



## Engineering Services Report

# CORNUBIA PHASE 2

February 2015

REF: DR2014/37- REV 2



Project Name:	CORNUBIA PHASE 2
Project Number:	DH0003
Report Number:	DR2014/37
Report for:	TONGAAT HULETT DEVELOPMENTS (THD)

REVISIONS

Revision #	Date	Change Overview	Prepared by	Reviewed by
0	JULY 2014	REVISION 0	R. MOODLEY	E VILJOEN
1	NOVEMBER 2014	REVISION 1	G. CUNNINGHAM	E VILJOEN
2	FEBRUARY 2015	REVISION 2	A. GILLESPIE	E VILJOEN

ISSUE REGISTER

Distribution List	Date Issued	Number of Copies

Signed:  \_\_\_\_\_

Date: 20/02/15

SMEC COMPANY DETAILS

<b>SMEC South Africa</b>
<b>2 The Crescent, West Way Office Park, Westville, South Africa 3629</b>

Tel: +27 (31) 277 6600

Fax: +27 (31) 277 6700

Email: [durban@smec.com](mailto:durban@smec.com)

[www.smec.com](http://www.smec.com)

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## EXECUTIVE SUMMARY

Cornubia Precinct has been planned as a Mixed Use Phased Development (which covers an area of approximately 1300ha) and includes a “Breaking New Ground Housing Initiative” by Tongaat Hulett Developments (Pty) Ltd in association with eThekweni Municipality.

This report covers an investigation regarding the availability and capacity of existing municipal infrastructure to meet the demands of the Cornubia Precinct Phase 2 (approximately 907ha).

The total water ADD for Phase 2 is approximately 30.12 Mℓ/day and will be supplied from the future Blackburn Reservoir. Blackburn Reservoir will be supplied by the augmented Northern Aqueduct which is currently under construction and will be completed by 2016. Ultimately the Northern Aqueduct will be supplied by the proposed Western Aqueduct, scheduled for completion by 2021. The first phase of construction of the Blackburn Reservoir will commence in 2015 and is expected to be complete by 2016. The reservoir will be constructed in a phased manner to meet future demands.

The total sewer ADF for Phase 2 is 30.05 Mℓ/day. Sewer effluent from the northern catchments will either gravitate or be pumped to the new Ohlanga gravity trunk sewer to be treated at the Phoenix WWTW. Sewer effluent from the Southern Catchment will gravitate to the Eastbury gravity trunk sewer to be treated at the Kwa-Mashu WWTW. The Phoenix WWTW has reached capacity and Kwa-Mashu WWTW has limited capacity. EThekweni Water and Sanitation (EWS) has confirmed current upgrades to the Phoenix WWTW to a capacity of 50 Mℓ/day by 2016 and an upgrade to the Kwa-Mashu WWTW to a capacity of 75 Mℓ/day by 2015. There is suitable bulk sewer infrastructure planning in place to ensure sewer from Phase 2 is adequately dealt with.

The planned framework roads include the extension of Blackburn Link to the Blackburn Interchange at the N2, extension of Cornubia Boulevard connecting into URTC and construction of Dube West and Dube East from the M41 to north of the Ohlanga River. Planned interchanges include Flanders Drive/M41 Highway, the Blackburn Interchange and the Northern Drive Interchange. A separate Traffic Impact Assessment Report has been prepared by Hatch GOBA addressing the traffic volumes generated in Phase 2.

Notable is the realignment of Cornubia Boulevard approved by Ethekeweni Roads Provision.

A Stormwater Management Plan has been prepared for the Phase 2 development. Adequate stormwater control measures are proposed and will be implemented.

An Urban Irrigation Plan has been prepared for Phase 1 & 2 of the Cornubia Development. Refer Report No DR2015/03, Concept Design Report: Cornubia Urban Irrigation.

## **NOTE**

Certain information gleaned from the following sources has been used in the compilation of this report –

- Bulk Services Planning Report for future developments in the Northern Region, Report No. DR2014/07 compiled by SMEC in April 2014.
- Cornubia Phase 1 Engineering Services Report Revision 3, Report No. 2009/17 compiled by SMEC in February 2011.
- Tongaat Hulett Development – Cornubia Phase 2 Traffic Impact Assessment, Document No. 122391 compiled by Hatch Goba in January 2014.
- Stormwater Management Plan – Cornubia Phase 2, Report No. DR2013/19 compiled by SMEC in July 2013.
- Investigations of the sewer options proposed to cater for the Retail Park Development with the Cornubia Precinct, Report No. DR2014/29 compiled by SMEC in June 2014
- Proposed Bulk Water and Sewer Infrastructure Planning Report Revision 1, Report No. DR2010/12 compiled by SMEC in June 2012.
- Cornubia Phase 1B Water Modelling Report, Report No. DR2014/39 compiled by SMEC in June 2014.
- Blackburn Reservoir Modelling Report Revision 3, Project No. D294, compiled by Naidu Consulting in January 2013.
- Attenuation Facilities Within Wetlands Analysis Report – Cornubia Phase 2, Report No. DR2014/70 compiled by SMEC in October 2014.
- Framework Roads Alignment Changes –Cornubia Phase 2, Report No. DR 2013/45 compiled by SMEC in October 2013.
- Concept Design Report: Cornubia Urban Irrigation. Report No DR2015/03, compiled by SMEC in February 2015.
- Investigation of the Sewer Options Proposed to Cater for the ‘Retail Park’ Development within the Cornubia Precinct, Report no. DR2014-29

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## 1. INTRODUCTION

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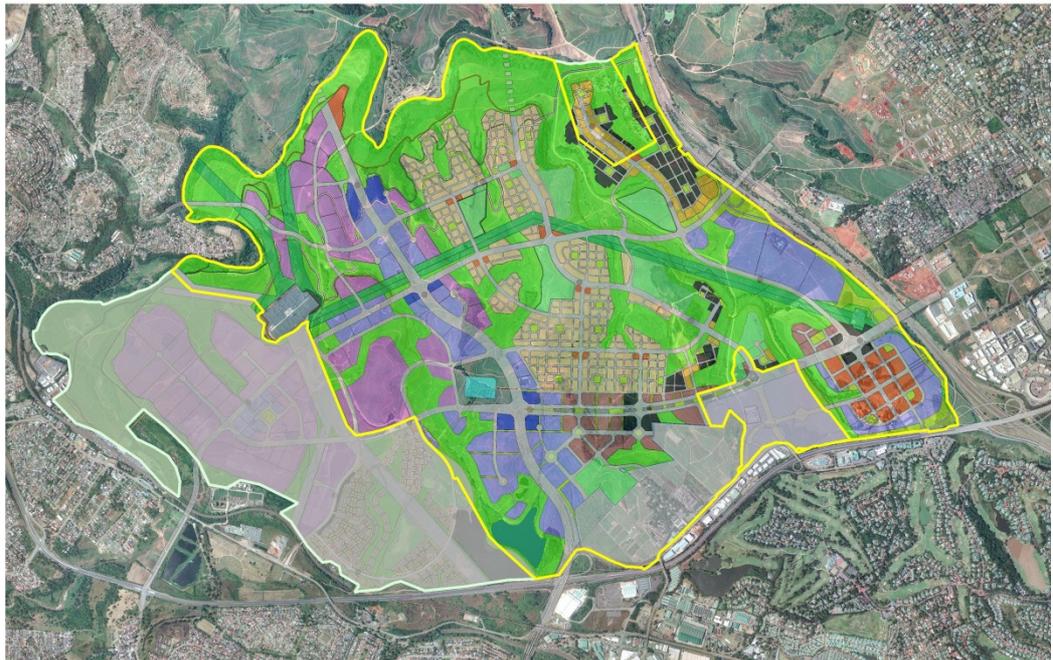
### 1.1 Background

The Cornubia Precinct has been planned as a Mixed Use *Phased* Development and includes a “Breaking New Ground Housing Initiative” by Tongaat Hulett Developments (Pty) Ltd in association with eThekweni Municipality. The purpose of this report is to identify the availability of existing bulk infrastructure for *Phase 2*, and to assess the requirements for additional bulk services.

### 1.2 Location and Extent

The entire Cornubia Precinct encompasses an area of approximately 1300ha, bounded in the East by the N2, generally in the South by the M41 and Flanders Drive and generally in the north by the Ohlanga River.

Phase 2 of the development encompasses an area of approximately 907ha and is bounded in the east by the N2 highway, the R102 in the south, the Ohlanga River in the north and Cornubia Phase 1 in the west.



**Figure 1: Extent of Cornubia Phase 2**



### 1.3 Description of Site

Reference needs to be made to FIGURE 3.

Currently major portions of the site are under sugar cane cultivation which requires the existing myriad network of gravel haul roads which generally follow the contours.

There are several notable features on the site as follows –

- South African Sugar Association (SASA) Headquarters and Experimental Station some 60ha in extent.
- Marshall Dam
- Ottawa Major Substation
- Pockets of natural forest some 31ha in extent
- Electrical Switching Station
- 35,0m wide electrical servitude from the existing switching station in the south east of the site running north and then west towards the Ottawa Substation
- 5,0m wide sewer servitude running from the north east corner of the site in a westerly direction towards the Waterloo pump station
- An existing 600mm diameter raw water supply pipeline which is not in a servitude
- NAA Water pipeline in 12m servitude

### 1.4 Topography

Reference needs to be made to FIGURE 4.

FIGURE 4 shows the slope analysis of the Phase 2 area. As can be seen from the legend on the drawing more than 50% (458ha) of the area is flatter than 1 in 6.

## 2. TERMS OF REFERENCE

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SMEC has been part of the project planning team for this development since 2005. In May 2014, SMEC was requested by Tongaat Hulett Developments (THD) to prepare this Engineering Services Report for Phase 2 of the Development.

### 3. LAND USES

Reference needs to be made to FIGURE 5 and TABLE 1.

A land use layout plan for the Cornubia Precinct was prepared by Iyer Urban Design Studio including two typologies for Cornubia Boulevard as indicated on the Figure 5 inset (Typology subject to eThekweni approval and endorsement). The mix of the various land uses as well as the projected yield of housing units (approximately 22 134) for the Phase 2 development is shown on TABLE 1 - Cornubia Phase 2 LUMS Precinct Plan and Area Schedule.

Refer to FIGURE 2 below for a brief explanation of the relevant land uses: -

**Figure 2: Description of Relevant Land Uses**

LAND USES		DESCRIPTION
	Medium Density Residential - Subsidised Duplex / Simplex Housing (BNG)	Anticipated 3 storey apartments with a projected 80 units per hectare and unit sizes of 50sqm.
	Medium Density Residential - Affordable	Anticipated 3 storey apartments with a projected 218 units per hectare and unit sizes of 55sqm.
	High Density Residential - Affordable	Anticipated 4 storey apartments with a projected 291 units per hectare and unit sizes of 55sqm.
	Mixed Use 1 (Residential Apartments + Retail Base) - 90% / 10% desired split)	Anticipated 4 storeys with a 90%/10% split between residential and Retail. Residential density to be 262 units per hectare with unit sizes of 55sqm.
	Mixed Use 2 (Residential Apartments + Retail Base) - 90% / 10% desired split)	Anticipated 6 storeys with a 90%/10% split between residential and Retail. Residential density to be 360 units per hectare with unit sizes of 60sqm.
	T.O.D 1 zone Mixed Use (With Residential) (90% / 10% desired split)	Anticipated 12 storeys minimum with a 90%/10% split between residential and commercial. Residential density to be 600 units per hectare with unit sizes of 60sqm.
	T.O.D 2 zone Commercial Only (No Residential)	Anticipated 8 storeys minimum with a FAR of 3.0.
	General Business	This zone would include opportunities for retail activities such as business parks, offices, showrooms, retail etc.
	Light Industry	This zone could contain a mixture of logistics, warehousing, light industry as well as opportunities for larger scale retail park activity.
	Social Facilities	This would include schools, clinics, government offices, multi-purpose halls, sports fields, swimming pool, police station, libraries and fire station.
	Community Facility	This would include allowing for hospitals, schools, health centre, children's home, cemetery, old age home and early childhood centre.
	Open Space	Open Space areas encompassing wetlands, buffers and forests.
	Blackburn Reservoir	This is the area set aside for the Proposed 80Mℓ Blackburn Reservoir dedicated to supply water to the Cornubia Precinct.
	Roads	This includes the total area of all the planned road reserves.

## 4. BULK INFRASTRUCTURE

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### 4.1 Water

#### 4.1.1 Proposed Water Demand

Reference needs to be made to TABLE 2 and TABLE 3.

TABLE 2 indicates a total Average Daily Demand ADD for Phase 2 of approximately 30.12 Mℓ/day. TABLE 3 indicates a required reservoir storage capacity of approximately 61 Mℓ and this includes allowance for 3.56 Mℓ fire flow in the additional 24 hour storage capacity.

#### 4.1.2 Proposed Ultimate Bulk Water Infrastructure

Reference needs to be made to FIGURE 6.

Currently there is no existing water infrastructure to serve Phase 2. The ultimate water supply for the entire Cornubia Development will be provided by the proposed Blackburn Reservoir, refer to the Bulk Services Planning Report for future developments in the Northern Region Report No. DR2014/07 compiled by SMEC.

The supply to the Blackburn Reservoir will be provided by the Northern Aqueduct. According to the Blackburn Reservoir Modelling Report Rev 2, Project No. D294/01 prepared by Naidu Consulting, the first phase of the Northern Aqueduct augmentation will increase capacity of the system to supply water from Durban Heights to Phoenix 2, Blackburn, Waterloo and Umhlanga 2 Reservoirs. This augmentation will result in additional capacity of 44 Mℓ/day into the current system. This is due for completion by 2016.

Ultimately in the second phase, the Northern Aqueduct will be supplied by the Western Aqueduct once it is completed. According to the Bulk Services Planning Report for future developments in the Northern Region Report No. DR2014/07 compiled by SMEC, this is scheduled for completion towards the end of 2021.

#### 4.1.3 Proposed Blackburn Reservoir

Reference needs to be made to TABLE 4 and TABLE 5.

The proposed Blackburn Reservoir will be constructed in phases in order to meet future demands. The first phase of construction will commence in 2015.

This initial reservoir storage needs to cater for the existing Phase 1 which includes Phase 1A Housing, 1B Housing (currently supplied by Phoenix 2 Reservoir) and the Retail Park. According to the Blackburn Reservoir Modelling Report Project No D294 compiled by Naidu Consulting, there is also a portion of Mount Edgecombe/Phoenix demand that will be transferred from the Phoenix 1 Reservoir zone to the Blackburn Reservoir zone in order to free up storage capacity at Phoenix 1 Reservoir. This demand also needs to be catered for in the initial storage.

From Table 4 and 5, the initial reservoir storage required is approximately 25 Mℓ. This includes an allowance of 1.45 Mℓ for fire flow in the additional 24 hour storage capacity.

#### 4.1.4 Conclusion

- The total water ADD estimated for Phase 2 is 30.12 Mℓ/day and a storage of 61 Mℓ is required
- Phase 2 water supply will be sourced from the new Blackburn Reservoir.
- The Blackburn Reservoir will initially be supplied by the augmented Northern Aqueduct which is currently under construction and due for completion in 2016. The augmentation will supply an additional 44 Mℓ /day into the current system.
- Ultimately the Northern Aqueduct will be supplied by the Western Aqueduct which is scheduled to be completed by the end of 2021.
- Blackburn Reservoir will be constructed in phases. The first phase of construction will commence in 2015 and an initial storage of approximately 25 Mℓ is required. In the event that a smaller reservoir is constructed under the first phase of the reservoir construction, indications from EWS has been that the storage capacity could be reduced to the early 30 hour range in the short term to facilitate development needs.
- Suitable bulk water infrastructure will be available to ensure adequate capacity to meet the water demands for any future developments within Phase 2.

## 4.2 Sewer

### 4.2.1 Existing Bulk Sewer Infrastructure

Reference needs to be made to FIGURE 7.

The whole of Cornubia is divided by a main ridgeline running west to east. The northern catchments gravitate to the Phoenix Waste Water Treatment Works (WWTW). The southern catchment gravitates to the Kwa-Mashu WWTW.

Aurecon has recently completed the upgrade of the Ohlanga Pump Station, the new rising main and the Ohlanga gravity trunk sewer. This gravity trunk sewer runs east to west across Cornubia and discharges directly into the Phoenix WWTW. This gravity trunk sewer will deal adequately with the overall sewer from the northern catchments.

Sewer from the southern catchment will discharge into the Eastbury Trunk Sewer which gravitates to the Kwa-Mashu WWTW.

### 4.2.2 Waste Water Treatment Works (WWTW)

The following information regarding the Phoenix and Kwa-Mashu WWTW has been confirmed by Ms Precious Mbhele of eThekweni Water and Sanitation EWS, Refer to Appendix C1.

- **Phoenix WWTW**

Operating (design) capacity	-	25 Mℓ/day
Current yearly average operating load	-	18 Mℓ/day
Spare capacity	-	0 Mℓ/day

Sludge handling capacity has restricted the works to 18 Mℓ/day as opposed to 25 Mℓ/day. EWS have stated that currently they are increasing sludge dewatering and digestion facilities to meet the 7 Mℓ/day shortfall. This is anticipated to be completed by mid-2015.

EWS is also planning to upgrade the works on the current site to a capacity of 50 Mℓ/day. This is anticipated to be completed by 2016.

Ultimately EWS plans to upgrade the works to a capacity of 100 Mℓ/day.

- **Kwa-Mashu WWTW**

Operating (design) capacity	-	65 Mℓ/day
Current yearly average operating load	-	60 Mℓ/day
Spare capacity	-	5 Mℓ/day

EWS has proposed an upgrade to a capacity of 75 Mℓ/day which is due for completion by 2015.

It should be noted that the additional capacities will be utilized as and when developments arise within the Ohlanga and Umgeni River Catchments and is not specifically set aside for the Cornubia Development.

#### **4.2.3 Sewer Catchments**

Reference needs to be made to FIGURE 8 and TABLE 6.

The total sewer Average Daily Flow (ADF) for Phase 2 is approximately 30.05 Mℓ/day. The topography of the site is such that the watershed lines determine that the sewer effluent needs to be dealt with in five different sub-catchment areas as shown on FIGURE 8.

Reference also needs to be made to the report prepared by SMEC, Investigation of the Sewer Options Proposed to Cater for the 'Retail Park' Development within the Cornubia Precinct, Report no. DR2014-29. This covers the Cornubia Retail Park which is not included in these calculations, but sewer gravity main sizing has taken cognisance of the full development yields and flows.

- **Northern Catchments**

Reference needs to be made to FIGURE 9.

Sewer generated from sub-catchments 1A, 3, 4 and 5 will gravitate to the new Ohlanga gravity trunk sewer and be treated at the Phoenix WWTW. Sewer effluent from sub-catchments 1B and 2 will gravitate to the Ohlanga sewer pump station and be pumped to the Phoenix WWTW. The total sewer ADF to be treated at Phoenix WWTW is approximately 27.18 Mℓ/day.

- **Southern Catchment**

Reference needs to be made to FIGURE 9.

Sewer generated from sub-catchment 6 of approximately 2.87 Mℓ/day, will gravitate to the Eastbury gravity trunk sewer to be treated at the Kwa-Mashu WWTW.

#### 4.2.4 Conclusion

- The total sewer ADF estimated for Phase 2 is 30.05 Mℓ/day.
- Sewer will be dealt with in 7 sub-catchments. The sewer ADF from catchment 1A – 5 of 27.18 Mℓ/day will be treated at the Phoenix WWTW. Sewer ADF from catchment 6 of 2.87 Mℓ/day will gravitate to the Eastbury gravity trunk sewer to be treated at the Kwa-Mashu WWTW.
- The Kwa-Mashu WWTW currently has a spare capacity of 5 Mℓ/day however a proposed upgrade to a capacity of 75 Mℓ/day is planned and will be completed by 2015.
- The Phoenix WWTW is currently at capacity. EWS are busy increasing the sludge handling facilities on site to free up 7 Mℓ/day which will be completed by mid-2015. The works will be upgraded to a capacity of 50 Mℓ/day which is anticipated to be completed by 2016.
- EWS ultimately plans to upgrade the Phoenix WWTW to a capacity of 100 Mℓ/day.
- Bulk sewer infrastructure planning is being implemented to ensure adequate capacity is available ahead of time for any future developments within Phase 2.

## 4.3 Roads

### 4.3.1 Roads Hierarchy

The road hierarchy model adopted for the overall development of Cornubia generally follows the standard design guidelines normally applied to a project of this magnitude.

### 4.3.2 Road Classification

The road classification with related traffic calming measures is as follows –

- Class 1: Freeway – High mobility, no or very limited at grade access. No traffic calming
- Class 2: Major Arterial/ Regional Distributor – High mobility, limited at grade access (intersections), no direct property access. No traffic calming.
- Class 3: Arterial/ Major Collector – Balanced mobility and accessibility function. Traffic calming only to consist of signage and road markings.
- Class 4: Collector – More accessibility, less mobility, direct property access. All types of traffic calming allowed.
- Class 5: Local Street – Limited mobility, more accessibility. All types of traffic calming allowed including speed humps.

### 4.3.3 Class 3 Roads

Reference needs to be made to FIGURE 10 and Report No. DR 2013/45 - Framework Roads Alignment Changes –Cornubia Phase 2 compiled by SMEC in October 2013.

The following class 3 roads will need to be constructed in Phase 2: -

- Extension of Cornubia Boulevard from Cornubia Industrial and Business Estate (CIBE). Cornubia Boulevard traverses the Southern portion of Cornubia and runs parallel to the R102/M41. Cornubia Boulevard links directly in the east into Umhlanga Ridge Boulevard. Limited access onto Cornubia Boulevard from the N2 via a north bound off ramp is provided as part of the Mount Edgecombe Interchange upgrade. Cornubia Boulevard is also the road that houses the IRPTN in future. Through engagement with ETA and ethekwini Road provision the Horizontal and Vertical alignment of this road has been agreed. Reference needs to be made to the Town planning report and the TIA for finalisation on the TRL and configurations proposed.
- The extension of Blackburn Link from CIBE/Ottawa Substation intersection. Blackburn Link traverses the northern portion of Cornubia and links up to the N2 in the east.



- Dube West is a natural extension of Phoenix Highway. The existing Marshall Dam interchange and intersection of the M41 Phoenix Highway will require major reconfiguration to allow for the connection of Dube West. Dube West runs midway through Cornubia and it is the intention that this will ultimately link up to the west of the Dube Tradeport. In the short term Dube West ends north of the Ohlanga River.
- Dube East originates from Flanders Drive in the south. It runs parallel to the N2 freeway and is midway between Dube West and the N2 freeway. Dube East is also intended to be extended northwards to the east of Dube Tradeport. In the short term it will terminate at the Ohlanga River in the north

#### **4.3.4 Ultimate Access Points**

Reference needs to be made to FIGURES 10 to 15.

Seven ultimate Access points have been proposed for as follows-

1. Proposed Blackburn Interchange on the N2.
2. Proposed bridge over the N2 linking Cornubia Boulevard and Umhlanga Ridge Boulevard in URTC currently out to tender.
3. Proposed M41/Flanders Drive Interchange (upgrade).
4. Proposed M41/Marshall Dam Interchange (upgrade).
5. Proposed Northern Drive Interchange.
6. Proposed bridge over the Ohlanga River from Dube West linking up to Waterloo road network and future developments to the north of Cornubia.
7. Proposed bridge over the Ohlanga River from Dube East linking up to future developments to the north east of Cornubia.

#### **4.3.5 Pedestrians**

According to the Cornubia Phase 1 Engineering Services Report No.DR2009/17, adequate provision will be made to ensure that sufficient width is allowed for within the sidewalks to accommodate pedestrians.

#### **4.3.6 Traffic Impact Assessment**

The traffic volumes generated by the abovementioned network of roads, intersection and lane requirements is addressed in a separate report entitled Tongaat Hulett Developments - Cornubia Phase 2 Traffic Impact Assessment TIA, Document No. 122391, prepared by Hatch Goba.

#### 4.3.7 Public Transport Network

According to the TIA stated in the clause above, the following public transport services will be incorporated:

- **Bus Rapid Transit (BRT) Services**

Two main BRT services will be provided within Cornubia, namely King Shaka International Airport to Durban CBD via Umhlanga (C8 corridor) and Bridge City to Umhlanga Ridge New Town Centre (C9 corridor).

- **Feeder Services**

Feeder Services will provide local bus services that will support the BRT routes. This will improve the access to the BRT service and local road networks

- **Quality Bus Services (QBS)**

The QBS will transport passengers not within the catchment areas of the BRT routes. The QBS routes will be located outside of Cornubia.

#### 4.3.8 Conclusion

- In Phase 2 the following class 3 roads will be need to be constructed – Dube West, Dube East, a portion of Cornubia Boulevard and a portion of Blackburn Link.
- A separate TIA analysing traffic volumes and discussing the Public Transport Network has been prepared by Hatch Goba.
- There will ultimately be 7 access points into Cornubia.
- All proposed roads and interchanges will be constructed in a phased manner to meet the required demands over time.

## **5. STORMWATER**

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### **5.1 Stormwater Management Plan**

A Stormwater Management Plan was prepared by SMEC in July 2013. Adequate stormwater control measures are proposed and will be implemented in line with Ethekewini Municipality's requirements. Refer Report No DR2013/19, Stormwater Management Plan – Cornubia Phase 2.

### **5.2 Stormwater Attenuation Facilities**

A Stormwater Attenuation Facility report was prepared by SMEC in November 2014 analysing the feasibility of attenuation features outside the wetland boundaries. Refer to Report No DR2014/70, Attenuation Facilities Within Wetlands Analysis Report – Cornubia Phase 2. The aim of the report is to explain the engineering and cost benefits of attenuating within the wetlands.

## 6. WETLAND CROSSINGS

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### 6.1 Design Philosophy

Reference needs to be made to FIGURE 16.

The following basic design philosophy for wetland crossings will apply during the course of the development of Phase 2:

- All new major access roads crossing wetlands will be supported by bridge structures where feasible. Care will be taken to avoid sensitive forest and wetland areas (where practical) when locating intermediate bridge supports.
- Where impractical to construct a bridge over wetlands and minor roads, the roads will be constructed on a layer of clean dump rock of sufficient depth to allow movement of groundwater under the road embankment in the valley bottom/wetland.
- Pipe crossings (typically water and sewer) and other services such as Telkom and electrical cables shall be ducted and designed within or attached to bridge structures where planning permits.
- Pipe crossings (particularly gravity services), over steep narrow wetland valley lines (where no structure is planned), will be designed as pipe bridges with pier locations designed to avoid or minimise impact on sensitive forest and wetland areas.
- Pipe crossings over flat wide valley lines should be designed to coincide with the necessary control devices i.e. where a storm water attenuation structure in a valley line is required to prevent erosion, the service crossing should be designed as an integral component of the device.
- Where no other alternative exists, pipes will need to be buried and alignment must avoid sensitive vegetation.
- Where practical all services (longitudinally) will be located outside of sensitive/wetland areas, else within buffers.

## 7. BULK IRRIGATION

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Reference needs to be made to FIGURE 17 and 18.

A Master Irrigation Plan was prepared by SMEC in February 2015. The purpose of this report is to advise towards an efficient bulk irrigation system comprising a source, storage nodes and reticulation to best serve the planned urban landscape of roads and open spaces within Cornubia's Phase 1 and 2 developments. Refer Report No DR2015/03, Concept Design Report: Cornubia Urban Irrigation.

## 8. TOPOGRAPHICAL SURVEY

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A comprehensive topographical survey of the entire Cornubia Precinct was carried out by R.A Logan & Associates during the period early 2006 to early 2008 for Tongaat Hulett Developments. The survey complied with the relevant project specifications and TMH 11: Standard Survey Methods (1997).

- Permanent Survey Stations which may be used for setting out of construction work. (Installed by Wall Marriott Paul & Borgen)

- Electronic Data

“All topographical details, inclusive of contours have been captured digitally on different layers/ levels. Final CAD and DTM have been provided”.

- “Digital Terrain Model” (DTM) Tolerances

Point density is sufficient to meet the listed DTM tolerances when a linear interpolation made between two successive feature points. Sufficient spot heights have been taken to provide accuracy of contours to 0,5m vertical intervals at a scale of 1:500.

All the digital information is held at SMEC's offices and is available for use by all parties who require the information for the design of the various construction elements. There is always the possibility that further detailed survey may be required to enable new services to tie into existing services i.e. sewers, water mains and roads.

## **9. INTERNAL SERVICES**

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### **9.1 Water**

All internal water reticulation will be designed by and in accordance with eThekweni Water Section's standards and subject to their approvals.

### **9.2 Sewer**

All internal sewer reticulation will be designed in accordance with eThekweni Wastewater Section's standards and subject to their approvals.

### **9.3 Roads**

All internal roads will be designed in accordance and conjunction with the eThekweni road design manual – Part 3 (1985) with occasional reference to the relevant UTG standards, all designs will be subject to approval from: eThekweni Roads/ Materials Department, eThekweni Transport Authority and eThekweni Roads Provision.

### **9.4 Stormwater**

All internal stormwater reticulation will be designed in accordance with the layout and sizes of the various stormwater elements as determined by the Stormwater Management Plan and the relevant applicable standards. The design will be subject to the approval of eThekweni Coastal and Drainage Section.

## **10. ADDITIONAL INFORMATION**

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During the detailed design stage of each individual phase of the development it will be necessary to confirm the following aspects –

- Sizes, positions and levels of existing underground services i.e. water mains, sewers and storm water pipes.
- Levels of existing roads at new tie-in positions.
- Additional topographical survey.

## 11. LIST OF DRAWINGS

FIG	DRAWING No.	DESCRIPTION
3	DH0003-PHASE 2-GEN-01 SHT 1	CORNUBIA PRECINCT - PHASE 2 - DESCRIPTION OF SITE
4	DH0003-PHASE 2-SLOPES-01 SHT 1	CORNUBIA PRECINCT - PHASE 2 - SLOPE ANALYSIS
5	CORN-BLOCK EIA-12498-16	CORNUBIA PHASE 2 – LUM PRECINCT PLAN
6	DH0003-PHASE 2-WATER-01 SHT 1	CORNUBIA PRECINCT - PHASE 2 – BULK WATER
7	DH0003-PHASE 2-SEWER-01 SHT 1	CORNUBIA PRECINCT - PHASE 2 – BULK SEWER
8	DH0003-PHASE 2-SEWER-01 SHT 2	CORNUBIA PRECINCT - PHASE 2 – PROPOSED SEWER CATCHMENTS
9	DH0003-PHASE 2-SEWER-01 SHT 3	CORNUBIA PRECINCT - PHASE 2 – PROPOSED SEWER LINKS
10	DH0003-PHASE 2-FRAMEWORK ROADS -01-SHT 01	CORNUBIA PRECINCT-PHASE 2-FRAMEWORK ROADS
11	DH0003-INTERCHANGE-BLACKBURN-01	PROPOSED BLACKBURN INTERCHANGE LAYOUT
12	DH0003-INTERCHANGE-CORN BRDG-01	PROPOSED CORNUBIA BRIDGE LAYOUT
13	DH0003-INTERCHANGE-FLANDERS-01	PROPOSED M41/FLANDERS DRIVE INTERCHANGE LAYOUT
14	DH0003-INTERCHANGE-MARSHALL-01	PROPOSED M41/MARSHALL DAM INTERCHANGE LAYOUT
15	DH0003-INTERCHANGE-NORTHERN-01	PROPOSED R102/NORTHERN DRIVE INTERCHANGE LAYOUT
16	DH0003-PHASE 2-WETLAND CROSSING	CORNUBIA PRECINCT-PHASE 2-WETLAND CROSSINGS
17	DH0003-BULK IRRIGATION -01 SHT 1	CONRUBIA PRECINCT – PHASE 2 – PROPOSED BULK IRRIGATION
18	DH0003-BULK IRRIGATION -01 SHT 2	CONRUBIA PRECINCT – PHASE 2 – PROPOSED ZONES

## 12. LIST OF TABLES

---

TABLE 1 – CORNUBIA PHASE 2 LUMS PRECINCT PLAN AREA SCHEDULE

TABLE 2 – WATER DEMAND GENERATION

TABLE 3 – WATER STORAGE REQUIRED FOR PHASE 2

TABLE 4 – CONTRIBUTIONS TO BLACKBURN RESERVOIR STARTER CELL

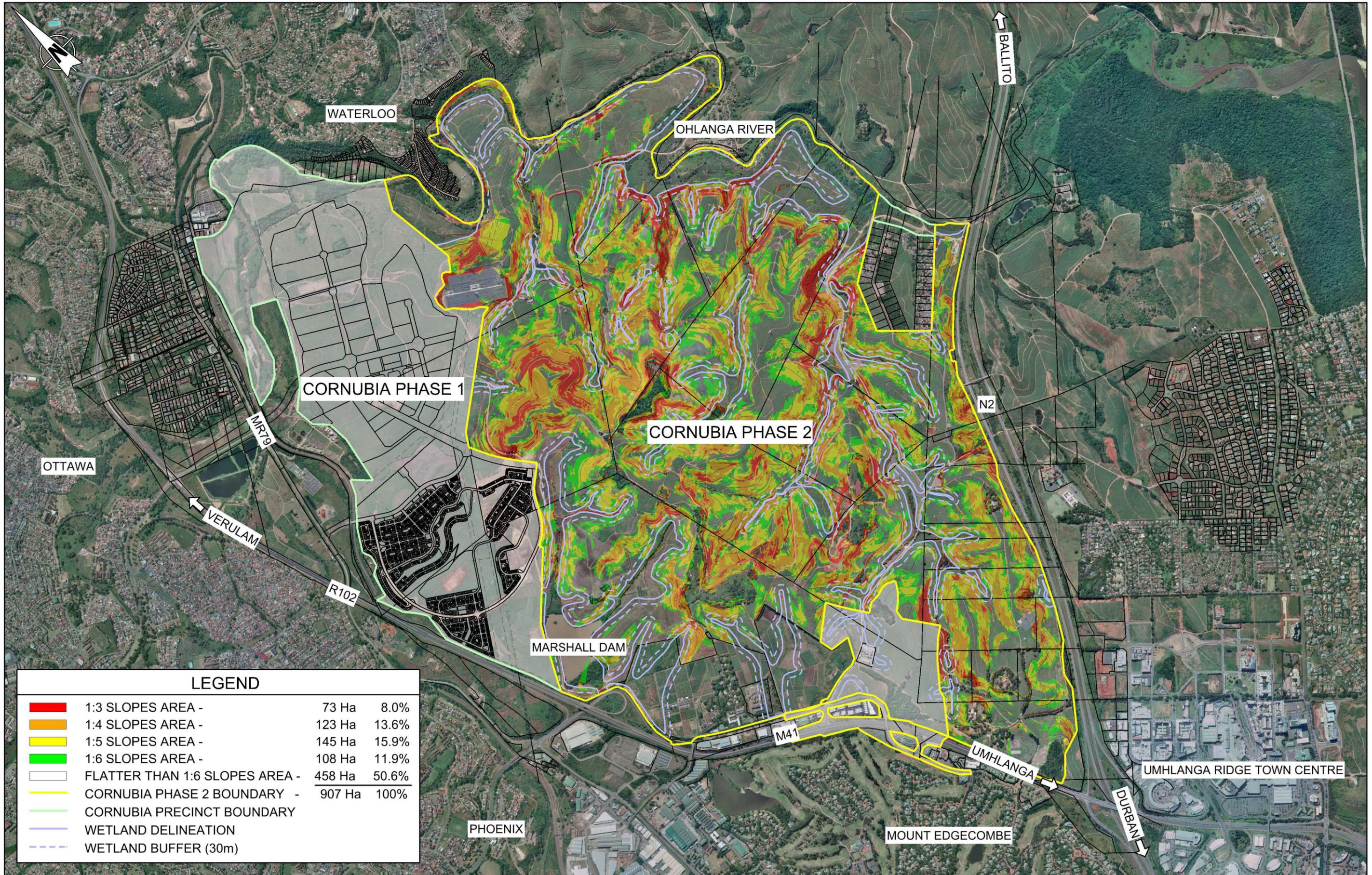
TABLE 5 – STORAGE REQUIRED FOR BLACKBURN CONTRIBUTIONS

TABLE 6 – SEWER FLOW GENERATION



## DRAWINGS





**CORNUBIA PRECINCT - PHASE 2**  
SLOPE ANALYSIS



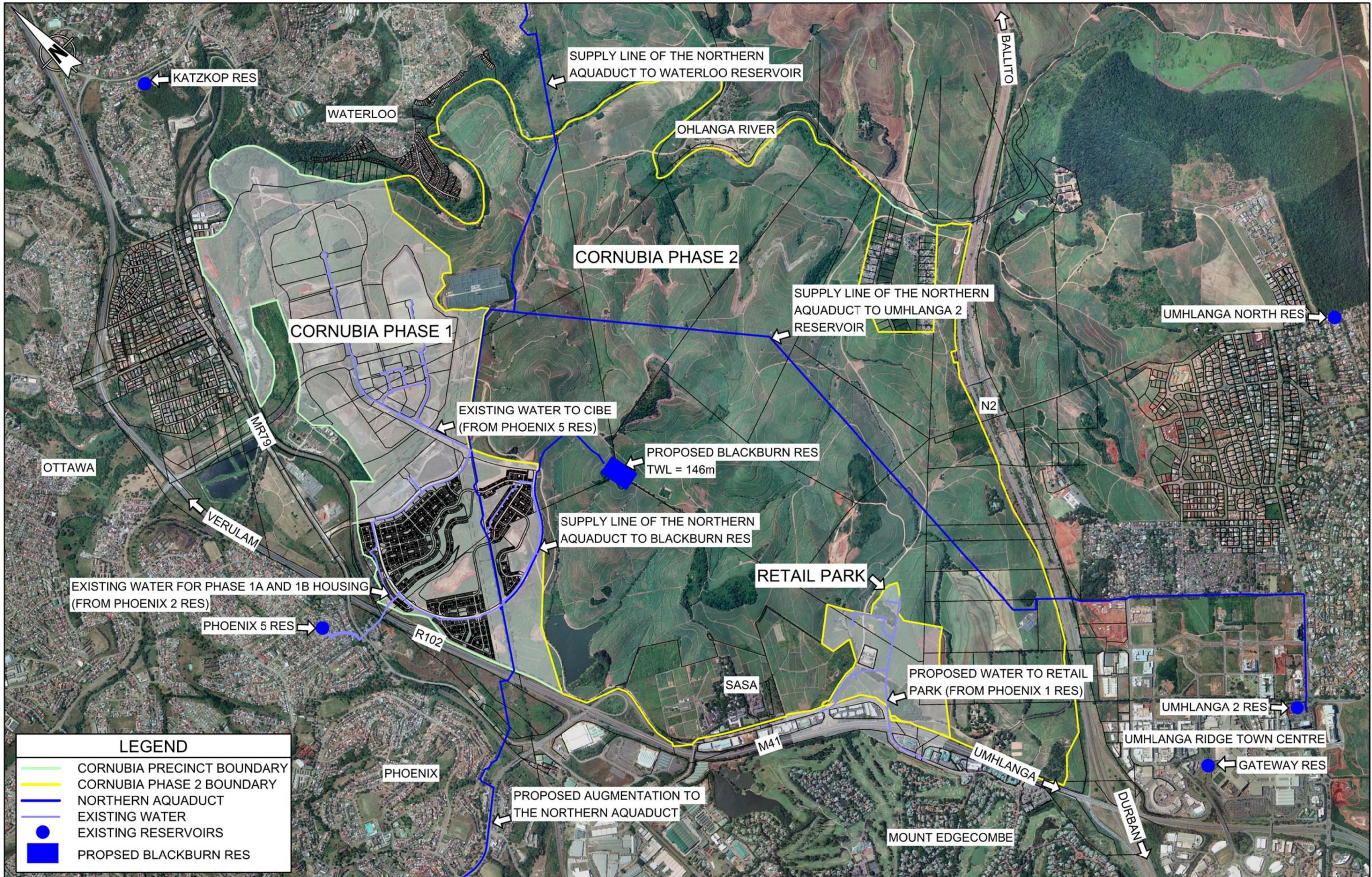
Client  
**Tongaat Hulett**  
DEVELOPMENTS

Scale  
1:20 000  
Drawing No  
DH0003-PHASE 2-SLOPES-01

Sheet  
1

FIGURE  
4





LEGEND	
	CORNUBIA PRECINCT BOUNDARY
	CORNUBIA PHASE 2 BOUNDARY
	NORTHERN AQUADUCT
	EXISTING WATER
	EXISTING RESERVOIRS
	PROPOSED BLACKBURN RES

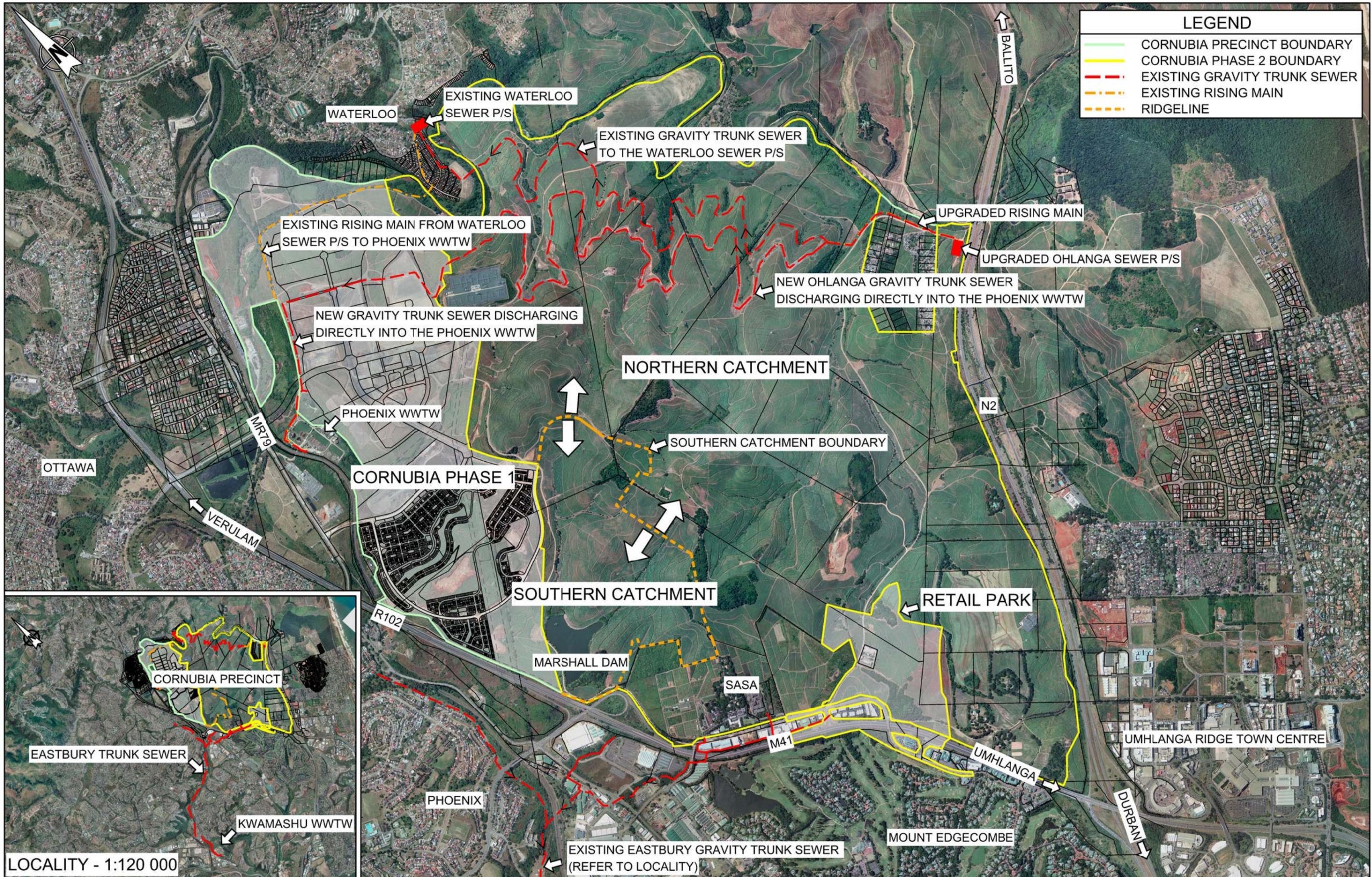
**CORNUBIA PRECINCT - PHASE 2**  
BULK WATER

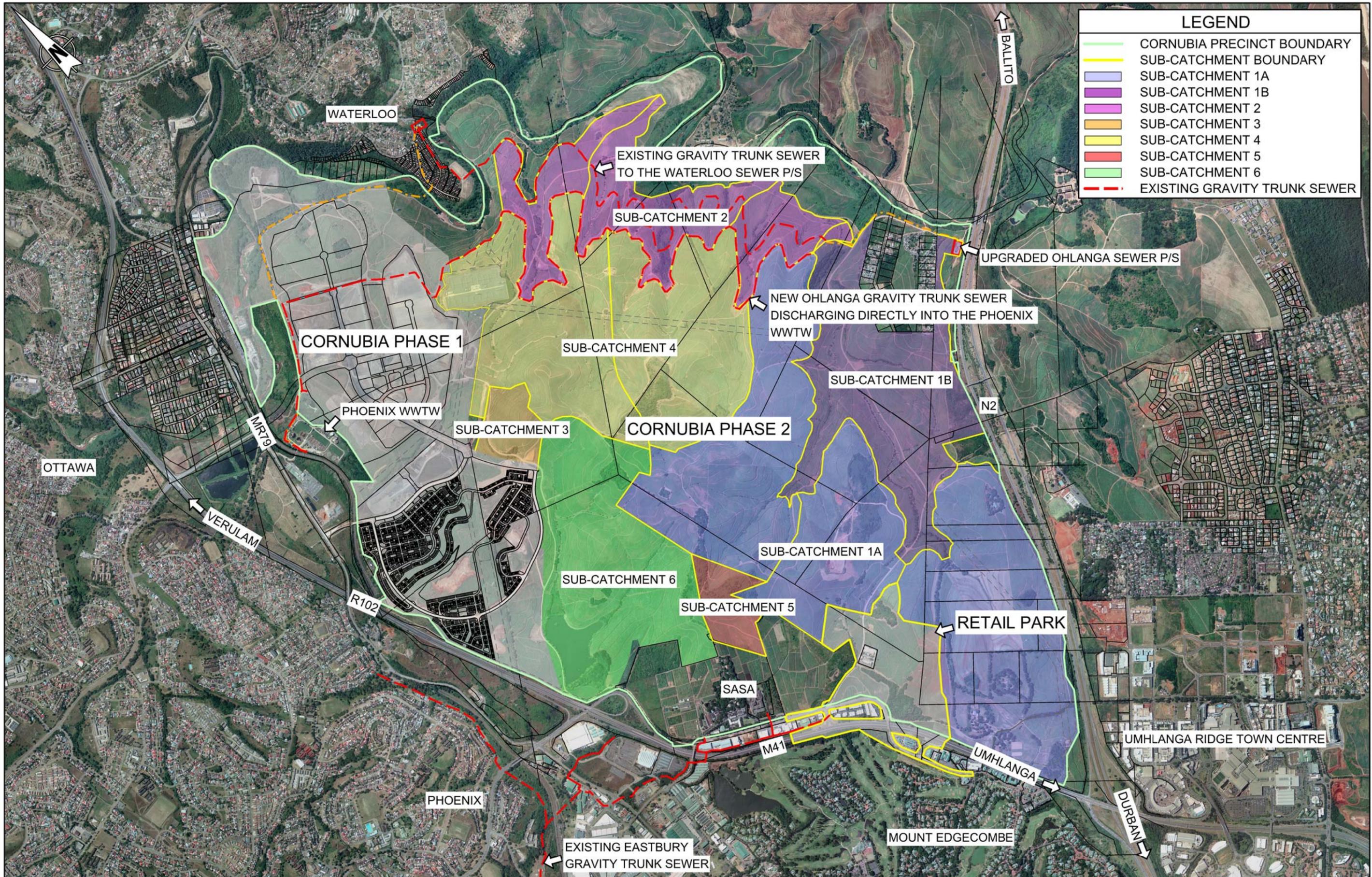


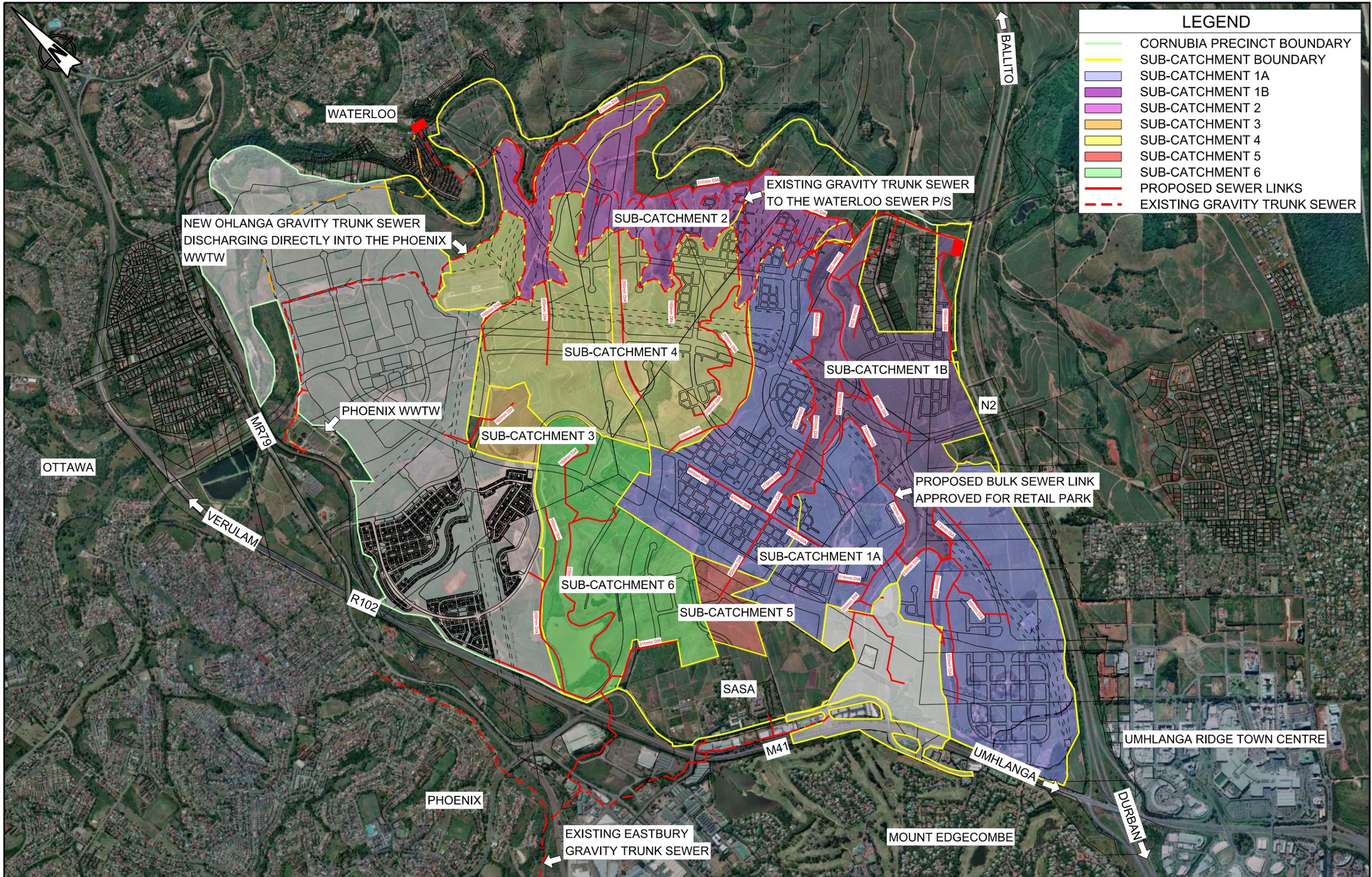
Client  
**Tongaat Hulett**  
DEVELOPMENTS

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Drawing No DH0003-PHASE 2-WATER-01	

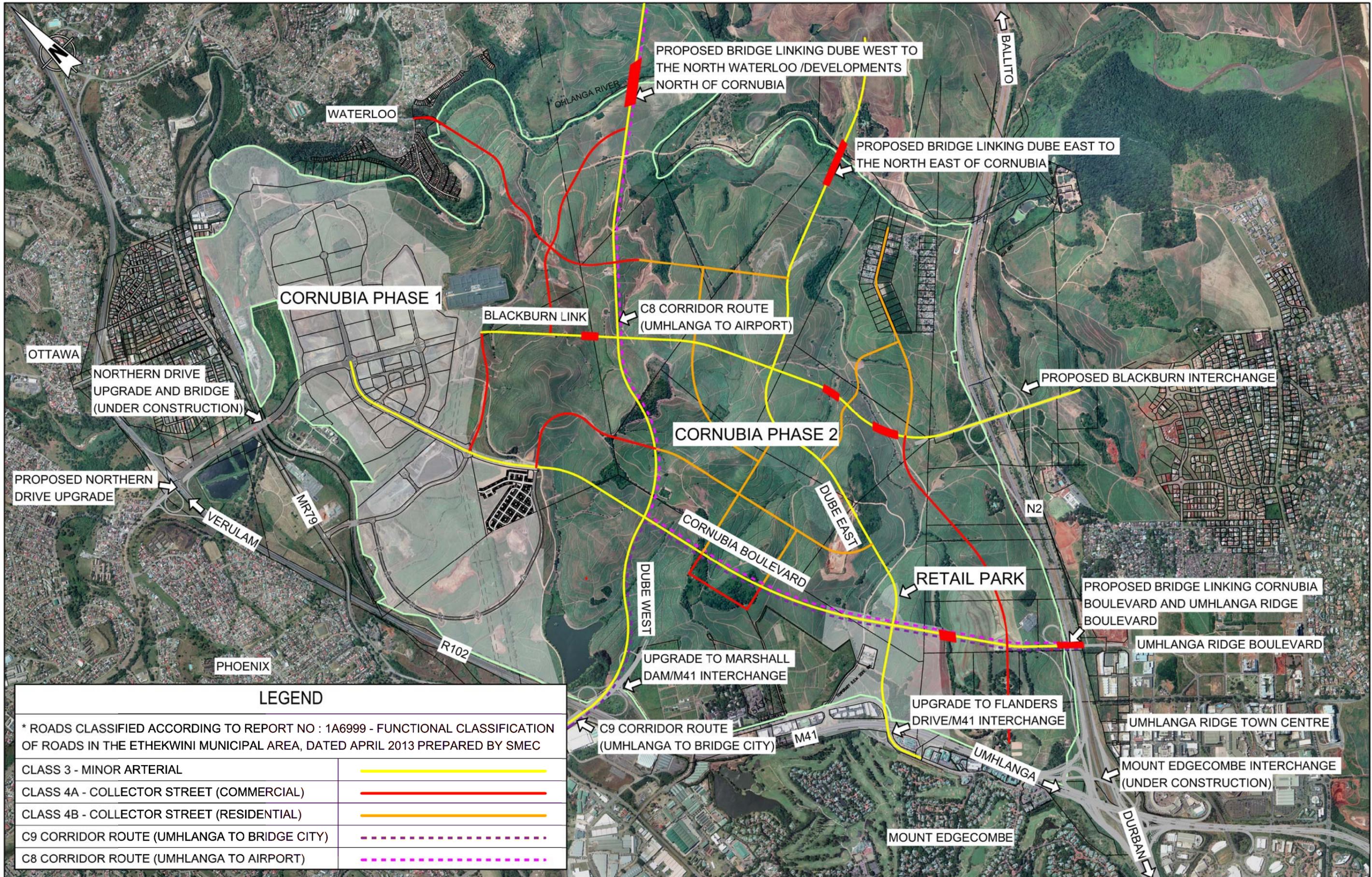
FIGURE  
6









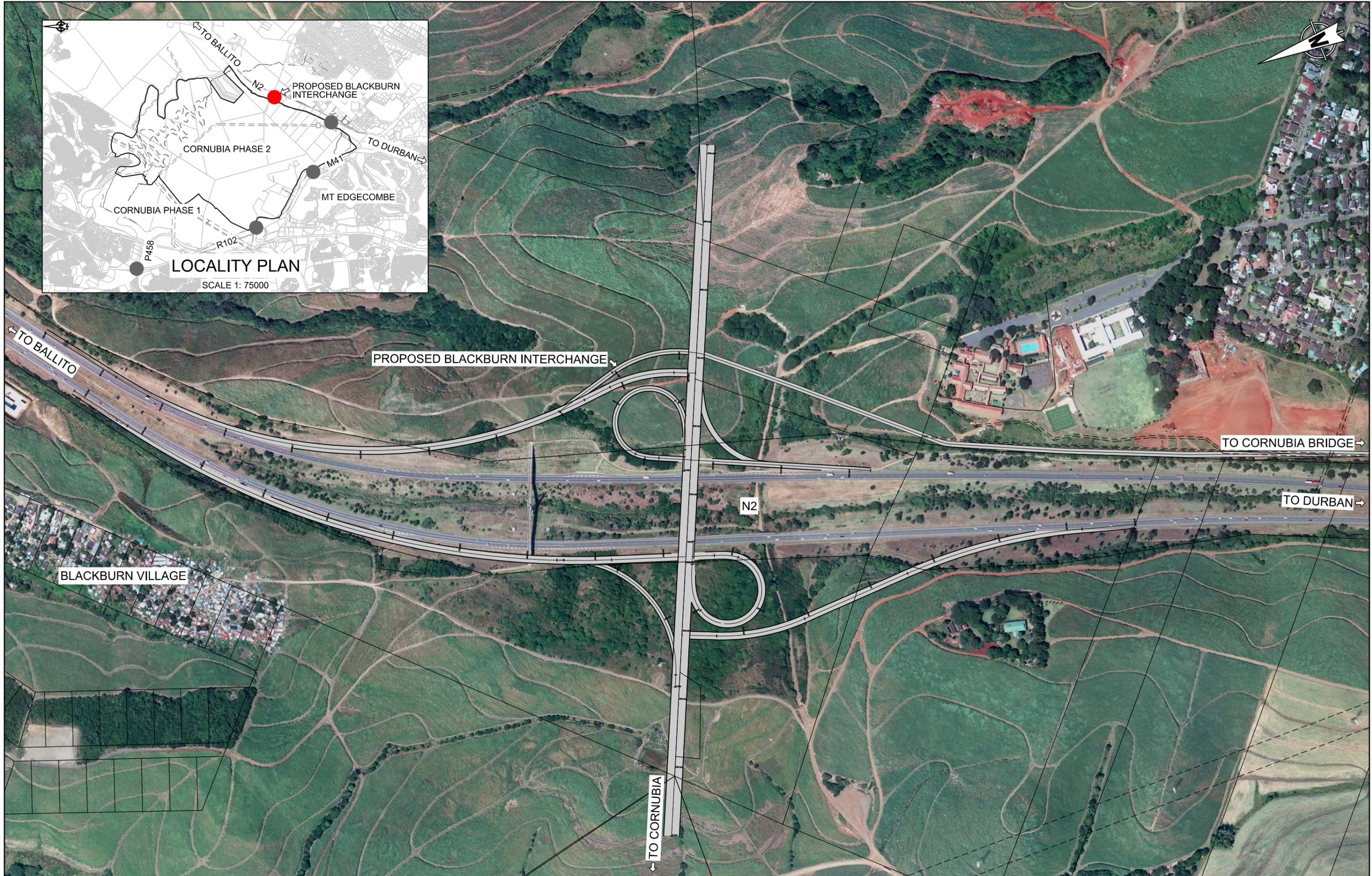


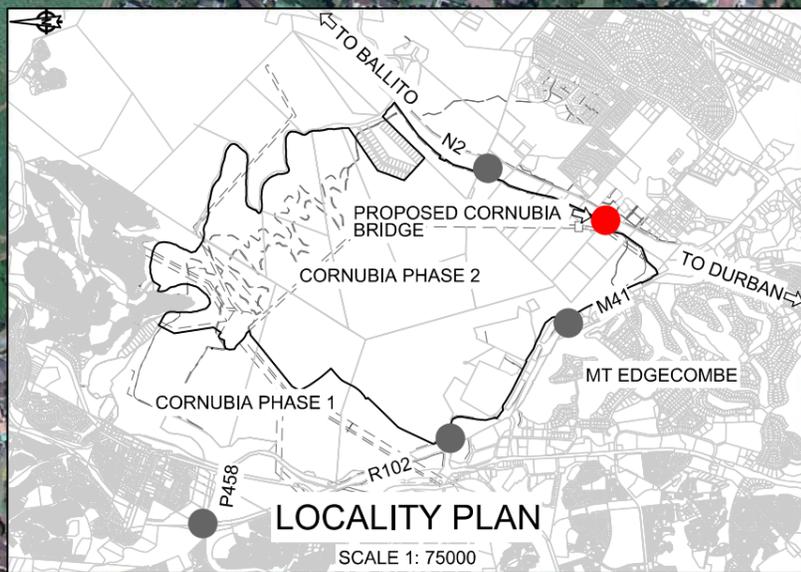
LEGEND	
* ROADS CLASSIFIED ACCORDING TO REPORT NO : 1A6999 - FUNCTIONAL CLASSIFICATION OF ROADS IN THE ETHEKWINI MUNICIPAL AREA, DATED APRIL 2013 PREPARED BY SMEC	
CLASS 3 - MINOR ARTERIAL	
CLASS 4A - COLLECTOR STREET (COMMERCIAL)	
CLASS 4B - COLLECTOR STREET (RESIDENTIAL)	
C9 CORRIDOR ROUTE (UMHLANGA TO BRIDGE CITY)	
C8 CORRIDOR ROUTE (UMHLANGA TO AIRPORT)	



## CORNUBIA PRECINCT - PHASE 2 FRAMEWORK ROADS

Client 	Scale 1:20 000	Sheet 1	FIGURE 10
	Drawing No DH0003-PHASE 2-FRAMEWORK ROADS-01		





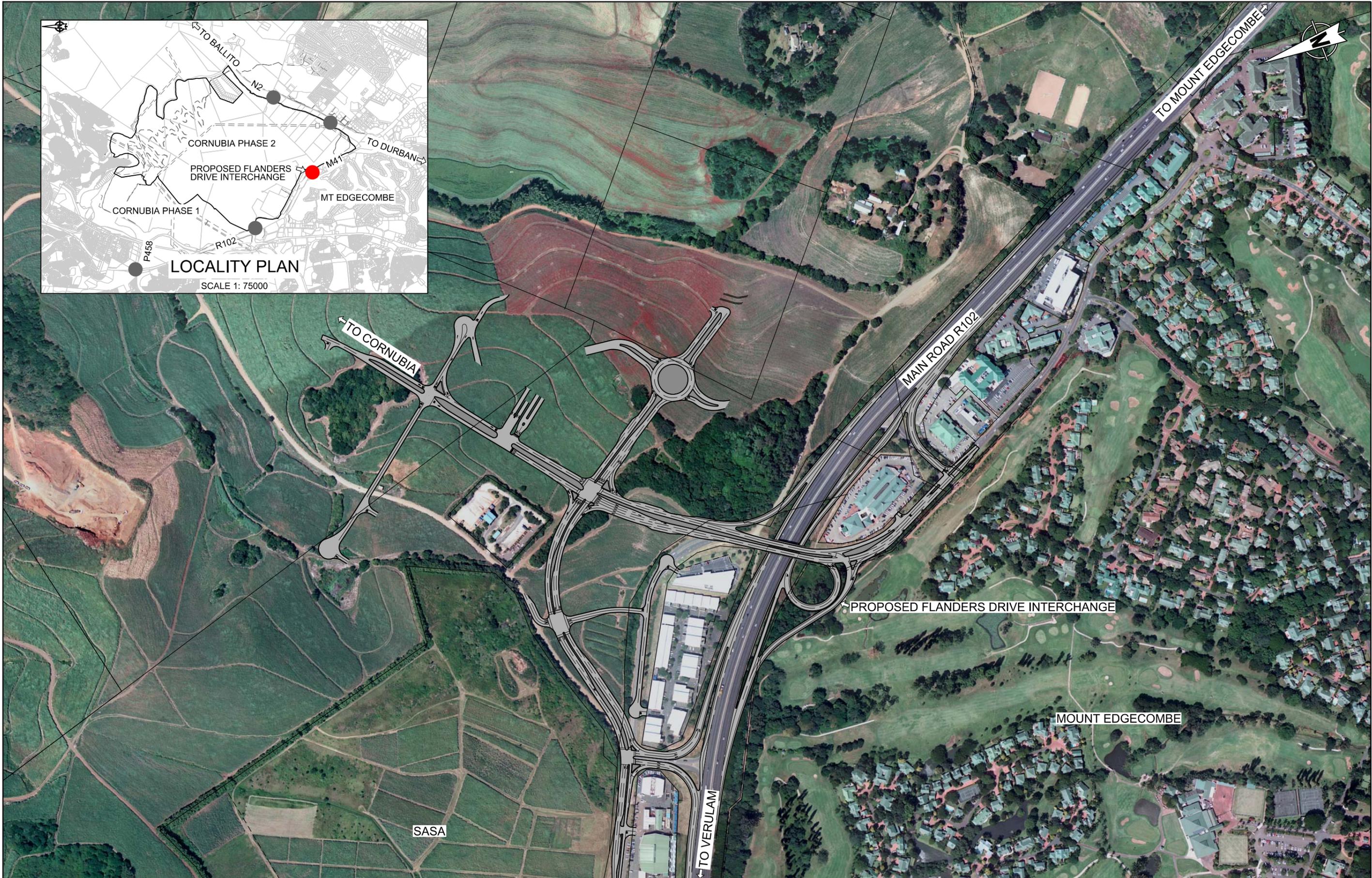
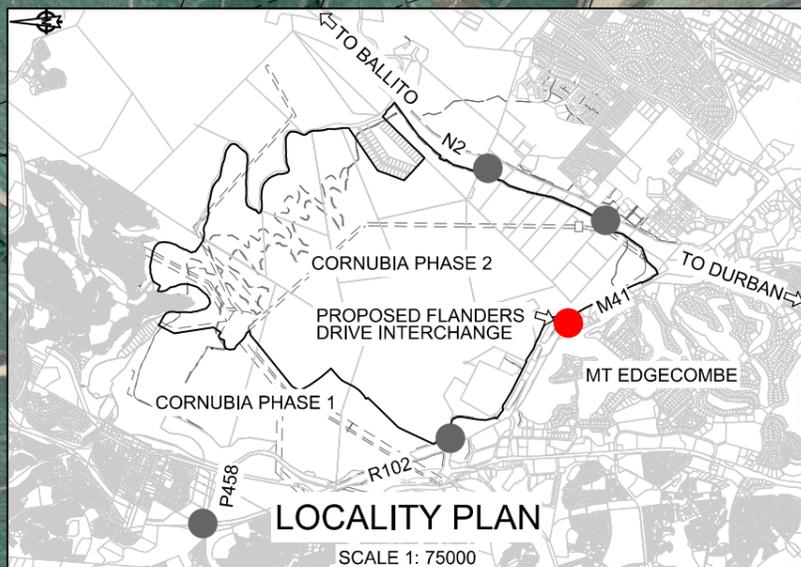
**CORNUBIA PRECINCT**  
**PROPOSED CORNUBIA BRIDGE**

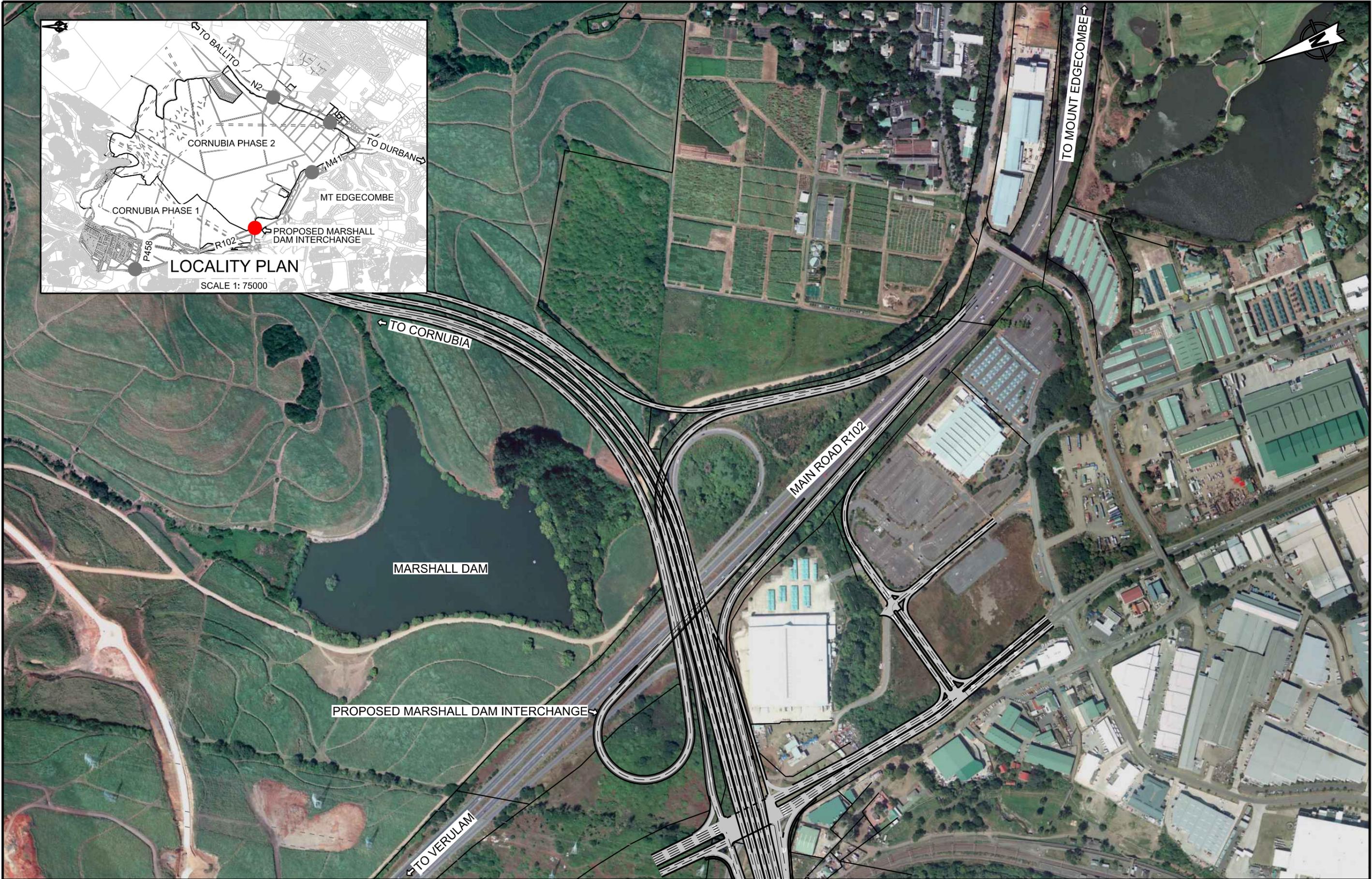
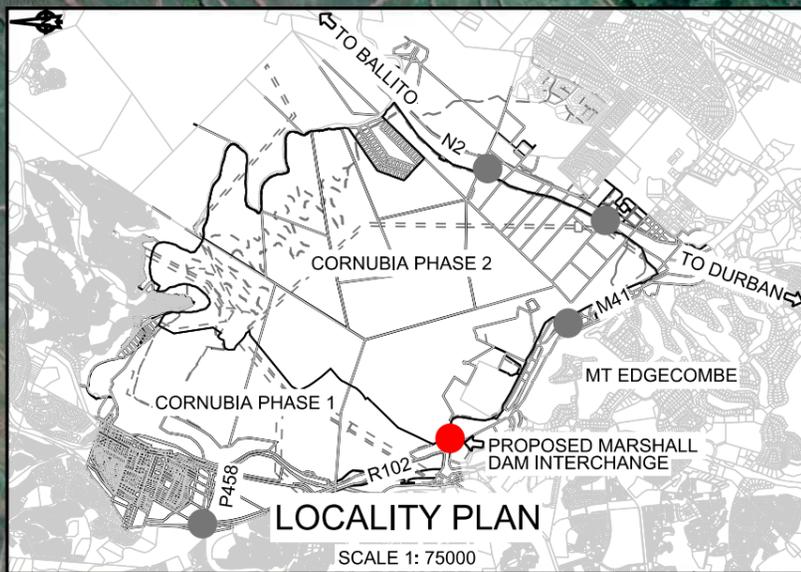
Client  
**Tongaat Hulett**  
 DEVELOPMENTS

Scale  
 1: 5000  
 Drawing No  
 DH0003-CORN-BRIDGE-01

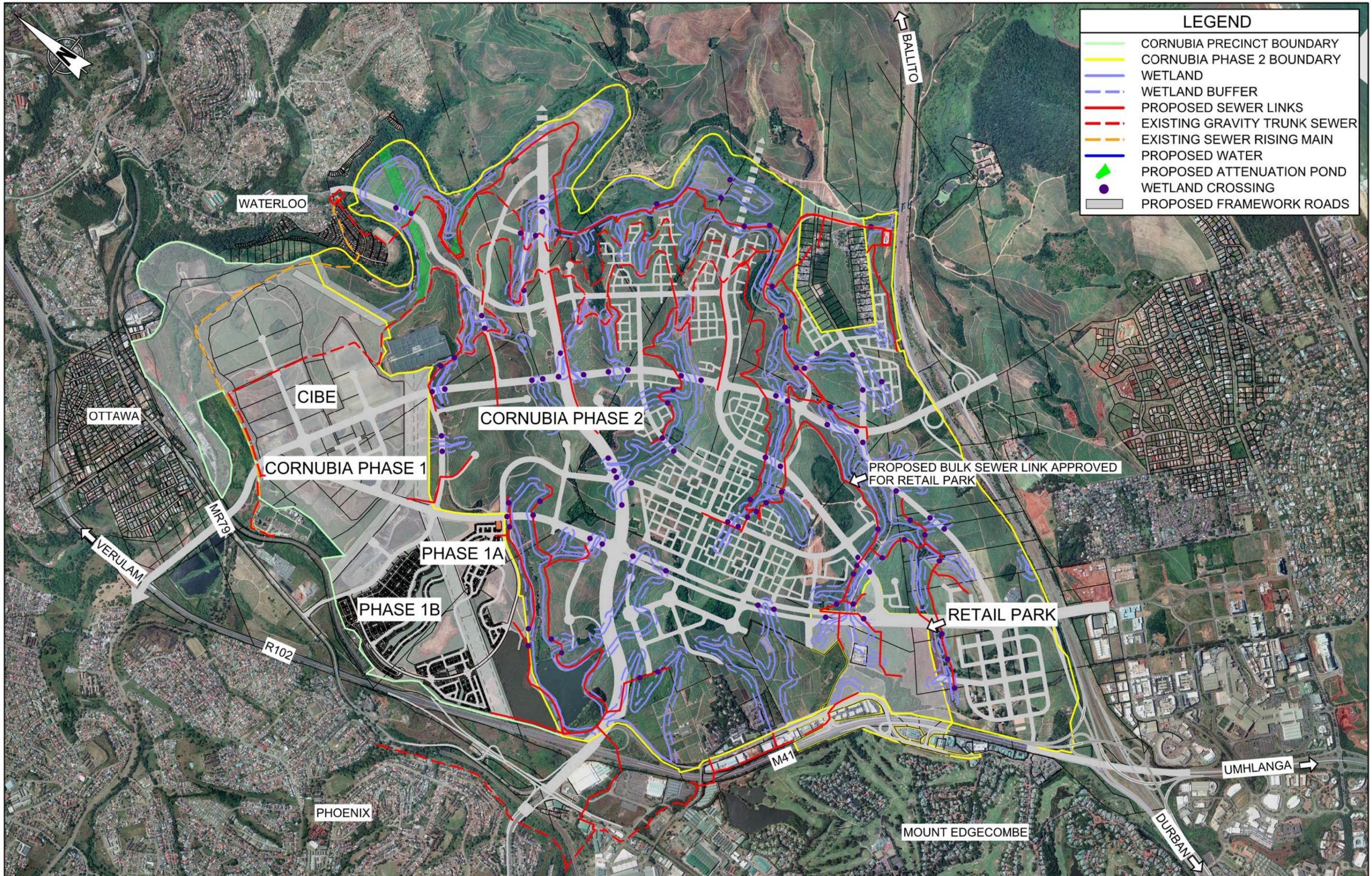
Sheet  
 1

**FIGURE**  
 12









LEGEND	
	CORNUBIA PRECINCT BOUNDARY
	CORNUBIA PHASE 2 BOUNDARY
	WETLAND
	WETLAND BUFFER
	PROPOSED SEWER LINKS
	EXISTING GRAVITY TRUNK SEWER
	EXISTING SEWER RISING MAIN
	PROPOSED WATER
	PROPOSED ATTENUATION POND
	WETLAND CROSSING
	PROPOSED FRAMEWORK ROADS

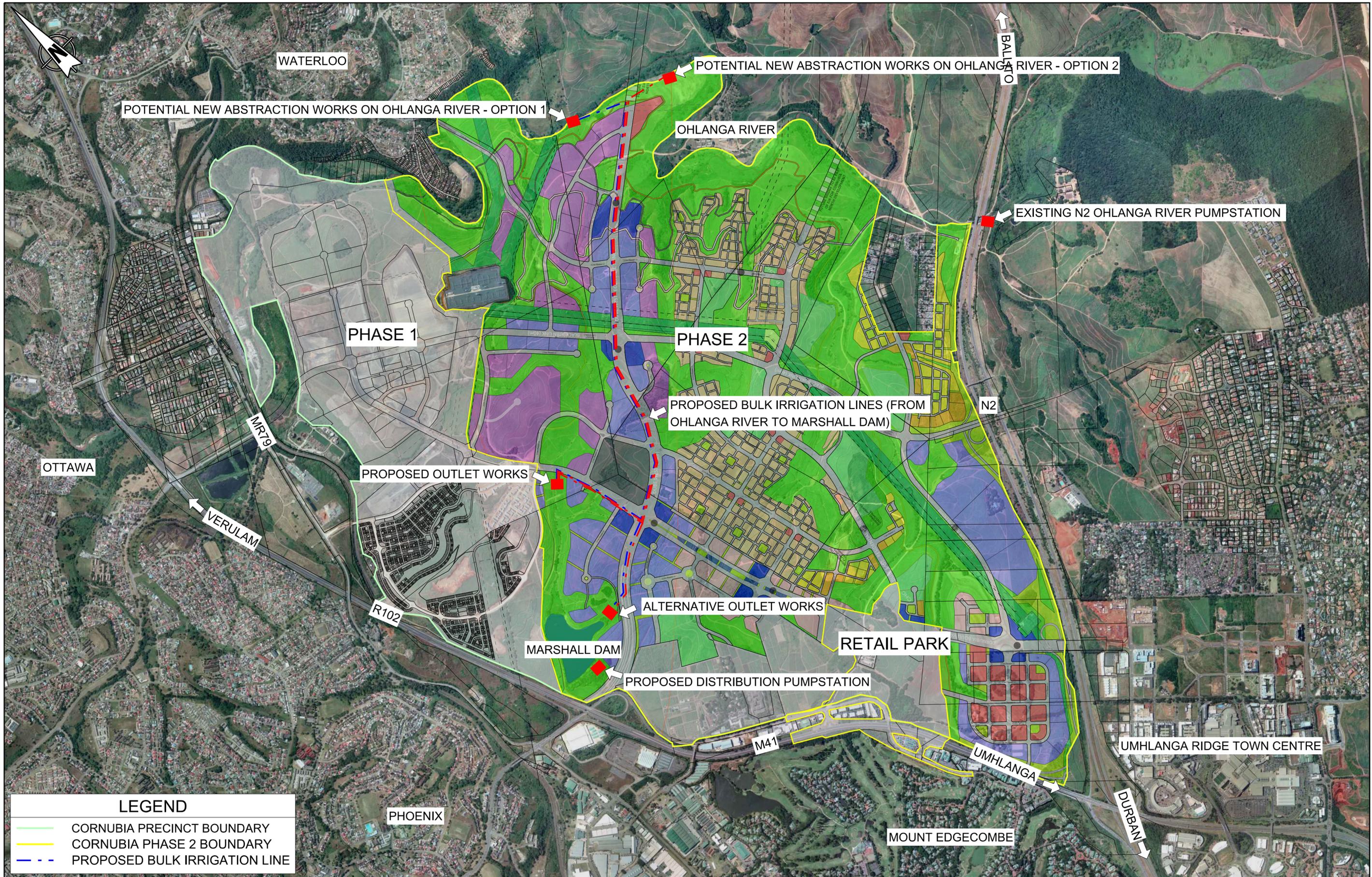
**CORNUBIA PRECINCT - PHASE 2**  
WETLAND CROSSING



Client  
**Tongaat Hulett**  
DEVELOPMENTS

Scale 1:20 000	Sheet 1
Drawing No DH0003-PHASE 2-WETLAND CROSSING	

FIGURE  
16



LEGEND	
	CORNUBIA PRECINCT BOUNDARY
	CORNUBIA PHASE 2 BOUNDARY
	PROPOSED BULK IRRIGATION LINE

## CORNUBIA PRECINCT - PHASE 2

### PROPOSED BULK IRRIGATION

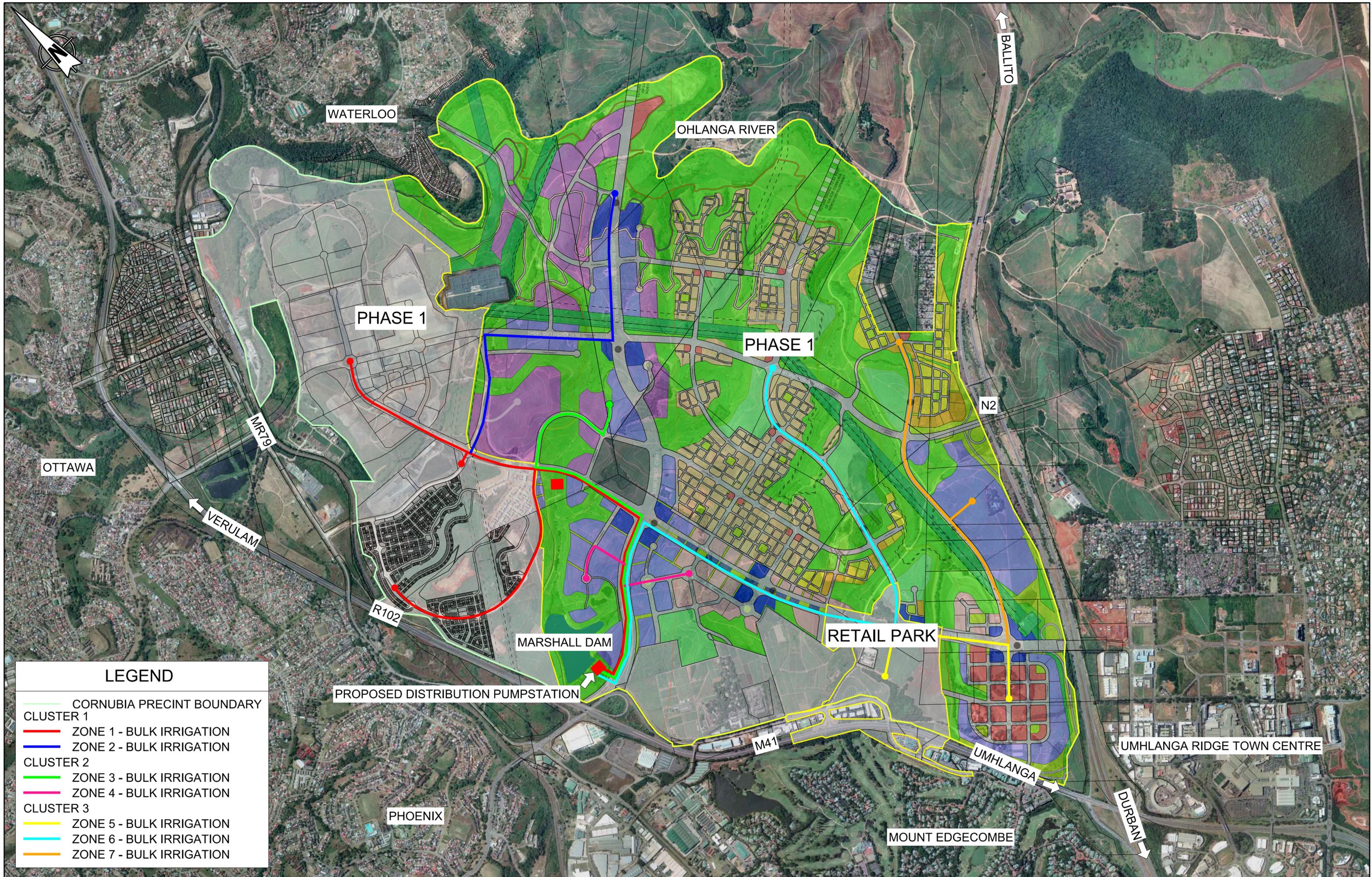


Client  
**Tongaat Hulett**  
 DEVELOPMENTS

Scale 1:20 000	Sheet 1
Drawing No DH0003-PHASE 2-BULK IRRIGATION-01	

FIGURE  
17





**CORNUBIA PRECINCT - PHASE 2**  
**BULK IRRIGATION ZONES**



Client  
**Tongaat Hulett**  
 DEVELOPMENTS

Scale  
 1:20 000

Sheet  
 2

Drawing No  
 DH0003-PHASE 2-BULK IRRIGATION-01

**FIGURE**  
 18

## TABLES

TABLE 1

## CORNUBIA PHASE 2 LUMS PRECINCT PLAN AREA SCHEDULE - Narrow Option

LAND USE CATEGORY & QUANTIFICATION												
Use	Gross Developable area (sqm)	Gross Developable Area(Ha)	Income Level	%	Proposed Average FAR	Total Bulk	Total Commercial Bulk	Total Residential Bulk	Size of unit (sqm)	RESIDENTIAL YIELD		
										Residential Density (du/ha)	Yield : no of units	%
Medium Density Residential - Subsidised Duplex / Simplex Housing (BNG)	616,041.46	61.60	R0 - R3500	6.9	0.4	197,133		197,133	50	80	3,943	18
Medium Density Residential - Affordable	150,742.16	15.07	R7001 - R15	1.7	1.5	180,891		180,891	55	218	3,289	15
High Density Residential - Affordable	65,300.59	6.53	R7001 - R15	0.7	2.0	104,481		104,481	55	291	1,900	9
Mixed Use 1 (Residential Apartments + Retail Base) - 90% / 10% desired split	198,056.67	19.81	>R15000	2.2	2	316,891	31,689	285,202	55	262	5,185	23
Mixed Use 2 (Residential Apartments + Retail Base) - 90% / 10% desired split	122,646.99	12.26	>R15000	1.4	3	294,353	29,435	264,917	60	360	4,415	20
T.O.D 1 zone Mixed Use (With Residential) (90% / 10% desired split)	58,793.21	5.88	>R15000	0.7	5.0	235,173	23,517	211,656	60	600	3,528	16
T.O.D 2 zone Commercial Only (No Residential)	85,151.89	8.52		1.0	3.0	204,365	204,365					
General Business	849,495.97	84.95		9.5	0.8	611,637	611,637					
Light Industry	601,886.93	60.19		6.7	0.65	341,541	341,541					
Social Facilities	410,594.39	41.06		4.6	0.6	246,357	123,178					
Community Facility	40,431.64	4.04		0.5								
Transport: IRPTN Depot Site	37,525.95	3.75		0.4								
Open Space	3,139,189.42	313.92		35.1								
Open Space Servitudes	471,696.03	47.17		5.3								
Highway Planting	172,082.03	17.21		1.9								
Parks	106,708.98	10.67		1.2								
Servitudes	73,877.94	7.39		0.8								
Blackburn Reservoir	94,503.00	9.45		1.1								
Roads	1,640,030.86	164.00		18.4								
<b>TOTAL - PHASE 2</b>	<b>8,934,756.11</b>	<b>893</b>		<b>100</b>		<b>2,732,820</b>	<b>1,365,362</b>	<b>1,244,279</b>			<b>22,260</b>	<b>100</b>
Phase 1 A - Subsidised Housing - Approved		6.10									486	
Phase 1 B - Subsidised Housing - Approved		33									2,186	
Phase 1 B - Medium density Residential - Gap / Social Housing	9,888.26	1			0.9			8,899	55	160	158	
Marshall Dam Residential	73,105.17	9			0.45			40,500	55	100	731	
Cornubia Industrial and Business Estate - Approved		107			0.6		460,000					
Cornubia Retail Park - (Separate EIA)		34			0.6		169,500					
Phase 1 Open Space (Wetlands, buffers, steep areas and additional space)		113										
Phase 1 Parks and Playlots		3										
Phase 1 Servitudes		32										
SASA - Landholdings - (Excludes wetland area - Total SASA area 62Ha)	513,661.31	51										
SASA Open Space	110,500.35	11										
Blackburn Extent	277,103.04	28										
Ottawa Electrical Substation	90,691.40	9										
<b>TOTAL - REMAINDER OF CORNUBIA</b>	<b>1,074,949.53</b>	<b>437</b>					<b>629,500</b>	<b>49,399</b>			<b>3,561</b>	
<b>OVERALL TOTAL</b>	<b>10,009,705.64</b>	<b>1331</b>									<b>25,821</b>	

**TABLE 2**  
**CORNUBIA PHASE 2 - WATER DEMAND GENERATION**

	RESIDENTIAL		COMMERCIAL					INDUSTRIAL		
	Residential yield (Units)	Total Residential ADD (Ml/day)	Total Bulk (less 15% Internal Circulation) (m <sup>3</sup> )	Commercial Bulk (m <sup>2</sup> )	Residential Bulk (m <sup>2</sup> )	Residential Yield (units)	Commercial ADD (Ml/day)	Residential ADD (Ml/day)	Industrial Developable Area (m <sup>2</sup> )	Total Industrial ADD (Ml/day)
Medium Density Residential - Subsidised Duplex/Simplex Housing BNG	3,943	3.55	-	-	-	-	-	-	-	-
Medium Density Residential - Affordable	3,289	2.96	-	-	-	-	-	-	-	-
High Density Residential - Affordable	1,900	1.71	-	-	-	-	-	-	-	-
Mixed Use 1 - (Residential Apartments+Retail Base) 90/10 Split	-	-	316,891	31,689	285,202	5,185	0.15	6.22	-	-
Mixed Use 2 - (Residential Apartments+Retail Base) 90/10 Split	-	-	294,353	29,435	264,917	4,415	0.14	5.30	-	-
T.O.D Zone Mixed Use - Transit Orientated Development Zone 90/10 Split	-	-	235,173	23,517	211,656	3,528	0.11	4.23	-	-
T.O.D Zone Commercial Only - Transit Orientated Development Zone	-	-	204,365	204,365	-	-	0.98	-	-	-
General Business	-	-	611,637	611,637	-	-	2.94	-	-	-
Light Industry	-	-	-	-	-	-	-	-	341,541	1.23
Social Facility	-	-	123,178	123,178	-	-	0.59	-	-	-
<b>Totals</b>	<b>9131</b>	<b>8.22</b>	<b>1,785,596</b>	<b>1,023,822</b>	<b>761,775</b>	<b>13,128</b>	<b>4.91</b>	<b>15.75</b>	<b>341,541</b>	<b>1.23</b>

**TOTAL WATER ADD 30.12 Ml/day**

BASE DATA	Adopted Value	Residential Density	
ADF Medium Density Residential - Subsidised Duplex/ Simplex Housing (BNG)	750 l/day/unit	80 du/ha	Low Income - IYER LANDUSE SCHEDULE - TABLE 1
ADF Medium Density Gap Housing	750 l/day/unit	218 du/ha	Middle Income - IYER LANDUSE SCHEDULE - TABLE 1
ADF High Density Residential - Gap/Social Housing	750 l/day/unit	291 du/ha	Middle Income - IYER LANDUSE SCHEDULE - TABLE 1
ADF Mixed Use 1 Residential Apartments	1000 l/day/unit	262 du/ha	High Income - IYER LANDUSE SCHEDULE - TABLE 1
ADF Mixed Use 1 Retail	4 l/day/m <sup>2</sup>	-	
ADF Mixed Use 2 Residential Apartments	1000 l/day/unit	360 du/ha	High Income - IYER LANDUSE SCHEDULE - TABLE 1
ADF Mixed Use 2 Retail	4 l/day/m <sup>2</sup>	-	
ADF T.O.D Zone Mixed Use -Transit Orientated Development Zone Commercial	4 l/day/m <sup>2</sup>	-	
ADF T.O.D Zone Mixed Use -Transit Orientated Development Zone Residential	1000 l/day/unit	600 du/ha	High Income - IYER LANDUSE SCHEDULE - TABLE 1
ADF T.O.D Zone Commercial Only - Transit Orientated Development Zone	4 l/day/m <sup>2</sup>	-	
ADF General Business	4 l/day/m <sup>2</sup>	-	
ADF Light Industrial	3 l/day/m <sup>2</sup>	-	
ADF Social Facilities	4 l/day/m <sup>2</sup>	-	(schools, clinics, government offices, community halls and libraries)
Allowance for Losses 20%	1.2	-	

**NB: The above base data has been confirmed by Ms hope Joseph and Mr Speedy Moodliar of Ethekwini Water and Sanitation**

(ADF - Average Daily Flow)

(ADD - Average Daily Demand)

(No. of Units, Bulk Areas and Residential Density based on TABLE 1: Cornubia Phase 2 LUMS Precinct Plan Area Schedule - 2014-10-22)

**TABLE 3**  
**WATER STORAGE REQUIRED FOR PHASE 2**

Total ADD	30.12	Mℓ/day
Storage for ADD	2	days
48 Hour Storage Required	<b>60.23</b>	<b>Mℓ</b>

**TOTAL STORAGE 60.23 Mℓ**

**STORAGE FOR FIRE FLOW**

Fire Flow Residential	95	ℓ/s
Storage	2	hrs
Storage Required	0.68	Mℓ
Fire Flow Commercial	100	ℓ/s
Storage	2	hrs
Storage Required	0.72	Mℓ
Fire Flow Industrial	150	ℓ/s
Storage	4	hrs
Storage Required	2.16	Mℓ
<b>TOTAL STORAGE REQUIRED</b>	<b>3.56</b>	<b>Mℓ</b>

***NB: The 3.56 Mℓ storage required for fire flow will be allowed for in the 24hr spare capacity***

**TABLE 4  
CONTRIBUTIONS TO BLACKBURN STARTER CELL**

	<b>NO. OF UNITS</b>	<b>BULK AREA m<sup>2</sup></b>	<b>ADD (Mℓ/day)</b>
Phase 1A - Subsidised Housing	486	-	0.44
Phase 1B - Subsidised Housing	2186	-	1.97
Phase 1B - Housing - Gap/ Social Housing	158	-	0.14
Retail Park	-	169693	0.81
Phoenix 1 Res. Transfer	-	-	8.83
<b>TOTAL</b>	<b>2830</b>	<b>169693</b>	<b>12.20</b>

**TOTAL ADD** **12.20 Mℓ/day**

**BASE DATA**

ADF Medium Density Residential - Subsidised Duplex/ Simplex Housing (BNG)  
 ADF Medium Density Gap Housing  
 Retail Park  
 Losses 20%

**ADOPTED VALUE**

750 ℓ/day/unit  
 750 ℓ/day/unit  
 4 ℓ/day/m<sup>2</sup>  
 1.2

*Phoenix 1 Reservoir Transfer ADD - from Blackburn Reservoir  
 Modelling Report Project No. D294 compiled by Naidu Consulting*



**TABLE 6  
CORNUBIA PHASE 2 - SEWER FLOW GENERATION**

	RESIDENTIAL				COMMERCIAL							INDUSTRIAL		TOTAL
	Net Developable area (ha)	Residential Density (du/ha)	Residential yield (Units)	ADF (Ml/day)	Bulk Area (m <sup>2</sup> )	Commercial bulk (m <sup>2</sup> )	Residential bulk (m <sup>2</sup> )	Size of Units	Residential yield (Units)	Commercial ADF (Ml/day)	Commercial Residential ADF (Ml/day)	Light Industrial Bulk (m <sup>2</sup> )	ADF (Ml/day)	ADF (Ml/day)
<b>SEWER TREATED AT PHOENIX WWTW (NORTHERN CATCHMENTS)</b>														
<b>Catchment 1A</b>														
Medium Density Residential - Subsidised Duplex / Simplex Housing (BNG)	41.60	80	2 662	2.30	-	-	-	50	-	-	-	-	-	-
Medium Density Residential - Affordable	4.31	218	940	0.81	-	-	-	55	-	-	-	-	-	-
High Density Residential - Affordable	1.64	291	477	0.55	-	-	-	55	-	-	-	-	-	-
T.O.D 1 Mixed Use (90-10 split)	5.10	-	-	-	51 000	5 100	45 900	60	3060	0.03	3.52	-	-	-
General Business	38.68	-	-	-	386 800	386 800	-	-	-	2.00	-	-	-	-
Social Facilities	21.60	-	-	-	216 000	216 000	-	-	-	1.12	-	-	-	-
Mixed Use 1 (90-10 Split)	10.69	-	-	-	106 900	10 690	96 210	55	2799	0.06	3.22	-	-	-
Mixed Use 2 (90-10 Split)	12.26	-	-	-	122 600	12 260	110 340	60	4414	0.06	5.08	-	-	-
Community facility	1.12	-	-	-	11 200	11 200	-	-	-	0.06	-	-	-	-
<b>Catchment totals</b>	<b>137.00</b>	<b>-</b>	<b>4 080</b>	<b>3.66</b>	<b>894 500</b>	<b>642 050</b>	<b>252 450</b>	<b>-</b>	<b>10272</b>	<b>3.32</b>	<b>11.81</b>	<b>-</b>	<b>-</b>	<b>18.79</b>
<b>Catchment 1B</b>														
Medium Density Residential - Subsidised Duplex / Simplex Housing (BNG)	0.71	80	45	0.04	-	-	-	50	-	-	-	-	-	-
Medium Density Residential - Affordable	10.77	218	2 350	2.03	-	-	-	55	-	-	-	-	-	-
High Density Residential - Affordable	4.89	291	1 423	1.64	-	-	-	55	-	-	-	-	-	-
General Business	2.07	-	-	-	20 700	20 700	-	-	-	0.11	-	-	-	-
Social Facilities	7.72	-	-	-	77 200	77 200	-	-	-	0.40	-	-	-	-
Community Facility	0.14	-	-	-	1 400	1 400	-	-	-	0.01	-	-	-	-
<b>Catchment totals</b>	<b>26.30</b>	<b>-</b>	<b>3 818</b>	<b>3.70</b>	<b>99 300</b>	<b>99 300</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>0.51</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>4.22</b>
<b>Catchment 2</b>														
Medium Density Residential - Subsidised Duplex / Simplex Housing (BNG)	8.22	80	526	0.45	-	-	-	50	-	-	-	-	-	-
Community Facility	1.76	-	-	-	17 600	17 600	-	-	-	0.09	-	-	-	-
T.O.D 2 Commercial	2.51	-	-	-	25 100	25 100	-	-	-	0.13	-	-	-	-
Light Industrial	16.79	-	-	-	-	-	-	-	-	-	-	167 900	0.39	-
<b>Catchment totals</b>	<b>29.28</b>	<b>-</b>	<b>526</b>	<b>0.45</b>	<b>42 700</b>	<b>42 700</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>0.22</b>	<b>-</b>	<b>167 900</b>	<b>0.39</b>	<b>1.06</b>
<b>Catchment 3</b>														
Light Industrial	12.23	-	-	-	-	-	-	-	-	-	-	122 300	0.28	-
<b>Catchment totals</b>	<b>12.23</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>122 300</b>	<b>0.28</b>	<b>0.28</b>
<b>Catchment 4</b>														
Medium Density Residential - Subsidised Duplex / Simplex Housing (BNG)	11.07	80	708	0.61	-	-	-	50	-	-	-	-	-	-
Social Facilities	4.56	-	-	-	45 600	45 600	-	-	-	0.24	-	-	-	-
T.O.D 2 Commercial	3.87	-	-	-	38 700	38 700	-	-	-	0.20	-	-	-	-
General Business	16.90	-	-	-	169 000	169 000	-	-	-	0.87	-	-	-	-
Light Industrial	28.80	-	-	-	-	-	-	-	-	-	-	288 000	0.66	-
Community Facility	1.01	-	-	-	10 100	10 100	-	-	-	0.05	-	-	-	-
IRPTN Depot	3.75	-	-	-	37 500	37 500	-	-	-	0.19	-	-	-	-
<b>Catchment totals</b>	<b>69.96</b>	<b>-</b>	<b>708</b>	<b>0.61</b>	<b>300 900</b>	<b>300 900</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1.56</b>	<b>-</b>	<b>288 000</b>	<b>0.66</b>	<b>2.83</b>
<b>Catchment 5</b>														
Mixed Use 1 (90-10 Split)	6.12	-	-	-	61 200	6 120	55080.00	55	1602	0.03	1.84	-	-	-
T.O.D 1 Mixed Use (90-10 split)	0.78	-	-	-	7 800	780	7020.00	60	468	0.00	0.54	-	-	-
<b>Catchment totals</b>	<b>6.90</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>69 000</b>	<b>6 900</b>	<b>62100.00</b>	<b>-</b>	<b>2070</b>	<b>0.04</b>	<b>2.38</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>TOTALS FOR NORTHERN CATCHMENT</b>	<b>281.67</b>	<b>-</b>	<b>9 132</b>	<b>8.42</b>	<b>1 337 400</b>	<b>1 084 950</b>	<b>252 450</b>	<b>-</b>	<b>12343</b>	<b>5.65</b>	<b>11.81</b>	<b>578 200</b>	<b>1.33</b>	<b>27.18</b>

**TOTAL SEWER FLOW TO PHOENIX WWTW** 27.18 M/day

<b>SEWER TREATED AT KWAMASHU WWTW (SOUTHERN CATCHMENT)</b>														
<b>Catchment 6</b>														
Mixed Use 1 (90-10 Split)	3.00	-	-	-	30 000	3 000	27 000	55	785	0.02	0.90	-	-	-
T.O.D Commercial	2.14	-	-	-	21 400	21 400	-	-	-	0.11	-	-	-	-
General Business	27.32	-	-	-	273 200	273 200	-	-	-	1.41	-	-	-	-
Light Industrial	2.37	-	-	-	-	-	-	-	-	-	-	23 700	0.05	-
Social Facilities	7.17	-	-	-	71 700	71 700	-	-	-	0.37	-	-	-	-
<b>TOTAL FOR SOUTHERN CATCHMENT</b>	<b>42.00</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>396 300</b>	<b>369 300</b>	<b>27 000</b>	<b>-</b>	<b>785</b>	<b>1.91</b>	<b>0.90</b>	<b>23 700</b>	<b>0.05</b>	<b>2.87</b>
<b>OVERALL TOTAL i.e. Northern + Southern Catchment</b>	<b>323.67</b>	<b>-</b>	<b>9 132</b>	<b>8.42</b>	<b>1 733 700</b>	<b>1 706 700</b>	<b>279 450</b>	<b>-</b>	<b>13128</b>	<b>7.56</b>	<b>12.72</b>	<b>601 900</b>	<b>1.38</b>	<b>30.05</b>

**TOTAL SEWER FLOW TO KWAMASHU WWTW** 2.87 M/day  
**OVERALL SEWER FLOW TOTAL FOR PHASE 2 OF CORNUBIA** 30.05 M/day

**BASE DATA**

	Adopted Value	Residential Density/Size of Unit
ADF Medium Density Residential - Subsidised Duplex/ Simplex Housing (BNG)	750 l/day/unit	80 du/ha
ADF Medium Density Gap Housing	750 l/day/unit	218 du/ha
ADF High Density Residential - Gap/Social Housing	1000 l/day/unit	291 du/ha
ADF Mixed Use 1 Residential Apartments	1000 l/day/unit	262 du/ha
ADF Mixed Use 1 Retail	4.5 l/day/m <sup>2</sup>	-
ADF Mixed Use 2 Residential Apartments	1000 l/day/unit	360 du/ha
ADF Mixed Use 2 Retail	4.5 l/day/m <sup>2</sup>	-
ADF T.O.D Zone Mixed Use -Transit Orientated Development Zone Commercial	4.5 l/day/m <sup>2</sup>	-
ADF T.O.D Zone Mixed Use -Transit Orientated Development Zone Residential	1000 l/day/unit	600 du/ha
ADF T.O.D Zone Commercial Only - Transit Orientated Development Zone	4.5 l/day/m <sup>2</sup>	-
ADF General Business	4.5 l/day/m <sup>2</sup>	-
ADF Light Industrial	2 l/day/m <sup>2</sup>	-
ADF Social Facilities	4.5 l/day/m <sup>2</sup>	-
Allowance for Infiltration 15%	1.15	-

Medium Density Residential - Subsidised Duplex / Simplex Housing (BNG)
Medium Density Residential - Affordable
High Density Residential - Affordable
Mixed Use 1 (Residential Apartments + Retail Base) - 90% / 10% desired split
Mixed Use 2 (Residential Apartments + Retail Base) - 90% / 10% desired split
T.O.D 1 zone Mixed Use (With Residential) (90% / 10% desired split)
(schools, clinics, government offices, community halls and libraries)

AVG FAR
0.4
1.5
2.0
2
3
5.0
3.0
0.8
0.65
0.6

**NB: The above base data has been confirmed by Ms Precious Mbhele of Ethekwini Water and Sanitation**  
(ADF - Average Daily Flow)  
(ADD - Average Daily Demand)  
(No. of Units, Bulk Areas and Residential Density based on TABLE 1: Cornubia Phase 2 LUMS Precinct Plan Area Schedule - 2014-11-03)



## APPENDIX C1

### CORRESPONDENCE FOR SEWER

## Moodley, Radeshni

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**From:** Precious Mbhele <Precious.Mbhele@durban.gov.za>  
**Sent:** 30 June 2014 03:01 PM  
**To:** Moodley, Radeshni  
**Cc:** Viljoen, Etienne  
**Subject:** RE: DH0003-1-2-3: Phoenix and KwaMashu WWTW

Hi Radeshni,

Please see my response in red below.

Regards  
Precious

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**From:** Moodley, Radeshni [<mailto:Radeshni.Moodley@smec.com>]  
**Sent:** 27 June 2014 04:16 PM  
**To:** Precious Mbhele  
**Cc:** Viljoen, Etienne  
**Subject:** DH0003-1-2-3: Phoenix and KwaMashu WWTW

Good Afternoon Precious,

We are currently preparing an engineering services report for Phase 2 of Cornubia. It would be much appreciated if you could confirm if the latest information we have regarding the Phoenix and KwaMashu WWTW are accurate.

Our latest information states the following:

### PHOENIX WWTW

- Operating (design) capacity - 25 MI/day. **Confirmed**
- Current yearly average operating load - 18 MI/day. **Confirmed**
- Spare capacity - 0 MI/day (Sludge handling facilities has restricted the works to 18 MI/day). **Confirmed**

Our information states that currently EWS is busy constructing further sludge handling facilities to meet the 7MI/day shortfall. **The completion of construction of the sludge dewatering and digestion facilities is anticipated in mid 2015.**

There is a proposed upgrade to 50 MI/day by 2017. **If all is going as planned this work should be complete by 2016 (Will this upgrade be on the current site?) Yes.**thereafter a proposed upgrade to ultimately 90 MI/day. **The proposed ultimate is 100MI/day subject to the current land issue being resolved between eThekwin and Tongaat Hulett.**

### KWAMASHU WWTW

- Operating (design) capacity - 65 MI/day. **confirmed**
- Current yearly average operating load - 59 MI/day. **confirmed**
- Spare capacity - 6.4 MI/day. **There are often problems with the old plant so it is safer to estimate 5MI/day**
- Proposed Upgrade to - 80 MI/day ultimate (by 2015) **75MI/day, 80MI/day would be achieved if the old plant was operating well.**

Please could you verify if the above information we have is accurate and in accordance with EWS current planning

Thank You.

Regards,

**Radeshni Moodley** | Graduate Engineer, Urban Development  
**SMEC South Africa**

2 The Crescent, Westway Office Park, Westville, South Africa, 3629

T +27 (31) 277 6745 | F +27 (31) 277 6700

[radeshni.moodley@smec.com](mailto:radeshni.moodley@smec.com) | [www.smec.com](http://www.smec.com) | [LinkedIn](#)

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