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DRAFT BASIC ASSESSMENT REPORT CONSTRUCTION OF THE MIDDLEDRIFT WATER SUPPLY SCHEME KING CETSHWAYO DISTRICT MUNICIPALITY EIA REF NO: DC28/0007/2019

KING CETSHWAYO DISTRICT MUNICIPALITY

EYETHU ENGINEERS
Consulting Engineers & Project Managers

EVP1138

This report was prepared by EnviroPro Environmental Consulting in terms of Appendix 1 to GNR 982

3 (1) (a) details of (i) the EAP who prepared the report; and (ii) the expertise of the EAP. Please see Appendix I for EAP Declaration and full Curriculum Vitae;

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Tertiary Education:	BSc (Hons)	Zoology
	MSc	By thesis in estuarine fish ecology.
Work Experience:	2001 – 2002	MSc formed part of EIA for National Ports Authority
	2003 – 2010	Senior Manager for KSEMS cc.
	2010 – Present	Managing Member of EnviroPro Environmental Consulting

Iain Jourdan BSocSci (Hons) (Dbn)

Tertiary Education:	BSc (Hons)	Geographical Science
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	2010 – Present	Managing Member of EnviroPro Environmental Consulting

Anthony Mader BSc (Hons)

Tertiary Education:	BSc (Hons)	Ecology, Environment, and Conservation
	PhD	(Currently Completing)
Work Experience:	2015	Research Assistant at the Ecological Engineering and Phytotechnologies Program (EEPP), University of the Witwatersrand
	2017 - Present	Environmental Consultant at EnviroPro

Executive Summary

The King Cetshwayo District Municipality propose to upgrade the bulk water supply and reticulation to Middledrift Water Supply Scheme (WSS) for Sub Supply Area 3 (SSA 3). The Middeldrift WSS has been previously authorized (DC28/0030/2012). This report is a resubmission due to a change in pipeline layout. The increase and decrease in community density in various parts of the Middeldrift WSS footprint accounts for this change in pipeline layout. The Middledrift SSA 3 is located in Ward 13 and Ward 14, Nkandla Local Municipality within the King Cetshwayo District Municipality. Water for the supply scheme will be obtained from the Thukela-Mhlathuze Transfer Scheme or the Nsuze River and pumped to the Middledrift water treatment works. The Middledrift SSA 3 is an existing bulk water supply and reticulation network that is currently being utilised by the public. However the existing infrastructure was designed to meet RDP level service, which does not allow for yard connection. The area boundary is identified by the Nsuze River to the east, uThukela River in the west and the Nkandla Forest to the north. The entire supply area is approximately 6 100 hectares and includes the construction of:

- 15km, 200Ø pipeline serving the regional bulk supply to SSA 3;
- 90Ø to 50Ø bulk main pipelines;
- 174km pipework comprising of pipelines ranging from 160Ø to 25Ø diameter; and
- Reservoirs at eight (8) locations with a capacity ranging from 100 – 450kl.

The pipeline route where possible, will run along the road reserve. The pipeline trench will be up to 1.5m wide and 2-4m deep. This pipeline will cross 72 watercourses.

The following key impacts and mitigation measures were assessed:

- **Damage to watercourse banks, wetland areas, and riparian zones from construction activity:** Caution must be exercised when working near and within all watercourses (WC1-72). Top soil must be stockpiled more than 32m from the watercourse and wetland areas. Heavy vehicles must be kept at least 32m away from the watercourses and wetlands except where needed for pipeline construction. The construction footprint within WC1-WC72 must not be widened more than is necessary for construction.
- **Encroachment of alien vegetation into areas disturbed during construction:** Alien vegetation within the construction footprint must not be allowed to encroach onto the site footprint area and must be continually removed during construction.
- **Damage to Surrounding properties, services and businesses:** The construction activity could disrupt access to existing services, and residential properties. All services must be identified prior to construction and all stakeholders must be notified prior to road closures and service disruption. Temporary alternative access routes for affected properties must be created where required.
- **Pipeline impeding or altering flow of the watercourses:** The pipes within the watercourse will be laid below the level of the river bed and encased in concrete. Reno Mattresses will be laid above the encasement and gabion baskets will be used to stabilise the banks of the river (if required). Where heavy stream flow is anticipated, the crossing will be anchored with the use of irons dowled into the river bed.
- **Loss of vegetation and riparian vegetation during excavation across watercourses:** No protected species of conservation significance were noted along the pipeline route. Vegetation clearing is to be kept to a minimum due to the small size of the pipe and associated trench. Where possible, the trench must be dug by hand across the watercourses to prevent unnecessary clearance. The potential for erosion is to be monitored by the Contractor on an ongoing basis during clearing.
- **Improved services:** The water supply scheme will improve service delivery to the area increasing the potable water supply for future expansion of the area. This is a positive impact.

These impacts can be mitigated by following the recommendations in this report and EMPr. Construction activities will be monitored and controlled through the implementation of the Environmental Management Program (EMPr).

Taking into consideration the above impacts and mitigation measures, it is the EAP's opinion that there are no significant environmental impacts associated with the proposal which cannot be mitigated. Therefore, it is recommended that the project be authorised.

Contents

Appendices

Section 1: Scope of Work and Location of Activity

1.1 Project Title

Construction of the Middeldrift Water Supply Scheme.

1.2 A Description of the Activities to Be Undertaken Including Associated Structure and Infrastructure As per Section 3(d) (ii)

The King Cetshwayo District Municipality propose to upgrade the bulk water supply and reticulation to Middledrift Water Supply Scheme (WSS) for Sub Supply Area 3 (SSA 3). The Middledrift SSA 3 is located in Ward 13 and Ward 14, Nkandla Local Municipality within the King Cetshwayo District Municipality. Water for the supply scheme will be obtained from the Thukela-Mhlathuze Transfer Scheme or the Nsuze River and pumped to the Middledrift water treatment works. The Middledrift SSA 3 is an existing bulk water supply and reticulation network that is currently being utilised by the public. However the existing infrastructure was designed to meet RDP level service, which does not allow for yard connection. The area boundary is identified by the Nsuze River to the east, uThukela River in the west and the Nkandla Forest to the north. The entire supply area is approximately 6 100 hectares and includes the construction of:

- 15km, 200Ø pipeline serving the regional bulk supply to SSA 3;
- 90Ø to 50Ø bulk main pipelines;
- 174km pipework comprising of pipelines ranging from 160Ø to 25Ø diameter; and
- Reservoirs at eight (8) locations with a capacity ranging from 100 – 450kl.

Where possible, the pipeline route where possible, will run along road reserves. The pipeline trench will be up to 1.5m wide and 2-4m deep. The portions of the pipeline that cross watercourses require environmental authorisation, for the sections located within (and within 32m of) a watercourse that require the infilling /excavation of more than $10m^3$ of material and for the larger watercourse crossings that may exceed a footprint area of $100m^2$ within the watercourse. There are seventy-two (72) watercourse crossings (WC) proposed, of which eighteen (18) have associated wetland that will be affected by the pipeline crossing. This report and EMPr focus on these sections of the pipeline.

The construction of the Middeldrift WSS will have a positive impact for local potable water access for the residents living in this area. The King Cetshwayo District Municipality believes that the construction of the pipeline will improve the longevity of this essential public service for the residents of Middeldrift.

1.3 Description Of Feasible Alternatives As Per Section 3(h)(i)

Technology/ Pipeline Design Alternatives

The aim of the project is to increase the reliable, potable water supply to this area with as little environmental and infrastructural disturbance/impact as possible. No alternative pipe routes or crossing points were considered as an alternatives would increase the number of watercourse crossings and the extent of trench excavation required. Different pipe crossing technology/designs were investigated.

Casing the pipe in steel and concrete and running it under the bed of the watercourses under the water level is the preferred alternative to constructing pipe bridges across the watercourses.

See Appendix A for Engineering Drawings.

The No Go Alternative

The construction of the Middeldrift WSS will not occur thereby compromising the supply of an increased demand for water by community members within the Middeldrift area. A new water supply route will still be required to meet future water service demands should this upgrade not be authorised. With the current and anticipated increase in water users in the Middeldrift area at present and in the near future, this will place increased pressure on the existing water service infrastructure in this area.

See Appendix A for Engineering Drawings.

1.4 All Listed And Specific Activities To Be Triggered And Being Applied For As Per Section 3(d)(i)

GNR	Activity Number	Activity as per the legislation	Activity as it applies to the proposal
LN 1 of 2014 EIA Reg. as amended.	12	*The development of—* *(ii) infrastructure or structures with a physical footprint of 100 square metres or more;* *where such development occurs—* *(a) within a watercourse;*	Some of the larger watercourse crossings will entail the development of more than 100m^2 of infrastructure within 32m of a watercourse in a rural area.
LN 1 of 2014 EIA Reg. as amended.	19.	*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;*	The applicant proposes to construct the pipeline through 72 watercourses. This activity will result in more than 10m^3 of material being moved within the watercourse.
LN 1 of 2014 EIA Reg. as amended.	45.	*The expansion of infrastructure for the bulk transportation of water or storm water where the existing infrastructure—* *(i) has an internal diameter of 0,36 metres or more; or* *(ii) has a peak throughput of 120 litres per second or more; and* *(a) where the facility or infrastructure is expanded by more than 1 000 metres in length; or* *(b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more;*	The applicant proposes to construct 15km of pipeline with a diameter greater than 0.36m.

1.5 Location Of Activity As Per Section 3 (b)(i)-(iii)

District Municipality	King Cetshwayo District Municipality	
Local Municipality	Nkandla Local Municipality	
Ward	Ward 13 and Ward 14	
Area / Town / Village	17km north-east of Kranskop	
Co-ordinates:	**Latitude**	**Longitude**
Starting point:	28°47’30.59”S	31°02’31.93”E
End point:	28°47’19.87”S	31°03’55.47”E
WC 1:	28°49'59.74"S	31° 3'49.64"E
WC 2:	28°50'13.10"S	31° 3'7.37"E
WC 3:	28°49'57.59"S	31° 2'19.23"E
WC 4:	28°49'55.26"S	31° 1'49.51"E
WC 5:	28°49'58.45"S	31° 1'46.57"E
WC 6:	28°50'14.03"S	31° 1'27.53"E
WC 7:	28°50'17.72"S	31° 1'22.33"E
WC 8:	28°50'41.26"S	31° 1'5.78"E
WC 9:	28°50'46.04"S	31° 0'58.06"E
WC 10:	28°50'51.54"S	31° 0'22.81"E
WC 11:	28°50'50.57"S	31° 0'11.12"E
WC 12:	28°50'46.49"S	30°59'54.62"E
WC 13:	28°50'38.89"S	30°59'35.72"E
WC 14:	28°47'41.74"S	31° 3'10.58"E
WC 15:	28°47'48.40"S	31° 2'43.18"E
WC 16:	28°47'48.89"S	31° 2'42.60"E
WC 17:	28°50'36.51"S	30°58'47.92"E
WC 18:	28°49'42.48"S	30°58'22.61"E
WC 19:	28°49'16.95"S	30°58'59.78"E

WC 20:	28°49'11.84"S	30°59'9.23"E
WC 21:	28°49'6.91"S	30°59'21.18"E
WC 22:	28°48'58.49"S	30°59'26.37"E
WC 23:	28°48'54.43"S	30°59'26.74"E
WC 24:	28°48'38.20"S	30°59'21.94"E
WC 25:	28°48'26.54"S	30°59'18.07"E
WC 26:	28°49'28.42"S	31° 1'45.59"E
WC 27:	28°49'29.25"S	31° 1'44.84"E
WC 28:	28°49'30.96"S	31° 1'44.07"E
WC 29:	28°49'31.36"S	31° 1'43.92"E
WC 30:	28°49'34.87"S	31° 1'47.87"E
WC 31:	28°49'15.68"S	31° 1'21.36"E
WC 32:	28°49'15.50"S	31° 1'24.36"E
WC 33:	28°48'50.52"S	31° 0'52.84"E
WC 34:	28°48'50.08"S	31° 0'49.04"E
WC 35:	28°48'49.63"S	31° 0'46.04"E
WC 36:	28°48'53.81"S	31° 0'56.28"E
WC 37:	28°48'55.85"S	31° 0'57.37"E
WC 38:	28°48'53.04"S	31° 2'16.33"E
WC 39:	28°48'34.77"S	31° 1'32.39"E
WC 40:	28°47'31.93"S	31° 2'59.26"E
WC 41:	28°47'27.17"S	31° 2'55.56"E
WC 42:	28°48'42.72"S	31° 2'28.82"E
WC 43:	28°48'31.58"S	31° 3'57.69"E
WC 44:	28°48'48.52"S	31° 1'4.85"E
WC 45:	28°49'19.10"S	31° 1'7.23"E
WC 46:	28°47'14.05"S	31° 3'5.26"E
WC 47:	28°47'14.64"S	31° 3'4.74"E
WC 48:	28°47'25.98"S	31° 2'53.15"E
WC 49:	28°47'18.68"S	31° 3'15.93"E
WC 50:	28°47'13.56"S	31° 3'25.35"E
WC 51:	28°47'13.99"S	31° 3'28.58"E
WC 52:	28°47'15.13"S	31° 3'36.94"E
WC 53:	28°47'31.14"S	31° 3'11.39"E
WC 54:	28°47'32.72"S	31° 3'9.94"E
WC 55:	28°47'34.30"S	31° 3'8.86"E
WC 56:	28°49'14.00"S	30°59'21.19"E
WC 57:	28°49'15.23"S	30°59'32.97"E
WC 58:	28°49'14.93"S	30°59'43.40"E
WC 59:	28°48'26.15"S	30°59'55.59"E
WC 60:	28°48'23.36"S	30°59'56.80"E
WC 61:	28°48'13.59"S	30°59'18.31"E
WC 62:	28°48'12.21"S	30°59'17.20"E
WC 63:	28°48'7.87"S	31° 3'11.83"E
WC 64:	28°48'6.74"S	31° 3'17.47"E
WC 65:	28°48'0.19"S	31° 3'14.40"E
WC 66:	28°50'37.53"S	31° 3'19.31"E
WC 67:	28°49'43.57"S	31° 3'59.93"E
WC 68:	28°48'17.71"S	31° 4'17.83"E
WC 69:	28°49'25.76"S	30°58'43.01"E
WC 70:	28°49'28.82"S	31° 2'45.50"E
WC 71:	28°50'30.21"S	31° 3'18.83"E
WC 72:	28°49'28.89"S	30°58'36.52"E
Abstraction point	28°49'16.66"S	31° 4'11.93"E
Property Description:	**Parent Farm:**	**Farm Portion:**
	Farm Reserve No. 19, Farm No. 15839	Portion 24
		Portion 28

Figure 1 below provides a topographical overview of the pipeline route. Figures 6- 31 provide illustrations of each watercourse crossing point along the route.

Figure 1: 1:50 000 Map Indicating the Location of the Middeldrift Water Supply Scheme (Red Line).

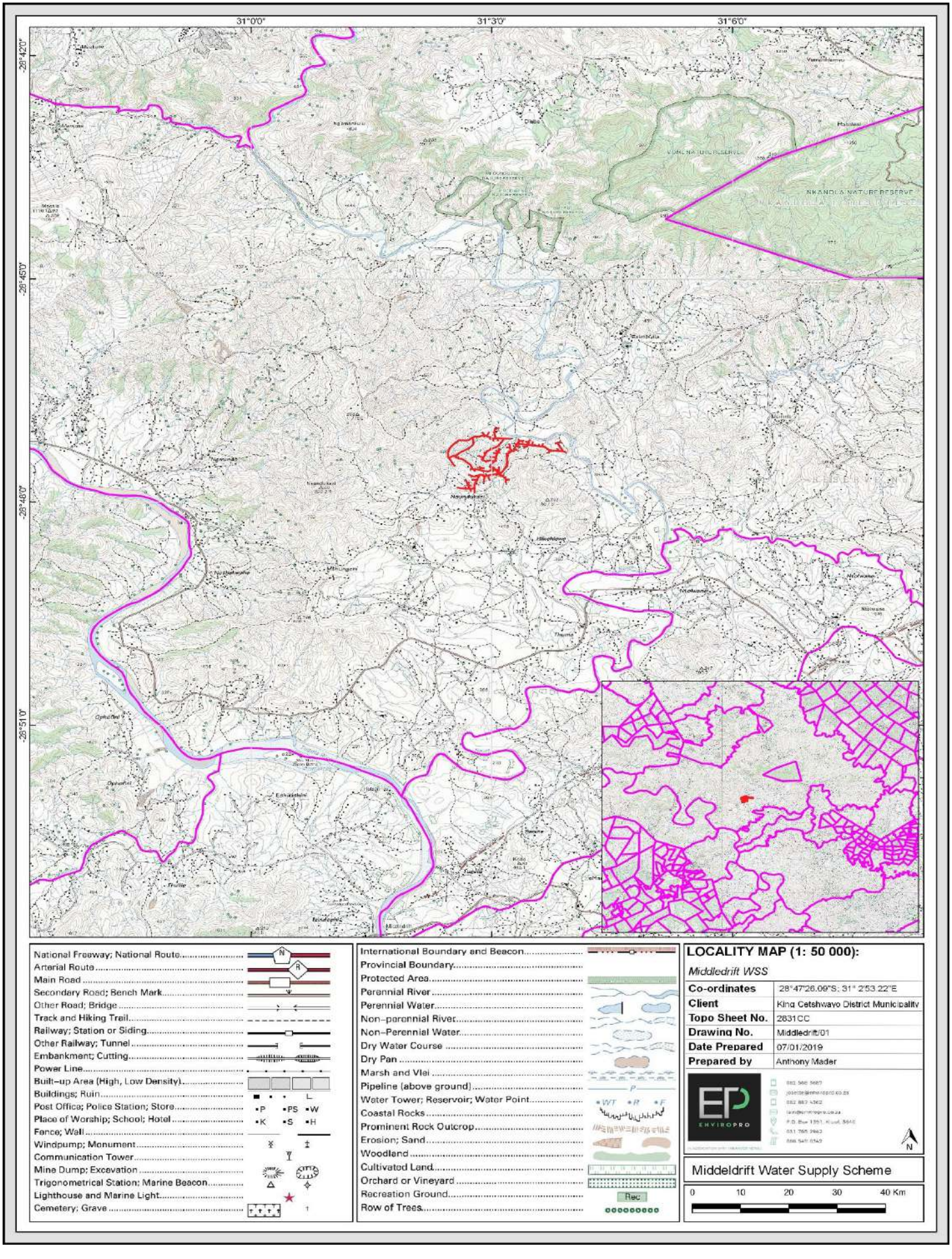


FIGURE 2: Aerial Photograph Showing an Overview of the Middeldrift Water Supply Scheme Pipeline Layout (red lines). QGIS, version 3.4.

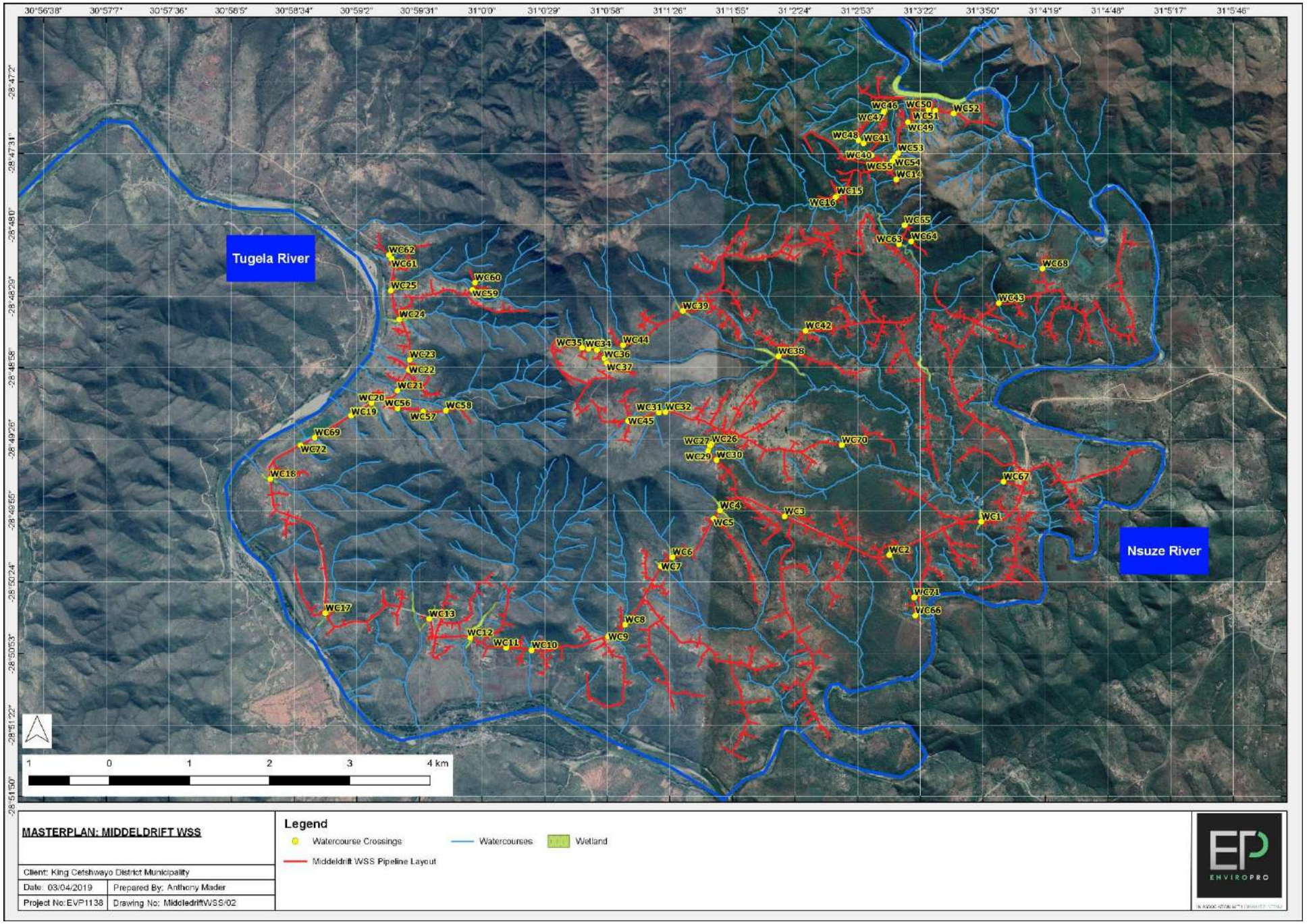


Figure 3: Aerial Photograph Showing an Overview of the Middeldrift Water Supply Scheme (Northern Section). QGIS, version 3.4.

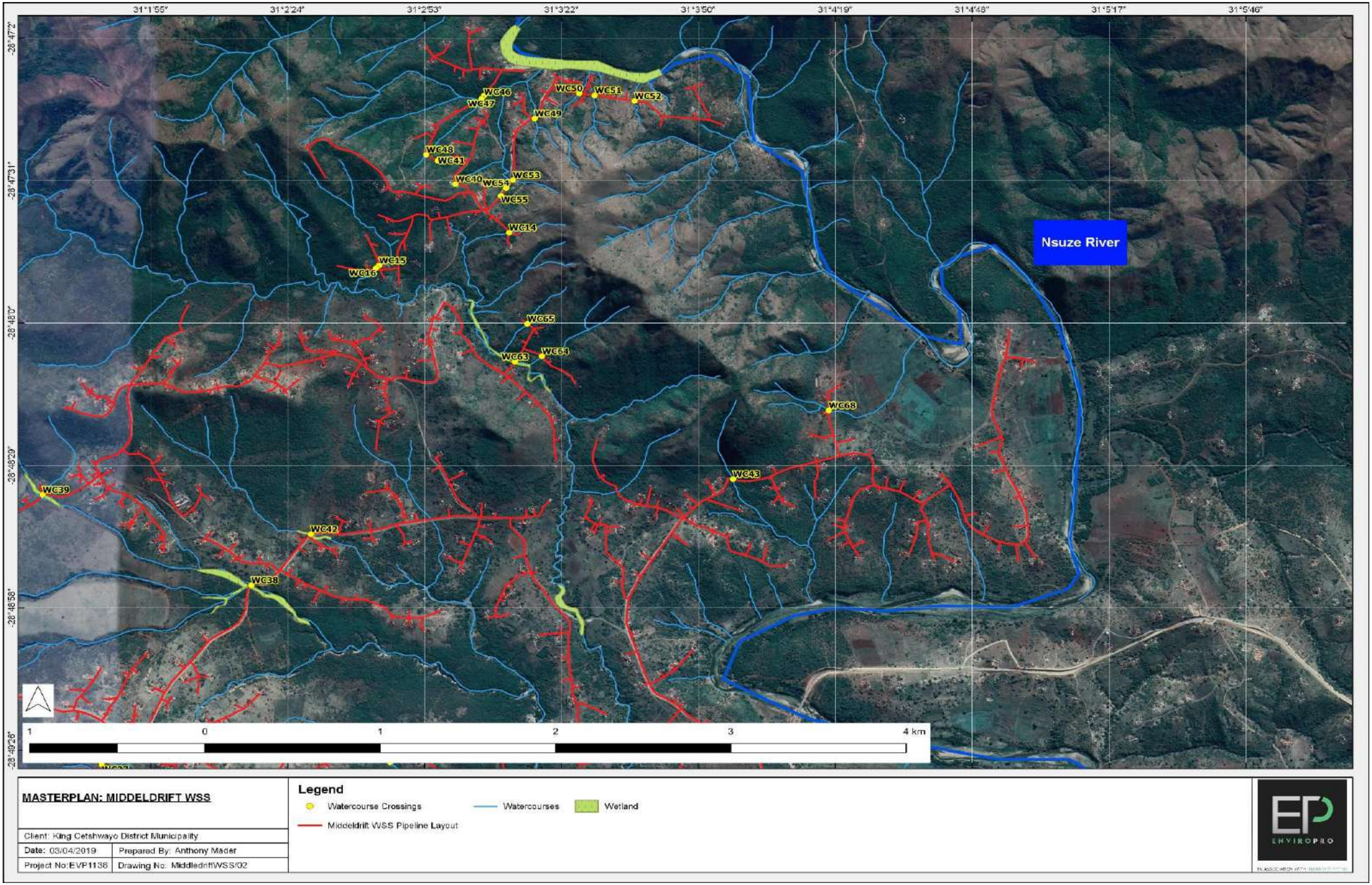


Figure 4: Aerial Photograph Showing an Overview of the Middeldrift Water Supply Scheme (Eastern Section). QGIS, version 3.4.

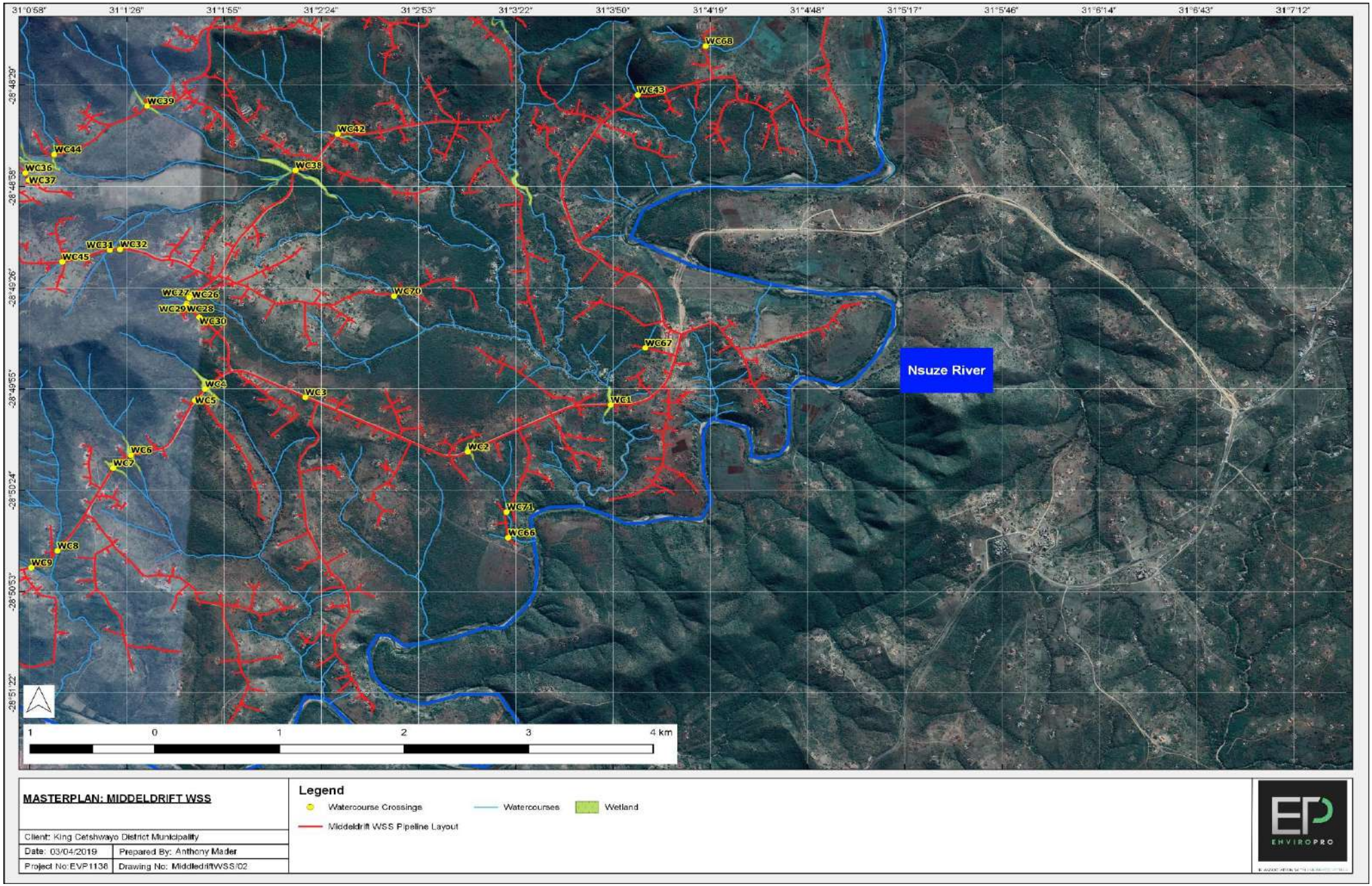


Figure 5: Aerial Photograph Showing an Overview of the Middeldrift Water Supply Scheme (Western Section). QGIS, version 3.4.

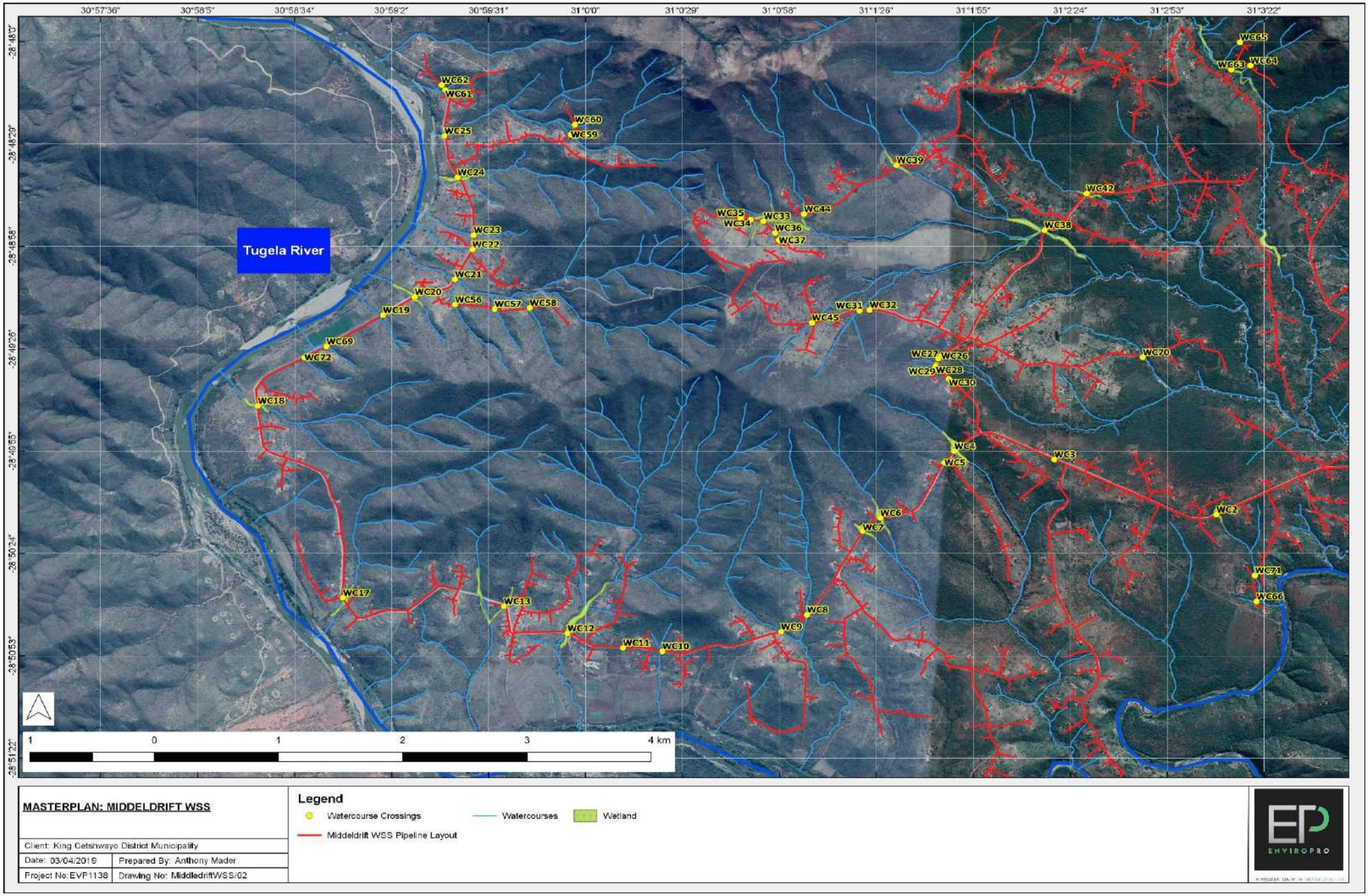


Figure 6: Aerial Photograph Showing the location of WC1 (28°49'59.74"S; 31°3'49.64"E) and WC67 (28°49'43.57"S; 31°3'59.93"E). QGIS, version 3.4.

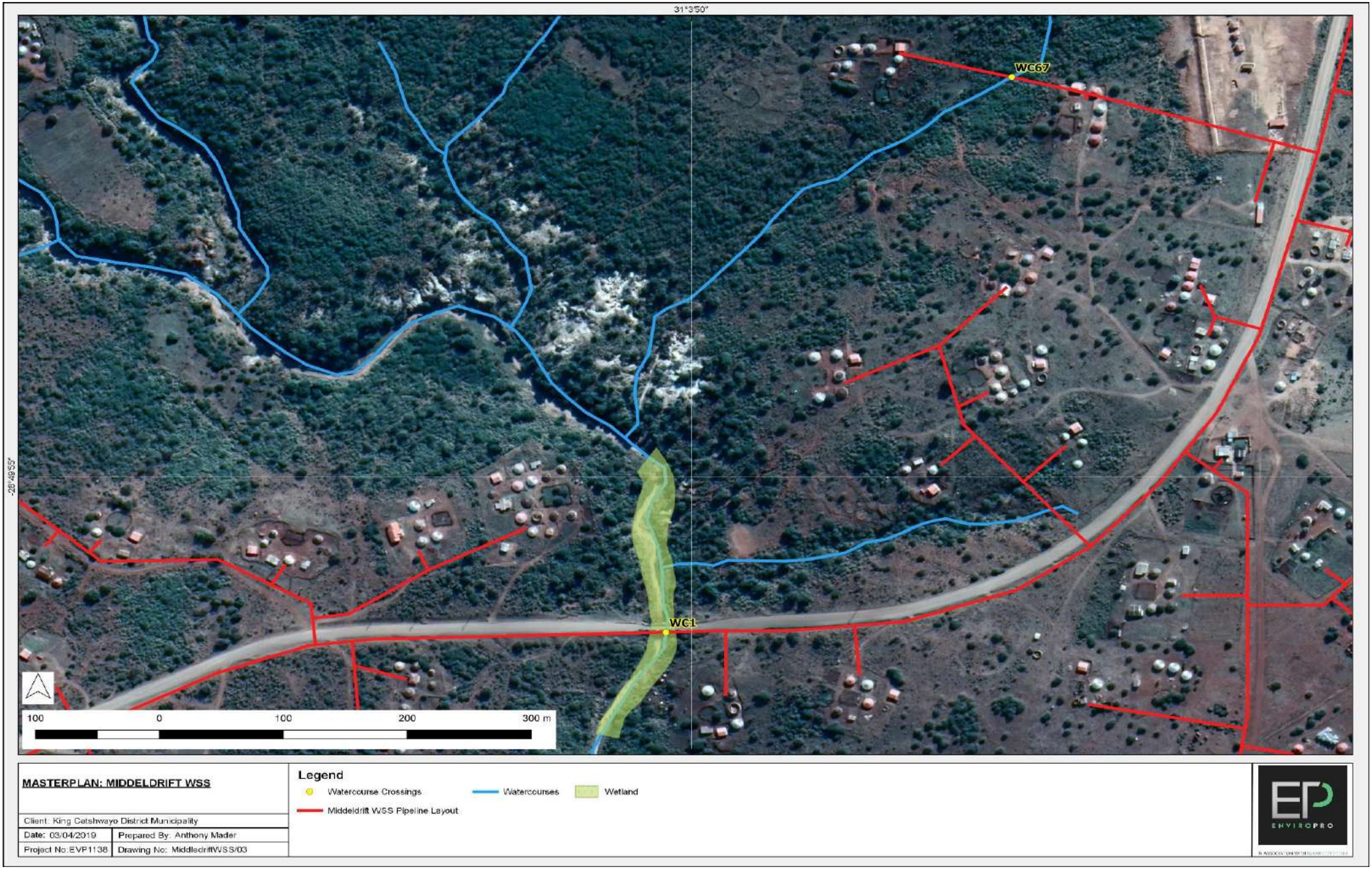


Figure 7: Aerial Photograph Showing the location of WC2 (28°50'13.10"S; 31°3'7.37"E). QGIS, version 3.4.

Figure 7: Aerial Photograph Showing the location of WC3 (28°49'57.59"S; 31°2'19.23"E). QGIS, version 3.4.

Figure 9: Aerial Photograph Showing the location of WC4 (28°49'55.26"S; 31°1'49.51"E) and WC5 (28°49'58.45"S; 31°1'46.57"E). QGIS, version 3.4.

Figure 10: Aerial Photograph Showing the location of WC6 (28°50'14.03"S; 31°1'27.53"E) and WC7 (28°50'17.72"S; 31°1'22.33"E). QGIS, version 3.4.

Figure 11: Aerial Photograph Showing the location of WC8 (28°50'41.26"S; 31°1'5.78"E) and WC9 (28°50'46.04"S; 31°0'58.06"E). QGIS, version 3.4.

Figure 12: Aerial Photograph Showing the location of WC10 (28°50'51.54"S; 31°0'22.81"E). QGIS, version 3.4.

Figure 13: Aerial Photograph Showing the location of WC11 (28°50'50.57"S; 31°0'11.12"E), WC12 (28°50'46.49"S; 30°59'54.62"E), WC13 (28°50'38.89"S; 30°59'35.72"E). QGIS, version 3.4.

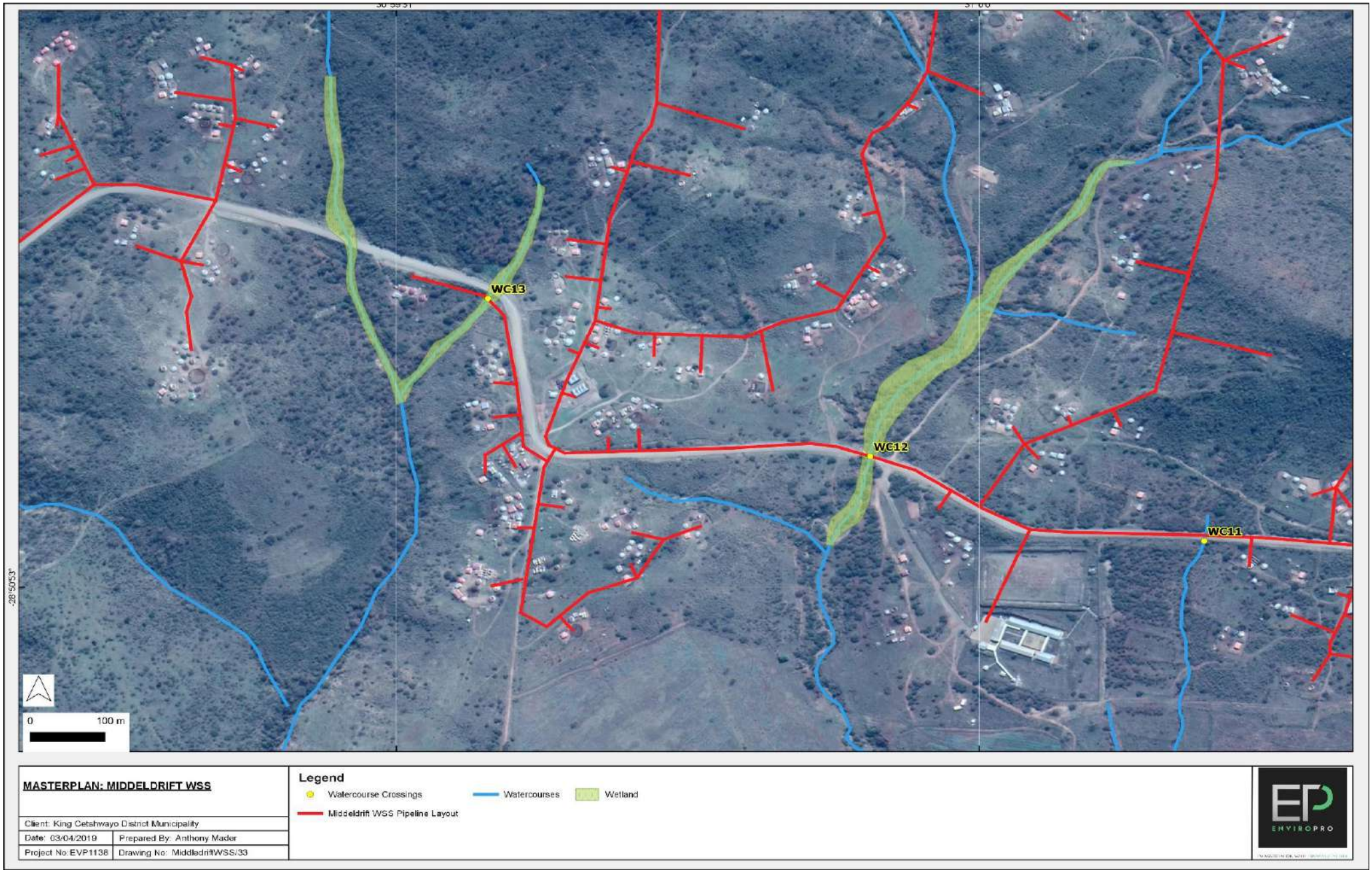


Figure 14: Aerial Photograph Showing the location of WC14 (28°47'41.74"S; 31°3'10.58"E), WC15 (28°47'48.40"S; 31°2'43.18"E), WC16 (28°47'48.89"S; 31°2'42.60"E). QGIS, version 3.4.

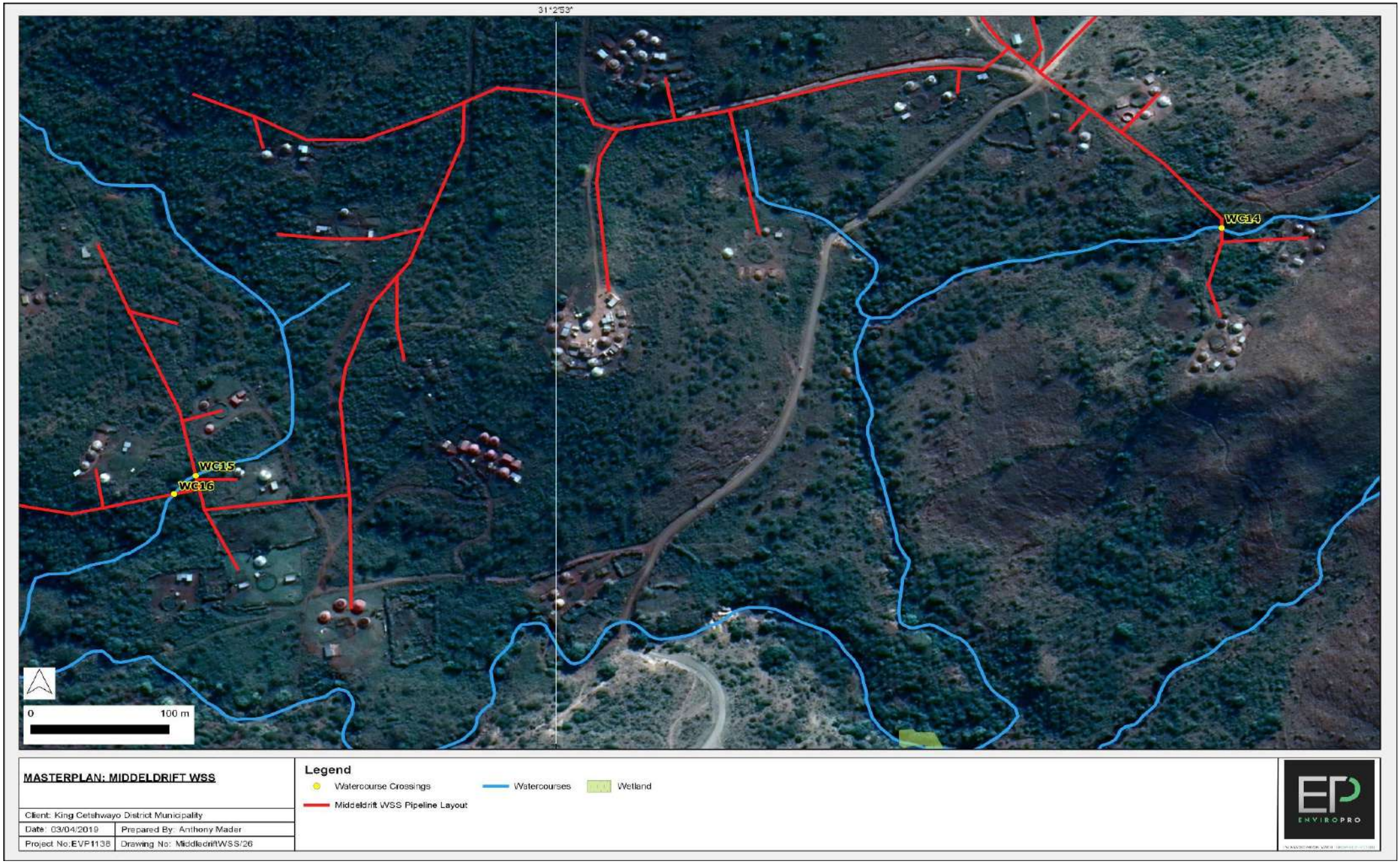


Figure 15: Aerial Photograph Showing the location of WC17 (28°50'36.51"S; 30°58'47.92"E) and WC18 (28°49'42.48"S; 30°58'22.61"E). QGIS, version 3.4.

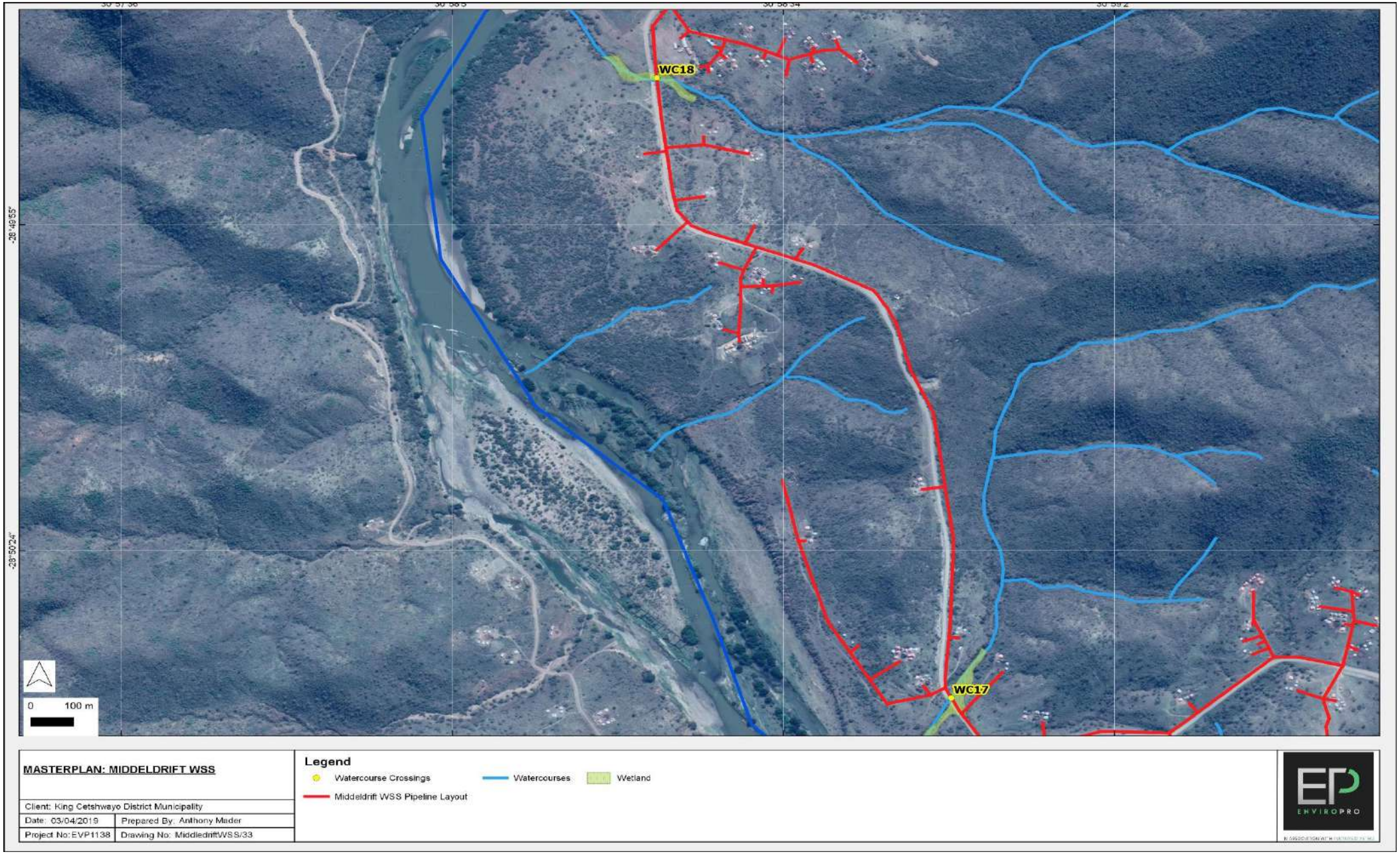


Figure 16: Aerial Photograph Showing the location of WC19 (28°49'16.95"S; 30°58'59.78"E) and WC20 (28°47'48.40"S; 31°2'43.18"E). QGIS, version 3.4.

Figure 17: Aerial Photograph Showing the location of WC21 (28°49'6.91"S; 30°59'21.18"E), WC22 (28°48'58.49"S; 30°59'26.37"E) and WC23 (28°48'54.43"S; 30°59'26.74"E). QGIS, version 3.4.

Figure 18: Aerial Photograph Showing the location of WC24 (28°48'38.20"S; 30°59'21.94"E) and WC25 (28°48'26.54"S; 30°59'18.07"E). QGIS, version 3.4.

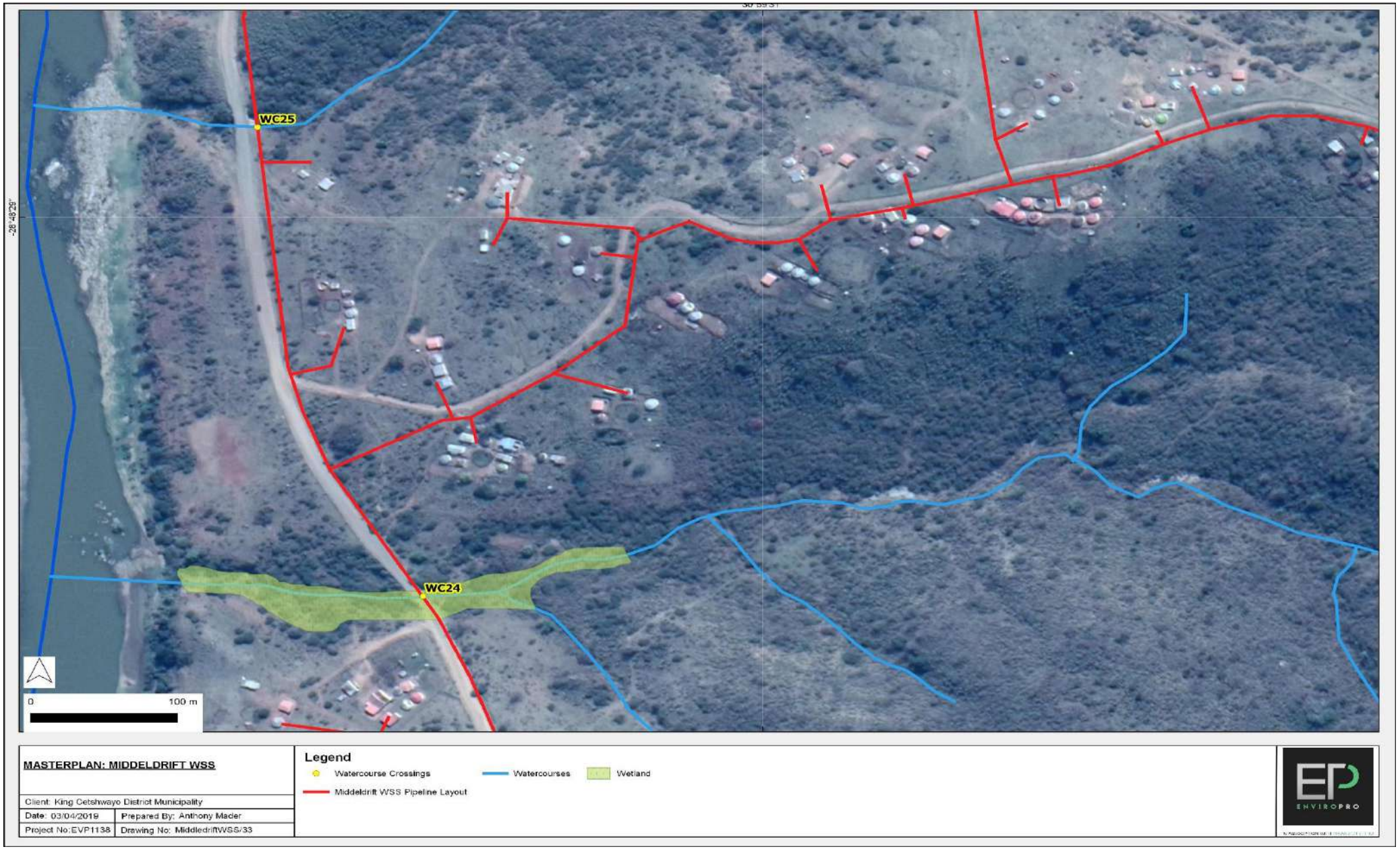


Figure 19: Aerial Photograph Showing the location of WC26 (28°49'28.42"S; 31°1'45.59"E), WC27 (28°49'29.25"S; 31°1'44.84"E), WC28 (28°49'30.96"S; 31°1'44.07"E), WC29 (28°49'31.36"S; 31°1'43.92"E), WC30 (28°49'34.87"S; 31°1'47.87"E), WC31 (28°49'15.68"S; 31°1'21.36"E), and WC32 (28°49'15.50"S; 31°1'24.36"E). QGIS, version 3.4.

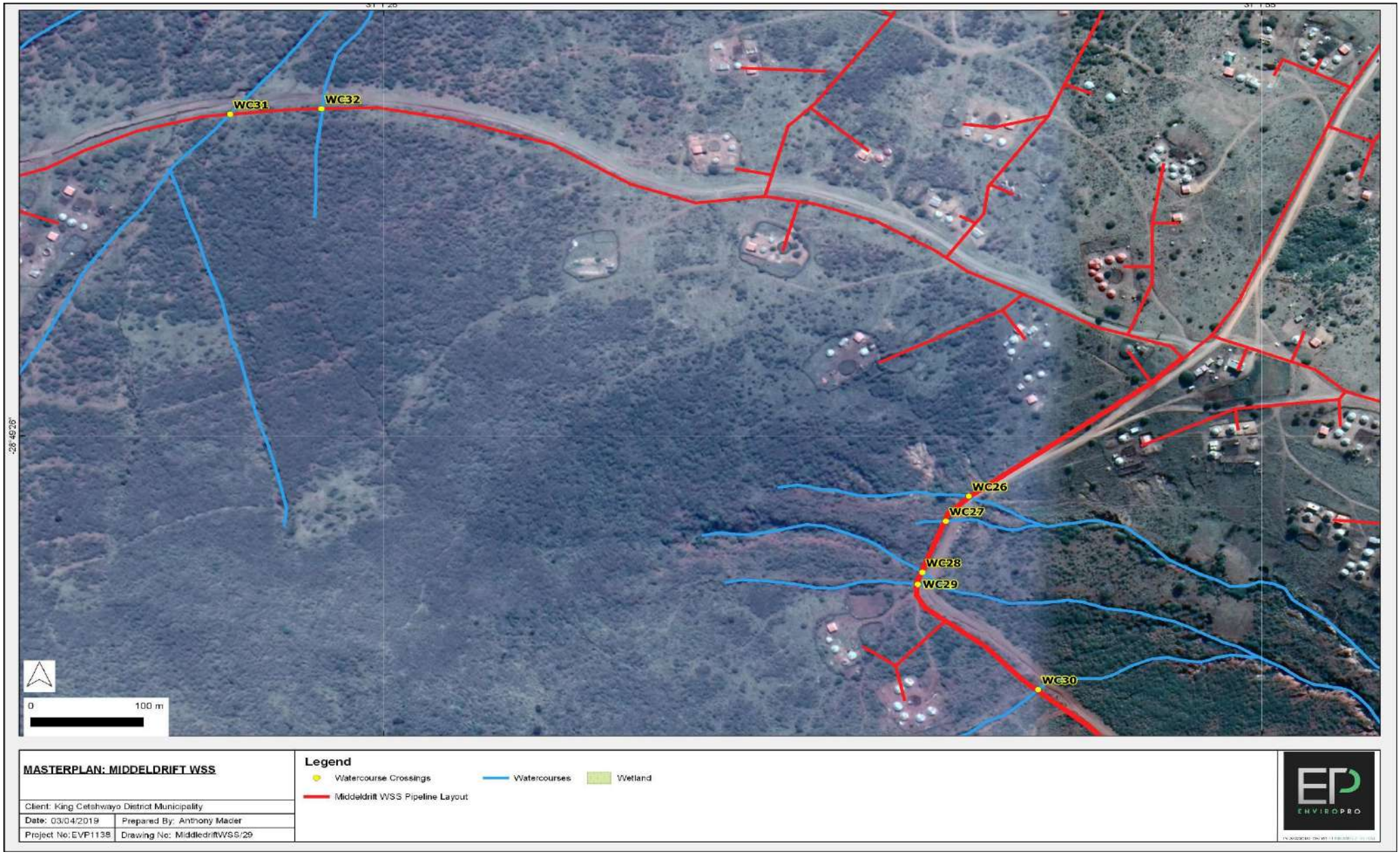


Figure 20: Aerial Photograph Showing the location of WC33 (28°48'50.52"S; 31°0'52.84"E), WC34 (28°48'50.08"S; 31°0'49.04"E), WC35 (28°48'49.63"S; 31°0'46.04"E), WC36 (28°48'53.81"S; 31°0'56.28"E) and WC37 (28°48'55.85"S; 31°0'57.37"E). QGIS, version 3.4.

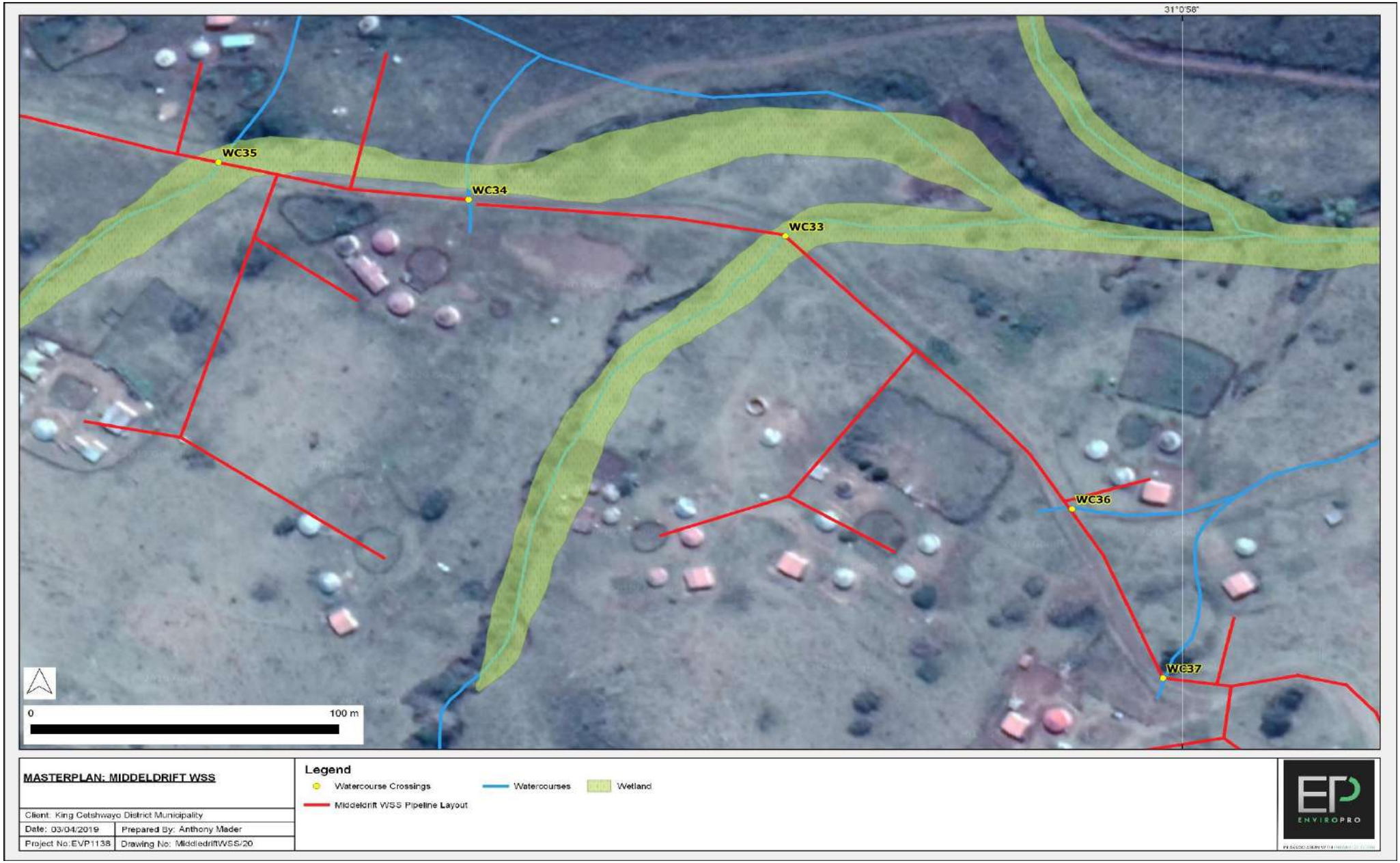


Figure 21: Aerial Photograph Showing the location of WC38 (28°48'53.04"S; 31°2'16.33"E) and WC42 (28°48'42.72"S; 31°2'28.82"E). QGIS, version 3.4.

Figure 22: Aerial Photograph Showing the location of WC40 (28°47'31.93"S; 31°2'59.26"E), WC41 (28°47'27.17"S; 31°2'55.56"E), WC46 (28°47'14.05"S; 31°3'5.26"E), WC47 (28°47'14.64"S; 31°3'4.74"E), WC48 (28°47'25.98"S;31°2'53.15"E), WC49 (28°47'18.68"S; 31° 3'15.93"E), WC50 (28°47'13.56"S; 31° 3'25.35"E), WC51 (28°47'13.99"S; 31° 3'28.58"E), WC52 (28°47'15.13"S; 31° 3'36.94"E), WC53 (28°47'31.14"S; 31°3'11.39"E), WC54 (28°47'32.72"S; 31°3'9.94"E), and WC55 (28°47'34.30"S; 31°3'8.86"E) QGIS, version 3.4.

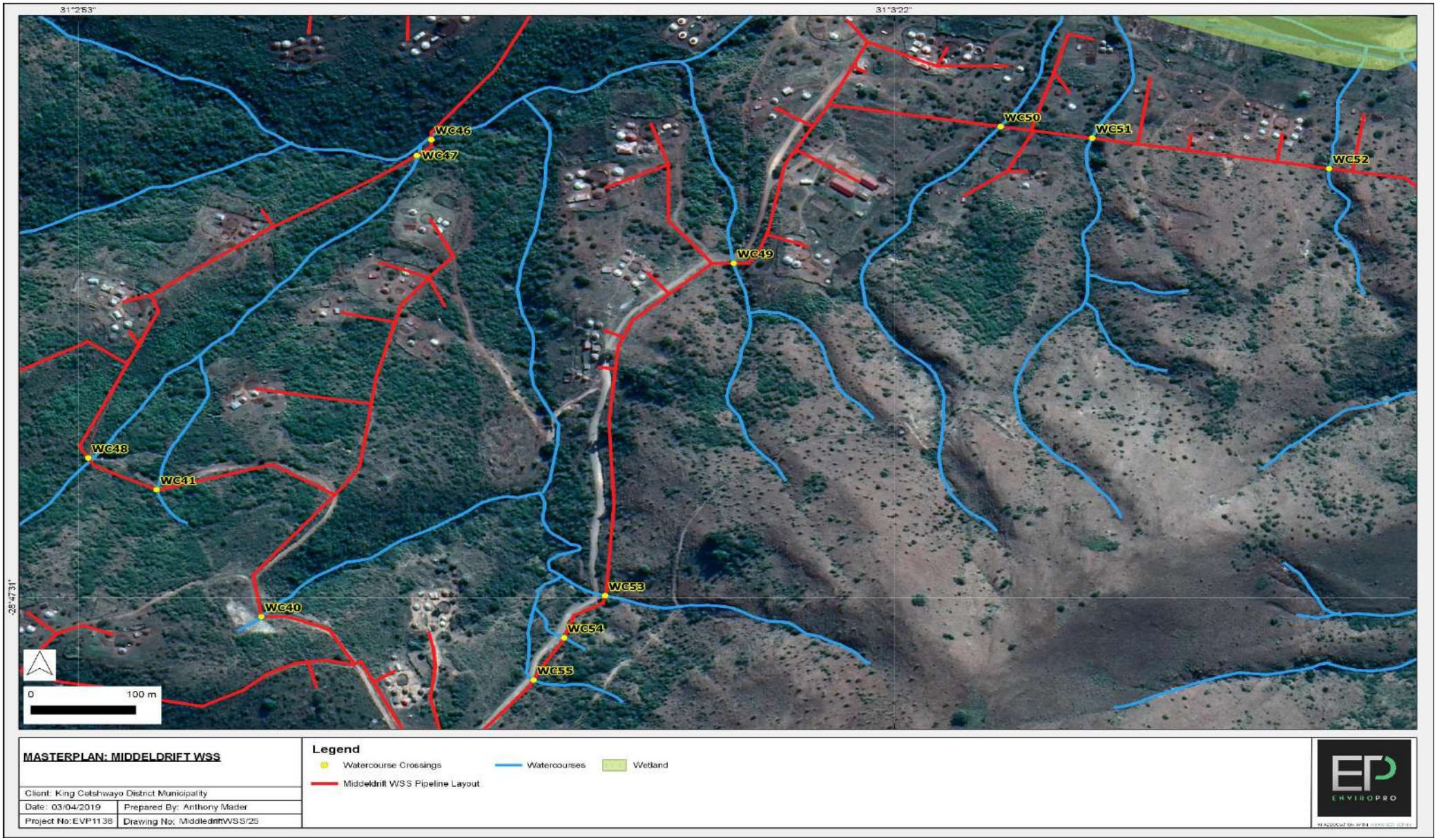


Figure 23: Aerial Photograph Showing the location of WC56 (28°49'14.00"S; 30°59'21.19"E), WC57 (28°49'15.23"S; 30°59'32.97"E) and WC58 (28°49'14.93"S; 30°59'43.40"E). QGIS, version 3.4.

Figure 24: Aerial Photograph Showing the location of WC43 (28°48'31.58"S; 31°3'57.69"E) and WC68 (28°48'17.71"S; 31°4'17.83"E). QGIS, version 3.4.

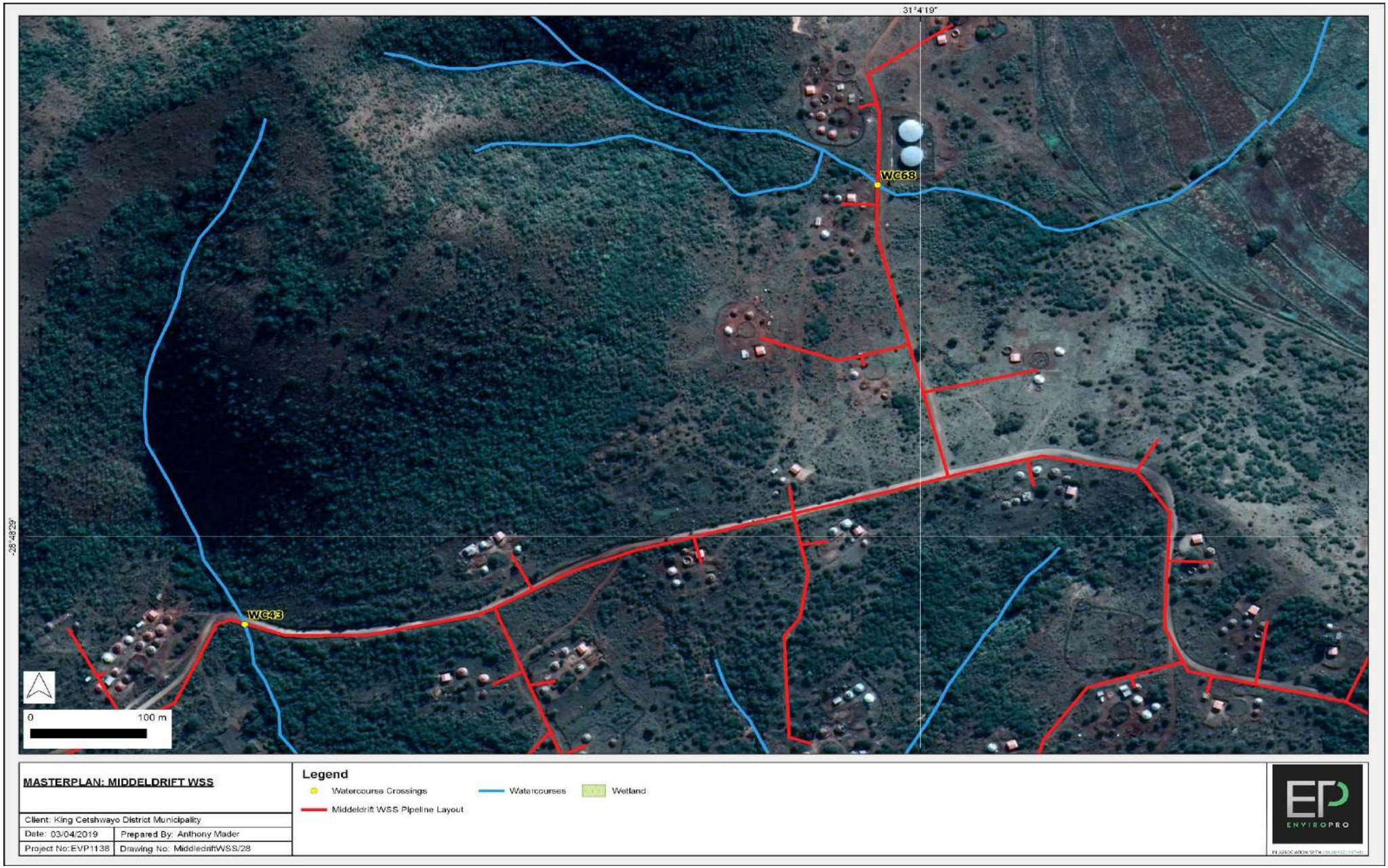


Figure 25: Aerial Photograph Showing the location of WC44 (28°48'48.52"S; 31°1'4.85"E). QGIS, version 3.4.

Figure 26: Aerial Photograph Showing the location of WC59 (28°48'26.15"S; 30°59'55.59"E) and WC60 (28°48'23.36"S; 30°59'56.80"E). QGIS, version 3.4.

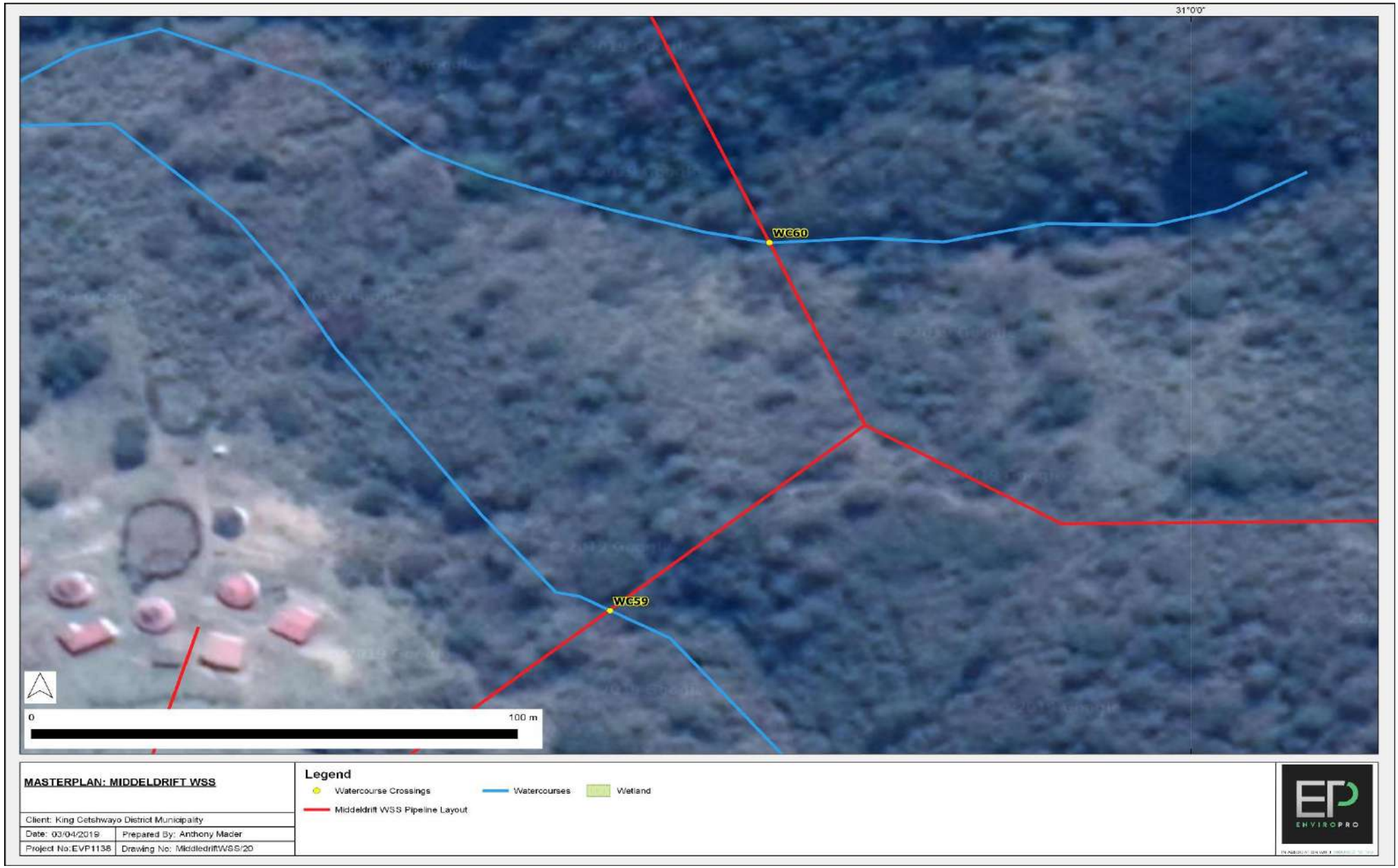


Figure 27: Aerial Photograph Showing the location of WC61 (28°48'13.59"S; 30°59'18.31"E) and WC62 (28°48'12.21"S; 30°59'17.20"E). QGIS, version 3.4.

Figure 28: Aerial Photograph Showing the location of WC63 (28°48'7.87"S; 31°3'11.83"E), WC64 (28°48'6.74"S; 31°3'17.47"E) and WC65 (28°48'0.19"S; 31°3'14.40"E). QGIS, version 3.4.

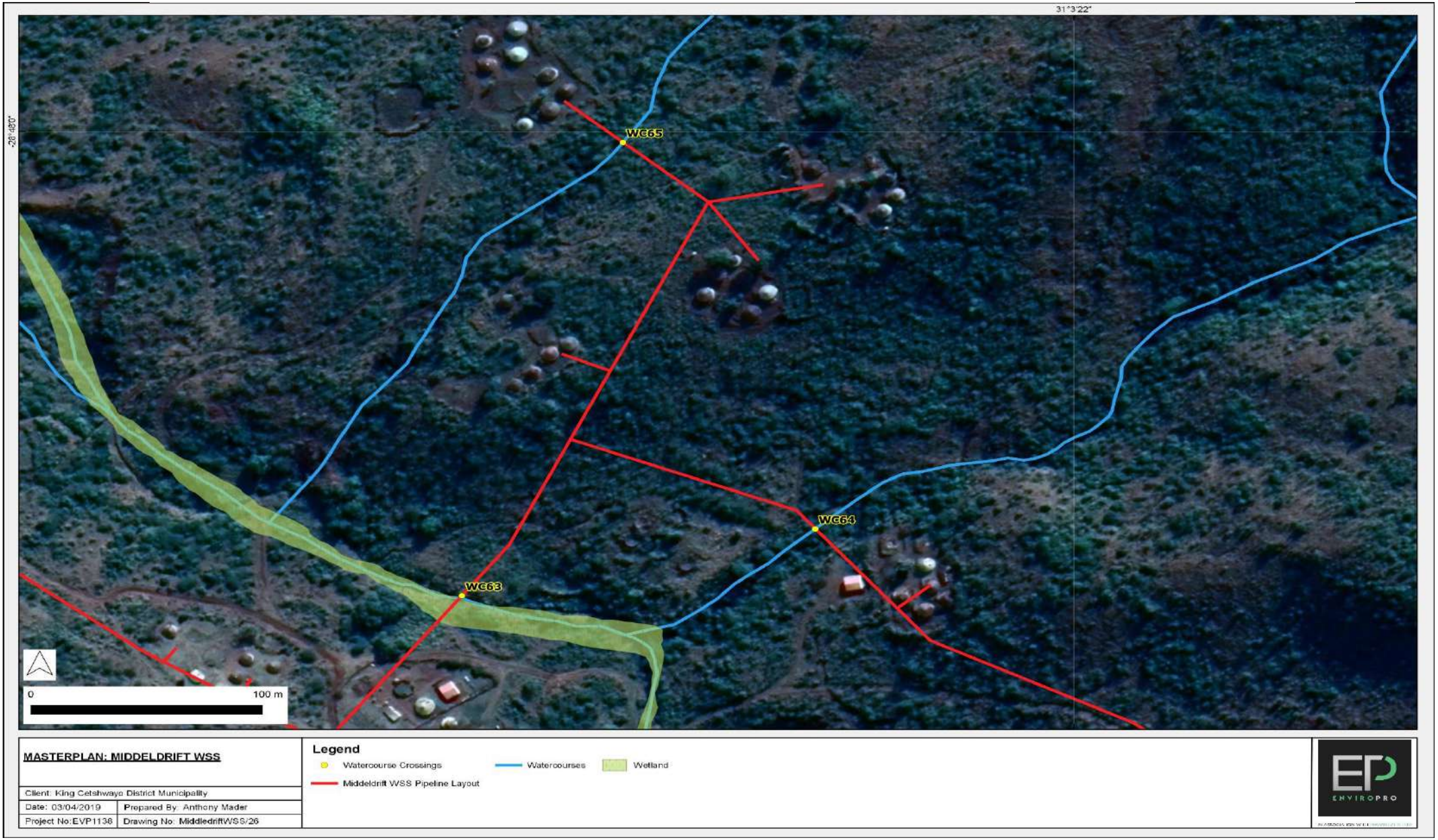


Figure 29: Aerial Photograph Showing the location of WC66 (28°50'37.53"S; 31°3'19.31"E) and WC71 (28°50'30.21"S; 31°3'18.83"E). QGIS, version 3.4.

Figure 30: Aerial Photograph Showing the location of WC69 (28°49'25.76"S; 30°58'43.01"E) and WC72 (28°49'28.89"S; 30°58'36.52"E). QGIS, version 3.4.

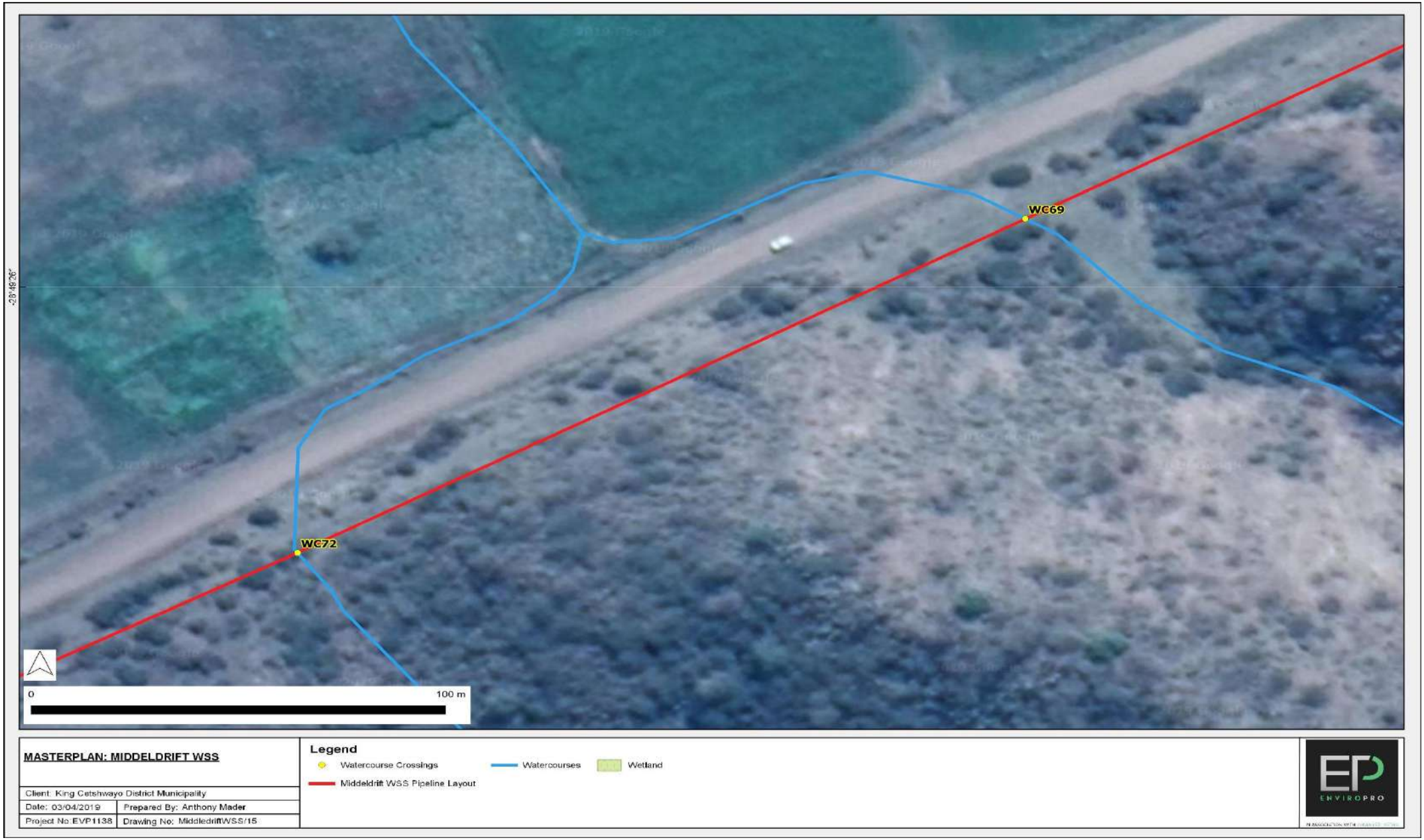
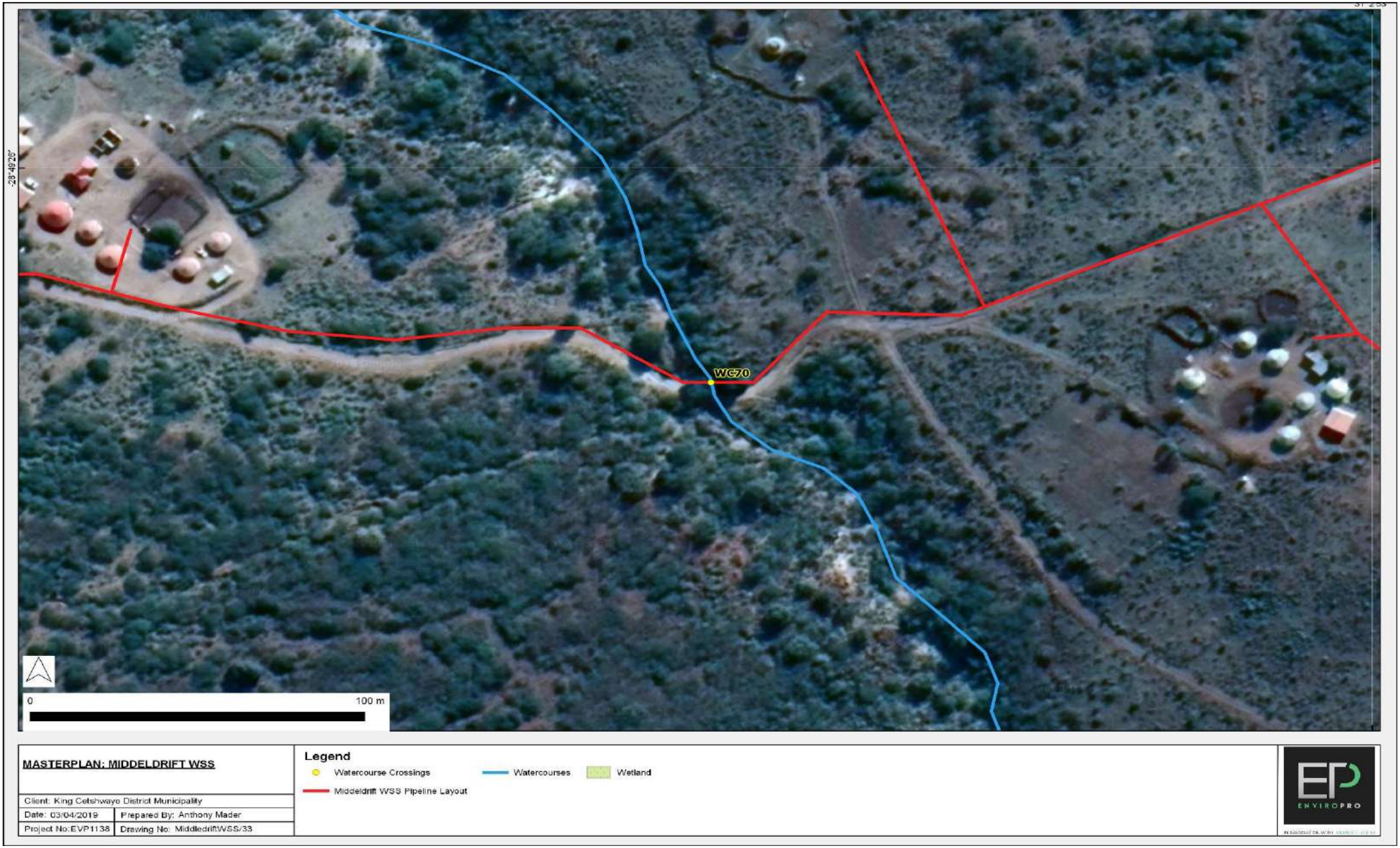


Figure 31: Aerial Photograph Showing the location of WC70 (28°49'28.82"S; 31°2'45.50"E). QGIS, version 3.4.



SECTION 2: SITE DESCRIPTION AND SURROUNDING LAND USE as per section 3(h)(iv) and (k)

2.1 Topography And Physical Characteristics Of Site

The project area is dominated by large open areas of rural residential land. The pipeline is gravity fed and thus flows from high points to the rest of the pipeline network. The topography within the project area comprises of numerous rolling hills. The area consists of scattered rural settlements of varying sizes with rural road infrastructure in place. The study area is located in the villages of Ezimbidla, Mthungeni and Mzwaneni, near Nkandla in the province of KwaZulu-Natal, South Africa. The area surrounding the proposed project site consists of open mountainous land, small scale agricultural and livestock activities, and small rural settlements.

2.2 Climate

This region is characterised by summer rainfall (MAP, 550-1000mm) with some rainfall in the winter season. The mean maximum temperatures for this region is 36.9°C whereas the mean minimum temperatures for this region is 4.0°C in December and June, respectively.

The gradient of the site is as follows:

Gradient	Description
Flat	N/A
1:50 – 1:20	The pipeline route that runs within the P711 Road reserve runs along the plateau of the hillside.
1:20 – 1:15	NA
1:15 – 1:10	Sections of the proposed pipeline traverse steeper hillsides.
1:10 – 1:7.5	N/A
1:7,5 – 1:5	N/A
Steeper than 1:5	N/A

The topographical features and landforms of the site and surrounding area have been described further in section 2.8 below.

2.3 Soils

The area is underlain by the sediments of the Karoo Supergroup with the mudstones and lesser sandstones of the Adelaide and Tarkastad Subgroups (Beaufort Group) dominant, and some Ecca Group shale. Dominant land type Fa (Land Type Survey Staff, 1972 – 2006). Lime is generally considered to be rare or absent in upland soils, but present in low lying areas. The geology of the area is as follows:

- Quartz feldspar, serpentinite and gabbro of the Tugela Complex;
- Schist of the Tugela Complex; and
- Serpentinite, metagabbro, amphibolite and granite gneiss of the Tugela Complex.

2.4 Surface Water and Ground Water

A water resource assessment was undertaken by an aquatic specialist (The Biodiversity Company)[1]. As per the aquatic assessment (see section 6.7), the majority of the watercourses were expected to be non-perennial and thus, those ephemeral systems were assessed at a desktop level only. A comprehensive aquatic assessment was conducted for the perennial watercourses, namely the Tugela (TU1: 28°48'26.21"S; 30°59'14.08"E) and Nsuze River (NS1: 28°47'7.86"S; 31° 3'28.50"E). The TU1 sample site was characterized by medium to fast flowing waters over stone in and out of current, gravel, sand and mud biotopes, with an absence of marginal vegetation whereas NS1 was characterized by medium flowing waters over stone in and out of current, and sand biotopes, with adequate marginal vegetation present. The river runs through a largely natural hillside area. The project area falls within the V40D and V40E quaternary catchments, within the Pongola - Mtamvuna Water Management Area (WMA 4) (NWA, 2016) and North Eastern Uplands Ecoregion (Dallas, 2007).

A total of eighteen (18) wetlands were identified, of these 18 wetlands two (2) hydrogeomorphic (HGM) units were identified within the project area, namely the channelled valley bottom (CVB) and unchannelled valley bottom (UCVB) wetlands. Only wetlands that were likely to be impacted by proposed development activities were assessed in the field. Wetlands located within a 500m radius of the sites, but not in a position within the landscape to be measurably affected by the proposed construction, were not considered as part of the water

[1] Water Resource Assessment for the proposed Middledrift Water Supply Scheme – Update, Mthungeni, KwaZulu-Natal (March 2019).

resource assessment. Although some areas, classified as channelled - or unchannelled valley bottom wetlands, resembled depressions, this was attributed to the road network causing inundation.

2.5. Aquatic Assessment[1]

2.5.1. *In situ* water quality

In situ water quality analysis of the Tugela (TU1) and Nsuze (NS1) rivers indicated adequate conditions during the high flow survey. Both watercourses had adequate pH, Dissolved Oxygen (DO) and water temperatures, falling within the Target Water Quality Range (TWQR).

Table 1. *In situ* water quality analysis of the Tugela and Nsuze rivers

Site	pH	Conductivity (µS/cm)	DO (mg/l)	Temperature (°C)
TWQR*	**6.5-9.0**	**<700****	**>5.00**	**5-30**
NS1	7.89	-	6.35	20.3
TU1	7.17	-	6.58	27.5

2.5.2. Intermediate Habitat Integrity Assessment (IHIA)

According to the IHIA assessment, the instream and riparian habitat integrity of the Tugela River Reach was categorized as Category B (Largely natural) and C (Moderately modified), respectively, whereas the instream and riparian habitat integrity has been categorized as A (Natural with no modification) and B (Largely natural), respectively, for the Nsuze Reach (*see Section 6.7.2. of the Water Resource Assessment*[1]).

2.5.3. Aquatic Macroinvertebrate Assessment

The macroinvertebrate habitat assessment, in accordance with Tate and Husted (2015), scored A (biotope diversity and habitat availability do not limit macroinvertebrate diversity and abundance) for NS1 whereas TU1 scored an E, showing poor habitat conditions. Moreover, NS1 was categorized as natural (Category A) whereas TU1 was categorized as largely natural (Category B). See the following table.

Table 2. Macroinvertebrate assessment relative to the South African Scoring System (SASS). Note, ASPT: Average Score Per Taxa.

Site	NS1	TU1
SASS Score	137	74
No. of Taxa	18	9
ASPT*	7.6	8.2
Category (Dallas, 2007) **	**A (Natural)**	**B (Largely Natural)**

Four of the eleven (11) expected fish species were collected during the February 2019 survey in the Tugela system (Table 3).

Table 3. List of fish collected during the sampling of the Tugela River (TU1) and Nsuze River (NS1). Note, LC = Least Concern). The fish's sensitivity were determined according to the watercourse's flow rate and physical and chemical (Phys-chem) properties.

Scientific name	Common name	IUCN Status	Site		Sensitivity	
			TU1	NS1	No-flow	Phys-chem
Clarias gariepinus	Sharptooth catfish	LC	1	1	**1.7**	**1.0**
Enteromius trimaculatus	Three spot barb	LC	1	1	**2.7**	**1.8**
Enteromius viviparus	Bowstripe barb	LC	0	1	**2.3**	**3.0**
Labeo cylindricus	Redeye labeo	LC	0	1	**3.1**	**3.1**

Labeo molybdinus	Leaden labeo	LC	1	1	**3.3**	**3.2**
Labeobarbus natalensis	Natal yellowfish	LC	1	1	**3.5**	**3.0**
Oreochromis mossambicus	Mozambique tilapia	NT	0	1	**0.9**	**1.3**
Number of species expected			**11**	**13**		
Number of species observed			**4**	**7**		

Figure 32. Fish species collected during sampling.

	*Labeobarbus natalensis*
	*Oreochromis mossambicus*
	*Enteromius trimaculatus*
	*Labeo cylindricus*
	*Clarias gariepinus*
	*Enteromius viviparus*
	*Labeo molybdinus*

2.5.4. Wetlands[2]

Three (3) National Freshwater Priority Areas (NFEPA) wetlands were identified (using desktop study) that are crossed or could be impacted on by the project. The NFEPA systems consist of seepage areas and both CVB and UCVB wetlands. However, a total of 18 wetlands (see Table 6 for GPS co-ordinates and photographs) were identified and of these, five HGM units (CVB and UCVB wetland types) were identified and delineated for the study. The Present Ecological State (PES) of the delineated wetlands varied from moderately-to-largely modified (Table 4):

Table 4. Present Ecological State (PES) and Ecological Importance (EI) of the five sampled wetlands present within 500m of the proposed Middeldrift WSS.

Wetland	Hydrology		Geomorphology		Vegetation	
	Rating	Description	Rating	Description	Rating	Description
1	D	Largely Modified	D	Largely Modified	D	Largely Modified
Overall PES Class					**D: Largely Modified**	
2	D	Largely Modified	D	Largely Modified	D	Largely Modified
Overall PES Class					**D: Largely Modified**	
3	D	Largely Modified	C	Moderately Modified	C	Moderately Modified
Overall PES Class					**D: Largely Modified**	
4	D	Largely Modified	C	Moderately Modified	C	Moderately Modified
Overall PES Class					**D: Largely Modified**	
5	C	Moderately Modified	C	Moderately Modified	C	Moderately Modified
Overall PES Class					**C: Moderately Modified**	

The ecological importance and sensitivity (EIS) have a moderate level of importance (Table 5).

Table 5. Ecological importance and sensitivity (EIS) of the sampled wetlands present within 500m of the proposed Middeldrift WSS.

Wetland Importance and Sensitivity	CVB	UCVB
Ecological Importance & Sensitivity	**C**	**C**
Hydrological/Functional Importance	**C**	**C**
Direct Human Benefits	**D**	**D**

[2] Water Resource Assessment for the proposed Middledrift Water Supply Scheme – Update, Mthungeni, KwaZulu-Natal. The Biodiversity Company, 2019.

Table 6: Summary of the wetlands intercepted by the proposed pipeline

Wetland Number	Wetland HGM Type	GPS Coordinates	Image
WC 1	Channelled Valley Bottom	28°49'59.74"S; 31°3'49.64"E	
WC 2	Unchannelled Valley Bottom	28°50'13.10"S; 31°3'7.37"E	
WC 4	Unchannelled Valley Bottom	28°49'55.26"S; 31°1'49.51"E	

WC 6	Unchannelled Valley Bottom	28°50'14.03"S; 31°1'27.53"E	
WC 7	Unchannelled Valley Bottom	28°50'17.72"S; 31°1'22.33"E	
WC12	Unchannelled Valley Bottom	28°50'46.49"S; 30°59'54.62"E	
WC13	Unchannelled Valley Bottom	28°50'38.89"S; 30°59'35.72"E	

WC17	Channelled Valley Bottom	28°50'36.51"S; 30°58'47.92"E	
WC18	Channelled Valley Bottom	28°49'42.48"S; 30°58'22.61"E	
WC20	Channelled Valley Bottom	28°49'11.84"S; 30°59'9.23"E	
WC24	Channelled Valley Bottom	28°48'38.20"S; 30°59'21.94"E	

WC33	Channelled Valley Bottom	28°48'50.52"S; 31°0'2.84"E	
WC34, WC35	Channelled Valley Bottom	28°48'50.08"S; 31°0'49.04"E 28°48'49.63"S; 31°0'46.04"E	
WC38	Channelled Valley Bottom	28°48'53.04"S; 31°2'16.33"E	
WC39	Channelled Valley Bottom	28°48'34.77"S; 31°1'32.39"E	

WC42	Channelled Valley Bottom	28°48'42.72"S; 31°2'28.82"E	
WC44	Channelled Valley Bottom	28°48'48.52"S; 31°1'4.85"E	

The construction of the new pipe crossings (WC1-72) will formalise the watercourse crossing points and promote the free flow of water through the watercourses and wetland areas. The construction activity should have no long term negative impact or influence on the wetlands along this pipeline route provided the mitigation measures provided in this report and EMP are followed.

2.6. Fauna and Flora

The proposed project area spreads over two (2) vegetation units, namely the Eastern Valley Bushveld (SVs 6) and the Ngongoni Veld (SVs 4) (Mucina and Rutherford, 2006).

The Eastern Valley Bushveld, categorized as Least Threatened, is distributed throughout KwaZulu-Natal and Eastern Cape Provinces. The Eastern Valley Bushveld comprises of deeply incised valleys of rivers such as the lower reaches of the Thukela, Mvoti, and Mgeni. The vegetation comprises of semi-deciduous savanna woodlands in a mosaic with thickets, often succulent and dominated by species of *Euphorbia* and species. Important plant species include; **Tall Trees**: *Acacia robusta, Sclerocarya birrea subsp. caffra*. **Small Trees**: *Acacia natalitia, A. nilotica, Combretum molle, Spirostachys africana, Acacia tortilis subsp. heteracantha, Berchemia zeyheri, Boscia albitrunca, Brachylaena elliptica, Cussonia spicata, Dombeya rotundifolia, Encephalartos natalensis, E. villosus, Hippobromus pauciflorus, Schotia brachypetala, Ziziphus mucronata*. **Succulent Trees**: *Euphorbia tirucalli, Aloe marlothii subsp. marlothii, A. rupestris, Euphorbia ingens, E. triangularis*. **Tall Shrubs**: *Dichrostachys cinerea, Calpurnia aurea, Coddia rudis, Ehretia rigida subsp. rigida, Euclea crispa subsp. crispa, Grewia occidentalis, Olea europaea subsp. africana.* **Succulent Shrubs**: *Aloe arborescens, Euphorbia grandicornis, Kleinia fulgens*. **Soft Shrubs**: *Hypoestes aristata, Peristrophe cernua*. **Woody Climber**: *Acacia brevispica subsp. dregeana*. **Herbaceous Climber**: *Ischnolepis natalensis*. **Graminoids**: *Aristida congesta, Eragrostis curvula, Hyparrhenia hirta, Melinis repens, Panicum maximum, Themeda triandra, Cymbopogon pospischilii, Eragrostis superba, Heteropogon contortus, Panicum deustum, Sporobolus fimbriatus, S. pyramidalis, Tristachya leucothrix, Urochloa mosambicensis.* **Herbs**: *Achyranthes aspera*.

The Ngongoni Veld is categorized as Vulnerable (VU). The Ngongoni Veld is distributed throughout KwaZulu-Natal and Eastern Cape Provinces with an altitude 400–900m. The Ngoni Veld is composed of dense, tall grassland overwhelmingly dominated by unpalatable, wiry Ngongoni grass (*Aristida junciformis*), with this monodominance associated with low species diversity. Wooded areas (thornveld) are found in

valleys at lower altitudes. *Termitaria* support bush clumps with *Acacia species, Cussonia spicata, Ziziphus mucronata, Coddia rudis, Ehretia rigida*. Important plant species include; **Small Trees**: *Acacia natalitia, A. nilotica, A. sieberiana var. woodii*. **Low Shrubs**: *Agathisanthemum bojeri, Euryops laxus, Gnidia anthylloides*. **Graminoids**: *Aristida junciformis subsp. junciformis, Bothriochloa insculpta, Eragrostis curvula, Hyparrhenia hirta, Panicum maximum, Paspalum scrobiculatum, Sporobolus africanus, S. pyramidalis, Themeda triandra*. **Herbs**: *Chamaecrista mimosoides, Conostomium natalense, Gerbera ambigua, Helichrysum allioides, Hermannia grandistipula, Pentanisia prunelloides, Selago tarachodes, Senecio exuberans, Vernonia galpinii*. **Geophytic Herbs**: *Hypoxis argentea, Watsonia* densiflora. **Succulent Herb**: *Aloe minima*.

2.6.1. Vegetation noted on site

The vegetation associated with the proposed pipeline footprint comprises of both indigenous and alien invasive plant species. Sections of the pipeline running parallel to the road consist of vegetation characteristic of secondary stages of ecological succession (Walker and Del Moral, 2003; Cook *et al*., 2005). Ecological succession is caused by disturbance, e.g. previous upgrade and clearing of the road surface or pipelines along the roadside. Indigenous vegetation include *Aloe marlothii* and *Euphorbia spp*. Numerous *A. marlothii* individuals were located along the proposed pipeline (Figure 33). These *Aloe* plants are protected under the Kwa-Zulu Natal Nature Conservation Ordinance No. 15 of 1974 (provides special protection to a range of indigenous plant species including trees and herbs within KZN). Therefore, if any *Aloe* individual should be disturbed, damaged, removed or destroyed, a permit from Ezemvelo KZN Wildlife will be required prior to disturbing, removing, destroying and/or relocating any Aloe species. The majority of *A. marlothii* plant individuals are located between WC7 and WC8, i.e. between 28°50'17.72"S; 31°1'22.33"E and 28°50'41.26"S; 31°1'5.78"E.

Figure 33. Proposed pipeline route (a) Pipeline will be constructed along a pre-existing road. *Aloe marlothii* individuals (red arrow) are protected plant species; (b) *Aloe marlothii* individual; (c) Additional image showing *A. marlothii* individuals (red arrows) located between 28°50'17.72"S; 31°1'22.33"E and 28°50'41.26"S; 31°1'5.78"E.

Most of the vegetation noted along the proposed pipeline route is highly disturbed, most likely from previous construction activity. The vegetation observed along the pipeline route was predominantly comprised of alien invasive plant species including *Solanum mauritianum* (Bugweed), *Lantana camara* (Lantana), *Senna didymobotrya* (Peanut butter cassia), *Ricinus communis* (Castor-oil plant), and *Tithonia diversifolia* (Mexican sunflower) (Figure 34). Bugweed, Lantana, Castor-Oil plant, and Mexican sunflower are all Category 1b invaders. In accordance with the National Environmental Management Act, NEMBA Act No. 10 of 2004, Government Gazette No. 40166, 29 July 2016 (Notice No. 864), Category 1b invader plant species may not be owned, imported into South Africa, grown, sold, or released into a water course. These species need to be removed and destroyed immediately [section 75(1), (2), and (3) of NEMBA], and consist of species which are major invaders and may require government assistance to be removed.

Figure 34. Alien invasive plant species; (a) *Lantana camara* (Lantana); (b) *Tithonia diversifolia* (Mexican sunflower); and (c) *Senna didymobotrya* (Peanut butter cassia).

2.7. Surrounding Environment and Land Uses

The environment and land uses surrounding the pipeline are as follows:

- Located within a rural area.
- The land surrounding the pipeline consists of:
  - Open indigenous bushveld;
  - Subsistence farming;
  - Grazing land; and
- The area the pipeline will run through is predominantly used for rural housing

Large-scale erosion of numerous drainage lines was observed (Figure 32). This has resulted in the collapse of soils and sedimentation of watercourses. The surrounding environment and land use will not be negatively affected by the water pipeline as the construction footprint will follow the same alignment as existing roads, foot paths and pipeline servitudes. The pipeline will be located underground and will therefore not detract from the aesthetics of the area during the operational phase.

Figure 35-40 below provides photographs of the site taken on the 6th and 26th February 2019.

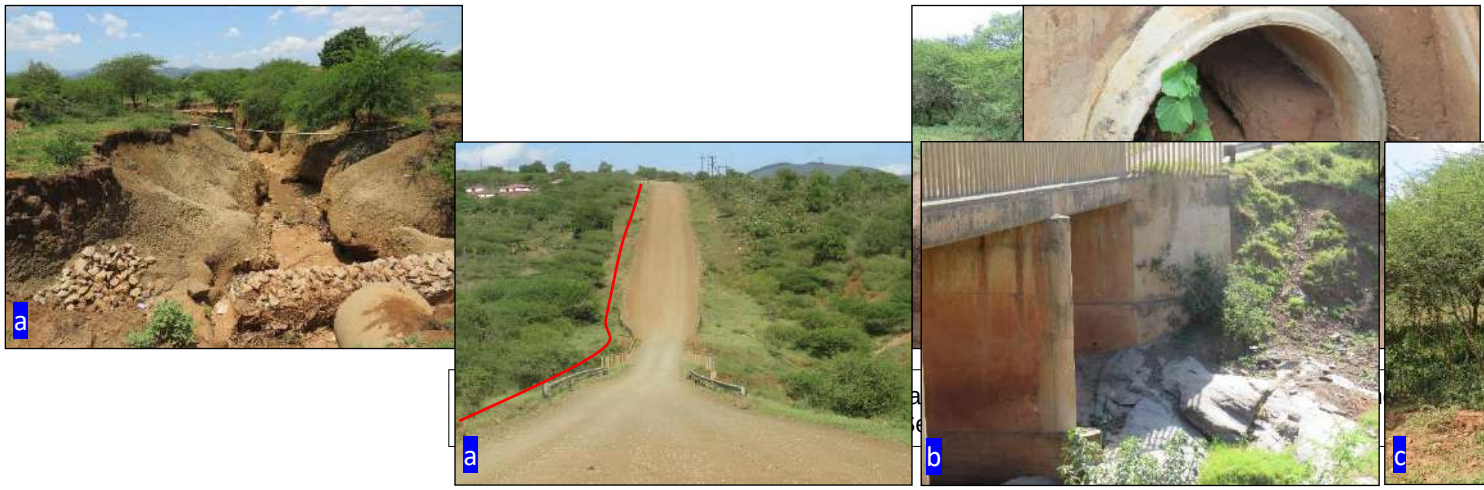


Figure 36: (a): A section of road that the pipe will be laid parallel to (red line). The waterc watercourse the proposed pipeline will traverse; **(c):** A section of the proposed pipeline.

Figure 37: (a): A section of road that the pipe will be laid parallel to. **(b):** Image showing section of road running parallel to the proposed pipeline; **(c):** A section of the proposed pipeline (red line) route.

Figure 38: (a): Existing stormwater infrastructure associated with the road running parallel to the proposed pipeline; **(b):**.School located in close proximity to WC18; **(c):** Existing stormwater infrastructure which the proposed pipeline will be

Figure 39: (a): Existing water access infrastructure' **(b):** House-holds which will benefit from the proposed water supply scheme; **(c):** A section of the pipe route runs parallel to powerlines. Note, the powerlines are located outside the proposed pipeline footprint. Note vegetation associated to a section of the road running parallel to the proposed pipeline

Figure 40: (a): Existing watercourse structure which the proposed pipeline would traverse (red line); **(b):** Existing pipeline crossing a watercourse. Note erosion associated with the watercourse; **(c):** A section of the road where the proposed pipeline would run parallel to as well as the associated vegetation.

2.8. Heritage And Cultural Aspects

No items of archaeological or cultural significance were noted in the immediate area or near the pipeline route. As this is largely an existing pipeline servitude within road reserves, it is unlikely that other archaeological or culturally significant aspects are present within the pipeline route. Construction workers will be cautioned to operate with care on site and should a culturally sensitive aspect be discovered on site, construction activities stop temporarily and the issue assessed and the authorities (AMAFA) be notified.

2.9. Socio Economic Environment

The environment and surrounding land uses within and adjacent to the pipeline are described as follows:

- Located within a rural, residential area;
- The open areas in the valley adjacent to the pipeline route are areas of open space and informal grazing areas. Being near the bottom of the valley and in such close proximity to the wetlands it is highly unlikely that the pipeline route will affect any future development;
- A school (fence boundary - 28°49'40.67"S; 30°58'22.61"E) is located in close proximity to the road reserve;
- The land that the pipeline passes through is largely DoT owned road reserve and open tribal land.

The surrounding environment and land use will not be negatively affected by the water pipeline as the construction footprint will follow the same alignment as existing roads. No local infrastructure or services will be affected by the construction of this pipeline. The pipeline will be located underground and will therefore not deter from the aesthetics of the area during operation. No fences and homestead access roads should require relocation, however should there be a need for the relocation of infrastructure, an agreement must be made with the contractor and community member.

Section 3: Policy And Legislative Context

3.5. Identification Of All Legislation, Policies, Plans, Guidelines, Spatial Tools, Municipal Development Planning Frameworks And Instruments As Per Section 3(e)(i) And Compliance Of Proposed Activity With Legislation And Policy 3(e)(ii)

Legislation	Compliance of Activity
National Environmental Management Act 1998	The National Environmental Management Act (Act 107 of 1998) (NEMA) is South Africa's overarching environmental legislation. It includes a set of principles that govern environmental management and against which all Environmental Management Programmes (EMPs) and actions are measured. These principles include and relate to sustainable development, protection of the natural environment, waste minimisation, public consultation, the right to an environment that is not harmful to one's health or wellbeing, and a general duty of care. The Environmental Impact Assessment (EIA) Regulations, 2014: GN R.982, R.983, and R.985 under Section 24 of the NEMA define the activities that require Environmental Authorisation and the processes to be followed to assess environmental impacts and obtain Environmental Authorisation. Environmental authorisation is required for the construction of the pipe crossings at WC1-72. Therefore this application is in line with the requirements of NEMA.
National Water Act 1998	The proposed Middeldrift WSS will result in alterations to the bed and banks of several watercourses and the site is located within 500m of wetlands, therefore a water use authorisation will be required as per Section 21 (c) and (i) of the National Water Act.
National Waste Management Act 2008	Reforms the law regulating waste management to prevent pollution and ecological degradation. Section 19 allows the Minister to publish a list of activities which require a Waste Management License. The most recent list is published in Government Gazette 37083 Notice No. 921 dated 29 November 2013. It is unlikely that any activities carried out by the development will trigger a Waste Management Activity.
Environmental Conservation Act 1996	Makes provisions for the application of general environmental principles for the protection of ecological processes, promotion of sustainable development and the protection of the environment. This Act has mostly been repealed by NEMA.
National Environmental Management Biodiversity Act 2004	To provide the framework, norms, and standards for the conservation, sustainable use and equitable benefit-sharing of South Africa's biological resources. Section 52 allows for the publication of a list of threatened ecosystems in need of protection. The list was published in Government Gazette No. 34809 Notice No. 1002 dated 9 December 2011. This site does not fall within a threatened ecosystem type.
National Heritage Resources Act 25 of 1999	For the protection of South African Heritage to nurture and conserve communities legacy. No archaeological significant artefacts will be disturbed during this project therefore no permits will be required from the provincial heritage authority, AMAFA.
Municipal Planning Framework	
Nkandla Integrated Development Plan (IDP), 2017-2022.	This project falls in line with the Municipality's sustainable development goals and better service delivery in previously marginalised rural areas within the local municipality.

Section 4: Motivation, Need and Desirability

4.5. Need And Desirability As Per Section 3(F)

The Middeldrift WSS aims to provide a reliable supply of water, in greater volumes over a large rural residential area in the King Cetshwayo District Municipality. The pipeline will supply safe and reliable potable water to residential households in this immediate area. The Middeldrift WSS aims to supply the growing water demand in the area. The proposed pipeline has been designed taking into consideration the future population growth, future increase in water supply demand and terrain in the area. Having carried out a capacity analysis, the engineers are confident that all of the proposed infrastructure will be able to serve the communities and have taken into account future predicted increases in water demand.

It must be noted that the Middeldrift WSS has been previously authorized (DC28/0030/2012). This report is a resubmission due to a change in pipeline layout. The increase and decrease in community density in various parts of the Middeldrift WSS footprint accounts for this change in pipeline layout.

4.6. Motivation For Preferred Site, Activity And Technology Alternative

The proposed pipeline mainly follow previously disturbed areas, including road reserves and foot paths, therefore no site alternative routing has been considered. The alternative ways in which the pipe will cross the watercourses has been discussed and considered in this assessment.

4.6.1. Preferred Alternative 1 – Concrete Pipe Casing

The applicant plans to run the pipeline through the watercourses, in a concrete casing in the bed of the systems. The pipeline will be below the ground, attached to the bedrock, below the water surface. Reno Mattresses will be laid above the pipe encasement and gabion baskets will be used to stabilise the banks of the river (where required). Where heavy stream flow is anticipated, the crossings will be anchored with the use of irons dowled into the river bed.

The pipe will not block or impede the flow of water in the watercourses WC1-72. This crossing technique will have a larger construction impact on the watercourses in terms of construction work in the bed and banks of WC1-72 but will have less impact long term post construction for the lifespan of the pipe.

4.2.2 Technology Alternative 2 – Pipe Pier Bridges

The alternative water crossing technology would be to construct pipeline bridges at each watercourse. This would entail building pier structures into the watercourse beds to support the pipes above ground as they cross the watercourse.

This approach will have a larger environmental and visual impact at the crossings WC1-72. Constructing pier bridges across the watercourses would potentially incur long term water flow impedance from the piers in the watercourse beds and banks. The pipe will be very visible at each crossing should it be above ground and raised above the water level. This technique would make the pipe susceptible to damage during flood events when the water levels rise, which would demand more infrastructural maintenance and repair for the King Cetshwayo District Municipality and threaten the consistent potable water supply for all users in this area.

It is the opinion of the EAP that there are no significant environmental impacts that cannot be mitigated against and that the preferred alternative 1 (concrete pipe casing through WC1-72) be authorized.

Section 5: Public Participation

5.5. Notification of Interested and Affected Parties

1) *fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of-*
    - i. *the site where the activity to which the application or proposed application relates is or is to be undertaken; and*
    - ii. *any alternative site.*

Two noticeboards (in isiZulu and English) were placed at the start and end of the pipeline routes on the 6th February 2019. The noticeboards detailed the Municipality's plan to construct the Middeldrift WSS, subject to a basic assessment and water use authorisation. See Appendix C – Proof of Placement of Notice Board.

2) *giving written notice, in any of the manners provided for in section 47D of the Act, to-*
    - i. *the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;*
    - ii. *the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;*
    - iii. *the municipality which has jurisdiction in the area;*
    - iv. *any organ of state having jurisdiction in respect of any aspect of the activity, and;*
    - v. *any other party as required by the competent authority;*

The majority of the pipeline will be placed in the Municipal Road Reserves and therefore the King Cetshwayo District Municipality have been included in the I&AP list to receive more information on the project. The

sections of pipeline that fall outside the road reserves fall on tribal land, managed by a local Traditional Council, owned by the Ingonyama Trust Board. The following steps were followed during the public participation process.

- A representative from King Cetshwayo introduced EnviroPro to the community on the 6th February 2019.
- A meeting was held with the Ward Councilor to discuss the project on the 6th February 2019. The ward councilor took the information packs (maps and project description pamphlets) they received from EnviroPro to discuss with the local Inkhosi and with interested resident in the community.
- Prior to EnviroPro being introduced to the community during the meeting, the pipeline construction was presented to the Indunas and information pamphlets handed out to the Indunas.
- A map showing the landowners is included under Appendix D. Landowners both private and public were notified electronically, via email and through hand delivered notices. Landowner information was acquired through the Deeds Office. Proof of notification is included under Appendix D.
- Signboards detailing the project were placed along the pipeline route in two different locations.
- All relevant authorities and registered I&APs have been notified of the application and copies of the BAR provided.
- A number of stakeholders were also tracked down electronically and information has been provided to them via email.
- The Draft BAR will be circulated for a legislated 30 day comment period.
- All comments received within the comment period will be included in Appendix G of the Final BAR, and
- All affected land owners were notified about the environmental authorisation process on the 18th April 2019 (Appendix D).

See Appendix D – Proof of Notification.

i. owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;

Email notifications to all I&APs were sent out on the 18th April 2019. See Appendix D – Proof of Notification. An Email reminding all commenting authorities and I&APs of the comment period closer will be sent out to all I&APs a week before the 30 day comment period ends (see Appendix D).

3) 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;
4) 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 district 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 paragraph (c)(ii); and

An advert was placed in the Ilanga local newspaper on the 10 June 2018 detailing the proposed project, Basic Assessment and WUA process, providing contact details for EnviroPro for anyone wanting to register as an I&AP. See Appendix E – Proof of Advert Placement.

5.6. Registered Interested and Affected Parties

42. A proponent or applicant must ensure the opening and maintenance of a register of interested and affected parties and submit such a register to the competent authority, which register must contain the names, contact details and addresses of-
(a) all persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;
(b) all persons who have requested the proponent or applicant, 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.

The contact details of all I&APs that have registered have been provided in the Registered I&AP list in Appendix F.

5.7. Comments

Comments of interested and affected parties to be recorded in reports and plans 44.

1) The applicant must ensure that the comments of interested and affected parties are recorded in reports and plans and that such written comments, including responses to such comments and

records of meetings, are attached to the reports and plans that are submitted to the competent authority in terms of these Regulations.

2) *Where a person desires but is unable to access written comments as contemplated in subregulation (1) due to-*
   - *i. a lack of skills to read or write;*
   - *ii. disability; or*
   - *iii. any other disadvantage;*
   - *iv. reasonable alternative methods of recording comments must be provided for.*

All comments received from I&APs will be recorded in the comments and response table and distributed to I&APs and EDTEA when the FBAR submitted to the Department.
See Appendix G – Comments and Response table and Comments Received.

Section 6: Impact Assessment

6.5. Methodology To Determine And Rank Significance And Consequences Of Impacts Associated With All Alternative As Per Section 3(h)(vi)

Impacts are assessed qualitatively and quantitatively, looking at the duration / frequency of the activity and likely impacts associated with that activity during both construction and operation. If the activity happens frequently, the risk of the associated impact occurring is much higher than if the activity happens less frequently. The geographical extent of the impact is assessed i.e. will the impact be restricted to the point of occurrence or will have it have a local or regional effect. Impacts are also reviewed looking at severity levels and consequences should the impact occur i.e. will the severity be low, medium or high and then probability of the impact occurring is taken into account.

Whether or not the impact can be mitigated and the extent to which it can be avoided, managed, mitigated or reversed is assessed i.e. the probability of occurrence after mitigation has been applied. This also takes into account likelihood of human error based on construction and operational auditing experience i.e. even though spills can be completely mitigated against and prevented, there is always a small chance that spills will still occur (residual risk). Based on all of these factors, the impact is then rated to determine its significance. For example an impact can have a regional affect with severe environmental implications, however the probability of it occurring is very low and the implementation of the proposed mitigation measures means that the ultimate rating is medium or low.

Please see below a description of the scoring. The full impact scoring tables detailing how the significance rating was calculated can be found in Appendix H.

Scoring of Impacts	
Duration / Frequency of activity likely to cause impact	0 = No impact 1 = short term / once off 2 = medium term / during operation 3 = long term / permanent
Geographical Extent	0 = No impact 1 = point of impact / restricted to site 2 = local / surrounding area 3 = regional
Severity (level of damage caused) if impact were to occur	0 = No impact 1 = minor 3 = medium

	5 = major
Probability of impact without mitigation	1 - 5 = low. 6 -10 = medium. 11 -14 = high.
Significance before application of Mitigation Measures	A score of between 1and 5 is rated as low. A score of between 6 and 10 is rated as medium. A score of between 11 and 14 is rated as high.
Will activity cause irreplaceable loss of resources?	10 = Yes 0 = No
Mitigation measures	0 = No impact - 5 = can be fully mitigated - 3 = can be partially mitigated -1 = unable to be mitigated
Probability of impact after mitigation	0 = No impact 1 = Low 2 = Medium 3 = High
Significance after application of Mitigation Measures	A score of between 1and 5 is rated as low. A score of between 6 and 10 is rated as medium. A score of between 11 and 14 is rated as high.

6.6. Preferred Site and Technology Alternative

See Appendix H for the full impacts scoring matrix which assesses the impacts on the above system. The below impacts relate to the site location and preferred technology alternative 1 (concrete cased pipe in the watercourse beds).

Nature and Consequences of impact	**Significance rating of impacts[3]:**	**Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:**	**Significance rating of impacts after mitigation:**
Construction			
1. Dusty conditions generated during construction and by construction vehicles.	5 (Low)	Since the pipeline will be predominantly placed adjacent to dirt roads, there is likely to be dust generated by construction vehicles accessing the area. However, the dust generation will be a temporary impact i.e. the site (the pipe trenching will be worked continuously for a few months until construction is completed. Further to this: • Water carts must be used on site should dust levels elevate to a nuisance level. • Water cart will be utilised to dampen dusty surfaces and suppress dust from road surfaces. • Shade cloth is to be utilised for stockpiled materials where required. This impact can be managed and mitigated to a large degree with the implementation of the EMPr. The applicant must comply with the National Dust Regulations (Government Notice R827, 2013) with regards to dust levels produced on site.	3 (Low)

[3] See Appendix H for more details.

2. Construction vehicles and personnel creating a nuisance to the surrounding area and businesses.	8 (Medium)	Sections of the pipeline run close to residential areas. The work area is to be designated to prevent trespassing onto adjacent farms/properties. Speed limits will be obeyed and enforced by the contractor. A complaints register will be kept on site in the environmental file. This impact can be avoided and managed.	5 (Low)
3. Impact on existing services i.e. power lines, water pipes, infrastructure, etc.	7 (Medium)	As standard construction practice the engineer and contractor will identify all existing services that may be affected along the route prior to construction. Any infrastructure that is removed must be replaced and any damage caused from construction must be repaired. This impact can be managed and mitigated.	4 (Low)
4. Damage to properties, fencing and subsistence farming plots during laying of pipework.	8 (Medium)	For the most part the pipeline will be laid within the road reserves. However should private properties or infrastructure be affected, the contractor will liaise with the landowner prior to construction commencement. This impact can be avoided and mitigated.	5 (Low)
5. Deposition of eroded material into water bodies when laying pipe across the 72 watercourses impacting water quality (increased turbidity, reduction of dissolved oxygen).	10 (Medium)	Caution needs to be exercised when working near the watercourse crossings. The following mitigation measures will be carried out and are included in the EMPr: • All construction activities occurring within the watercourses must be done with extreme care to avoid damage to the watercourse and associated wetland area. • No heavy vehicles will be permitted to work in any watercourse unless exceptionally hard material is encountered and the trench cannot be dug by hand. Pipework around these sensitive areas should be laid by hand. • No storage of materials will be permitted within these areas or within 15m of these areas, which will be agreed on and demarcated before construction begins on each section. • Where larger river crossings are required, the type of in-situ material will be confirmed. In places with bed-rock, the rock will be blasted such that the water pipes could be encased in concrete and the top of the encasement at the same level of the undisturbed river bed. Soft	6 (Medium)

		material banks would be crossed the same except gabions will be used instead of concrete (gabions paced downstream of pipe; see typical section through the river crossing attached under Appendix A). • The contractor must ensure that stream bed work is carried out in the dry season when flow rates are low to non-existent (i.e. June – August). • It is unlikely that any of the streams will need to be temporarily diverted however if this is the case, a suitably qualified contractor will be appointed to handle the temporary stream diversion work to ensure that the flow rate and stream morphology are taken into account. • In order to prevent long-term deposition of material into the watercourses, areas exposed to erosion must be protected through the use of sand bags, gabions, berms and efficient construction processes i.e.: limiting the extent (footprint) and duration period that areas are exposed. This impact can be managed and mitigated.	
6. Physical damage to wetland areas associated with the rivers and tributaries during excavation, resulting in the loss of wetland.	10 (Medium)	Construction activities are to be restricted strictly to the pipeline route across the wetlands (i.e. no wider than 1.2m and 2m deep). A maximum construction servitude width of 5m must be adhered to when working within the wetlands. The surrounding area must be demarcated as 'no-go areas' to prevent workers from unintentionally encroaching into wet areas. Furthermore: • The pipeline is to run as close to all existing pipelines as possible to reduce the disturbance footprint. • The pipe must be tied to existing structures at the watercourse, where feasible to reduce the amount of construction activities within the watercourse. • No storage of material, vehicles or equipment is permitted within the wetland areas; • Apart from where the pipeline crosses the wetlands, a buffer of 15m is to be maintained around	5 (Low)

		wetland areas; • The trenches within the watercourses and wetland must not stay open for longer than 7 days. • Soil must be excavated and stockpiled in different layers. Once the pipe has been laid, the stockpiled material must be replaced in the same order it was taken out. This will promote the rehabilitation of the site. • No heavy vehicles will be permitted to work in the wetland areas unless exceptionally hard material is encountered and the trench cannot be dug by hand. Pipework around these sensitive areas should be laid by hand. • No dumping of material or waste may occur within these areas. All material and waste must be taken back to the construction camp at the end of the day. • Designated stockpile storage areas must be established outside of the wetland areas. This impact can be managed during construction through the implementation of the EMPr.	
7. Temporary increase in waste and litter due to the construction process.	6 (Medium)	The construction phase of the project will see an increase in workers on site and therefore an increase in waste in the area. • Littering will not be permitted in the study area; • Designated waste storage areas with appropriate waste receptacles must be set up within the construction site camp; • Waste will be removed from site and disposed of at a registered waste disposal site; • Safe disposal slips for the disposal of all waste must be obtained and kept on site as proof of safe disposal. Waste management will be controlled through the implementation of the EMPr. This impact can be managed and mitigated.	4 (Low)
8. Insufficient number of toilet facilities on site resulting in the contamination of the environment.	8 (Medium)	The increase of construction personnel during the construction phase will require an appropriate number of toilet facilities for the site. • Appropriate and sufficient toilet facilities (1 toilet per 15 employees) must be provided by the contractor;	5 (Low)

		• Toilet facilities are to be placed at intervals across the project areas; • All toilet facilities must be checked on a daily basis; • All toilet facilities must be emptied and cleaned on a weekly basis. • A registered waste removal contractor must remove effluent waste from site or effluent waste must be disposed of at a permitted Waste Water Treatment Site; • Safe disposal slips for the disposal of effluent waste must be obtained and kept on site as proof of safe disposal. This impact can be managed and mitigated.	
9. Contamination of the receiving environment due to inappropriate storage and usage of hazardous materials and substances (cement, fuel etc.).	7 (Medium)	It is unlikely that there will be many hazardous materials used during construction however any potentially hazardous substances (including cement and paint) will be stored within a secured area in the construction camp. No storage of material is to occur within 32m of any watercourse. The storage area will be a hard surfaced, bunded and covered area. Cement mixing must be done on a hard surface that is protected from stormwater runoff. This impact can be prevented by managing the storage.	4 (Low)
10. Erosion of exposed soil prior to the rehabilitation of the construction area (i.e. trenches).	10 (Medium)	Exposed soil is very susceptible to erosion and therefore erosion control is critical, especially around the watercourse crossings. • Exposed areas will be rehabilitated and re-vegetated as soon as possible during construction. • Cleared areas may not be left exposed for long periods of time (2 weeks) and should be re-vegetated in stages on completion of a section of the pipework. • Small inspection holes may be left open along the route but the rest of the trench must be closed once the pipe has been laid. • In certain steeper sections additional precautions to manage erosion will be required (e.g. sand bags or gabions). • During the exaction of trenches, flows must be diverted around the active work areas to prevent	5 (Low)

		channelled flow. • Temporary stormwater channels and preferential flow paths should be filled with aggregate and/or logs (branches included) to dissipate and slow flows thereby limiting erosion. This impact is to be monitored during construction and can be mitigated.	
11. Trenches remaining open for long periods of time, causing them to collapse, creating an erosion and safety hazard.	7 (Medium)	Trenches must not be left open for longer than 2 weeks at a time. Trench work must be completed in sections and then closed once the pipe has been laid in that section. Small inspection holes may be left open along the route but the rest of the trench must be closed. Cleared areas may not be left exposed for long periods of time and must be re-vegetated as each stage of pipework is completed. Trenches must not remain open during building shut down periods i.e. over Christmas and Easter. Trench work must be planned so that trenches are closed before these shut down periods as there is a risk that the trenches will either collapse or fill with water if left unattended and this can create a hazard for children and animals. Trenches must be demarcated. This impact can be avoided.	5 (Low)
12. Incorrect filling of trenches on completion creating points of erosion, especially on slopes and near watercourses.	8 (Medium)	Care must be taken to ensure that when closing trenches, soil is compacted sufficiently and left so that the level of the trench is slightly higher than the surrounding land, to allow settling. Should soil settle below the level of the surrounding land, it will leave a depression along which water will travel and this could create a focal point for erosion. This can occur on sloped sections where water will follow the depression along the pipeline route, building up speed down steeper sections and creating furrows. If this occurs near watercourses, it will erode the river banks and cause them to collapse. Rehabilitation through replanting of indigenous grass species soon after closure will aid in stabilising soil and preventing erosion and will also assist in dust control. This impact can be avoided and mitigated.	5 (Low)
13. Excavations within the area impacting on features with heritage value (i.e. graves).	6 (Medium)	Since the pipeline will be placed in areas previously disturbed by construction activity for the current pipeline, it is not anticipated that there are heritage or cultural significant aspects associated with	1 (Low)

		the project area. Should any graves be identified within the project area, a 20m buffer will be maintained around the grave. Construction workers will however be cautioned to operate with care on site and should a culturally sensitive aspect be discovered on site that has not been previously identified, construction activities stop temporarily and the issue assessed and the authorities (AMAFA) notified if need be.	
14. Clearing of indigenous vegetation during the laying of the pipeline and temporary access points in a threatened ecosystem type.	8 (Medium)	The majority of the pipeline will be on existing road and pipeline servitudes which means that the vegetation has been previously disturbed. In order to minimise the amount of vegetation cleared, the following measures have been included in the EMPr: One protected plant species was identified, namely *Aloe marlothii* between28°50'17.72"S;31°1'22.33"E and 28°50'41.26"S; 31°1'5.78"E. Should any protected species (prior or post environmental authorisation) be identified within the pipeline servitude, these plants must be avoided and protected or a permit must be applied for from KZN Wildlife to remove or relocate these species. • A maximum trench servitude of 10m (5m on either side of the trench) must be adhered to for this pipeline construction. • A maximum width of 5m must be managed within the watercourse crossing points. • The relatively small trench size (1.2m) should result in the loss of only a narrow strip of vegetated area, which must then be re-vegetated on completion of construction. • Clearing of vegetation and excavating of the trench in close proximity to the watercourses will need to be done by hand, where possible. Vehicle access will be restricted as there is a higher risk of damage and disturbance to surrounding vegetation. • All access routes are to follow the existing roads / access tracks. • The contractor must ensure that invasive species do not gain a foothold along the cleared route until the indigenous vegetation has had time to re-establish. This impact can be managed and	6 (Medium)

		minimised.	
Fauna & Flora			
15. Encroachment of alien vegetation into disturbed areas during construction.	8 (Medium)	Alien vegetation were noted along the roadside and some watercourse crossings, due to previous disturbance associated with construction of roads, and pipeline infrastructure. The Contractor is to ensure that the alien vegetation does not further establish within the disturbed areas associated with the excavation of the trench. Any cleared area for the pipeline is the contractor's responsibility to keep free from alien vegetation encroachment. • Alien vegetation within the construction footprint must not be allowed to encroach onto the site and must be continually removed (monthly) during construction. • All soil stockpiles must be free from alien invasive species before they are used to backfill the trenches. This impact can be managed and mitigated.	5 (Low)
16. Loss of riparian vegetation during excavation for pipework crossings on watercourses, leading to erosion and damage to stream banks.	8 (Medium)	The watercourses are already crossed by roads and pipes and therefore, the riparian habitat at these points has previously been cleared and disturbed. Furthermore, the drainage lines have very little to no riparian vegetation present due to the non-perennial nature of the watercourses and the frequent disturbance through foot traffic and animal grazing activities. Where clearing of riparian vegetation is required, it will be kept to a minimum and associated trench (1.2mx2m). The key impact that requires attention is the potential for erosion, which is to be monitored by the Contractor on an ongoing basis. Erosion can be reduced by keeping any vegetation associated with the banks of the watercourses intact. This impact can be avoided and managed.	5 (Low)
17. Clearance of vegetation from within the pipe footprint area.	7 (Medium)	The pipe has been aligned alongside an existing road which has been previously disturbed. No clearing may take place outside of the project footprint. The ECO must sign off the site camp locations prior to site establishment.	3 (Low)
Operation			

18. Upgrading and constructing the water supply to the local area.	0	This is a positive impact.	0
19. Long-term erosion around watercourses and damage to watercourse banks where pipe crossings have been placed.	9 (Medium)	Since the pipeline will be placed in line with the bed of the watercourses, it is unlikely to cause a long-term erosion impact. Where watercourses have been crossed, a concrete block will be constructed in the river bank together with gabion mattresses to anchor the pipeline in place during high flow conditions. Gabions / reno mattresses may be included in the design to stabilize the banks and prevent erosion of the banks during high flow events. It must also be ensured that trench rehabilitation has been effectively carried out before contractors leave the site. Soil in the trenches must be compacted effectively to the same level or slightly higher than the surrounding land to prevent settling which could create depressions for water to travel along, creating erosion funnels and exposing the pipeline. It must be ensured that indigenous vegetation (grass) is planted after the soil has been compacted and that this vegetation has taken successfully before contractors leave the site. This impact can be avoided during the construction phase.	5 (Low)
20. Placement of pipes in the beds of watercourses impacting the flow regime of the rivers.	7 (Medium)	Due to the small size of the pipes and tributaries as well as the placement of the pipeline underneath the bed of the watercourses, the construction will not impact the flow regime of the rivers. The pipes will be tied to existing structures, where possible or placed underneath the stream bed. This impact can be prevented during the construction phase.	4 (Low)
21. Water pipes bursting resulting in localised flooding and erosion.	8 (Medium)	Various measures to ensure pipe integrity will be implemented including: • Scour valves to control the supply of water. They are used to stop supply when any repairs are carried out on a section of pipeline. • Non-Return Valves (spring loaded) will be placed along the pipeline length which effectively break the line into smaller sections thereby decreasing the overpressures. These valves have been designed for placement on long pump mains (over and above the mandatory placing at pump stations). Double purpose (RBX) air	5 (Low)

		valves would be installed either side of the valve. • Vacuum Breaker / Air Release Valves designed to accommodate air intake and release during normal operation and in the event that the pump trips or the line is being filled or scoured. These valves will be installed at apexes along the pipelines at distances of not more than 600m and also before and after isolation valves and non-return valves. This impact can be prevented and mitigated.	
22. Illegal connections resulting in damage to pipework, flooding, erosion and loss of water supply.	6 (Medium)	Since most of the households in the area will have easy access to water, there is unlikely to be illegal connections however the pipeline will be laid in trenches that will be 2-4m deep. The water service provider is to monitor the pipeline, through routine inspections with any leaks being repaired as soon as they are reported. This impact can be prevented and managed.	1 (Low)
Decommissioning			
23. Rubble, soil and material left on site and in close proximity to the watercourses.	7 (Medium)	It is unlikely that the pipeline will be decommissioned however should this be required, all rubble and pipework area to be removed from the site and disposed of at a registered landfill site. Where the pipe is removed from the watercourses, the trench is to be filled with stones and rehabilitated to its current condition to prevent pooling in this section. This impact can be managed and mitigated.	2 (Low)
Cumulative			
24. General pollution and sedimentation within the catchment.	7 (Medium)	Provided that the Contractor is compliant with the measures included in the attached EMPr, waste management and erosion control will be sufficiently managed to prevent this cumulative impact.	2 (Low)
25. Pressure on water resources in the Middeldrift area.	6 (Medium)	This project is part of the King Cetshwayo District Municipality's plan to continually improve basic services in their area. Water will be supplied to these communities from the existing water treatment plant, so no water will be abstracted from a water resource or body for this water supply. This impact has been avoided.	3 (Low)
26. Improved service delivery to the local area.	0	This is a positive impact.	0

6.7. Technology Alternative 2 (Pipe Pier Bridges across the watercourses)

The below impacts relate to the technology 2 (crossing the watercourses on raised pier bridges).

Nature and Consequences of impact	Significance rating of impacts[4]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
Construction			
1. All general construction related impacts remain the same for the preferred and alternative technology alternatives. The operational impacts relating to watercourse crossings may differ between the two alternative crossing techniques.	-	Mitigation measures for impacts 1 – 17 remain the same for the preferred and alternative options for the pipe crossings.	-
Operation			
Watercourses			
2. Impacts No.5 and 6 remain the same for both technology alternatives however the significance of the risk to the watercourse is slightly higher with the pipe pier bridge since there is more risk of the piers obstructing flow than that of the preferred alternative (laying the pipe under the bed).	11 (High)	Mitigation measures for impacts No.5 and 6 largely remain the same for the preferred and alternative technique. Additionally: • The concrete piers must be located outside of the watercourse beds to prevent unnecessary long-term flow obstruction.	8 (Medium)
3. Having a raised pipe above the surface level would expose the pipe to flood damage and consequential ongoing maintenance and service disruption.	11 (High)	The pipeline must be raised above the 1:100 year floodline level to avoid flood damage. The raised pipe would require additional reinforcement for protection from weathering.	9 (Medium)
Decommissioning			
4. Decommissioning impacts remain the same for both the preferred and alternate crossing techniques.	-	Mitigation measures remain the same for the preferred and alternate crossing techniques.	-
Cumulative			
5. Cumulative impacts remain the same for both the preferred and alternate layouts.	-	Mitigation measures remain the same for the preferred and alternate layouts.	-

6.8. Environmental Impact Statement as per section (l)

The key impacts associated with the construction of the Middeldrift WSS relate to those during the construction period. Issues such as clearing indigenous vegetation, damaging watercourses and wetlands, and the management of erosion need to be addressed. This can be best managed by minimising the clearing of vegetation to strictly the project footprint, managing the watercourses WC1-72 and the associated wetlands as sensitive no-go areas and by implementing effective stormwater measures. All construction activity is to be confined to the existing pipeline footprint area. Should a large tree or section of riparian vegetation require clearing, the ECO must be consulted before clearing takes place. All vehicles must use the existing road and operate within the existing route. The watercourse and wetlands within 500m are not expected to be affected by the pipeline construction as long as the mitigation measures are adhered to

[4] See Appendix H for more details.

during construction. Once construction is complete there should be no significant impacts related to the operation of the pipeline.

Taking into consideration the above impacts and mitigation measures, it is the EAP's opinion that the construction of the Middeldrift WSS be authorised.

6.9. Impact Management Objectives And Outcomes For The Development For Inclusion In The EMP As Per Section 3(m)

The following objectives and outcomes must be considered for this project:

- Objectives:
  - For there to be no lasting negative impacts on the environment once construction is complete, specifically within the watercourses and wetlands.
  - To practice responsible construction, 'best practice' with regards to housekeeping on site during construction (outlined within the EMPr) and enforce the polluter pays principle. The applicant / contractor must be responsible for their actions on site during construction and the rehabilitation of the site post construction.
- Outcomes:
  - To promote sustainable development. Create infrastructure and an environment that is healthy and sustainable for future generations to come.

6.10. Assumptions, Uncertainties And Gaps In Knowledge Relating To The Assessment And Mitigation Measures Proposed As Per Section 3(o)

The information in this report is based on findings from the Aquatic and Wetland assessments. The design drawings and typical cross sections through the watercourses, have been provided to the EAP by the engineer. The EAP is therefore satisfied that there are no gaps in knowledge relating to this assessment.

6.11. Period For Which Authorization Is Required, Proposed Monitoring And Auditing And Post Construction Requirement's

Environmental authorisation is required for the construction of the pipeline within the second quarter of the 2019 business plan for the King Cetshwayo District Municipality. The authorization would need to be valid for a period of five years, within which time construction would need to commence. Due to the length of the pipeline, construction may be split into two phases, each phase requiring six months.

Given the nature of this project, it is recommended that **monthly** ECO audits be carried out for the duration of the construction phase of this project. One post construction audit should be conducted once construction is complete.

The EMPr details the post construction, rehabilitation and closure objectives which will be monitored by the ECO and compliance authorities.

6.12. Financial Provisions As Per Section 3(s)

The contractor is responsible for and must ensure that the site has been rehabilitated in full before leaving the site. No upfront financial provision is required for this project.

6.13. EAP Opinion On Whether Or Not To Authorize Activity And Recommendations And Conditions For Authorisation As Per Section 3(n) And (p)

With respect to the technology alternatives, it is recommended that preferred alternative 1, which is to encase the pipe in concrete and run it beneath the watercourse beds, be authorised. Impacts associated with the pipeline construction are considered 'low'.

6.14. Summary of Recommendations for the construction of the Middeldrift WSS:

Stakeholders, Properties & Services

- As standard construction practice the engineer and contractor should identify all existing services that may be affected prior to construction.
- Any structures that need to be removed, should be replaced and any damage repaired.
- The pipeline route must run adjacent to existing roads, footpaths and services, wherever feasible.

- Environmental induction at the start of the construction is to be conducted and proof retained in the site file.

Traffic & Construction Vehicles

- Appropriate signage and trench demarcation must be used to cordon off construction areas.
- All construction vehicles should be fitted with the appropriate silencers and exhausts.
- Speed limits must be obeyed.
- Existing roads must be used with no ad hoc roads being created.

Housekeeping, waste management, storage and materials handling

- Littering must not be permitted on site.
- All hazardous materials and substances should be stored within a secured area in the construction camp. The storage area should be a hard surfaced, bunded and covered area.
- Cement mixing must be done on a hard surface that is protected from storm water runoff.
- Contractors should be required to dispose of construction rubble at an appropriate landfill site. Delivery notes and safe disposal certificates to prove appropriate disposal should be available.
- Appropriate and sufficient toilet facilities must be provided by the contractor.
- Toilet facilities must be provided by a registered company and all sewage must be disposed of at an appropriate facility. Safe disposal certificates must be kept on record.
- Toilet facilities must not be located within 32m of any watercourses.

Dust and erosion control

- A water cart should be used to dampen dusty surfaces and suppress dust.
- Exposed areas should be rehabilitated and re-vegetated as soon as possible during construction.
- Areas exposed to erosion must be protected through the use of sand bags, berms and efficient construction processes i.e.: limiting the extent (footprint) and duration period that areas are exposed. The contractor must ensure that any blockages created during construction are resolved.

Stormwater management and protection of watercourses

- The engineer/contractor must ensure that only clean stormwater runoff enters the environment. Any contaminated run off must be collected and disposed of.
- No excavated material or fill material may be stored within or directly adjacent to the watercourses / wetlands.
- Only the area directly in the path of the trench may be cleared of vegetation.
- The contractor must ensure that invasive species do not gain a foothold along the cleared route until the indigenous vegetation has had time to re-establish itself.
- Heavy vehicles should avoid working near the watercourses as much as possible. Trenches to preferably be dug by hand.
- Once construction is complete, it must be ensured that no material whatsoever is left in the stream channels or near the banks where it may be washed into the watercourses in a high flood event. It is recommended this material be removed from site entirely if it is not used in the construction process.
- During the exaction of trenches, flows must be diverted around the active work areas to prevent channelled flow.

Trenching

- Only the minimum area required for the trench may be cleared.
- Trenches must not remain open indefinitely.
- Trench work must be completed in sections and then closed once the pipe has been laid in that section.
- Cleared areas may not be left exposed for long periods of time and must be re-vegetated at each stage of pipework is completed.
- Trenches must not remain open during building shut down periods i.e. over Christmas and Easter.
- Soil in the trenches must be compacted effectively to the same level or higher than the surrounding land to prevent settling which could create depressions for water to travel along, creating erosion funnels and exposing the pipeline.
- Indigenous grasses must be replanted after the soil has been compacted and that this vegetation has taken successfully before contractors leave the site.
- Trench rehabilitation must be effectively carried out before contractors leave the site, especially where approaching the watercourse crossings and on steeper hills.

- A maximum width of 10m wide construction footprint buffer must be maintained along the pipeline in the sections outside the watercourses.

Watercourse Crossing construction

- All watercourses (including wetlands) must be identified and demarcated at the start of construction.
- Work in stream beds should preferably be carried out during winter when flow rates are lower.
- Erosion protection features (i.e. gabions) must be installed at the watercourse crossings if there are no existing structures.
- Pipework must be laid in the river bed flush with the bedrock or the stream bed so as not to create a point for erosion.
- A buffer of 5m is to be maintained around the watercourses and wetlands (excluding the actual crossings).

Protection of Heritage Resources

- A buffer of 20m is to be maintained around any graves that are encountered during construction.
- Attention is drawn to the South African Heritage Resources Act, 1999 (Act No. 25 of 1999) and the KwaZulu-Natal Heritage Act (Act no 4 of 2008) which, requires that operations that expose archaeological or historical remains should cease immediately, pending evaluation by the provincial heritage agency.

Appendix A: Drawings & Maps

Appendix B: Specialist Reports

Appendix C: Proof of Placement of Notice Board

Appendix D: Proof of Notification

Appendix E: Adverts

Appendix F: Registered I &Aps

Appendix G: Comments and Response table and Comments Received

Appendix H: Impacts Scoring Matrix

Appendix I: EAP declaration and Curriculum Vitae

Appendix J: Environmental Management Program