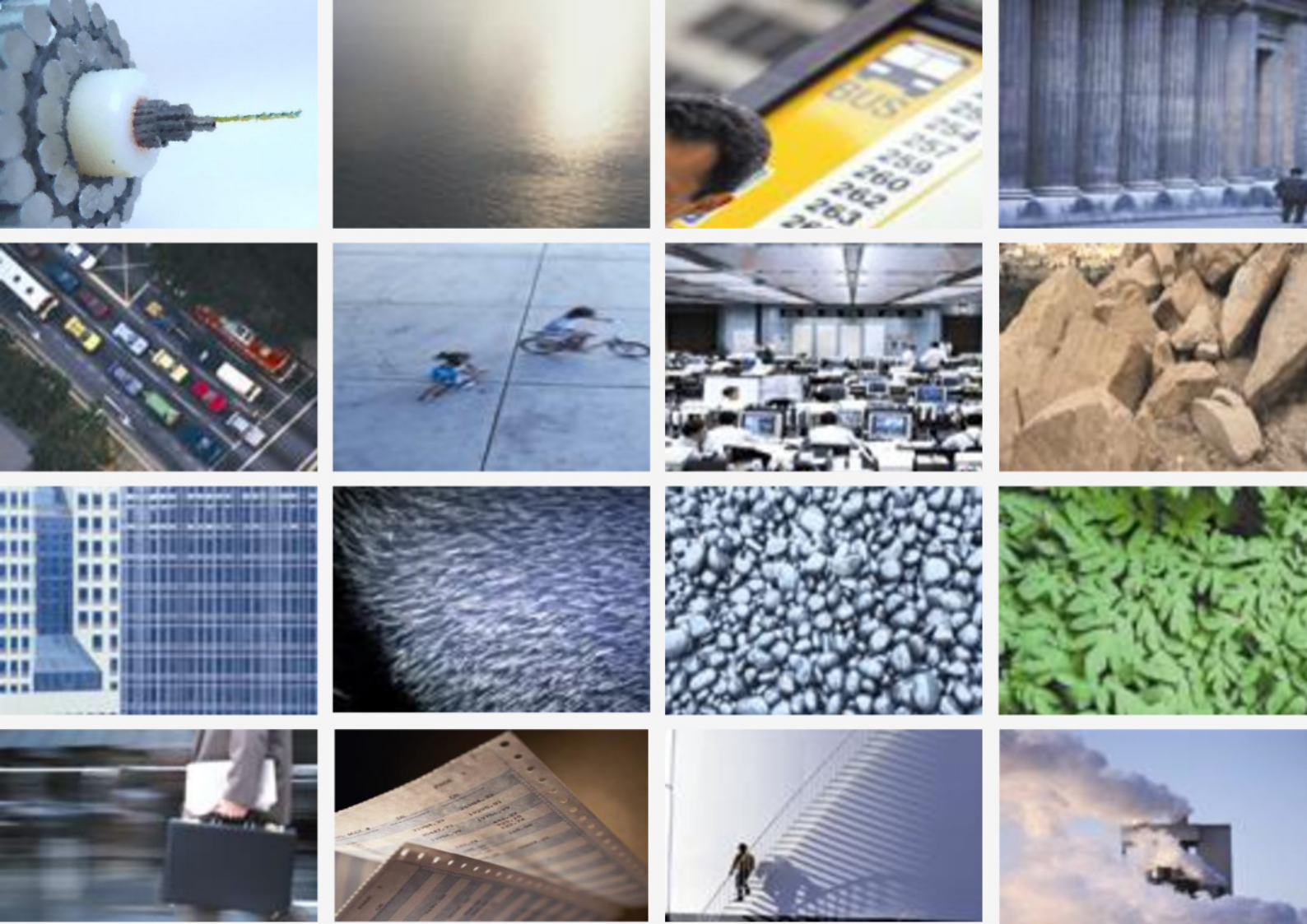


APPENDIX G ENVIRONMENTAL MANAGEMENT PROGRAMME

An Environmental Management Programme has been compiled to address potential impacts associated with the proposed project.

- ANNEX A – Traffic management Plan
- ANNEX B – Terrestrial Ecology Management Plan
- ANNEX C – Project Locality Maps



Installation and Operation of the METISS Subsea Cable System to be Landed in Amanzimtoti, South Africa

Environmental Management Programme

30 May 2019

ERM Project No.: 0482086

CONTENTS

1.	IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT PROGRAMME	0
1.1	Roles and Responsibilities.....	0
1.2	Environmental Awareness Training	2
1.3	Environmental Monitoring	2
1.4	Specific Management Plans	3
1.4.1	Waste Management Plan.....	3
1.4.2	Traffic Management Plan.....	4
1.4.3	Plant Rescue and Protection Plan	4
1.4.4	Re-vegetation and Habitat Rehabilitation Plan	4
1.5	Environmental Management Programme Commitments Register	5
1.6	Auditing.....	11

List of Tables

Table 1.1	EMPr Commitments Register	0
-----------	---------------------------------	---

List of Figures

Figure 1-1	Waste Hierarchy	3
------------	-----------------------	---

List of Annexes

- Annex A: Traffic Management Plan
- Annex B: Terrestrial Ecology Management Plans
- Annex C: Project Locality Maps

Acronyms and Abbreviations

Name	Description
ASN	Alcatel Submarine Networks
BMH	Beach Manhole
BU	Branching Unit
CBA	Critical Biodiversity Area
CBD	Convention on Biological Diversity
CLS	Cable Landing Station
cm	Centimetre
CPT	Cone Penetrometer Tests
CR	Critically Endangered
CRR	Comments and Responses Report
CV	Curriculum Vitae
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	National Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EKZNW	Ezemvelo KwaZulu-Natal Wildlife
EMPr	Environmental Management Programme
ERM	Environmental Resources Management
GNR	Government Notice Regulations
Ha	Hectares
HIA	Heritage Impact Assessment
ICPC	International Cable Protection Committee
IDP	Integrated Development Plan
IDZ	Industrial Development Zone
Km	Kilometre
KZN	KwaZulu Natal
LT	Liquid Telecom
m	Meter
NEMA	National Environmental Management Act (Act No. 107 of 1998, as amended)
nm	Nautical miles
PPP	Public Participation
ROV	Remotely Operated Vehicle
SAHRA	South African Heritage Resources Agency
SAR	Single Armour
SMH	Splicing Manhole
TCR	Terrestrial Cable Route
WMP	Waste Management Plan

1. IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT PROGRAMME

The EMPr details the mitigation measures, which must be implemented during the development of the proposed Project and assigns responsibilities for specific tasks. METISS shall ensure that a copy of the approved EMPr and associated approvals are supplied to the cable laying sub-contractors.

The EMPr is applicable to all work activities during the installation, operations and decommissioning phases of the proposed activities and is prepared in accordance with the requirements of Section 24(N) of the National Environmental Management Act, as amended (Act No. 107 of 1998).

1.1 Roles and Responsibilities

The following describes the parties that will carry out the requirements of the EMPr during the installation (including pre-installation) and operational phases.

METISS, ASN, Elettra and Liquid Telecom

METISS is owned by a consortium of companies which were specifically formed for the purpose of developing the subsea cable system. This Consortium has contracted various companies to aid in developing the system from the manufacturing all through to operations.

ASN and Elettra were appointed to both manufacture and install the METISS subsea cable from Mauritius to South Africa. They will be responsible for the manufacturing and installation of the main trunk, including the Branching Units off the main trunk to the landing points at Reunion Island and Madagascar. Once the subsea cable reaches terrestrial land in South Africa, it becomes the responsibility of Liquid Telecom. As such, Liquid Telecom was contracted for the installation activities on terrestrial land including the BMH, SMH and the CLS. Further to this, Liquid Telecom is the operator of the cable and has been named the Project proponent for this Project.

Once the Subsea Cable system has been installed, the operation and subsequent maintenance of the subsea cable system is the responsibility of METISS. It is important to note that both Liquid Telecom and ASN are sub contracted to METISS, and as such, either one may be contracted for the maintenance of the subsea cable system depending on their contract with METISS

The roles and responsibilities associated with the proposed Project Activities that fall within South African waters are elaborated on below.

CEO and Director

The ultimate responsibility for the Project's environmental performance lies with the CEO and Director of ASN and Elettra (during the installation phase within South African waters only) and Liquid Telecom (during installation, operation and decommissioning phases). This will involve ensuring that the Health, Safety and Environmental requirements are applied and that all requirements are met by terrestrial and vessel contractors engaged in installation activities; including monitoring the performance of these contractors as well as the overall Project. Environmental commitments will be incorporated into operational procedures, working practices and overall management procedures.

Environmental Control Officer

An independent Environmental Control Officer (ECO) shall be appointed by Liquid Telecom to oversee the implementation of the EMPr where it is relevant to land-based activities during the installation (including pre-installation) phase. The ECO will form part of the Project team and attend Project meetings. The following points are to be implemented for the installation on terrestrial land:

- The ECO shall accompany the terrestrial contractor on an initial site inspection of the onshore cable route and various manholes and inform the terrestrial contractor about sensitive areas and boundaries of the terrestrial cable route.

- The ECO shall demarcate the linear development area for the terrestrial cable route and various manholes in conjunction with the terrestrial contractor. The boundaries will be designated by danger tape or temporary fencing.
- The ECO will liaise with all other parties who have roles and responsibilities in relation to the implementation of the EMPr.
- The ECO shall keep a record of communications with the terrestrial contractor, authorities, and any other external interested and affected parties.
- The ECO will arrange an environmental briefing and training session with the terrestrial installation crew prior to the initiation of activities on site.
- The ECO shall establish a communications protocol with the terrestrial contractor to ensure that ad hoc mitigation actions are effectively communicated to labourers and subcontractors.
- The ECO will be present on the site daily during the initial clearing activities to ensure that plant species identified by the botanist are not damaged.
- Following the initial clearing activities, the ECO will undertake regular site inspections during installation phase to ensure that the overall objectives of the mitigation actions are met. This shall be done by monitoring the implementation of these actions and by monitoring their success.
- The ECO will produce site inspection reports following each site visit, and a closure audit report following the final site inspection on completion of the land-based installation activities.
- The ECO will facilitate site inspections undertaken by the archaeologist and botanist.
- Whilst the Project activities are taking place, the ECO shall have the power to stop the work at any time should the actions contained and agreed to in the EMPr not be followed.

Terrestrial Contractor

During installation (including pre-installation), terrestrial contractors will be engaged to provide technical services and installation works associated with terrestrial burial of the cable and establishment of the various manholes (including the Beach Manhole). The responsibility is with the contractors to comply with all relevant legislation and adhere to all mitigation measures specified in the EMPr. The measures should be enforced by contractual obligation.

Vessel Contractor

During pre-installation and installation, vessel contractors will be engaged to provide technical services and installation works associated with subsea cable installation. The responsibility is with the contractors to comply with all relevant legislation and adhere to all mitigation measures specified in the EMPr. The measures should be enforced by contractual obligation.

Marine Mammal Observer

A Marine Mammal Observer/ trained vessel staff (with experience in seabird, turtle and marine mammal identification) will be appointed by ASN and Elettra to monitor marine fauna during subsea cable laying activities. The Marine Mammal Observer will be on-board the ship during the cable installation.

The Marine Mammal Observer will carry out daylight observations of the cable route and record incidence of marine mammals, and their responses to vessel activities.

Data collected should include position, distance from the vessel, swimming speed and direction, and obvious changes in behaviour (e.g. startle responses or changes in surfacing/diving frequencies,

breathing patterns). Both the identification and the behaviour of the animals must be recorded accurately.

1.2 Environmental Awareness Training

Adequate training of employees and contractors with direct responsibility for activities relevant to the Project's social and environmental performance is required so that they have the knowledge and skills necessary to perform their work, including implementation of the actions in the EMP. The following awareness raising and training activities will be undertaken prior to and during the installation phase:

- The ECO will undertake an onshore site walkover with the contractual team installing the terrestrial cable to identify and discuss sensitive areas, confirm demarcation boundaries and identify areas suitable for parking, offloading and temporary ablution facilities.
- The ECO will hold a briefing session with the contractual team on environmental awareness, accommodation rules and worker code of conduct.
- The ECO will have ad hoc conversations and reminders in response to observations made on site.
- The ECO will hold mini-briefing sessions and as when required, i.e. if a new subcontractor is appointed or at key handover stages during the installation period.

Environmental awareness training for the marine contractors will be undertaken as part of the standard briefing prior to embarking. The areas covered in the briefing will be similar to those for the terrestrial works and will probably form part of the Pre-Lay Meeting which is an integral part of the pre-installation activity for any subsea cable landing. Such a meeting aims to coordinate the inputs of the shore-based and ship-based personnel.

The environmental briefing component of the meeting, led by the ECO, will focus on the following:

- Familiarisation of all personnel with the key characteristics of the marine and shoreline environment.
- Identification of ecological sensitivities in the shallow water zone and beach zone crossed by the shore crossing, and the measures to be taken to safeguard these resources during the cable landing operation. Measures to be taken by divers during cable inspection and post-lay burial operations will be particularly important.
- Familiarisation of all personnel with the measures in place to manage relations with relevant stakeholders, including fishermen, owners of pleasure craft and recreational users of the beach.

1.3 Environmental Monitoring

Monitoring of the land based activities shall be undertaken during the Project pre-installation and installation activities to achieve the following:

- Ensure that the EMP is implemented;
- Assess the efficiency of mitigation actions;
- Provide information to permitting authorities; and
- Provide information on environmental and social performance to affected stakeholders if and when required.

Monitoring of onshore activities will be undertaken by the ECO on a daily basis during site clearance activities and in accordance with a schedule agreed with the contractor thereafter. Ad hoc or unannounced inspections will also be undertaken. Where corrective actions are deemed necessary, specific instructions, specifying the designated responsibility and timing, shall be issued.

Monitoring of activities offshore will be undertaken by the Marine Mammal Observer on board. Such monitoring will be done on a daily basis and the Marine Mammal Observer will liaise directly with the ship captain regarding his observations and any necessary actions.

1.4 Specific Management Plans

1.4.1 Waste Management Plan

Offshore and onshore Waste Management Plan (WMP) will be developed before the Project commences. The WMP establishes the procedures adopted for the management of waste to be generated during the course of conducting offshore and onshore. It covers collection, storage, transport, disposal, discharge, reporting and data management.

The WMP will comply with applicable International Conventions for the Prevention of Pollution at Sea from Ships (MARPOL 73/78)¹.

The following are key recommended measures for the Waste Management Plan Development:

- Waste will be dealt by the installation contractors on either aquatic or terrestrial land in accordance with the waste hierarchy presented in Figure 1-1 below;
- Suitably approved and fully licensed companies providing waste disposal services will be selected by review and evaluation in line with international good practice;
- Waste tracking procedures will be defined in the WMP to provide traceability from source of generation to end point; and
- Non-hazardous waste will be segregated and recycled where possible.

Figure 1-1 Waste Hierarchy

The Waste Management Hierarchy



Source: DEA, 2010

¹ It is the understanding of ERM that a Waste Management Licence is not required.

1.4.2 Traffic Management Plan

Implementation of the Traffic Management Plan (TMP) will ensure regulatory compliance and the reduction of the significance of impacts related to transport during the installation and operation of the Project for both the terrestrial and marine Areas of Influence. The objectives of this plan are therefore:

- Ensure compliance with all legislation regulating traffic and transportation within South Africa (both marine and terrestrial);
- Avoid incidents and accidents;
- Raise greater safety awareness in each drivers;
- Avoid the deterioration of roads; and
- Avoid pollution that can be created from noise and emissions related to transport.

It is important that the relevant authorities at sea and on land be notified of the proposed activities which may impact on traffic in advance. The Traffic Management Plan has been included in Annex A of this report.

1.4.3 Plant Rescue and Protection Plan

Certain plant species may need to be protected during the installation of the cable. The Plant Rescue and Protection Plan allows for the transplant of conservation important species from areas to be transformed during installation. This plan has been included in Annex B of this Report.

1.4.4 Re-vegetation and Habitat Rehabilitation Plan

Disturbance of terrestrial vegetation outside the actual development footprint is likely to be inevitable and will likely require rehabilitation post-installation where the vegetation and/ or soil surfaces have been damaged or disturbed. The purpose of this plan is to ensure that areas cleared or impacted during installation activities of the proposed activity are rehabilitated with a plant cover that reduces the risk of erosion from these areas as well as restores ecosystem function. The purpose of the rehabilitation at the site can be summarised as follows:

- Achieve long-term stabilisation of all disturbed areas to minimise erosion potential;
- Re-vegetate all disturbed areas with suitable local plant species;
- Minimise visual impact of disturbed areas;
- Ensure that disturbed areas are safe for future uses; and
- The movement of people and vehicles within rehabilitated areas must be restricted and controlled.

The Re-vegetation and Habitat Rehabilitation plan also provides a framework for the management of alien and invasive plant species during the installation and operation of the Project using the finalised development layout. The broad objectives of the plan include the following:

- Ensure alien plants do not become dominant in parts or the whole site through the control and management of alien and invasive species presence, dispersal and encroachment.
- Initiate and implement a monitoring and eradication programme for alien and invasive species.
- Promote the natural re-establishment and planting of indigenous species in order to retard erosion and alien plant invasion.

The Re-vegetation and Habitat Rehabilitation Plan has been included in Annex B of this Report.

1.5 Environmental Management Programme Commitments Register

This section details the specific management commitments to be implemented to prevent, minimise or manage significant negative impacts and optimise and maximise any potential benefits of the Project. These commitments are presented for the three Project phases; pre-installation, installation, operations and decommissioning phases.

This EMPr Commitments Register (Table 1.1) is structured in the following manner so that the mitigation measures have a clear and logical context within which they are designed, implemented, monitored and evaluated:

- Aspects, potential impact or issue;
- Objective;
- Mitigation/ Management and Enhancement Commitments;
- Responsibility;
- Timing/ Frequency; and
- Monitoring and Indicators.

Table 1.1 EMPr Commitments Register

Ref no.	Aspect	Objective	Mitigation /Management and Enhancement Commitments	Responsibility	Timing/ Frequency	Monitoring and Indicators
A) Planning Phase						
1.	General	Ensure legal compliance	<ul style="list-style-type: none"> • Procure and appoint an appropriately qualified ECO that understands coastal environments to oversee the onshore installation activities and implementation of the EMPr as far as it is relevant to onshore activities. • Appoint a Marine Mammal Observer or train vessel staff in seabird, turtle and marine mammal identification and observation techniques and designate resources for observation. • Notify all registered I&APs and key stakeholders of the Environmental Authorisation and appeal procedure. • Notify relevant authorities (ie, Department of Environmental Affairs and South African Maritime Safety Authority) of location and timing of Project activities prior to commencement of the activity. • Ensure that the Environmental Authorisation (EA) and approved EMPr are available at the site. • Ensure that the EA and EMPr form part of the contract with the Contractors appointed to install the cable. 	METISS and ECO	Prior to commencement of installation and throughout the Project Lifecycle	Training records, proof of notification and signed commitment from all Project contractors
2.	Terrestrial Flora and Ecology	Avoid undue damage and destruction of indigenous vegetation and promote rehabilitation of natural vegetation is disturbed areas	<ul style="list-style-type: none"> • Blanket clearing of vegetation must be limited to the required footprint and the area to be cleared must be demarcated before any clearing commences. No clearing outside of maximum required footprint must take place. • Topsoil must be stripped and stockpiled separately during site preparation and replaced over disturbed areas on completion. • Applicable permits must be obtained timeously (1 – 2 months) before vegetation clearing commences and a flora search and rescue plan must be implemented. • Permits must be kept on site and in the possession of the flora and fauna search and rescue team at all times. • Once flora search and rescue is complete, a clearance certificate must be issued and copies of a post audit report supplied to 	Terrestrial contractors, METISS/ Liquid Telecom and ECO	Throughout onshore installation	Site Inspection Reports by ECO Closure Audit by ECO

Ref no.	Aspect	Objective	Mitigation /Management and Enhancement Commitments	Responsibility	Timing/ Frequency	Monitoring and Indicators
			<p>Department of Economic Development, Environmental Affairs & Tourism of KwaZulu-Natal.</p> <ul style="list-style-type: none"> • Suitable measures must be implemented in areas that are susceptible to erosion (i.e. on dunes with mobile sands and near watercourse), including but not limited to gabions and temporary runoff diversion berms (if necessary). Areas must be rehabilitated and a suitable cover crop planted once installation is completed. • Disturbances to the watercourses must be kept to a minimum and measures implemented to mitigate any erosion risk. • A suitable grass crop must be applied on completion of installation. • Adequate scour protection and energy dissipation measures must be designed and installed at discharge points. Where vegetation cover is disturbed downstream of the discharge point, measures must be implemented to rehabilitate before discharge commences. 			
3.	Noise	Avoid excessive noise (i.e. avoid provocation of complaints about noise)	<ul style="list-style-type: none"> • The municipality should be notified about the intention to bring vehicles and equipment on to the beach for the shore crossing installation. Contractors need take account of any recommendations made by the municipality. An Application for Exemption: Vehicle use in the Coastal Zone must be made to DEA prior to any activities involving vehicles on the beach. 	METISS / Liquid Telecom and ECO	Weekly inspection for equipment by ECO	<p>ECO site inspection reports</p> <p>Record of interaction with the municipality</p> <p>Application for Exemption: Vehicle use in the Coastal Zone Permit</p> <p>Record of and response to complaints about noise from visitors/residents</p>
4.	Community Health and Safety	Avoidance of public health and safety incidents	<ul style="list-style-type: none"> • Safety plans specific to the work area shall be prepared to prevent accidents. • Implement the Traffic Management Plan attached in Appendix G of the EIA Report. 	METISS and ECO	Daily observation of shore crossing activities by ECO	<p>Reporting of serious incidents to Department of Labour.</p> <p>Site Inspection Reports by ECO</p>
5.	Disturbance of the Coastal Zone/ Seabed		<ul style="list-style-type: none"> • Using the results of the seabed survey undertaken to design the subsea cable routing, plan the routing to as far as practicably possible avoid sensitive benthic habitats in the coastal and nearshore zone; 	METISS/ ASN / Elettra and vessel contractors.	Daily observation of shore crossing	Reporting of serious incidents to Department of Labour.

Ref no.	Aspect	Objective	Mitigation /Management and Enhancement Commitments	Responsibility	Timing/ Frequency	Monitoring and Indicators
			<ul style="list-style-type: none"> Ensure that installation activities required for subsea cable installation occur concurrently thereby minimizing the disturbance duration in the coastal and nearshore zone 		activities by ECO	Site Inspection Reports by ECO
B) Installation Phase						
6.	General	Ensure legal compliance	<ul style="list-style-type: none"> Conduct a comprehensive environmental awareness programme amongst contracted installation personnel, emphasising compliance with relevant provincial and national legislation including the Occupational Health and Safety Act. 	METISS / Liquid Telecom/ ASN / Elettra and ECO	Prior to commencement of installation and throughout the Project Lifecycle	Training records, proof of notification and signed commitment from all Project contractors
7.	Coastal Processes	Minimise impact to seawater quality.	<ul style="list-style-type: none"> Keep heavy vehicle traffic associated with beach manhole installation and terrestrial cable installation in the coastal zone to a minimum. Restrict vehicles to clearly demarcated access routes and installation areas only. These should be selected under the guidance of the local municipality. 	Liquid Telecom/ ASN/ Elettra and ECO	Daily inspection onshore during installation by the ECO	ECO Site Inspection Reports. Non-compliances reported to relevant authority
8.	Seawater Quality	Minimise impacts on seawater quality	<ul style="list-style-type: none"> In the intertidal and shallow subtidal zone, impacts can be kept to a minimum through responsible installation practices. 	METISS/ ASN / Elettra and vessel contractors.	Prior and throughout the Project Installation	ECO Site Inspection Reports. Non-compliances reported to relevant authority
9.	Fisheries	Minimise impact on fisheries	<ul style="list-style-type: none"> Distribute a Notice to Mariners prior to the commencement of the subsea cable installation. The Notice to Mariners should give notice of an indication of the proposed timeframes for subsea installation and an indication of the 500 m safety zone around the subsea cable lay. This Notice to Mariners should be distributed timeously to fishing companies and directly onto vessels where possible The subsea vessel contractors must adhere to the International Organization for Standards under the ISO 9000 and ISO 9001 and the International Cable Protection Committee (ICPC) recommendations. 	METISS/ ASN / Elettra and vessel contractors.	Prior and throughout the Project Installation	Record of communications with Fisheries and Authorities Copy of notice sent to the Navy and the South Africa Navy Hydrographic Department with cable coordinates

Ref no.	Aspect	Objective	Mitigation /Management and Enhancement Commitments	Responsibility	Timing/ Frequency	Monitoring and Indicators
			<ul style="list-style-type: none"> The subsea cable routing and exclusion corridor must be published in nautical charts, which are distributed by the navy hydrographic office. The burial of the cable to a target depth of 1.0 m in waters shallower than 1,000 m. Undertaking all maritime operations in line with International Maritime Law and safe practice guidelines. 			
10.	Terrestrial Flora and Ecology	Avoid undue damage and destruction of indigenous vegetation and Promote rehabilitation of natural vegetation is disturbed areas and Avoid spread of alien invasive species	<ul style="list-style-type: none"> Ensure, as far as possible, that the terrestrial cable route and associated manholes avoid the Northern Coastal Forest (i.e. dune and coastal forest), as well as untransformed land that is characterised as CBA: Irreplaceable and/or D'MOSS. However, as already mentioned, impacts associated with TCR 1 have been mitigated through omission of this route. Furthermore, the terrestrial cable and associated manholes will be aligned mostly with existing roads and walkways, with minimal encroachment on natural, largely degraded, habitats. During the earthworks phase, where possible, excavating the sidewalk for placement of the terrestrial cable and associated manholes should be undertaken rather than vegetation. However, where this is not possible, then forest/thicket habitat must be clearly demarcated using barrier tape to avoid disturbance to these habitats. Disturbances outside these direct impact zones should be prohibited and regulated by a competent Environmental Control Officer (ECO) as per the plan rescue and protection plan (Appendix G). This is especially important in segments with protected flora species. <ul style="list-style-type: none"> In Segment B it is important that the <i>M. caffra</i> not be subjected to adverse root damage during the excavation phase. In Segment E it is recommended that the installation of the terrestrial cable be done immediately adjacent to the bridge. This will avoid removal of <i>C. aurea</i>. It is also important that no excavated material smother these plants. 	Terrestrial contractors, METISS/ Liquid Telecom and ECO	Throughout onshore pre-installation and installation	Site Inspection Reports by ECO Closure Audit by ECO

Ref no.	Aspect	Objective	Mitigation /Management and Enhancement Commitments	Responsibility	Timing/ Frequency	Monitoring and Indicators
			<ul style="list-style-type: none"> • Where avoidance of these plants is not possible, then necessary permits will need to be obtained from the regional and national authorities (i.e. EKZMW and DAFF). • Upon completion of the installation of the terrestrial cable and associated manholes, the excavation should be re-filled with the same soil or with soil of the same consistency. No finer material should be used. It is recommended that the topsoil (upper 300 mm of the soil profile) be stored separately from the rest of the soil material and be re-used for re-vegetation purposes. • The re-filled excavation must be level with the surrounding soil and re-vegetated with suitable indigenous plant species as per the Re-vegetation and habitat rehabilitation plan (Appendix G). Species recommended include <i>Asystasia gangetica</i>, <i>Cynodon dactylon</i> and <i>Oplismenus hirtellus</i>. These are fast- and low- growing species and therefore will aid in suppressing invasive plant growth and will not provide challenges to accessibility for maintenance. • All waste material/solid waste should be disposed in a sensible manner at designated legal disposal sites and should not be dumped in the proximal vegetation. • A re-vegetation and habitat rehabilitation plan has been compiled and is attached as Appendix G. This plan should be implemented to successfully rehabilitate natural vegetation and to control problematic IAPs that will most likely invade new areas in response to disturbance of land during the excavation phase. • Appointment of a suitably qualified and experienced Environmental Control Officer (ECO) will be essential to minimise unnecessary impacts and disturbance during installation. 			

Ref no.	Aspect	Objective	Mitigation /Management and Enhancement Commitments	Responsibility	Timing/ Frequency	Monitoring and Indicators
11.	Archaeology and Palaeontology	Minimise chance of damage to any archaeological and paleontological sites and maximize benefits associated with finds	<ul style="list-style-type: none"> The archaeological review of geophysical data, particularly sidescan sonar and multibeam bathymetry, is recommended before the grapnel run or cable laying to locate the SANHO "Position Approximate" wreck and ensure that the wrecks of the Fair Helga, and Ibishu will not be affected by, or affect the subsea cable or cable-laying machinery. The geophysical data review has the additional benefit of identifying any previously unknown wrecks on the seabed within the subsea cable route corridor. In the event that an unknown or unrecorded shipwreck is encountered during the installation of the subsea cable, the Project archaeologist and South African Heritage Resources Agency (SAHRA) must be notified immediately. If the wreck will be impacted by the subsea cable laying, all work must cease until the archaeologist and SAHRA have assessed the significance of the site and a decision has been taken as to how to deal with it Installation activity must stop immediately if any archaeological material is encountered and the area must be cordoned off. No archaeological material may be removed from the site; A suitably qualified archaeologist must be called to site to assess the significance of the find and Amafa aKwaZulu-Natali (Amafa) must be notified of the find; Only once the archaeologist gives the go-ahead can work in the area of the find re-commence; Under no circumstances may any archaeological material be destroyed or removed from site unless under direction of the archaeologist; In the event of human remains being uncovered during work, all activities in the vicinity must cease and the site made secure until a suitably qualified archaeologist and SAHRA and Amafa have been notified, the significance of the material has been assessed and a decision has been taken as to how to deal with it. 	Vessel contractor, terrestrial contractor and METISS / Liquid Telecom / ASN / Elettra	During pre-installation and installation	Notification of the South African Heritage Resources Agency (SAHRA) if any discoveries are made Site Inspection Reports by ECOs

Ref no.	Aspect	Objective	Mitigation /Management and Enhancement Commitments	Responsibility	Timing/ Frequency	Monitoring and Indicators
12.	Waste	Compliance with MARPOL 73/78 requirements	<ul style="list-style-type: none"> Waste generation on board the cable laying vessel must be minimised, and the disposing/treating of non-recyclable wastes must be done in an environmentally sound manner (MARPOL 73/78 prohibits the disposal to sea of any plastics whilst restricting the discharge of other non-hazardous waste in coastal waters). Hazardous waste and debris recovered from the seabed during pre-lay clearing activities should be stored on board the vessel until it can be disposed at a suitably equipped port. Discharge of sewage and bilge waters must be managed in accordance with applicable MARPOL 73/78 requirements. Building rubble from all terrestrial installation activities to be stored in a designated area and regularly removed from site to an appropriately licensed landfill or waste transfer station. Site should be designated for eating and ablution facilities and managed appropriately. 	ASN, Elettra and ECO	Weekly inspections by ECO	Note variance from standard operating procedures, if applicable, Contractor Work Plan Proof of safe disposal for hazardous/electronic waste components ECO Site Inspection Reports. ECO Closure Audit
13.	Air quality	Vessel to comply with MARPOL requirements	<ul style="list-style-type: none"> Project vessels must operate in compliance with MARPOL 73/78 regarding limits on SO2 and NOx emissions from ship exhausts, the prohibition of ozone depleting substances and limit on the sulphur content of fuel. The Project shall require that contractors operate only modern and well maintained engines. 	Vessel contractors	Once, prior to installation for vessel compliance.	Vessel to maintain records of certification
		Minimal visible dust plumes in vicinity of installation works	<ul style="list-style-type: none"> Should considerable dust generation occur during installation, causing a nuisance and impacting on visibility in the vicinity of the works and shore crossing (a potential occurrence during installation when it is windy), a routine wetting program including installation areas shall be undertaken to ensure sufficient moisture content is maintained to suppress dust generation. Stockpiles of dry, loose material onshore should be covered with a secure tarpaulin. Similarly, sand and fines should be transported under tarpaulin. 	Terrestrial contractors and ECO	Throughout installation, based on site conditions	Record of and response to complaints about dust from the East London IDZ

Ref no.	Aspect	Objective	Mitigation /Management and Enhancement Commitments	Responsibility	Timing/ Frequency	Monitoring and Indicators
14.	Noise (onshore)	Avoid excessive noise (i.e. avoid provocation of complaints about noise)	<ul style="list-style-type: none"> Contractors shall be required to use equipment and vehicles that are in good working order and are well maintained. Contractors shall be required to implement best driving practices when approaching and leaving the site to minimize noise emissions created through activities such as unnecessary acceleration and braking. Equipment and general operations that produce noise should be limited to daylight hours (7 am to 6 pm, adjusted to seasonal conditions). 	ASN, Elettra, Liquid Telecom and ECO	Weekly inspection for equipment by ECO	<p>ECO site inspection reports</p> <p>Record of interaction with the municipality</p> <p>Application for Exemption: Vehicle use in the Coastal Zone Permit</p> <p>Record of and response to complaints about noise from visitors/residents</p>
15.	Underwater noise		<p>The following mitigation measures are recommended:</p> <ul style="list-style-type: none"> If subsea cable installation is scheduled during the whale migration period (beginning of June to end of November), consideration must be given for the subsea cable-laying vessels to accommodate dedicated independent Marine Mammal Observers (MMOs). These MMO's should have experience in seabird, turtle and marine mammal identification and observation techniques, and would carry out daylight observations of the subsea cable route and record incidence of marine mammals, and their responses to vessel activities. Data collected should include position, distance from the vessel, swimming speed and direction, and obvious changes in behaviour (eg, startle responses or changes in surfacing/ diving frequencies, breathing patterns). Both the identification and the behaviour of the animals must be recorded accurately. Alternatively, relevant vessel staff trained in seabird, turtle and marine mammal identification and observation techniques should be assigned for observation, distance estimation and reporting, to perform marine mammal observations and notifications. 	METISS / ASN / Elettra	Weekly	<p>Marine Mammal Observation Reports</p>

Ref no.	Aspect	Objective	Mitigation /Management and Enhancement Commitments	Responsibility	Timing/ Frequency	Monitoring and Indicators
16.	Community Health and Safety	Avoidance of public health and safety incidents	<ul style="list-style-type: none"> Controlled access to the work area for public safety during shore crossing installation activities, but no beach closures. Access will be controlled through a number of measures, including red tape, temporary fencing, signage, and advisory staff. Contractors shall be required to wear suitable Personal Protective Equipment (PPE) as required by in-country health and safety legislation. Except for areas secured by fencing or shoring, all active installation areas shall be demarcated with high-visibility tape to reduce the risk of accidents involving pedestrians and vehicles. All open trenches and excavated areas shall be shored and backfilled as soon as possible after the installation has been completed. Access to open trenches and excavated areas shall be secured to prevent pedestrians or vehicles from falling in. Maintain adequate emergency response procedures and first aid resources to minimise the impacts of incidents. 	ASN, Elettra, Liquid Telecom and ECO	Observation of shore crossing activities by the ECO daily	Reporting of serious incidents to Department of Labour. Site Inspection Reports by ECO
17.	Traffic at sea and on land	No collisions or impact on seafarers, vessels and installation vehicles	<ul style="list-style-type: none"> The relevant Port Authority must be notified of the marine activities associated with subsea cable laying activity so that vessels in the area are warned in advance of the 3.5 months installation period through a 'Notice to Mariners' report Terrestrial installation activities and associated vehicular movement should be restricted to daylight hours (7 am to 6 pm) Mitigation measures as per the Traffic Management Plan (Appendix G) should be implemented throughout installation. 	ASN, Elettra, ECO and vessel contractor	Weekly monitoring by ECO	Record of communication with Ports Authorities. Record of vessel incidents Record of and response to complaints about traffic congestion from visitors/residents

Ref no.	Aspect	Objective	Mitigation /Management and Enhancement Commitments	Responsibility	Timing/ Frequency	Monitoring and Indicators
18.	Unplanned Event	Minimise impact to seawater quality	<ul style="list-style-type: none"> For equipment maintained in the field, oils and lubricants must be appropriately contained and correctly disposed of off-site. Maintain vehicles and equipment to ensure that no oils, diesel, fuel or hydraulic fluids are spilled. There is to be no vehicle maintenance or refuelling on the beach. All onshore vehicles and offshore vessels should have a spill kit (peatsorb/ drip trays) in the event of a spill to ensure that all accidental diesel and hydrocarbon spills are cleaned up accordingly. The subsea cable laying vessel shall be required to have the Shipboard Oil Pollution Emergency Plan (SOPEP) in place. Small chemical and oil spills onboard by the subsea cable laying vessel shall be cleaned up immediately. 	Liquid Telecom, ASN, Elettra, ECO and vessel contractor	Daily inspection onshore during installation by the ECO When required offshore	ECO Report Reporting of major terrestrial spills in accordance with the requirements of the National Environmental Management Act and the National Water Act. Reporting of major marine spills in accordance with MARPOL 73/78 requirements.
		Avoid collisions with or disturbance to marine mammals	<ul style="list-style-type: none"> Give consideration for the cable-laying vessels to accommodate dedicated independent Marine Mammal Observer with experience in seabird, turtle and marine mammal identification and observation techniques, to carry out daylight observations of the cable route and record incidence of marine mammals, and their responses to vessel activities. Data collected should include position, distance from the vessel, swimming speed and direction, and obvious changes in behaviour (e.g. startle responses or changes in surfacing/diving frequencies, breathing patterns). Both the identification and the behaviour of the animals must be recorded accurately. Alternatively, train vessel staff in seabird, turtle and marine mammal identification and observation techniques and designate resources for observation, distance estimation and reporting, to perform marine mammal observations and notifications. 	Marine Mammal Observer	Daily during offshore pre-installation and installation	Record of collisions and incidents to be reported to the DEA Oceans and Coasts Directorate
C) Operation Phase						
19.	Terrestrial Flora and Ecology	Avoid undue damage and destruction of indigenous vegetation and	<ul style="list-style-type: none"> A suitable weed management strategy to be implemented in operation phase. 	METISS / Liquid Telecom	Operations	Site Inspection Reports by ECO Closure Audit by ECO

Ref no.	Aspect	Objective	Mitigation /Management and Enhancement Commitments	Responsibility	Timing/Frequency	Monitoring and Indicators
		Promote rehabilitation of natural vegetation is disturbed areas				
20.	Fisheries	Minimise impact on fisheries	<ul style="list-style-type: none"> • A notice to mariners and a navigational warning will be issued to mariners, to communicate the location of the exclusion zone for the subsea cable, via the South African Navy Hydrographic Office (HydroSAN). • Prohibit trawling or anchoring within one nautical mile on either side of the subsea cable, as per national legislation, is accurately charted with HydroSAN office. • Burying the cable to a depth of 1 m in waters shallower than 1,000 m. • Undertaking all maritime operations in line with International Maritime Law and safe practice guidelines. 	METISS / ASN / Elettra	During operational phase	Record of communications with Fisheries and Authorities Copy of notice sent to the Navy and the South Africa Navy Hydrographic Department with cable coordinates
D) Maintenance Phase						
21.	Cable Repair	Minimise the length of time the cable is inoperable in order to limit socio-economic impacts	<ul style="list-style-type: none"> • Cable repair contractors must be immediately mobilised and repairs be undertaken as efficiently as possible. • Rubble, debris etc. from all repair activities to be stored in a designated area and removed from site to an appropriately licensed landfill or waste transfer station. 	METISS	As required	Maintenance records

1.6 Auditing

Section 34 of the EIA Regulations stipulate that a holder of an environmental authorisation must, for the period during which the environmental authorisation and EMP, remain valid:

- Audit the compliance with the conditions of the environmental authorisation and EMP; and
- Submit an environmental audit report to the relevant competent authority, ie, Department of Environmental Affairs.

Section 34 of the regulations also stipulates that the environmental audit report must be prepared by an independent person with the relevant environmental auditing expertise and must be conducted and submitted to the relevant competent authority at intervals as indicated in the environmental authorisation. These intervals may not exceed 5 years. It is recommended that the Project undergo an external compliance audit once during construction, and once at the completion of construction.

An environmental audit report must contain all information set out in Appendix 7 of the Environmental Impact Assessment Regulations.

ERM has over 160 offices across the following countries and territories worldwide

Argentina	The Netherlands
Australia	New Zealand
Belgium	Norway
Brazil	Panama
Canada	Peru
Chile	Poland
China	Portugal
Colombia	Puerto Rico
France	Romania
Germany	Russia
Guyana	Singapore
Hong Kong	South Africa
India	South Korea
Indonesia	Spain
Ireland	Sweden
Italy	Switzerland
Japan	Taiwan
Kazakhstan	Tanzania
Kenya	Thailand
Malaysia	UK
Mexico	US
Mozambique	Vietnam
Myanmar	

ERM's Cape Town Office

1st Floor, Great Westerford
240 Main Road,
Rondebosch 7700,
Cape Town,
South Africa

T: +27 21 681 5400

F: +27 21 686 0736

www.erm.com

ANNEX A

TRAFFIC MANAGEMENT PLAN

TRAFFIC MANAGEMENT PLAN

1.1 Purpose

Implementation of the Traffic Management Plan (TMP) will ensure regulatory compliance and the reduction of the significance of impacts related to transport during the installation of the Project. The objectives of this plan are therefore:

- Ensure compliance with all legislation regulating traffic and transportation within South Africa;
- Avoid incidents and accidents;
- Raise greater safety awareness in each drivers;
- Avoid the deterioration of roads; and
- Avoid pollution that can be created from noise and emissions related to transport.

1.2 Traffic and Transport Management Principles

The following principles will be adhered to during the applicable phases of the Project:

- Conduct a road condition survey in order to gauge the damage to the road as a result of the intensive heavy traffic.
- All employees must attend an environmental training programme which will include details of approved access roads and speed limits.
- Adjacent landowners must be notified of the installation and operation schedule.
- Flagging must be provided at access points to the site and must be maintained until installation is completed.
- All vehicles used during installation must be maintained in good condition.
- Speed restrictions must be established prior to commencement of installation and enforced over all installation traffic.
- The movement of all vehicles within the site must be on designated roadways.
- All necessary transportation permits to be applied for and obtained from the relevant authorities prior to installation.
- If abnormal loads are required, the appropriate arrangements will be made to obtain the necessary transportation permits and the route agreed with the relevant authorities to minimise the impact of other road users.
- Signs must be placed along installation roads to identify speed limits, travel restrictions and other standard traffic control information and road markings.
- Where possible, installation vehicles to avoid travelling on the public roadway during the morning and late afternoon commute time, to reduce the impact on other road users.
- All roads that will be used during the operational phase of the Project must be maintained.

1.3 Monitoring

- Contractors and the Project Company must ensure that all vehicles adhere to the speed limits. A speeding register should be maintained which details the offending drivers and the offence.

ANNEX B

**TERRESTRIAL ECOLOGY MANAGEMENT
PLAN**

METISS SUBMARINE CABLE SYSTEM (SOUTH AFRICA): TERRESTRIAL ECOLOGY MANAGEMENT PLAN

FINAL REPORT



MAY 2019

PROJECT REF: GTB226










GroundTruth

Water, Wetlands and Environmental Engineering

Head Office KwaZulu-Natal

P.O. Box 916, Hilton 3245, South Africa
Tel: +27 33 343 2229 - Fax: +27 86 599 2300
admin@groundtruth.co.za
www.groundtruth.co.za

Report Issue	Final Report		
Consultant Ref Number	GTB226-29052019		
Title	METISS Submarine Cable System (South Africa): Terrestrial Ecology Management Plan		
Prepared by:			
Consultant sign-off	Name / Prof. Reg.	Signature	Date
Author(s)	Gary de Winnaar		29 May 2019
	Dr Mahomed Desai		29 May 2019
Director	Dr Mark Graham		29 May 2019
Prepared for:			
Client sign-off	Name	Signature	Date
Document Reviewer	Reinett Mogotshi		28 May 2019
Approved by	Vicky Stevens		28 May 2019
Reference No			

Copyright

All intellectual property rights and copyright associated with GroundTruth's services are reserved and project deliverables¹ may not be modified or incorporated into subsequent reports, in any form or by any means, without the written consent of the author/s. Similarly, reference should be made to this report should the results, recommendations or conclusions stated in this report be used in subsequent documentation. Should this report form a component of an overarching study, it is GroundTruth's preference that this report be included in its entirety as a separate section or annexure/appendix to the main report.

Indemnity

The project deliverables, including the reported results, comments, recommendations and conclusions, are based on the author's professional knowledge, as well as available information. The study is based on assessment techniques and investigations that are limited by time and budgetary constraints applicable to the type and level of survey undertaken. GroundTruth therefore reserves the right to modify aspects of the project deliverables if and when new/additional information may become available from research or further work in the applicable field of practice, or pertaining to this study.

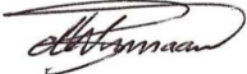
GroundTruth exercises reasonable skill, care and diligence in the provision of services; however, GroundTruth accepts no liability or consequential liability for the use of the supplied project deliverables (in part, or in whole) and any information or material contained therein. The client, including their agents, by receiving these deliverables, indemnifies GroundTruth (including its members, employees and sub-consultants) against any actions, claims, demands, losses, liabilities, costs, damages and expenses arising directly or indirectly from, or in connection with services rendered, directly or indirectly, by GroundTruth.

¹ Project deliverables (including electronic copies) comprise *inter alia*: reports, maps, assessment and monitoring data, ESRI ArcView shapefiles, and photographs.

Declaration of Independence

GroundTruth Water, Wetlands and Environmental Engineering (GroundTruth) hereby acknowledge that it does not have any invested interests in the following project, and is thus independent to the proponent as required in terms of Section 33 of Government Notice Regulation 358 published under Section 24 of the National Environmental Management Act (Act 107 of 1998). Furthermore, in line with Appendix 6 of the 2014 EIA regulations (GN R982), I, Gary de Winnaar, as the specialist representing GroundTruth for this project, declare that:

- I act as the independent specialist in this application;
- do not have and will not have any vested interest (either business, financial, personal or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I am aware that a person is guilty of an offence in terms of Regulation 48 (1) of the EIA Regulations, 2014, if that person provides incorrect or misleading information. A person who is convicted of an offence in terms of sub-regulation 48(1) (a) to (e) is liable to the penalties as contemplated in section 49B(1) of the National Environmental Management Act, 1998 (Act 107 of 1998).

Signed: 
.....
.....

Date: 29 May 2019

Gary de Winnaar
Pr. Sci. Nat. (Ecology) Reg. No. 400454/13

Table of Contents

1.	INTRODUCTION	1
2.	PROTECTION OF SENSITIVE VEGETATION	3
3.	RESCUE AND RELOCATION OF PROTECTED PLANTS	5
4.	REHABILITATION AND REVEGETATION	8
4.1	Areas containing lawn grass.....	8
4.2	Areas containing natural vegetation.....	8
	Step 1: Remove plants for transplanting during revegetation	9
	Step 2: Excavation.....	9
	Step 3: Backfilling.....	9
	Step 4: Revegetation.....	10
5.	INVASIVE ALIEN PLANT (IAP) CONTROL/MANAGEMENT	11
5.1	Eradication methods	13
5.1.1	Hand pulling	13
5.1.2	Cutting, chopping or slashing.....	13
5.1.3	Cut stump and/or frilling.....	13
5.1.4	Foliar spray (and other chemical treatments)	14
5.2	Additional recommendations	14
6.	MONITORING AND EVALUATION	16
7.	CONCLUSION	17
8.	REFERENCES	18
9.	APPENDICES	19

List of figures

Figure 1-1	Overview of the Management Plan to minimise impacts on terrestrial ecosystems through various management actions required from the construction of the METISS terrestrial cable	2
Figure 2-1	Photographs illustrating protected species recorded within the study area of the Terrestrial Cable Route (TCR) of the METISS submarine cable system in South Africa	6

List of Abbreviations

Durban Metropolitan Open Space System	D'MOSS
Environmental Control Officer	ECO
Environmental Impact Assessment	EIA
Environmental Resources Management	ERM
Ezemvelo KwaZulu-Natal Wildlife	EKZNW
Invasive Alien Plant	IAP
KwaZulu-Natal	KZN
Melting Pot Indianoceanic Submarine System	METISS
National Environmental Management: Biodiversity Act	NEMBA
Terrestrial Cable Route	TCR

1. INTRODUCTION

GroundTruth Water, Wetlands and Environmental Engineering (GroundTruth) were recently appointed by Environmental Resources Management (ERM) to conduct a terrestrial ecological assessment for the proposed Melting Pot Indianoceanic Submarine System (METISS) fibre optic cable system proposed to link South Africa, Madagascar, Réunion Island and Mauritius. The anticipated METISS cable footprint within South African waters (inclusive of Territorial and Economic Exclusive Zone) is 538 km. The system includes a 14 to 35 mm diameter cable that will enter the South African Exclusive Economic Zone (200 nautical miles from the sea shore), pass through to the Territorial Waters (12 nautical miles from the sea shore) and land onshore at Pipeline Beach in Amanzimtoti, KwaZulu-Natal Province. The terrestrial area perceived to be influenced by the installation of the terrestrial section of the cable, and the associated manholes/splicing manholes is hereafter referred to as the “study area” (**Figure 1-1**). Two terrestrial cable routes (TCRs) were considered initially, however, TCR 2 was selected as the preferred option due to environmental sensitivities associated with TCR 1. TCR 2 largely traverses the existing road network and smaller fragments of mostly degraded vegetation.

Following the completion of the terrestrial ecological assessment, GroundTruth was then requested by ERM to develop a Management Plan in order to minimise impacts to terrestrial ecosystems during the construction and installation of the METISS cable. The Management Plan presented herein considers the following key components, which are presented as individual sections in this report:”

- **Protection of sensitive vegetation (Section 2);**
- **Rescue and relocation of protected plants (Section 3);**
- **Rehabilitation and revegetation of areas disturbed during construction (Section 4); and**
- **Control of alien invasive plants (IAPs) (Section 5).**

This Management Plan is based on knowledge and understanding of the study area and the proposed METISS terrestrial cable as obtained during the site visit conducted on the on the 3rd April 2019. **Figure 1-1** provides a spatial overview of the Management Plan, and refers to certain specific management actions as presented in sections that follow.



Figure 1-1 Overview of the Management Plan to minimise impacts on terrestrial ecosystems through various management actions required from the construction of the METISS terrestrial cable

2. PROTECTION OF SENSITIVE VEGETATION

The structure of the vegetation within the study area was found to be spatially heterogeneous, and there was a distinct lack of vegetation features that are indicative of the original, reference vegetation types of the study area (i.e. Northern Coastal Forest and KwaZulu-Natal Coastal Belt Grassland). Northern Coastal Forest is considered the principal vegetation type for the study area, yet there was evidence of considerable disturbance, particularly along the edges. Consequently, no areas along or immediately adjacent to the terrestrial cable route were found to contain “sensitive” vegetation. This is largely attributed to the substantially transformed landscape through which the METISS terrestrial cable traverses. Despite the high levels of transformation and vegetation disturbance, a few important taxa were recorded during the site visit (see Section 3), however, flora richness and structure overall was found to be largely lacking.

Although the vegetation along the terrestrial cable route does not support climax vegetation, it would be important to reduce unnecessary impacts to indigenous vegetation when installing/constructing the terrestrial cable and manholes. This will also serve to reduce the need for additional rehabilitation and revegetation (see Section 4).

The following key points need to be considered as part of protecting existing indigenous vegetation:

- **Avoid mature indigenous trees:** These should be identified and marked using barrier tape before implementation of invasive alien plant (IAP) control program (see Section 5) and commencement of cable installation/construction.
- **Avoid degraded forest vegetation:** Degraded forests are mapped and defined as “special zones” for the purposes of this Management Plan (see **Figure 1-1**). Any disturbance within these “special zones” should be strictly limited to the actual work areas, and special care should be granted to limited disturbance and/or loss of indigenous plants adjacent to the working areas. Barrier tape should be used to clearly mark and define the boundaries designating the working area through these “special zones”.
- **Contractor awareness:** Contractors appointed to undertake the construction and installation of the terrestrial cable must be made aware of sites containing protected plants (per Section 3), as well as those areas containing special zones and mature indigenous trees.
- **Due diligence:** Contractor teams must be closely monitored and regulated by a competent Environmental Control Officer (ECO) during the construction phase. This

is especially important in segments containing protected plants (per Section 3), special zones, and mature indigenous trees.

3. RESCUE AND RELOCATION OF PROTECTED PLANTS

Findings from the terrestrial ecological assessment highlighted that the vegetation along the proposed METISS terrestrial cable route is largely degraded, within only a few pockets of relatively natural vegetation encountered. This is mainly attributed to the high levels of transformation and habitat fragmentation that is associated with the study area, which is further exacerbated by high infestations of invasive alien plants (IAPs). As a consequence, very few species of conservation concern were encountered during the site visit.

The following listed protected species (and their respective listings) were recorded along the terrestrial cable route, and actual observations were limited to one or very few individuals:

- ***Crocosmia aurea* (Iridaceae)** – Listed as Schedule 12 under the KwaZulu-Natal (KZN) Nature Conservation Ordinance (NCO; Act No. 15 of 1974);
- ***Ledebouria petiolata* (Hyacinthaceae)** – Listed as Schedule 12 under the KZN NCO;
- ***Mimusops caffra* (Sapotaceae)** – Listed protected tree under the National Forests Acts (NFA; Act No. 84 of 1998); and
- ***Sideroxylon inerme* (Sapotaceae)** – Listed protected tree under the NFA.

Figure 1-1 provides a spatial illustration of their respective localities in relation to the cable routing. **Figure 2-1** shows a series of photographs of each protected plant as observed along the terrestrial cable route.

The only protected plant that is likely to be directly affected by the construction/installation of the METISS cable is *Crocosmia aurea*. Several individuals of *C. aurea* were recorded here in close proximity to each other in the vicinity of N3 highway at approximately 30.03925°S and 30.89553°E.

Should any *C. aurea* plants need to be removed for the construction of the terrestrial cable, then a permit will need to be obtained from Ezemvelo KZN Wildlife (EKZNW). *C. aurea* is a geophyte (i.e. a perennial plant with an underground storage organ, such as a bulb, tuber or corm), and can be easily transplanted, and can even be stored in a cool, dry facility for a short period of time before being transplanted. It is thus recommended that any *C. aurea* plants needing to be removed during construction are relocated to a suitable area away from the construction area and safe from other impacts.



Sideroxylon inerme



Mimusops caffra



Crocosmia aurea



Ledebouria petiolata

Figure 3-1 Photographs illustrating protected species recorded within the study area of the Terrestrial Cable Route (TCR) of the METISS submarine cable system in South Africa

The following points should be taken into consideration when implementing any plant relocations, in particular protected plants:

- Smaller plants/geophytes needing to be removed from the working/construction areas should be relocated to suitable habitat that is as close as possible to their original sites while taking into consideration Step 1 for rehabilitation and revegetation of indigenous plants from areas containing natural vegetation (see Section 4.2).
- Planting of relocated plants must not cause unnecessary disturbance to the habitat of the relocation sites.
- It is possible that the cable route contains other protected plants (species and/or individuals), which should also ideally be relocated. It is therefore recommended that pre-construction screening is conducted in an attempt to uncover additional protected plants. Screening surveys should be conducted by a botanist or suitable ecologist. Only once areas have been sufficiently screened may the

botanist/ecologist give clearance for IAP control (per Section 5) and clearing for construction activities to commence.

- GPS positions of all rescued plants listed as protected species must be taken, and given a unique identifier code. The same code should be used to mark individual plants (or clumps).
- All plants should be planted out into suitable sites as soon as possible after being rescued. Geophytes may be stored temporarily in a cool, dry environment. Where plants need to be stored for a longer period of time, they should be planted into suitable containers and housed in a designated area (e.g. nursery) where they can be taken care of.
- GPS positions of all relocated plants, marked using the unique identifier code, should be recorded. This is to ensure that the success of relocation efforts over time – continuous monitoring of protected plants must be conducted for at least 3 years to ensure that relocated individuals are stable.

4. REHABILITATION AND REVEGETATION

The working area (i.e. the direct area of disturbance from construction/installation) for the METISS terrestrial cable route is summarised as follows:

- **Cable installation** – requires digging a 0.5m wide and 1.0m deep trench to accommodate the cable; and
- **Manholes** – a number of manholes are required to install and service the terrestrial cable, including three, larger splicing manholes of 5.0 by 5.0 m and 2.0 m deep.

Specific rehabilitation and revegetation measures are provided in the following sections in relation to the Management Plan as spatially presented in **Figure 1-1**.

4.1 Areas containing lawn grass

For most sections, the installation/construction of the cable and manholes will take place on verges containing lawn grass or concrete/paved sidewalks (see **Figure 1-1**). Where this is the case, then the following points should be considered:

- Lawn grass should be carefully removed in sods, approximately 50cm by 50 cm and 15cm deep to include *in situ* topsoil;
- Sods should be stored as close to the working areas as possible, and protected from drying out during the construction through regular watering;
- Once the cable has been installed and trenches have been backfilled (subsoil, then topsoil, leaving sufficient depth for sods), grass sods should then be carefully laid back into the trench while working in an upslope direction;
- Sods should be tightly positioned with neighbouring sods, with topsoil used to fill any gaps;
- Once laid, sods should be sufficiently compressed into the ground, taking care not to over compact the soils and grass sods; and
- Depending on rainfall, grass sods should be occasionally watered as is necessary to prevent the grass from drying out.

4.2 Areas containing natural vegetation

Rehabilitation and revegetation will be required where the terrestrial cable passes through natural vegetation (see **Figure 1-1**). As far as possible, excavation of trenches should take place along sidewalks and lawn grass rather than natural vegetation. Where rehabilitation

and revegetation are required (i.e. when traversing natural vegetation, even degraded vegetation), then it should be done in a progressive manner, and within the shortest time that is considered practical.

A five metre zone, inclusive of the working area for the terrestrial cable and manholes, is recommended, mainly to manage and control IAPs, but also to facilitate the establishment of indigenous vegetation cover.

The following steps need to be followed to ensure that areas disturbed during the construction/installation of the terrestrial cable are adequately rehabilitated and revegetated.

Step 1: Remove plants for transplanting during revegetation

It would be prudent to remove indigenous plants that could be used for re-vegetation, in particular herbs and low-growing shrubs such as *Asystasia gangetica*, *Chrysanthemoides monilifera*, *Isoglossa ciliata*, *Plumbago auriculata*, *Strelitzia nicolai*, etc. that were observed along the terrestrial cable route. This should be done prior to commencement of construction activities, and preferably after initial clearing of IAPs (see Section 5). The following points should be considered when removing plants for transplanting:

- Plants should be pruned to reduce evapotranspiration water losses while being temporarily stored;
- Individual plants should be carefully removed from the soil, ensuring an adequately-sized root ball containing *in situ* soil is retained; and
- Extracted plants should be wrapped in hessian cloth or plastic, and root balls kept moist.

This process should be done under the supervision of a competent ECO/botanist/horticulturalist.

Step 2: Excavation

During the earthworks phase, topsoil (approximately 30cm) should be dug up and stockpiled in a designated area. Remaining subsoil should also be stockpiled separately to the topsoil, and positioned as close to the trench as is possible.

Step 3: Backfilling

Trenches should be backfilled and rehabilitated immediately after the cable has been installed, and this should be done concurrently as the construction process progresses along

the cable route. Backfilling should utilise the excavated subsoil, then top-dressed with the separately stockpiled topsoil. Should there be a shortage of subsoil, then *ex situ* material (of a similar consistency, but not finer than the *in situ* material) may be sourced and used for backfilling. However, should there be a shortage of topsoil then only approved topsoil should be used, and mixed with reputable/weed-free compost (approximately one part compost to three parts topsoil). The back-filled trenches must be level, or preferably a few centimetres higher than the surrounding soil level to account for natural settling of soil.

Step 4: Revegetation

All exposed soils should be re-vegetated immediately after completion of backfilling (Step 3) using suitable indigenous plant species as follows:

- **Areas dominated by grasses** – Areas adjacent to sections of the cable route that are dominated by grasses should be seeded (preferably using a grass seed applicator) with a typical veld grass mix comprising grass species such as *Eragrostis curvula*, *Chloris gayana*, *Digitaria eriantha*, along with a sterile form of *Eragrostis teff* (to establish immediate cover), and an indigenous stoloniferous/runner grass such as *Cynodon dactylon* (non-hybridised forms). Prior to seeding, the soil should be loose and uniformly wet to a depth of about 15cm. The seeded area should then be gently raked, lightly compacted, and then watered.
- **Areas dominated by herbs, shrubs and trees** – Areas adjacent to sections of the cable route that are dominated by herbs and woody vegetation should be planted with suitable indigenous species. Recommended species include: *Asystasia gangetica*, *Isoglossa ciliata* and *Oplismenus hirtellus*, all of which are fast- and low-growing species, and therefore will aid in suppressing invasive plant growth. These, and other indigenous plant species that are suited to Durban coastal regions, may be sourced directly from the terrestrial cable route (per Step 1). Additional, plants may be sourced from a reputable plant nursery in the Durban region to supplement plantings along the cable route. Each plant (i.e. translocation or nursery stock) should be planted into suitably sized holes, and planting holes backfilled using a mix of topsoil and reputable/weed-free compost (approximately one part compost to three parts topsoil). In addition, an organic (slow release) fertilizer may be applied, but only as recommended by suppliers.

All revegetated areas should be irrigated as required until plants are able to survive independently (i.e. depending on the rainfall).

This process should be done under the supervision of a competent ECO/botanist/horticulturalist.

5. INVASIVE ALIEN PLANT (IAP) CONTROL/MANAGEMENT

Areas disturbed and/or transformed by the METISS terrestrial cable will create opportunities for the spread of invasive alien plants (IAPs). IAPs that already occur in the area are likely to invade newly disturbed areas. These infestations have the potential to further degrade existing natural vegetation, thereby reducing ecological functioning and integrity, as well as compromising the establishment and survival of indigenous fauna and flora. Moreover, the infestation of IAPs along the route will lead to accessibility challenges for short-term and long-term maintenance.

Thirty-two species of IAPs were recorded within the study area during the site assessment. The species observed, and their associated NEMBA category as per the Alien and Invasive Species List document (DEA, 2016) are summarised in **Appendix 1**.

Effective management and control of IAPs in the context of the METISS terrestrial cable is imperative in order to prevent impacts from IAPs on the environment, especially when considering the existing infestations along the terrestrial cable route. An integrated approach using a combination of methods is normally recommended for control of IAPs to be effective (van Wilgen *et al.*, 2001). The following control methods are generally referred to when developing a fully integrated control programme (with reference to the EPCPD Guideline Document and van Wilgen *et al.*, 2001):

- **Mechanical methods** – involves the physical destruction or total removal of plants through hand-pulling, felling, uprooting, ring-barking, cutting/slashing, strip-barking, mowing or burning. The equipment used ranges from hand-held instruments (e.g. saws, slashers and axes) to power-driven tools (such as chainsaws and brush-cutters), and even to bulldozers in some extreme cases.
- **Chemical methods** – involves the use of selected herbicides to treat specific IAPs, and is generally used to prevent sprouting of cut stumps, or to control seedling regrowth after mechanically clearing an area.
- **Biological methods** – Biological control, or biocontrol, is the introduction of natural enemies (i.e. species-specific insects/diseases from the IAP's country of origin) to reduce the competitive advantage of IAPs over the natural vegetation.

Mechanical and chemical methods are typically considered for short-term periods, with follow-up control and rehabilitation required in the medium-term. Biological control can provide effective control over the short- to medium-term, but the effect is often only realised over the longer-term.

It is recommended that a five metre zone, inclusive of the working area for the terrestrial cable and manholes, is used to manage/control IAPs over a three year period.

Appropriate eradication and control methods will be required within the working/construction areas of the terrestrial cable in order to properly manage/control the spread of IAPs, in particular those listed under NEMBA. The types of control methods will need to be suited to the types of species targeted and/or growth forms encountered (i.e. seedling, sapling, shrub, tree, etc.). Furthermore, disturbance to the soil, particularly during initial clearing, should be minimised as much as possible to limit further/secondary disturbance, especially where there is limited soil cover and organic material such as in highly infested areas. Great care must be taken when using herbicides, particularly when working within areas comprising natural vegetation.

The control of alien vegetation within the five-meter zone should be done according to the following phases:

- 1. Initial clearing** – intensive clearing of IAPs prior to construction/installation of the terrestrial cable to reduce the extent and cover of the existing alien vegetation on-site. This should be done a few months before commencement of the cable installation, but no more than six months prior to the commencement.
- 2. Follow-up** – to target and control seedlings and re-growth within the five-metre working zone. This should be considered in the first year following the construction/installation of the terrestrial cable.
- 3. Maintenance** – to sustain zero/negligible numbers of IAPs within the five-metre working zone through routine and on-going maintenance of IAPs while indigenous vegetation cover establishes.

It is recommended that the aforementioned phases adopt the following approach:

- More manual removal methods, including hand-pulling of seedlings, to reduce the risk of the translocation of herbicide, particularly during the initial phase;
- Frequent follow-up operations, due to the rapid re-growth of some alien invasive species, with at least three operations being planned for during the first year after the initial clearing (i.e. a few months after completion of the construction phase, then again at the beginning of the summer/rainfall season, and thirdly at the end of the end of the summer/rainfall season); and
- Only where absolutely necessary foliar application of herbicide to emerging coppice.

Open areas along the terrestrial cable route support a fair amount of indigenous vegetation, so it will be important that unnecessary removal and/or disturbance of indigenous vegetation is avoided. Thus, it is suggested that a competent contractor is appointed to implement the IAP control programme, and that the programme is closely monitoring by a competent environmental control officer (ECO).

5.1 Eradication methods

The following techniques are recommended to remove and control alien vegetation during initial, follow-up, and maintenance clearing/control phases. A combination of both chemical and mechanical control techniques are suggested (see **Appendix 1** for additional detail regarding species-specific treatment according to growth form, technique, recommended herbicides and mixing concentrations), but strongly dependent on the phase of IAP control.

5.1.1 Hand pulling

As the name suggests, plants are removed by hand, while ensuring that the root is also properly removed. Hand pulling is recommended for areas that are sparsely invaded by herbs and shrubs, and should ideally be carried out when soils are damp following rainfall.

5.1.2 Cutting, chopping or slashing

Young plants with woody stems and dense stands of shrubs may be removed by cutting, chopping or slashing the stems near the base. Plant species that are likely to coppice or re-grow (e.g. *Lantana camara*) should be chemically treated by painting an appropriate herbicide onto the stumps immediately after cutting, chopping or slashing the stems (see below).

Areas containing dense patches of IAPs can also be cleared using heavy-duty brush-cutters – a steel blade must be fitted when cutting stems that are up to 15cm in diameter.

5.1.3 Cut stump and/or frilling

When using the cut stump technique, trees and larger stumps should be cut as low to the ground as possible, and a suitable herbicide should be applied directly to the cut surface immediately after cutting. When frilling, an axe or bush knife/machete is used to make a series of downward-angled cuts around the entire trunk circumference, about 50cm to 75cm above the ground surface. The cuts should be made through the bark and into the cambium and cuts into the bark should be open using the blade of the axe/bush knife. An appropriate herbicide should be sprayed into the frill immediately thereafter. It is

important that the frill forms a continuous line around the trunk and that the cuts are deep enough to expose the cambium layer below the bark.

5.1.4 Foliar spray (and other chemical treatments)

Shrubs and small herbaceous plants can also be eradicated with an approved, **registered herbicide** applied directly to the leaves and stems using a fine spray from a solid cone nozzle. It is important that the following points are considered when using this method:

- Only apply herbicide during the active growing season;
- Avoid spraying during rainfall events, windy conditions, very hot days, periods when plants are stressed/dormant, or when leaves are damp;
- Ensure use of correct herbicide mixing ratios according to specified application rates;
- Dyes are useful to assist in identifying areas that have already been treated and a binding agent may be used to improve the absorption of herbicide;
- Care should be taken to ensure that indigenous vegetation is not affected (this can also be established through the use of dyes); and
- Avoid spraying areas close to any surface water resource – as a general rule, foliar spray should be avoided within 20 metres of aquatic systems, and replaced with more controlled chemical treatment methods (e.g. cut-stump).

Foliar spraying is not recommended during the initial clearing of dense patches of IAPs and should only be considered during follow-up and maintenance stages.

Appendix 1 provides recommended herbicides and dosages for foliar and cut-stump applications.

5.2 Additional recommendations

- **Competency and training:** From the outset, contractor teams must be assessed, and if necessary, trained in terms of the site-specific IAP control programme. This should include correct identification of target species, removal/control methods, care for working within natural and sensitive environments, safety, working in difficult conditions, etc.
- **Environmental contamination:** Extreme caution needs to be practiced when applying herbicides due to the potential risks of chemical contamination to the environment. Thus, herbicides need to be mixed and decanted into suitable containers at control sites (preferably outside of the conservation area) and

according to best management practices. When working with chemicals, it is critical that herbicides are applied directly to the foliage, cut trunks/stumps, frill wounds, etc. of targeted species.

- **Large trees:** especially solitary trees and/or trees growing within open spaces and away from risks of falling can be ring-barked, and chemical treated immediately after the bark is removed. These trees will slowly breakdown and collapse.
- **Disposing waste material:** any flowering, fruiting or seeding material should be gathered into refuse bags, containers or skips, and then disposed at a registered municipal dump site. All other material can be stockpiled on-site for drying and burning, but this needs to be carefully controlled and managed to prevent fire spreading into other areas. Alternatively, a chipper may be used to generate compost for later use.
- **Personnel safety:** Teams should working according to industry specifications, particularly in terms of personal protective equipment (PPE). Any chemicals/herbicides must be registered according to the targeted species.
- **Accidental spills:** Teams must be responsible for the immediate cleaning and remediation of accidental spills of any herbicides, dyes, fuels, etc. All soil and vegetation that has been in contact with contaminants must be disposed of at a registered municipal dump site.
- **Sustainability:** Most important to the efficacy and success of managing/controlling IAP as part of the METISS project, a process needs to be put in place to ensure that infested areas adjacent to the cable route are also properly cleared and managed. For this, it is encouraged that the eThekweni Environmental Planning and Climate Protection Department (EPCPD) are engaged to similarly clear and manage IAPs in their open spaces to further control the spread of IAPs.

6. MONITORING AND EVALUATION

Continuous monitoring of this Management Plan will be important in order to ensure that management actions presented according to the various components of the Management Plan are successfully implemented. Monitoring is also important for allowing adaptive feedback and management in response to specific elements of the programme. The monitoring will require the collection of baseline and routine monitoring information to enable the evaluation of the implementation effectiveness after completion of the activities. It should be noted that the following recommended monitoring is considered to be the minimum level of monitoring required to show effectiveness, and additional monitoring may be required by the relevant authorities:

- Pre- and post-construction photographs must be recorded at strategic positions within each of the management units. These should be collected in the form of Fixed Point Photographs to allow repeated monitoring to be undertaken.
- During construction, regular visual assessments (with photographic records) of the condition of translocated plants, checking for signs of stress such as wilted leaves.
- During rehabilitation, regular visual assessments (with photographic records) of the areas being rehabilitated and revegetated.
- Areas cleared of IAPs should be monitored on a regular basis to detect emergent seedlings and initiate teams to remove IAP re-growth, as well as to inspect disturbance of indigenous vegetation.
- Records must be kept of all IAP operations including, but not limited to, areas cleared, number of labour units, amount of herbicide used, etc. This will assist with planning over the years, and for evaluating/managing associated costs.

The results and findings from each year monitored should be used to evaluate the effectiveness and performance of the Management Plan process. It is however acknowledged that, the process of change will be slow in some cases (e.g. establishment of indigenous vegetation), and will most likely only become apparent over the course of several years to decades. Monitoring and evaluation must allow for adaptive feedback of recommendations into the overall management process, whilst engaging key stakeholders such as the eThekweni EPCPD.

7. CONCLUSION

The main objective of this Management Plan is to regulate and control specific impacts to terrestrial ecosystems potentially resulting from the proposed METISS submarine cable project. Specific management actions are provided according to key components of the project in relation to terrestrial ecology, namely protection of sensitive vegetation, rescue and relocation of protected plants, rehabilitation and revegetation of areas disturbed during construction, and control of alien invasive plants (IAPs). Of these management components, the control of IAPs stands to have the biggest impact on terrestrial ecosystems, and this is largely attributed to the high infestations that already exist in the landscape. As a consequence, special attention needs to be given to this aspect of the Management Plan, particularly in terms of ensuring the overall success and sustainability of the plan. Thus, it has been recommended that the eThekweni EPCPD are be approached in light of this project to facilitate IAP control in areas adjacent to the METISS terrestrial cable route.

Key to achieving the desired outcomes of this Management Plan, it is recommended that suitably experience personnel are involved across the various components of the plan, and depending on the component, these be either in the form on an ECO or a botanist/ecologist. Lastly, monitoring measures are provided to ensure that the various components are adequately implemented during pre-construction, construction and post-construction.

8. REFERENCES

EPCPD. General Invasive Alien Plant Control: Insight into Best Practice, Removal Methods, Training and Equipment. Guideline document prepared by the eThekweni Municipality Environmental Planning and Climate Protection Department (EPCPD).

van Wilgen B, Richardson D and Higgins S. 2001. Integrated Control of Invasive Alien Plants in Terrestrial Ecosystems. Land Use and Water Resources Research 1: 1-6.

9. APPENDICES

Appendix 1 Invasive alien plants (IAPs) recorded within the study area along the METISS Terrestrial Cable Route (TCR) with recommended mechanical and chemical controls

Family	Scientific Name	Common Name	Growth Form	NEMBA Category	Mechanical Control Method	Chemical Control Method (herbicide dosages)
Amaranthaceae	<i>Achyranthes aspera</i>	Burweed	Terrestrial herb	-	Hand-pull	n/a
Apiaceae	<i>Centella asiatica</i>	Centella	Terrestrial herb	-	Hand-pull	n/a
Aristolochiaceae	<i>Aristolochia elegans</i>	Dutchman's Pipe	Herbaceous climber	1b	Hand-pull all creeping stems	Scrape and paint 1/3 of stem diameter using Roundup or suitable alternative
Asteraceae	<i>Chromolaena odorata</i>	Triffid Weed	Shrub	1b	Hand-pull and press down disturbed soil	Foliar:0.5% Garlon EC with 0.5% wetter and dye Cut-stump:1% Garlon EC with 0.5% wetter and dye
	<i>Bidens pilosa</i>	Common Blackjack	Terrestrial herb	-	Hand-pull	Foliar:0.5% Garlon EC with 0.5% wetter and dye
	<i>Montanoa hibiscifolia</i>	Tree Daisy	Shrub	1b	Preferably uproot whole plants or cut stump/treat	Cut-stump: 2% Chopper or Hatchet 100 SL and 0.1% dye
	<i>Tagetes minuta</i>	Khaki Bush	Terrestrial herb	-	Hand-pull	n/a
	<i>Tithonia diversifolia</i>	Mexican Sunflower	Shrub	1b	Hand-pull	Cut-stump: 2% Chopper or Hatchet 100 SL and 0.1% dye
Basellaceae	<i>Anredera cordifolia</i>	Madeira Vine	Herbaceous climber	1b	Extreme caution as tubers are severely persistent: Place tarpaulins below plant, remove all material, double bag, and dispose at	Foliar:0.5% Garlon EC with 0.1% dye Scrape and paint 1/3 of stem diameter using Roundup or suitable alternative

Family	Scientific Name	Common Name	Growth Form	NEMBA Category	Mechanical Control Method	Chemical Control Method (herbicide dosages)
					registered landfill.	
Cactaceae	<i>Pereskia aculeata</i>	Barbados Gooseberry	Woody climber	1b	Cut down to 2 m and treat. Hand-pull seedlings.	Foliar:0.5% Garlon EC with 0.5% wetter and dye
Commelinaceae	<i>Tradescantia zebrina</i>	Wandering Jew	Geophyte	1b	Hand-pull	n/a
Convolvulaceae	<i>Ipomoea indica</i>	Purple Morning Glory	Herbaceous climber	1b	Hand-pull all creeping stems	Scrape and paint 1/3 of stem diameter using Roundup or suitable alternative
	<i>Ipomoea purpurea</i>	Common Morning Glory	Herbaceous climber	1b	Hand-pull all creeping stems	Scrape and paint 1/3 of stem diameter using Roundup or suitable alternative
Euphorbiaceae	<i>Euphorbia hirta</i>	Red Milkweed	Terrestrial herb	-	Hand-pull	Foliar spray using suitable broadleaf herbicide
	<i>Ricinus communis</i>	Castor-oil Plant	Shrub	1b	Preferably uproot whole plants or cut stump/treat	Cut-stump: 3% Chopper or Hatchet 100 SL and 0.1% dye
Fabaceae	<i>Leucaena leucocephala</i>	Leucaena	Small tree	1a	Hand-pull seedlings. Preferably uproot whole plants or cut stump/ treat	Cut-stump: 3% Chopper or Hatchet 100 SL and 0.1% dye
Lamiaceae	<i>Vitex trifolia</i>	Indian Three-leaf Vitex	Small tree	1b	Hand-pull seedlings. Preferably uproot whole plants or cut stump/ treat	Cut-stump: 3% Chopper or Hatchet 100 SL and 0.1% dye
Malvaceae	<i>Malvastrum coromandelianum</i>	Prickly Malvastrum	Terrestrial herb	1b	Hand-pull	n/a
Meliaceae	<i>Melia azedarach</i>	Syringa	Tall tree	1b	Hand-pull seedlings.	Cut-stump: 3% Chopper or

Family	Scientific Name	Common Name	Growth Form	NEMBA Category	Mechanical Control Method	Chemical Control Method (herbicide dosages)
					Preferably uproot whole plants or cut stump/treat	Hatchet 100 SL with 0.5% wetter and dye
Moraceae	<i>Morus alba</i>	Common Mulberry	Tall tree	2	Hand-pull seedlings. Preferably uproot whole plants or cut stump/treat	Cut-stump: 5% Chopper or Hatchet 100 SL
Nyctaginaceae	<i>Boerhavia diffusa</i>		Terrestrial herb	-	Hand-pull	n/a
Passifloraceae	<i>Passiflora suberosa</i>	Devil's Pumpkin	Herbaceous climber	1b	Hand-pull all creeping stems	Scrape and paint 1/3 of stem diameter using Roundup or suitable alternative
Phytolaccaceae	<i>Phytolacca dioica</i>	Belhambra	Tall tree	3	Hand-pull	Foliar spray using suitable broadleaf herbicide
Phytolaccaceae	<i>Rivina humilis</i>	Bloodberry	Terrestrial herb	1a	Hand-pull	Foliar spray using suitable broadleaf herbicide
Poaceae	<i>Arundo donax</i>	Spanish Reed	Megagraminoid	1b	Hand-pull	n/a
	<i>Bambusa balcooa</i>	Bamboo	Megagraminoid	-		n/a
	<i>Coix lacryma-jobi</i>	Job's Tears	Graminoid	-	Hand-pull	n/a
	<i>Pennisetum clandestinum</i>	Kikuyu Grass	Graminoid	-	Hand-pull	n/a
	<i>Pennisetum purpureum</i>	Napier Grass	Graminoid	1b	Hand-pull	n/a
Solanaceae	<i>Cestrum laevigatum</i>	Inkberry	Tall tree	1b	Hand-pull seedlings. Preferably uproot whole plants or cut stump/treat	Cut-stump: 2% Chopper or Hatchet 100 SL with 0.1% dye
Solanaceae	<i>Solanum mauritianum</i>	Bugweed	Small tree	1b	Hand-pull seedlings. Preferably uproot	Cut-stump: 2% Chopper or Hatchet 100 SL with 0.1%

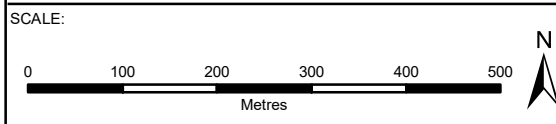
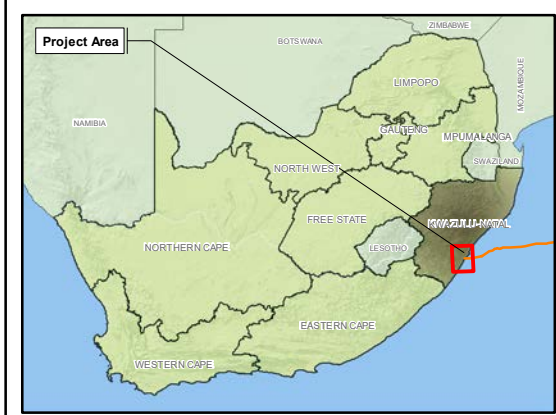
Family	Scientific Name	Common Name	Growth Form	NEMBA Category	Mechanical Control Method	Chemical Control Method (herbicide dosages)
					whole plants or cut stump/treat	dye or 1% Access 240 SL with 0.5% wetter and dye
Verbenaceae	<i>Lantana camara</i>	Lantana	Shrub	1b	Preferably uproot whole plants or cut stump/treat	Foliar: 2% Chopper or Hatchet 100 SL or 1% Access 240 SL with 0.5% wetter and dye Cut-stump: 2% Chopper or Hatchet 100 SL or 1% Access 240 SL with 0.5% wetter and dye

ANNEX C

PROJECT LOCALITY MAPS



- ### Legend
- Beach Manhole
 - Splicing Manhole
 - Liquid Telecom Manhole
 - Terrestrial Cable Route
 - Road Drill
 - Subsea Cable Route
 - ▨ Servitudes



TITLE:
 Direct Area of Influence (AOI) map of the proposed METISS subsea cable system, Amanzimtoti, Kwa-Zulu Natal province.

CLIENT:
Alcatel Submarine Networks (ASN)

DATE: May 2019	CHECKED: AB	PROJECT: 0482086
DRAWN: TN	APPROVED: VS	SCALE: 1:8 000

DRAWING: A3_OrthoLayoutAOIMap_ASN_Rev3	REV: 3
---	-----------

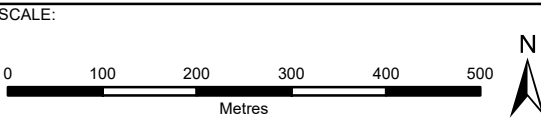
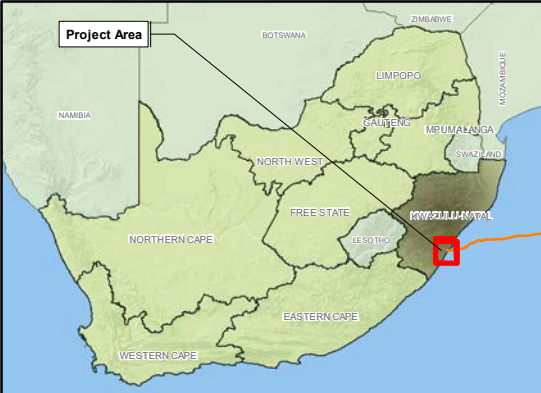
ERM
 1st Floor
 The Great Westerford Building
 240 Main Road
 Rondebosch, 7700
 Tel: +27 (0)21 681 5400
 Fax: +27 (0)21 686 0736

Projection: Geographic, Datum: WGS84
 Source: ESRI Map Service, eThekweni Web Map Service, CBA 2016, Servitudes
 Inset: ESRI Data and Maps

SIZE:
A3



- ### Legend
- Beach Manhole
 - Splicing Manhole
 - Liquid Telecom Manhole
 - Terrestrial Cable Route
 - Road Drill
 - Subsea Cable Route
 - Rivers
 - CBA Irreplaceable (2016)



TITLE:
Sensitivity map of the proposed METISS subsea cable system, Amanzimtoti, Kwa-Zulu Natal province.

CLIENT:
Alcatel Submarine Networks (ASN)

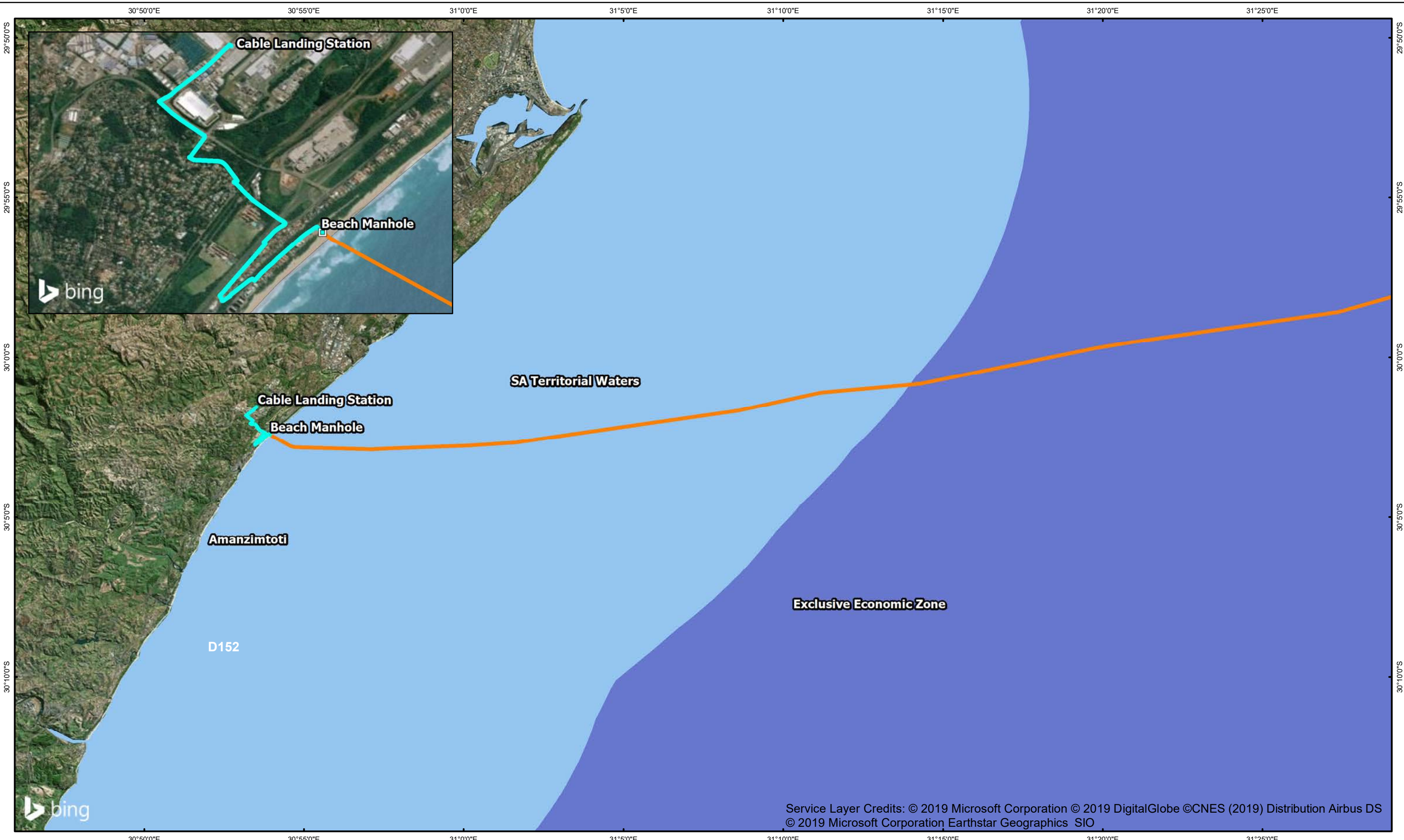
DATE: May 2019	CHECKED: AB	PROJECT: 0482086
DRAWN: TN	APPROVED: VS	SCALE: 1:8 000

DRAWING: A3_OrthoLayoutSensitivityMap_ASN_Rev3	REV: 3
---	-----------




ERM
 1st Floor
 The Great Westerford Building
 240 Main Road
 Rondebosch, 7700
 Tel: +27 (0)21 681 5400
 Fax: +27 (0)21 686 0736

Projection: Geographic, Datum: WGS84
 Source: ESRI Map Service, eThekweni Web Map Service, CBA 2016, Servitudes
 Inset: ESRI Data and Maps

SIZE:
A3



Service Layer Credits: © 2019 Microsoft Corporation © 2019 DigitalGlobe ©CNES (2019) Distribution Airbus DS
 © 2019 Microsoft Corporation Earthstar Geographics SIO

- Legend**
-  Terrestrial Cable Route
 -  Subsea Cable Route
 -  SA Territorial Waters
 -  Exclusive Economic Zone

SCALE: 0 2 4 6 8 10 Kilometers	N	DATE: May 2019	CHECKED: AB	PROJECT: 0482086
TITLE: Locality map of the proposed METISS subsea cable system, Amanzimtoti, Kwa-Zulu Natal province.		DRAWN: TN	APPROVED: VS	SCALE: 1:200 000
CLIENT: Alcatel Submarine Networks (ASN)		DRAWING: A3_TopoLocalityMap_ASN_Rev3		REV: 3
		ERM 1st Floor The Great Westerford Building 240 Main Road Rondebosch, 7700 Tel: +27 (0)21 681 5400 Fax: +27 (0)21 686 0736		
		Projection: Geographic, Datum: WGS84 Source: Chief Directorate National Geo-Spatial Information WGS2930DD_31CC,30308B.TIF Inset: ESRI Data and Maps		SIZE: A3



LIQUID TELECOM KZN PROJECTS

Metiss ASN

PROJECT DETAIL

Metiss ASN
Amanzimtoti



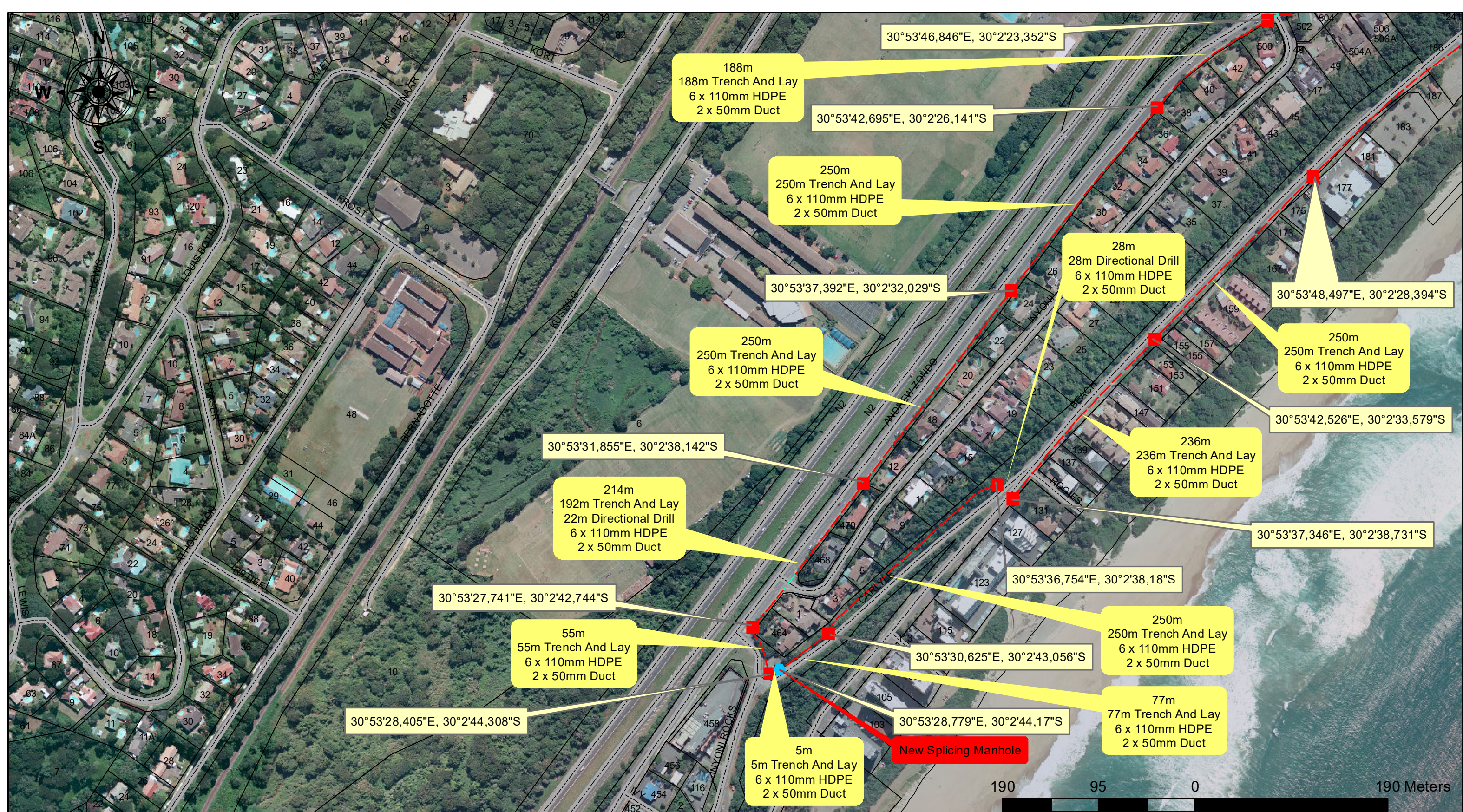
P.O.BOX 1630
UMHLANGA
4320
TEL : 031 5662296

DRAWN	KESAVAN ARJOON
DESIGNED	KESAVAN ARJOON
DATE	06 MAY 2019
CHECKED	SASHLIN NAIDOO
ROUTE PLANNER	ANDILE SCINA
CONTACT NUMBER	011 585 0261
ESD	
APPROVED	
PAGE SIZE	A4
SCALE	1:866



Legend

- ◆ New Splicing Manhole
- New Beach Manhole
- New ASN Pull Through Manhole
- New Directional Drill
- New Trench And Lay
- roads
- parcels



LIQUID TELECOM KZN PROJECTS

Metiss ASN

PROJECT DETAIL

Metiss ASN
Amanzimtoti



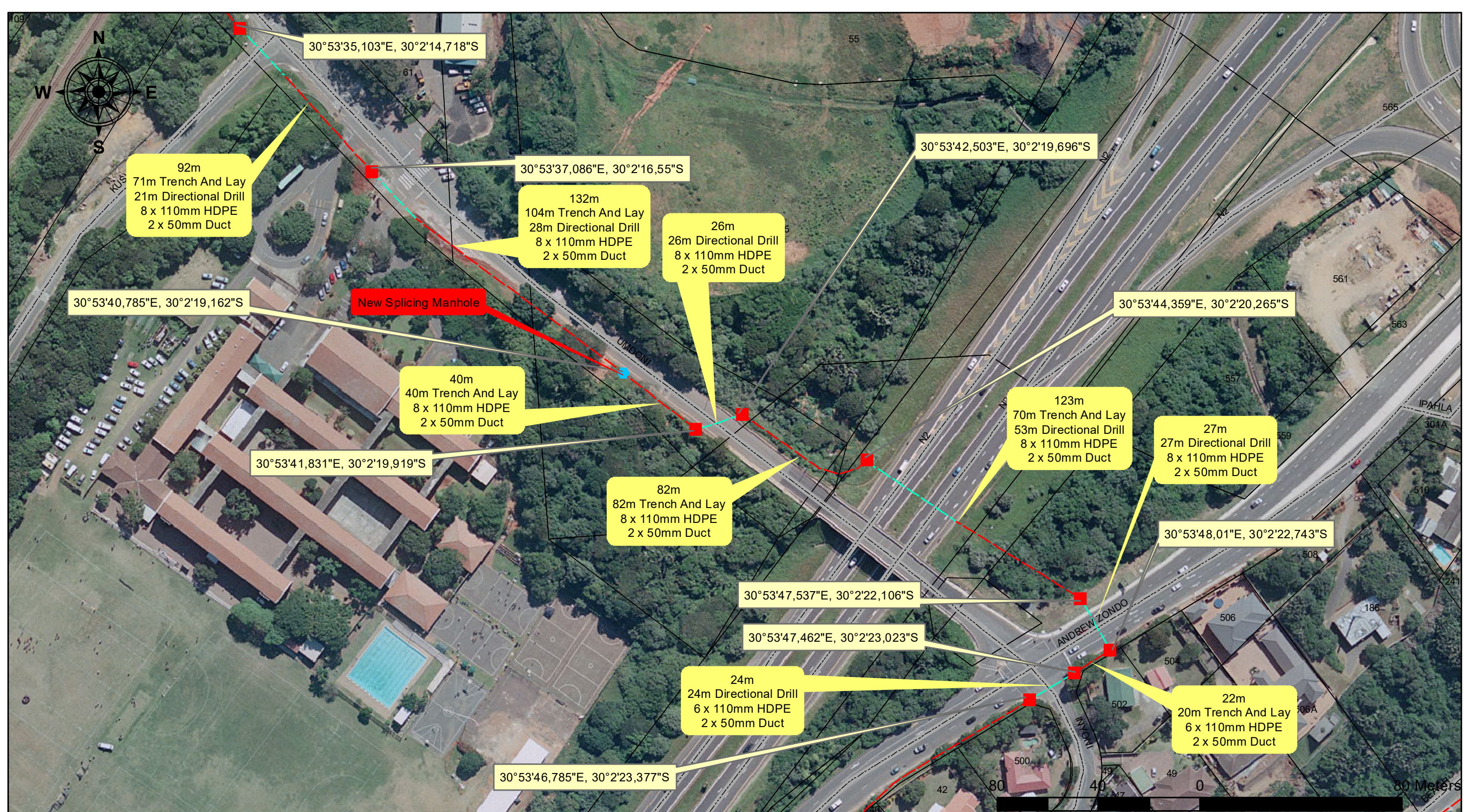
P.O.BOX 1630
UMHLANGA
4320
TEL : 031 5662296

DRAWN	KESAVAN ARJOON
DESIGNED	KESAVAN ARJOON
DATE	06 MAY 2019
CHECKED	SASHLIN NAIDOO
ROUTE PLANNER	ANDILE SCINA
CONTACT NUMBER	011 585 0261
ESD	
APPROVED	
PAGE SIZE	A4
SCALE	1:3 465



Legend

- ◆ New Splicing Manhole
- New Beach Manhole
- New ASN Pull Through Manhole
- New Directional Drill
- New Trench And Lay
- roads
- parcels



LIQUID TELECOM KZN PROJECTS

Metiss ASN

PROJECT DETAIL

Metiss ASN
Amanzimtoti



P.O.BOX 1630
UMHLANGA
4320
TEL : 031 5662296

DRAWN	KESAVAN ARJOON
DESIGNED	KESAVAN ARJOON
DATE	24 MAY 2019
CHECKED	SASHLIN NAIDOO
ROUTE PLANNER	ANDILE SCINA
CONTACT NUMBER	011 585 0261
ESD	
APPROVED	
PAGE SIZE	A4
SCALE	1:1 386



Legend

- ◆ New Splicing Manhole
- ◆ New Beach Manhole
- New ASN Pull Through Manhole
- New Directional Drill
- New Trench And Lay
- roads
- parcels



LIQUID TELECOM KZN PROJECTS

Metiss ASN

PROJECT DETAIL

Metiss ASN
Amanzimtoti



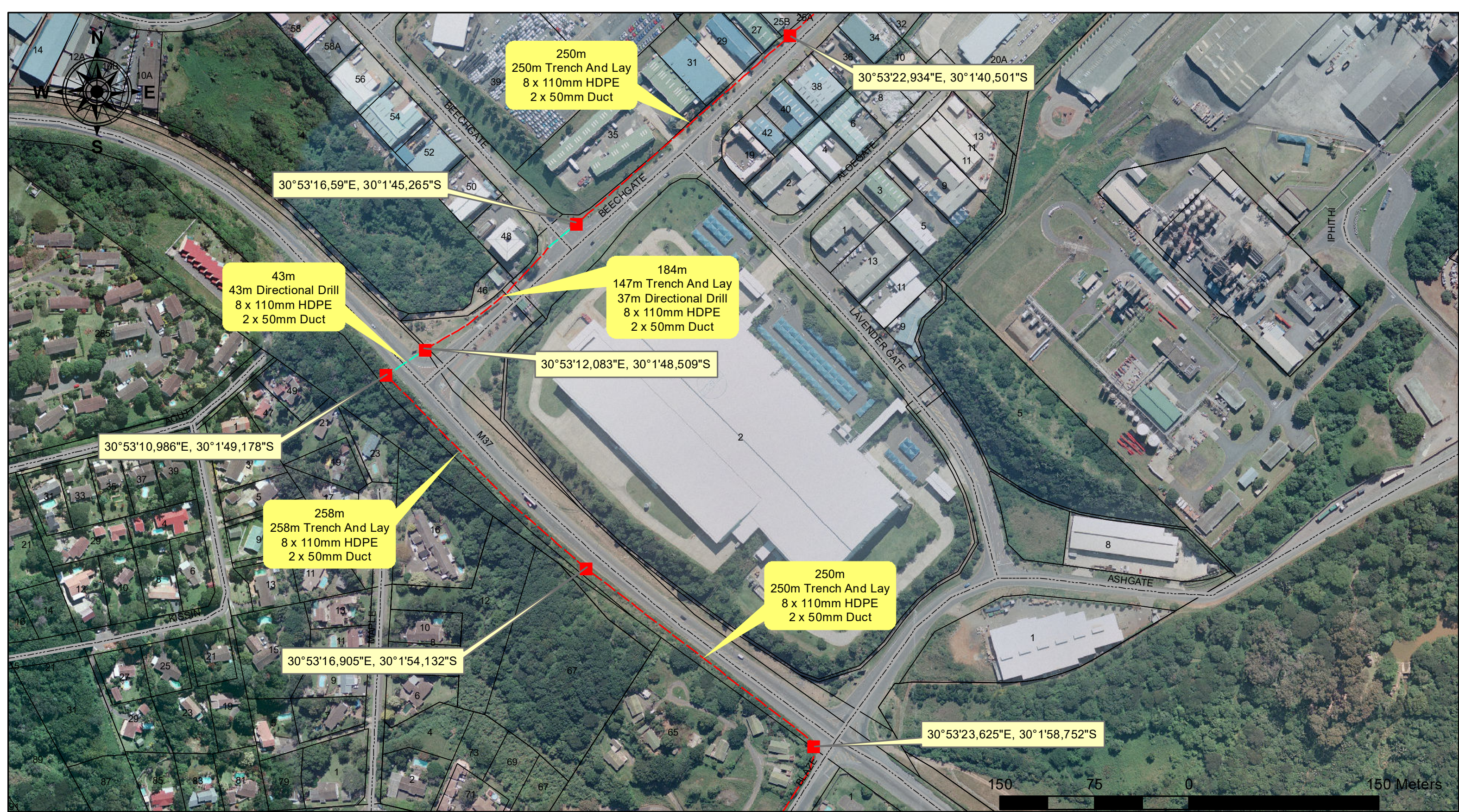
P.O.BOX 1630
UMHLANGA
4320
TEL : 031 5662296

DRAWN	KESAVAN ARJOON
DESIGNED	KESAVAN ARJOON
DATE	24 MAY 2019
CHECKED	SASHLIN NAIDOO
ROUTE PLANNER	ANDILE SCINA
CONTACT NUMBER	011 585 0261
ESD	
APPROVED	
PAGE SIZE	A4
SCALE	1:2 772



Legend

- ◆ New Splicing Manhole
- ◆ New Beach Manhole
- New ASN Pull Through Manhole
- New Directional Drill
- - - New Trench And Lay
- roads
- parcels



LIQUID TELECOM KZN PROJECTS

Metiss ASN

PROJECT DETAIL

Metiss ASN
Amanzimtoti



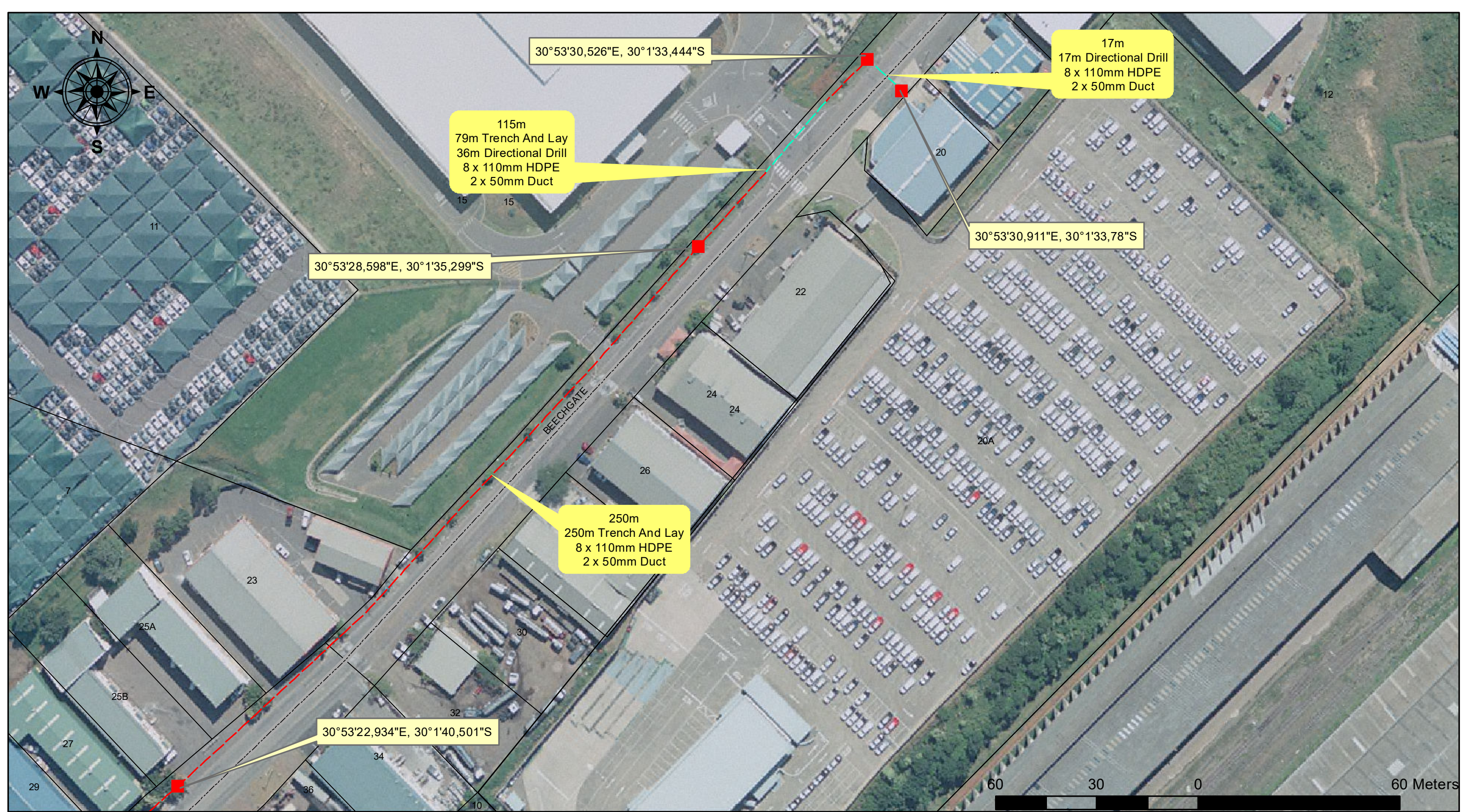
P.O.BOX 1630
UMHLANGA
4320
TEL : 031 5662296

DRAWN	KESAVAN ARJOON
DESIGNED	KESAVAN ARJOON
DATE	24 MAY 2019
CHECKED	SASHLIN NAIDOO
ROUTE PLANNER	ANDILE SCINA
CONTACT NUMBER	011 585 0261
ESD	
APPROVED	
PAGE SIZE	A4
SCALE	1:2 772



Legend

- ◆ New Splicing Manhole
- ◆ New Beach Manhole
- New ASN Pull Through Manhole
- New Directional Drill
- New Trench And Lay
- roads
- parcels



30°53'30,526"E, 30°1'33,444"S

17m
17m Directional Drill
8 x 110mm HDPE
2 x 50mm Duct

115m
79m Trench And Lay
36m Directional Drill
8 x 110mm HDPE
2 x 50mm Duct

30°53'28,598"E, 30°1'35,299"S

30°53'30,911"E, 30°1'33,78"S

250m
250m Trench And Lay
8 x 110mm HDPE
2 x 50mm Duct

30°53'22,934"E, 30°1'40,501"S

LIQUID TELECOM KZN PROJECTS

Metiss ASN

PROJECT DETAIL

Metiss ASN
Amanzimtoti



P.O.BOX 1630
UMHLANGA
4320
TEL : 031 5662296

DRAWN	KESAVAN ARJOON
DESIGNED	KESAVAN ARJOON
DATE	24 MAY 2019
CHECKED	SASHLIN NAIDOO
ROUTE PLANNER	ANDILE SCINA
CONTACT NUMBER	011 585 0261
ESD	
APPROVED	
PAGE SIZE	A4
SCALE	1:1 040



Legend

- ◆ New Splicing Manhole
- ◆ New Beach Manhole
- New ASN Pull Through Manhole
- New Directional Drill
- New Trench And Lay
- roads
- parcels