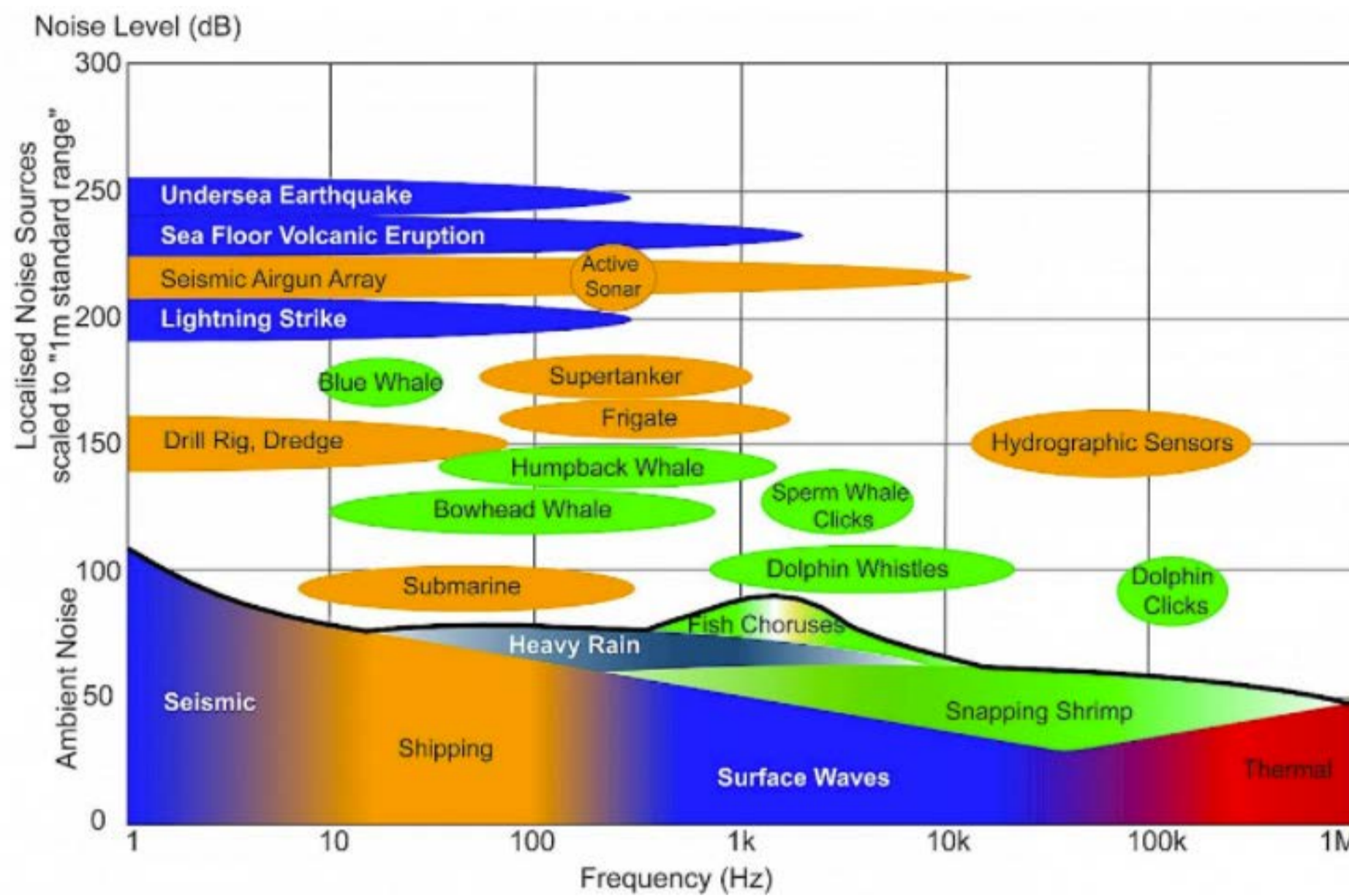
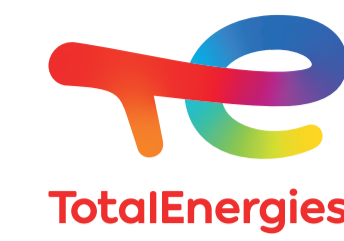


# INGXOLO YANGAPHANTSI KOLWANDLE



UMFANEKISO 1: AMANQANABA ENGXOLO NE-FRIKHWENSI EBANGELWA NGABANTU KUNYE NEZINYE IZINTO ZEMVELO ELWANDLE.

- Ukuvezwa kwingxolo yokugrumba yemizuzu engama-30, kucingelwa ukuba kunokwenzeka ukuba isilwanyana sisuke kude nomthombo wengxolo.
- Uphononongo luthathele ingqalelo le meko kwiziza ezibini, zombini ezikufutshane nonxweme kunye neendawo ezinovakalelo.
- Uphononongo lomfuziselo wengxolo yangaphantsi kwamanziluthatheleingqaleloimisebenziyeProjekthi, equka ukumba amaqula, iprofayili yenyikima ethe nkqo (VSP) kunye novavanyo lwesonar.

## IMIGANGATHO YENGXOLO EKHOYO PHANTSI KOLWANDLE

- Amanqanaba engxolo angaphantsi kwamanzi aphejlelwa yimithombo yendalo kunye nabantu.
- Umthombo ngamnye wengxolo unamanqanaba ahlukeneyo engxolo kuluhlu lweefrikhwensi.
- I-Frequencies ephantsi (LF) ichaphazeleka ngokubanzi ngamagalelo abantu, ukuthunyelwa kweenqanawa zaselwandle, ngelixa i-frequencies ephezulu kakhulu (VHF) ichaphazeleka ngokubanzi kwimithombo yendalo yendalo okanye ye-bioacoustics, njengamaza omhlaba kunye nemvula (jonga uMfanekiso 1).
- Kummandla weBloko 11B/12B, amaqondo engxolo angaphantsi kwamanzi aphejlelwa ikakhulu kukuhamba kweenqanawa, kunye nemithombo yendalo efana nomoya, amaza, invula kunye neentetho zezilwanyana ezanyisayo zaselwandle.
- Olona galelo lubalulekileyo kumanqanaba akhoyo engxolo angaphantsi kwamanzi kwiBloko ye-11B/12B kukuhamba kweenqanawa ekhoyo (jonga uMfanekiso 2).

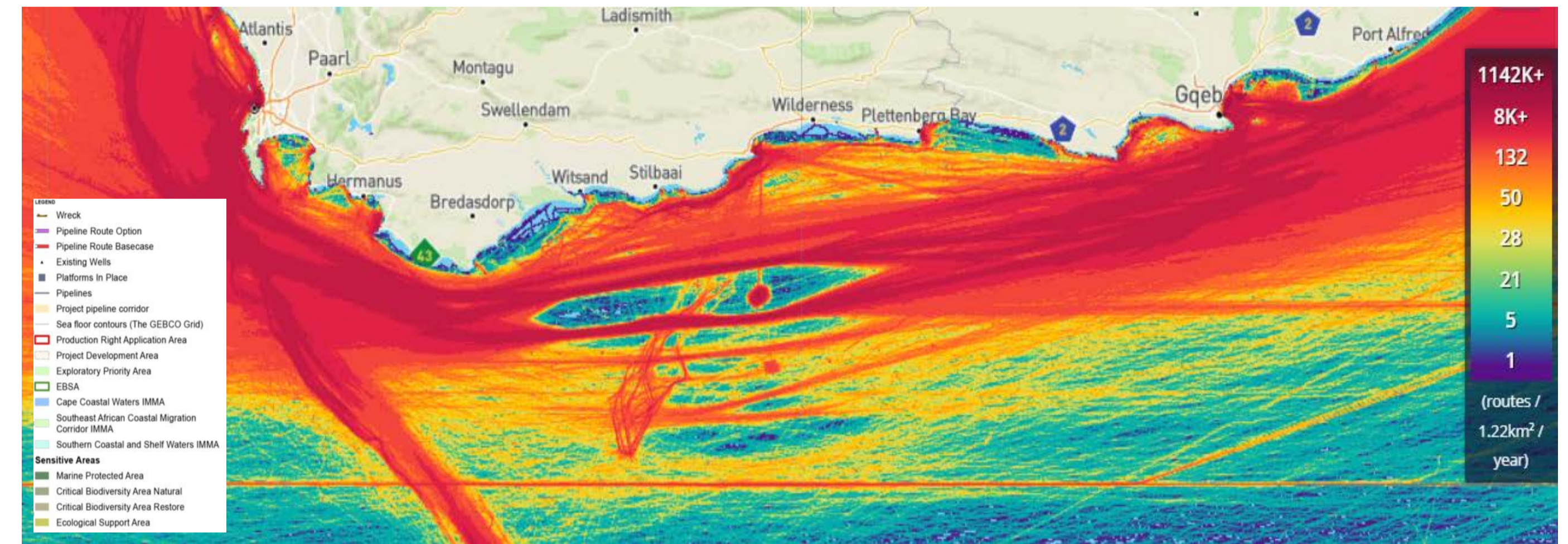


FIGURE 2: EXISTING VESSEL TRAFFIC IN 2022 ALONG THE SOUTH COAST OF SOUTH AFRICA

## IINGXOLO EZINOKUBAKHO

- NgexeshaleSigabasokuHlola, amaqondo engxolo angaphantsi kwamanzi ayakunyakungenxa yokusebenza kwesixhobo sokubhobha, intshukumo yokuxhasa ukutsalwa kweenqanawa kunye nokubonelela ngeenqanawa, kunye nokuqhutywa kweVSP. Iimpembelelo zokuzivezwa kweeyure ezingama-24 kunye nemizuzu engama-30 zithathwa njengokubaluleka okuPhantsi ngexesha lokugrunjwa kwamaqula kunye nokubaluleka okuphantsi ngexesha le - VSP.
- Ngexesha lokwenziwa kovavanyo lwakude nonxweme, amaqondo engxolo angaphantsi kwamanzi aya kunyuka ngenxa yokwenziwa kwemisebenzi yeprofayili ye-sonar. Impembelelo ithathwa njengokubaluleka okuPhantsi ngexesha lolu phando.
- Ngexesha leSigaba soKwakha, amaqondo engxolo angaphantsi kwamanzi aya kunyuka ngenxa yokusebenza komatshini wokubhobha, ukuhamba kweentambo zokuxhasa kunye neenqanawa zokubonelela. Impembelelo yazo zombini iiyure ezingama-24 kunye nemizuzu engama-30 ithathwa njengokubaluleka okuphantsi ngexesha lokugrunjwa kwamaqula.

ULUHLU 1 : ISISHWANKATHELO SOBDULA OKUQIKELELELWEYO OKUQIKELELWAYO

Iqela elivayo	Uhlobo lwe-Threshold	Owona Mgama mkhulu ukuya kwiThreshold (m)				I-Sonar
		Ukugrumba		VSP		
		Iiyure	30 iyure	250 pulses	50 pulses	
Izilwanyana zaseLwandle ezanyisayo	PTS	400 (VHF)	20	210 (LF)	80 (LF)	350 (VHF)
	TTS	9,000 (LF)	790 (VHF)	2,200 (LF)	600 (LF)	860 (VHF)
IiFudo zoLwandle	PTS	10	<10	20	<10	n / A
	TTS	330	10	170	70	n / A
Intlanzi	Ukuziphatha	10		350		n / A
	Ukufa kunye nokwenzakala okunokwenzeka	n / A		30	10	40
	Ukwenzakala OkunokuBuyiswa	30		40	20	40
	TTS	160		400	160	10
Oonombombiya / lintaka zokuntywila	Ukuziphatha	440		7,050		1,480
	Ukuziphatha	11,800		19,200		2,450

## INGXELO NGAPHANTSI KWAMANZI KWIZILWANYANA ZAMANZ

Ingxelo engaphantsi kwamanzi inokuchaphazela izilwanyana zaselwandle ngezi ndlela zilandelayo:

- **UkuMasking okuVavayo (Auditory Masking)** okuchaphazela amandla esilwanyana esanyisayo sokuvakalisa ilizwi.
- **Iimpembelelo zokuziphatha (Behavioural Impacts)** ezifana nokuphetshwa kweendawo.
- Ukulahlekelwa kwindlebe, kuquka i-TTS kunye ne -PTS.
- **Ukwenzakala emzimbeni** okanye ukufa

## UKUNCIPHISWA

- I-Marine Mammal Observer (MMO) iya kujoyina iisaveyizangaphambili zokombisa ukuqinisekisa ukufuduka kwe-cetacean / ukuhanjiswa kweemodeli.
- Ukugrumba akuyi kqualisa ukuba ii-MMOs ziqwalasele iicetaceans ngaphakathi kwendawo yomgama ye-PTS.
- I-Passive Acoustic Monitoring iya kwenziwa ukubeka esweni umsebenzi we-cetacean.
- Iinkqubo "zokuqalisa ngokuthambileyo" ziya kuphunyezwa phambi kweVSP.
- Iyure enye yokuskena kwangaphambi kokudubula kuya kwenziwa.

Umnenga we-Baleen (umzekelo, i-southern right whale [ *Eubalaena australis* ] kunye ne- humpback whale [ *Megaptera novaeangliae* ] ) [jonga uMfanekiso we-3 ] kunye nezinye i-VHF cetaceans ( i-pygmy sperm whale [ *Kogia breviceps* ] [jonga uMfanekiso 4 ] kunye nomnenga obizwa ngokuba yi-dwarf sperm whale [ *K. sima* ] kungenzeka ukuba ube nefuthe elikhulu ngeempembelelo zexeshana ezithi zenzeke kwi-9 km kunye ne-8.6 km ngokulandelelanayo, kunye nemida yomanzakalo esisigxina eqikelelwe ukuba yenzeke kumgama omalunga nama-250 m kunye nama-50 m ngokulandelelanayo, ukusuka kumthombo wesandi.



UMFANEKISO 3 : I-HUMPBAC WALE (UMTHOMBO: WWW.THOGHT.CO.COM)



UMFANEKISO 4 : I-PYGMY PERM WALE (UMTHOMBO: WWW.PINTEREST.COM)

## ISIGAMA

- **Ulahleko yoThutho (Transmission Loss)** ibhekisa kwisixa apho amanqanaba esandi ehla phakathi komthombo kunye nomamkeli.
- **Ingxolo engalindelwanga (Impulsive Noise)** ibhekisa kwingxolo ephethe isandi esibukhali ngesiqophe okanye isithonga sexesha elifutshane, oko kukuthi, iprofiling yenyikima ethe nkqo (VSP) kunye nophando lwesona olunxulumanyiswa neProjekthi.
- **Ingxolo eqhubekayo (Continuous Noise)** ibhekisa kuyo yonke ingxolo engangxamanga kwaye ibonakala ngokunyuka okunyukayo kwinqanaba lesandi ukuya kwincopho ephezulu elandelwa kukubola okukhawulezayo.
- **i-Temporary Threshold Shifts (TTS)** ibhekisa ekuphulukaneni nokungeva okwethutyana.
- **Ii-Permanent Threshold Shifts (PTS)** zibhekiselele kwilahleko esisigxina yokuva ubuntununtunu.

## IMLINGANISO YENQANABA LESANDI SANGAPHANTSI KOLWANDLE

- Amanqanaba esandi sangaphantsi kolwandle abonakalisa ngee-desibels (dB), umlinganiselo welogarithmic ngokunxulumene nereferensi esisigxina (re) yoxinzelelo lwe-1  $\mu\text{Pa}$  (elingana no- $10^{-6}$  Pa) okanye i-1  $\mu\text{Pa}^2$  -s. Isandi sangaphantsi kwamanzi siqhele ukulinganiswa kusetyenziswa ezi metrics zilandelayo:
  - Inqanaba loxinzelelo lweSandi (South Pressure Level) (SPL) – lilinganiswa nge-dB re 1  $\mu\text{Pa}$ :
    - Ingcambu ithetha isikwere (Root mean square) SPL ( SPL rms ) – ingcambu ephakathi ithetha inqanaba loxinzelelo lwesikwere kwisithuba sexesha elixeliweyo.
    - Incopho (Peak) ye-SPL ( incopho ye -SPL ) - eyona nto iphezulu yoxinzelelo lwesandi olukhawulezayo kwisithuba sexesha elibekiweyo.
  - INqanaba lokuVezwa kweZandi (Sound Exposure Level) (SEL) – lilinganiswa nge-dB re 1  $\mu\text{Pa}^2$  -s:
  - I-SEL yeeyure ezingama-24 (SEL 24h ) - amandla e-acoustic aqokelelwe kwixesha leeyure ezingama-24.

## IMODELI YENGXOLO (I-NOISE MODELLING)

- Ukujongana neempembelelo ezinokubakho ezivela kwingxolo yangaphantsi kwamanzi eveliswa yimisebenzi yeProjekthi, uphononongo lomfuziselo wengxolo yangaphantsi kwamanzi lwenziwa.
- limeko ezimbini zenziwe imodeli:
  - Imeko embi kakhulu, apho isilwanyana siya kuboniswa kwingxolo yokomba iiyure ezingama-24; kwaye