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DRAFT BASIC ASSESSMENT REPORT

THE CONSTRUCTION OF THE UMDONI SOUTH WATER AUGMENTATION PROJECT RESULTING IN THE CONSTRUCTION OF INFRASTRUCTURE AND ASSOCIATED WATERCOURSE CROSSINGS THAT HAVE A FOOTPRINT OF MORE THAN 10M² WITHIN THE EFZ REQUIRING THE EXCAVATION AND INFILL OF MATERIAL FROM A WATERCOURSE IN EXCESS OF 10M³ AND 5M³ FROM WITHIN 100M OF THE SEA'S HIGH-WATER MARK AS WELL AS THE CLEARANCE OF MORE THAN 300M² FROM AN ENDANGERED ECOSYSTEM

UMDONI LOCAL MUNICIPALITY
UGU DISTRICT MUNICIPALITY

EIA REF: DC21/0003/2024

EVP1621



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

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Executive Summary

The Ugu District Municipality proposes to upgrade the existing water supply network within the uMdoni Local Municipality, through nine communities: Umdoni, Pennington, Kelso, Malangeni, Sezela, Ifafa, Bazley, GDP, and Elysium. These areas form part of Wards 7 to 10 of the uMdoni Local Municipality, KwaZulu-Natal.

The ultimate goal of the applicant is to provide improved access to a potable water supply by means of constructing new infrastructure and upgrading existing infrastructure which will serve to satisfy the increasing water demand throughout the entire project area. Ultimately the project will uplift standards of living in the communities serviced by the new project and provide employment for local labour forces during construction. To achieve this goal the proposed augmentation project will include 47.83km of pipeline, comprising 37.43km of both new and upgraded bulk mains and 10.40km of newly constructed reticulated pipeline in the GDP area.

The existing bulk main which runs from Sezela Cricket Grounds on Sezela Drive and extending South along the coastline to the town of Elysium will be replaced as it has deteriorated and insufficient to meet demand. In some sections, the existing pipeline infrastructure could not be followed, and will therefore be re-routed to a better alternative route. New bulk mains will also be constructed as part of the proposal; these bulk mains will be constructed between the towns of Ifafa, Glebe and Pennington, and will run through Malangeni and parallel to the N2 highway. Most of the project area is currently receiving water through these systems, and so reticulation pipelines for these areas will not fall part of the scope of works for this project. However, reticulation pipelines have been included in this project for the newly developed area of GDP, which does not have an existing reticulation system and has no official water supply.

There are 36 watercourse crossings along the pipeline route and while no wetlands have been identified within the project area, numerous riparian and estuarine environments have been delineated. A small working servitude will be required to ensure there is available working space on either side of the pipeline to allow access for construction personnel as well as an area to support the stockpiling of material. The maximum servitude will be 10m. There will be a need to clear vegetation along the water pipeline route and within the 10m working servitude. The area falls within the endangered KwaZulu-Natal Coastal Belt Grassland ecosystem type. Due to the location of the study area in relation to the coastal area associated with the Indian Ocean, there are also small portions of the proposed pipeline which fall within 100m of the high watermark of the sea.

Taking the above project description into consideration and the proposed works, the construction of the Umdoni South Water Augmentation project will require Environmental Authorisation through a Basic Assessment for the following reasons:

- Infilling and removal of 1611.58m³ of material within the identified watercourses on-site (Listing Notice 1, Activity 19).
- Infilling and removal of 8436.36m³ of material from areas that are within 100m of the high-water mark of the sea (Listing Notice 1, Activity 19A).
- The clearance of 478 281m² of indigenous vegetation from the endangered KwaZulu-Natal Coastal Belt Grassland ecosystem type (Listing Notice 3, Activity 12).
- The development of 4290.03m² of infrastructure within 32m of a watercourse that falls within a rural area (Listing Notice 1, Activity 12).
- The development of 659.86m² of infrastructures within 32m of a watercourse that falls within several estuarine functional zones (EFZ; Listing Notice 3, Activity 14).

The following key impacts and mitigation measures have been assessed:

- **Damage to the watercourses and coastal areas from the construction activities**
These impacts are unavoidable; however, the pipeline will be trenched below ground, and if the rehabilitation plan is followed, there should be no long-lasting impacts. The pipeline route predominantly follows existing and previously cleared road and service servitudes. There are some areas that have not been cleared or crossed previously, while the majority of the riparian and drainage line areas are already impacted by infrastructure (i.e. roads). Caution must be exercised when working near and within a watercourse.
- **Clearance of endangered indigenous vegetation within the construction footprint**
Clearance of vegetation is unavoidable as a 10m working corridor is required for the installation of the water pipeline. The majority of the pipeline follows existing road and bulk pipeline servitudes. The significance of these impacts can be reduced if all mitigation measures are implemented.

- **Improved services**

The water supply scheme will improve service delivery to the Umdoni, Pennington, Kelso, Malangeni, Sezela, Ifafa, Bazley and Elysium communities, and increase 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 Programme (EMPr).

One route alternative was considered for the proposed project. This route predominantly follows sections of previously undisturbed areas such as road reserves, railway lines and existing bulk pipeline routes. However, the primary driver which dictates the pipeline route is the topography as the proposed network has been designed to be a gravity-fed system. Two design alternatives have been considered for the proposed Umdoni Water Pipeline. These design alternatives relate to the watercourse crossing methodology. Design Alternative 1 (preferred alternative) is to construct the length of the water pipeline below ground level, while Design Alternative 2 requires the construction of low-level bridges to support the pipelines across the watercourses. This design alternative is not the preferred option as the exposed pipelines across the watercourses have a high potential for failure during flood events due to debris being captured below the structure. In addition, an exposed pipeline also increases the risk of vandalism and as such, is an increased risk to the local potable supply.

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 preferred route and design alternative 1 be authorised for the construction of the Umdoni South Water Augmentation project.

Table of Contents

Section 1: Scope of Work and Location of Activity	8
1.1 Project Title	8
1.2 A Description of the Activities to Be Undertaken Including Associated Structures and Infrastructure As per Section 3(d) (ii)	8
1.3 Construction Methodology	31
1.3.1 General pipeline construction	31
1.3.2 Pipelines across existing bridges/culverts	31
1.3.3 Pipelines across watercourses	31
1.4 Description of Feasible Alternatives as Per Section 3(h)(i)	32
1.4.1 Route Alternatives	32
1.4.2 Design Alternatives	32
1.4.3 The No-Go Alternative	32
1.5 All Listed and Specific Activities to Be Triggered and Being Applied for As Per Section 3(d) (i)	33
1.6 Location of Activity as per Section 3 (b)(i)-(iii)	33
Section 2: Surrounding Land Use as per section 3(h)(iv) and (k)	38
2.1 DFFE Site Sensitivity Verification	38
2.2 Surrounding Environment	40
2.3 Topography and Physical Characteristics of Site	53
2.4 Surface Water	55
2.4.1 Aquatic and Riverine Systems ³	55
2.4.2 Water Quality ³	57
2.4.3 Habitat Integrity Assessment ³	57
2.4.4 Aquatic Macroinvertebrate Assessment ³	58
2.4.5 Ichthyofauna Community ³	59
2.4.6 Present Ecological State ³	60
2.4.7 Riparian/Watercourse Buffer ³	60
2.4.8 Impact Statement ³	66
2.5 Terrestrial Biodiversity	66
2.5.1 Impact Statement	69
2.6 Geotechnical Environment	69
2.7 Heritage and Cultural Aspects	69
2.8 Paleontological Environment	70
Section 3: Policy and Legislative Context	71
3.1 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)	71
Section 4: Motivation, Need and Desirability	74
4.1 Need and Desirability as Per Section 3(F)	74
4.2 Motivation for Preferred Site, Activity and Design Alternative	80
4.2.1 Route Alternatives	80
4.2.2 Design Alternatives	80
Section 5: Public Participation	82
5.1 Notification of Interested and Affected Parties	82
5.2 Registered Interested and Affected Parties	83
5.3 Comments	83
Section 6: Impact Assessment	84
6.1 Methodology to Determine and Rank Significance and Consequences of Impacts Associated With All Alternatives as Per Section 3(h) (vi)	84
6.2 Impact Assessment of the Route and Design Alternatives	85
6.3 Environmental Impact Statement as per section (l)	103
6.4 Impact Management Objectives and Outcomes for the Development for Inclusion in the EMPr as Per Section 3(m)	105
6.5 Assumptions, Uncertainties and Gaps in Knowledge Relating To the Assessment and Mitigation Measures Proposed As Per Section 3(o)	105
6.6 Period for Which Authorisation Is Required, Proposed Monitoring and Auditing and Post Construction Requirements	105
6.7 Financial Provisions as Per Section 3(s)	105
6.8 EAP Opinion on Whether Or Not to Authorise Activity and Recommendations and Conditions for Authorisation as Per Section 3(n) and (p)	105

List of Figures

Figure 1: Locality Map For Umdoni South Water Augmentation Project	12
Figure 2: Aerial Photograph showing the Umdoni South Water Augmentation Project	13
Figure 3: Aerial Photograph showing Watercourse Crossing 1 - 3 of the Umdoni South Water Augmentation Project	14
Figure 4: Aerial Photograph showing Watercourse Crossing 4 - 6 of the Umdoni South Water Augmentation Project	15
Figure 5: Aerial Photograph showing Watercourse Crossing 7, 8, 9 and 21 - 23 of the Umdoni South Water Augmentation Project	16
Figure 6: Aerial Photograph showing Watercourse Crossing 10 - 14 of the Umdoni South Water Augmentation Project	17
Figure 7: Aerial Photograph showing Watercourse Crossing 15 and 16 of the Umdoni South Water Augmentation Project	18
Figure 8: Aerial Photograph showing Watercourse Crossing 17 - 19 of the Umdoni South Water Augmentation Project	19
Figure 9: Aerial Photograph showing Watercourse Crossing 20 of the Umdoni South Water Augmentation Project	20
Figure 10: Aerial Photograph showing Watercourse Crossing 24 and 25 of the Umdoni South Water Augmentation Project	21
Figure 11: Aerial Photograph showing Watercourse Crossing 26 of the Umdoni South Water Augmentation Project	22
Figure 12: Aerial Photograph showing Watercourse Crossing 27 of the Umdoni South Water Augmentation Project	23
Figure 13: Aerial Photograph showing Watercourse Crossing 28 and 29 of the Umdoni South Water Augmentation Project	24
Figure 14: Aerial Photograph showing Watercourse Crossing 30 of the Umdoni South Water Augmentation Project	25
Figure 15: Aerial Photograph showing Watercourse Crossing 31 of the Umdoni South Water Augmentation Project	26
Figure 16: Aerial Photograph showing Watercourse Crossing 32 and 34 of the Umdoni South Water Augmentation Project	27
Figure 17: Aerial Photograph showing Watercourse Crossing 33 of the Umdoni South Water Augmentation Project	28
Figure 18: Aerial Photograph showing Watercourse Crossing 35 of the Umdoni South Water Augmentation Project	29
Figure 19: Aerial Photograph showing Watercourse Crossing 36 of the Umdoni South Water Augmentation Project	30
Figure 20: Photographs of the Site Taken on the 29 th November 2023, 7 th March 2024, and 11 th April 2024.	40
Figure 21: Aerial Photograph showing the Elvational Gradient of the Umdoni South Water Augmentation Project	54
Figure 22: Location Of Aquatic Sampling Sites ³	56
Figure 23: SASS5-derived Ecological Categories Based On Dallas (TBC, 2024) ³	59
Figure 24: Riparian/Watecourse Buffers for the Southern Section of Umdoni Water Pipeline (TBC, 2024) ³	61
Figure 25: Riparian/Watecourse Buffers for the Mid Section of Umdoni Water Pipeline (TBC, 2024) ³	62
Figure 26: Riparian/Watecourse Buffers for the Northern-Mid Section of Umdoni Water Pipeline (TBC, 2024) ³	63
Figure 27: Riparian/Watecourse Buffers for the North-Eastern Section of Umdoni Water Pipeline (TBC, 2024) ³	64
Figure 28: Riparian/Watecourse Buffers for the North-Western Section of Umdoni Water Pipeline (TBC, 2024) ³	65
Figure 29: Habitat Types along the Umdoni South Pipeline Route	67
Figure 30: Sensitivity Ratings of Habitats Along Northern Section of Umdoni Water Pipeline (TBC, 2024) ³	68
Figure 31: Sensitivity Ratings of Habitats Along Southern Section of Umdoni Water Pipeline (TBC, 2024) ³	70
Figure 32: Desktop SAHRIS Database Palaeo Sensitivity Map of the Project Area (Source; SAHRIS, 2024)	70
Figure 33: Aerial Photograph showing the Umdoni South Water Augmentation Project	104

List of Tables

Table 1: Pipe lengths for replacement (Source: EnSync Preliminary Design Report)	9
Table 2: Pipe lengths for system upgrade (Source: EnSync Preliminary Design Report)	9
Table 3: Pipe lengths for system upgrade (Source: GDP Design Proposal Report)	9
Table 4: Volume Calculations Within Watercourses	10
Table 5: Area Calculations Within 32m Of Watercourses	10
Table 6: Area Calculations For Temporary Clearance Of Indigenous Vegetation	11
Table 7: Volume Calculations Within 100m Of The High Watermark	11
Table 8: Listed Activities Being Applied for	33
Table 9: Location Information	33
Table 10: Site Sensitivity Verification	38
Table 11: Gradient Of The Site	53
Table 12: Topographical Features and Landforms of The Site	53
Table 13: Surface water quality results (June 2023) ³	57
Table 14: The Habitat Integrity Assessment Results For Instream and Riparian Habitat ³	58
Table 15: SASS5 Macroinvertebrate Assessment (TBC, 2024) ³	59
Table 16: Sampled Fish Community (TBC, 2024) ³	59
Table 17: Present Ecological State of Aquatic Resources Associated with the Umdoni Water Augmentation Pipeline (TBC, 2024) ³	60
Table 18: The Delineated Habitat Types (Source: TBC, 2024)	66
Table 19: Legislation Table	71
Table 20: Need and Desirability as Per the 2017 Guideline on Need and Desirability	74
Table 21: Scoring of Impacts	84
Table 22: Specific Impacts Associated with Route and Design Alternative 1 (Preferred Alternatives)	85
Table 23: Site-Specific Impacts Associated with Design Alternative 2	101

Appendices

Appendix A: Drawings and Maps	106
Appendix B: Specialist Reports	107
Appendix C: Public Participation	108
C1: I & Ap Notification Register	108
C2: Registered I & Aps And Proof Of Registration	109
C3: Proof of Notification	110
C4: Meeting Minutes and Register	111
C5: Proof Of Placement Of Notice Board	112
C6: Proof Of Placement Of Advert	113
C7: Comments And Response Table	114
C8: Comments And Responses Received	115
Appendix D: Impacts Scoring Matrix	116
Appendix E: EAP Declaration	117
Appendix F: Environmental Management Programme	118

Section 1: Scope of Work and Location of Activity

1.1 Project Title

The Construction of The Umdoni South Water Augmentation Project Resulting in the Construction of Infrastructure and Associated Watercourse Crossings That Have a Footprint of More than 10m² Within the EFZ Requiring the Excavation and Infill of Material from a Watercourse in Excess of 10m³ and 5m³ from within 100m of the Sea's High-Water Mark as well as the Clearance of more than 300m² from an Endangered Ecosystem.

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

The Ugu District Municipality proposes to upgrade the existing water supply network within the uMdoni Local Municipality, through nine communities: Umdoni, Pennington, Kelso, Malangeni, Sezela, Ifafa, Bazley, GDP, and Elysium (Figure 1). These areas form part of Wards 7 to 10 of the uMdoni Local Municipality, KwaZulu-Natal.

An existing bulk water pipeline is in place in the region; however, the pipeline currently supplies 25ℓ per person per day which does not sufficiently serve the project area. There are also numerous illegal connections which could result in the collapse of the entire system. The project area's water infrastructure is currently being supplied from two water treatment works (WTW) via existing bulk pipelines, and through existing storage reservoirs and reticulation system. Analysis of the current network has revealed that the existing water supply and infrastructure are insufficient for the current demand, and it is strained by the growth that has taken place in the area. The deterioration of the infrastructure has also led to multiple leaks. Furthermore, there is currently no reticulation infrastructure within the GDP area, whereby this community is currently without water supply, though other surrounding communities have had water.

Therefore, the ultimate goal of the applicant is to provide improved access to a potable water supply by constructing new infrastructure and upgrading existing infrastructure in order to satisfy the increasing water demand throughout the entire project area. Ultimately the project will uplift standards of living in the communities serviced by the new project and provide employment for local labour forces during construction. To achieve this goal the proposed augmentation project will include 47.83km of pipeline (Figure 2), comprising 37.43km of both new and upgraded bulk mains and 10.40km of newly constructed reticulated pipeline in the GDP area.

The existing bulk main which runs from Sezela Cricket Grounds on Sezela Drive and extending South along the coastline to the town of Elysium will be replaced as it has deteriorated and insufficient to meet demand. In some sections, the existing pipeline infrastructure could not be followed, and will therefore be re-routed to a better alternative route (Refer to Figure 2 and Table 1). New bulk mains will also be constructed as part of the proposal; these bulk mains will be constructed between the towns of Ifafa, Glebe and Pennington, and will run through Malangeni and parallel to the N2 highway (Table 2). Most of the project area is currently receiving water through these systems, and so reticulation pipelines for these areas will not fall part of the scope of works for this project. However, reticulation pipelines have been included in this project for the newly developed area of GDP, which does not have an existing reticulation system and has no official water supply (Table 3). Figure 2 provides an overview of the proposed new bulk mains and the position of existing bulk mains.

To summarise:

- The bulk system will consist of mains varying in diameter from 100mm to 350mm:
 - Umdoni Command Reservoir:
 - 315mm diameter pipeline to the Malangeni Reservoir D and Reservoir E through a pumped system
 - 250mm diameter pipeline to supply Kelso, Pennington, and Hilltop.
 - Kelso, Pennington and to Umdoni:
 - These pipelines will be replaced and upgraded, then have their flow reversed from Umdoni to Pennington to Kelso.
 - Hilltop passing through GDP:
 - A new pipeline will be laid which will also have its own designated pipeline for bulk supply supplied from the existing 1,27MI Umdoni Reservoir.
 - Elysium, Bazley and Ifafa:
 - Pipelines replaced to the same pipe diameters that are currently supplying the area, because these communities have seen very minimal growth in the past few years.

- Galvanized steel pipes will be used in the Umdoni South Bulk Water Augmentation project as requested by Ugu District Municipality.
- The reticulation water system will run through the GDP area, and supply each household, and will have meters at each entrance point. Various pipe diameters will be used throughout the reticulation system. Pipes that are larger than 50mm in diameter will be built using uPVC, and pipes smaller than 50mm in diameter will be built using HDPE material.

Table 1: Pipe lengths for replacement (Source: EnSync Preliminary Design Report)

Hydraulic Zone	Proposed Diameter (uPVC)	Pipe Length (m)
Elysium – Ifafa	160	5467.711
Ifafa – Bazley	160	6348.609
Bazley – Hilltop	160	5486.187
	Total Length	17 302.507

Table 2: Pipe lengths for system upgrade (Source: EnSync Preliminary Design Report)

Hydraulic Zone	Flow (l/s)	Proposed Diameter (GMS)	Pipe Length (m)
Umdoni Main Reservoir (Inlet from Umgeni SCP2)	92.59	350	
GDP	6.77	100	1920
Kelso	7.83	100	3272.78
Pennington	15.37	150	52.478
Hilltop	16.36	150	4334.77
Malangeni (Res E)	11.34	150	2180.16
Leg 1 (Hilltop, Kelso, and Pennington)	91.80	250	86.54
Leg 2 (Kelso + Pennington)	23.21	200	1338.67
Leg 3 (Malangeni)	52.23	300	6890.911
		Total Length	20 126.301

Table 3: Pipe lengths for system upgrade (Source: GDP Design Proposal Report)

Pipe Diameter	Pipe Length (m)
25mm diameter	2100
50mm diameter	3500
75mm diameter	2800
110mm diameter	2000
Total Length	10 400

As part of the project scope, the reservoirs feeding the bulk lines will be refurbished and where necessary capacities increased. Umdoni Reservoir, Malangeni Reservoir D and Malangeni Reservoir E will have their capacities increased, and these reservoirs will remain in the same location as they currently stand. All other existing reservoirs, namely Kelso, Pennington, and Hilltop, will be refurbished. The Water Supply System (WSS) is serviced partly by gravity-fed pipes, and some by the use of pump stations, this existing infrastructure will also be refurbishment as part of the project scope.

There are multiple sections of pipeline where the route will need to cross the existing roads, two of which cross the N2. It is required by the Department of Transport (DoT) that all road crossings be done by pipe boring. However, it has been proposed that gravel road crossings be constructed by open-cut trenching with the necessary provision for traffic deviations and control. This proposal will be confirmed with DoT prior to construction whilst allowance is made for pipe boring for all road crossings. For the N2 road crossings, a pipe jack will be used.

There are 36 watercourse crossings along the pipeline route, please refer to Figures 2 to 20 for the location of each of these watercourse crossings. Although no wetlands have been identified within the project area, numerous riparian and estuarine environments have been delineated. Refer to Section 2 of the BAR which provides more details as to these delineations:

- WC2, WC21, WC26, WC27, WC31, WC35, WC36
 - The pipeline will be attached to existing structures already placed within the watercourses and estuaries. Because of the recent floods, it is believed that the optimal solution is to anchor the pipes securely onto the structures within the watercourse. This measure aims to prevent the pipeline from being swept away during periods of high-water flow. Additionally, this approach minimizes further disturbance to the already affected watercourses, as it eliminates the need for additional excavation within them.
- WC4, WC5, WC6, WC7, WC8, WC16, WC17, WC20, WC33
 - The pipeline will be trenched beneath the watercourses but do not follow existing infrastructure reserves. Excavation will be undertaken in low-flow season (dry season) and full rehabilitation will be carried out post-construction. Therefore, the flow of the watercourse will not be impacted.
- WC1, WC3, WC9, WC10, WC11, WC12, WC13, WC14, WC15, WC18, WC19, WC22, WC23, WC24, WC25, WC28, WC29, WC30, WC32, WC34
 - These watercourse crossings will be within an existing road reserve with the pipeline being trenched below ground level within the road prism. Therefore, there will be limited impact on these areas, as they have already been disturbed.

Table 4 below provides details of the total volume of material infilled/excavated from the watercourses (does not include WC2, WC21, WC26, WC27, WC31, WC35, WC36 as these will be attached to existing structures), while Table 5 provides total infrastructure that are within 32m of watercourses as well as infrastructure within estuarine functional zones.

Table 4: Volume Calculations Within Watercourses

The following is applicable:	
Total length of water pipeline within watercourses ¹ (A)	1611.58m
Width of the trench (B)	1m
Depth of trench (C)	3m
Total volume of material infilled/excavated from the watercourse² (A x B x C)	= 4834.74m³

¹Please note this distance only takes into consideration the portion of the pipelines that crosses the watercourses. The remainder of the working servitude will not require excavation or infilling from these watercourses.

²Please note due to the nature of the pipelines i.e. below the watercourse, the total volume of excavated material will equal the total volume of infilled material.

Table 5: Area Calculations Within 32m Of Watercourses

The following is applicable:	
Total length of water pipeline within 32m of watercourses within rural areas (A)	12257.24m
Total length of water pipeline within 32m of watercourses within estuarine functional zones (B)	1885.32m
Maximum width of pipes (C)	0.35m
Total area of pipeline within 32m of watercourse¹ (A x C)	= 4290.03m²
Total area within estuarine functional zones (B x C)	= 659.86m²

¹Please note this distance only takes into consideration the portion of the pipelines that fall within rural areas.

To support the construction of the water pipelines a small working servitude is required to ensure there is available working space on either side of the pipeline for access for construction personnel as well as an area to support the stockpiling of material. The maximum servitude will be 10m. The topsoil will be removed along the proposed pipeline route to suit trench width, at a depth of 300mm, divided into 100m intervals, and stockpiled separately from the other excavated material. There will be a need to clear vegetation along the water pipeline route and within the 10m working servitude (Figures 2-20). The area falls within the endangered KwaZulu-Natal Coastal Belt Grassland ecosystem type.

As above, the proposed construction methodology is to place the entire pipeline beneath ground level, aside from the sections being attached to existing structures. Therefore, upon completion, previously vegetated areas that were cleared can be suitably rehabilitated. Table 6 below provides details of the indigenous vegetation clearance required for the project.

Table 6: Area Calculations For Temporary Clearance Of Indigenous Vegetation

The following is applicable:	
Length of the water pipeline which requires clearance of indigenous vegetation (A)	47 828.81m
Width of working corridor (B)	10m
Total area of indigenous vegetation to be cleared^{1/2} (A x B)	= 478 281m²

¹Upon completion vegetated areas that were cleared will be suitably rehabilitated.

² For the purpose of the calculation the 10m assumption working corridor has been applied to the entire pipeline route and has not considered transformed areas such as roads and railways.

Due to the location of the study area in relation to the coastal area associated with the Indian Ocean, there are also small portions of the proposed pipeline which fall within 100m of the high watermark of the sea, refer to Table 7 which provides details of the pipelines to be constructed within this 100m zone.

Table 7: Volume Calculations Within 100m Of The High Watermark

The following is applicable:	
Length of pipeline within 100m of the high watermark of the sea (A)	2812.12m
Width of trench (B)	1m
Depth of trench (C)	3m
Total volume of material infilled/excavated within 100m of the high watermark of the sea (A x B x C)	8436.36m³

It must also be noted that the applicant commenced with the replacement of a 6km section of the pipeline near Bazley Beach, part of the bulk pipeline replacement route, prior to receiving formal approval from EDTEA. Subsequently, EDTEA issued a *Notice of Intent to Issue a Compliance Notice* to Ugu District Municipality. Following consultation with EDTEA, Ugu District Municipality was granted a Section 30A approval for this work on the condition that no other work continues, and that rehabilitation of this section be incorporated into the Umdoni South Water Augmentation Project Environmental Management Plan (EMPr). For the purpose of the Environmental Authorization (EA) Application and EMPr, the entire pipeline was evaluated. However, it is important to note that this specific portion of the pipeline will not be included in any subsequent Environmental Authorizations.

Taking the above project description into consideration and the proposed works, the construction of the Umdoni South Water Augmentation project will require Environmental Authorisation through a Basic Assessment for the following reasons:

- Infilling and removal of 1611.58m³ of material within the identified watercourses on-site (Listing Notice 1, Activity 19).
- Infilling and removal of 8436.36m³ of material from areas that are within 100m of the high-water mark of the sea (Listing Notice 1, Activity 19A).
- The clearance of 478 281m² of indigenous vegetation from the endangered KwaZulu-Natal Coastal Belt Grassland ecosystem type (Listing Notice 3, Activity 12).
- The development of 4290.03m² of infrastructure within 32m of a watercourse that falls within a rural area (Listing Notice 1, Activity 12).
- The development of 659.86m² of infrastructures within 32m of a watercourse that falls within several estuarine functional zones (EFZ; Listing Notice 3, Activity 14).

Figure 1: Locality Map For Umdoni South Water Augmentation Project

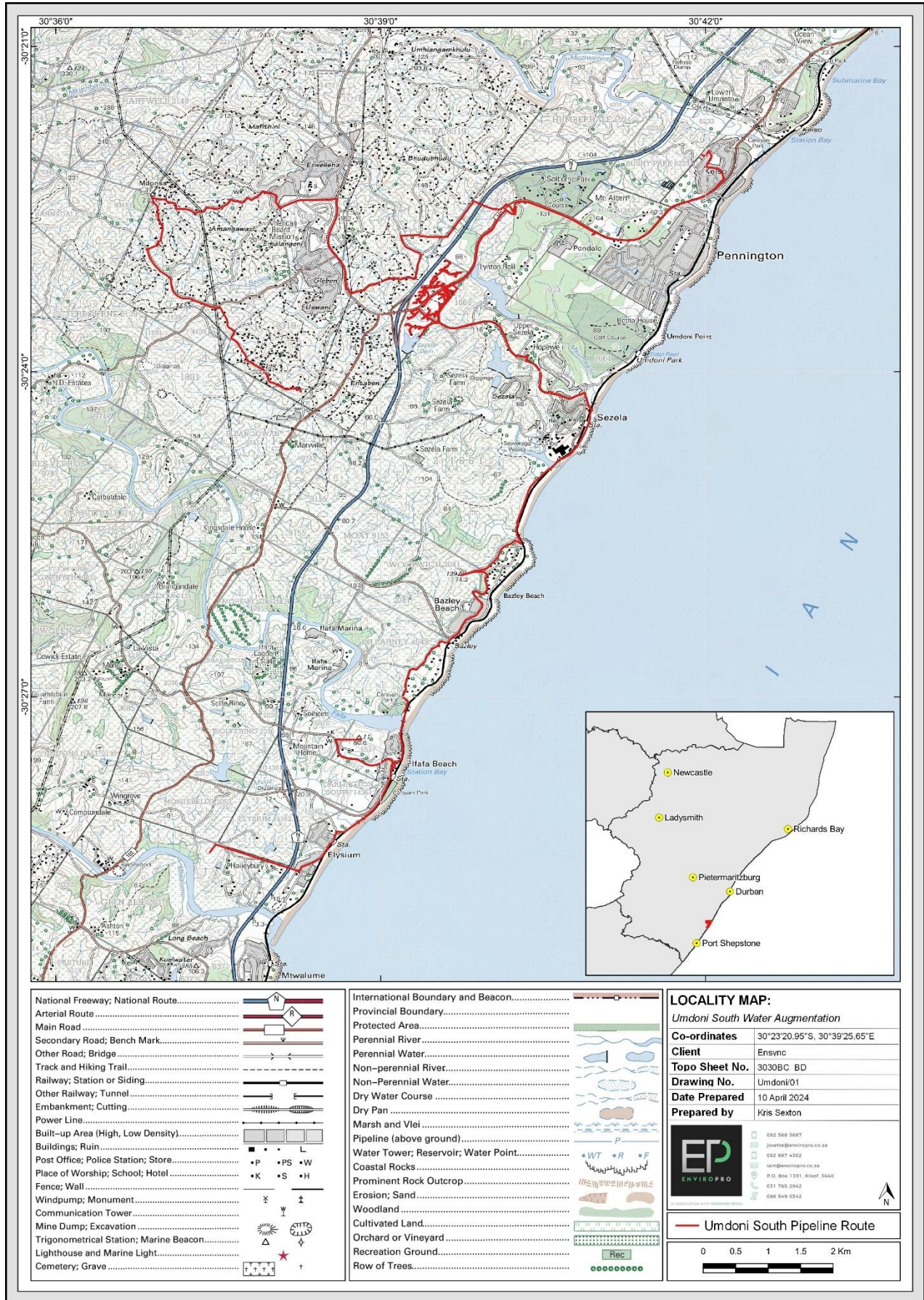


Figure 2: Aerial Photograph showing the Umdoni South Water Augmentation Project

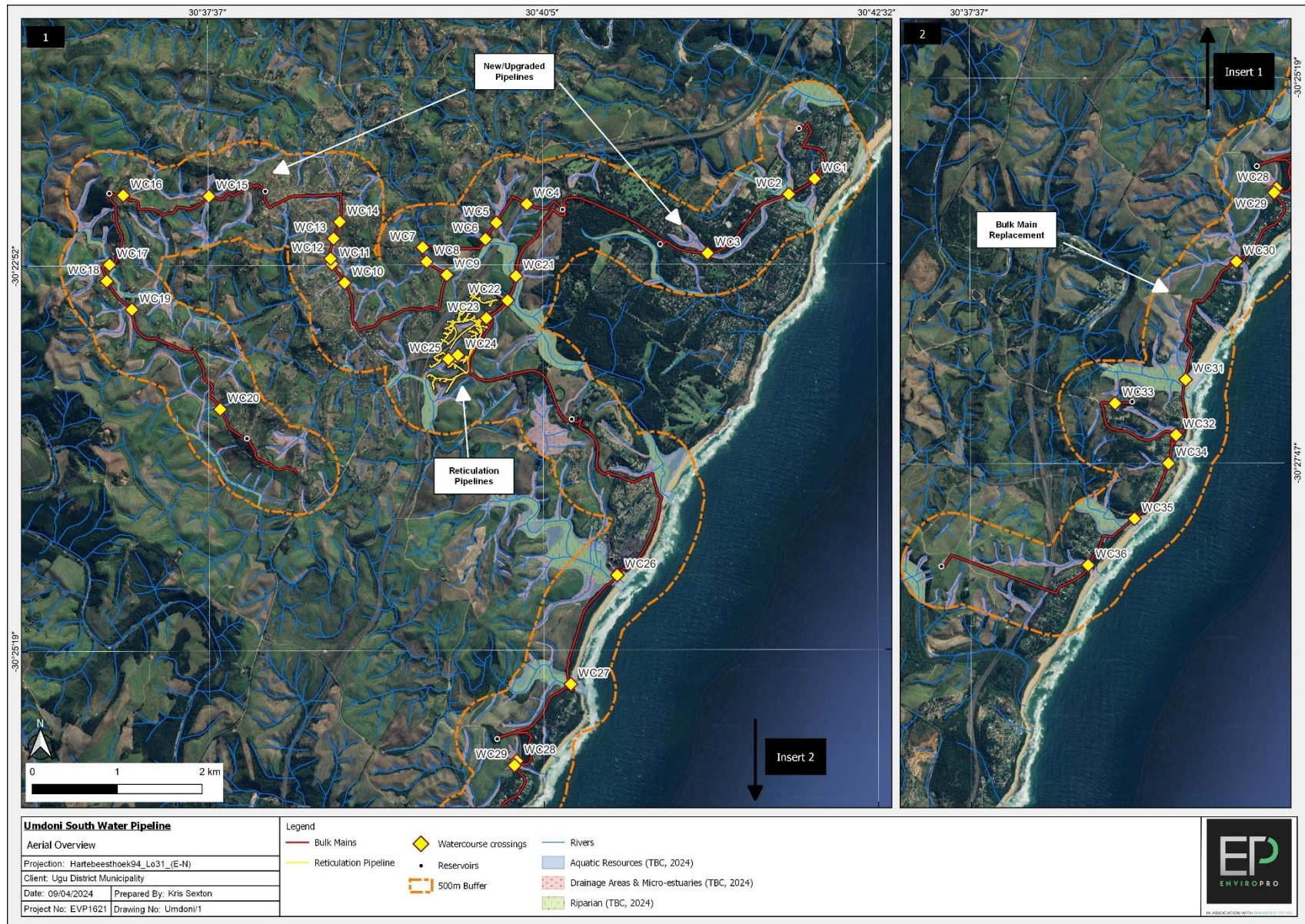


Figure 3: Aerial Photograph showing Watercourse Crossing 1 - 3 of the Umdoni South Water Augmentation Project

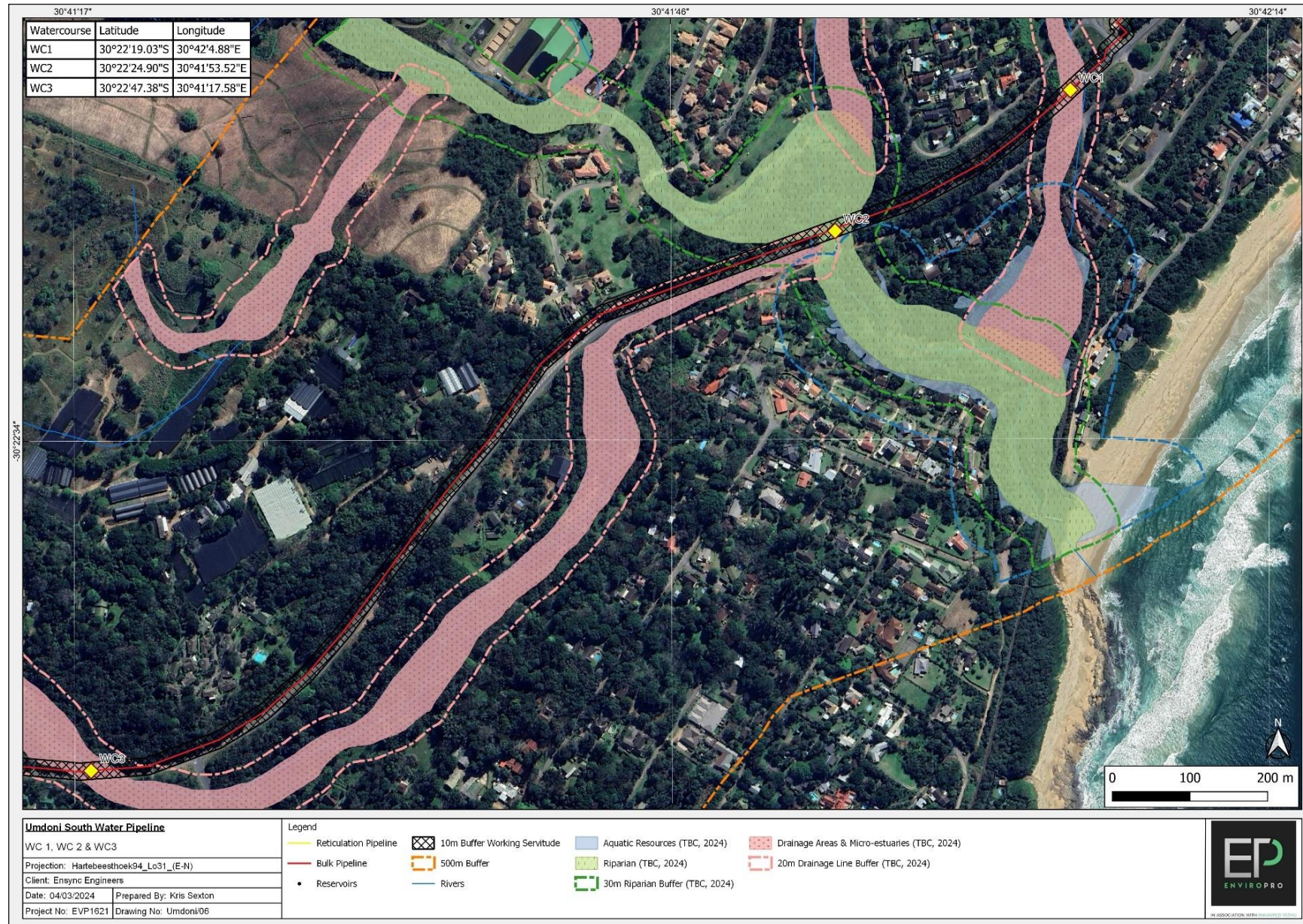


Figure 4: Aerial Photograph showing Watercourse Crossing 4 - 6 of the Umdoni South Water Augmentation Project



Figure 5: Aerial Photograph showing Watercourse Crossing 7, 8, 9 and 21 - 23 of the Umdoni South Water Augmentation Project

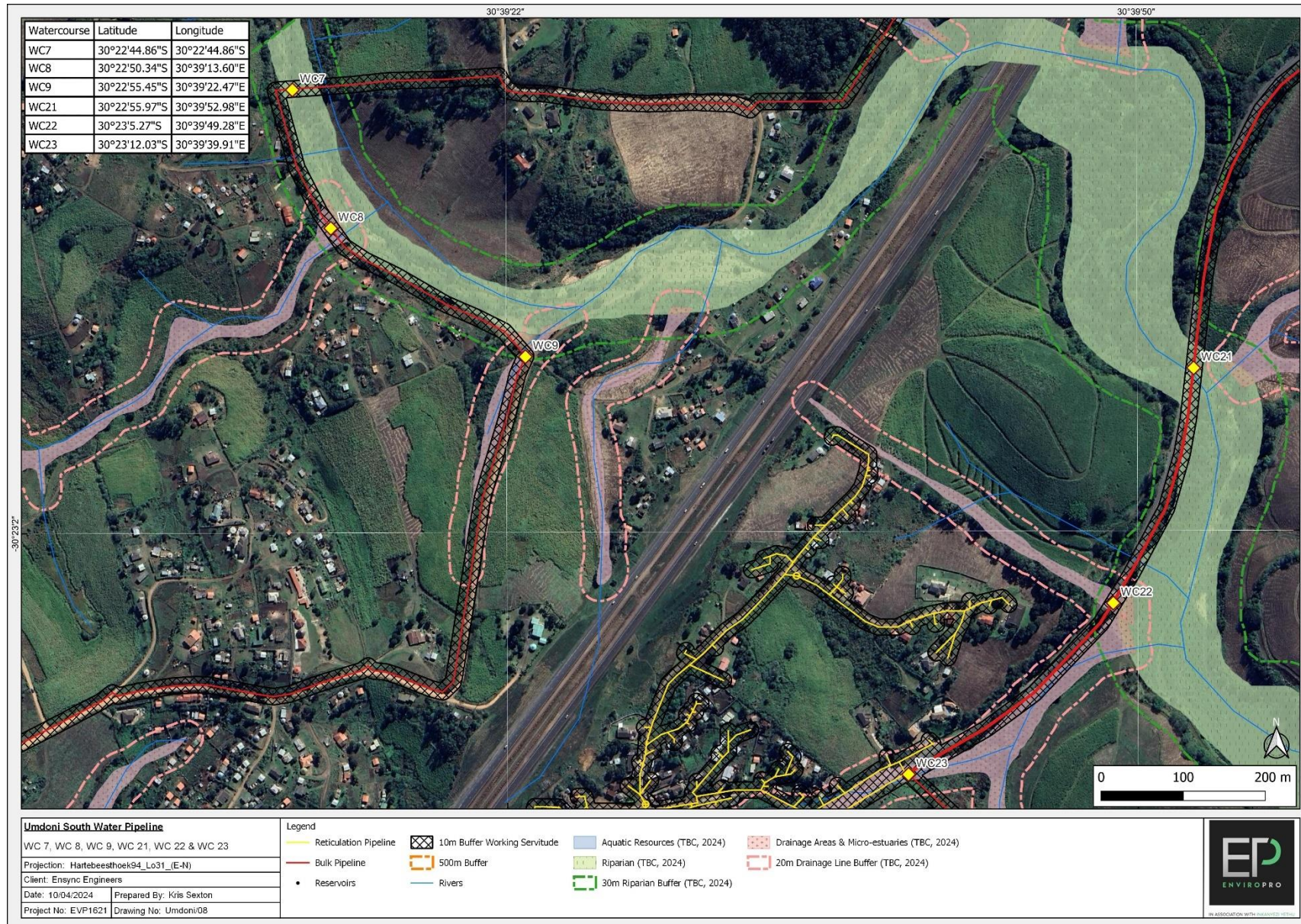


Figure 6: Aerial Photograph showing Watercourse Crossing 10 - 14 of the Umdoni South Water Augmentation Project



Figure 7: Aerial Photograph showing Watercourse Crossing 15 and 16 of the Umdoni South Water Augmentation Project



Figure 8: Aerial Photograph showing Watercourse Crossing 17 - 19 of the Umdoni South Water Augmentation Project



Figure 9: Aerial Photograph showing Watercourse Crossing 20 of the Umdoni South Water Augmentation Project



Figure 10: Aerial Photograph showing Watercourse Crossing 24 and 25 of the Umdoni South Water Augmentation Project



Figure 11: Aerial Photograph showing Watercourse Crossing 26 of the Umdoni South Water Augmentation Project

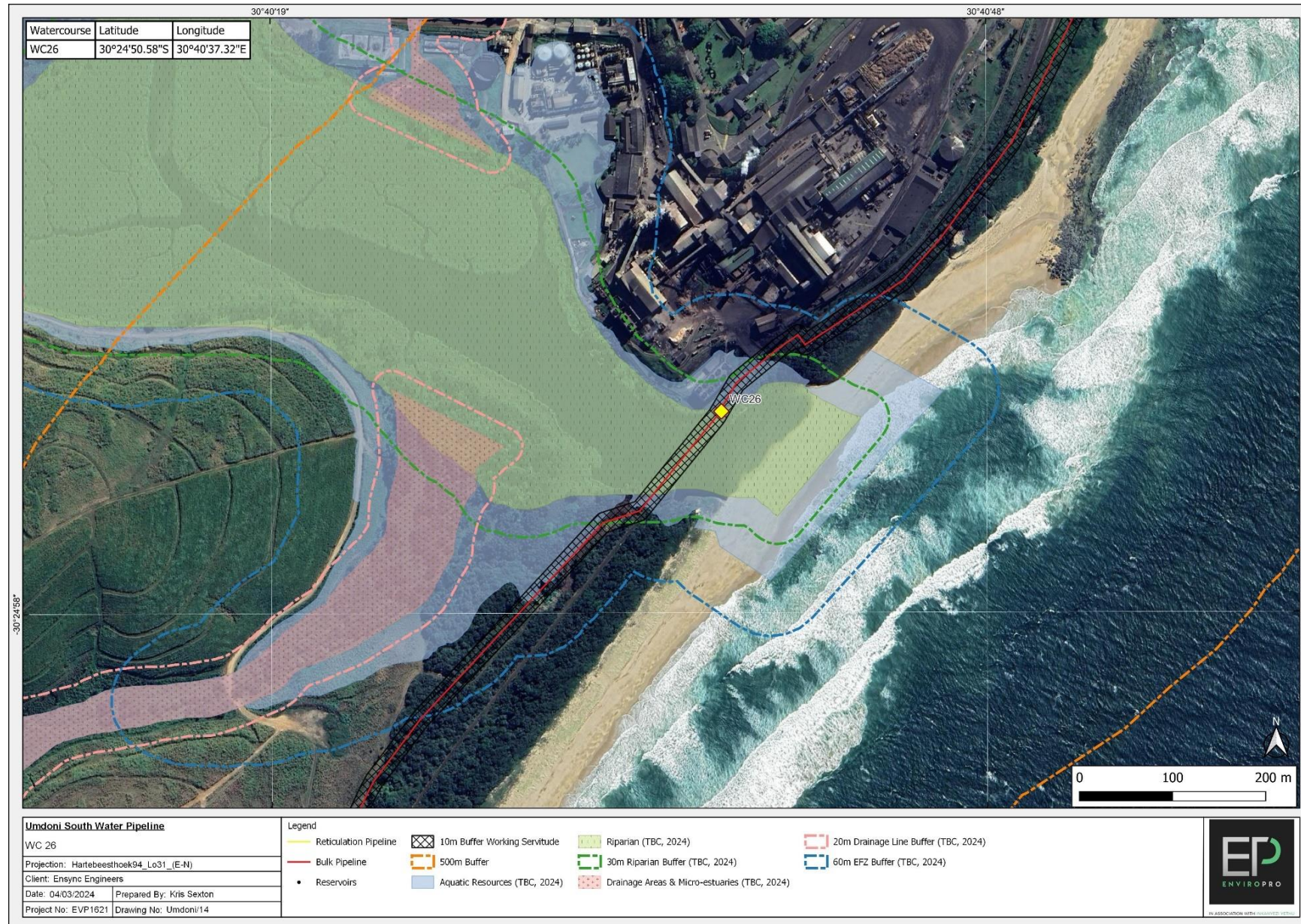


Figure 12: Aerial Photograph showing Watercourse Crossing 27 of the Umdoni South Water Augmentation Project

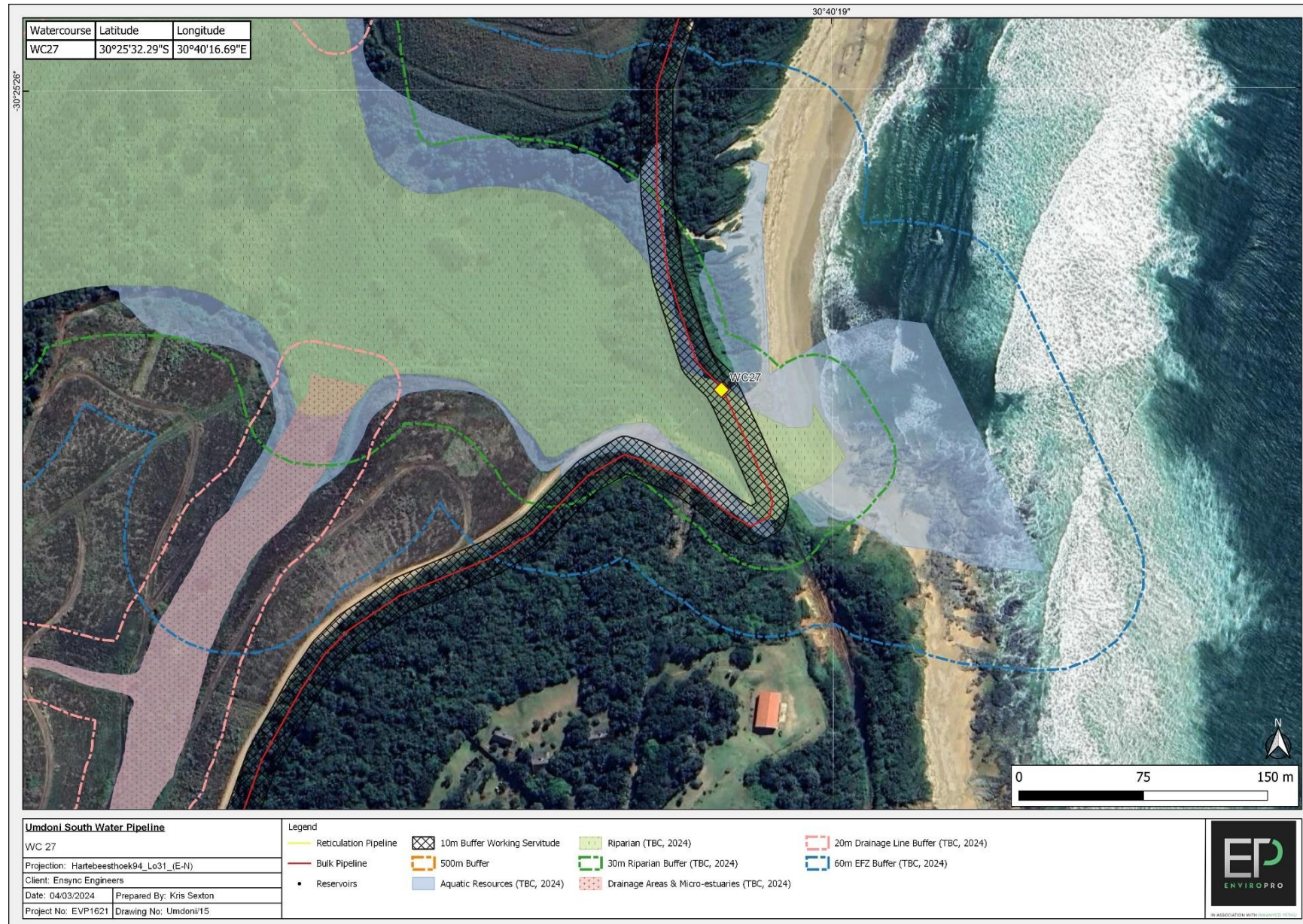


Figure 13: Aerial Photograph showing Watercourse Crossing 28 and 29 of the Umdoni South Water Augmentation Project

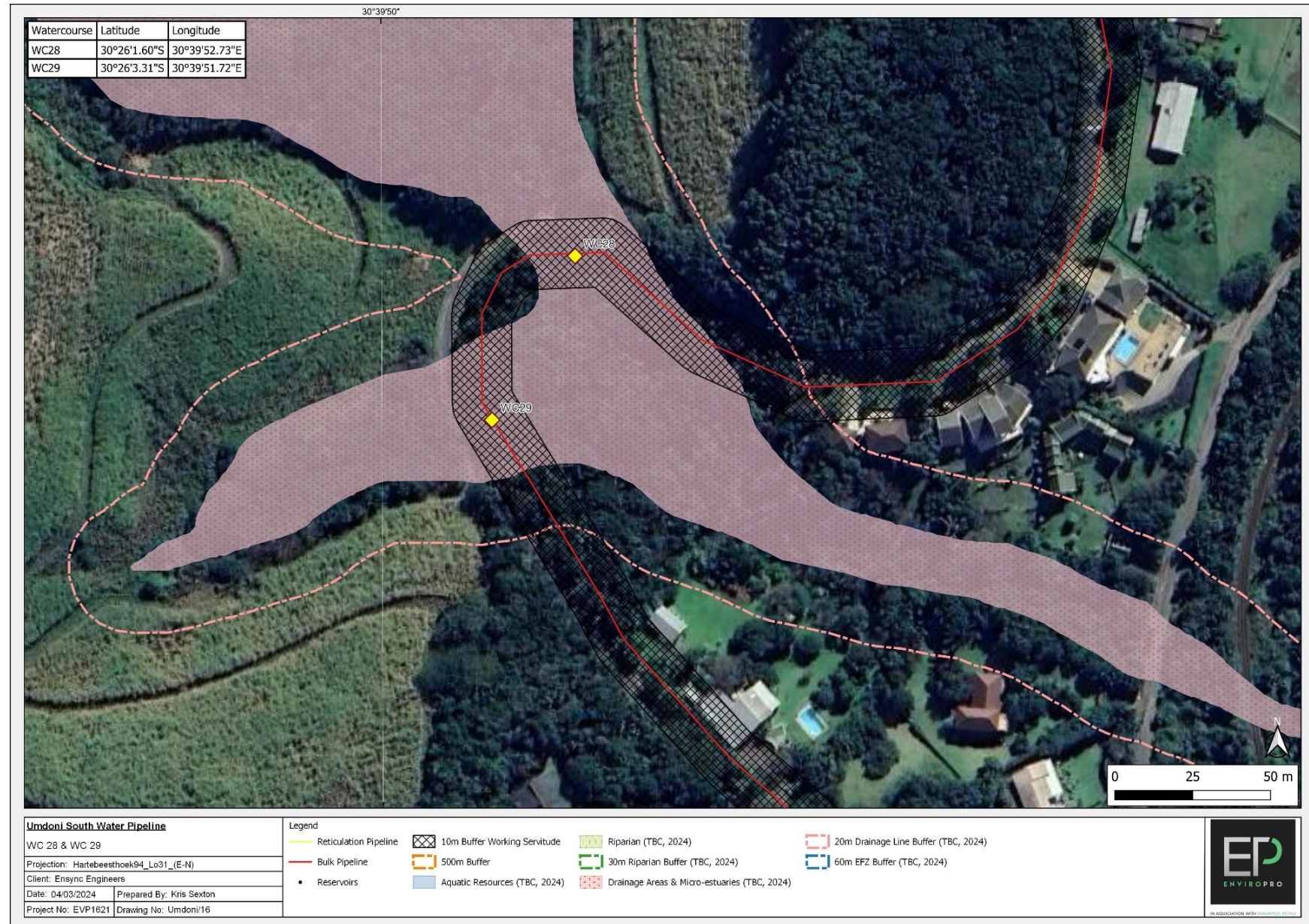


Figure 14: Aerial Photograph showing Watercourse Crossing 30 of the Umdoni South Water Augmentation Project



Figure 15: Aerial Photograph showing Watercourse Crossing 31 of the Umdoni South Water Augmentation Project

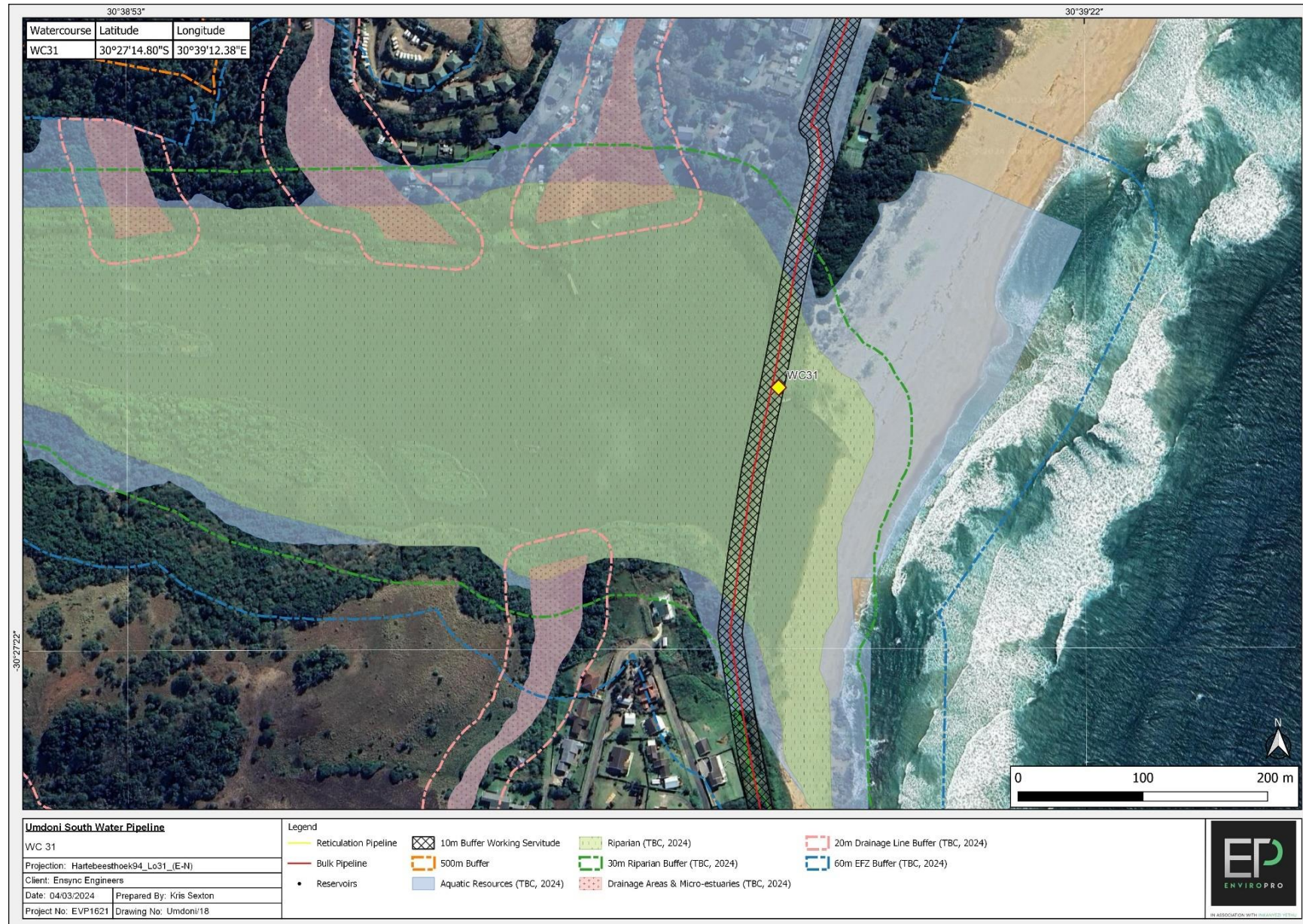


Figure 16: Aerial Photograph showing Watercourse Crossing 32 and 34 of the Umdoni South Water Augmentation Project



Figure 17: Aerial Photograph showing Watercourse Crossing 33 of the Umdoni South Water Augmentation Project

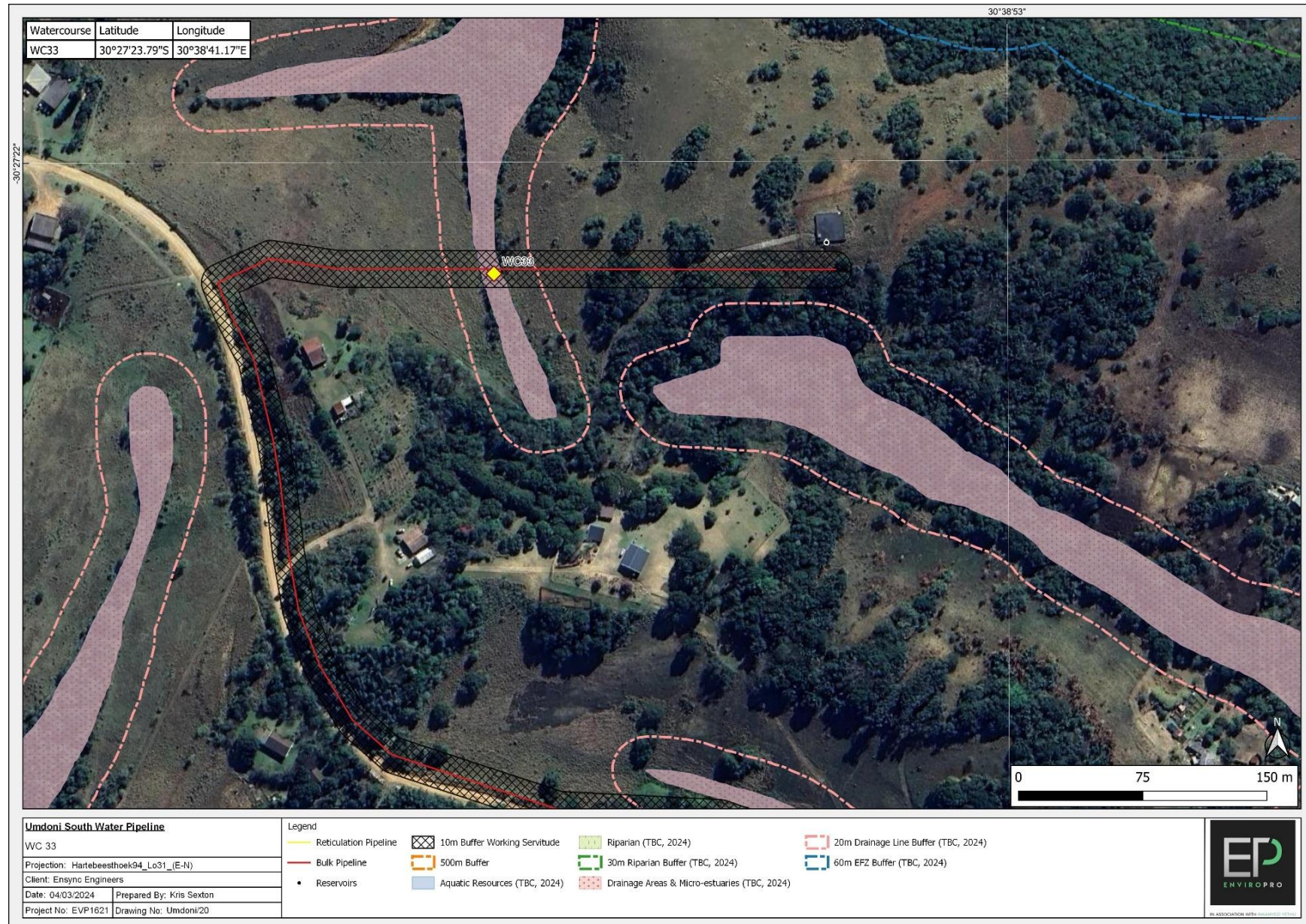


Figure 18: Aerial Photograph showing Watercourse Crossing 35 of the Umdoni South Water Augmentation Project

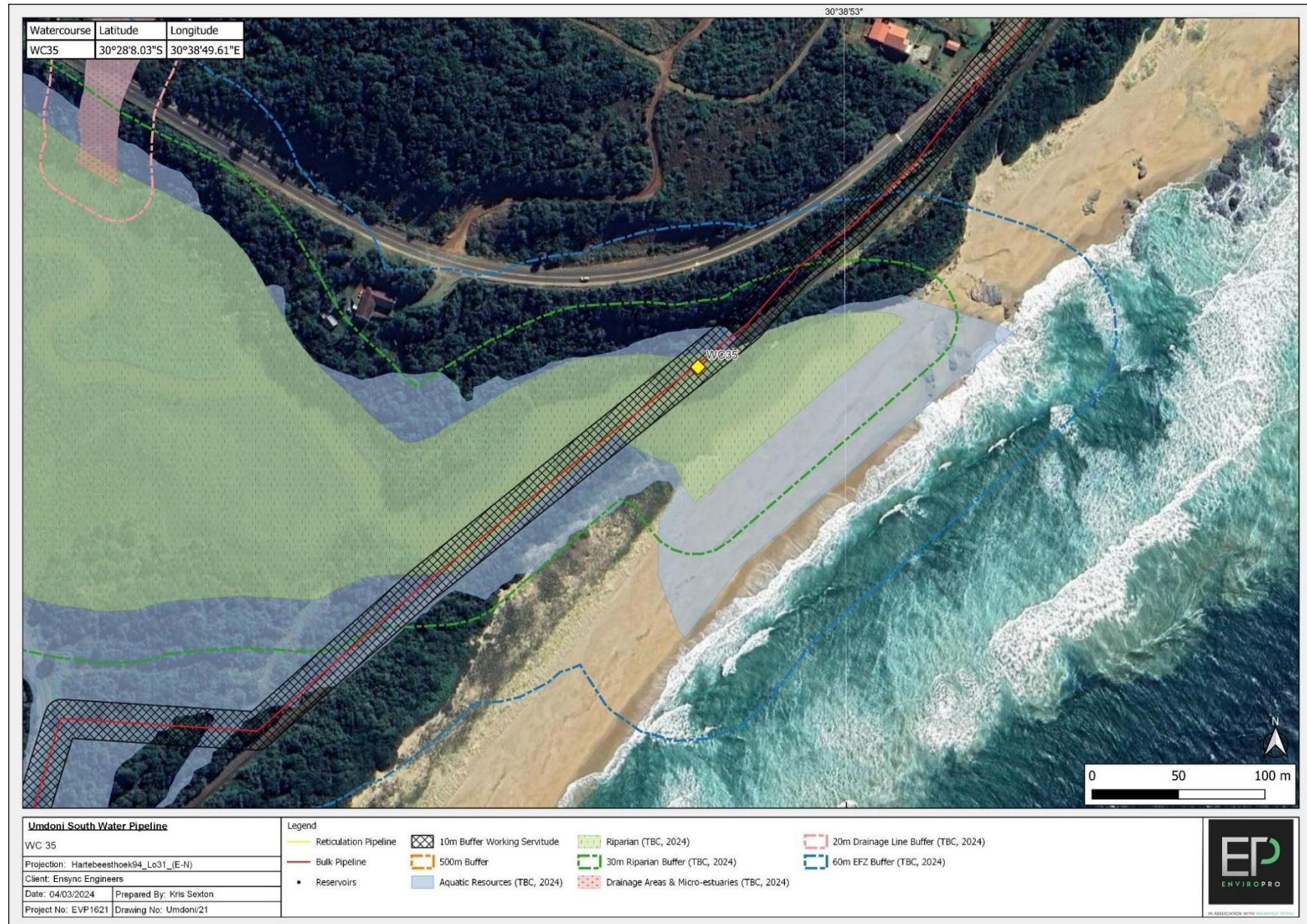


Figure 19: Aerial Photograph showing Watercourse Crossing 36 of the Umdoni South Water Augmentation Project



1.3 Construction Methodology

The following provides the construction methodology for the project, please note that the following information has been based on similar construction projects:

1.3.1 General pipeline construction

- The new pipes are to be constructed adjacent to existing roads, tracks, and footpaths where possible as these areas have already been disturbed.
- The excavation of the trenches for replacement of existing pipeline will occur within the existing pipeline servitude.
- In sections where the existing pipeline infrastructure can't be followed, it will be re-routed to a better alternative route to avoid disturbance to occupants of the properties.
- Construction of the pipeline in the existing servitude will minimise disturbance to the surrounding environment, including soils, aquatics, wetlands, native vegetation, and wildlife.
- Trenches will be excavated.
- Topsoil will be removed and stockpiled carefully for later use.
- Excavated material will be placed alongside the pipe trench if suitable for backfill material.
- Bedding will be placed and compacted, the pipe will be laid with selected fill placed and compacted.
- The trench will be backfilled to natural ground level.
- The impacted area will be re-shaped to its original topography.
- Topsoil will be reinstated.
- The impacted area will be rehabilitated to its original or an improved form.
- All Environmental and Health and Safety requirements and good practice will be strictly adhered to.
- The construction of the pipeline will have a low environmental impact due to the proposed methodology above.
- An Environmental Control Officer will be appointed and will perform monthly audits during the construction and rehabilitation period to ensure that the terms of the EMPr and all other environmental requirements and regulations are complied with.

1.3.2 Pipelines across existing bridges/culverts

- Pipe to be fixed to the bridge with suitable brackets above ground.
- The pipework crossing the stream will consist of flanged steel pipework (either epoxy-coated or hot-dip galvanised).
- If possible, the pipe will be encased in concrete.
- The impacted area will be re-shaped to its original topography.
- The topsoil and foliage will be reinstated.
- The impacted area will be rehabilitated to its original or an improved form.
- All Environmental and Health and Safety requirements and good practice will be strictly adhered to.

1.3.3 Pipelines across watercourses

- Topsoil/foliage along the required river/stream bank will be carefully stripped and placed carefully to one side (foliage side up) to minimise the damage to the ecosystem surrounding the watercourse.
- A temporary trench will be excavated to create a diversion channel around the pipe crossing construction area.
- The pipeline shall be laid beneath the riverbed level and encased in mass concrete to prevent floatation. In addition to the above, reno mattresses shall be installed on top of the concrete encasement. Gabions will be used to stabilise the riverbanks if so required.
- The pipe trench will be excavated across the dry river channel. Hand excavation will be used for the removal of soft/intermediate material.
- An excavator or TLB with a mini/small bucket will be used to remove any localised hard rock/boulders or hard material that might encountered during construction.
- The impacted area will be re-shaped to its original topography.
- The topsoil and foliage will be reinstated.
- The impacted area will be rehabilitated to its original or improved form.
- All Environmental and Health and Safety requirements and good practices will be strictly adhered to.

1.4 Description of Feasible Alternatives as Per Section 3(h)(i)

“Alternatives” are defined as “different means of meeting the general purpose and requirements of the activity”¹. Alternatives considered must be feasible and reasonable². Alternatives considered must aim to address key significant impacts of the proposed activity by “maximising benefits and avoiding or minimising the negative impacts”².

1.4.1 Route Alternatives

This route traverses sections of previously untouched terrain but will largely follow existing infrastructure road reserves and railway lines. A significant portion of the pipeline will run parallel to existing pipeline routes, replacing them, and remaining within their designated servitudes. However, certain segments of the route will diverge from these servitudes to accommodate nearby properties and minimize disruption to occupants' livelihoods during construction. The primary driver dictating the pipeline route is the topography as the proposed network has been designed to be a gravity-fed system. Gravity-fed systems work by means of transferring water from a single high point to points of lower elevation. Therefore, due to the proposal being a gravity-fed system no other feasible route alternatives were available.

1.4.2 Design Alternatives

Two design alternatives have been considered for the proposed Umdoni South Water Augmentation project. These design alternatives relate to the watercourse crossing methodology for crossings that cannot be strapped to existing infrastructure i.e. bridges.

1.4.2.1 Design Alternative 1 (Preferred Design Alternative)

Design Alternative 1 is to construct the Umdoni South Water Augmentation project so that the length of the water pipeline across watercourses will be buried below natural ground level. This will mean that at the watercourse crossings, the pipelines will be trenching below the watercourse. Therefore, there would be no permanent infrastructure within the watercourses, as all infrastructure would be below the bed of the watercourses allowing for the unobstructed flow of water. As such upon completion of rehabilitation the watercourse will be able to function as before.

1.4.2.2 Design Alternative 2

Design Alternative 2 is to construct additional low-level bridges to support the pipelines over the river. This will require placement of permanent concrete columns will need to be placed within the watercourses to support the pipeline. The remaining portions of the pipelines will then be buried below natural ground level. This design alternative is not the preferred option as the exposed pipelines across the watercourses have a high potential for failure during flood events due to debris being captured below the structure. In addition, an exposed pipeline also increases the risk of vandalism, and such is an increased risk to the local potable supply.

1.4.3 The No-Go Alternative

The proposed Umdoni South Water Augmentation project will not be constructed and therefore there will be no need to infill or remove any material from within the watercourses. Neither would there be a need to clear any indigenous vegetation, which has a positive ecological impact. However, if the current infrastructure were to remain in its current state, it would not be able to meet the present or the projected 30-year-future water demands of the Umdoni area. There will therefore be an insufficient supply of water to the area, which would significantly reduce the standard of living in the communities within the project area.

¹ Environmental Impact Assessment Regulations, 2014 as amended published under Government Notice No. 326 in Gazette No. 40772 of 07 April 2017.

² DEA & DP (2010) Guideline on Alternatives, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA & DP).

1.5 All Listed and Specific Activities to Be Triggered and Being Applied for As Per Section 3(d) (i)

Table 8: Listed Activities Being Applied for

GNR	Activity Number	Activity as per the legislation	Activity as it applies to the proposal
Listing Notice 1; 4 th December 2017 as amended	12	The development of infrastructure or structures with a physical footprint of <u>100 square metres</u> or more, where such development occurs – (c) if no development setback exists, <u>within 32 metres of a watercourse</u> , measured from the edge of a watercourse	The construction of the Umdoni South Water Augmentation project will result in the development of pipeline infrastructure with a footprint of 4290.03m ² that is within 32m of delineated watercourses.
Listing Notice 1; 4 th December 2017 as amended	19	The <u>infilling</u> or depositing of any material of more than <u>10 cubic metres</u> into, or the dredging, <u>excavation</u> , removal or moving of soil, sand, shells, shell grit, pebbles, or rock of more than 10 cubic metres <u>from a watercourse</u> .	The construction of the Umdoni South Water Augmentation project will result in 4834.74m ³ of material being infilled/removed from several watercourses.
Listing Notice 1; 4 th December 2017 as amended	19A	The infilling or depositing of any material of more than <u>5 cubic metres</u> into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles, or rock of more than 5 cubic metres from – (ii) the littoral active zone, an estuary or a distance of <u>100 metres inland of the high-water mark of the sea or an estuary</u> , whichever distance is the greater	The construction of the Umdoni South Water Augmentation project will result in 8436.36m ³ of material being infilled/removed from a distance of 100 metres inland of the high-water mark of the sea.
Listing Notice 3; 4 th December 2017 as amended	12	The clearance of an area of <u>300 square metres</u> or more of indigenous vegetation. d. KwaZulu-Natal iv. Within any <u>critically endangered or endangered ecosystem</u> listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004	The construction of the Umdoni South Water Augmentation project will result in the clearance of 478 281m ² of indigenous vegetation from the endangered KwaZulu-Natal Coastal Belt Grassland.
Listing Notice 3; 4 th December 2017 as amended	14	The development of— (ii) infrastructure or structures with a physical footprint of <u>10 square metres</u> or more, where such development occurs— (a) within a watercourse. (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse: excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. (d) KwaZulu Natal i. In an <u>estuarine functional zone</u>	The construction of the Umdoni South Water Augmentation project will result in the development of pipeline infrastructure with a footprint of 659.86m ² that is within 32m of delineated watercourses located within the estuarine functional zones of several estuaries.

1.6 Location of Activity as per Section 3 (b)(i)-(iii)

Table 9: Location Information

District Municipality	Ugu Municipality	
Local Municipality	Umdoni Municipality	
Wards	Ward 7, 8, 9, 10	
Area / Town / Village	Umdoni South Coast	
Coordinates:	Latitude	Longitude
Project Center Point	30°23'20.95"S	30°39'25.65"E
End Point 1 Elysium	30°28'26.09"S	30°37'24.86"E
End Point 2 Malangeni	30°24'11.04"S	30°38'16.03"E
End Point 3 Pennington	30°22'00.15"S	30°41'58.26"E

Co-ordinates for all 36 watercourse crossings below, with watercourses shown in green as requiring removal and infilling of material within a watercourse (Listing notice 1, Activity 19)		
Point	Latitude	Longitude
WC1	30°22'19.03"S	30°42'04.88"E
WC2	30°22'24.90"S	30°41'53.52"E
WC3	30°22'47.38"S	30°41'17.58"E
WC4	30°22'28.41"S	30°39'57.87"E
WC5	30°22'35.53"S	30°39'44.41"E
WC6	30°22'41.78"S	30°39'39.59"E
WC7	30°22'44.86"S	30°39'11.86"E
WC8	30°22'50.34"S	30°39'13.60"E
WC9	30°22'55.45"S	30°39'22.47"E
WC10	30°22'58.35"S	30°38'37.41"E
WC11	30°22'51.08"S	30°38'31.82"E
WC12	30°22'49.09"S	30°38'31.19"E
WC13	30°22'41.40"S	30°38'32.55"E
WC14	30°22'35.00"S	30°38'35.29"E
WC15	30°22'25.07"S	30°37'37.61"E
WC16	30°22'24.64"S	30°36'59.77"E
WC17	30°22'51.15"S	30°36'53.61"E
WC18	30°22'57.43"S	30°36'52.37"E
WC19	30°23'8.38"S	30°37'03.44"E
WC20	30°23'46.66"S	30°37'42.29"E
WC21	30°22'55.97"S	30°39'52.98"E
WC22	30°23'05.27"S	30°39'49.28"E
WC23	30°23'12.03"S	30°39'39.91"E
WC24	30°23'26.13"S	30°39'27.22"E
WC25	30°23'27.64"S	30°39'23.02"E
WC26	30°24'50.58"S	30°40'37.32"E
WC27	30°25'32.29"S	30°40'16.69"E
WC28	30°26'01.60"S	30°39'52.73"E
WC29	30°26'03.31"S	30°39'51.72"E
WC30	30°26'29.68"S	30°39'34.98"E
WC31	30°27'14.80"S	30°39'12.38"E
WC32	30°27'36.01"S	30°39'08.08"E
WC33	30°27'23.79"S	30°38'41.17"E
WC34	30°27'46.86"S	30°39'04.70"E
WC35	30°28'08.03"S	30°38'49.61"E
WC36	30°28'25.75"S	30°38'29.08"E
Property Description:	Erf975 of Pennington Portion 115 of farm Mount Albert 2074 Portion 117 of farm Mount Albert 2074 Portion 116 of farm Mount Albert 2074 Portion 106 of farm Mount Albert 2074 Portion 103 of farm Mount Albert 2074 Portion 3 of Erf 1171 of Pennington Portion 194 of farm Mount Albert 2074 Portion 1 of Erf 14 Sezela Sezela 17463 Humberdale 17270 Portion 159 of farm Ifafa 8319 Portion 160 of farm Ifafa 8319 Portion 161 of farm Ifafa 8319 Portion 162 of farm Ifafa 8319	

	Portion 157 of farm Ifafa 8319 Portion 405 of farm Ifafa 8319 Portion 148 of farm Ifafa 8319 Portion 152 of farm Ifafa 8319 Lot H 4693 Portion 191 of farm Ifafa 8319 Portion 192 of farm Ifafa 8319 Portion 125 of farm Ifafa 8319 Portion 120 of farm Ifafa 8319 Portion 121 of farm Ifafa 8319 Portion 119 of farm Ifafa 8319 Portion 112 of farm Ifafa 8319 Portion 70 of farm Ifafa 8319 Portion 69 of farm Ifafa 8319 Ifafa 8319 Portion 32 of farm Ifafa 8319 Portion 68 of farm Ifafa 8319 Portion 33 of farm Ifafa 8319 Portion 34 of farm Ifafa 8319 Portion 35 of farm Ifafa 8319 Portion 19 of farm Ifafa 8319 Portion 48 of farm Ifafa 8319 Portion 4 of farm Ifafa 8319 Portion 6 of farm Ifafa 8319 Portion 7 of farm Ifafa 8319 Portion 8 of farm Ifafa 8319 Portion 144 of farm Ifafa 8319 Portion 145 of farm Ifafa 8319 Erf 1 of Sezela Erf 14 Sezela Erf 15 Sezela Erf 20 Sezela Erf 94 Sezela Erf 93 Sezela Erf 92 Sezela Erf 91 Sezela Erf 90 Sezela Erf 89 Sezela Erf 88 Sezela Erf 87 Sezela Erf 86 Sezela Erf 85 Sezela Erf 431 Sezela Erf 186 Sezela Erf 187 Sezela Erf 189 Sezela Nicole 17573 Erf 103 of Bazley Remaining Extent of Killarney 4949 Erf 113 of Bazley Remaining Extent of Erf 138 Bazley Erf 142 Bazley Erf3 of Ifafa Erf146 of Ifafa Erf 54 of Ifafa Erf 55 of Ifafa Erf 59 of Ifafa Portion 163 of Farm 6517 Portion 160 of Farm 6517 Portion 157 of Farm 6517 Erf 108 of Bazley Erf 100 Ifafa Erf 103 Ifafa Erf 104 Ifafa Erf 107 Ifafa Erf 140 Elysium Erf 15582 Elysium Portion 4 of Farm 186 Erf 186 of Elysium
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	Erf 185 of Elysium																		
	Erf 136 of Elysium																		
	Portion 130 (Remaining Extent) of Southern Home 2052																		
	Portion 129 (Remaining Extent) of Southern Home 2052																		
	Portion 128 (Remaining Extent) of Southern Home 2052																		
21 Digit Surveyor General no.	Portion 133 (Remaining Extent) of Southern Home 2052																		
	N	0	E	T	0	2	5	5	0	0	0	0	9	7	5	0	0	0	0
	N	0	E	T	0	0	0	0	0	0	0	2	0	7	4	0	0	1	1
	N	0	E	T	0	0	0	0	0	0	0	2	0	7	4	0	0	1	1
	N	0	E	T	0	0	0	0	0	0	0	2	0	7	4	0	0	1	1
	N	0	E	T	0	0	0	0	0	0	0	2	0	7	4	0	0	1	3
	N	0	E	T	0	0	0	0	0	0	0	2	0	7	4	0	0	1	0
	N	0	E	T	0	2	5	5	0	0	0	0	1	2	4	4	0	0	0
	N	0	E	T	0	0	0	0	0	0	0	2	0	7	4	0	0	1	9
	N	0	E	T	0	6	9	0	0	0	0	0	0	1	4	0	0	0	0
	N	0	E	T	0	0	0	0	0	0	0	1	7	4	6	3	0	0	0
	N	0	E	T	0	0	0	0	0	0	0	1	7	2	7	0	0	0	0
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	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	1	6
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	1	6
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	1	5
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	4	0
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	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	1	5
	N	0	E	T	0	0	0	0	0	0	0	4	6	9	3	0	0	0	0
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	1	9
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	1	9
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	1	2
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	1	2
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	1	2
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	1	1
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	1	1
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	0	7
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	0	6
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	0	0
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	0	3
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	0	6
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	0	3
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	0	3
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	0	3
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	0	1
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	0	4
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	0	0
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	0	0
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	0	0
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	0	0
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	1	4
	N	0	E	T	0	0	0	0	0	0	0	8	3	1	9	0	0	1	4
	N	0	E	T	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0

	N	0	E	T	0	6	9	0	0	0	0	0	0	0	1	4	0	0	0	0	0
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	N	0	E	T	0	6	9	0	0	0	0	0	0	0	2	0	0	0	0	0	0
	N	0	E	T	0	6	9	0	0	0	0	0	0	0	9	4	0	0	0	0	0
	N	0	E	T	0	6	9	0	0	0	0	0	0	0	9	3	0	0	0	0	0
	N	0	E	T	0	6	9	0	0	0	0	0	0	0	9	2	0	0	0	0	0
	N	0	E	T	0	6	9	0	0	0	0	0	0	0	9	1	0	0	0	0	0
	N	0	E	T	0	6	9	0	0	0	0	0	0	0	9	0	0	0	0	0	0
	N	0	E	T	0	6	9	0	0	0	0	0	0	0	8	9	0	0	0	0	0
	N	0	E	T	0	6	9	0	0	0	0	0	0	0	8	8	0	0	0	0	0
	N	0	E	T	0	6	9	0	0	0	0	0	0	0	8	7	0	0	0	0	0
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	N	0	E	T	0	6	9	0	0	0	0	0	0	1	8	7	0	0	0	0	0
	N	0	E	T	0	6	9	0	0	0	0	0	0	1	8	9	0	0	0	0	0
	N	0	E	T	0	0	0	0	0	0	0	1	7	5	7	3	0	0	0	0	0
	N	0	E	T	0	0	1	7	0	0	0	0	0	1	0	3	0	0	0	0	0
	N	0	E	T	0	0	0	0	0	0	0	4	9	4	9	0	0	0	0	0	0
	N	0	E	T	0	0	1	7	0	0	0	0	0	1	1	3	0	0	0	0	0
	N	0	E	T	0	0	1	7	0	0	0	0	0	1	3	8	0	0	0	0	0
	N	0	E	T	0	0	1	7	0	0	0	0	0	1	4	2	0	0	0	0	0
	N	0	E	T	0	1	4	9	0	0	0	0	0	0	0	3	0	0	0	0	0
	N	0	E	T	0	1	4	9	0	0	0	0	0	1	4	6	0	0	0	0	0
	N	0	E	T	0	1	4	9	0	0	0	0	0	0	5	4	0	0	0	0	0
	N	0	E	T	0	1	4	9	0	0	0	0	0	0	5	5	0	0	0	0	0
	N	0	E	T	0	1	4	9	0	0	0	0	0	0	5	9	0	0	0	0	0
	N	0	E	T	0	0	0	0	0	0	0	6	5	1	7	0	0	1	6	3	
	N	0	E	T	0	0	0	0	0	0	0	6	5	1	7	0	0	1	6	0	
	N	0	E	T	0	0	0	0	0	0	0	6	5	1	7	0	0	1	5	7	
	N	0	E	T	0	0	1	7	0	0	0	0	0	1	0	8	0	0	0	0	0
	N	0	E	T	0	1	4	9	0	0	0	0	0	1	0	0	0	0	0	0	0
	N	0	E	T	0	1	4	9	0	0	0	0	0	1	0	3	0	0	0	0	0
	N	0	E	T	0	1	4	9	0	0	0	0	0	1	0	4	0	0	0	0	0
	N	0	E	T	0	1	4	9	0	0	0	0	0	1	0	7	0	0	0	0	0
	N	0	E	T	0	1	4	9	0	0	0	0	0	1	4	0	0	0	0	0	0
	N	0	E	T	0	0	0	0	0	0	0	1	5	5	8	2	0	0	0	0	0
	N	0	E	T	0	0	9	2	0	0	0	0	0	1	8	6	0	0	0	0	4
	N	0	E	T	0	0	9	2	0	0	0	0	0	1	8	6	0	0	0	0	0
	N	0	E	T	0	0	9	2	0	0	0	0	0	1	8	5	0	0	0	0	0
	N	0	E	T	0	0	9	2	0	0	0	0	0	1	3	6	0	0	0	0	0
	N	0	E	T	0	0	0	0	0	0	0	2	0	5	2	0	0	1	3	0	
	N	0	E	T	0	0	0	0	0	0	0	2	0	5	2	0	0	1	2	9	
	N	0	E	T	0	0	0	0	0	0	0	2	0	5	2	0	0	1	2	8	
	N	0	E	T	0	0	0	0	0	0	0	2	0	5	2	0	0	1	3	3	

Section 2: Surrounding Land Use as per section 3(h)(iv) and (k)

2.1 DFFE Site Sensitivity Verification

The Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Section 24(5) (a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation ("the Protocols" Government Notice No. 320 as published in Government Gazette No. 43110 on 20 March 2020), are applicable to the proposed development. In line with these Protocols, this Site Sensitivity Verification Report has been included in the BAR. This Site Sensitivity Verification Report addresses the findings of the Screening Tool Report (Appendix B of the BAR), generated from the National Web-Based Environmental Screening Tool, and provides a motivation for the various specialist studies identified to be conducted. It also discusses whether the specialist studies forming part of this project are required to comply with the above Protocol.

As per the Screening Tool Report (Appendix B), the proposed site is located within the following:

- A very high-sensitivity area from an agricultural perspective.
- A high-sensitivity area from an animal species perspective.
- A very high-sensitivity area from an aquatic biodiversity perspective.
- A very high-sensitivity area from an archaeological and cultural heritage perspective.
- A low-sensitivity area from a civil aviation perspective.
- A low-sensitivity area from a defence perspective.
- A high-sensitivity area from a palaeontology perspective.
- A high-sensitivity area from a plant species perspective.
- A very high-sensitivity area from a terrestrial biodiversity perspective.

Based on the above-detailed sensitivities, the Screening Tool Report identifies and recommends the following eight specialist assessments:

1. Agricultural Impact Assessment
2. Archaeological and Cultural Assessment
3. Palaeontology Impact Assessment
4. Terrestrial Biodiversity Assessment
5. Aquatic Biodiversity Assessment
6. Geotechnical Assessment
7. Socio-Economic Assessment
8. Plant Species Assessment
9. Animal Species Assessment

Table 10 below provides the site sensitivity verification for the proposed development. This table provides an indication as to whether or not a certain specialist study was undertaken. The table also provides an explanation as to why a certain specialist study was not undertaken based on the site sensitivity verification.

Table 10: Site Sensitivity Verification

SENSITIVITY AND SPECIALIST INPUT IDENTIFIED IN TERMS OF THE DFFE SCREENING TOOL	CONDUCTED	VERIFICATION OF SITE-SPECIFIC SENSITIVITY AND MOTIVATION ON THE NEED FOR SPECIALIST INVESTIGATION
Agriculture Theme DFFE Sensitivity: Very High <u><i>Necessitating an Agricultural Impact Assessment</i></u> Actual Sensitivity: Very High	No	A large portion of the water pipeline falls within an existing road reserve and in previously developed areas, where no agricultural activity takes place. There are two short sections of the pipeline running from Malangeni Reservoir G and Elysium Reservoir that do not follow existing infrastructure. The entire pipeline will be trenched below ground, and excavated material will be infilled again and rehabilitated. Therefore, any portion of land that may be used for agriculture will be unaffected post project should the rehabilitation methodology be followed. Therefore, it is the EAPs opinion that an Agricultural Assessment is not necessary.
Animal Species Theme DFFE Sensitivity: High	Yes	A large portion of the water pipeline falls within an existing road reserve and in previously developed areas. There are short sections of the pipeline that do not follow existing infrastructure. However, these sections run through previously disturbed vegetation that has been transformed for agriculture. Therefore,

<u>Necessitating an Animal Species Assessment</u> Actual Sensitivity: High		these areas will likely have low diversity from an animal species perspective. The entire pipeline will be trenched below ground, and excavated material will be infilled again and rehabilitated. Nevertheless, a Terrestrial Biodiversity specialist was commissioned. Based on the specialist's findings the proposed footprint area is of a 'High' sensitivity, however due to the nature of the proposal a Terrestrial Biodiversity Compliance Statement (see Appendix B) was compiled. Please refer to Terrestrial Biodiversity under Section 2.5.
Aquatic Biodiversity Species Theme DFFE Sensitivity: Very High <u>Necessitating an Aquatic Biodiversity Impact Assessment</u> Actual Sensitivity: Very High	Yes	The DFFE screening report indicated a very high sensitivity for the area. As The water pipeline will cross multiple watercourses a "Freshwater and Estuarine Ecological & Impact Assessment" specialist study was conducted for the site by The Biodiversity Company (see Appendix B). Based on the specialist's findings the proposed footprint area is of a 'Very High' sensitivity,
Archaeological and Cultural Heritage Theme DFFE Sensitivity: Very High <u>Necessitating an Archaeological & Cultural Impact Assessment</u> Actual Sensitivity: Low	Yes	A Heritage Impact Assessment (see Appendix B) has been compiled by the specialist. Based on specialists' findings the impact of the proposed project on heritage resources is considered low.
Civil Aviation Theme DFFE Sensitivity: Low <u>Does not necessitate any specialist assessment</u> Actual Sensitivity: Negligible	N/A	No specialist input has been required.
Defence Theme DFFE Sensitivity: Low <u>Does not necessitate any specialist assessment</u> Actual Sensitivity: Negligible	N/A	No specialist input has been required.
Paleontological Theme DFFE Sensitivity: High <u>Necessitating a Palaeontology Impact Assessment</u> Actual Sensitivity: Low	Yes	According to the SAHRIS PalaeoSensitivity Map, the project area falls within an area of "High" to "Moderate" to "Low" Palaeontology Sensitivity. The DFFE screening report indicated a "High" sensitivity for the area. Therefore, a specialist Paleontological Impact Assessment (see Appendix B) was conducted for the site by Prof Marion Bamford.
Plant Species Theme DFFE Sensitivity: High <u>Necessitating a Plant Species Assessment</u> Actual Sensitivity: Medium	Yes	The project area will require the clearance of vegetation, despite the majority of the pipeline following existing infrastructure, there are sections where it deviates from this. Please refer to Section 2.2 where photographs have been provided as to the receiving environment. Therefore, a Terrestrial Biodiversity specialist was commissioned. Based on the specialist's findings the proposed footprint area is of a 'Medium' sensitivity, however due to the nature of the proposal a Terrestrial Biodiversity Compliance Statement was compiled (see Appendix B). Please refer to Terrestrial Biodiversity under Section 2.5.
Terrestrial Biodiversity Theme DFFE Sensitivity: Very High	Yes	The project area will require the clearance of vegetation, despite the majority of the pipeline following existing infrastructure, there are sections where it deviates from this. Please refer to Section 2.2 where photographs have been provided as to the receiving environment. Therefore, a Terrestrial Biodiversity specialist was commissioned. Based on the specialist's findings

<u>Necessitating a Terrestrial Impact Assessment</u>		the proposed footprint area is of a 'Medium' sensitivity, however due to the nature of the proposal a Terrestrial Biodiversity Compliance Statement was compiled (see Appendix B). Please refer to Terrestrial Biodiversity under Section 2.5.
Actual Sensitivity: Medium/Low		
ADDITIONAL SPECIALIST STUDIES CALLED FOR BY THE SCREENING REPORT		
Geotechnical Assessment	Yes	As a standard engineering requirement, a geotechnical assessment was conducted. This would be the case regardless of the receiving environment as the assessment is required to inform the water pipeline design.
Socio-Economic Assessment	No	The upgrade of the Umdoni Water Pipeline will have a positive impact by improving water supply within the area. As this is an upgrade of an existing infrastructure, a Socio-Economic Assessment was not deemed necessary for this site.

2.2 Surrounding Environment

Photographs of the watercourses crossed by Umdoni South Water Augmentation Project taken on the 29th November 2023, 7th March 2024 and 11th April 2024 (Figure 20).

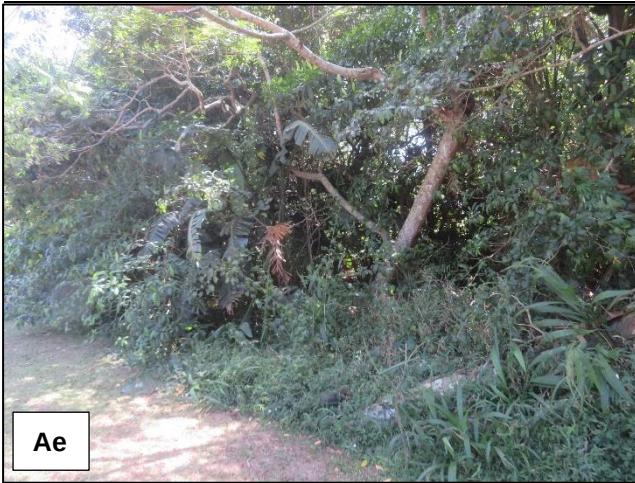
Figure 20: Photographs of the Site Taken on the 29th November 2023, 7th March 2024, and 11th April 2024.



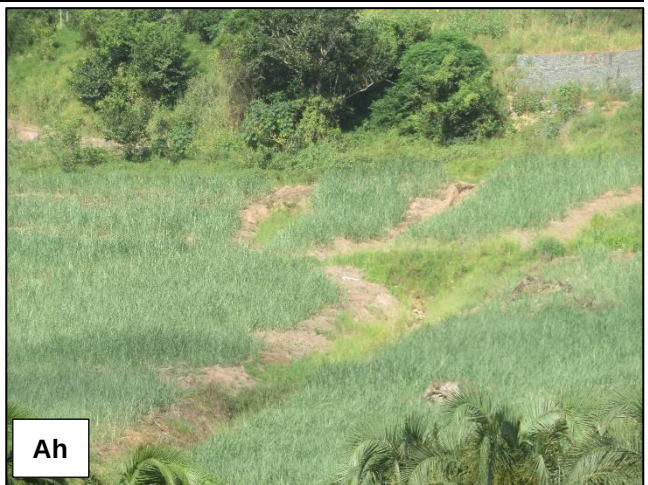
(Aa) View upstream of WC1, a non-perennial watercourse and associated drainage line; **(Ab)** View downstream of WC1.



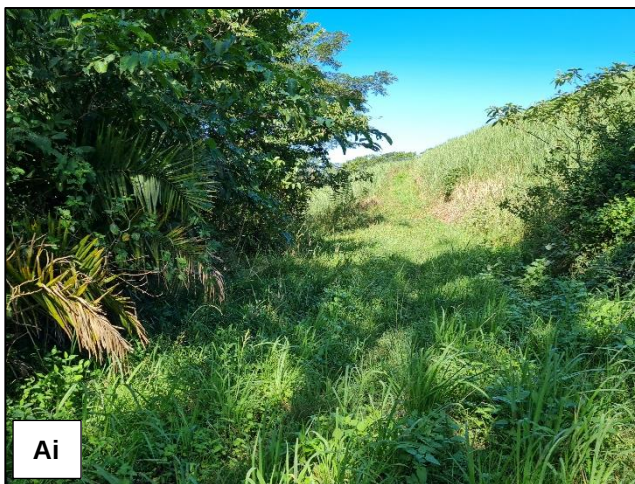
(Ac) View upstream of WC2; **(Ad)** View downstream of WC2, showing existing culvert structure underneath R102.



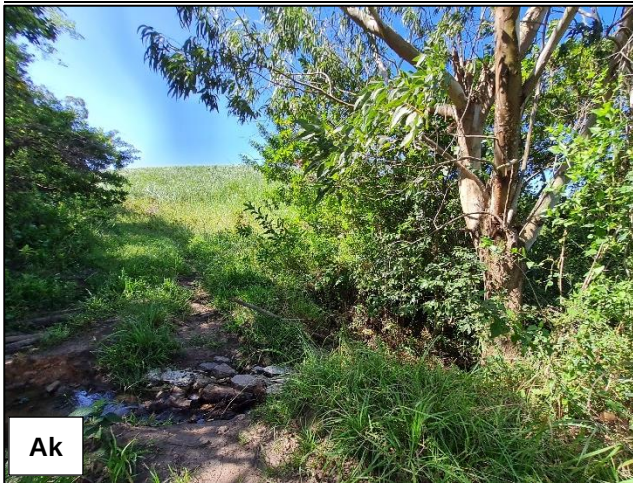
(Ae) View upstream of WC3; **(Af)** View downstream of WC3, with runoff from the road creating erosion.



(Ag) Overview of WC4 along the N2 highway, showing it as non-perennial rivers running through sugarcane fields; **(Ah)** Drainage line formed by water flow off the R102 towards WC4 through the sugarcane fields.



(Ai) North-East direction from first drainage line in WC5 along which the pipeline will run, showing associated drainage line habitat and sugarcane fields beyond; **(Aj)** Downstream view of first drainage line in WC5, showing existing structure within the flowing drainage line.



Ak



Al

(Ak) South-West direction from second drainage line within WC5; drainage line and associated habitat within sugar cane fields; **(Al)** North-East direction of second drainage line in WC5, showing flowing water.

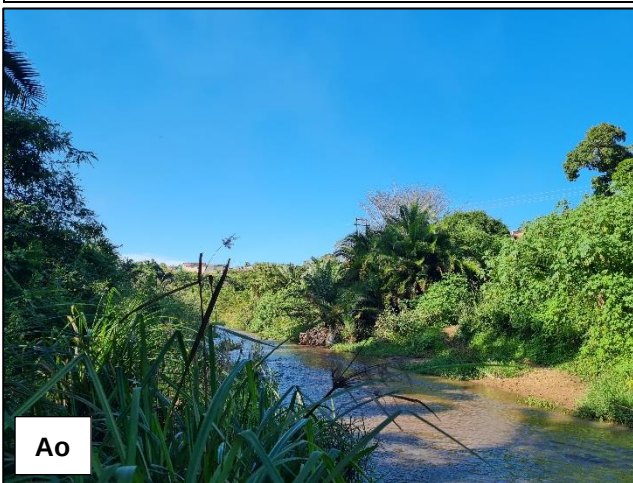


Am



An

(Am) Associated habitat around WC6; **(An)** Water within drainage line of WC5.

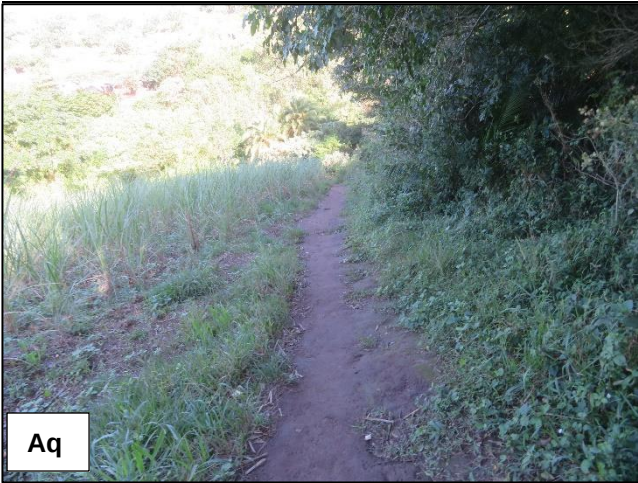


Ao



Ap

(Ao) Downstream view of WC7; **(Ap)** Upstream view of WC7.



Aq



Ar

(Aq) Footpath heading West down towards WC7, along the pipeline route; **(Ar)** Graveyard within 25m of pipeline route, East of WC7.



As



At

(As) Direction North-West of existing structure within WC8; **(At)** Existing structure within WC8.



Au



Av

(Au) Upstream view of WC9, showing disturbed area and exposed pipelines; **(Av)** Downstream view of WC9, through sugarcane fields.



Aw



Ax

(Aw) Upstream view of WC10, showing associated drainage line; **(Ax)** Downstream view of WC10.



Ay



Az

(Ay) Upstream view of WC11, showing associated drainage line; **(Az)** Downstream view of WC11, showing pavilion within sports field, and housing behind.



Ba



Bb

(Ba) Upstream view of WC12, showing associated drainage line and housing alongside; **(Bb)** Downstream view of WC12, showing pavilion within sports field, and housing behind.



Bc



Bd

(Bc) Upstream view of WC13; **(Bd)** Downstream view of WC13.



Be

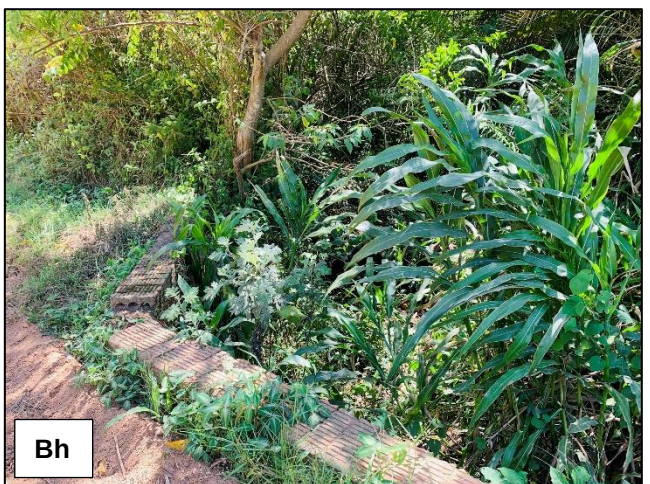


Bf

(Be) Upstream view of WC14; **(Bf)** Downstream view of WC14, showing a footpath leading to housing.

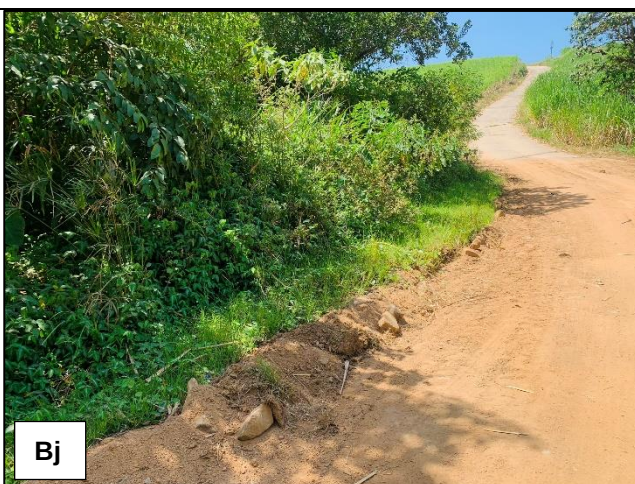


Bg

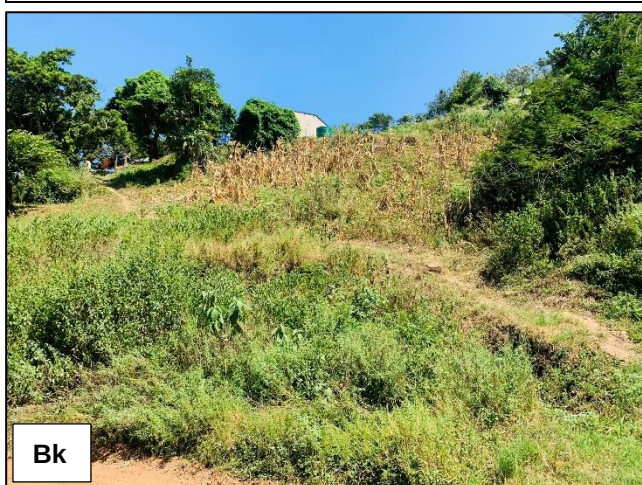


Bh

(Bg) The first of two structures within WC15, showing downstream of existing culvert; **(Bh)** Upstream view of structure 1 of WC15.



(Bi) A second structure downstream view of WC15, showing a smaller culvert, approximately 15m from the first structure; **(Bj)** Upstream view structure 2 of WC15.



(Bk) Upstream view of WC16; **(Bl)** Downstream view of WC16, showing erosion on the road caused by water run-off.



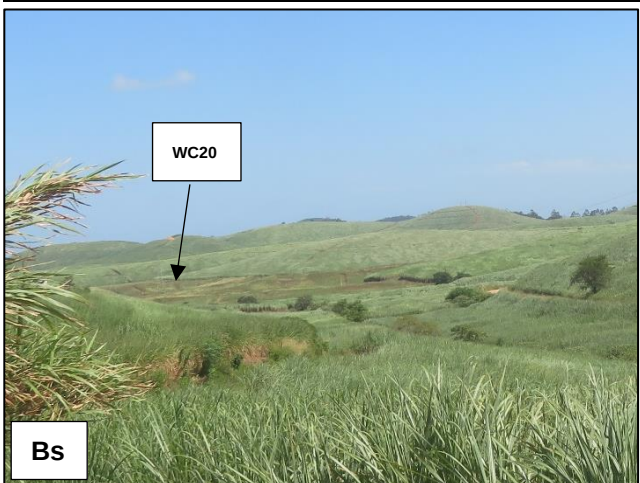
(Bm) Upstream view of WC17, showing water flowing within the Sezela River; **(Bn)** Downstream view of WC17, showing bucket used by surrounding households.



(Bo) Upstream view of WC18 showing its associated drainage line; **(Bp)** Downstream view of WC18, where the drainage line runs down to meet the Sezela river, further downstream from WC17.



(Bq) Upstream view of WC19 showing its associated drainage line through sugarcane fields; **(Br)** Downstream view of WC19, showing flowing water within the drainage line



(Bs) Overview of the valley containing WC20, within sugarcane fields; **(Bt)** The existing structure over WC21.



Bu



Bv

(Bu) Upstream view of WC21 underneath existing bridge; **(Bv)** Downstream view of WC21, showing flowing water.



Bw



Bx

(Bw) Upstream view of WC22; **(Bx)** Downstream view of WC22, showing associated riparian vegetation.



By



Bz

(By) Upstream view of WC23; **(Bz)** Downstream view of WC23.

**Ca****Cb**

(Ca) Upstream view of WC24; **(Cb)** Downstream view of WC24, showing houses on the other side of associated drainage line, which follows into WC25.

**Cc****Cd**

(Cc) Upstream view of WC25, showing dense vegetation; **(Cd)** Downstream view of WC25.

**Ce****Cf**

(Ce) Upstream view of WC26, showing existing bulk water pipeline strapped to existing structure within the estuary; **(Cf)** View of railway bridge over WC26, showing the ocean downstream and the Illovo factory.



Cg



Ch

(Cg) Upstream view of WC28, showing existing culvert within drainage line; **(Ch)** View downstream of WC26 and culvert.

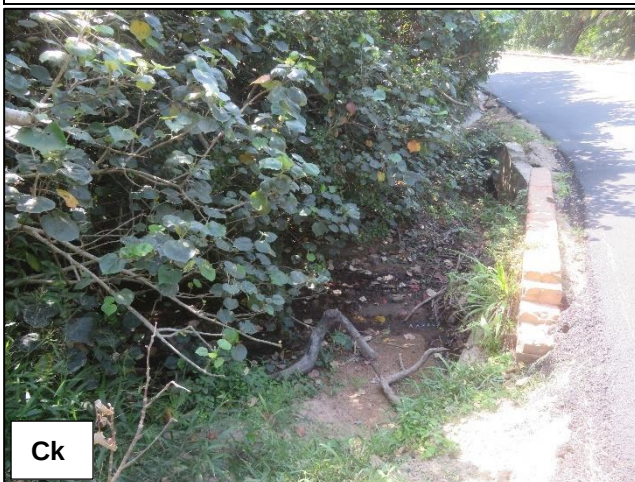


Ci



Cj

(Ci) Upstream view of WC29; **(Cj)** Downstream view of WC29.



Ck



Cl

(Ck) Upstream view of WC30, showing existing culvert; **(Cl)** Downstream view of WC30, showing flowing water within the culvert.

**Cm****Cn**

(Cm) Upstream view of WC31, showing existing bulk water pipeline strapped to existing railway bridge within the estuary; **(Cn)** Downstream view of WC31, showing proximity to the sea.

**Co****Cp**

(Co) Upstream view of WC32, showing associated drainage line; **(Cp)** Downstream view of WC32, showing the sea within view along the drainage line.

**Cm****Cn**

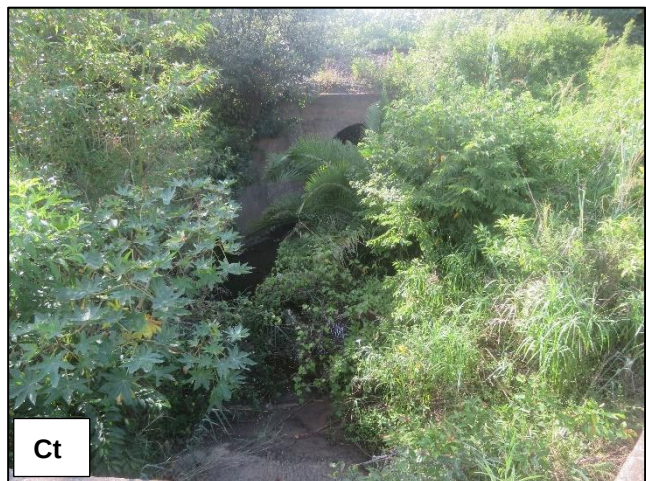
(Cm) View from hilltop where pipeline diverts from within the road reserve, towards Ifafa Reservoir, through WC33; **(Cn)** Overview of drainage line containing WC33.

**Co****Cp**

(Co) Upstream view of WC34, showing drainage line running between two households and a stormwater culvert below; **(Cp)** Downstream view of WC34, showing proximity to the sea.

**Cq****Cr**

(Cq) Upstream view of WC35, showing existing railway bridge crossing the estuary to which the pipeline will be strapped; **(Cr)** Downstream view of WC35.

**Cs****Ct**

(Cs) Upstream view of WC36, showing existing culvert and water within the watercourse; **(Ct)** Downstream view of WC36, showing an additional railway bridge structure, approximately 10m from culvert.

2.3 Topography and Physical Characteristics of Site

The following applies to the area surrounding the sites as per Figure 20 above.

The gradient of the site is described in Table 11 below, also refer to Figure 21:

Table 11: Gradient of The Site

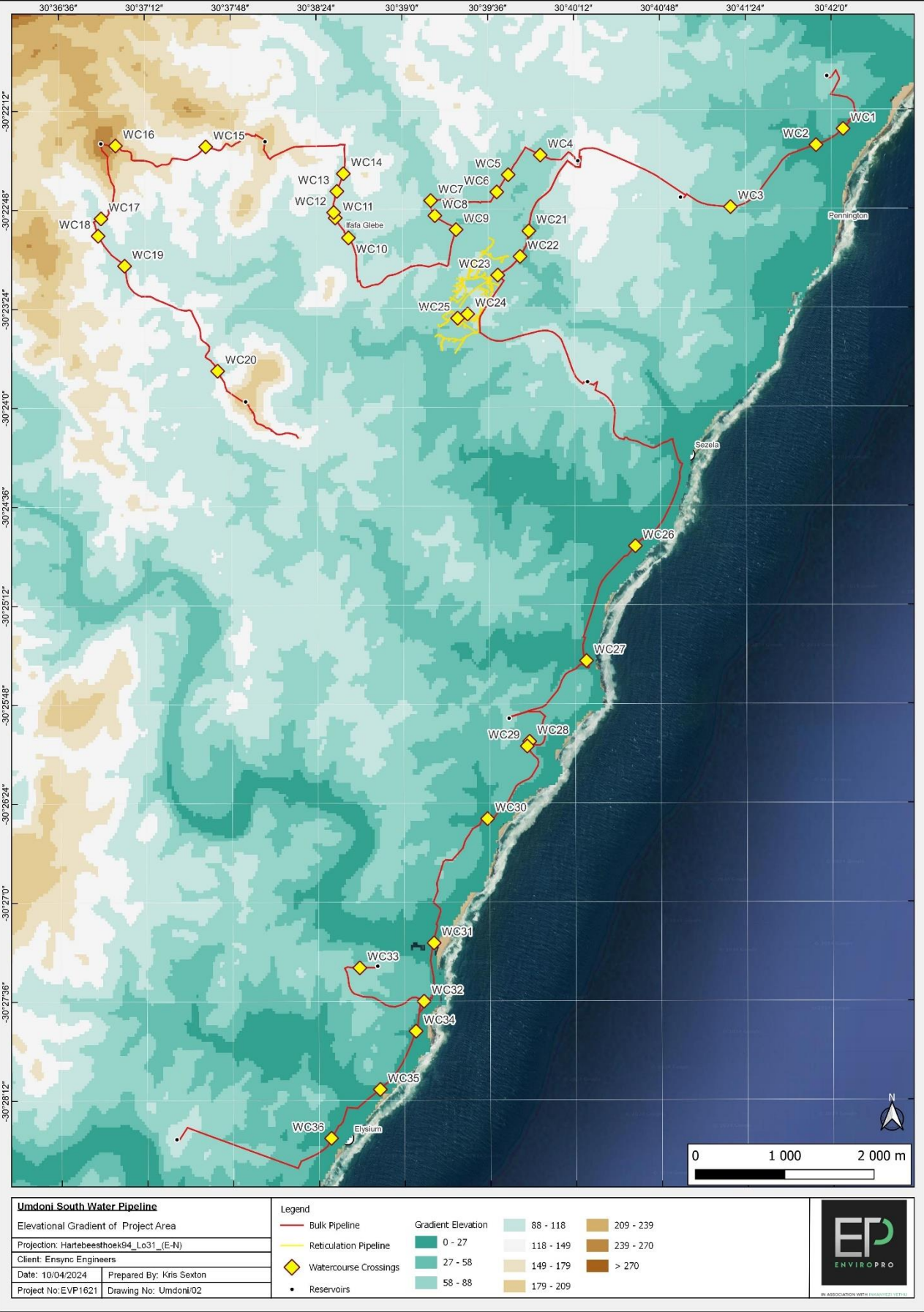
Gradient	Description
Flat	Some of the crossings are associated with flat topography
1:50 – 1:20	There are sections of pipeline that run up gentle gradient hillsides.
1:20 – 1:15	There are sections of pipeline that run up moderate gradient slopes.
1:15 – 1:10	There are sections of pipeline that run up and down steep gradient slopes.
1:10 – 1:7,5	There are sections of pipeline that run up and down very steep gradient slopes.
1:7,5 – 1:5	There are sections of pipeline that run up and down very steep gradient slopes.
Steeper than 1:5	There are sections of pipeline that run up and down extremely steep gradient slopes.

The topographical features and landforms of the site and surrounding area are described in Table 12 below:

Table 12: Topographical Features and Landforms of The Site

Topographical Feature	Description
Ridgeline	N/A
Plateau	N/A
Side slope of hill/mountain	The pipeline network traverses the side slopes of both hillsides and mountains.
Closed valley	The pipeline network traverses closed valleys.
Open valley	The pipeline network traverses open valleys.
Plain	The pipeline network traverses gentle plains and drainage lines.
Undulating plain/low hills	The pipeline network traverses undulating hillsides.
Dune	N/A
Sea-front	N/A

Figure 21: Aerial Photograph showing the Elvational Gradient of the Umdoni South Water Augmentation Project



2.4 Surface Water³

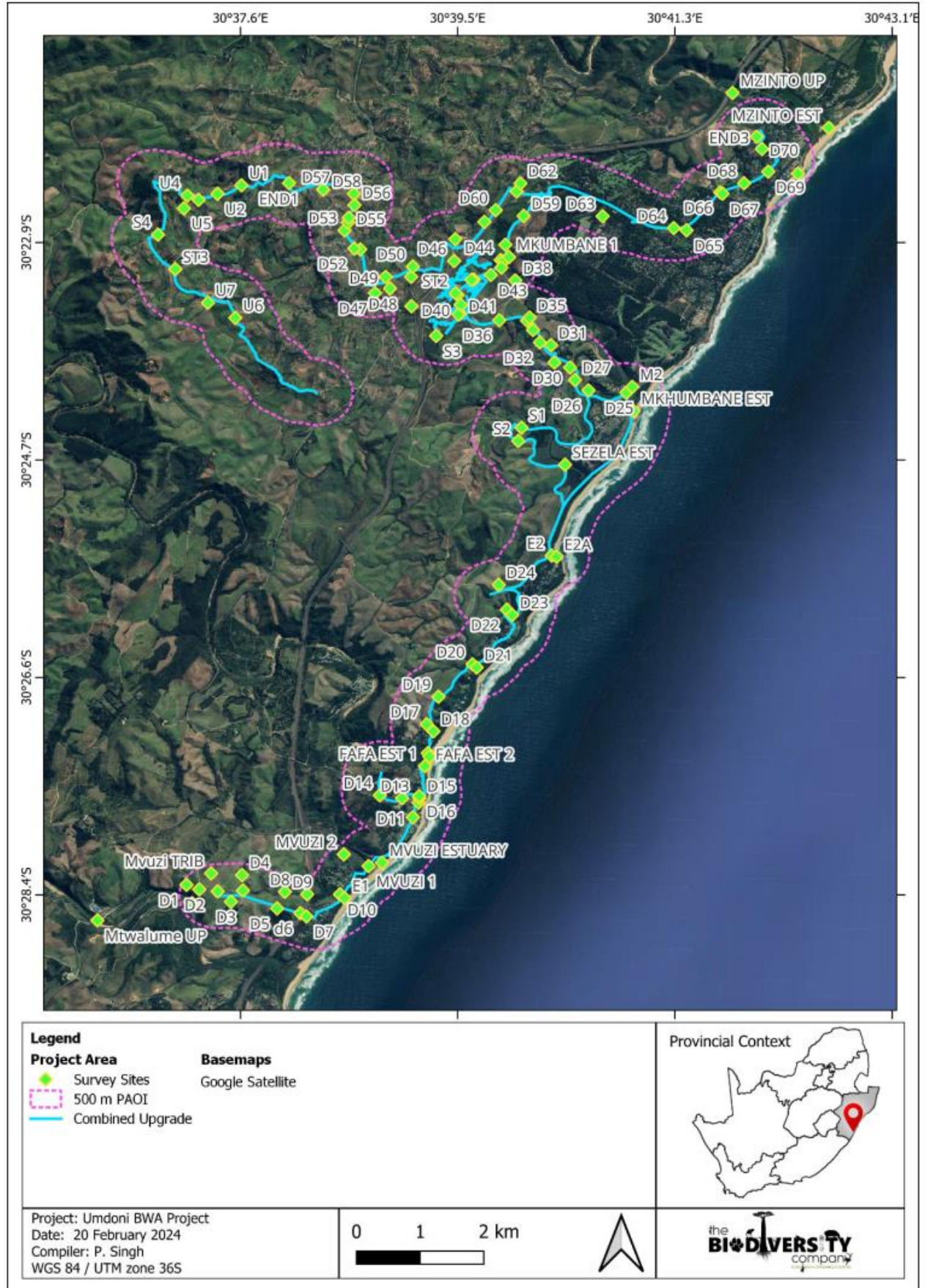
The Biodiversity Company was appointed to undertake a Freshwater and Estuarine Ecological & Impact Assessment for the proposed Umdoni South Bulk Water Augmentation Project, the following information has been sourced from this report.

The NFEPA data identified several non-priority wetlands and one priority wetland within a 500m radius of the Umdoni South Bulk Water Augmentation project area. Furthermore, the project area falls within a FEPA. The Mzinto River, Mkhumbane River, Sezela River, Mdesingane River, Fafa River, Mvuzi River and Mtwalume River are all located within the project area and are classified as NFEPA rivers. MWM5 data also recognised the presence of freshwater features within the extent of the project area, and includes rivers, estuaries, depressions, and micro-estuaries. However, after consulting the desktop data and visiting the site, it was determined that there were no wetlands within the project area, only rivers, estuaries, and associated tributaries/drainage areas partially due to extensive modification through sugarcane farming. Therefore, efforts were focused on aquatic/riverine assessment.

2.4.1 Aquatic and Riverine Systems³

Numerous sample sites were identified and formed part of the Freshwater and Estuarine Ecological & Impact Assessment. These sites are indicated in Figure 22.

³ The Biodiversity Company (2024) Freshwater and Estuarine Ecological & Impact Assessment for the Proposed Umdoni South Bulk Water Augmentation Project (Appendix B)

Figure 22: Location Of Aquatic Sampling Sites³

2.4.2 Water Quality³

The in-situ water quality parameters fell within the acceptable limits for tolerant aquatic life in the project area. The dissolved oxygen in mg/l fell within the limits at all sampling sites, except the Mvuzi2 site, whereas the saturation was below the TWQR at most sites but still within the minimum allowable values at >60% and >40%, which would permit the survival of sensitive taxa for a short period of time. The electric conductivity was stable for most sites. However, sand mining causing sedimentation in the rivers was observed at site Mtwalume MS, which could limit habitat and biodiversity and deposit pollutants into the water. Within the Estuaries or Estuarine Functional Zones (sites D10, D21, Sezela Est, Mvuzi2, and Mkhumbane Est), the electrical conductivity was elevated, which could potentially be caused by possible tidal effects, which causes an influx of seawater and salts and/or concentration of dissolved solids in closed estuaries. Overall, the water quality in this reach would not have a limiting effect on the local tolerant aquatic biota that are adapted to these systems at the time of the survey. Refer to Table 13.

Table 13: Surface water quality results (June 2023)³

Site	pH	Conductivity (µS/cm)	DO (mg/l)	DO (%)	Temperature (°C)
TWQR	6.5-9*	500 µS/cm***	>5.0**	80-120*	5-30*
Mtwalume (U80F)					
Mtwalume US	7.70	231	6.16	64.1	17.44
Mtwalume MS	6.66	517	5.94	67.8	21.62
D2.5	7.02	240	6.06	67.0	19.95
Mvuzi (U80G)					
Mvuzi2	6.86	2 539	4.04	46.2	21.18
D10	7.59	649	9.50	100.5	17.83
Mkhumbane (U80H)					
Mkhumbane 3	7.35	377	5.84	72.0	25.48
Mkhumbane 4	7.18	349	5.51	66.0	23.63
D25	7.70	378	7.56	83.3	19.44
Mkhumbane Est	6.97	8 336	6.72	77.7	21.22
Sezela (U80H)					
Sezela 4	6.93	481	6.33	72.4	21.32
Sezela Est	6.82	3 288	6.83	78.1	21.32
Drainage (U80H)					
D21 Micro-est	7.33	6 615	5.70	60.0	17.73
M2	6.90	370	6.21	70.1	22.04
U1	7.30	223	7.26	82.0	22.04

*TWQR (DWAF, 1996) | **Chapman and Kimstach (1996) | *** DWA (2011)

Parameters exceeding guideline limits are indicated in red.

2.4.3 Habitat Integrity Assessment³

The Index of Habitat Integrity assessment for instream, riparian, and the associated reaches are presented in Table 14. The reaches with instream conditions were assessed to be Largely Modified (class D) to Moderately Modified (class C) and riparian habitat was rated as Seriously Modified (class E) to Moderately Modified (class C) indicating that the loss of natural habitat, biota and basic ecosystem functions is extensive. Conditions contributing to this state include clearing of indigenous vegetation, extensive agricultural activities (mainly sugarcane farming), runoff, sand mining leading to sedimentation, and formal and informal settlements. This has resulted in habitat loss, encroachment of alien vegetation into the

riparian habitat, flow modification, deterioration of water quality, and impacts to instream and riparian habitat.

Table 14: The Habitat Integrity Assessment Results For Instream and Riparian Habitat³

Instream	Mtwalume River Reach	Mvuzi River Reach	Mkhumbane River Reach	Sezela River Reach	iFafa River Reach	Mdesingane River Reach
	Impact Score	Impact Score	Impact Score	Impact Score	Impact Score	Impact Score
Water abstraction	12	7	9	5	5	5
Flow modification	17	6	6	7	6	6
Bed modification	18	5	6	12	8	8
Channel modification	14	11	10	10	10	10
Phys-chem modification	7	13	10	10	10	10
Inundation	10	9	9	9	9	10
Alien macrophytes	5	6	5	3	5	4
Introduced aquatic fauna	0	0	0	2	2	2
Rubbish dumping	6	9	8	5	5	5
Total Instream	41.0	63	71	67	72	72
Category	D	C	C	C	C	C
Riparian	Mtwalume River Reach	Mvuzi River Reach	Mkhumbane River Reach	Sezela River Reach	iFafa River Reach	Mdesingane River Reach
	Impact Score	Impact Score	Impact Score	Impact Score	Impact Score	Impact Score
Vegetation removal	15	5	15	16	12	10
Exotic vegetation	10	10	16	10	10	10
Bank erosion	16	5	12	6	6	8
Channel modification	17	7	7	7	6	8
Water abstraction	9	5	7	5	5	5
Inundation	5	4	4	5	5	5
Flow modification	8	5	6	6	6	8
Phys-chem	5	7	5	7	6	5
Total Riparian	31	76	39	57	65	70
Category	E	C	D/E	D	C	C

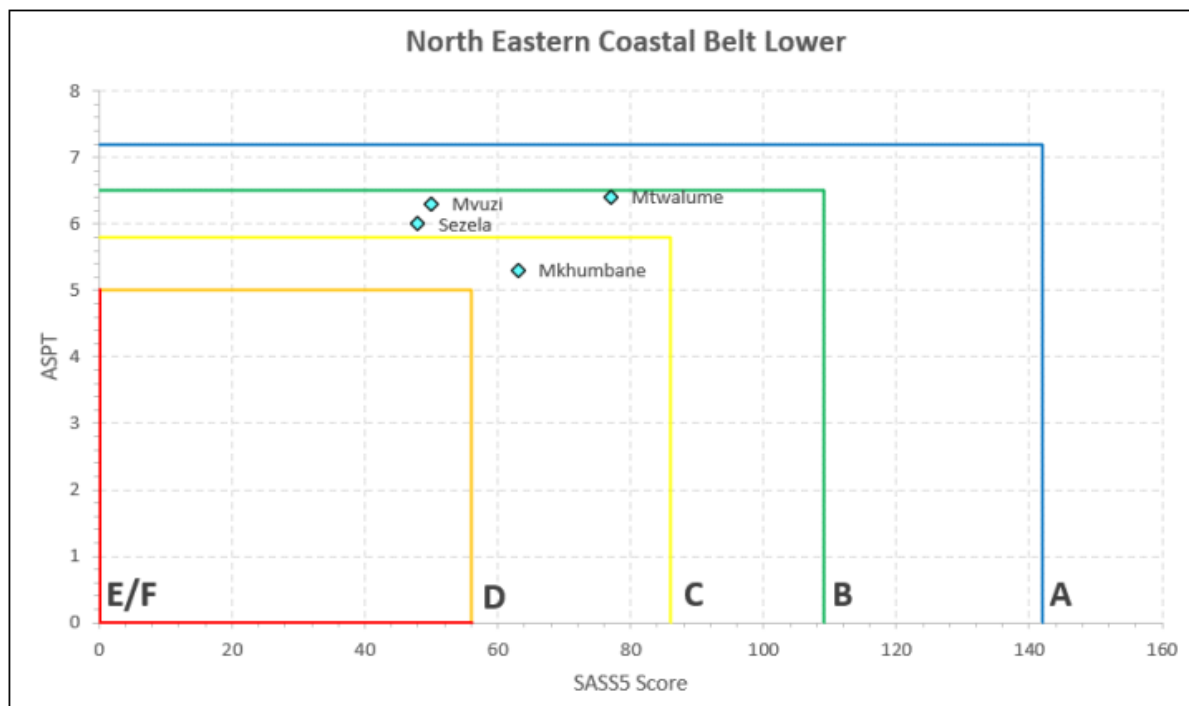
2.4.4 Aquatic Macroinvertebrate Assessment³

Biological SASS5 assessments were completed at applicable and representative sites in the considered river reaches. The SASS5 score and SASS5 ecological classes obtained for the sampled system during the survey are presented in Table 15. The Dallas biological bands generated categories of class B and C, refer to Figure 23. This can be largely attributed to moderate and limited instream habitat, particularly the absence of aquatic and marginal vegetation in and out of current, as well as mud. This would limit the diversity of macroinvertebrates, restricting the available habitats to stones, bedrock, gravel, and sand. Despite the moderate instream habitat diversity, a *Heptageniid* was sampled, which is an *Ephemeroptera* with very low tolerance to pollution (SASS score 11–15), suggesting that the water quality was sufficient for accommodating intolerant macroinvertebrate taxa.

Table 15: SASS5 Macroinvertebrate Assessment (TBC, 2024)³

Site	Mtwalume Reach	Mvuzi Reach	Mkhumbane Reach	Sezela Reach
SASS Score	77	50	63	48
No. of Taxa	12	8	12	8
ASPT*	6.4	6.3	5.3	6.0
Category (Dallas, 2007)	C	C	D	C

*ASPT: Average score per recorded taxon

Figure 23: SASS5-derived Ecological Categories Based On Dallas (TBC, 2024)³

2.4.5 Ichthyofauna Community³

Three (3) of the expected 16 fish species were sampled from the study areas (Table 16).

Table 16: Sampled Fish Community (TBC, 2024)³

Scientific Name	Common Name	IUCN Status (IUCN, 2024)	Sampling site present in
<i>Glossogobius callidus</i>	River Goby	LC	Mtwalume Reach Sezela Reach Mkhumbane Reach
<i>Oreochromis mossambicus</i>	Mozambique Tilapia	VU	Sezela Reach Mkhumbane Reach
<i>Anguilla mossambica</i>	Longfin Eel	LC	Mtwalume Reach

Fish species have different sensitivities to physiochemical and flow modification and therefore this was considered for both the expected and present fish species assemblage. This indicated that the average expected assemblage is moderately tolerant to changes in flow and tolerant to physiochemical modification. The average results for the sampled community indicated that the present community are moderately tolerant to changes in flow and physiochemical modifications. The expected species are generated on a reach basis, and the occurrence of all species in the system is unlikely as different species are specialists in different habitats which are present along a reach. The river reaches have a moderate instream habitat and therefore a limited range of fish species is expected.

2.4.6 Present Ecological State³

The PES for the receiving environments (i.e., the major rivers and estuaries) was determined and these results are presented in Table 17 below.

Table 17: Present Ecological State of Aquatic Resources Associated with the Umdoni Water Augmentation Pipeline (TBC, 2024)³

Aquatic Resource/Feature	Ecological Indices/Database* - Class	Present Ecological State
Mtwalume River Reach	Instream Integrity – Class D (Largely Modified)	Class D/E – Largely to Seriously modified
	Riparian Integrity – Class E (Seriously Modified)	
	SASS5 – Class C (Moderately Modified)	
Mvuzi River Reach	Instream Integrity – Class C (Moderately Modified)	Class C – Moderately Modified
	Riparian Integrity – Class C (Moderately Modified)	
	SASS5 – Class C (Moderately Modified)	
Mkhumbane River Reach	Instream Integrity – Class C (Moderately Modified)	Class D – Largely Modified
	Riparian Integrity – Class D/E (Largely to Seriously Modified)	
	SASS5 – Class D (Largely Modified)	
Sezela River Reach	Instream Integrity – Class C (Moderately Modified)	Class C – Moderately Modified
	Riparian Integrity – Class D (Largely Modified)	
	SASS5 – Class C (Moderately Modified)	
iFafa River Reach	Instream Integrity – Class C (Moderately Modified)	Class C – Moderately Modified
	Riparian Integrity – Class C (Moderately Modified)	
Mdesingane River Reach	Instream Integrity – Class C (Moderately Modified)	Class C – Moderately Modified
	Riparian Integrity – Class C (Moderately Modified)	

*National Biodiversity Assessment (Van Deventer *et al.*, 2018).

2.4.7 Riparian/Watercourse Buffer³

A conservative buffer zone of 30m was suggested for the river riparian areas and 20m for the associated drainage lines as well as micro-estuaries. A 60m buffer has also been delineated for the Estuarine Functional Zone (EFZ). These buffer areas serve as No-go zones for unauthorised activities, such as equipment/machinery (heavy or light), waste dumping and laydown yards (with the exception for the authorised activities to be within the buffer, like pipes crossing the watercourse). Ensuring buffers are intact increases the resilience of a watercourse to future disturbances. These sensitivity buffers are presented in Figures 24 – 28.

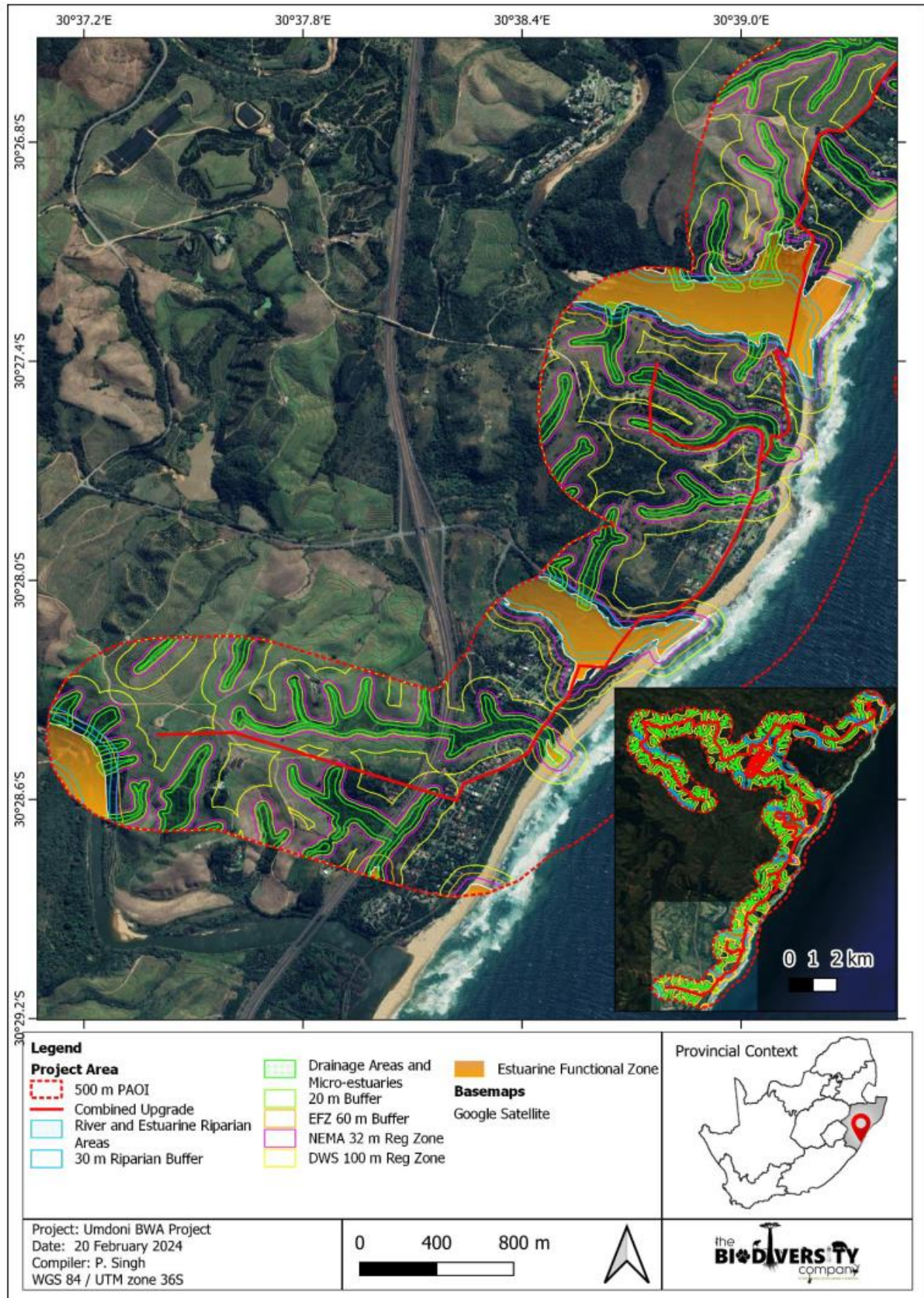
Figure 24: Riparian/Watecourse Buffers for the Southern Section of Umdoni Water Pipeline (TBC, 2024)³

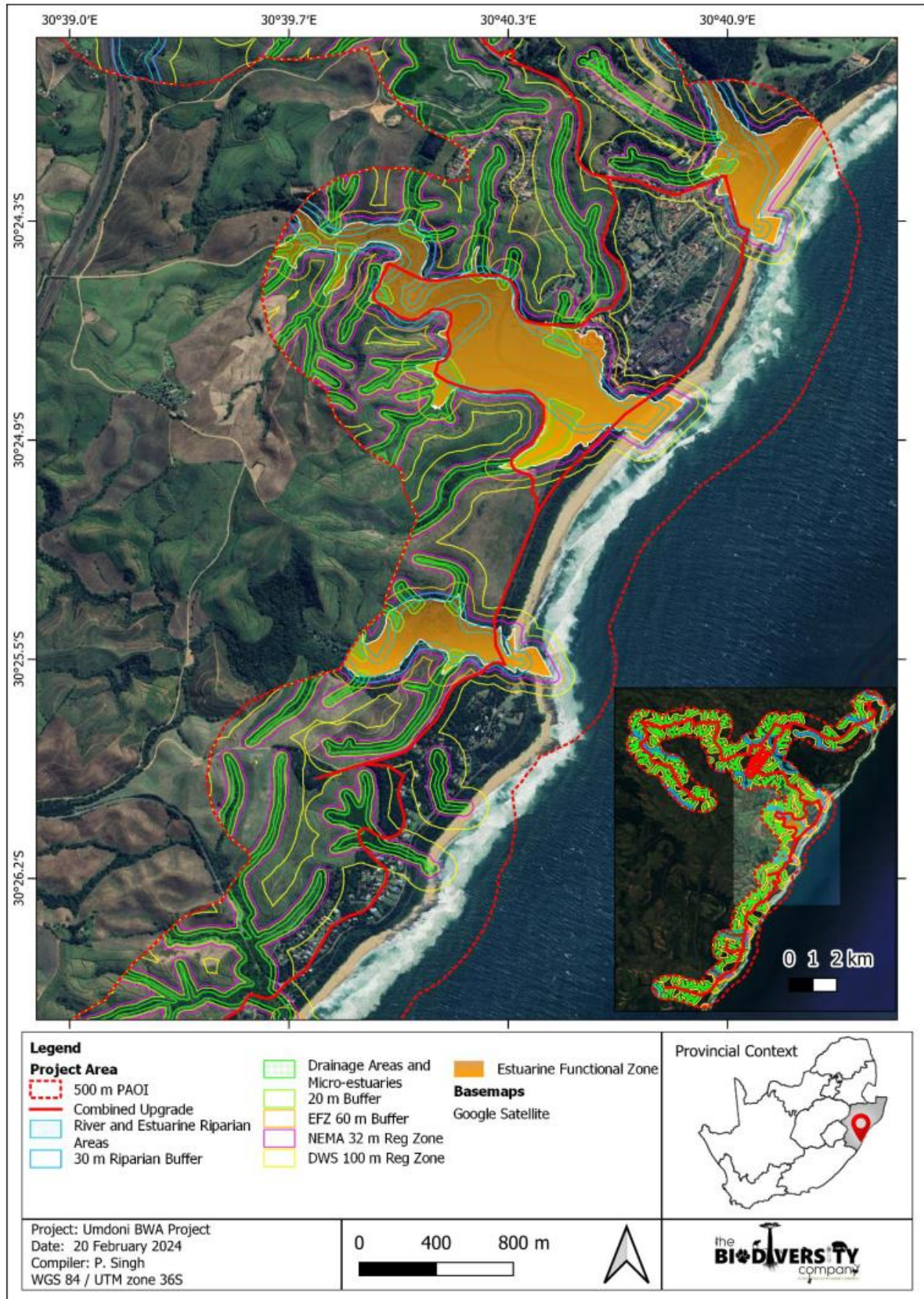
Figure 25: Riparian/Watecourse Buffers for the Mid Section of Umdoni Water Pipeline (TBC, 2024)³

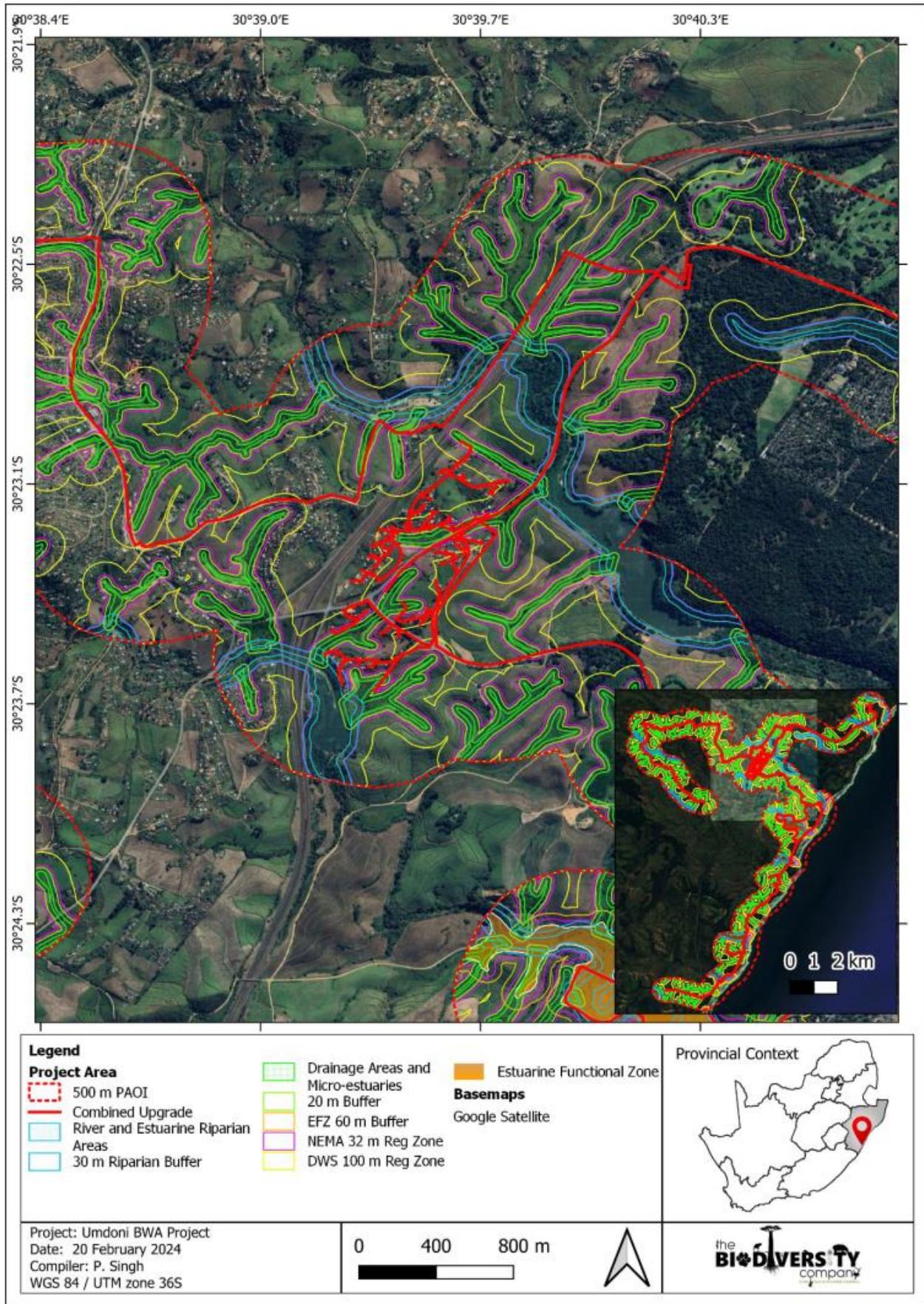
Figure 26: Riparian/Watecourse Buffers for the Northern-Mid Section of Umdoni Water Pipeline (TBC, 2024)³

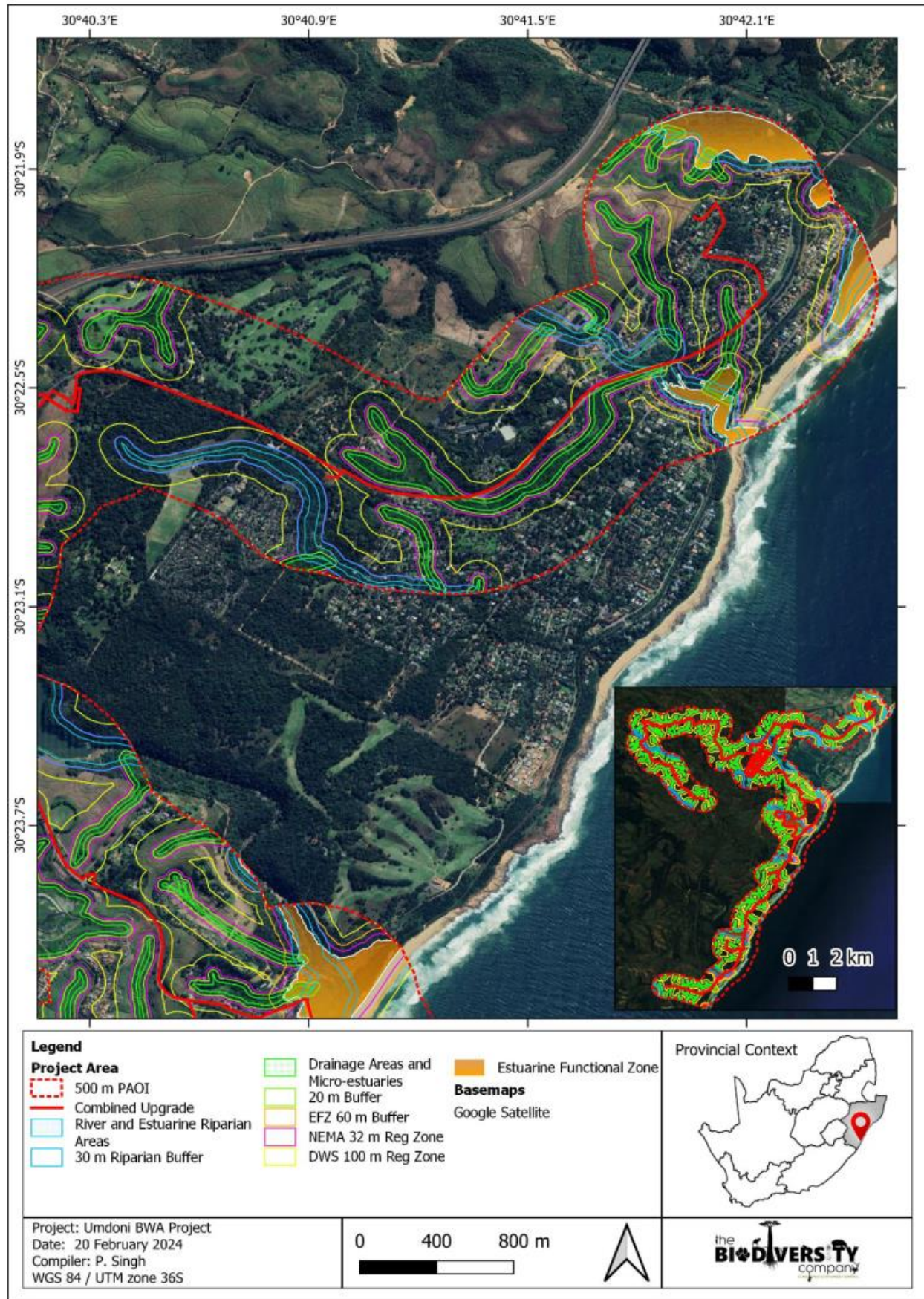
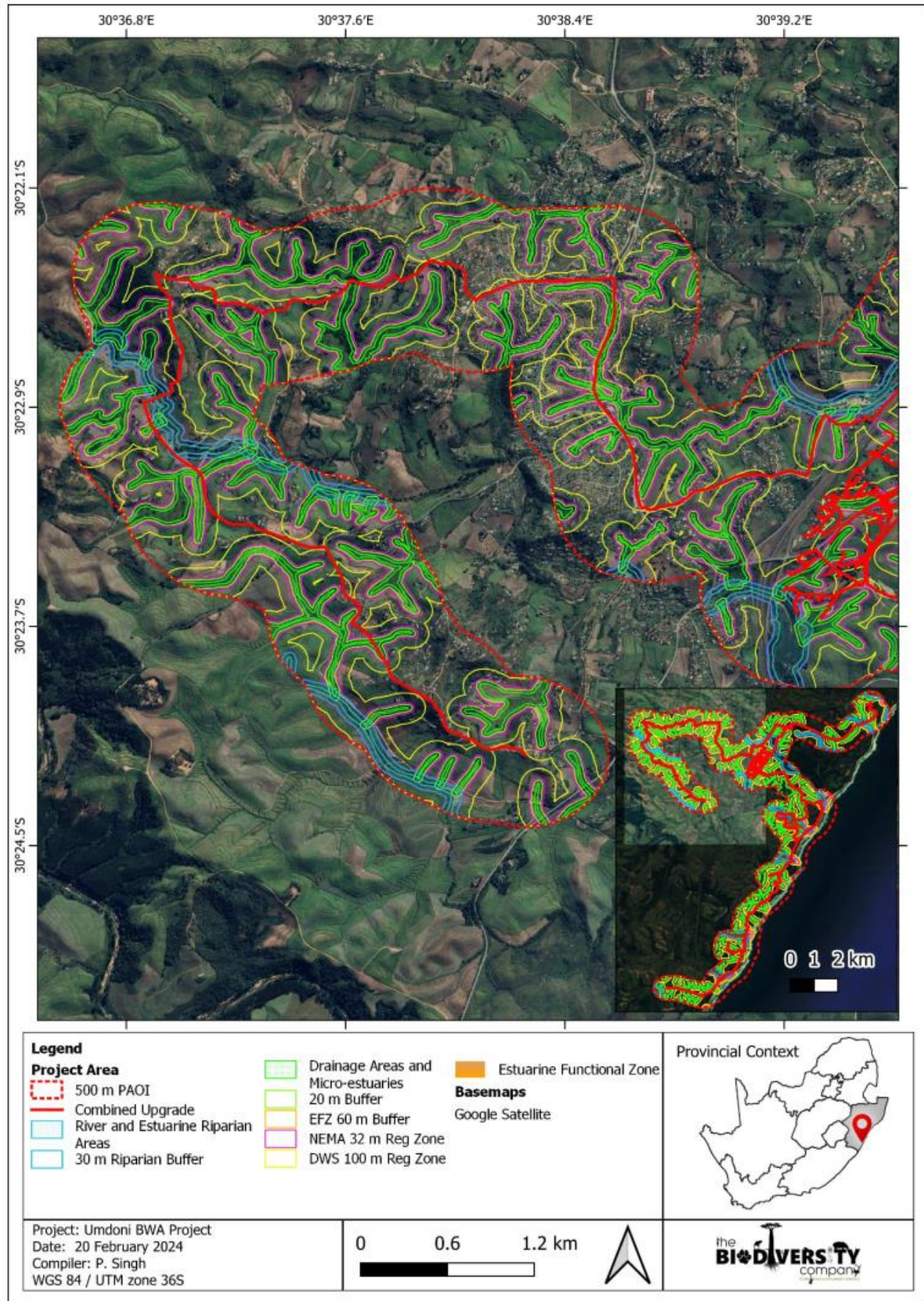
Figure 27: Riparian/Watecourse Buffers for the North-Eastern Section of Umdoni Water Pipeline (TBC, 2024)³

Figure 28: Riparian/Watecourse Buffers for the North-Western Section of Umdoni Water Pipeline (TBC, 2024)³

2.4.8 Impact Statement³

The findings from the risk assessment indicate that the aspects involved with the construction of the proposed project have been scored “Low” to “Moderate” pre-mitigation significance ratings. Please note that all construction-related impacts are temporary. All the significance ratings have been decreased assuming that all prescribed mitigation measures are adhered to, with the significance of most of the aspects having been reduced to a “Low” level of risk. All aspects involved with the operation of the proposed project have scored a “Low” post-mitigation significance rating.

The specialist concluded the project can proceed subject to the implementation of adequate mitigation measures recommended in their report that would prevent negative impacts on the watercourses and receiving catchment.

2.5 Terrestrial Biodiversity⁴

The Biodiversity Company prepared a Terrestrial Biodiversity Compliance statement for the proposed Umdoni South Bulk Water Augmentation Project. The following information has been sourced from this report.

Four (4) different habitats were delineated within the project area (Figure 29). No species of conservation concern (SCCs) were found within any of the delineated habitats. However, it has been noted that all habitat units have the potential to support SCCs, with the exception of the Modified habitat unit. The Site Ecological Importance was determined for each unit, which is calculated as a function of Biodiversity Importance (which takes into account the SCCs, vegetation/fauna community or habitat type present in the project area) and Receptor Resilience (its resilience to impacts). This information has been presented in Table 18 below.

Table 18: The Delineated Habitat Types (Source: TBC, 2024)

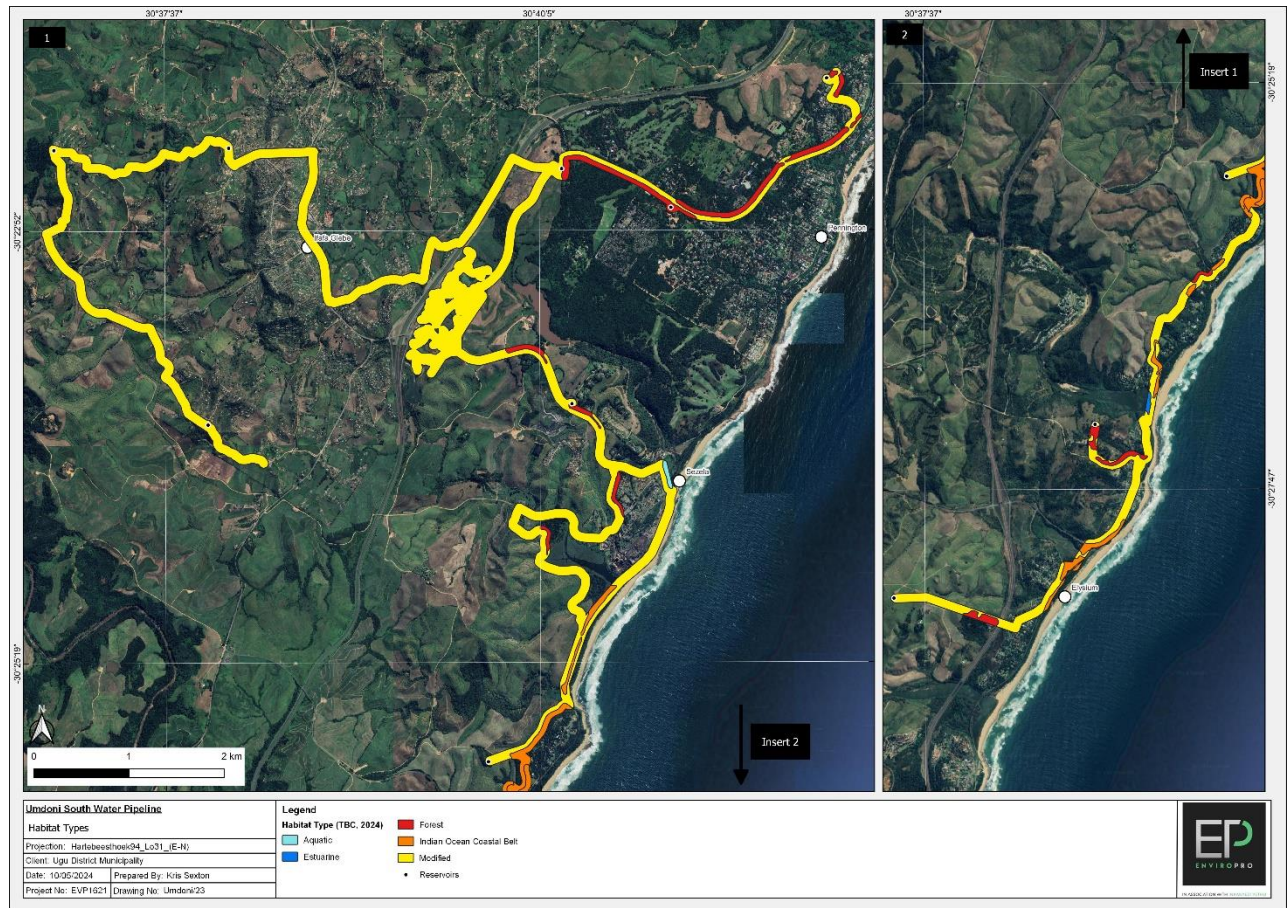
Habitat	Description	SEI
Indian Ocean Coastal Belt	This habitat unit occurs as the dominant vegetation type throughout the extent of the project area. Comprised predominantly of indigenous KZN Coastal Belt vegetation (e.g., <i>Bridelia micrantha</i>, <i>Albizia adianthifolia</i>, <i>Antidesma venosum</i>) with scattered clusters of Alien Invasive Plants (AIPs) (e.g., <i>Ricinus communis</i>, <i>Lantana camara</i>, <i>Melia azedarach</i>). Although no SCCs were detected, this habitat unit does have the potential to support fauna and flora SCCs. Fairly high anthropogenic impact associated with vehicle traffic prevalent throughout.	Medium
Forest	Small patches of intact forest vegetation occur within the project area. Intact indigenous forest vegetation with sudatory signals suggestive of a high avifauna diversity (e.g., <i>amaroptera brachyura</i>, <i>Tauraco porphyreolophus</i>, <i>Pogoniulus bilineatus</i>, <i>Bycanistes buccinator</i>). Like Indian Ocean Coastal Belt, no fauna and/or flora SCCs were detected. However, this habitat unit has the potential to supports SCCs (particularly avifauna).	Medium
Aquatic	This habitat unit is comprised of wetlands, rivers, estuaries, and seasonal dams. Although no fauna and flora SCC were recorded, this habitat unit does have the potential to support both fauna and flora SCCs.	Medium
Modified	This habitat unit is characterised by transformed agricultural land used to farm predominantly sugar cane. The habitat is in a constant state of disturbance and cannot recover to a more natural state owing to continuous disturbances and ecological impacts attributed	Low

⁴ The Biodiversity Company (2024) Terrestrial Biodiversity Compliance Statement for the proposed Umdoni South BWA project. (Appendix B)

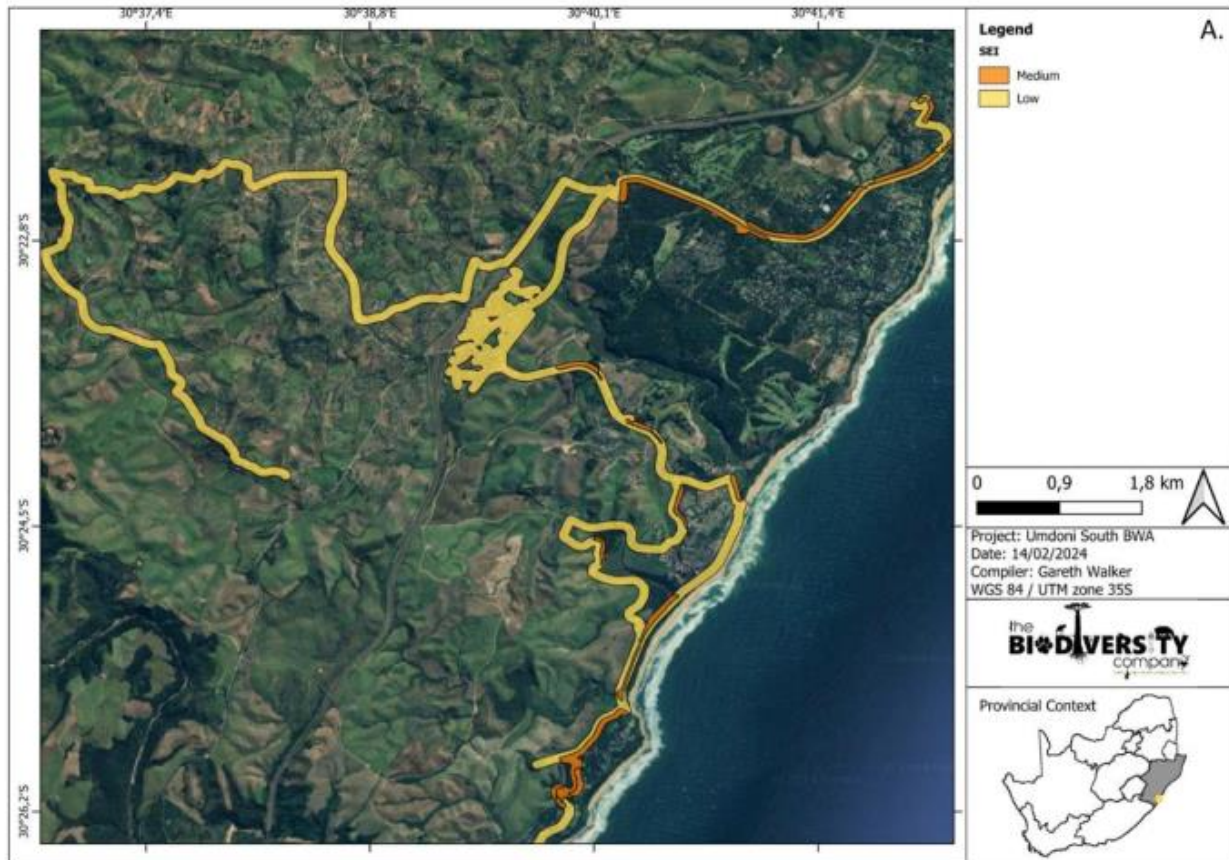
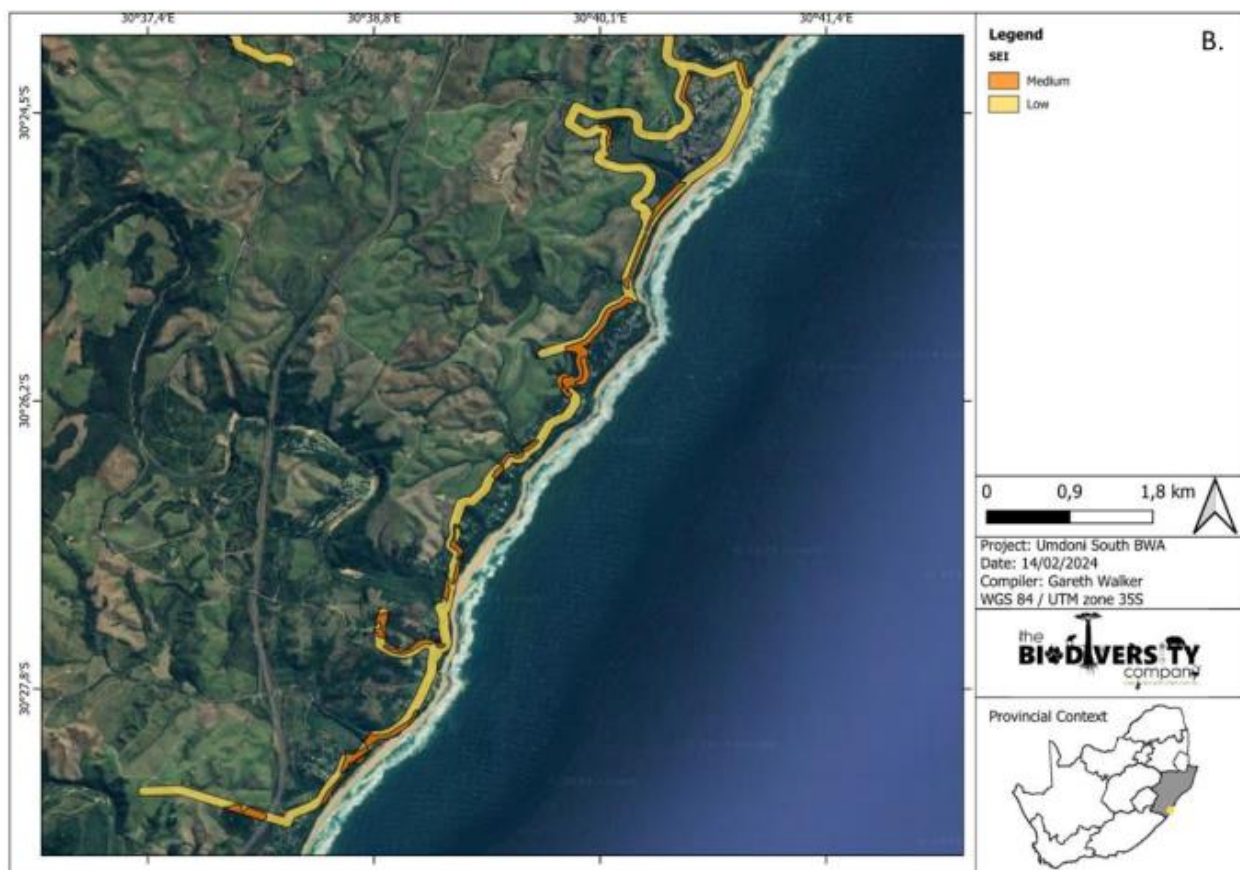
	to agricultural practices, and edge effects from land use and mismanagement.	
	No fauna or flora SCC were recorded or are expected to occur within this habitat unit.	

There are small patches of Forest along the pipeline route that fall within existing road and pipeline servitudes. Trees within these Forests will require pruning or removal for the construction of the pipeline within the 10m construction corridor. The appropriate permits will be required prior to commencement of clearance for these areas.

Figure 29: Habitat Types along the Umdoni South Pipeline Route



The figures below (Figure 30 and Figure 31) were extracted from the Terrestrial Compliance Statement, which details the specialist's sensitivity ratings of the habitats along the pipeline routes.

Figure 30: Sensitivity Ratings of Habitats Along Northern Section of Umdoni Water Pipeline (TBC, 2024)³Figure 31: Sensitivity Ratings of Habitats Along Southern Section of Umdoni Water Pipeline (TBC, 2024)³

2.5.1 Impact Statement⁴

It is the opinion of the specialists that the project may be favourably considered, provided that the mitigation measures presented in this report and the accompanying wetland report are implemented correctly. The location, state and size of the ecosystem means that it is unlikely that any functional habitat or SCCs will be lost because of the impacts arising from the proposed activities.

2.6 Geotechnical Environment⁵

The following information has been obtained from the Geotechnical Investigation for the Proposed Umdoni South Bulk Water Augmentation Pipeline Development, and details some of the considerations and recommendations to be taken into account.

The project area is characterised by moderate to occasional steep topography, which may produce localized problems where trench excavations alongside slopes and valley bottoms, in particular, where intersecting hill wash and deeply weathered clayey materials are.

The sandy residual and colluvial subsoils derived from the weathered sandstone and weathered granite as well as the alluvium have relatively low clay content and associated cohesive characteristics. As such, potential instability can be expected in near vertical trench sidewalls in this sandy material if left open for extended periods of time. Excavations greater than 1.2m depth must be restricted to a maximum temporary slope batter of 1:1.75 in all materials or alternatively adequately stored to ensure safe working conditions.

Residual and colluvial soils derived from tillite bedrock and clayey alluvial soils are considered active soils, while soft alluvial clays may be susceptible to consolidation settlement in the mid to long term. Sandy alluvial material, likely encountered in valley/stream bases may classify as potentially collapsible in the sense that the material will undergo settlement under an implied load, with a critical increase in the materials in-situ moisture content. Similarly, sandy colluvial soils, dune sand, and Berea Formation sediment may also be somewhat collapsible, and highly prone to erosion.

Groundwater seepage is likely to be encountered at the soil-rock interface, perched on less permeable horizons or along open joints within the weathered bedrock. Such seepage is likely to occur during or shortly after rainfall events and be relatively short-lived. Along lower slope and valley bottoms or towards the heads of natural drainage lines, more permanent seepage is likely to be encountered at relatively shallow depths where perched in less permeable soils. All will be non-problematic if trench excavations are properly stored and supported where required.

The specialist concluded from the initial desktop assessment of the project area that all aspects of the proposed pipeline development are considered feasible provided the general assessment and general recommendations are taken into consideration in the planning phase of the project.

2.7 Heritage and Cultural Aspects⁶

A Phase 1 Heritage Impact Assessment was conducted for the Umdoni South Water Augmentation project by Tsimba Archaeological Footprints, the following information has been obtained from the report.

Due to the lack of significant heritage resources in the study area, the impact of the proposed project on heritage resources is considered low. It is recommended that the proposed project commence on the condition that the following chance find procedures are implemented as part of the EMPr and based on approval from SAHRA and AMAFA. The applicant will be required to obtain this approval.

The possibility of the occurrence of subsurface finds cannot be excluded and therefore, a Chance Find Protocol should be added to the EMPr. If any heritage resources are found such as stone tool scatters, artefacts or bone and fossil remains, by the contractor, environmental officer, or another responsible person once excavations have commenced then the operations must be stopped and must be reported to a qualified archaeologist at Amafa Research and Institute for an assessment to be done of the find.

⁵ Drennan Maud (Pty) Ltd (2024) PRELIMINARY REPORT ON DESKTOP GEOTECHNICAL INVESTIGATION FOR THE PROPOSED UMDONI SOUTH BULK WATER AUGMENTATION PIPELINE DEVELOPMENT – KWA-ZULU NATAL SOUTH COAST - Appendix B

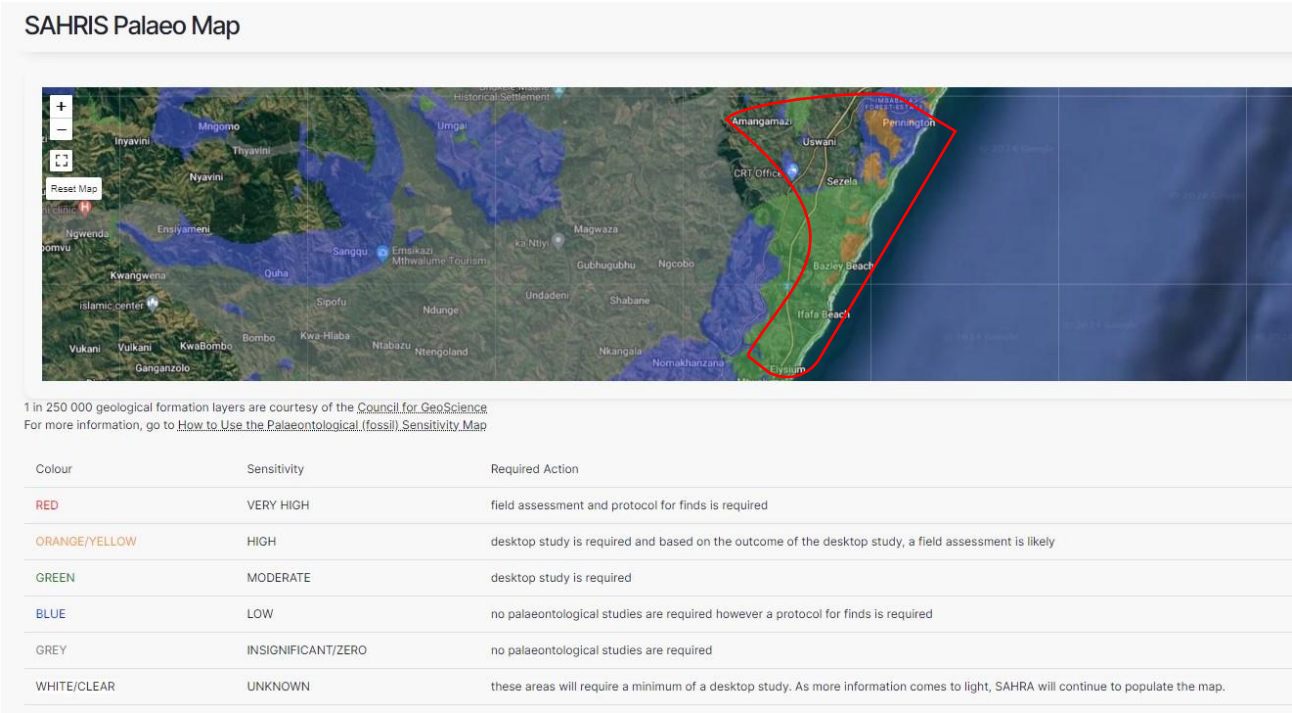
⁶ Tsimba Archaeological Footprints (Pty) Ltd (2023) Phase 1 Hertiaga Impact Assessment Report - The proposed construction for the proposed Umdoni South Bulk Water Pipeline in the Ugu District of Kwa-Zulu Natal. – Appendix B

2.8 Paleontological Environment⁷

According to the SAHRIS PalaeoSensitivity Map, the project area falls within an area of “High” to “Moderate” to “Low” Palaeontology Sensitivity (Figure 32) and the DFFE screening report indicated a “High” sensitivity for the area. Therefore, an assessment was conducted of the site by Prof Marion Bamford. The following information has been obtained from the Paleontological Impact Assessment.

The proposed site routes lie on the sands of the Umkwelane Formation (Maputaland Group) which might preserve trace fossils and marine shells of Holocene age, and on the Dwyka Group tillites (Karoo Supergroup) that might have trace fossils or fragments of early Glossopteris flora fossils. Most of the route is along existing pipelines and roads. The proposed new routes are on non-fossiliferous Natal Group rocks. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further paleontological impact assessment is required unless fossils are found by the developer, environmental officer, or other designated responsible person once excavations for laying pipes, foundations or infrastructure have commenced.

Figure 32: Desktop SAHRIS Database Palaeo Sensitivity Map of the Project Area (Source; SAHRIS, 2024)



⁷ Prof Marion Bamford (2024) Palaeontological Impact Assessment for the proposed Umdoni Bulk Water Supply, South Coast, KwaZulu Natal Province – Appendix B

Section 3: Policy and Legislative Context

3.1 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)

Table 19: Legislation Table

Legislation	Compliance of Activity
The Constitution of South Africa (No. 108 of 1996)	The Constitution cannot manage environmental resources as a standalone piece of legislation; hence additional legislation has been promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated Act and associated Regulations is designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld on an on-going basis throughout the country. In terms of Section 24, the constitution gives every person the right to an environment that is not harmful to their health and wellbeing.
National Environmental Management Act (Act 107 of 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 (EMPr) 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: GNR.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. The proposed development requires EA following the BAR process. The associated EMPr includes mitigation measures, recommended by specialists, that are required to be implemented to ensure that environmental resources are protected.
National Water Act (Act 36 of 1998)	NWA states that a person may only use water if the water use is authorised by a license under NWA or if the responsible authority has dispensed with a license requirement if it is satisfied that the purpose of the NWA will be met by the granting of a license, permit or other authorisation under any other law. The site is located within 100m of numerous drainage lines and as such there will be alterations to the bed and banks of a watercourse. Therefore, a water use authorisation will be required as per Section 21 (c) and (i) of the National Water Act.
National Environmental Management: Waste Act (Act 59 of 2008)	To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement, and to provide for matters connected therewith. Section 15 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.
National Environmental Management: Air Quality Act (Act 39 of 2004)	To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management, and control by all spheres of government; for specific air quality measures; and for matters incidental thereto.

	It is unlikely that any activities carried out by the development will have an impact on the local and regional air quality.
National Environmental Management: Protected Areas Act (Act 57 of 2003)	The National Environmental Management: Protected Areas intends to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes, for the establishment of a national register of all national, provincial and local protected areas, for the management of those areas in accordance with national norms and standards, for intergovernmental co-operation and public consultation in matters concerning protected areas, and for matters in connection therewith. The proposed development will not have an impact on any protected areas.
National Environmental Management: Integrated Coastal Management Act (Act 24 of 2008)	The National Environmental Management: Integrated Coastal Management Act aims to establish a system of integrated coastal and estuarine management in the Republic, including norms, standards and policies, in order to promote the conservation of the coastal environment, and maintain the natural attributes of coastal landscapes and seascapes, and to ensure that development and the use of natural resources within the coastal zone is socially and economically justifiable and ecologically sustainable, to define rights and duties in relation to coastal areas, to determine the responsibilities of organs of state in relation to coastal areas, to prohibit incineration at sea, to control dumping at sea, pollution in the coastal zone, inappropriate development of the coastal environment and other adverse effects on the coastal environment, to give effect to South Africa's international obligations in relation to coastal matters and to provide for matters connected therewith. Sections of the pipeline runs parallel to the coastline, within 100m of the highwater mark, and within 32m of estuaries. Therefore, the proposed development requires EA following the BAR process.
National Forest Act (Act 84 of 1998)	To reform the law on forests as the government recognises that everyone has the constitutional right to have the environment protected for the benefit of present and future generations. Natural forests and woodlands form an important part of that environment and need to be conserved and developed according to the principles of sustainable management. Plantation forests play an important role in the economy, have an impact on the environment and need to be managed appropriately. The State's role in forestry needs to change; and the economic, social, and environmental benefits of forests have been distributed unfairly in the past. The terrestrial specialist has identified forest habitats within the project footprint, and as a result, DFFE has been included as an I&AP.
Environmental Conservation Act (Act 43 of 1996)	This Act makes provisions for the application of general environmental principles for the protection of ecological processes, the promotion of sustainable development and the protection of the environment. This Act has mostly been repealed by NEMA.
National Environmental Management: Biodiversity Act (Act 10 of 2004)	The National Environmental Management: Biodiversity Act intends, to provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998, the protection of species and ecosystems that warrant national protection, the sustainable use of indigenous biological resources, the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources, the establishment and functions of a South African National Biodiversity Institute and for matters connected therewith. The site is located within endangered ecosystem types and, as such, an EA is required.
National Heritage Resources Act (Act 25 of 1999) KwaZulu-Natal Heritage Act (Act 4 of 2008)	The National Heritage Act (No. 25 of 1999) aims to promote good management of the national estate in order to preserve the country's unique heritage for current and future generations. The KwaZulu-Natal Heritage Act (Act No. 4 of 2008) provides for the conservation and preservation of the physical and intangible heritage resources of the KwaZulu-Natal province. No archaeologically significant artefacts will be disturbed during this project; therefore, no permits will be required from the provincial heritage authority, AMAFA.
Mineral & Petroleum Resources Development (Act 28 of 2002)	To provide for the sustainable development of the nation's mineral and petroleum resources which includes activities carried out for the winning of any mineral on, in or under the earth (i.e. the use of borrow pits).

	The material used to install the pipelines must be obtained from a licensed source.
Occupational Health and Safety Act (Act 181 of 1993)	These regulations provide for the health and safety of persons at work, including aspects which are hazardous to health and safety. In terms of major hazardous installation, the regulations shall apply to employers, self-employed persons, and users, who have on their premises, either permanently or temporarily, a major hazard installation or a quantity of a substance which may pose a risk that could affect the health and safety of employees and the public. During the construction phase of this development, all the requirements of Occupational Health and Safety Act 1993 will need to be adhered to.
Hazardous Substances Act (Act No. 15 of 1973)	This Act aims to provide for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances, and for the control of certain electronic products, to provide for the division of such substances or products into groups in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products and to provide for matters connected therewith. A Spill Contingency Plan will be compiled for managing spills during the construction of the proposed development.
National Building Regulations and Building Standards Act (Act 103 of 1977)	This Act aims to provide for the promotion of uniformity in the law relating to the erection of buildings in the areas of jurisdiction of local authorities and for the prescribing of building standards.
Guideline on Need and Desirability (2017)	Guideline considered determining the need and desirability of the proposed development.
Municipal Planning Framework	
Ugu District Municipality Water Services Masterplan 2020-2025	This project falls in line with the Ugu Municipality's goals to improve water infrastructure within the municipality to "ensure long term sustainability".

Section 4: Motivation, Need and Desirability

4.1 Need and Desirability as Per Section 3(F)

The following table has been prepared as per the 2017 Integrated Environmental Management Guideline: Guideline on Need and Desirability compiled by the Department of Environmental Affairs.

Table 20: Need and Desirability as Per the 2017 Guideline on Need and Desirability

“Securing ecological sustainable development and use of natural resources”	
<i>How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?</i>	The water pipeline will result in a large amount of clearance of endangered indigenous vegetation when creating the construction corridor. However, should the EMPr be followed, rehabilitation of the land post-construction should mitigate these impacts. The majority of the pipeline network will follow existing road and watercourse crossing infrastructure. The impact on the ecological integrity of the area has been rated as low during both the construction and operational phases, with the recommended mitigation measures to reduce any impact in place.
<i>How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity?</i> <i>What measures were explored to firstly avoid these negative impacts and, where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts?</i> <i>What measures were explored to enhance positive impacts?</i>	The water pipeline will result in substantial clearance of endangered indigenous vegetation when creating the construction corridor. However, the construction is occurring adjacent to and within the existing road servitude and existing water pipeline servitudes, therefore additional disturbance will be limited. No other route alternatives were possible as the pipeline route has been dictated by the current land uses and topography and follows existing pipeline routes that need replacement. One other design alternative was considered - i.e. creating pier structures through the watercourses. This was not the preferred alternative due to the higher significance of the operational impacts. The construction of the water infrastructure doesn't offer much opportunity to enhance biological diversity, but the proposed route does seek to avoid areas where construction would have the highest impact. The water pipeline will allow for the enhancement, replacement, and enlargement of the current water pipeline in use within the project area. This will ultimately contribute to providing a long-term potable water supply. This supply of potable water will also aid in the provision of other basic services such as waterborne sanitation. The project does not offer any other opportunities to enhance biological diversity apart from alien invasive species being removed from the project footprint.
<i>How will this development pollute and/or degrade the biophysical environment?</i> <i>What measures were explored to firstly avoid these impacts and, where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts?</i> <i>What measures were explored to enhance positive impacts?</i>	Apart from the risk of spills and temporary clearance of vegetation during construction which can be managed and mitigated, the project will not pollute and/or degrade the biophysical environment. The EMPr details measures to manage hazardous materials and fuels used on site during construction and details measures to put in place to ensure that pollution is prevented. Any potential leakages from the pipeline during operation will only result in clean water entering the environment. By providing households with access to potable drinking water at their homes, the project could reduce the pedestrian traffic in and around watercourses and also reduce the need for people to wash clothing, vehicles, and dishes in the watercourses, thereby reducing impacts on water quality.
<i>What waste will be generated by this development?</i>	Small volumes of general waste and a small amount of hazardous waste, such as oil spills, will be generated during construction. This will be temporary.

<i>What measures were explored to firstly avoid waste and, where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste?</i> <i>What measures have been explored to safely treat and/or dispose of unavoidable waste?</i>	No waste will be generated during operation. An EMPr has been provided to ensure waste is properly stored and managed site and the appropriate disposal of waste is also addressed. Measures for the separation and recycling of waste are addressed in the EMPr.
<i>How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage?</i> <i>What measures were explored to firstly avoid these impacts and, where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts?</i> <i>What measures were explored to enhance positive impacts?</i>	There are no negative or positive impacts on any cultural heritage sites provided the recommendations stipulated by the heritage specialist are followed. A heritage impact study was commissioned to assess if there is to be any impact on cultural heritage. The project does not offer much opportunity to enhance cultural diversity but does not negatively impact it.
<i>How will this development use and/or impact non-renewable natural resources?</i> <i>What measures were explored to ensure responsible and equitable use of the resources?</i> <i>How have the consequences of the depletion of the non-renewable natural resources been considered?</i> <i>What measures were explored to firstly avoid these impacts and, where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts?</i> <i>What measures were explored to enhance positive impacts?</i>	The construction process will make use of quarried materials as bedding material and fuels to operate the vehicles. The EMPr addresses the responsible sourcing of materials and use of permitted sites only. The project will not significantly deplete non-renewable natural resources. These impacts cannot be completely avoided but the EMPr addresses appropriate measures to ensure sustainable sourcing. The project does not offer much opportunity to enhance positive impacts related to non-renewable resources.
<i>How will this development use and/or impact renewable natural resources and the ecosystem of which they are part?</i> <i>Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds?</i> <i>What measures were explored to firstly avoid the use of resources or, if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?</i> <i>Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. dematerialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)</i> <i>Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative)?</i>	The development is not expected to impact on any renewable natural resources on site. The project will however, increase the demand for potable water in the region. Water supply is a basic human need and therefore use of the resource cannot be avoided; however, implementation of a formal scheme does allow proper management and monitoring of water use and can ensure that impacts are mitigated through formal management as opposed to the impacts caused by local communities accessing local water resources in an informal and uncontrolled manner.

Do the proposed location, type and scale of development promote a reduced dependency on resources?	
How was a risk-averse and cautious approach applied in terms of ecological impacts? - What are the limits of current knowledge? (note: the gaps, uncertainties and assumptions must be clearly stated) - What is the level of risk associated with the limits of current knowledge? - Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	There are very few if any gaps in knowledge as detailed site inspections were undertaken by all specialists involved. The existing route which has the least impact on the environment was selected. Therefore, unnecessary impacts on vegetated areas have been avoided. The existing road servitude routes that have been previously cleared/ disturbed will have the least impact on the environment have been selected for the majority of the pipeline route. Therefore, substantial unnecessary impacts on vegetated area clearing have been avoided. The most risk-averse and cautious approach has been followed by placing the proposed pipelines underground. This reduces the risk of any operational impact linked to flood events and vandalism.
How will the ecological impacts resulting from this development impact on people's environmental right in terms following - Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but, if avoidance is not possible, to minimise, manage and remedy negative impacts? - Positive impacts: e.g. improved access to resources, improved amenity, improved air, or water quality, etc. What measures were taken to enhance positive impacts?	The proposed development will have very little negative impact on the community's environmental rights. There may be some nuisance and disturbance and access constraints during construction as well as associated noise and dust. The long-term impacts will be positive as the construction of the project will improve access to potable water which is a natural resource and will allow better management and monitoring of water usage.
Describe the linkages and dependencies between human wellbeing, livelihoods, and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)	The proposed development will have a limited ecological impact and will have a positive impact on the community by providing a long-term potable water supply. This supply of potable water will also aid in the provision of other basic services such as waterborne sanitation. The ecological impacts will not result in any significant negative socio-economic impacts as there no identified dependencies between human well-being, livelihoods and ecosystem services within the project area that may be impacted. Therefore, ecological impacts will not result in any loss of livelihoods, loss of heritage site or loss of property value.
Based on all of the above, how will this development positively or negatively impact ecological integrity objectives/targets/considerations of the area?	The proposed project should have no significant negative impact on ecological integrity based on the understanding that the applicant will construct and operated the pipelines as per the conditions of the EMPr.
Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations.	Please refer to Section 1.4 and 4.2. In terms of site alternatives, the preferred pipeline route took into account site conditions, sensitive areas, and specialist recommendations. In terms of design alternatives, the preferred alternative will have a smaller construction impact on the watercourse in terms of construction work in the bed and banks, and will have less impact in the long term, post-construction (less sedimentation of the downstream watercourse). Due to post-construction impacts being permanent this design is seen as much more favourable when considering ecological impacts.
Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope, and nature of the project in relation to its location and existing and other planned developments in the area.	The construction works for the new pipeline results in clearance of endangered indigenous vegetation, impacting biodiversity. It can however be mitigated by following the measures indicated in the EMPr. Due to the nature of the project, there are no identified positive cumulative ecological/biophysical impacts.

"Promoting justifiable economic and social development"	
<i>What is the socio-economic context of the area based on, amongst other considerations, the following considerations:</i> <i>The IDP (and its sector plans' vision, objectives, strategies, indicators, and targets) and any other strategic plans, frameworks of policies applicable to the area?</i> <i>Spatial priorities and desired spatial patterns (e.g. need for integrated or segregated communities, need to upgrade informal settlements, need for densification, etc.)?</i> <i>Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.)? and</i> <i>Municipal Economic Development Strategy ("LED Strategy")?</i>	The project is located in a low to middle-income area associated with the Umdoni area.
<i>Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?</i>	The identified positive socio-economic impacts are as follows: - Improved access to a potable water supply to the Umdoni area. - Infrastructure that will serve to satisfy the increasing water demand within the project area. - Provision of an economically efficient solution to the water supply problem. - Reduced water services backlog and uplifted standards of living in Umdoni. - Provision of employment for local labour.
<i>How will this development address the specific physical, psychological, developmental, cultural, and social needs and interests of the relevant communities?</i>	The new Bulk Water infrastructure will aid in improving potable water supply for the Umdoni area. This will have a direct positive impact on sanitation and health.
<i>Will the development result in inequitable (intra- and inter-generational) impact distribution, in the short- and long-term?</i>	No, as the proposed development will provide public infrastructure; it will benefit the public in general and will not result in inequitable (intra- and inter-generational) impact distribution.
<i>Will the impact be socially and economically sustainable in the short- and long-term?</i>	Yes, the development will be socially and economically sustainable as there have not been any significant negative socio-economic impacts identified. The Bulk Infrastructure will have a positive long-term social impact on all residents in the Umdoni areas.
<i>In terms of location, describe how the placement of the proposed development will:</i> <i>result in the creation of residential and employment opportunities in close proximity to or integrated with each other</i> <i>reduce the need for transport of people and goods</i> <i>result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport?)</i> <i>compliment other uses in the area</i> <i>be in line with the planning for the area</i> <i>for urban related development, make use of underutilised land available within the urban edge</i> <i>optimise the use of existing resources and infrastructure</i> <i>opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement)</i> <i>discourage "urban sprawl" and contribute to compaction/densification</i>	The upgrade of the existing infrastructure and construction of the new pipeline will result in a small number of employment activities during the construction phase. With the increased access to potable water supply to the Umdoni communities, additional employment and housing opportunities will be created. The increase in the potable water supply will allow these communities to grow, providing further economic development to the area.

▪ contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs ▪ encourage environmentally sustainable land development practices and processes ▪ take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.) ▪ the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential) ▪ impact the sense of history, sense of place and heritage of the area and the socio-cultural and ▪ cultural-historic characteristics and sensitivities of the area, and ▪ in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement	
<i>How were a risk-averse and cautious approach applied in terms of socio-economic impacts?</i> • What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? • What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability, and sustainability) associated with the limits of current knowledge? • Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	There are very few if any gaps in knowledge in terms of the socio-economic impacts as the proposal is to provide key social infrastructure. The most risk-averse and cautious approach has been followed by placing the proposed pipes underground. This thus reduces the risk of any operational impact linked to flood events and vandalism.
<i>How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:</i> • Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts but, if avoidance is not possible, to minimise, manage and remedy negative impacts? • Positive impacts. What measures were taken to enhance positive impacts?	The proposed development will not negatively impact on people's environmental rights. In fact, the development will have a positive impact, the improved supply of potable water to households and will aid in improving the standard of living for all in the project area.
<i>Considering the linkages and dependencies between human wellbeing, livelihoods, and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)</i>	The proposed development will have a limited ecological impact and will have a positive impact on the community by providing a long-term potable water supply. The development will have limited to no impact on the other ecological services provided during construction and no impact during preparation. There will be an unavoidable increase in use of water from the supply catchment.
<i>What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?</i>	As the development is for the improved provision of potable water, no other alternatives were considered from a socio-economic point of view. The proposal of constructing the water supply infrastructure is the "best practicable environmental option".
<i>What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries) and is the development located appropriately?</i>	There have been no identified impacts that will adversely affect vulnerable and/or disadvantaged persons.

Considering the need for social equity and justice, do the alternatives identified allow the “best practicable environmental option” to be selected, or is there a need for other alternatives to be considered?	Yes, the best practicable environmental option is selected.
What measures were taken to pursue equitable access to environmental resources, benefits, and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	The development will not impact on anyone’s access to environmental resources, benefits, and services to meet basic human needs and ensure human wellbeing. It will, in fact, improve water supply into the area.
What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development’s life cycle?	The EMPr includes conditions which have been developed to manage operational impacts. Upon receipt of the EA, the EMPr will become legally binding. Therefore, the Ugu Municipality will be bound to the conditions of the EMPr throughout the life cycle of the pipeline.
What measures were taken to: • ensure the participation of all interested and affected parties? • provide all people with an opportunity to develop the understanding, skills, and capacity necessary for achieving equitable and effective participation? • ensure participation by vulnerable and disadvantaged persons? • promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means? • ensure openness and transparency, and access to information in terms of the process? • ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition was given to all forms of knowledge, including traditional and ordinary knowledge? • ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein would be promoted?	Please refer to Section 5 describing the public participation carried out for the project.
Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle- and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area).	As the proposed development is a municipal water supply project, it will benefit the public in general and will not result in inequitable impact distribution.
What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	During construction, a full health, safety, and environmental induction will be conducted with all employees. This induction brings to the attention of the employees all potential human health hazards and environmental dangers associated with the workings of the site. Inductions also indicate that all employees have a right to work in a clean and safe environment.
Describe how the development will impact job creation in terms of, amongst other aspects: • the number of temporary versus permanent jobs that will be created • whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area?) • the distance from where labourers will have to travel • the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits) and	There will be the provision of temporary jobs during construction. However, there will be no new employment opportunities created during the operational phase. This is due to the nature of the development being a water supply scheme with only general maintenance required over its life cycle.

the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	
What measures were taken to ensure: - that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment? - that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	The proposed project falls under the jurisdiction of the Ugu District Municipality and as such there was no inter-governmental coordination required.
What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	The proposed development will not negatively impact people's common heritage with respect to the environment.
Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	All of the mitigations proposed by the EAP and specialists are realistic and practical.
What measures were taken to ensure that the costs of remedying pollution, environmental degradation, and consequent adverse health effects and of preventing, controlling, or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	The EMPr will designate responsibility for all conditions. This document will be legally binding and as such any non-compliance with the conditions of the EMPr will effectively be breaking the law; therefore, the Ugu Municipality will prioritise these items.
Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations.	Please refer to Section 1.5 and 4.2. In terms of site alternatives, the preferred pipeline route took into account site conditions, sensitive areas, and specialist recommendations. In terms of design alternatives, the preferred alternative will have a smaller construction impact on the watercourse in terms of construction work in the bed and banks, and will have less impact in the long term, post-construction (less sedimentation of the downstream watercourse). Due to post-construction impacts being permanent this design is seen as much more favourable when considering ecological impacts.
Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope, and nature of the project in relation to its location and other planned developments in the area.	The proposed project will have a positive cumulative socio-economic impact. An improved access to potable water will ultimately allow for greater hygiene and improved health of residents.

4.2 Motivation for Preferred Site, Activity and Design Alternative

The project entails the construction of the Umdoni Water Pipeline and associated infrastructure which will include multiple watercourse crossings.

4.2.1 Route Alternatives

This route traverses sections of previously untouched terrain but will largely follow existing road reserves and railway lines. A significant portion of the pipeline will run parallel to existing pipeline routes, replacing them, and remaining within their designated servitudes. However, certain segments of the route will diverge from these servitudes to accommodate nearby properties and minimize disruption to occupants' livelihoods during construction. The primary driver dictating the pipeline route is the topography as the proposed network has been designed to be a gravity-fed system. Gravity-fed systems work by means of transferring water from a single high point to points of lower elevation. Therefore, due to the proposal being a gravity-fed system no other feasible route alternatives were available.

4.2.2 Design Alternatives

Two design alternatives have been considered for the proposed Umdoni South Water Augmentation project. These design alternatives relate to the watercourse crossing methodology for crossings that cannot be strapped to existing infrastructure i.e. bridges.

4.2.2.1 Design Alternative 1 (Preferred Design Alternative)

Design Alternative 1 is to construct the Umdoni South Water Augmentation project so that the length of the water pipeline across watercourses will be buried below natural ground level. This will mean that at the watercourse crossings, the pipelines will be trenched below the watercourse. Therefore, there would be no permanent infrastructure within the watercourses, as all infrastructure would be below the

bed of the watercourses allowing for the unobstructed flow of water. As such upon completion of rehabilitation the watercourse will be able to function as before.

4.2.2.2 Design Alternative 2

Design Alternative 2 is to construct additional low-level bridges to support the pipelines over the rivers. This will require placement of permanent concrete columns within the watercourses to support the pipeline. The remaining portions of the pipelines will then be buried below natural ground level. This design alternative is not the preferred option as the exposed pipelines across the watercourses have a high potential for failure during flood events due to debris being captured below the structure. In addition, an exposed pipeline also increases the risk of vandalism, and such is an increased risk to the local potable supply.

Section 5: Public Participation

5.1 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*

Thirteen (13) noticeboards (isiZulu and English) were placed along the proposed bulk water pipeline route on the 12th October 2023, and a further seven (7) were placed along the reticulation pipeline route on the 7th March 2024. The noticeboard detailed the Ugu Municipality's proposed plan to construct the Umdoni water pipeline, subject to a basic assessment and water use authorization. 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 following steps were taken during the public participation process:

- Noticeboards detailing the proposed development were erected along the proposed pipeline site on the 12th October 2023 and 7th March 2024.
- English and isiZulu adverts were placed in the South Coast Sun Classifieds on the 13th October 2023.
- The Ward Councilors were notified of the application via a meeting on the 11th and 25th October 2023.
- All relevant authorities and stakeholders were notified of the application via email on the 10th and 11th October 2023 and 13th February 2024, via SMS notifications on the 11th October 2023 and via hand notification on the 11th, 24th and 25th October 2023, 7th and 29th November 2023, 7th March 2024 and the 11th of April 2024.
- All relevant authorities and registered I&APs were given the opportunity to review complete copies of the Draft BAR. The Draft BAR was circulated for a legislated 30-day comment period.

See Appendix C – 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 were sent out to I&APs between the 10th and 11th October 2023, and 13th February 2024. SMS notifications were sent 11th October 2023. Hand notifications were done on the 11th, 24th and 25th October 2023, 7th, and 29th November 2023 and on the 7th March 2024. See Appendix C – Proof of Notification.

- 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)*

English and isiZulu adverts were placed in the South Coast Sun Classifieds on the 13th October 2023. The adverts detailed the proposed project, Basic Assessment and Water Use Authorisation requirements and provided contact details of EnviroPro should anyone wish to register as an I&AP. See Appendix C – Proof of Advert Placement.

5.2 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 who have registered have been provided in the Registered I&AP list in Appendix C.

5.3 Comments

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

- 5) *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.*
- 6) *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 have been recorded in the comments and response table. The original comments provided have been included together with the C&R table. See Appendix C – Comments and Response table and Comments Received.

Section 6: Impact Assessment

6.1 Methodology to Determine and Rank Significance and Consequences of Impacts Associated With All Alternatives 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 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 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 effect 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 D.

Table 21: Scoring of Impacts

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 1 and 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 1 and 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.

6.2 Impact Assessment of the Route and Design Alternatives

See Appendix D for the full impacts scoring matrix, which assesses the impacts on the below identified sensitive environmental aspects. The specific activities and associated impacts identified in Table 22 below are route-specific and relate to the Preferred Route and Design Alternatives.

Table 22: Specific Impacts Associated with Route and Design Alternative 1 (Preferred Alternatives)

<i>Aspect / Activity</i>	<i>Nature And Consequences Of Impact</i>	<i>Significance rating of impacts before mitigation⁸</i>	<i>Proposed mitigation and Extent to which impact can be reversed / avoided, managed, or mitigated</i>	<i>Significance rating of impacts after mitigation</i>
SITE AND DESIGN-SPECIFIC CONSTRUCTION IMPACTS				
A) Clearing and earthworks for the construction of the water pipeline within the delineated watercourses (LN1, Activity 12)	Direct Impact 1. Increase in sediment inputs and turbidity in the watercourse.	10 (Medium)	- Construction work within the watercourse areas must be strictly limited to the construction footprint only. A construction corridor of 10m must be maintained. - Sandbags must be used as a temporary measure around key areas of soil loss to prevent soils from washing into the local watercourse. - Contamination of watercourses with unset cement or cement powder must be negated as it is detrimental to aquatic biota. - All removed soil and material must not be stockpiled within the system.	5 (Medium)
	Direct Impact 2. Erosion in the watercourse and loss of material leading to sedimentation and deposition of material downstream of the affected watercourses.	12 (High)	- Construction work within the watercourse areas must be strictly limited to the construction footprint only. A construction corridor of 10m must be maintained. - No areas may be excavated outside of the project footprint. - No soil stockpiles may be placed within 32m of a watercourse. All stockpiles must have sufficient erosion protection measures to ensure sediment is not dislodged as runoff resulting in erosion and sedimentation. - The watercourse area must be rehabilitated as soon as the installation of the pipeline has been completed. - Any exposed earth must be rehabilitated promptly by planting indigenous vegetation (vigorous indigenous grasses) to protect the exposed soil. - Only primary activities related to the water pipeline must be allowed within the watercourse area. All construction activities related to the area must be restricted to have a minimum footprint of disturbance. - Contamination of watercourses with unset cement or cement powder must be negated as it is detrimental to aquatic biota. - All removed soil and material must not be stockpiled within the system. - The contractor must ensure that topsoil is stored and re-applied.	8 (Medium)

⁸ See Appendix D for more details.

Aspect / Activity	Nature Consequences Impact	And Of	Significance rating of impacts before mitigation ⁸	Proposed mitigation and Extent to which impact can be reversed / avoided, managed, or mitigated	Significance rating of impacts after mitigation
				- The contractor must make sure that the soil is backfilled and compacted to geotechnical specifications for the project area. - Signs of erosion must be addressed immediately to prevent further erosion.	
	Direct Impact 3. Excavation of the watercourses leading to the alteration of the hydrological regimes		9 (Medium)	This impact is unavoidable. However, where possible the pipeline and related infrastructure are going to be constructed along the existing road servitudes and will be tied to existing bridge infrastructure. The following measures must be carried out to mitigate the disturbance of the watercourse area: - Construction work within the watercourse areas must be strictly limited to the construction footprint only. A construction corridor of 10m must be maintained. - The watercourse area must be rehabilitated as soon as the installation of the pipeline has been completed.	5 (Low)
	Cumulative Impact 4. Potential for reduced functionality for the wider watercourse system.		11 (High)	- Construction work within the watercourse areas must be strictly limited to the construction footprint only. A construction corridor of 10m must be maintained. - Sandbags must be used as a temporary measure around key areas of soil loss to prevent soils from washing into the local watercourse. - The watercourse area must be rehabilitated as soon as the installation of the pipeline has been completed. - Any exposed earth must be rehabilitated promptly by planting indigenous vegetation (vigorous indigenous grasses) to protect the exposed soil. - Only primary activities related to the water pipeline must be allowed within the watercourse area. All construction activities related to the area must be restricted to have a minimum footprint of disturbance. - The recommended buffer zones 30m for riparian areas, 20m for drainage line areas, and 60m for EFZ must be strictly adhered to during the construction phase of the project. Any supporting aspects and activities not required to be within the buffer area must adhere to the buffer zone.	7 (Medium)
	Cumulative Impact 5. Erosion and loss of material leading to deposition of material downstream affecting other watercourse systems.		9 (Medium)	- Construction work within the watercourse areas must be strictly limited to the construction footprint only. A construction corridor of 10m must be maintained. - Sandbags must be used as a temporary measure around key areas of soil loss to prevent soils from washing into the local watercourse. - The watercourse area must be rehabilitated as soon as the installation of the pipeline has been completed. - Any exposed earth must be rehabilitated promptly by planting indigenous vegetation (vigorous indigenous grasses) to protect the exposed soil.	5 (Low)

Aspect / Activity	Nature Consequences Impact	And Of Significance rating of impacts before mitigation ⁸	Proposed mitigation and Extent to which impact can be reversed / avoided, managed, or mitigated	Significance rating of impacts after mitigation
			- Only primary activities related to the water pipeline must be allowed within the watercourse area. All construction activities related to the area must be restricted to have a minimum footprint of disturbance. - Contamination of watercourses with unset cement or cement powder must be negated as it is detrimental to aquatic biota. - All removed soil and material must not be stockpiled within the system. - The contractor must ensure that topsoil is stored and re-applied. - The contractor must make sure that the soil is backfilled and compacted to geotechnical specifications for the project area. - Signs of erosion must be addressed immediately to prevent further erosion.	
B) Operation of vehicles and use of construction equipment within 32m of the delineated watercourses and surrounding areas during the pipeline construction. (LN1, Activity 19)	Direct Impact 6. Degradation of vegetation and surrounding habitat from vehicles and equipment	10 (Medium)	- There will be construction work required within the watercourse areas as per the layout, however the sensitive areas around the watercourses not within the construction footprint must be demarcated as no-go areas. - The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. - Heavy vehicles must avoid working near the watercourse areas as far as possible. Where heavy vehicles are required to work in the watercourse during the construction of the pipeline, these vehicles must remain in the authorised pipeline footprint. There must be no haphazard entry into / exit from the watercourse along the route. i.e. construction plants and vehicles may only travel along existing access routes and may only use a single point of entry into and out of the watercourse buffer zone. - The contractor must work to minimize stream-bank disturbance. - Any disturbed areas within the construction footprint must be rehabilitated within a month of occurrence to the satisfaction of the ECO and or EDTA Compliance Authorities. - All activity within the watercourse must be strictly according to the prescribed engineering designs and approved drawings. - The locations of all infrastructure and services which may be impacted on by the operation of construction plant and related construction activities must be identified and demarcated prior to commencement of construction. - Access to site must make use of the existing access roads. - Heavy vehicles and construction equipment must not impact on the existing. - All construction activity must stay within the predetermined construction footprint and avoid areas with pre-existing infrastructure.	6 (Medium)

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	Indirect Impact 7. Hazardous substance spills leading to downstream contamination		10 (Medium)	- All contractors and employees must undergo induction and must have action plans and training material to cater for spills, leaks, and other impacts on the aquatic systems. - All chemicals and toxicants during construction must be stored in bunded areas. - All machinery and equipment must be inspected regularly for faults and possible leaks; these must be serviced off-site.	6 (Medium)
	Cumulative Impact 8. Vehicle activity in the watercourse could result in direct and cumulative damage to the watercourse.		11 (High)	- There will be construction work required within the watercourse areas as per the layout, however the sensitive areas around the watercourses not within the construction footprint must be demarcated as no-go areas. - The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. - Heavy vehicles must avoid working near the watercourse areas as far as possible. Where heavy vehicles are required to work in the watercourse during the construction of the pipeline, these vehicles must remain in the authorised pipeline footprint. There must be no haphazard entry into / exit from the watercourse along the route. i.e. construction plants and vehicles may only travel along existing access routes and may only use a single point of entry into and out of the watercourse buffer zone. - Any disturbed areas within the construction footprint must be rehabilitated within a month of occurrence to the satisfaction of the ECO and or EDTEA Compliance Authorities. - All activity within the watercourse must be strictly according to the prescribed engineering designs and approved drawings. - The locations of all infrastructure and services which may be impacted on by the operation of construction plant and related construction activities must be identified and demarcated prior to commencement of construction. - Access to site must make use of the existing access roads. - Heavy vehicles and construction equipment must not impact on the existing. - All construction activity must stay within the predetermined construction footprint and avoid areas with pre-existing infrastructure.	7 (Medium)
C) Earthworks and use of construction equipment within 100m of the high-water mark of the sea and near estuarine	Direct Impact 9. The infilling and excavation of 8436.36m ³ of material during		9 (Medium)	- The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. - Heavy vehicles must avoid working near the coastal and estuarine	5 (Low)

Aspect / Activity	Nature Consequences Impact	And Of	Significance rating of impacts before mitigation ⁸	Proposed mitigation and Extent to which impact can be reversed / avoided, managed, or mitigated	Significance rating of impacts after mitigation
functional zones (LN1 Activity 19A / LN3 Activity 14)	construction resulting in the alteration and degradation of coastal habitats			habitats as far as possible. Where heavy vehicles are required to work in or near coastal and estuarine habitats during the construction of the pipeline, these vehicles must remain in the authorised pipeline footprint.	
	Direct Impact 10. Installation of 659.86m ² of pipeline within the estuarine functional zones resulting in the alteration and degradation of estuarine habitats		9 (Medium)	- All contractors and employees must undergo induction and must have action plans and training material to cater for spills, leaks, and other impacts on the coastal and estuarine habitats. - Any disturbed areas within the construction footprint must be rehabilitated within a month of occurrence to the satisfaction of the ECO and or EDTEA Compliance Authorities. - All activity within the coastal and estuarine habitats must be strictly according to the prescribed engineering designs and approved drawings. - All chemicals and toxicants during construction must be stored in bunded areas. - All machinery and equipment must be inspected regularly for faults and possible leaks; these must be serviced off-site. - The locations of all infrastructure and services which may be impacted on by the operation of construction plant and related construction activities must be identified and demarcated prior to commencement of construction.	5 (Low)
D) Clearing of vegetation for the establishment of the working corridor. (LN3, Activity 12)	Direct Impact 11. Degradation, destruction, and fragmentation of 478 281m ² of the endangered KwaZulu-Natal Coastal Belt Grassland ecosystem.		12 (High)	Vegetation clearing must be kept within the construction footprint. Majority of the project area's construction will be within existing road reserves. The impact of vegetation clearing associated with the pipeline crossing is therefore low. This impact cannot be completely mitigated as there will be vegetation loss in areas where there hasn't been previous disturbance. However, the following measures must be carried out to mitigate unnecessary and preventable vegetation clearing and limit the damage: - The construction footprint must be 5m wide within the watercourses and 10m wide outside of the watercourses. - The vegetation that will be cleared must be restricted to the construction footprint of the pipelines. No vegetation may be cleared other than that is required for access to the site or for the construction activities associated with the construction of the Umdoni Water Supply Infrastructure. - Contractors must avoid damaging any vegetation that is not within the construction footprint. - All personnel and contractors are to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the Project area to inform contractors and site staff of the presence of protected species, their identification, conservation status and importance, biology, habitat requirements and management requirements in line with	10 (High)

Aspect / Activity	Nature Consequences Impact	And Of Significance rating of impacts before mitigation ⁸	Proposed mitigation and Extent to which impact can be reversed / avoided, managed, or mitigated	Significance rating of impacts after mitigation
			the Environmental Authorisation and within the EMP. Contractors and employees must all undergo the induction and must be made aware of any sensitive areas to be avoided. • The ECO must be consulted should a tree or any vegetation require clearing outside of the designated construction footprint area. • Laydown and construction preparation activities (such as cement mixing, temporary toilets, etc.) must be limited to already modified areas and must take up the smallest footprint possible. • Areas to be developed/disturbed must be specifically demarcated so that during the construction/activity phase, only the demarcated areas be impacted upon. • Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, must not be fragmented or disturbed further. • All vehicles and personnel must make use of existing roads and walking paths, especially construction/operational vehicles. • The clearing of indigenous vegetation must be minimised. All activities must be restricted to within the authorised areas. • A qualified environmental control officer must be on site when activities begin. • A site walk through is recommended by a suitably qualified ecologist prior to any activities taking place and any SSC or protected species should be noted. • In situations where these species are observed and must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development and implementation of a search, rescue and recovery program is suggested for the protection of these species. • Should animals not move out of the area on their own, relevant specialists must be contacted to advise on how the species can be relocated. • Any materials may not be stored for extended periods of time and must be removed from the Project Area once the construction phase has been concluded. No permanent construction phase structures must be permitted. Construction buildings must preferably be prefabricated or constructed of reusable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated laydown areas. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of	

Aspect / Activity	Nature Consequences Impact	And Of Significance rating of impacts before mitigation ⁸	Proposed mitigation and Extent to which impact can be reversed / avoided, managed, or mitigated	Significance rating of impacts after mitigation
			functional habitat. This will also reduce the likelihood of encroachment by more alien invasive plant species. All grazing mammals must be kept out of the areas that have recently been re-planted. • The Contractor shall be in possession of an emergency spill kit that must always be complete and available on-site. • No servicing of equipment on site unless necessary. • All contaminated soil must be treated <i>in situ</i> or removed and placed in containers. • Contain any generator diesel storage tanks, and machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment. • All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the Project Area. • It must be made an offence for any staff member to remove any indigenous plant species from the Project Area or bring any alien species in. This is to prevent the spread of exotic or alien species or the illegal collection of plants. • All management outcomes and mitigations put forward in the accompanying freshwater report must be strictly adhered to. All construction waste must be removed from the site at the closure of the construction phase.	
	Direct Impact 12. Disruption/alteration of faunal species activities (breeding, migration, feeding).	13 (High)	The following measures must be carried out to mitigate the excessive and preventable impact on fauna: • Clearing and disturbance activities must be conducted in a progressive linear manner, always outwards and away from the centre of the Project area and over several days, to provide an easy escape route for all small mammals and herpetofauna. • Should animals not move out of the area on their own, relevant specialists must be contacted to advise on how the species can be relocated. • The duration of the activities should be minimised to as short a term as possible, to reduce the period of disturbance on fauna. • Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to reptile species and nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be allowed and signs must be put up to enforce this. Monitoring must take place in this regard. Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive	11 (High)

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			areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. • Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons. • Any holes/deep excavations must be dug in a progressive manner and shouldn't be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in. Holes must be subsequently inspected for fauna prior to backfilling. • If fencing is required: wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area. • Use environmentally friendly cleaning and dust suppressant products. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests. • All personnel and contractors are to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the Project area to inform contractors and site staff of the presence of protected species, their identification, conservation status and importance, biology, habitat requirements and management requirements in line with the Environmental Authorisation and within the EMP. Contractors and employees must all undergo the induction and must be made aware of any sensitive areas to be avoided. • Rivers, forests, and riparian vegetation on and near the project site provide suitable habitats for most fauna on site and must not be unnecessarily disturbed. • Work in rivers, forests and riparian zones must preferably be done during the low-flow season. • All construction vehicles must use designated access roads. Off-road driving is prohibited. • No food or similar waste that may attract wild animals may be disposed of at the site. All food and litter waste must be placed in sealed bins and removed from the site each day.	

Aspect / Activity	Nature Consequences Impact	And Of	Significance rating of impacts before mitigation ⁸	Proposed mitigation and Extent to which impact can be reversed / avoided, managed, or mitigated	Significance rating of impacts after mitigation
				To reduce collisions of vehicles with fauna, animals must have the right of way.	
	Direct Impact 13. Removal of alien invasive vegetation found along the pipeline route.		0 (No Impact)	This is a positive impact.	0 (No Impact)
	Indirect Impact 14. Encroachment of alien vegetation into cleared areas.		9 (Medium)	- An extensive Invasive Alien Plant Programme must be developed and implemented. This should regularly be updated to reflect the annual changed in AIP composition. - All alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs) must be promptly removed. - Herbicides must not be used in or near (within the buffer) watercourses (opt for mechanical removal). - The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths. - A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests. - The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. - Clearing of vegetation must be kept to the construction footprint only. - All denuded areas must be landscaped and revegetated as soon as possible. - Areas that have been cleared of invasive vegetation must be re-vegetated with indigenous pioneer species local to the area. This will aid in impeding the growth of IAPs. These areas must be monitored to ensure vegetation growth.	5 (Low)
E) Construction activity in areas with no vegetated cover.	Direct Impact 15. Erosion on exposed banks and areas resulting in scouring and the siltation of the watercourses.		9 (Medium)	This impact is partially unavoidable as the construction activity will need to take place over cleared exposed areas. The following mitigation measures must, however, be applied: - Exposed banks that are susceptible to erosion must not be left exposed for more than 2 months at any time. - Exposed banks that are susceptible to erosion within 32m of the edge of any watercourse must not be left exposed for more than 1 month at any time.	5 (Low)

Aspect / Activity	Nature Consequences Impact	And Of	Significance rating of impacts before mitigation ⁸	Proposed mitigation and Extent to which impact can be reversed / avoided, managed, or mitigated	Significance rating of impacts after mitigation
				- Erosion/ stormwater protection measures must be implemented above and below the slope in the form of sandbag berms, pack rock berms or even vegetation berms to slow runoff down the slope. - Any accumulated siltation must be removed by spade (by hand). - The planting of dense indigenous pioneer grass seeds across all bare earth area. - Exposed cut and fill slopes near the riparian areas must be top soiled, hydro seeded or have grass sods planted within 4 weeks of being cut.	
F) Handling of hazardous chemicals/substances on-site	Direct Impact 16. Spilling of hazardous chemicals/substances into the receiving environment and penetrating into sensitive habitats.		10 (Medium)	The following measures must be carried out to mitigate potential downstream contamination: - All construction activities must be undertaken during the low flow (dry season) period as much as possible to limit surface flow transporting contaminants to the surrounding watercourse habitat. - All contractors and employees must undergo induction and must have action plans and training material to cater for spills, leaks, and other impacts on the aquatic systems. - As much material must be prefabricated and then transported to the site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on site. - All chemicals and toxicants during construction must be stored in bunded areas. - All machinery and equipment must be inspected regularly for faults and possible leaks; these must be serviced off-site. - No dumping of construction material on-site may take place. - All waste generated on-site during construction must be adequately managed. - A stormwater management method statement must be compiled for the project by the contractor and implemented during the construction phase. - All stormwater infrastructure must be monitored and maintained addressing areas of non-efficacy.	6 (Medium)
G) Sourcing material	Indirect Impact: 17. Sourcing material from unlicensed borrow pits and sand mines increases the danger to the surrounding community and is		8 (Medium)	Bedding material is often sourced from local quarries or sand mines. The following criteria must be adhered to: - Any local quarry or sand mine used must be a permitted source through DMR. - The contractor excavating the material must do so within the parameters of the mining permit, adhering to the EMP conditions for that site.	1 (Low)

Aspect / Activity	Nature Consequences Impact	And Of	Significance rating of impacts before mitigation ⁸	Proposed mitigation and Extent to which impact can be reversed / avoided, managed, or mitigated	Significance rating of impacts after mitigation
	detrimental to the local environment.				
H) Excavation for the creation of the pipeline (LN3, Activity 19/19A)	Direct Impact 18. Disruption of existing services i.e., powerlines, water pipes etc.		9 (Medium)	The following measures must be implemented prior to and during excavation along the entire route of the pipeline: All existing services must be identified and relocated prior to construction.	7 (Medium)
	Direct Impact 19. Trench failure due to poor construction techniques.		6 (Medium)	The following measures must be implemented prior to and during excavation along the entire route of the pipeline: - All earthworks must be carried out in a manner to promotes the stable development of the site. - Earthworks and drainage measures be designed in such a way as to prevent ponding of, or high concentrations of, stormwater or groundwater anywhere on the site and include effective erosion and anti-siltation controls. - Both the geotechnical professional and contractor must carry out regular documented inspections of the trenches to detect unstable sidewall conditions during the construction phase. - Workers must not enter or work below any excavations/cuts deeper than 1.5m that are not shored or battered back as described above.	2 (Low)
	Direct Impact 20. Excavations and infilling of trenches leading to the destruction of the natural soil structure		10 (Medium)	The following measures must be implemented during excavation and infilling along the entire route of the pipeline: During excavations, the first 300 mm of soil (i.e. topsoil) must be stockpiled separately from the soil excavated deeper than 300 mm.	8 (Medium)
	Direct Impact 21. Excavations leading to the loss/damage of fossils.		10 (Medium)	The following measures must be implemented prior to and during excavation along the entire route of the pipeline: - There is a very small chance that fossils may occur in the aeolianites below ground so a Fossil Chance Find Protocol must be added to the EMPr. - If fossils are found once excavations have commenced, then they must be rescued, and a palaeontologist called to assess and collect a representative sample.	6 (Medium)
	Direct Impact 22. Excavations leading to the loss/damage of heritage resources.		10 (Medium)	The following measures must be implemented prior to and during excavations along the entire route of the pipeline: In the event that any cultural heritage resources are discovered operations exposing archaeological and historical residues, including	6 (Medium)

<i>Aspect / Activity</i>	<i>Nature Consequences Impact</i>	<i>And Of</i>	<i>Significance rating of impacts before mitigation⁸</i>	<i>Proposed mitigation and Extent to which impact can be reversed / avoided, managed, or mitigated</i>	<i>Significance rating of impacts after mitigation</i>
				modern graves, must cease immediately pending an evaluation by the heritage authorities. A Chance Finds Procedure must be implemented, and a qualified archaeologist must be called on-site if cultural heritage resources are found during construction.	
I) The construction period of the Umdoni water pipeline	Indirect Impact 23. This is a positive impact on the community through the potential creation of local employment.		0 (No Impact)	This has a positive impact.	0 (No Impact)
J) Construction vehicles and personnel working in the area.	Direct Impact 24. Creating a nuisance to the surrounding area and residents.		6 (Medium)	The construction phase of the project will create a level of nuisance to the local community. - The work area must be designated to prevent trespassing onto adjacent properties. - Speed limits will be obeyed and enforced by the contractor. - A complaints register will be kept on-site in the environmental file.	2 (Low)
	Direct Impact 25. Dusty conditions impact air quality affecting community members and fauna along the construction route.		9 (Medium)	There will be increased dust generated during the construction phase; however, this will be on a temporary basis - i.e., the site will be worked continuously for a few months until construction is completed. Further to this: - The material being transported to the site in the back of the trucks must be covered. - Wetting of exposed soft soil surfaces - No non-environmentally friendly suppressants may be used as this could result in the pollution of water sources. - Shade cloth must be utilised for stockpiled materials where required. - The applicant must comply with the National Dust Regulations (Government Notice R827, 2013) with regards to dust levels produced on site.	7 (Medium)
	Indirect Impact 26. Impacting existing traffic conditions and pedestrians.		7 (Medium)	The construction activity will pose an increased risk to pedestrians and traffic. This cannot be avoided as traffic will increase during the construction phase temporarily until construction is completed. - Construction safety signage must be erected to notify of construction activities and potential hazards on site. - Flagmen must be in attendance to direct traffic where required.	5 (Low)
	Direct Impact 27. Improper storage of waste on-site resulting in littering		9 (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 project area.	5 (Low)

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	and impact on the environment on-site affecting the surrounding community.		- Designated waste storage areas with waste receptacles must be set up within the construction site camp. - Waste will be removed from the site and disposed of at a registered waste disposal site. - Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site. - Dangerous waste such as metal wires and glass must only be stored in fully sealed and secure containers, before being moved off site as soon as possible. - Safe disposal slips for the disposal of all waste must be obtained and kept on-site as proof of safe disposal. - The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility within every 10 days at least. Where a registered disposal facility is not available close to the PAOI, the Contractor shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site or buried on open pits. - Waste management will be controlled through the implementation of the EMP. This impact can be managed and mitigated.	
	Indirect Impact 28. Emissions from construction vehicles associated with the construction activities.	9 (Medium)	The construction phase of the project will see an increase in vehicles moving through the area which will result in the increase of emissions into the atmosphere. All construction vehicles operating on the site must be fitted with the appropriate silencers and exhausts to reduce emissions and noise into the atmosphere.	7 (Medium)
	Direct Impact 29. Insufficient number of toilet facilities on site resulting in construction staff having to use the surrounding areas as ablutions, resulting in contamination of the environment.	11 (High)	The increase in construction personnel during the construction phase will require several toilet facilities for the site. Toilets at the recommended Health and Safety standards must be provided. - Sufficient toilet facilities (1 toilet per 15 employees) must be provided by the Contractor. - All toilet facilities must be checked on a daily basis. - All toilet facilities must be emptied and cleaned on a weekly basis. - Once no longer required, they must be pumped dry to prevent leakage into the surrounding environment and removed from site.	7 (Medium)

Aspect / Activity	Nature Consequences Impact	And Of Significance rating of impacts before mitigation ⁸	Proposed mitigation and Extent to which impact can be reversed / avoided, managed, or mitigated	Significance rating of impacts after mitigation
	Indirect Impact 30. Inappropriate disposal of toilet waste resulting in the contamination of the environment.	12 (High)	The following mitigation measures must be adhered to: • All toilet facilities on site utilised by the construction personnel must be checked on a daily basis and emptied on a weekly basis by the contractor. • A registered waste removal contractor must remove sewage waste from site or sewage waste must be disposed of at a permitted Wastewater Treatment Site. • Once no longer required, they must be pumped dry to prevent leakage into the surrounding environment and removed from site. • Safe disposal slips for the disposal of effluent waste must be obtained and kept on-site as proof of safe disposal.	8 (Medium)
K) Rehabilitation taking place along the water pipeline working servitude.	Direct Impact 31. Inappropriate rehabilitation leading to long-term environmental degradation	13 (High)	The following mitigation measures must be adhered to: • Re-vegetation of the disturbed site must aim at approximating as near as possible the natural vegetative conditions prevailing prior to construction. • Bare surfaces must be grassed as soon as possible after construction to minimise time of exposure. the planting of dense indigenous pioneer grass seeds across all bare earth areas. • Take remedial action where vegetation establishment is unsuccessful, or erosion is evident. • As much vegetation growth as possible must be promoted within the study area to protect soils and to reduce the percentage of the surface area which is left bare ground. • Rehabilitation of all disturbed areas must be an ongoing process and areas must be rehabilitated as soon as construction is completed in that area (i.e. rehabilitation of the whole route is not only undertaken once all construction is completed, but rather in incremental sections as construction progresses. • All areas to be affected by the project activities must be rehabilitated by indigenous vegetation. • Indigenous plants naturally growing within the project area, but that would be otherwise destroyed during clearing for development purposes, must be incorporated into rehabilitation areas. • When rehabilitating the construction footprint site, it is imperative that as far as possible the habitat that was present prior to disturbances is recreated or improved, so that faunal species that were displaced by vegetation clearing and construction activities are able to recolonize the rehabilitated area.	9 (Medium)

Aspect / Activity	Nature Consequences Impact	And Of	Significance rating of impacts before mitigation ⁸	Proposed mitigation and Extent to which impact can be reversed / avoided, managed, or mitigated	Significance rating of impacts after mitigation
				- The plant material to be used for rehabilitation must be similar to what is found in the surrounding area. - Immediate rehabilitation of any areas disturbed as a result of construction activities. Use species that are specific to the original vegetation type of the affected area (ensure to keep topsoil separate). - A fire management plan needs to be compiled and implemented to restrict the impact fire would have on the surrounding areas.	
SITE AND DESIGN-SPECIFIC OPERATIONAL IMPACTS					
L) Operation of the Umdoni Water Pipeline	Direct Impact 32. Improved supply of potable water and service delivery into the surrounding areas.		0 (Positive)	This is a positive impact.	0 (Positive)
	Indirect Impact 33. Erosion caused by unplanned pipe leaks		9 (Medium)	Precautions to be taken include: - The installation of leak warning and detection systems - The planting of dense indigenous pioneer grass seeds across all bare earth areas. - Monitoring of the pipeline must be undertaken to detect leaks and monitoring should be undertaken at least once a week.	4 (Low)
	Cumulative Impact 34. Constructing the pipeline will be a positive operational impact. The community will benefit from the supply of potable water.		0 (Positive)	This is a positive impact.	0 (Positive)
	Indirect Impact 35. Indirect Impact: Illegal connections leading to damage to the pipework, flooding, erosion, and loss of water supply		9 (Medium)	Since most of the households in the area will have easy access to water, there are unlikely to be illegal connections. However, the pipeline will be laid in trenches, except for across the watercourses. The water service provider must monitor the pipeline through routine inspections with any leaks being repaired as soon as they are reported.	7 (Low)
M) Placement of the pipelines	Direct Impact 36. Long-term erosion around watercourses		12 (High)	The following measures must be carried out to mitigate long-term erosion: Trench rehabilitation must be effectively carried out before contractors leave the site.	8 (Medium)

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• Incomplete trenching and rehabilitation of the site • Improper placement of pipes	and damage to watercourse banks where the pipeline has been placed.			• The 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. • Indigenous vegetation must be planted after the soil has been compacted. The vegetation must have been taken successfully before contractors leave the site. • Regular monitoring for erosion after construction must take place to ensure that no erosion problems have developed as a result of the disturbance. • All erosion problems observed should be rectified as soon as possible.	

Table 23: Site-Specific Impacts Associated with Design Alternative 2

See Appendix D for the full impacts scoring matrix, which assesses the impacts on the above system. The impacts relating to Design Alternative 1 and Design Alternative 2 are similar, therefore the impacts below include the impacts which differentiate the most between the two Design Alternatives, namely the impact on watercourses.

<i>Aspect / Activity</i>	<i>Nature Consequences Impact</i>	<i>And Of</i>	<i>Significance rating of impacts before mitigation⁸</i>	<i>Proposed mitigation and Extent to which impact can be reversed / avoided, managed, or mitigated</i>	<i>Significance rating of impacts after mitigation</i>
SITE AND DESIGN-SPECIFIC CONSTRUCTION IMPACTS					
N) Larger construction footprint associated with trenching all watercourse crossings (LN1 Activity 19)	Indirect Impact 37. Increased construction complexity and costs which will increase strain on the Municipality.		8 (Medium)	This impact cannot be mitigated.	8 (Medium)
	Direct Impact 38. Greater infill and removal of material in the watercourses.		13 (High)	The following measures must be carried out to mitigate the disturbance of watercourse area: - Construction work within the watercourse areas must be strictly limited to the construction footprint only. - No areas may be excavated outside of the project footprint. - Any stockpiles within 32m of a watercourse area must have sufficient erosion protection measures to ensure sediment is not dislodged into the watercourses. - The areas outside of the watercourse areas must be demarcated as no go areas with snow netting. - The watercourse area must be rehabilitated as soon as the pipelines have been completed. - A dry work area is required for the installation of the bridge crossings and pouring of the concrete. Minor diversions will be required within the macro channel of the river system. Water will be diverted around the current work area. It is recommended that large sandbags are used for the diversion. This enables the contractor to shift the work as construction progresses. - When erosion, siltation and turbidity are observed within the watercourse area, effort must be made to prevent further erosion in that area. Sandbags and pack rock may be used within these areas to limit the duration period that areas are exposed. - All areas upstream and downstream of the construction footprint must be demarcated as a 'no-go' zone for the duration of the construction process. No site staff are permitted to enter these areas. The recommended buffer of 30m for riparian areas, 20m for drainage line areas, and 60m for EFZ must be implemented.	12 (High)

			- No excavated material or fill material may be stored within 20m of the watercourse. Sandbags or pack rock must be placed below the soil stockpiles as berms should erosion start to occur from these areas. - Bedding material that will be used must not be stored within 20m of the watercourse before it is used. - An approved storm water plan (by the ECO) must be adhered to during construction.	
SITE AND DESIGN-SPECIFIC OPERATION IMPACTS				
O) Operation of Umdoni South Water Pipeline	Direct Impact 39. Exposure to flood damage and consequential ongoing maintenance and service disruption.	13 (High)	The following must be implemented to mitigate against any damage from flood events: - The pipeline must be raised above the flood line level recommended by the engineer to avoid flood damage. - The raised pipe must include additional reinforcement for protection from weathering.	11 (High)

6.3 Environmental Impact Statement as per section (I)

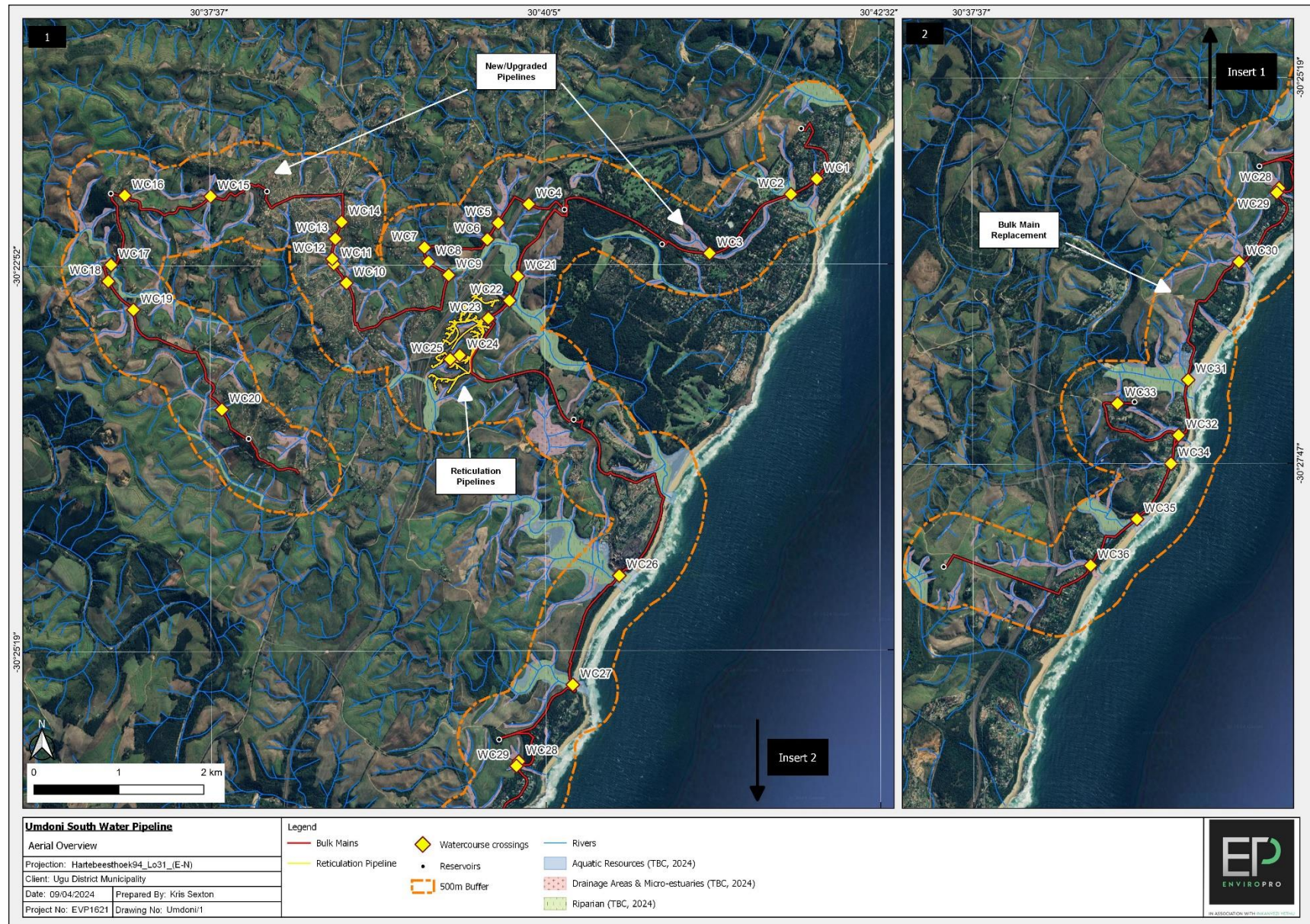
The critical impacts associated with the construction of the Umdoni South Water Augmentation Project relate to those during the construction period, specifically the clearance of endangered vegetation associated with the working corridor, construction within 32m of the watercourses and construction near coastal and estuarine habitats. There are very few negative operational impacts anticipated for the pipeline infrastructure as the pipelines will be trenched below ground level with the exception of the coastal estuary crossings being strapped to existing bridges.

The key mitigation measure for the water pipeline is that the majority will be placed below ground level which would allow for the construction footprint to be fully rehabilitated once construction is complete. The associated impacts with constructing the pipeline across sensitive habitats can be partially mitigated by implementing and enforcing stringent no-go areas outside of the pipeline footprint, where all construction activities are to be confined to the proposed construction footprint areas and all vehicles to use the existing road and operate within the existing routes. As well as limiting the clearing of vegetation to the construction footprint. A number of positive impacts may result from the construction of the Umdoni South Water Augmentation Project, and these relate to improving the provision of temporary employment and improved service delivery and potable water to the region. All identified impacts can be mitigated if all conditions stipulated in the EMPr are adhered to during both the construction and operational phases of the project.

It must also be noted that the applicant commenced with the replacement of a 6km section of the pipeline near Bazley Beach, part of the bulk pipeline replacement route, prior to receiving formal approval from EDTEA. Subsequently, EDTEA issued a *Notice of Intent to Issue a Compliance Notice* to Ugu District Municipality. Following consultation with EDTEA, Ugu District Municipality was granted a Section 30A approval for this work on the condition that no other work continues, and that rehabilitation of this section be incorporated into the Umdoni South Water Augmentation Project Environmental Management Plan (EMPr). For the purpose of the Environmental Authorization (EA) Application and EMPr, the entire pipeline was evaluated. However, it is important to note that this specific portion of the pipeline will not be included in any subsequent Environmental Authorizations.

Therefore, taking into consideration the above impacts, and provided the mitigation measures and recommendations in this report are adhered to, it is the EAP's opinion that the Umdoni South Water Project be authorised as depicted in Figure 33 below.

Figure 33: Aerial Photograph showing the Umdoni South Water Augmentation Project



6.4 Impact Management Objectives and Outcomes for the Development for Inclusion in the EMPr 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 identified indigenous vegetation and watercourses associated the Umdoni South Water Augmentation Project.
 - 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.
 - That implementation of the rehabilitation plan improves the condition of the environment on the pipeline route.

6.5 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 of the Freshwater and Vegetation Ecological Assessment, Heritage Impact Assessment Report and Paleontological Assessment (see Appendix B). The pipeline layout and preliminary design report have been provided to the EAP by the engineer. The assessment is also based on the assumption that the input received from the engineers and applicant is accurate. A site visit has been conducted by the EAP.

6.6 Period for Which Authorisation Is Required, Proposed Monitoring and Auditing and Post Construction Requirements

Environmental authorisation is required for the commencement of construction of the Umdoni South Water Augmentation from 2024 - 2028. It is recommended that the authorisation would need to be valid for a period of ten years, within which time construction would need to commence.

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.

6.7 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.

6.8 EAP Opinion on Whether Or Not to Authorise Activity and Recommendations and Conditions for Authorisation as Per Section 3(n) and (p)

With respect to the alternatives, it is recommended that the preferred Design Alternative 1 be authorised. The significance of the impacts associated with the project is considered to be 'low' provided all mitigation measures are implemented.

Appendix A: Drawings and Maps

Appendix B: Specialist Reports

No.	Prepared By	Authors	Professional Registrations	Title of Report	Date of Report
1	The Biodiversity Company	I. Makwela		Freshwater and Estuarine Ecological and Impact Assessment for the Proposed Umdoni South Bulk Water Augmentation	February 2024
2	The Biodiversity Company	G. Walker A. Husted	Pr. Sci. Nat.	Terrestrial Vegetation Compliance Statement for the proposed Umdoni South BWA project	February 2024
3	Tsimba Archaeological Footprints (Pty) Ltd	R. Muroyi	Pr. Sci. Nat.	Phase One (1) Archaeology and Heritage Impact Assessment for the Proposed Umdoni South Bulk Water Pipeline, Located in Umdoni Local Municipality KwaZulu-Natal	February 2024
4	Prof. M. Bamford	Prof. M. Bamford	-	Palaeontological Impact Assessment for the proposed Umdoni Bulk Water Supply, South Coast, KwaZulu Natal Province	February 2024
5	Drennan Maud (Pty) Ltd	A. Joubert	Pr. Sci. Nat.	Preliminary Report On Desktop Geotechnical Investigation For The Proposed Umdoni South Bulk Water Augmentation Pipeline Development – Kwa-Zulu Natal South Coast	March 2024
6	Ensync Engineers	N. Mthethwa	-	03-2267-01-06-09-002 Umdoni South Bulk Water Augmentation Preliminary Design Report	April 2024
7	Ensync Engineers	N. Mthethwa	-	03-2267-01-06-09-003 GDP Design Proposal Report	January 2024
8	DFFE	-	-	DFFE Screening Reports	August 2023

Appendix C: Public Participation

C1: I & Ap Notification Register

C2: Registered I &Aps And Proof Of Registration

C3: Proof of Notification

C4: Meeting Minutes and Register

C5: Proof Of Placement Of Notice Board

C6: Proof Of Placement Of Advert

C7: Comments And Response Table

C8: Comments And Responses Received

Appendix D: Impacts Scoring Matrix

Appendix E: EAP Declaration

Appendix F: Environmental Management Programme