestrian crossing areas are provided at all the signalised intersections. As such, pedestrians pose no obvious threat to motorists unless they blatantly disobey the rules of the road.

3.9 Road Safety

The road safety conditions on the surrounding road network are deemed to be acceptable within the study area. Relatively high volumes of traffic pass through the Tongaat CBD with a combination of pedestrian and public transport activity along uShukela Drive and the R102. Minibus taxis park along both sides of the road in the Tongaat CBD, often double parking which affects both the capacity and road safety in terms of sight distance. However this problem can be easily resolved through better law enforcement in the area. Traffic generally travels at acceptable speeds on the surrounding road network. Sight distance conditions on the road network within the study area are acceptable. No major adverse road safety conditions were observed on the road network surrounding the study area.

4. The uShukela Precinct Development Proposal

4.1 The Development Proposals

The proposed uShukela Precinct Development is a multi-phased “greenfields” development. In Phase One, the uShukela Precinct will be developed as eight distinct sub-precincts, while a further two sub-precincts will be developed in Phase Two – see **Figure 3. Table 5** and **Table 6** show the land use types that will be developed in each sub-precinct, along with the respective bulk areas and floor areas of each land use type.

It is envisaged that by 2017 the proposed uShukela Development will be 10% complete and by 2022 the development will attain 40% of its developmental potential. It is envisaged that by 2027, the uShukela Development will be 100% complete. In addition, the Dube Tradeport (DTP) located to the south of the uShukela Development is currently planning to expand the area of their tradezone to 120 000m². It is envisaged that by 2017 the expansion of the tradezone will be complete and fully operational. The traffic generated from the DTP expansion will share the same road network as the traffic generated from the uShukela Development. Therefore, the traffic generated from the proposed DTP expansion will be considered in the analysis of future scenarios in this study. For further information on the DTP expansion, reference should be made to the traffic study completed by TECHSO, 2011.

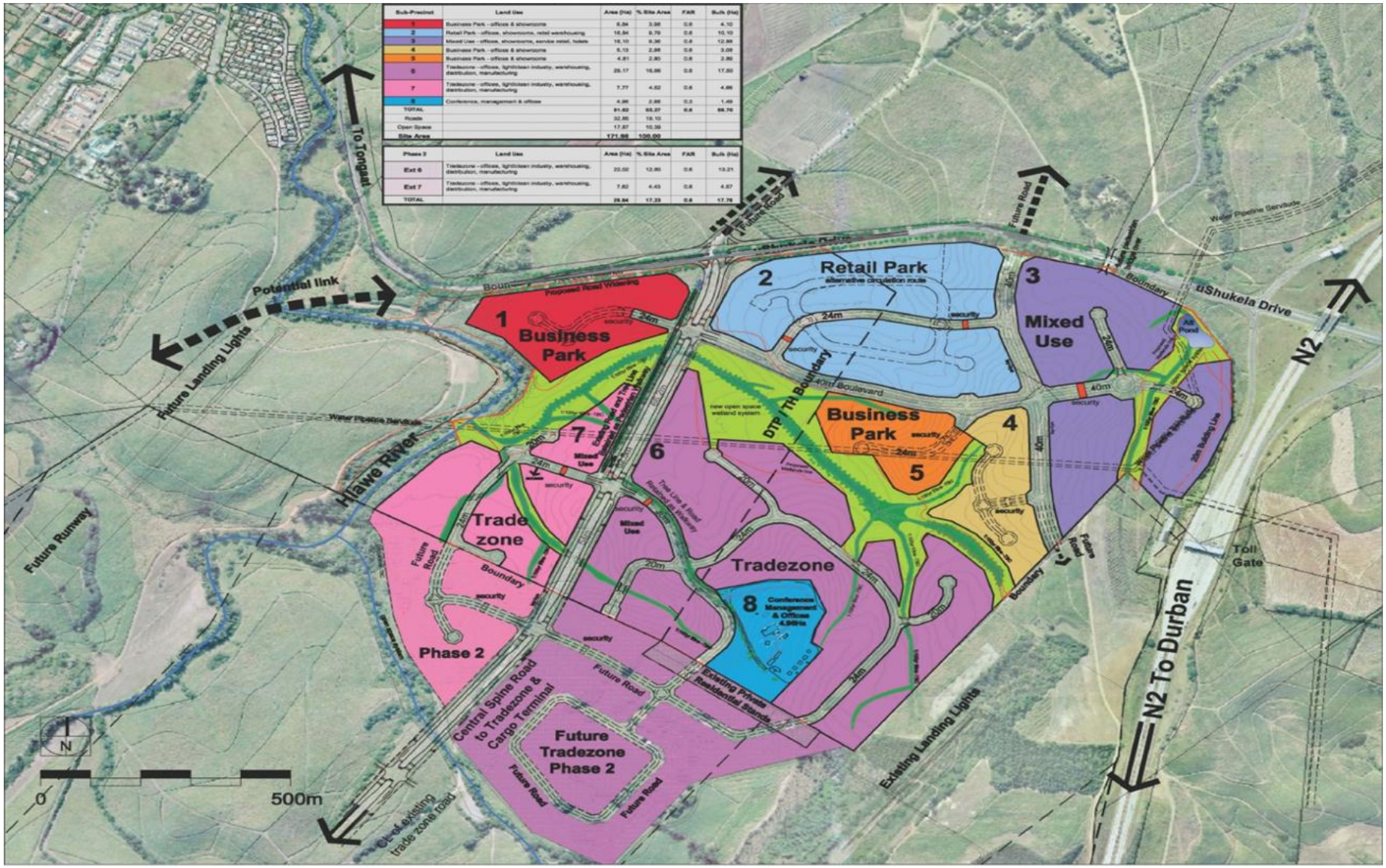


Figure 3: Land Use Plan

PHASE ONE							
Sub Precinct	**Land Use**	**Platform Area (m^2)**	**FAR**	**Bulk Area m^2**	**Land Use-Type**	**Land Use Split**	**Area (m^2)**
1	**Tradezone**	**60,729**	**0.6**	**36,437**	Offices	0.05	1,822
					Light Industry	0.25	9,109
					Warehousing	0.25	9,109
					Distribution	0.25	9,109
					Manufacturing	0.2	7,287
2	**Tradezone**	**163,646**	**0.6**	**98,188**	Offices	0.05	4,909
					Light Industry	0.25	24,547
					Warehousing	0.25	24,547
					Distribution	0.25	24,547
					Manufacturing	0.2	19,638
3	**Tradezone**	**140,909**	**0.6**	**84,545**	Offices	0.05	4,227
					Light Industry	0.25	21,136
					Warehousing	0.25	21,136
					Distribution	0.25	21,136
					Manufacturing	0.2	16,909
4	**Tradezone**	**29,154**	**0.6**	**17,492**	Offices	0.05	875
					Light Industry	0.25	4,373
					Warehousing	0.25	4,373
					Distribution	0.25	4,373
					Manufacturing	0.2	3,498
5	**Tradezone**	**39,677**	**0.6**	**23,806**	Offices	0.05	1,190
					Light Industry	0.25	5,952
					Warehousing	0.25	5,952
					Distribution	0.25	5,952
					Manufacturing	0.2	4,761
6	**Tradezone**	**173,730**	**0.6**	**104,238**	Offices	0.05	5,212
					Light Industry	0.25	26,060
					Warehousing	0.25	26,060
					Distribution	0.25	26,060
					Manufacturing	0.2	20,848
7	**Tradezone**	**87,894**	**0.6**	**52,736**	Offices	0.05	2,637
					Light Industry	0.25	13,184
					Warehousing	0.25	13,184
					Distribution	0.25	13,184
					Manufacturing	0.2	10,547
8	**Conference Mgt**	**4.8**	**0.3**	**14,400**	Conference	0.5	7,200
					Offices	0.5	7,200

Table 5: Phase One – Land Use Areas (amended)

PHASE TWO							
Sub Precinct	**Land Use**	**Gross Area (ha)**	**FAR**	**Bulk Area m²**	**Land Use Type**	**Land Use Split**	**Area (m²)**
EXT 6	**Tradezone**	**22.02**	**0.6**	**132 120**	Offices	0.05	6 606
					Light Industry	0.25	33 030
					Warehousing	0.25	33 030
					Distribution	0.25	33 030
					Manufacturing	0.2	26 424
EXT 7	**Tradezone**	**7.62**	**0.6**	**45 720**	Offices	0.05	2 286
					Light Industry	0.25	11 430
					Warehousing	0.25	11 430
					Distribution	0.25	11 430
					Manufacturing	0.2	9 144

Table 6: Phase Two – Land Use Areas

4.2 Access Proposals

Initially, there were two proposed accesses to the uShukela Development, both of which were located along uShukela Drive. The primary access will be at the intersection of the proposed spine road through the uShukela Development and uShukela Drive. This primary intersection will be located approximately 1,28 km from the N2 interchange.

The secondary access was intended to be located along uShukela Drive as well, approximately 600m from the N2 interchange. However, this second access off uShukela Drive was rejected by the KZN DOT who contended that uShukela Drive was classified as a mobility route hence the Department would therefore only grant one access intersection off it.

Subsequently, the TECHSO report "Traffic Impact Study for Rezoning within the Dube Tradeport" of June 2012, indicated that in the longer term, the primary access intersection would have to be upgraded to an interchange and this would therefore preclude the existence of a second intersection along this stretch of road.

As it is generally acknowledged that the magnitude of the uShukela Development is too large to have only one access intersection, numerous alternative access positions were considered. It was decided that a new access off the R102, south of Tongaat, would be introduced and tested.

The new access road will come off the R102 approximately 2.7 km south of the existing R102 / uShukela Drive intersection and it will follow the existing alignment of Brake Drive. This new road will traverse towards the Hlawe River where it will across the watercourse by means of a bridge and traverse further east into the uShukela Development.

This revision (4) of the Traffic Study for the proposed uShukela Drive Precinct Development has been prepared in order to document the implications of the new "western" access intersection and new land use proposals.

The required capacity and lane configurations of these proposed accesses will be elaborated on in **Chapter 11**.

5. Traffic Generation

5.1 General Discussion

A critical aspect of any traffic study is to quantify the volume of traffic that will be generated by the proposed development. The trip generation rates for this study were carefully determined using a combination of available data and sound professional judgement.

Trip generation rates were extracted from the Department of Transport Manual RR 92/228 entitled SA Trip Generation Rates. In instances where the SA Generation Rates Manual did not provide a rate for a particular land use type, then rates were extracted from the American ITE Manual.

The units of measure for the rates obtained from both the above mentioned sources are given as the number of private vehicle trips per unit of area. However, for this particular study, it was deemed prudent to convert the generated volume of private vehicle trips into an equivalent number of person trips due to the high public transport utilisation that is envisaged for the proposed development.

The equivalent volume of person trips was calculated by multiplying the volume of private vehicle trips by a vehicle occupancy rate. The vehicle occupancy rates used in this study for each land use type are tabulated in **Table 7**. The vehicle occupancy assumed for a mini bus taxi was 20 occupants per vehicle and 60 occupants was used per bus. The product yielded was in turn multiplied by an Equivalent Vehicle Unit (evu) factor of 1,33 and 3,0 for mini bus taxis and buses respectively to convert these passenger trip volumes back to private vehicle trip volumes. The evu factor can be essentially defined as the impact that a particular vehicle type has on traffic variables (such as headway, speed, size, density) compared to a single passenger car.

Land Use Type	Occupants Per Car	Occupants Per Mini Bus Taxi	Occupants Per Bus
Offices	1.45	20	60
Light Industry	1.79	20	60
Warehousing	1.66	20	60
Distribution	1.66	20	60
Manufacturing	1.79	20	60
Conference	1.80	20	60

Table 7: Vehicle Occupancy Rates

5.2 Modal Split

The advantage of working with person trips rather than private vehicle trips is to quantify the required public transport component to/from the uShukela Development and, if necessary, to permit meaningful testing of different modal splits. In this regard, it is proposed to test the modal split strategy that is shown in **Table 8**. Strategies for subsequent phases will be guided by the results of the initial test.

Land Use Type	Mini Bus Taxis %	Buses %	Private Cars %
Offices	10	10	80
Light Industry	25	25	50
Warehousing	30	30	40
Distribution	30	30	40
Manufacturing	30	30	40
Conference	2,5	2,5	95

Table 8: Vehicle Modal Split

5.3 Trip Generation

A series of comprehensive spreadsheets, which encapsulate the previous discussions from **Sections 5.1** and **5.2**, were developed to calculate the total volume of traffic that will be generated by the proposed uShukela Development during the AM and PM peak hours. Summaries of these spreadsheets are shown in **Tables 9 to 11**.

Table 9 shows the total peak hour traffic that will be generated by the proposed development when it attains full completion. A total of 3 112 private vehicle trips per hour will be generated by the proposed uShukela Development in the AM and PM peak hours. During the AM peak hour 2 263 veh/h will enter the development while 849 veh/h will exit the development when the development attains 100% completion as shown in **Table 9**. The converse of these volumes holds true for the PM peak hour.

	AM Peak Hour			PM Peak Hour		
	Peak Total 2-way	In	Out	Peak Total 2-way	In	Out
Phase 1	2250	1649	602	2250	602	1649
Phase 2	862	614	248	862	248	614
Total	**3112**	**2263**	**849**	**3112**	**849**	**2263**

Table 9: Generated Traffic Volumes at 100% Completion

Given the magnitude, the proposed development will only be 10% complete by 2017 and 40% complete by 2022. **Tables 11** and **12**, show the peak hour traffic volumes that will be generated by the proposed development in 2017 and 2022 respectively (Phase 1 only). By 2017, the proposed development will generate 225 veh/h in the AM and PM peak hours. Table 12 shows that by 2022 the proposed development will generate 900 veh/h during the AM and PM hours.

AM Peak Hour			PM Peak Hour		
Peak Total 2 way	**In**	**Out**	**Peak Total 2 way**	**In**	**Out**
225	165	60	225	60	165

Table 10: Generated Traffic Volumes at 10% Completion

AM Peak Hour			PM Peak Hour		
Peak Total 2 way	**In**	**Out**	**Peak Total 2 way**	**In**	**Out**
900	659	241	900	241	659

Table 11: Generated Traffic Volumes at 40% Completion

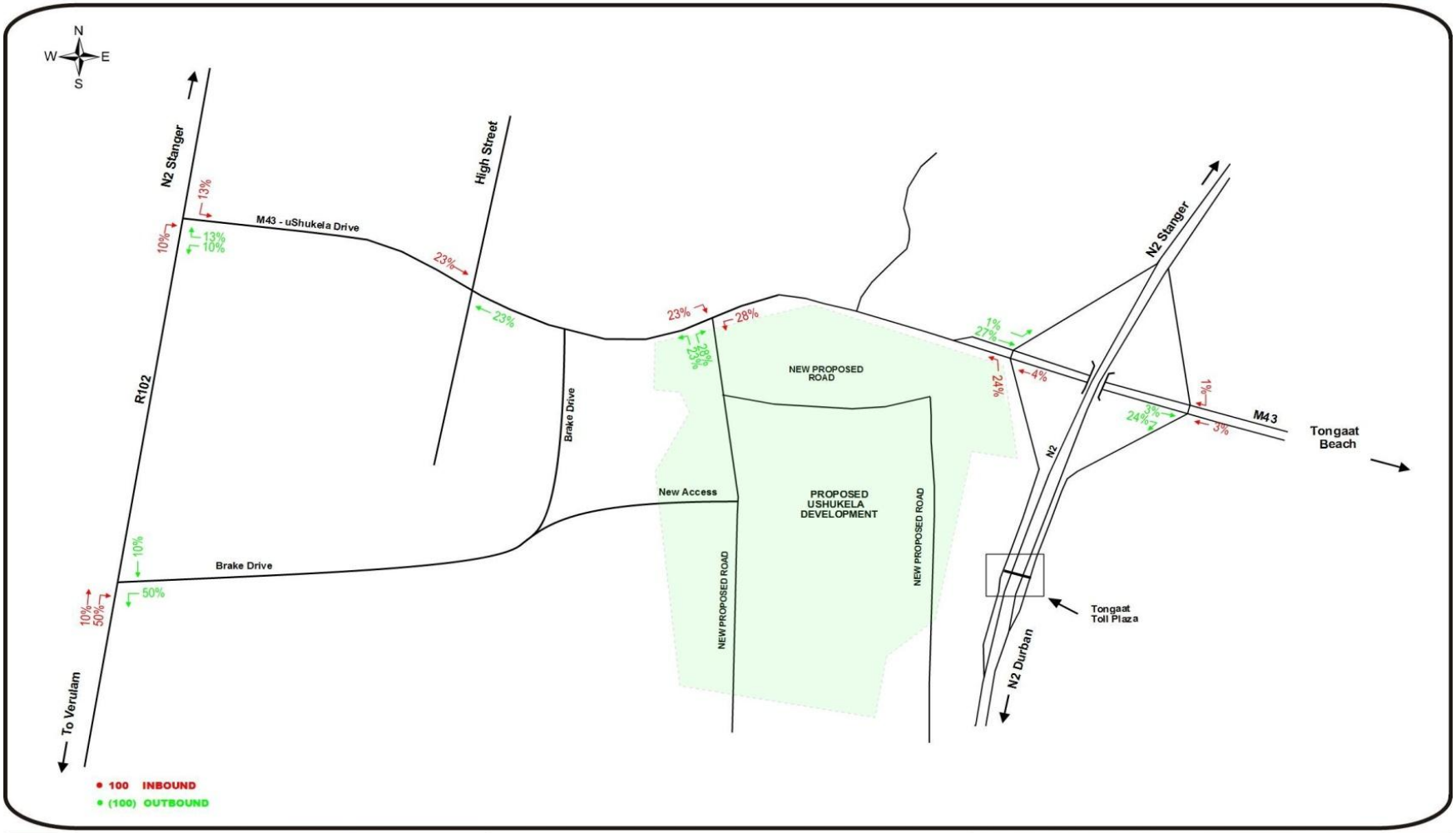
6. Trip Distribution and Assignment

The volume of traffic generated by the proposed development was distributed and assigned onto the surrounding road network to analyse the impact of the generated traffic on the surrounding road links and intersections. There are several trip distribution models that could possibly be used in a traffic impact study of this nature. A Gravity Model was selected for this study as it is based on the simple principle that the attractiveness of a development is positively influenced by the size thereof and conversely reduced by the travel impedance to the development.

The trip distribution that was developed and used for previous versions of this study (2 accesses off uShukela Drive) was modified locally to allow for the new point of access at Brake Drive and is as shown on **Figure 4**.

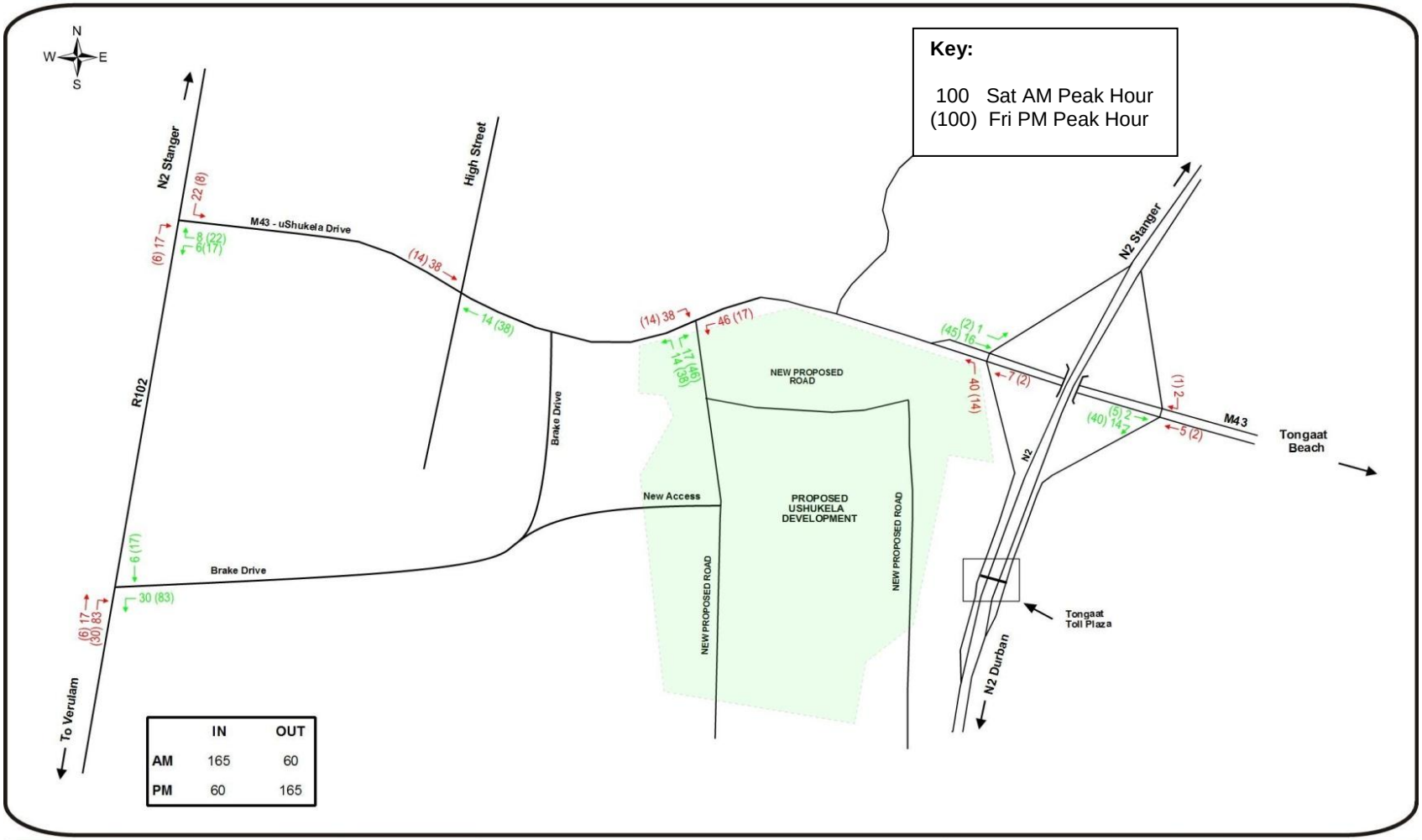
As previously mentioned, by 2017 the uShukela Development will be 10% complete. The volume of traffic generated by the uShukela Development by 2017 is shown in **Figure 5**.

The TECHSO study for the expansion of the Dube Tradeport suggested that by 2016 the expansion of the tradezone will be fully complete and operational. The traffic generated from the DTP expansion is included in the analysis of the surrounding road network in this study. The DTP generated traffic volumes, as shown in **Figure 6**, were distributed according to the trip distribution developed for the uShukela Study.



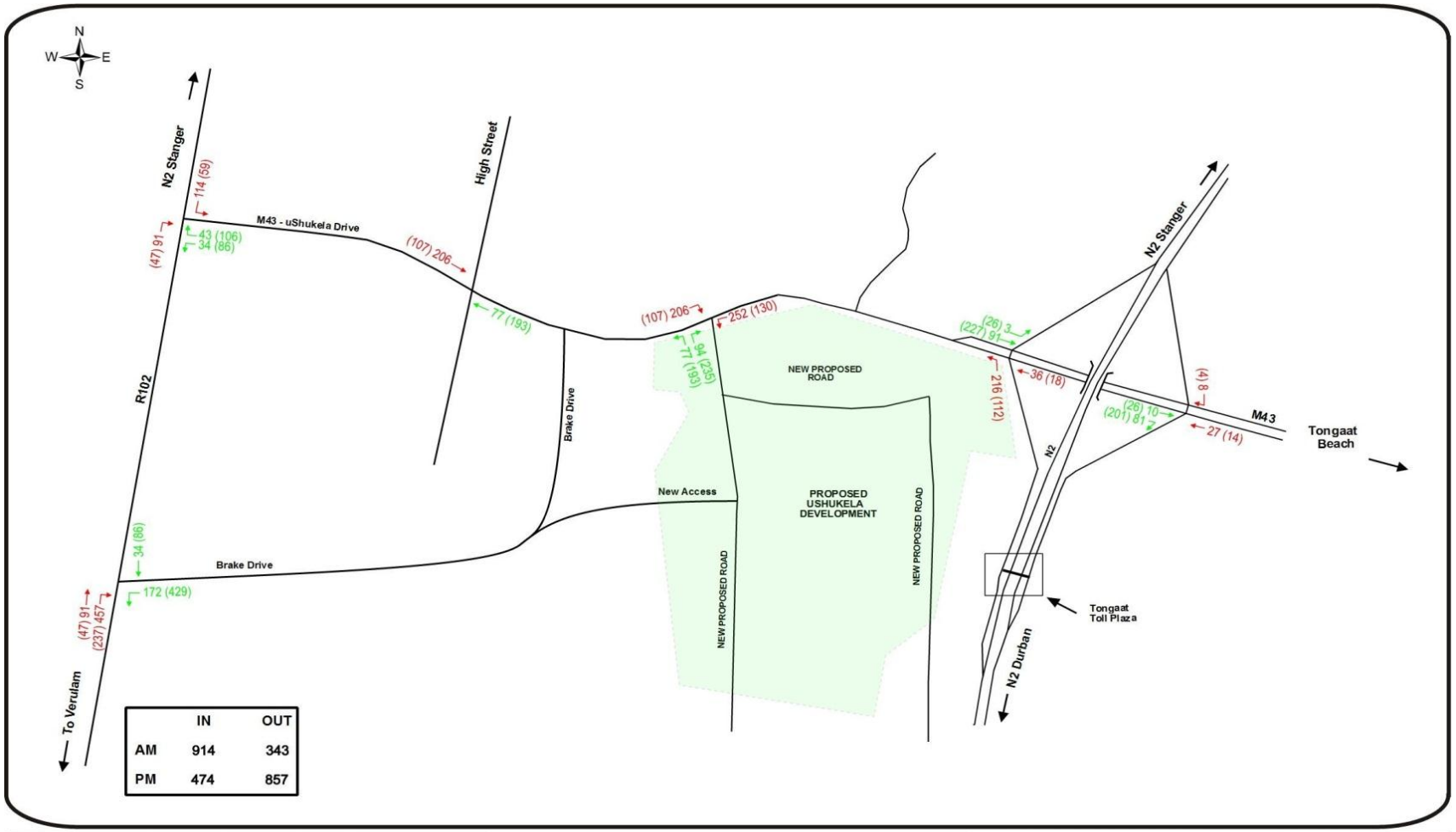
aurecon Leading. Vibrant. Global.	TRIP DISTRIBUTION (GRAVITY MODEL)	PROJECT: 106521
	Proposed uShukela Drive Precinct Development in the Tongaat Area	FIGURE: 4
November 2012	AURECON (PTY) LTD	SCALE: Not to Scale

Figure 4: Trip Distribution (Gravity Model)



aurecon Leading. Vibrant. Global.	USHUKELA GENERATED AM & PM PEAK HOUR TRAFFIC VOLUMES IN 2017 (10% COMPLETION) Proposed uShukela Drive Precinct Development in the Tongaat Area	PROJECT: 106521 FIGURE: 5
November 2012	AURECON (PTY) LTD	SCALE: Not to Scale

Figure 5: Development Generated AM and PM Peak Hour Volumes in 2017



aurecon Leading. Vibrant. Global.	DTP DEVELOPMENT GENERATED AM & PM PEAK HOUR TRAFFIC VOLUMES IN 2016 (AURECON DISTRIBUTION) Proposed uShukela Drive Precinct Development in the Tongaat Area	PROJECT: 106521 FIGURE: 6
November 2012	AURECON (PTY) LTD	SCALE: Not to Scale

Figure 6: DTP Development Generated AM and PM Peak Hour Volumes for 2016 (onwards)

7. Five Year Forecast plus Development Generated Traffic

The South African guidelines on Traffic Impact Studies recommend that for developments that generate more than 2 000 vehicle trips in the peak hour, an analysis of the 10 year horizon is required. The proposed uShukela Development will generate far more than 2 000 vehicle trips in the peak hour and hence only requires an analysis of a 10 year horizon. However, due to the sensitivity of the study area as a result of the new airport and other surrounding developments, it was considered prudent to analyse the 5 year horizon as well. A compound growth rate of 5% was used to forecast the background traffic volumes. This growth rate was deemed to be acceptable for this study due to the close proximity of the King Shaka Airport and the Dube Tradeport to the proposed development. The 5 year forecast on the existing traffic volumes is shown on **Figure 7**. The combined 5 year forecasted traffic volumes plus development-generated traffic volumes are shown on **Figure 8**. The results of the analyses of these combined traffic volumes are discussed in this Chapter.

7.1 uShukela Drive

The base year analysis has shown that uShukela Drive is currently operating at a level of service E in both the AM and PM peak hours. An analysis of the 5 year forecasted background traffic volumes reveals that uShukela Drive will convey 1 642 veh/h two way in the AM peak hour and 1 521 veh/h in the PM peak hour two way traffic. This means that uShukela Drive will experience severe congestion before any development-generated traffic is added onto the road network. This roadway will operate at a LOS E during the peak hours purely as a result of the natural growth in the existing traffic volumes. Once the development generated traffic volumes are considered, uShukela Drive will operate at a LOS F.

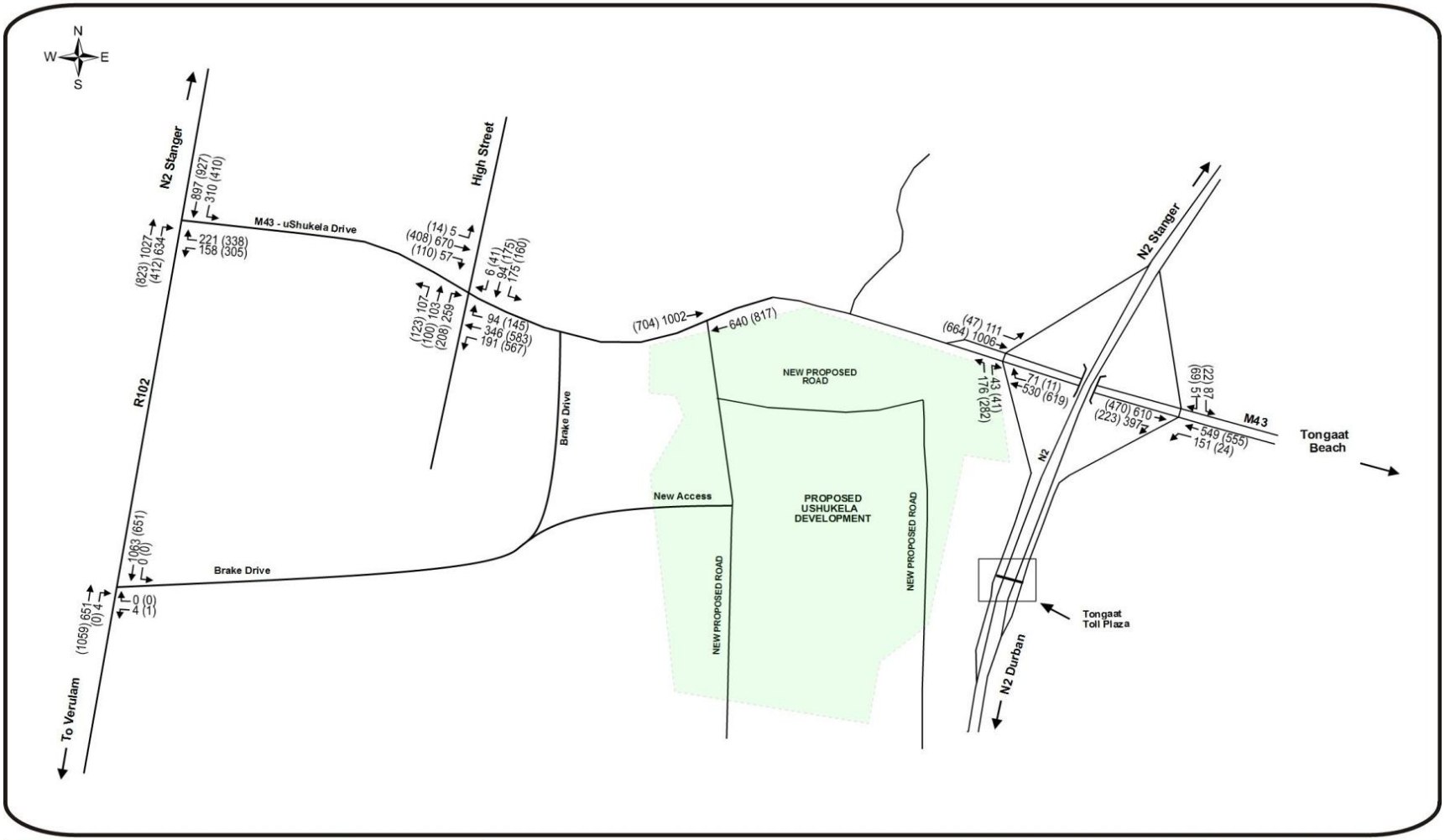
This section of uShukela Drive will unquestionably require a capacity improvement within a five year horizon by upgrading it to a dual carriageway.

7.2 R102

An analysis of the dual carriageway section of the R102 revealed that this section of road will operate at an acceptable level of service in the 5 year horizon. The analysis of the single carriageway section of the R102, south of Tongaat, revealed that this section of the R102 will operate at a LOS F in the 5 year horizon purely as a result of the natural growth in traffic volumes.

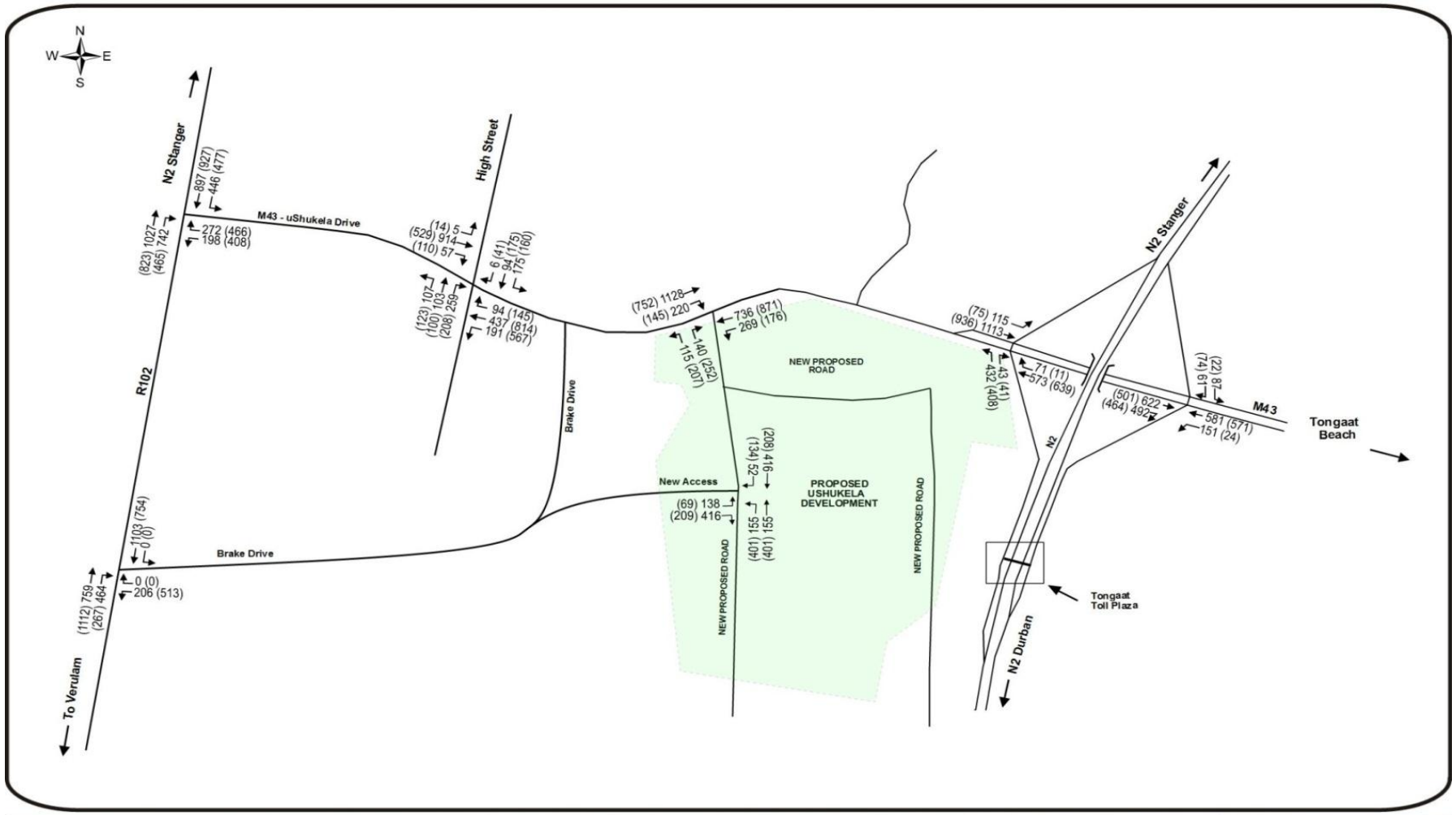
The single carriageway section of the R102 will not cope with forecasted traffic volumes within the 5 year horizon period and will have to be upgraded to a dual carriageway.

All further analyses of these sections of road will be based on the premise that they will have been upgraded to dual carriageways.



aurecon Leading. Vibrant. Global.	5 YEAR FORECAST ON THE EXISTING TRAFFIC VOLUMES IN 2017 Proposed uShukela Drive Precinct Development in the Tongaat Area	PROJECT: 106521 FIGURE: 7
November 2012	AURECON (PTY) LTD	SCALE: Not to Scale

Figure 7: Five Year Forecast on Existing Volumes

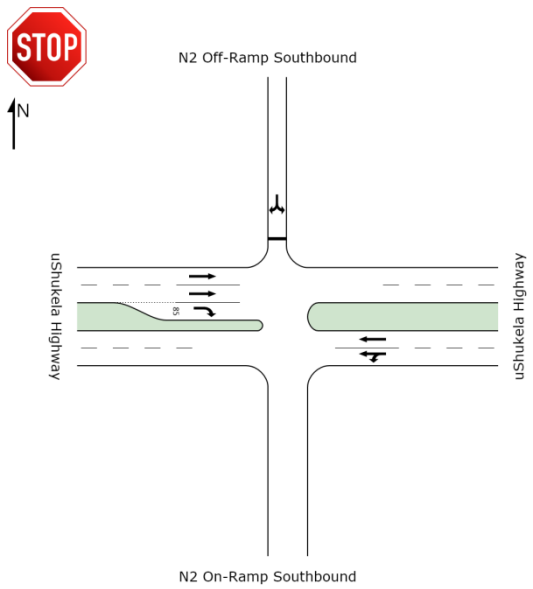


aurecon Leading. Vibrant. Global.	5 YEAR FORECAST PLUS DEVELOPMENT GENERATED TRAFFIC (10%) PLUS DTP GENERATED TRAFFIC VOLUMES (100%) 2017 Proposed uShukela Drive Precinct Development in the Tongaat Area	PROJECT: 106521
		FIGURE: 8
November 2012	AURECON (PTY) LTD	SCALE: Not to Scale

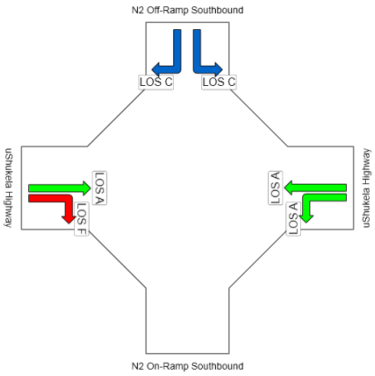
Figure 8: Five Year Forecast plus Development Generated Traffic plus DTP Generated Traffic Volumes in 2017

7.3 N2 Interchange – Eastern Intersection

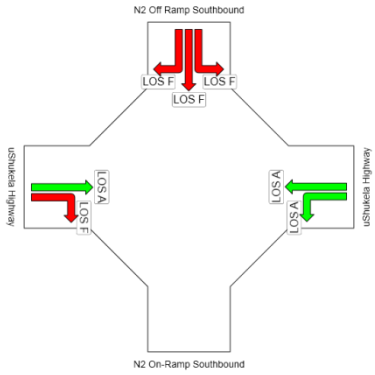
The SIDRA analysis of the combined traffic volumes revealed that severe congestion (LOS F) will be encountered at this intersection during both the peak hours particularly on the northern approach. The through traffic on uShukela Drive will operate fairly efficiently. The westbound traffic turning left onto the southbound on-ramp will operate freely. The LOS schematics are shown in **Table 18**. The average delays will be 23.5 and 236.1 seconds for the AM and PM peak hours respectively. The average queue lengths will be 225.6 and 1572.1 metres for the AM and PM peak hours respectively. This intersection will require upgrading in the base year.



Eastern Intersection Geometric Layout



AM Peak – LOS Schematic



PM Peak – LOS Schematic

Table 12: N2 Interchange Eastern Intersection, Five Year Forecast plus Generated Traffic

Upgrade of N2 Interchange – Eastern Intersection

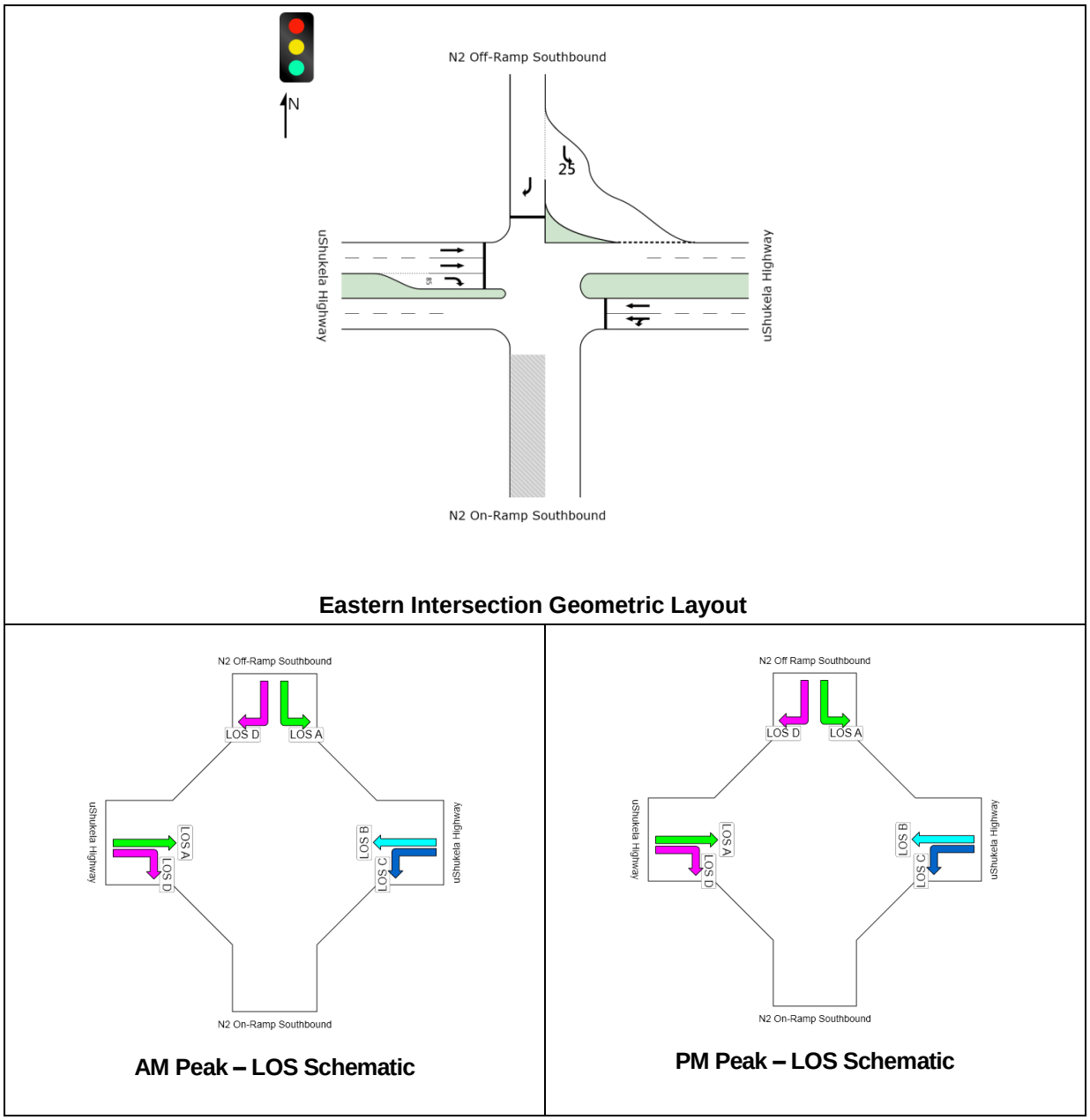
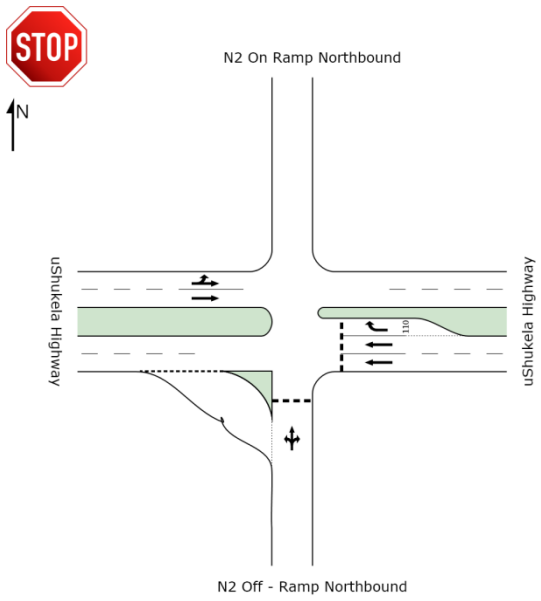


Table 13: Upgraded N2 Interchange Eastern Intersection, Five Year Forecast plus Generated Traffic

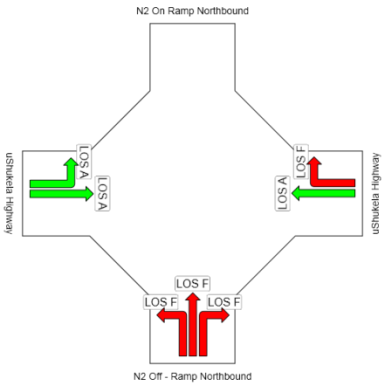
This intersection must be upgraded from a stop controlled intersection to a signalised intersection to improve the overall efficiency of this intersection. Furthermore, a 25m left slip lane must be added to the northern approach. The SIDRA analysis of the improved geometric configuration exhibit enhanced levels of service at this intersection during both the peak hours as shown above. The average delays will be 18.5 and 31.4 seconds for the AM and PM peak hours respectively. The average queue lengths will be 145.3 and 187.5 metres for the AM and PM peak hours respectively.

7.4 N2 Interchange – Western Intersection

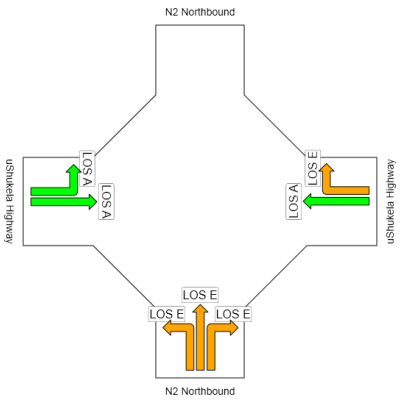
The SIDRA analysis of the combined traffic volumes at the western intersection of the N2 interchange revealed that this intersection will encounter immense levels of congestion (LOS F) particularly on the southern approach (off-ramp). The average delays will be 29.2 and 9.6 seconds for the AM and PM peak hours respectively. The average queue lengths will be 152 and 86.5 metres for the AM and PM peak hours respectively. This intersection will require upgrading in the 5 year horizon. The LOS schematics are shown in **Table 14**.



Western Intersection Geometric Layout



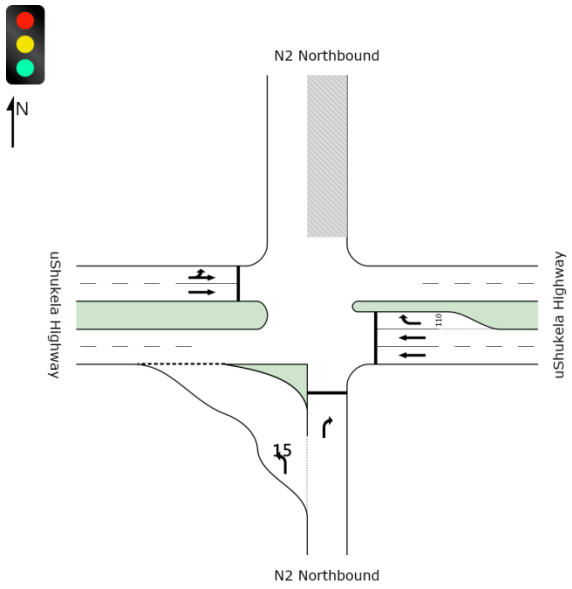
AM Peak – LOS Schematic



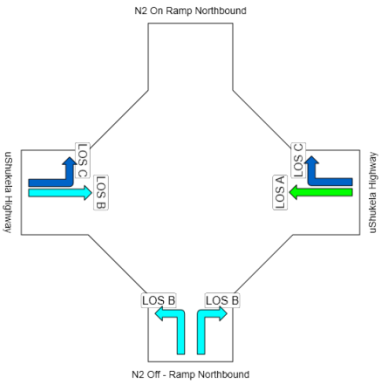
PM Peak – LOS Schematic

Table 14: N2 Interchange – Western Intersection, Five Year Forecast plus Generated Traffic

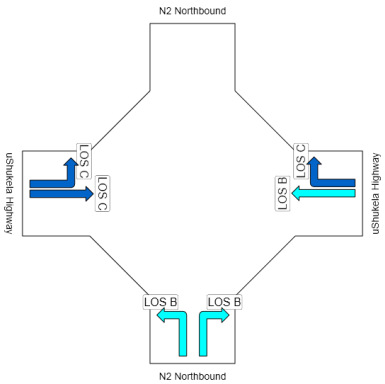
Upgrade of N2 Interchange – Western Intersection



Western Intersection Geometric Layout



AM Peak – LOS Schematic



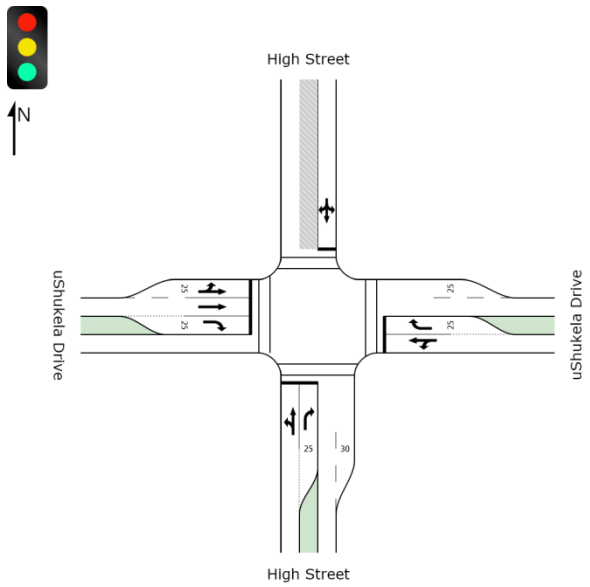
PM Peak – LOS Schematic

Table 15: N2 Interchange – Western Intersection, Five Year Forecast plus Generated Traffic

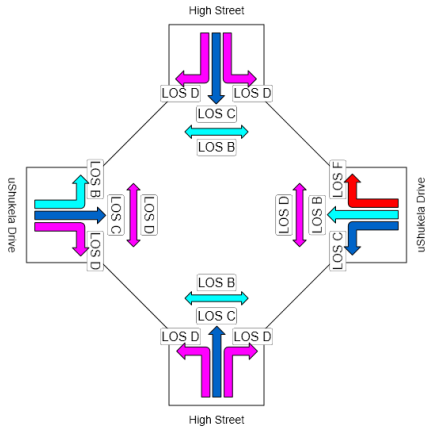
This intersection must be upgraded to a signalised intersection in the five year horizon. In addition, a left slip lane must add onto the southern approach. The results of the SIDRA analysis shown in Table 20 show that the improvements proposed for this intersection will improve the overall efficacy of this intersection. The average delays will be 16.1 and 17.4 seconds for the AM and PM peak hours respectively. The average queue lengths will be 93.7 and 78.9 metres for the AM and PM peak hours respectively.

7.5 uShukela Drive and High Street Intersection

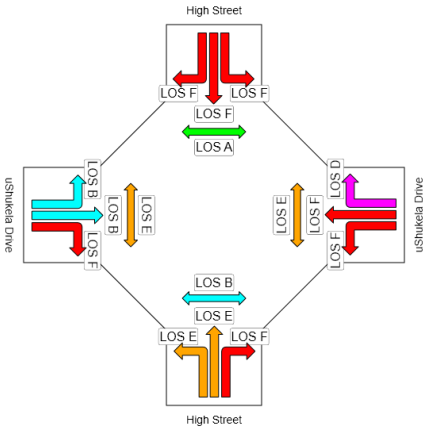
Table 16 shows that the uShukela Drive and High Street intersection will experience unacceptable levels of congestion (LOS F) on all the approaches during the PM peak hour. . The average delays will be 30.8 and 182.2 seconds for the AM and PM peak hours respectively. The average queue lengths will be 290.5 and 1800.4 metres for the AM and PM peak hours respectively. As such, this intersection will require capacity upgrades in the 5 year horizon.



Intersection of uShukela Drive and High Street



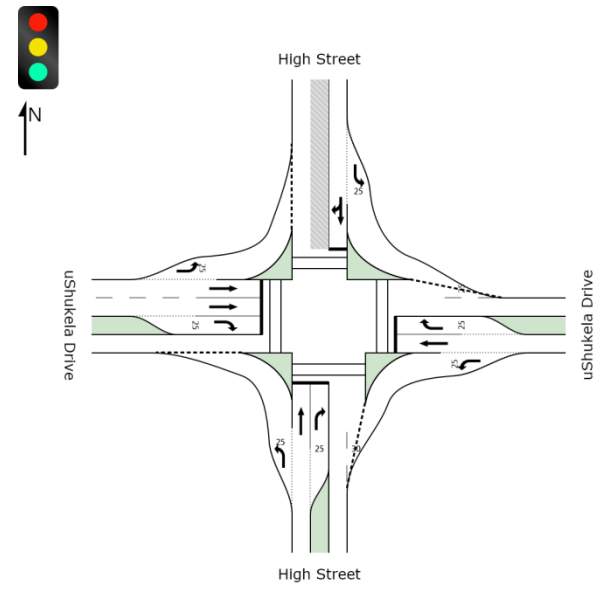
AM Peak – LOS Schematic



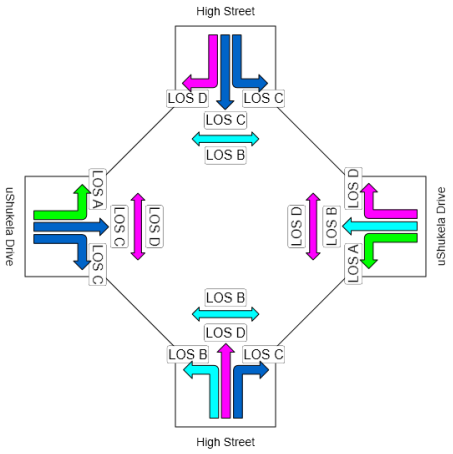
PM Peak – LOS Schematic

Table 16: High Street and uShukela Drive, Five Year Forecast plus Generated Traffic

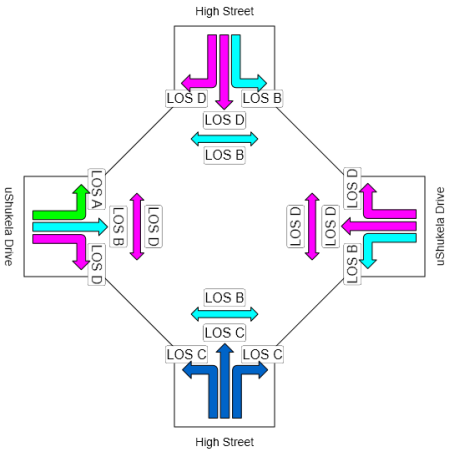
Upgrade of uShukela Drive and High Street Intersection



Intersection of uShukela Drive and High Street



AM Peak – LOS Schematic



PM Peak – LOS Schematic

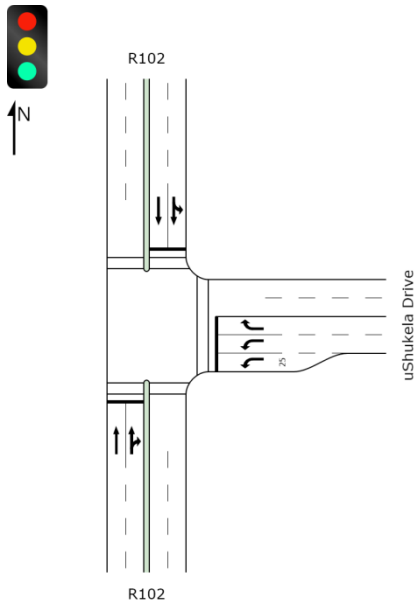
Table 17: Upgrade High Street and uShukela Drive, Five Year Forecast plus Generated Traffic

The SIDRA analysis shown in **Table 17**, reveals that once this intersection is upgraded to the geometric configuration shown above it will operate at acceptable levels of service during both the peak hours. The average delays will be 25.8 and 32 seconds for the AM and PM peak hours respectively. The average queue lengths will be 238.6 and 379.3 metres for the AM and PM peak hours respectively.

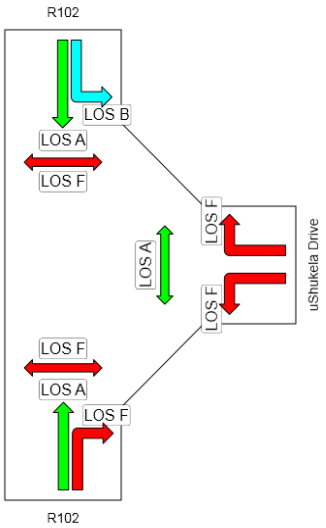
7.6 uShukela Drive and R102 Intersection

The SIDRA analysis of the uShukela Drive and R102 intersection show that serious congestion (LOS F) will be encountered on the southern and western approaches as shown

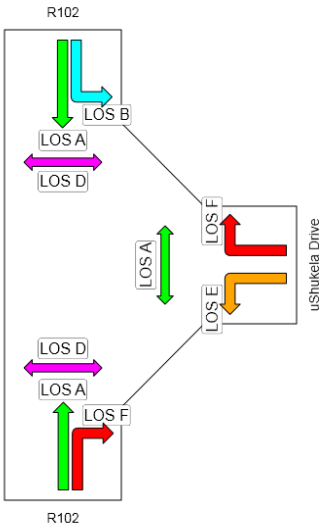
in **Table 18**. The average delays will be 179.7 and 233.5 seconds for the AM and PM peak hours respectively. The average queue lengths will be 1608.8 and 1116 metres for the AM and PM peak hours respectively. As such, upgrades will be required in the 5 year horizon.



Intersection of uShukela Drive and R102



AM Peak – LOS Schematic



PM Peak – LOS Schematic

Table 18: R102 and uShukela Drive Intersection, Five Year Forecast plus Generated