VEDLEGG 1

Koordinater og dybder for de fire nye turbinpunktene (Euref 89, UTM sone 32). Det presiseres at det kan bli noen mindre justeringer på turbinpunktene ifm. godkjenning av detaljplanen i neste fase.

Alternativ 1:

Turbin	Øst	Nord	Dybde (m)
1	275719	6561354	-189
2	274341	6561950	-200
3	270296	6566076	-205
4	269423	6567298	-207

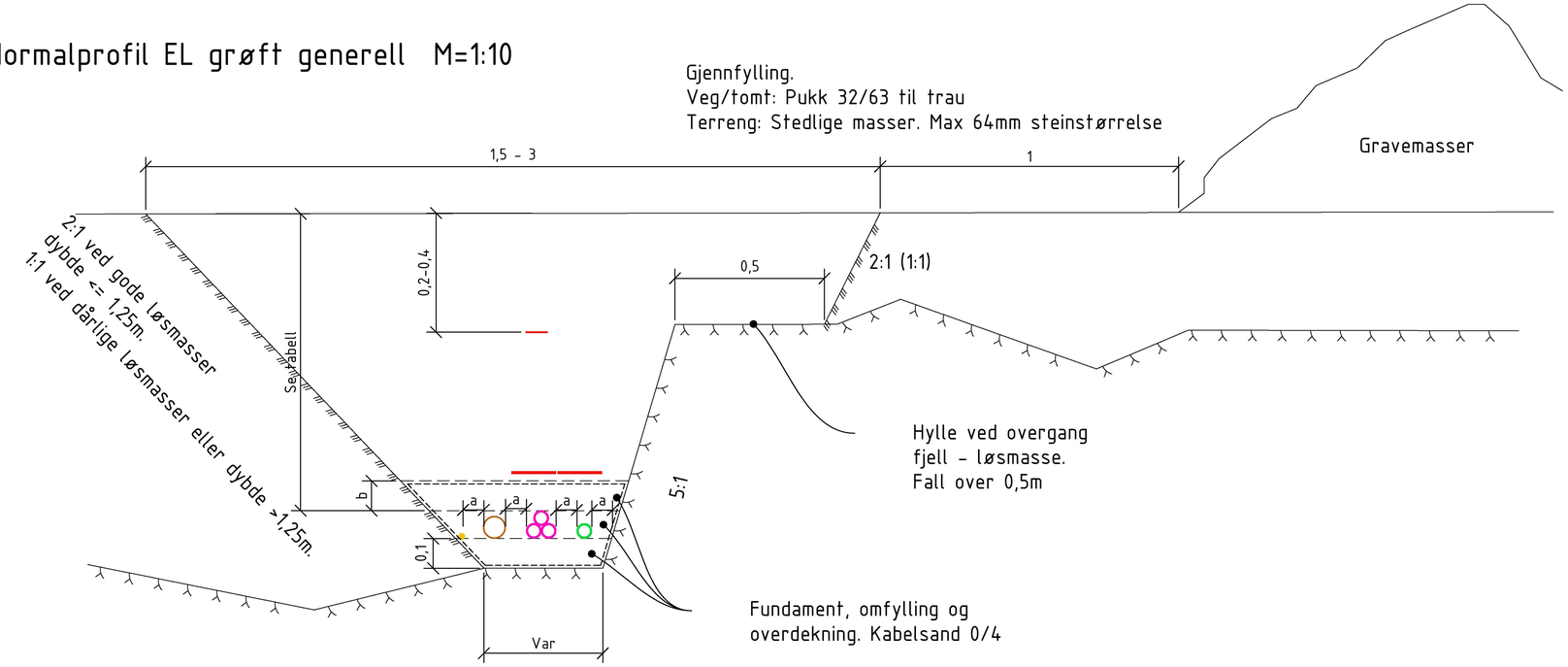
Alternativ 2:

Turbin	Øst	Nord	Dybde (m)
1	274410	6562542	-196
2	273552	6563774	-194
3	272694	6565005	-191
4	271837	6566237	-189

VEDLEGG 2

Grøfteprofil for jordkabeltraseen

Normalprofil EL grøft generell M=1:10

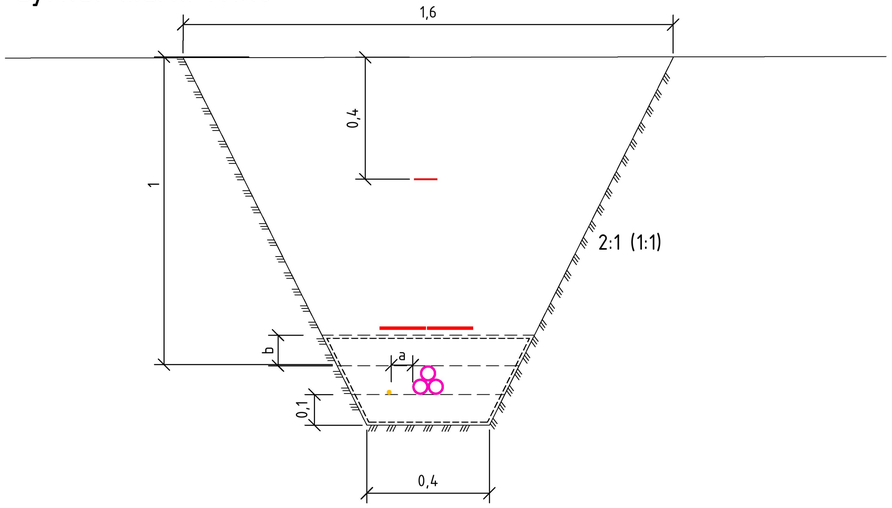


Tegnforklaring

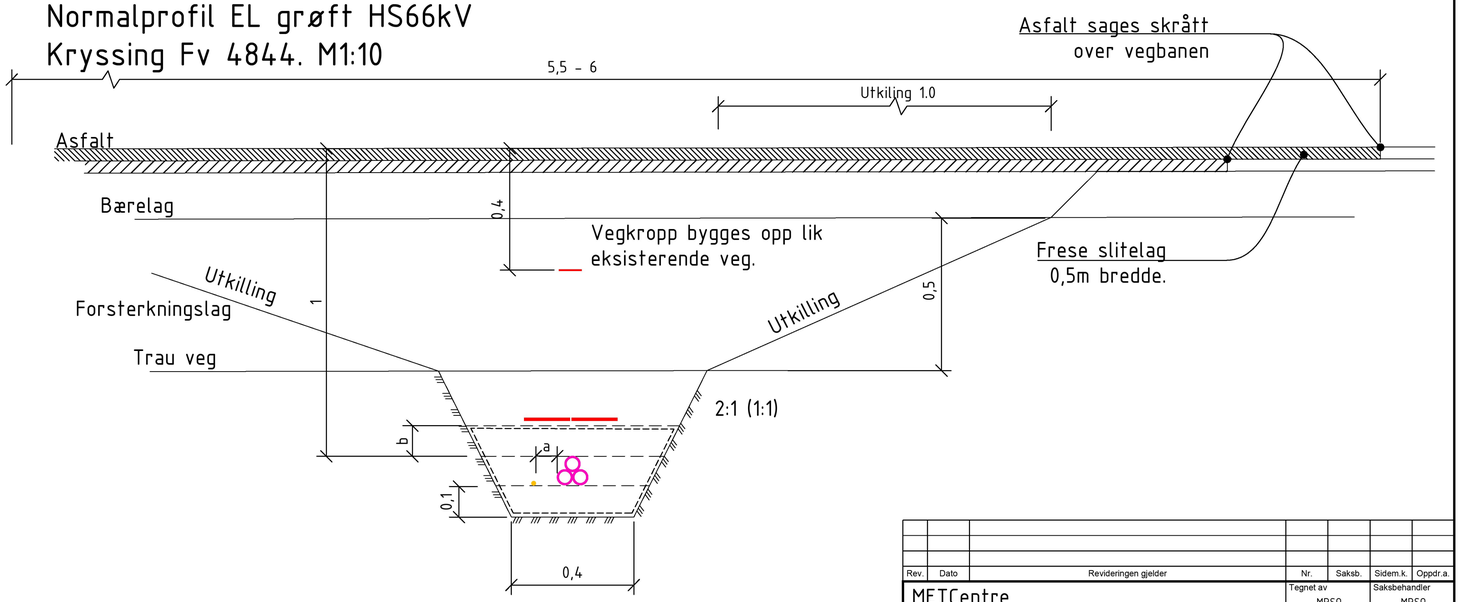
- Trekkerør
- Høyspent (HS)
- Lavspent (LS)
- Jordledning
- Markeringsbånd
- Dekkebord
- Fiberduk

Avstand kabler/trekkerør i grøft				Dybde topp kabel	
Yttre diameter (OD) mm		a mm	b mm	Tettbygde strøk mm	Dyrket mark og veg mm
min.	maks.				
<	70	70	100	500	1000
70	150	OD	100	500	1000
150	<	150	150	500	1000

Normalprofil EL grøft HS66kV i dyrket mark. M1:10



Normalprofil EL grøft HS66kV Kryssing Fv 4844. M1:10



Rev.	Dato	Revideringen gjelder	Nr.	Saksb.	Sidem.k.	Oppdr.a.

METCentre

HØYSPENTKABEL SKUDESNESHAVN
GRØFTETRASE RØYRVIK- SKUDESNESHAVN

NORMALPROFIL
EL-GRØFT

Tegnet av	Saksbehandler
MRSO	MRSO
Sidemannskontr.	Oppdragsansvarlig
OINI	MRSO
Fag	Målestokk
EL	1:10
Dato	
23.11.21	

COWI

Oppdragsnr.	Status
A236230	SKISSE
Tegning nr.	Rev.
IN10	

Format: A1 Filnavn: O:\A235000\A236230\3.7 Tegninger\Plandata\2d\tegning grunnlagUN Grøftenprofil.dwg Xref:

TPlot: MRSO 14.01.2022 14:05:45

VEDLEGG 3

Oversikt over berørte eiendommer (gnr/bnr)

Oversikt over berørte eiendommer og naboeiendommer langs jordkabeltrasèen

Kommunenummer	Gårdsnummer	Bruksnummer	Eiendommens adresse
1149	38	1	Syrevegen 145
1149	38	2	Røyrvikvegen 7
1149	38	4	Mjølhusvegen 140
1149	38	5	Eiendommen har ikke veiadresse
1149	38	6	Grødheimvegen 19
1149	38	7	Eiendommen har ikke veiadresse
1149	38	9	Røyrvikvegen 42
1149	38	12	Eiendommen har ikke veiadresse
1149	38	13	Eiendommen har ikke veiadresse
1149	38	14	Eiendommen har ikke veiadresse
1149	38	15	Eiendommen har ikke veiadresse
1149	38	16	Eiendommen har ikke veiadresse
1149	38	17	Eiendommen har ikke veiadresse
1149	38	18	Eiendommen har ikke veiadresse
1149	38	19	Eiendommen har ikke veiadresse
1149	38	20	Stokkavika 10
1149	38	21	Røyrvikvegen 5
1149	38	24	Eiendommen har ikke veiadresse
1149	38	26	Syrevegen 130
1149	38	29	Røyrvikvegen 50
1149	38	42	Røyrvikvegen 15
1149	38	44	Syrevegen 77
1149	38	50	Røyrvikvegen 60
1149	38	52	Eiendommen har ikke veiadresse
1149	38	59	Eiendommen har ikke veiadresse
1149	38	60	Eiendommen har ikke veiadresse
1149	38	61	Syrevegen 129
1149	38	63	Syrevegen 100
1149	38	67	Syrevegen 149
1149	38	70	Eiendommen har ikke veiadresse
1149	38	71	Eiendommen har ikke veiadresse
1149	38	75	Eiendommen har ikke veiadresse
1149	38	76	Eiendommen har ikke veiadresse
1149	38	77	Syrevegen 141
1149	38	78	Syrevegen 109
1149	38	85	Syrevegen 89
1149	38	93	Røyrvikvegen 94
1149	38	95	Syrevegen 131
1149	38	102	Syrevegen 114
1149	38	103	Syrevegen 127
1149	38	105	Syrevegen 103
1149	38	112	Syrevegen 106
1149	38	119	Røyrvikvegen 29
1149	38	124	Røyrvikvegen 31
1149	38	126	Eiendommen har ikke veiadresse
1149	38	128	Røyrvikvegen 35

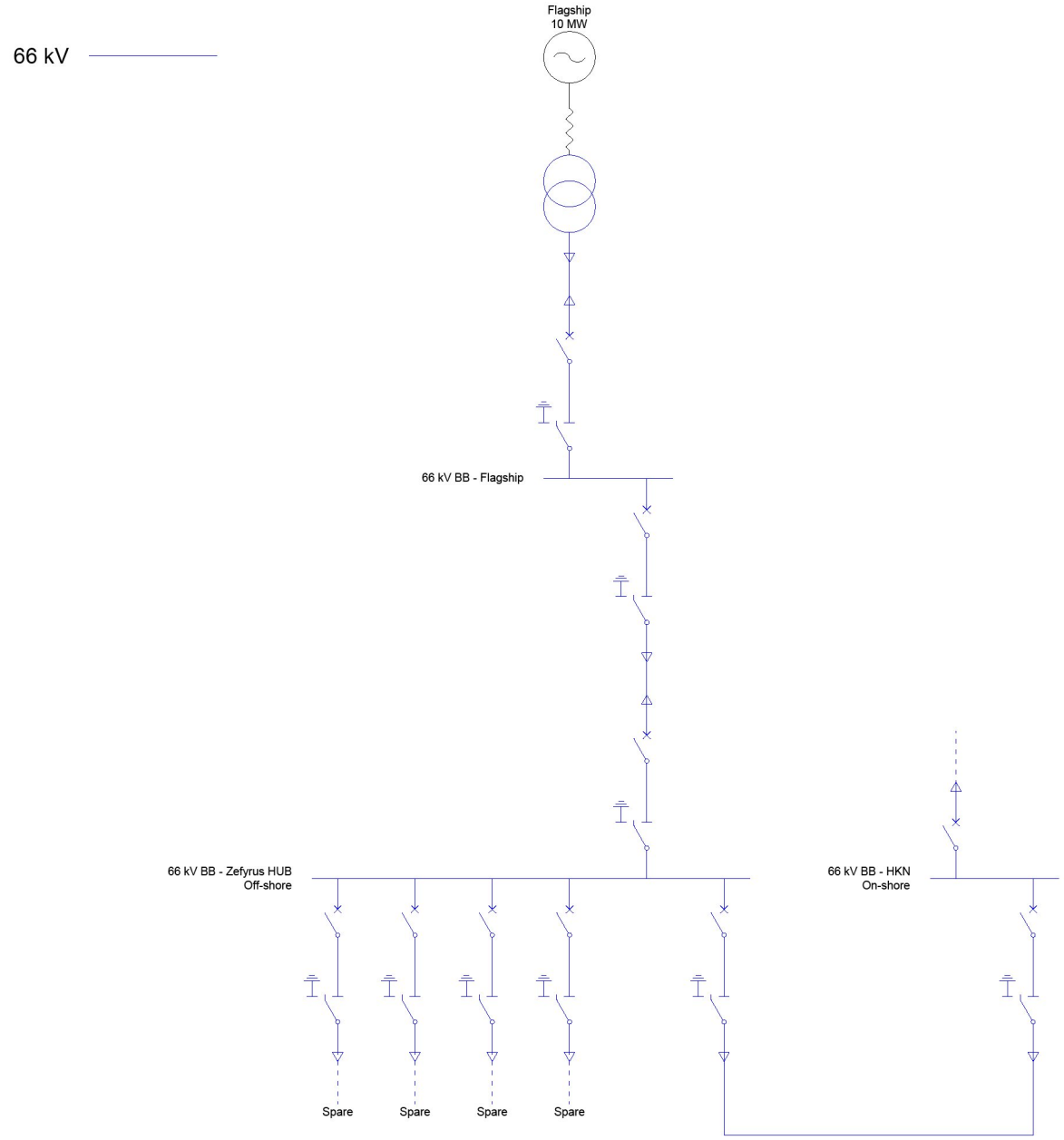
1149	38	129	Syrevegen 125
1149	38	132	Eiendommen har ikke veiadresse
1149	38	134	Syrevegen 151
1149	38	140	Røyrvikvegen 25
1149	38	148	Eiendommen har ikke veiadresse
1149	38	150	Eiendommen har ikke veiadresse
1149	38	163	Habnavågvegen 37
1149	38	169	Eiendommen har ikke veiadresse
1149	38	170	Røyrvikvegen 40
1149	38	171	Syrevegen 147
1149	38	184	Kvednavegen 10
1149	38	198	Syrevegen 112
1149	38	204	Kråkebergvegen 10
1149	38	216	Syrevågvegen 8
1149	38	217	Syrevågvegen 10
1149	38	218	Syrevågvegen 12
1149	38	220	Syrevågvegen 4
1149	38	221	Syrevågvegen 6
1149	38	227	Syrevågvegen 23
1149	38	229	Syrevågvegen 2
1149	38	230	Syrevågvegen 19 A
1149	38	231	Syrevågvegen 21
1149	38	234	Eiendommen har ikke veiadresse
1149	38	235	Eiendommen har ikke veiadresse
1149	38	236	Trodlaskarvegen 20
1149	38	237	Trodlaskarvegen 22
1149	38	238	Trodlaskarvegen 24
1149	38	255	Eiendommen har ikke veiadresse
1149	38	263	Grødheimvegen 2
1149	38	266	Kråkebergvegen 7
1149	38	267	Eiendommen har ikke veiadresse
1149	38	268	Syrevegen 91
1149	38	278	Eiendommen har ikke veiadresse
1149	38	280	Syrevegen 139
1149	38	287	Røyrvikvegen 90
1149	38	298	Eiendommen har ikke veiadresse
1149	38	299	Eiendommen har ikke veiadresse
1149	38	300	Eiendommen har ikke veiadresse
1149	38	304	Grødheimvegen 7
1149	38	320	Eiendommen har ikke veiadresse
1149	40	1	Postvegen 222
1149	40	4	Postvegen 207
1149	40	7	Eiendommen har ikke veiadresse
1149	40	9	Eiendommen har ikke veiadresse
1149	40	12	Eiendommen har ikke veiadresse
1149	40	13	Syrevegen 70
1149	40	16	Syrevegen 45
1149	40	17	Habnavågvegen 1
1149	40	18	Syrevegen 47
1149	40	19	Syrevegen 49

1149	40	21	Kvednavegen 14
1149	40	24	Eiendommen har ikke veiadresse
1149	40	26	Habnavågvegen 5
1149	40	28	Habnavågvegen 7
1149	42	1	Gamle Syrevegen 110
1149	42	2	Sørhålandvegen 11
1149	42	11	Eiendommen har ikke veiadresse
1149	42	24	Gamle Syrevegen 108
1149	42	25	Syrevegen 30
1149	42	31	Syrevegen 35
1149	42	32	Gamle Syrevegen 59 A
1149	42	33	Gamle Syrevegen 105
1149	42	36	Gamle Syrevegen 109
1149	42	50	Gamle Syrevegen 77
1149	42	51	Eiendommen har ikke veiadresse
1149	42	74	Eiendommen har ikke veiadresse
1149	42	76	Gamle Syrevegen 81
1149	42	83	Gamle Syrevegen 91
1149	42	92	Eiendommen har ikke veiadresse
1149	42	95	Eiendommen har ikke veiadresse
1149	42	101	Gamle Syrevegen 111
1149	42	127	Gamle Syrevegen 90
1149	42	135	Eiendommen har ikke veiadresse
1149	42	136	Eiendommen har ikke veiadresse
1149	42	156	Gamle Syrevegen 107
1149	42	186	Eiendommen har ikke veiadresse
1149	42	231	Syrevegen 32
1149	42	240	Gamle Syrevegen 79
1149	43	8	Høynesvegen 95
1149	43	42	Høynesvegen 28
1149	43	43	Gamle Syrevegen 55
1149	43	44	Gamle Syrevegen 42
1149	43	45	Eiendommen har ikke veiadresse
1149	43	84	Kryssvegen 1
1149	43	91	Gamle Syrevegen 17
1149	43	112	Gamle Syrevegen 28
1149	43	117	Gamle Syrevegen 29
1149	43	119	Høynesvegen 7
1149	43	126	Gamle Syrevegen 21
1149	43	128	Postvegen 101
1149	43	139	Gamle Syrevegen 40
1149	43	141	Eiendommen har ikke veiadresse
1149	43	149	Høynesvegen 27
1149	43	172	Gamle Syrevegen 20 B
1149	43	179	Gamle Syrevegen 41
1149	43	193	Eiendommen har ikke veiadresse
1149	43	199	Eiendommen har ikke veiadresse
1149	43	200	Eiendommen har ikke veiadresse
1149	43	205	Eiendommen har ikke veiadresse
1149	43	206	Eiendommen har ikke veiadresse

1149	43	212	Gamle Syrevegen 39
1149	43	217	Idlamyrvegen 10
1149	43	218	Idlamyrvegen 20
1149	43	219	Idlamyrvegen 14
1149	43	220	Idlamyrvegen 12
1149	43	221	Gamle Syrevegen 37
1149	43	222	Gamle Syrevegen 35
1149	43	225	Kryssvegen 4
1149	43	228	Idlamyrvegen 8
1149	43	229	Kryssvegen 3
1149	43	238	Gamle Syrevegen 45
1149	43	240	Vektarvegen 18
1149	43	242	Vektarvegen 17
1149	43	260	Eiendommen har ikke veiadresse
1149	43	278	Høynesvegen 11
1149	43	298	Høynesvegen 13
1149	43	324	Gamle Syrevegen 43
1149	43	330	Moldgrovegen 8
1149	43	331	Moldgrovegen 10
1149	43	332	Moldgrovegen 12
1149	43	333	Moldgrovegen 14
1149	43	335	Moldgrovegen 16
1149	43	336	Moldgrovegen 6
1149	43	337	Moldgrovegen 4
1149	43	338	Moldgrovegen 2
1149	43	339	Moldgrovegen 1
1149	43	340	Moldgrovegen 3
1149	43	341	Moldgrovegen 7
1149	43	344	Eiendommen har ikke veiadresse
1149	43	349	Eiendommen har ikke veiadresse
1149	43	401	Eiendommen har ikke veiadresse
1149	43	402	Eiendommen har ikke veiadresse
1149	43	404	Postvegen 97
1149	43	405	Gamle Syrevegen 38
1149	43	436	Gamle Syrevegen 44
1149	43	499	Eiendommen har ikke veiadresse
1149	43	550	Eiendommen har ikke veiadresse
1149	43	554	Eiendommen har ikke veiadresse
1149	43	623	Skeismyrvegen 3
1149	43	636	Eiendommen har ikke veiadresse
1149	43	648	Eiendommen har ikke veiadresse
1149	47	17	Eiendommen har ikke veiadresse

VEDLEGG 4

Forenklet enlinjeskjema



Beskrivelse av anlegg:

Single line diagram

Principle drawing - Flagship and Zefyros HUB 66 kV

Rev:	Dato tegnet:	Tegnet:	Kontrollert:	Godkjent :	Dato godkjent:
0	13.04.2021	SAA	ROL	JA	13.04.2021

4	
3	
2	
1	
0	Creation of drawing

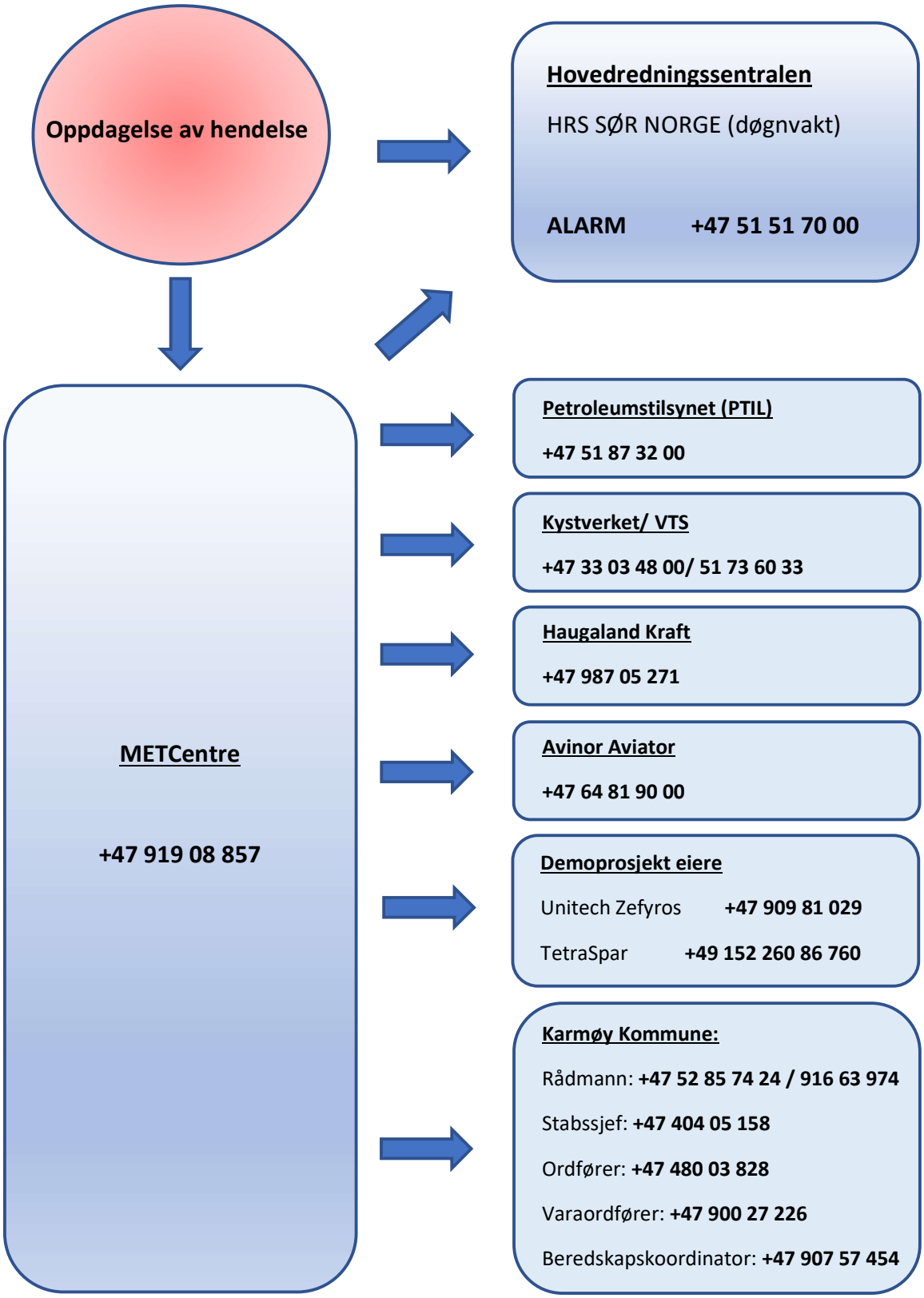
AABO PowerConsulting AS
Fjøsangerveien 70 A, 5068 Bergen
post@aabopowerconsulting.no
www.aabopowerconsulting.no

VEDLEGG 5

Varslings og beredskapsplan ved hendelser på METCentre

v.1.0
20.12.2021

Varsling og beredskapsplan ved hendelser på METCentre



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MARINE ENERGY TEST CENTRE • KARMØY

VEDLEGG 6

Uttalelse til utbyggingsplanene fra Avinor

AVINOR

Multiconsult Norge AS avd Ålesund
Postboks 4416 Sentrum
6044 ÅLESUND

Att.: Kjetil Mork

Vår ref. 21/00367-14

Deres ref.

Vår dato: 09.04.2021

Deres dato: 26.01.2021

Vår saksbehandler:
Einar K Merli - 976 51 687

Karmøy kommune - Offshore vindturbiner utenfor Karmøy - Utvidelse av eksisterende demonstrasjonsanlegg - Uttalelse fra Avinor

Vi viser til Deres e-post av 26.01.2021 vedrørende utvidelse av eksisterende demonstrasjonsanlegg for offshore vindturbiner utenfor Karmøy. Den 15.02.2021 ble det oversendt et oppdatert kartunderlag med tilhørende koordinater og høydedata, som Avinor forholder seg til i denne uttalelsen.

1. Restriksjonsplaner for Avinors lufthavner

De planlagte vindturbinene vil bli liggende ca. 25 km sørvest av Haugesund lufthavn Karmøy og ca. 45 km nordvest av Stavanger lufthavn Sola. Vindturbinene vil ikke berøre hinderflatene/høyderestriksjonsflatene i restriksjonsplanene for disse to lufthavnene, jf. *EASA-krav CS ADR-DSN.H og CS ADR-DSN.J.480, om hinderflater og begrensing av hinder, gjeldende fra 08.12.2017.*

Avinor gjør oppmerksom på at for vindturbiner gjelder følgende regelverk:

- Rapportering og registrering av luftfartshinder til Statens kartverk i medhold av *kapittel II i Forskrift om rapportering, registrering og merking av luftfartshinder av 15.07.2014.*
- Merking av luftfartshinder i medhold av *kapittel III i samme forskrift*. Det er Luftfartstilsynet som håndhever denne forskriften og kan gi pålegg om utbedring dersom merkingen av hindrene (vindturbinene) ikke er gjort i henhold til forskriften. Luftfartstilsynet vil kunne gi veiledning i hvordan merkingen skal gjennomføres.

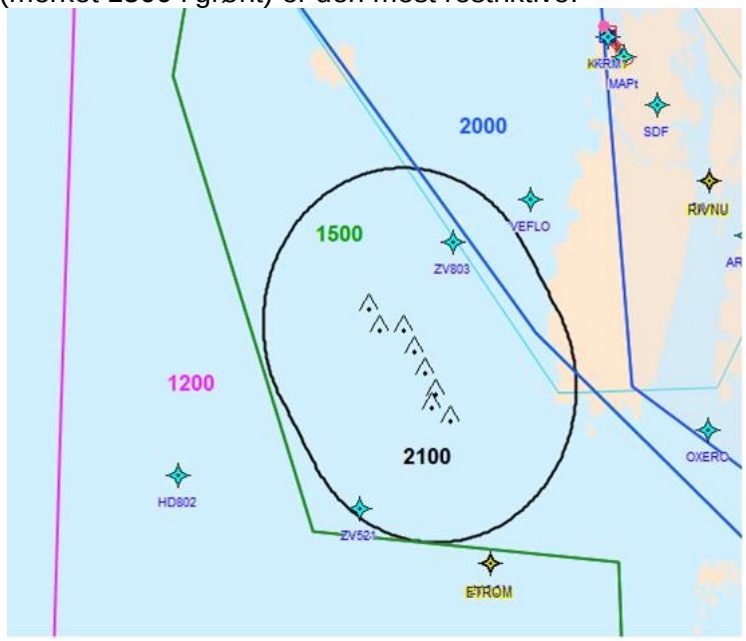
2. PANS OPS vurderinger (prosedyrer for fly og helikopter)

Avinor v/Prosedyredesign har gjennomført en operativ vurdering (Operational assessment) av de to alternativene for utvidelse av demonstrasjonsanlegget for offshore vindturbiner utenfor Karmøy, jf. vedlagt rapport datert 16.02.2021.

Konklusjonen i rapporten er at vindturbinene vil påvirke følgende prosedyrer innenfor kontrollert luftrom:

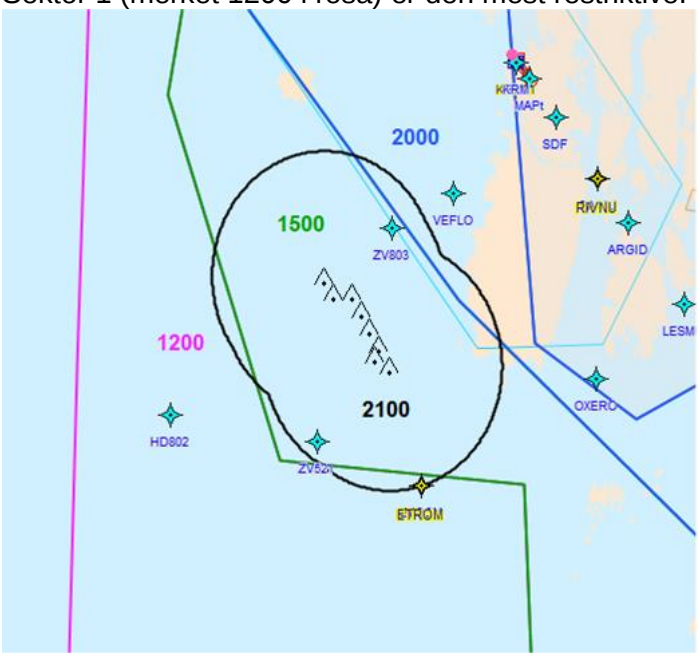
Alternativ A

- ENZV ATCSMAC Sector Minima Altitude Area (SMAA) sektor 2 og 3.
    - Maksimal høyde på vindturbin for ikke å påvirke disse sektorene: 132 meter. Sektor 2 (merket 1500 i grønt) er den mest restriktive.



Alternativ B

- ENZV ATCSMAC
    - SMAA sektor 1, 2 og 3.
        - Maksimal høyde på vindturbin for ikke å påvirke disse sektorene: 65 meter. Sektor 1 (merket 1200 i rosa) er den mest restriktive.



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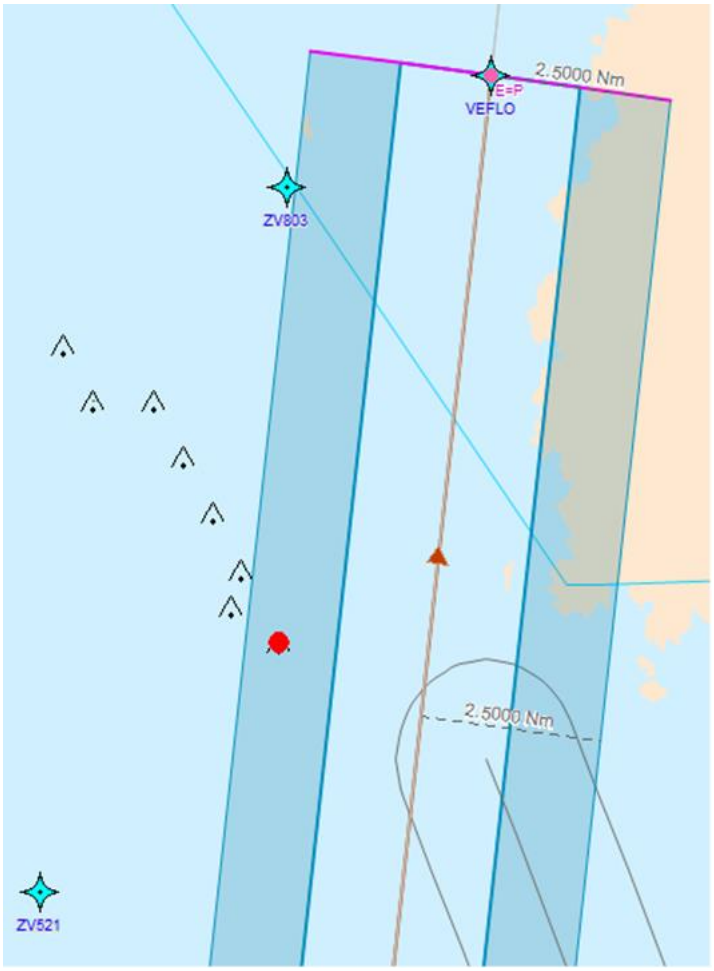
NO 985 198 292 MVA

- Low LVL Rute KY978, segment mellom ETROM og VEFLO.
    - Maksimal høyde av vindturbin for ikke å påvirke publisert flygerute: 254 meter. Bare én vindturbin vil påvirke ruten.



3. Operative vurderinger

Utbygging av begge alternativ vil i hovedsak påvirke offshore helikoptertrafikk og i mindre grad andre aktører. Offshore helikopter har behov for å fly så lavt som mulig i visse værforhold for å unngå ising på rotorbladene. Værforhold som kan gi ising oppstår i hovedsak i denne regionen fra september til april, men kan også oppstå i forbindelse med frontsystemer på sommeren. Et estimat bygget på 6 måneders trafikk, viser at i 2020 ville omtrent 800 slike flyginger blitt påvirket av utbyggingen med dagens standard flygehøyder.
Blå streker på kartet under er ankomster til Stavanger lufthavn med offshore helikopter, mens røde streker er avganger.

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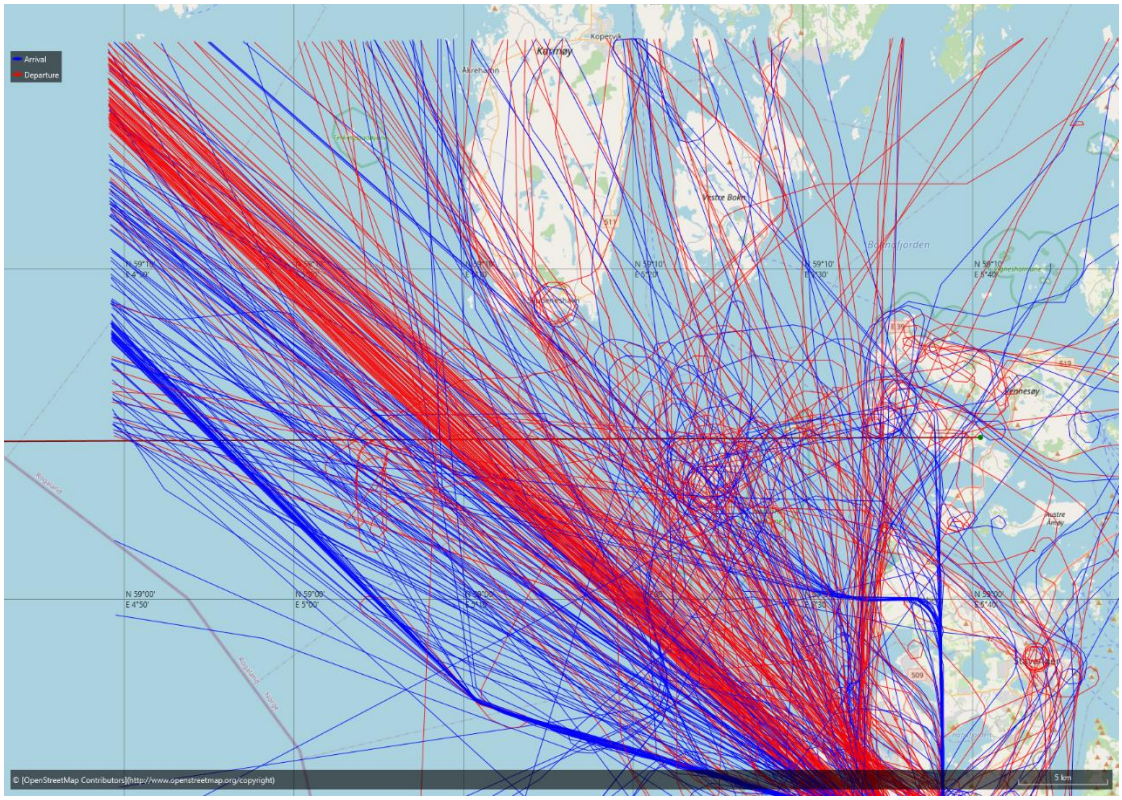

Operative konsekvenser for helikopteroperatørene vil være lengre omrutinger og lengre flytid som gir et øket miljøavtrykk grunnet øket drivstofforbruk, alternativt å fly i isingsforhold. Å fly i isingsforhold uten mulighet til å komme under værforholdene som skaper isingsforhold er en sikkerhetsutfordring for offshore helikoptertrafikk og i slike værforhold må offshore helikoptertrafikk måtte planlegge med å fly utenom sikkerhetssonene for vindturbinene. Omrutinger vil også gi uønsket merarbeid og større kompleksitet for lufttrafikktjenesten.

4. VFR ruteføringer (visuell flyging)

Den planlagte utbyggingen vil ikke være i nærheten av VFR ruteføringer eller punkter.

Vindturbiner kan utgjøre hindringer for luftfarten for de selskapene som opererer lavtflygende fly og helikopter (Forsvaret, Luftambulansen, Norsk Helikopter, Airlift mv.). Tiltakshaver bør derfor kontakte selskaper som opererer med slike luftfartøy.

5. Kommunikasjons-, navigasjons- og overvåkingsanlegg

Det er foretatt en vurdering av konsekvensene for kommunikasjons-, navigasjons- og overvåkingsanlegg i forhold til den oppgitte informasjonen om tiltaket for delstrekningen. Konklusjon: Grunnet avstand til vindturbinene vil ikke tiltaket ha noen negative påvirkninger på Avinor sine radiokommunikasjonsanlegg, navigasjonsanlegg, radaranlegg eller WAM (Wide Area Multilateration). Vurderingene er gjort med referanse til ICAO EUR DOC 015.

6. Avinors anbefaling

Av de to alternativene som er foreslått, er Alternativ A det beste alternativet for dagens offshore helikoptertrafikk siden færre av lufttrafikktjenestens sektorer for minimumshøyder blir berørt.

Men ingen av de to alternativene med ønsket høyde på vindturbinene er gode for lufttrafikken og for tjenesteutøvelsen av lufttrafikktjenesten i området. Avinor vil derfor sterkt anbefale utbygger å forholde seg til maksimumshøydene for vindturbinene som er angitt i punkt 2 over (132 meter for alternativ A).

Med vennlig hilsen
Avinor AS

Einar K Merli
Arealplanlegger
Masterplaner og arealdisponering

Dokumentet er godkjent elektronisk.

Att.: Luftfartstilsynet, Norges vassdrags- og energidirektorat (NVE)

Vedlegg: 1

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VEDLEGG 7

Sammenstilling av resultatene fra overvåkningen av sjøfugl (Spoor)

Ettersendes i januar 2022.

VEDLEGG 8

Flaggermus og offshore vindkraft utenfor Karmøy

Av Tore Christian Michaelsen, Michaelsen Biometrika

Bakgrunn

Flaggermus kan være utsatt for kollisjon med vindturbiner både på land (Rydell et al., 2010; Lehnert et al., 2014) og til havs (Ahlen, 1997). Man har nokså lenge hatt kunnskap om at enkelte arter kan trekke svært langt, mens andre kun gjennomfører kortere forflytninger eller de er stasjonære (Hutterer et al., 2005). Noen arter som trekker over større avstander kan passere mange vindkraftanlegg når de forflytter seg mellom sommer og vinteroppholdssteder, og de krysser landegrenser. Trekkende flaggermus er derfor ikke bare et nasjonalt anliggende og flere arter er beskyttet gjennom Bonn-konvensjonen (Convention on the Conservation of Migratory Species of Wild Animals, www.cms.int), EUROBATS-avtalen (www.eurobats.org) og selvsagt nasjonale lovverk (Naturmangfoldloven). Eksempler på flaggermus som trekker langt og som finnes i Norge er trollflaggermus *Pipistrellus nathusii* og storflaggermus *Nyctalus noctula*. Disse vet vi har forflyttet seg henholdsvis 2224 (Alcalde et al., 2021) og 1600 kilometer (Hutterer et al., 2005). Slike langdistansetrekkere krysser flere landegrenser både vår og høst (Hutterer et al., 2005).

Studier viser at vindkraftverk kan ta livet av mange individer av nettopp disse artene (Rydell et al., 2010). Satsning på grønn energi gjør at man må vise hensyn til denne dyregruppen i langt større grad enn det som er gjort frem til nå. Gjør man ikke det, kan vindkraft være en medvirkende faktor til populasjonsreduksjon hos noen og kanskje mange arter (Rodrigues et al., 2008). Både nasjonale og internasjonale avtaler er til for å hindre at dette inntreffer. På den positive side, finnes det tiltak som kan redusere eventuelle negative effekter av vindkraft for flaggermus (Rydell et al., 2017). Hvis man bruker slike tiltak fornuftig, kan man vesentlig redusere negative effekter og samtidig minimere tap av kraftproduksjon. I noen tilfeller kan man forvente svært beskjedne produksjonstap hvis man innhenter nødvendig kunnskap (Rydell et al., 2017). Norge vil noen være blant de landene i Europa som vil ha lavest tap av produksjon som følge av relativt få arter. Arter som krever særlig beskyttelse har begrenset geografisk utbredelse eller forekommer i gitt områder kun i perioder av året (vår og høst).

Kunnskap om trekkende flaggermus i Norge og flaggermus i Rogaland

Kunnskapen om trekkende flaggermus har endret seg vesentlig det siste tiåret. Noen arter har vist seg å ha en videre utbredelse enn først antatt. Dette gjelder for eksempel trollflaggermus som dukker opp svært mange steder i Norge i trekktiden. Likeledes har storflaggermus blitt påvist nord til Trøndelag, en art som man tidligere kun trodde at kun fantes sør på Østlandet. Kunnskapen om forflytning og trekk hos storflaggermus er fremdeles mangelfull, men man antar at det er hunner som finnes i Norge og at disse trekker til andre land lenger sør for å overvintre. Funn av arten er gjort på øyer i Rogaland om høsten.

Trollflaggermus derimot vet vi at blir påvist på Østlandet, i Trøndelag, i høyereliggende områder om høsten og arten synes å aggregeres langs kysten av Sør-Norge, inklusive på øyer ute i havet. Om våren er denne arten påvist både på fastlandet og på oljeinstallasjoner langt ute i havet. Funn om sommeren dreier seg trolig om hanner som venter på forbipasserende hunner. Om høsten får man altså en betydelig økning i antall individer og dette dreier seg trolig om hunner og ungdyr som forflytter seg mellom ynglesteder i EU-land øst for Norge. Vi forventer at det forekommer et trekk mot Storbritannia og EU-land.

Andre arter blir også påvist på øyer, og mer unntaksvis på holmer og skjær utenfor de større øyene. Dvergflaggermus *P. pygmaeus*, nordflaggermus *Eptesicus nilssonii* og Myotis-arter *Myotis* spp kan alle forflytte seg over åpent hav. Dette kan også gjelde skimmelflaggermus *Vespertillio murinus*, men slike funn er foreløpig usikre. Hvor omfattende slike forflytninger er vites ikke, men man kan forvente at bare en mindre del av populasjonene foretar slike forflytninger (egne pågående studier på Vestlandet). Lovverket sier skal man vurdere effekt på populasjoner (feks Naturmangfoldloven og EUROBATS-avtalen). Disse andre artene kan jeg vanskelig se at skal bli skadelidende på populasjonsnivå som følge av offshore vindkraft som planlegges i større avstand fra fastlandet.

Rogaland synes å være blant fylkene med nokså høy flaggermusdiversitet. Trollflaggermus finnes her hele året og det synes å forekomme en vesentlig økning i antall om høsten (trekkende individer). Arten er også registrert svært langt fra land på Utsira og på oljeinstallasjoner i Nordsjøen. Storflaggermus er påvist på øyer i havet. En art som er publisert forekommende i Rogaland, tusseflaggermus *P. pipistrellus*, regnes ikke lenger for å være en norsk art.

Flaggermus og vindkraft i Norge

Kunnskap om eventuelle negative effekter av vindkraft på flaggermus i Norge er fraværende og kun svært begrensede studier har blitt gjennomført til nå. Avbøtende tiltak er også helt fraværende i vårt land, til tross for at nokså mange vindkraftverk når er i drift. Det vi vet er at noen arter trekker i områder hvor det finnes vindturbiner og vi har noen forventninger om hva dette kan bety basert på internasjonale publiserte studier. Ikke all slik kunnskap kan uten videre overføres til norske forhold. Med tanke på offshore vindkraftverk er kunnskapen mangelfull også internasjonalt. Det man kan si om problematikken i Norge er at det vil være rimelig om internasjonale konvensjoner og ratifiserte avtaler faktisk ble fulgt opp slik som er tilfelle ellers i europeiske land.

Kunnskap om avbøtende tiltak

Forundersøkelser har som mål å predikere potensielle negative effekter for flaggermus, og i noen tilfeller, tallfeste slike effekter. Avbøtende tiltak kan anbefales basert på slike undersøkelser. Det er ikke alltid mulig å gjennomføre egnede forundersøkelser og da gjelder det å finne mer generelle løsninger og eventuelt justere disse slik at de passer for lokale forhold etter utbygging er ferdigstilt. Noe slik generell informasjon finnes, og man kan følge opp med etterundersøkelser som kan maksimere kraftproduksjon og samtidig vise hensyn til dyregruppen. For trekkende flaggermus vil trolig (men ikke garantert) BatMode og full stans av rotorbladene i perioder med bestemte temperatur- og vindforhold være relevante for offshore vindkraft (Rydell et al., 2017). Her har man en del kunnskap fra utlandet som kan være gyldig for norske forhold (Ahlen, 1997; Rydell et al., 2010), med visse justeringer med tanke på klima og arter. En viktig forskjell kan være at man lengst nord i Europa, inklusive deler av Norge, har færre arter som man må ta hensyn til. Generelt kan bruk av BatMode redusere mortalitet med rundt 60 til 90 %. Jeg gir en kort oppsummering av noen viktige konklusjoner fra studier i vårt naboland Sverige. Flere av artene fra disse studiene er også forekommende i Norge og her fokuserer jeg på trollflaggermus og storflaggermus som kan være mest utsatt.

En studie fra offshore vindkraftverk i havområder utenfor Sør-Sverige (Østersjøen) viste en vesentlig reduksjon i aktivitet ved økende vindstyrke og man konkluderer med at denne aktiviteten delvis er knyttet til adferd hos insekter (Ahlen, 1997). Insektene styres av temperatur og vindforhold og kan under gunstige perioder sverme ved/over vindturbinene. Flyvehøyden når de trekker over åpent hav er ofte lav, og for noen arter langt lavere enn det man ofte observerer over land. Flaggermus kan justere flyvehøyde når de nærmer seg vindkraftverk til havs og forekomst av insekter spiller trolig en rolle når man observerer denne adferden. Flere arter kan jakte rundt turbiner under gitte væreforhold

og dessuten bruke anleggende som hvilested (Ahlen, 1997). Mer presist har man angitt høyest aktivitet hos flaggermus ved vindstyrke mellom 0 og 2 m/s og et fall i aktiviteten mellom 2 og 8 m/s, og dette synes å gjelde både landbasert og offshore vindkraft (Ahlen, 1997; Rydell et al., 2010). Studier viser at ikke bare lokale vindforhold spiller inn på mortaliteten ved vindkraftverk, men også generelle værforhold, hvor man kunne finne større aktivitet etter lavtrykk med storm og mye nedbør (Rydell et al., 2010). Det synes å være variasjon mellom arter med tanke på hvilke forhold som må være tilstede for å gjennomføre trekk (Ahlen, 1997). Lokal kunnskap om hvilke arter som trekker gjennom et gitt område er derfor viktig hvis man vil tilpasse avbøtende tiltak slik at tap av produksjon minimeres. En mer generell omtale av når BatMode bør anvendes er gitt av det svenske VindVal-prosjektet. Her anbefales det at rotorene stoppes når vindstyrken faller under 4-6 m/s (Rydell et al., 2017). Dette gjelder særlig vindkraftverk på land.

Studier utenfor sørspissen av Sverige viste aktivitet hos flere flaggermusarter også utenfor trekktiden (Ahlen, 1997). Ikke alle disse forekommer i Norge og flere av observasjonspunktene lå nært fastlandet eller større øyer med populasjoner av flaggermus. Undersøkelser gjort på Vestlandet tilsier ikke at man regulært kan forvente å finne flaggermus flere kilometer ut fra land om sommeren (Olsen & Michaelsen, 2007). Variasjon i lysforhold mellom sørspissen av Sverige og Norge spiller nok en vesentlig rolle i sommerhalvåret og deler av de svenske studiene har liten eller ingen relevans for norsk forhold i denne perioden (Michaelsen et al., 2011; Michaelsen, 2016). Videre er landskapet svært ulikt og flaggermus i Norge kan godt velge andre tilgjengelige jakthabitater både sommer og høst (Michaelsen, 2010). Fokus for eventuelle avbøtende tiltak for offshore vindkraftverk bør derfor være vår og høst, og i mindre grad om sommeren. Vi vet en del om trekk i Norge og man kan forvente at mai er viktig trekkperiode om våren, mens september og første del av oktober har flest trekkende individer om høsten. Det kan være at det finnes en vesentlig forskjell mellom mengde trollflaggermus som trekker gjennom Norge/Nordsjøen mellom vår og høst og det er sannsynlig at trekkrutene er forskjellig mellom disse årstidene. Det finnes ingen tydelig informasjon om eksakt hvor flaggermus samles før de forlater landet på vei sørover.

Anbefalt prosjekt på flaggermus og avbøtende tiltak for demonstrasjonsanlegget utenfor Karmøy

Plassering av ultralydloggere i nedre og midtre del på tre turbiner og utplassering av ultralydloggere lengst sør på Karmøy og på Utsira for å se etter mulige trekkruter. Det vil være nødvendig å bruke en værstasjon som samler inn avgjørende data fra området. Inntil man har mer informasjon om trekk og aktivitet i havområdet utenfor Karmøy, anbefaler jeg at man stanser kraftproduksjon når vindstyrken er lavere enn 5 m/s i perioder uten nedbør, men kun i mai måned og fra 1. september til 15. oktober. Datainnsamling bør foregå over tre år slik at man fanger opp temporær variasjon. Den/de som skal gjennomføre prosjektet bør ha særlig kompetanse på flaggermus og dessuten statistikk/modellering.

Interessante spørsmål som kan besvares gjennom en god studie

Det er ønskelig å få besvart noen spørsmål knyttet spesifikt til dette vindkraftverket. I tillegg, hvis finansiering er tilstede, er det ønskelig å innhente mer generell kunnskap om trekkveier i Norge. Slik kunnskap kan vesentlig redusere kostnader for fremtidige offshore vindkraftverk og man kan finne en tilnærming til kraftproduksjon som ikke krever feltinnsats for hvert vindkraftverk som skal bygges.

1. Ligger vindkraftverket i en trekkrute for flaggermus?
2. Er dette en viktig trekkrute for én eller flere arter, eller finnes det andre hovedtrekkruter (f.eks. sørover i retning Stavanger/Jæren)?
3. Finnes det temporær variasjon (mellom år) og eventuelt hvordan kan man predikere aktivitet i det aktuelle området?

4. Når på året foregår trekket gjennom det aktuell området (hvilke måneder av året)?
5. Under hvilke værforhold trekker flaggermus gjennom det aktuelle området (vind, vindretning og temperatur)?
6. Hvilke avbøtende tiltak er aktuelle dersom området viser seg å være en viktig trekkrute for flaggermus?
7. Hvilken effekt vil eventuelle avbøtende tiltak har for kraftproduksjon?

De neste spørmålene er viktig for fremtidige prosjekter i Norge. Det ville vært interessant og nyttig for industrien å finne svar også på disse spørmålene.

8. Kan man redusere bruk av avbøtende tiltak gjennom prediktiv modellering uten at dette har negative effekter for flaggermus?
9. Kan man bruke data fra dette studieområdet til å generalisere og dermed redusere kostnader for fremtidige offshore prosjekter?

Noen av spørsmålene ovenfor (1-7) kan nokså enkelt besvares gjennom utplassering av ultralydloggere deler av året. Gjør man dette over en periode på to eller tre år, avhengig av resultater, kan man gi trygge svar for det aktuelle vindkraftverket og minimere tapt produksjon av kraft. De to siste spørsmålene er trolig mer relevant for NVE og generell kunnskap om offshore vindkraft. Det synes å være temporær variasjon (mellom år) med tanke på trekk hos trollflaggermus (egne upubliserte data). Dette er med all sannsynlighet knyttet til værsystemer og hvordan lavtrykkene legger seg i august-september. Mer kunnskap om dette kan redusere bruk av avbøtende tiltak. Slik informasjon vil være særlig relevant for offshore kraftproduksjon på Vestlandet. Det ville vært produktivt om man fant alternative finansieringskilder som muliggjør et mer omfattende forskningsprosjekt hvis man anser offshore vindkraft som et satsningsområde.

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Om forfatteren:

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VEDLEGG 9

HYWIND ROV Survey Cable Route (2008)

Frame Contract No. 4600008515

Hywind ROV Survey
Cable Route Alt 5

2008

Vessel: Acergy Viking

ST08538

			AHJ	TRI	EJA
Issued for Construction	0	Jan.20.09	AHJ	TRI	EJA
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1. INTRODUCTION

1.1 GENERAL

This report comprises the results of the Hywind Cable Route Alt5. The survey covered a proposed route from the Hywind Demo offshore floating wind turbine to the Hywind cable kiosk (approximate length of route 12.1km). The objective of the route survey was to document the topography and sediment conditions related to trenching.

The Hywind Cable Route Alt5 survey was carried out using ROV mounted MBE, SSS and SBP sensors. A visual survey of the route was carried out using ROV mounted centre and boom cameras.

Survey operations were undertaken on the 1st December 2008 utilising the *ACV03* ROV deployed from the M/V *Acergy Viking.* The *ACV03* ROV was equipped with centre and boom cameras, Reson Seabat 7125 dual-head MBE, CDL2 RLG gyro, MRU-5 attitude sensor, Digiquartz depth sensor, Octans 3000 TI gyro, RDI Doppler log, SES 2002 side scan sonar and Innomar SES 2000ROV sub-bottom profiler.

The data has been processed in accordance with the StatoilHydro documents *Technical and professional requirements* (reference TR2234, Final Ver. 1), valid from Oct.30.07, and *Specification on seabed surveys, inspection and documentation* (reference TR1007, Draft A Ver. 2), valid from Mar.15.07. In addition, the survey data conforms to the Acergy AS *Survey Operations Procedure Acergy Viking* rev.0 (reference STATSURV08-SRV-0001) dated 8th February 2008.

Full charting of the data is presented in addition to this report; refer to Drawing Index, 5.4.

All co-ordinates are presented in the ED50 datum and UTM Zone 31 projection. The datum transformation used for the DGPS-derived WGS84 positions was a Normal 7-parameter shift (WGS84 to ED50 (Norway EPSG South of 62)). Refer to *EPSG Guidance Note Number 10* and Statoil Memo *Datum* transformations *between ED50 and WGS84 offshore Norway,* dated 22nd March 2002. Mean Sea Level (MSL) was used as the vertical datum.

Location diagrams of the Hywind cable Route Alt5 area are shown in Figure 1.1 overleaf.

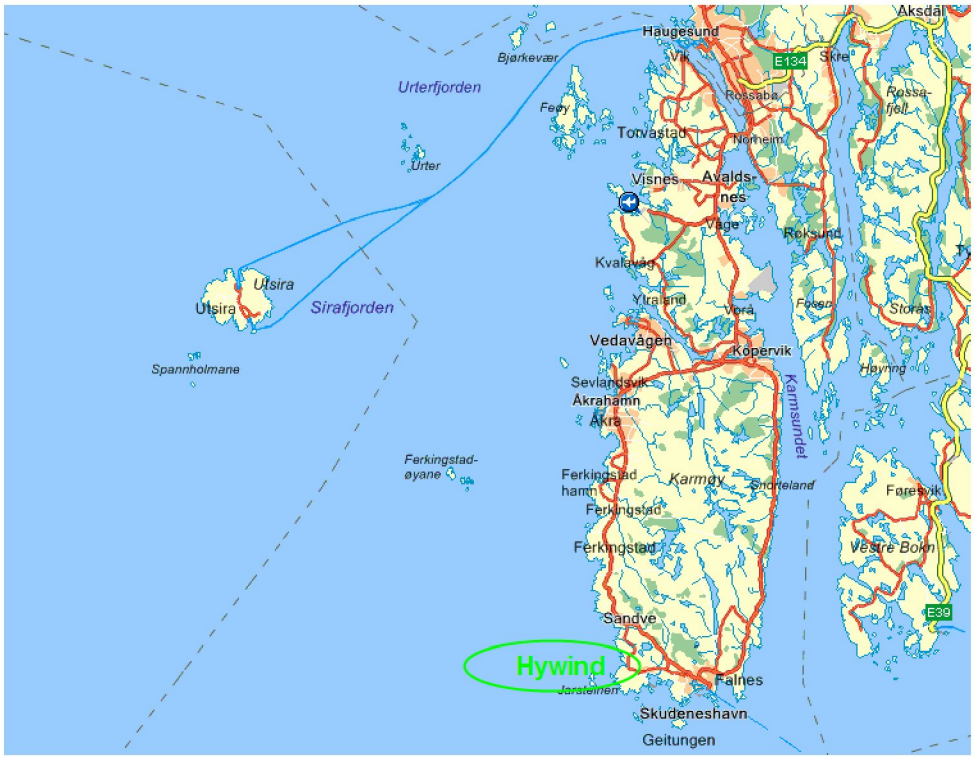


Figure 1.1 Hywind Location Diagram

1.2 SCOPE

The scope of this document is to present the results from the Hywind ROV Survey Cable Route Alt5.

1.3 RESPONSIBILITIES

The Senior Surveyor is responsible for compiling this document.
The Survey Reporting Manager is responsible for checking this document.
The Project Manager is responsible for approval/distribution of this document.

1.4 DEFINITIONS AND ABBREVIATIONS

ASCII	American Standard Code for Information Interchange
CD	Compact Disc
C-O	Computed - Observed
CPI	Company Provided Item
CTD	Conductivity, Temperature and water Density
DATUM	Set of reference points on the earth's surface
DOC	Microsoft Word document format
DTM	Digital Terrain Model
DVD	Digital Versatile Disc
DWG	Autocad drawing file format
DCC	Distance Cross Course (Deviation/offset from design route)
DGPS	Differential Global Positioning System
DP	Dynamic Positioning
DTM	Digital Terrain Model
DVL	Doppler Velocity Log
ED50	European Datum 1950)
EPSG	European Petroleum Survey Group
FOC	Fibre Optic Cable
FPSO	Floating Production Storage Offshore
GPS	Global Positioning System
HDD	Hard Disk Drive (USB)
IMU	Inertial Motion Unit
INS	Inertial Navigation System
ITRF	International Terrestrial Reference Frame
ITRS	International Terrestrial Reference System
IDC	Internal Disciplinary Check
HAIN	Hydroacoustic Aided Inertial Navigation
HiPAP	High Precision Acoustic Positioning
KP	Kilometre Post
JPG	File format for photographic images
MBE	Multi Beam Echosounder
MPEG2	Digital video file format
MRU	Motion Reference Unit
MSL	Mean Sea Level
MVP	Moving Vessel Profiler
MBE	Multi Beam Echo sounder
MOB	Mobilisation
MRU	Motion Reference Unit

MSB	Absolute depth to Mean Seabed
MSL	Mean Sea Level
OAS	Obstacle Avoidance Sonar
PDF	Portable Document Format (Adobe)
PGW	Georeference file for the PNG format
PNG	File format for images
PC	Personal Computer
RAID	Redundant Array of Independent Disks
ROV	Remotely Operated Vehicle
RTCM	Radio Technical Commission for Maritime Services
SBP	Sub Bottom Profiler
SES	Sonar Equipment Services
SSBL	Super Short Base Line
SSS	Side Scan Sonar
SVP	Sound Velocity Profile
TWT	Two Way Travel
TIF	File format for images
USB	Universal Serial Bus
USBL	Ultra-short baseline
UTC	Universal Time, Coordinated
VMS	Vessel position Monitoring System
UTM	Universal Transverse Mercator
VoS	Velocity of Sound
WGS84	World Geodetic System 1984

1.5 REFERENCES

Contract References

46000008515	*Frame contract for survey services between Statoil ASA and Acergy Norway AS.*

Statoil References

TR1007, Final Ver.2	*Specification for Seabed Surveys, Inspection and Documentation.*
TR1063, Ver.1	*Geographical Information.*
TR2234, Final Ver.1	*Specification for external inspection of offshore pipelines.*
TR2234, Final Ver.1	*Amendment to: Specification for external inspection of offshore pipelines.*
ST08538-SOW, Rev. 0	*Hywind ROV Survey. Cable route alt 5.*

Statoil Memo

Datum transformations between ED50 and WGS84 offshore Norway, dated Mar.22.02.

Acergy References

STATSURV08-SRV-0001 Ver 2.0	*Survey Procedure Acergy Viking.*
STATSURV08-SRV-0005 Ver.1.0	*Reconnaissance Survey Procedure.*
STATSURV08-SRV-0003 Ver1.0	*Mobilisation and Calibration Report 2008 Acergy Viking.*

EPSG References

Changes in the handling of spatial data Offshore Norway - Geodetic Transformations - EPSG Guidance Note Number 10.

2. SURVEY DESCRIPTION

2.1 SCOPE OF WORK

The scope of work is described in:

ST08538-SOW, Rev. 0	*ST08538 Hywind ROV Survey. Cable route alt 5 (Dated 12.11.2008 Tom Hansen).*

Hywind is located on the Norwegian west coast, at a water depth ranging from 0 to 210m. The survey was to cover the alternative 5 route from the planned Hywind Demo offshore floating wind turbine to the Hywind cable kiosk (approximate length of route 12.1km).

The purpose of the work was to document the nature of the seabed topography and sediment conditions related to trenching, paying special attention to seabed classification, features, obstructions and/or corals on the seabed, it was important that the survey gave the most detailed DTM possible.

The Hywind ROV Survey Cable Route Alt 5, location diagram is shown in Figure 2.1 overleaf.

Reporting was in accordance with existing Frame contract 46000008515 and Acergy reporting procedures.

The Hywind ROV Survey Cable Route Alt 5 was completed and performed in accordance with the scope of work.

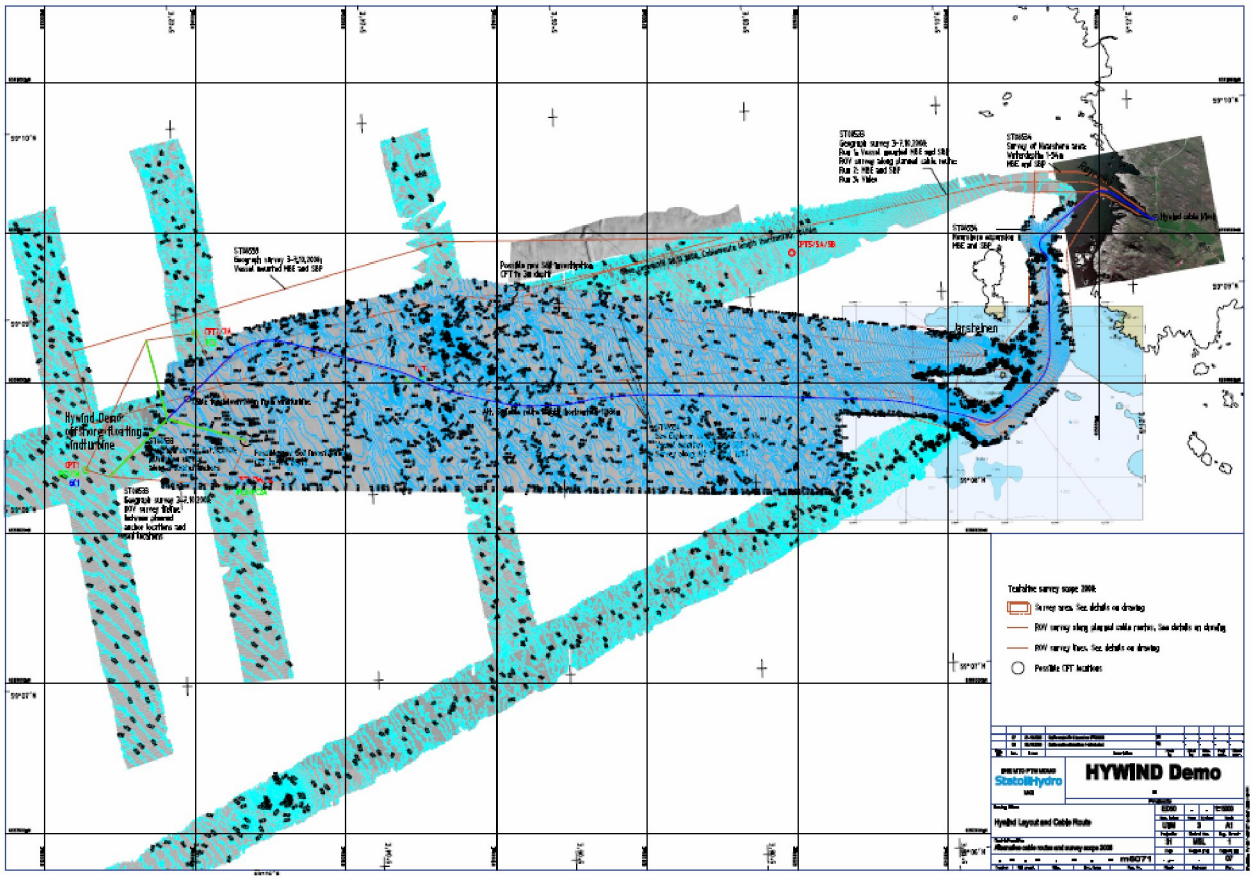


Figure 2.1 Hywind ROV Survey Cable Route Alt 5, location diagram

2.2 GEODESY

The following geodetic parameters were used throughout the project.

Datum Parameters ED50	
Spheroid	International (Hayford 1924)
Semi-Major axis	6 378 388.000m
Semi-minor axis	6 356 911.946m
Flattening	1/297.0000000
Eccentricity	0.006722670
Unit	International Metre

UTM Zone (Various) Projection Parameters	
Projection	Transverse Mercator
Zone	31N
Latitude of Origin	0°
Central Meridian	3°E
Scale Factor	0.9996
False Easting	500 000
False Northing	0
Unit	International Metre

Transformation Parameters WGS84 to ED50 (South of 62° North)			
Translation (m)		Rotation (seconds of arc)	
DX:	+90.36m	Rx:	-0.3330
DY:	+101.13m	Ry:	-0.0770
DZ:	+123.38m	Rz:	-0.8940
Scale Factor: -1.994ppm			

Acergy Viking's surface navigation is based on two different suppliers of DGPS positioning. Both DGPS systems are referenced to ITRF with a specific epoch.

Fugro SkyFix XP DGPS: ITRF 2005, epoch 2007
Veripos ULTRA: ITRF 2000

2.3 PERFORMED WORK/SUMMARY OF EVENTS

The Hywind ROV Survey Cable Route Alt 5 was performed in accordance with the scope of work, as tabulated below in Table 2.1. For additional detail, refer to the *Summary of Events* shown in Table 2.2.

Table 2.1 Performed Work

Task	Route	Comments
Route Survey	Cable Route Alt 5	ROV mounted MBE & SBP survey. - Centreline along the cable alt 5 route. - Length 12.136km - ROV altitude 10-15m.
Visual Survey	Cable Route Alt 5	- Visual survey to identify obstructions and/or corals on the planned route alt 5.
Visual Inspection	Cable Route Alt 5	- Visual inspection of mine found on route (ref: FHR-61003100-097).

Table 2.2 Summary of Events

Date	Time UTC	Operations Description	Distance Surveyed (km)
01/12/2008	03:50	Vessel on location. Setting up on DP	
01/12/2008	04:20	Vessel on DP. ROV preparing to dive.	
01/12/2008	04:23	ROV of deck.	
01/12/2008	04:57	CTD values entered into NaviPac, NaviScan, Hain, Hipap	
01/12/2008	05:06	Log on. Survey south west on Cable route Alt 5.	
01/12/2008	05:11	Log off. End of Testline. ROV turning 180°.	
01/12/2008	05:19	Log on SOL. Surveying Hywind Cable route Alt 5. Survey towards coast North East.	
01/12/2008	05:29	ROV increasing speed to 0.9m/s.	
01/12/2008	07:28	Log off.	6.454
01/12/2008	07:47	Log on. Resume Surveying Hywind Cable route Alt 5. Survey towards coast North East.	
01/12/2008	07:58	ROV at 0.9m/s.	
01/12/2008	08:25	ROV reducing speed to 0.7 m/s due to seabed topography	
01/12/2008	09:19	ROV reducing speed to 0.5 m/s due to seabed topography	
01/12/2008	09:34	ROV adjusts altitude to 8m due to shallow	

Date	Time UTC	Operations Description	Distance Surveyed (km)
		sea.	
01/12/2008	09:37	ROV adjusts altitude to 4.7m due to shallow sea.	
01/12/2008	09:38	Start logging.	
01/12/2008	09:47	ROV speed down to 0.2m/s due to shallow sea and proximity to coast.	
01/12/2008	10:17	Vessel coming to a stop. ROV moved along line as far as operationally possible.	
01/12/2008	10:27	Log off EOL. ROV cannot survey any further as hipap is losing signal in shallow water at 150m from vessel. Move back to start visual survey away from coast.	11.503
01/12/2008	10:35	Log on. Visual survey along route towards Hywind.	
01/12/2008	12:57	Wire debris on seabed in centre camera.	
01/12/2008	13:48	Mine on starboard side.	
01/12/2008	13:54	Tyre on centre camera.	
01/12/2008	13:57	Log off. Move back to KP 3.242 to investigate possible mine. Moving back along line to target area.	
01/12/2008	14:18	Log on. Target investigation	
01/12/2008	14:24	Fix on mine position E- 619088.04 N- 6557904.88	
01/12/2008	14:29	Log off. End of investigation. Move to look at another target KP 3.082	
01/12/2008	14:47	Target was a ladder E- 618920.00 N- 6557920.00	
01/12/2008	14:53	Log on. Visual survey along route towards Hywind.	
01/12/2008	16:02	Log off EOL. Completed survey. ROV recovering to deck for transit to CCB.	

2.4 DATA ACQUISITION PARAMETERS

ROV - SSS	All SSS data digitally stored (no paper records). 100m range Frequency 320kHz (High resolution)
ROV - SBP	Range 20msec twt (recorded) Low Frequency 10KHz Ping rate 4 p/s Sampling 480 samples/pulse
CTD	Profile measured before the start of survey.
Water level	MSL – Predicted tides using Polpred software package were used for the ROV based survey.
ROV MBE (Seabat 7125)	MBE Ping Frequency – 10 Hz. Range 50. Power 220 – max power. Gain 8. Pulse Length 90 Mode - Equidistant.

2.5 EQUIPMENT

Hywind Cable Route Alt5 survey was undertaken utilising the following survey equipment and sensors:

Vessel:

Surface positioning	Fugro SkyFix XP DGPS. MultiFix 5 QC software x 2. Veripos ULTRA with Veripos QC 5 PC's x 2.
Sub-surface positioning	Kongsberg HiPAP 500 dual transducers c/w APOS and HAIN.
Heading and attitude	Seatex Seapath 200 and MRU-5 attitude dual sensors x 2. IXSEA Hydrins heading and attitude sensor x 1.
Barometer	Paroscientific MET3A digital Barograph.

ROV (ACV03):

MBE	Reson Seabat 7125 Dual Head MBE System.
SSS	SES Probe 2002 Multilink
SBP	Innomar SES 2000 ROV Parametric Echo Sounder
Bathymetry	Paroscientific Digiquartz sensor.
INS System	HAIN Inertial Navigation System.
Subsea Gyro	Ixsea Octans 3000 TI gyro / motion sensor

	CDL2 MiniRLG gyro / motion sensor.
Attitude	Seatex MRU 5E motion sensor. Ixsea Octans 3000 TI gyro / motion sensor. CDL2 MiniRLG gyro / motion sensor.
Doppler	RDI Workhorse Navigator Doppler Velocity Log (1200kHz).
CTD	*Sensordata* A/S Mini CTD SD204 STD/CTD probe.

2.6 PROCESSING SYSTEMS

Navigation (Hain)	Processed in MatLab v7.3.0
Depth Data	Processed in MatLab v7.3.0
MBE Data	Processed in Neptune and CFloor V6.3.4
SBP Data	Processed in Innomar ISE v 2.92
Charting	Processed in SeaMap2000 v.08c18 and AutoCAD 2008. Shaded relief in Eiva Imaging Vers 2.2.2.0

2.7 DATA PRESENTATION

A summary of results and detailed results are presented within this report along with all paper charts, DTM's, SSS Coda files and SBP Innomar files.

The survey data is presented on a series of A1 size drawings. The content and layout of the charts is described below in Table 2.3. The *Drawing Index* is given in Table 5.4.

Table 2.3 Data Presentation

Drawing Title	Drawing Content and Layout
Route Survey : Hywind Cable Route. 10 charts Horizontal Scale: 1:2000 Contour Interval: 0.5m	Box 1: Plan Box with Bathymetry and Seabed Features. Including SSS targets and visual events.
	Box 2: Shaded Relief with contours
	Box 3: Longitudinal Profile and Sub-Seabed Geology. Cut line along the proposed cable route Vertical Scale 1:200.

2.8 REPORTING

The survey data was processed in accordance with StatoilHydro specification and Acergy work procedures. All the resulting survey data were collated and presented as a series of charts and data files, together with the final survey report.

The navigation and depth data was processed in Navlab (tide values applied) before being exported to Seamap, merged with the MBE and exported to Neptune.

The MBE data was then 'cleaned' to remove any noise before being processed to produce a DTM.

A grid cell size of 0.1 X 0.1 metres was used for the route survey, from which contours were generated at 0.5 metre intervals.

The SSS records were interpreted for significant targets and seabed features. The SBP data were interpreted to identify shallow soil classification and sediment thicknesses.

2.9 SURVEY OPERATIONS AND QUALITY EVALUATION

All survey sensors performed to specification and the *ACV03* ROV provided a very reliable and stable platform from which to record the data.

The speed of survey for the MBE / SSS and SBP work was not limited by any survey factors and was thus determined by ROV, vessel and the environmental conditions. The actual survey speed varied throughout but the aim was to average 1m/s. Speed was reduced in the shore approach area.

A Reson Seabat 7125 dual-head MBE system, mounted on the ROV, was utilised and provided detailed bathymetry data throughout the project. The heads were mounted onto the ROV 2 metres apart and outwards at an angle of 17° from the horizontal. This ensured that overlapping coverage was achieved between the two Seabat heads. The exact head roll offsets were determined by calibration prior to the start of survey and maintained for the duration of the survey. The overall corrections for pitch, roll, heading and any timing offsets were calculated from a patch test of 5 short lines carried out on the 15th November (ref: FHR-61003100-093).

The Seabat 7125 data showed some noise, mainly induced by interference from the sub-bottom profiler. This noise was substantially reduced by online gating in the 7125 software. The remaining noise was cleaned manually in Neptune. The ping rate for the Seabat 7125 was set to 10Hz, the range to 50m with the ROV altitude at 10 – 12m the density of data was sufficient for the 0.1 m grid required.

The SAIV A/S Mini CTD SD204 mounted on the ROV was used for CTD measurements. The SD204 was interfaced through the ROV so that a velocity of sound profile was recorded during the ROV dive to the seabed or recovery to deck. A new profile was recorded at the start of the survey operations and the values input to the sensors. The HiPAP, HAIN NaviPac and NaviScan software all required velocity of sound and / or water density input. The data was stored for later offline use in depth processing in NabLab. The CTD sensor was also interfaced to the Reson MBE systems to provide real-time updates for the velocity of sound. Details of CTD data recorded during the project can be viewed in Appendix I – CTD Measurements.

The SES Probe 2002 SSS system was operated in high frequency mode (320 kHz). A 100m slant range was used for all survey lines.
An ROV flying height of 10 - 12m was required for sufficient MBE coverage and this was not optimal for SSS acquisition. In the nearshore, shallow area between KP 10.8 and KP 11.5, the flying height was 5m. SSS data was also recorded during the visual inspection along the planned cable route. The SSS records were of limited quality outside the range of 45m.

The SBP data acquired with the Innomar system was of acceptable and mostly of good quality. However, the SBP penetration was generally less than 3m sub-seabed due to the nature of the shallow sediments (dense sand), SBP and SSS data examples are presented in Section 4.5.

The ROV auto follow function was used with great success on this project; the online navigation computer sends the ROV a heading and DOL value. The ROV then runs in auto altitude (12m) and the pilot only has to control the speed of the vehicle. Thus the platform for data collection is stable and a constant speed.

The HAIN position and depth data was good quality. A constant speed, direction, altitude and a good run-in to the survey line, give the Kalman filter the best possible opportunity to compute a good solution. If there was a break in the survey line for whatever reason then an overlap of 50m was required.

For the ROV based survey bathymetry data was reduced to mean sea level (MSL) using predicted tides calculated from the Polpred software package. For more information see Appendix II – Tidal Data.

3. SUMMARY OF RESULTS

3.1 INTRODUCTION

The Hywind Cable Route, Alternative 5, Survey utilised ROV-mounted MBE, SSS and SBP. The quality of the survey sensor data was generally good throughout.

All depths presented in this report and accompanying drawings are reduced to Mean Sea Level (MSL) using predicted tides generated by the Polpred software package. Water depth contours have been drawn at an interval of 0.5m, based on a DTM model generated with grid cell size of 0.1m by 0.1m.

Geotechnical sampling data, StatoiHydro Ref. ST087536 Hywind, was made available at the time of writing this report. Consequently, sediment descriptions are based upon a combination of CPT interpretations, some box core samples, seismic character, sonar reflectivity and ROV video footage.

3.2 HYWIND CABLE ROUTE, ALTERNATIVE 5

Bathymetry

The water depth at survey start, KP -0.200 was 207.0m. The water depth at survey end, KP 11.500 was 20.6m. The seabed topography within the proposed route survey corridor essentially shoals gently from KP 0 to KP 6.6, from KP 8.3 to KP 10.6 and from KP 10.9 to KP 11.5. Some anomalous local slopes were observed: 8° at KP 3.830 (soft CLAY), and 5° to 8° between KP 10.600 and KP 10.850 (loose SAND).

Seabed Features

The seabed between KP -0.200 and KP 6.540 was interpreted as very soft to soft clay. Occasional areas of higher sonar reflectivity may represent discrete patches of slightly coarser seabed sediments and/or shell fragments. From KP 6.540 to the Landfall the seabed was interpreted as loose SAND.

A total of 410 unidentified sonar targets were observed within the route survey corridor. These were predominantly believed to represent boulders.

One mine was observed at KP 3.243 during the visual survey along the centre line.

Shallow Sediments

A unit of very soft to soft CLAY, of thickness not exceeding 3m, was interpreted to cover stiff to hard CLAY from KP -0.200 to KP 6.540. From KP 6.540 the top soil changes to clayey SAND, then gradually to SAND. From KP 6.540 to the landfall area the subsoil comprised dense to very dense SAND.

4. DETAILED RESULTS

4.1 INTRODUCTION

This section presents the detailed results of the Hywind Cable Route, Alternative 5, Survey. The survey covered a proposed route for a cable from the planned location of the Hywind Demo Offshore Floating Wind Turbine towards the Landfall in Røyrvika on Karmøy (approximate length of surveyed route 11.7km). The survey results are discussed in relation to the route centreline based on the proposed cable route.

The details of scope of work and work performed are given in Section 2.

The objective of the Route Survey was to document the seabed topography and sediment conditions related to trenching.

- Acquire data for seabed classification
  - shallow geology
  - sediment distribution
  - thickness of soft sediment layers
- High resolution mapping of the seabed topography
- Identify seabed features
- Identify obstructions and/or corals on seabed

The survey was carried out using ROV mounted MBE, SSS and SBP sensors. The visual survey along the planned route was carried out using ROV mounted centre and boom cameras.

Chart drawing numbers are listed in Section 5.4. The ROV Video and SSS Observation Listings are included as an attachment to this report (ref: *Hywind_Observation_Listing.xls).*

All depths presented in this report and accompanying drawings are reduced to Mean Sea Level (MSL) using predicted tides generated by the Polpred software package. Water depth contours have been drawn at an interval of 0.5m, based on a DTM model generated with grid cell size of 0.1m by 0.1m.

A longitudinal profile (section through the DTM) has been generated along the route. Sub-bottom geological information included on the longitudinal profile has been scaled vertically based on an assumed velocity of sound in sediments of 1600 m/s.

Geotechnical sampling data (StatoilHydro Ref. ST08536 Hywind) was available at the time of writing this report. Consequently, sediment descriptions are based upon a combination of CPT and core sampling, seismic character, sonar reflectivity and ROV video footage.

The classification (legend) used for the seabed sediments and shallow soils is given in Table 4.1 and Table 4.2 respectively.

Table 4.1 Seabed Sediments Classification (SSS Interpretation)

Unit	Acoustic Character	Geological Interpretation
1A	Low uniform reflectivity.	Very soft to soft CLAY.
1B	Low to moderate uniform reflectiviry.	Soft sandy CLAY.
1E	Low to moderate reflectivity with point source contacts.	Soft CLAY with boulders and cobbles.
2A	Moderate reflectivity.	Loose to medium dense SAND.
2D	Striated medium to high reflectivity.	Rippled, loose to medium dense SAND.
2E	High reflectivity with point source contacts.	Loose to dense gravely SAND with boulders and cobbles.
3	Very high or irregular reflectivity.	BEDROCK with uneven cover of sediments.

Table 4.2 Shallow Soils Classification (SBP Interpretation)

Unit	Acoustic Character	Geological Interpretation
A1	Acoustically transparent with occasional weak to moderately strong, parallel, continuous reflectors.	Very soft to soft CLAY with sandy interlayers.
B1	Acoustically semi transparent.	Loose to medium dense SAND
B2	No evident acoustic penetration.	< KP 6.500 Stiff to hard CLAY. > KP 6.500 Dense to very dense SAND.

Note: Velocity of sound used (time to depth conversion) for shallow soils was 1600m/s.

4.2 BATHYMETRY

The drawings and their drawing numbers are listed in Section 5.4.

The water depth at survey start, KP -0.200 was 207.0m. The water depth at survey end, KP 11.500 was 20.6m. The seabed topography within the proposed route survey corridor essentially shoals gently from KP 0 to KP 6.6, from KP 8.3 to KP 10.6 and from KP 10.9 to KP 11.5. The seabed was undulating due to relict iceberg plough marks between KP 0.100 and KP 7.300, causing local slopes > 5° at KP 0.350, KP 1.350, KP 3.730, KP 3.830 (8°), KP4.150, KP 4.400, KP 4.650, KP 4.750, KP 5.470, and at KP 6.750.
Irregular seabed due to exposed bedrock was evident between KP 8.150 and KP 8.400, and between KP 10.600 and KP 10.850. In the last mentioned area slopes of 5° to 8° were observed.

4.3 SEABED FEATURES

The full detailed SSS target listing and visual seabed features listing are included in the attached file ***Hywind_Observation_Listing.xls***.

The seabed sediments classification used on the drawings is shown in Table 4.1.

The dominant morphological features were caused by relict, or buried, iceberg plough scars, or by exposed crystalline rocks. However, The seabed along most of the proposed cable route exhibits a very low uniform sonar reflectivity, which is interpreted as very soft to soft clay. Areas of higher sonar reflectivity represented discrete patches of slightly coarser seabed sediments with small boulders and cobbles. From KP 6.540 and towards the Landfall the seabed was covered by loose to medium dense SAND. Rippled SAND was particularly evident between KP 7.600 and KP 9.500. Bedrock outcrops were encountered in the shallow parts of the route, see data example from SSS in Figure 4.1. At KP 8.860 a 5m by 3m bedrock outcrop was visually observed (was within the SSS blind zone).

A mine and numerous boulders were observed during the ROV visual survey along the planned cable route. The most important items of debris are listed in Table 4.3 below.

Table 4.3 Most significant Items of Debris along the Cable Route.

Time	KP	Easting (m)	Northing (m)	L (m)	H (m)	W (m)	Offset (m)	Side Of Route	Description – (Code)
15:34:58	1.126	617054.7	6558389.6	0.4	0.4	0.4	0	On Track	Debris-Metal – (DEME)
13:52:43	3.081	618931.4	6557943.9	0.8	0.1	0.8	0	On Track	Mine-Sinker Only – (MISO)
13:49:35	3.243	619087.5	6557901.1	1.0	1.0	1.0	3.2	North	Mine-Mine Only – (MION)
12:58:17	5.756	621578.2	6557874.7	43.0	0.2	0.2	0	On Track	Debris-Cable/Wire – (DECW)
14:47:35	3.083	618926.8	6557922.7	5.0	1.0	1.0	21	South	Debris – Metal – (DEME) Ships Ladder

A total of 410 sonar targets were depicted within 45m from the planned cable route, all interpreted as unidentified targets.

The full detailed visual events and the SSS target listings are included in the attached Observation Listing, ***Hywind_Observation_Listing.xl.s***

4.4 SHALLOW SEDIMENTS

The shallow soils classification used on the drawings is shown in Table 4.2.

The SBP data records were consistent along the cable route from KP – 0.200 to about KP 6.540 where a unit (A) of very soft to soft sandy CLAY, of thickness 3m, decreasing to 1m, was interpreted to cover stiff to hard CLAY. From about KP 6.540 the top soil changes to clayey SAND, then gradually to SAND. From KP 6.540 to the landfall area the subsoil comprised dense to very dense SAND.

Although boulders were frequently observed on the seabed, there were no obvious signs of boulders or other single point contacts detected in the subsoil.

SBP data examples are presented in Section 4.5, refer to Figure 4.2 and Figure 4.3.

4.5 DATA EXAMPLES

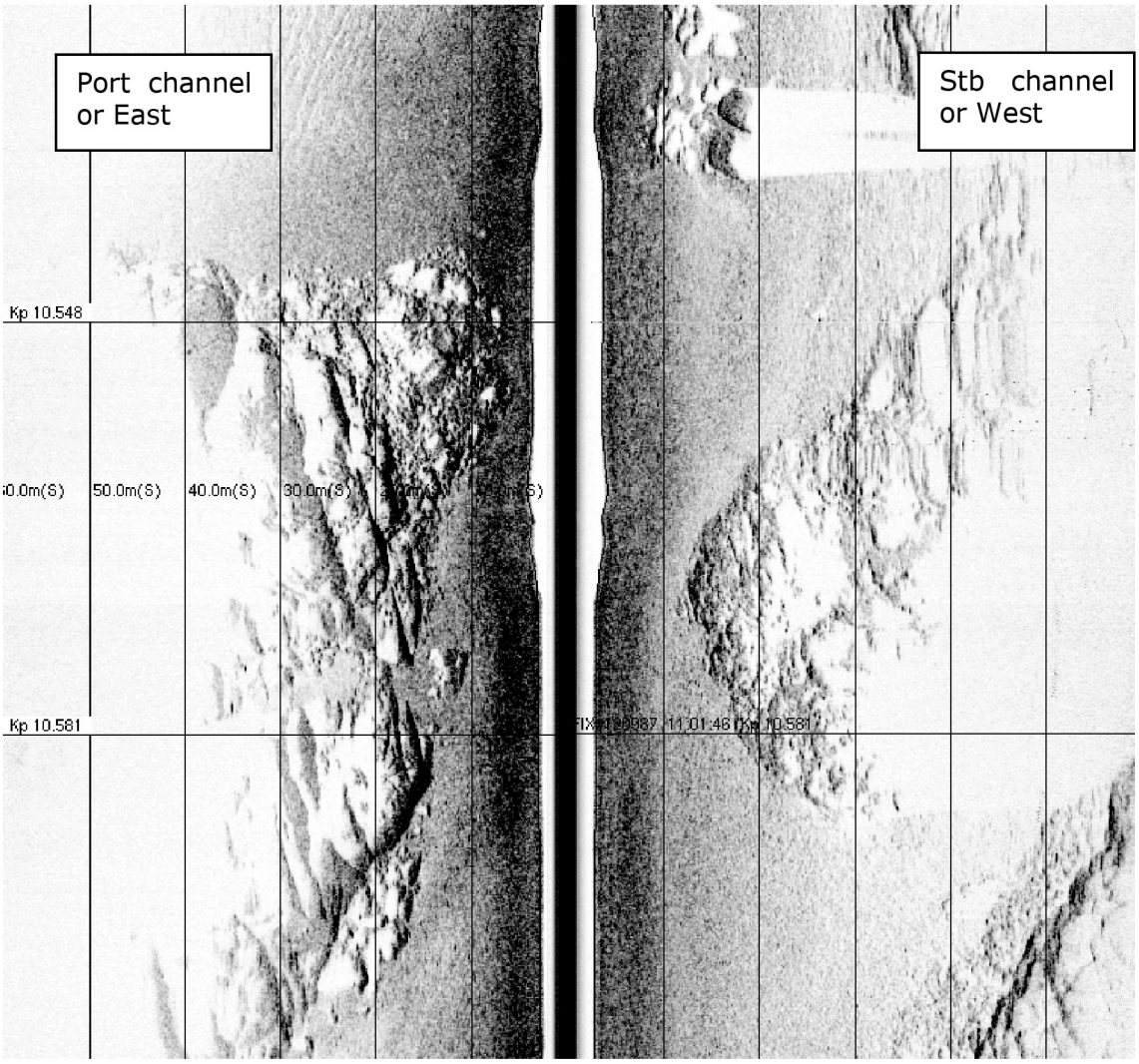


Figure 4.1 SSS KP 10.525 to KP 10.610. Approximately 60m range displayed on both channels. Sandy seabed between bedrock outcrops.

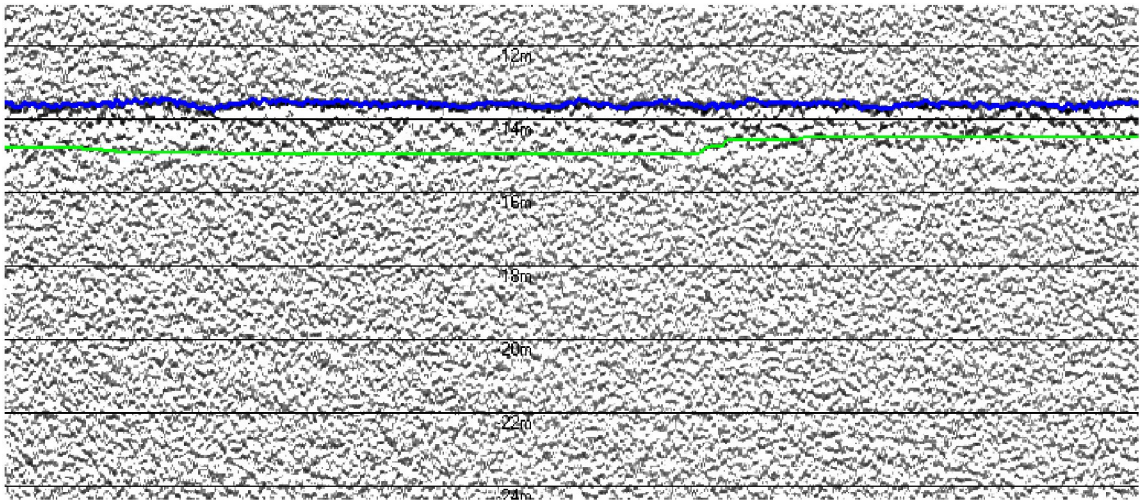


Figure 4.2 SBP KP 7.760 to KP 7.910. Interpreted as about 1m of loose, clayey SAND on top of dense SAND (green line). Speed of sound 1600m/sec. The blue line is the seabed at approximately 94m water depth.

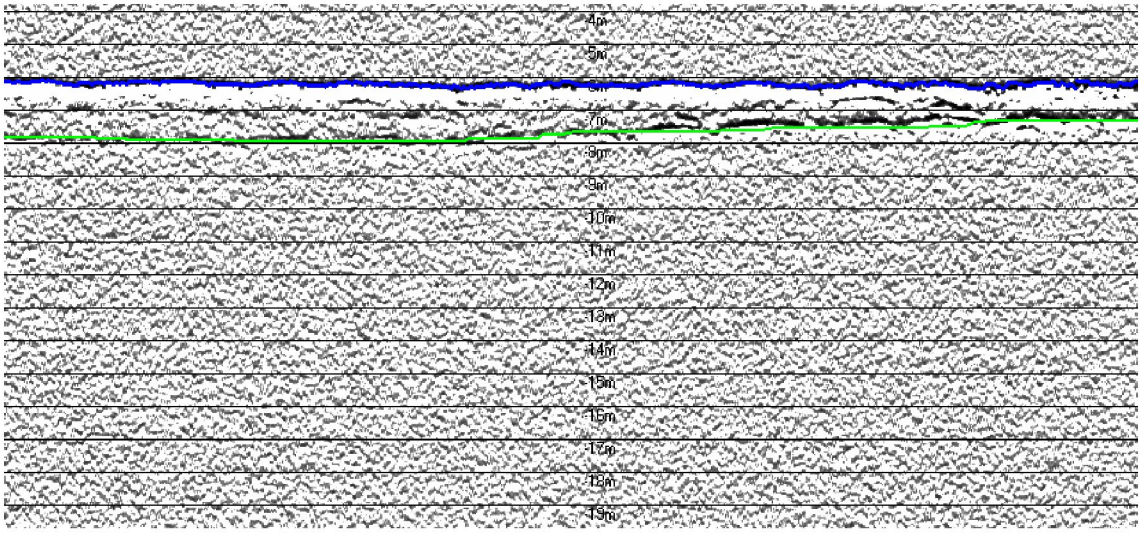


Figure 4.3 SBP KP 10.980 to KP 11.030. 1 - 2m of loose SAND on top of dense SAND (green line). High reflective horisonts might represent buried rippled surfaces. Speed of sound 1600/sec. The blue line is the seabed at approximately 27m water depth.

5. DATA INDEXES

5.1 SSS CODA FILE INDEX

Table 5.1 SSS CODA File Index

Date	Content	File Name	Time		KP	
			Start	End	Start	End
01/12/2008	Hywind Cable Route Survey alt 5 - Survey towards shore North East	081201 051932	0519	0525	-0.227	-0.177
01/12/2008	Hywind Cable Route Survey alt 5 - Survey towards shore North East	081201 052526	0525	0611	-0.177	2.378
01/12/2008	Hywind Cable Route Survey alt 5 - Survey towards shore North East	081201 061142	0611	0657	2.378	4.810
01/12/2008	Hywind Cable Route Survey alt 5 - Survey towards shore North East	081201 065758	0657	0728	4.810	6.454
01/12/2008	Hywind Cable Route Survey alt 5 - Survey towards shore North East	081201 074715	0747	0833	6.390	8.561
01/12/2008	Hywind Cable Route Survey alt 5 - Survey towards shore North East	081201 083331	0833	0919	8.561	10.229
01/12/2008	Hywind Cable Route Survey alt 5 - Survey towards shore North East	081201 091946	0919	1005	10.229	11.205
01/12/2008	Hywind Cable Route Survey alt 5 - Survey towards shore North East	081201 100558	1005	1027	11.205	11.500
01/12/2008	Hywind Cable Route Survey alt 5 - Visual survey away from shore	081201 104046	1040	1127	11.341	9.742
01/12/2008	Hywind Cable Route Survey alt 5 - Visual survey away from shore	081201 112701	1127	1213	9.742	7.668
01/12/2008	Hywind Cable Route Survey alt 5 - Visual survey away from shore	081201 121316	1213	1259	7.668	5.704
01/12/2008	Hywind Cable Route Survey alt 5 - Visual survey away from shore	081201 125929	1259	1345	5.704	3.436
01/12/2008	Hywind Cable Route Survey alt 5 - Visual survey away from shore- Log off to investigate target	081201 134541	1345	1357	3.436	2.831
01/12/2008	Hywind Cable Route Survey alt 5 - Visual survey away from shore	081201 145334	1453	1539	3.081	0.915
01/12/2008	Hywind Cable Route Survey alt 5 - Visual survey away from shore- Log off EOL	081201 153949	1539	1602	0.915	-0.048

5.2 INNOMAR SBP FILE INDEX

Table 5.2 Innomar SBP File Index

Date	Content	File Name	Time		KP	
			Start	End	Start	End
01/12/2008	Hywind Cable Route Survey alt 5 - Survey towards shore North East	081201 051929	0519	0709	-0.227	5.426
01/12/2008	Hywind Cable Route Survey alt 5 - Survey towards shore North East-	081201 070956	0709	0728	5.426	6.454
01/12/2008	Hywind Cable Route Survey alt 5 - Survey towards shore North East	081201 074712	0747	0937	6.390	10.794
01/12/2008	Hywind Cable Route Survey alt 5 - Survey towards shore North East-	081201 093734	0937	1027	10.794	11.503

5.3 DIGITAL VIDEO INDEX

Table 5.3 Digital Video Index

Filename From	Filename To	Content	Date	From Time	To Time	From KP	To KP
20081201 093842	20081201 102344	Start visual survey of Hywind Route cable alt 5 towards coast	01/12/08	0938	1027	10.794	11.503
20081201 103459	20081201 135010	Visual survey of Hywind Route cable alt 5- Away from coast- Log off to investigate target	01/12/08	1034	1357	11.341	2.831
20081201 141831	20081201 141831	Target investigation possible mine.	01/12/08	1418	1429	3.192	3.241
20081201 145329	20081201 155331	Visual survey of Hywind Route cable alt 5- Away from coast.	01/12/08	1453	1602	3.081	-0.048

5.4 DRAWING INDEX

Table 5.4 Drawing Index

Drawing Number/File Name	Start KP	End KP	Scale	Drawing Title
Hywind_2000_a1_01	-0.225	0.925	2000	HYWIND CABLE ROUTE, Alt. 5
Hywind_2000_a1_02	0.875	2.125	2000	HYWIND CABLE ROUTE, Alt. 5
Hywind_2000_a1_03	2.075	3.325	2000	HYWIND CABLE ROUTE, Alt. 5
Hywind_2000_a1_04	3.275	4.525	2000	HYWIND CABLE ROUTE, Alt. 5
Hywind_2000_a1_05	4.475	5.725	2000	HYWIND CABLE ROUTE, Alt. 5
Hywind_2000_a1_06	5.675	6.925	2000	HYWIND CABLE ROUTE, Alt. 5
Hywind_2000_a1_07	6.875	8.125	2000	HYWIND CABLE ROUTE, Alt. 5
Hywind_2000_a1_08	8.075	9.325	2000	HYWIND CABLE ROUTE, Alt. 5
Hywind_2000_a1_09	9.275	10.525	2000	HYWIND CABLE ROUTE, Alt. 5
Hywind_2000_a1_10	10.475	11.504	2000	HYWIND CABLE ROUTE, Alt. 5

5.5 DTM INDEX

Table 5.5 DTM Index

File Name	Survey Area	Cell Size
ST08538_Hywind_01.gtf	Hywind Cable Route Alt5	0.1m
ST08538_Hywind_02.gtf	Hywind Cable Route Alt5	0.1m
ST08538_Hywind_03.gtf	Hywind Cable Route Alt5	0.1m
ST08538_Hywind_04.gtf	Hywind Cable Route Alt5	0.1m
ST08538_Hywind_05.gtf	Hywind Cable Route Alt5	0.1m
ST08538_Hywind_06.gtf	Hywind Cable Route Alt5	0.1m
ST08538_Hywind_07.gtf	Hywind Cable Route Alt5	0.1m
ST08538_Hywind_08.gtf	Hywind Cable Route Alt5	0.1m
ST08538_Hywind_09.gtf	Hywind Cable Route Alt5	0.1m
ST08538_Hywind_1m_01.gtf	Hywind Cable Route Alt5	1m
ST08538_Hywind_1m_02.gtf	Hywind Cable Route Alt5	1m
Hywind_Mine.gtf	Local area around mine	0.05.

5.6 KP DATABASE INDEX

Table 5.6 Used KP database

File Name	Pipeline	Comment
Cable_route_Alt_5.rlx	Hywind Cable Route Alt5	Runline used for route survey (The file is in EIVA rlx-format)

5.7 OBSERVATION LISTING INDEX

Table 5.7 Observation Listing Index

Observation Listing File Name	Pipeline
Hywind_Observation_Listing.xls	Hywind Cable Route Alt5

5.8 FIRST HAND REPORT INDEX

Table 5.8 First Hand Report Index

FHR Reference	Subject	Issue Date
Fhr_61003100_093_ROV_ Seabat Calibration.doc	Seabat Calibration	11/11/2008
Fhr_61003100_097_Hywind_Cable_Route_Alt5_Observed_Mine.pdf	Mine found on Cable Route	01/12/2008
Fhr_61003100_099_Hywind_Targets.pdf	Event and Target Listing	06/12/2008

All First Hand Reports issued from the *Acergy Viking* relating to the Hywind Cable Route Survey are listed in Appendix III of this report.

5.9 ELECTRONIC DATA INDEX

5.9.1 Digital Report Delivery

Revision 2 delivery : Issued for Company Review contains the following data:

Paper copy of report A4 (t his document) 2 copies
Paper copy of charts A3 2 copies x 10 charts

2 x CD's containing:
- Report text (.pdf & .doc)
- Charts (.pdf & .dwg)
- Run-Lines (.rlx)
- GIS Data (.shp)

2 x HDD containing:
- DTM (.gtf)
- DTM Shaded Relief (.png & .pgw)
- MBE Sounding (.xyz & .sbd)
- SSS data (.Cod)
- SBP data (.ses)
- Digital Video Data (visualsoft format)

Revision 0 delivery : Issued for Construction contains the following data:

Paper copy of report A4 (t his document) 2 copies
Paper copy of charts A3 2 copies x 10 charts

2 x CD's containing:
- Report text (.pdf & .doc)
- Charts (.pdf & .dwg)
- Run-Lines (.rlx)
- GIS Data (.shp)
- Metadata (.xls)

2 x HDD containing:
- DTM (.gtf)
- DTM Shaded Relief (.png & .pgw)
- MBE Sounding (.xyz & .sbd)
- SSS data (.Cod)
- SBP data (.ses)
- Digital Video Data (visualsoft format)

APPENDIX I – CTD MEASUREMENTS

The SAIV A/S Mini CTD SD204 (S/N515) interfaced through the ROV was used to record data during the project. The Chen and Millero formula for so und velocity calculation, EOS80 for density calculations and PSS78 fo r salinity calculations were used.

The following pages show a table with a su mmary of the CTD profiles taken and a graph showing the sound velocity profile.

Acergy Entity **Acergy Norway AS**	Client and Contract Reference: **Statoil Frame Agreement 2008** Client Document no. & Revision: **HW-00-NH-X15-00003 Rev.0**	Date of Issue **Jan.20.09**
Document No.: **STATSURV08-SRV-0046 Ver.2.0**	Document Title: **Hywind ROV Survey Cable Route Alt 5 – ST08538**	**APPENDIX I**

Velocity of Sound Profile Details

CTD No.	Latitude	Longitude	Date	Time UTC	Probe No.	Depth	SV 10m	SV Mean	SV Bot	Atm Press	Density Mean	Gravity	Temp Bot	Comment
212	59 08 23	005 01 48	01/12/08	04:23	515	206.68	1488.24	1486.5	1483.0	998.70	1.02749	9.81870	7.22	Hywind

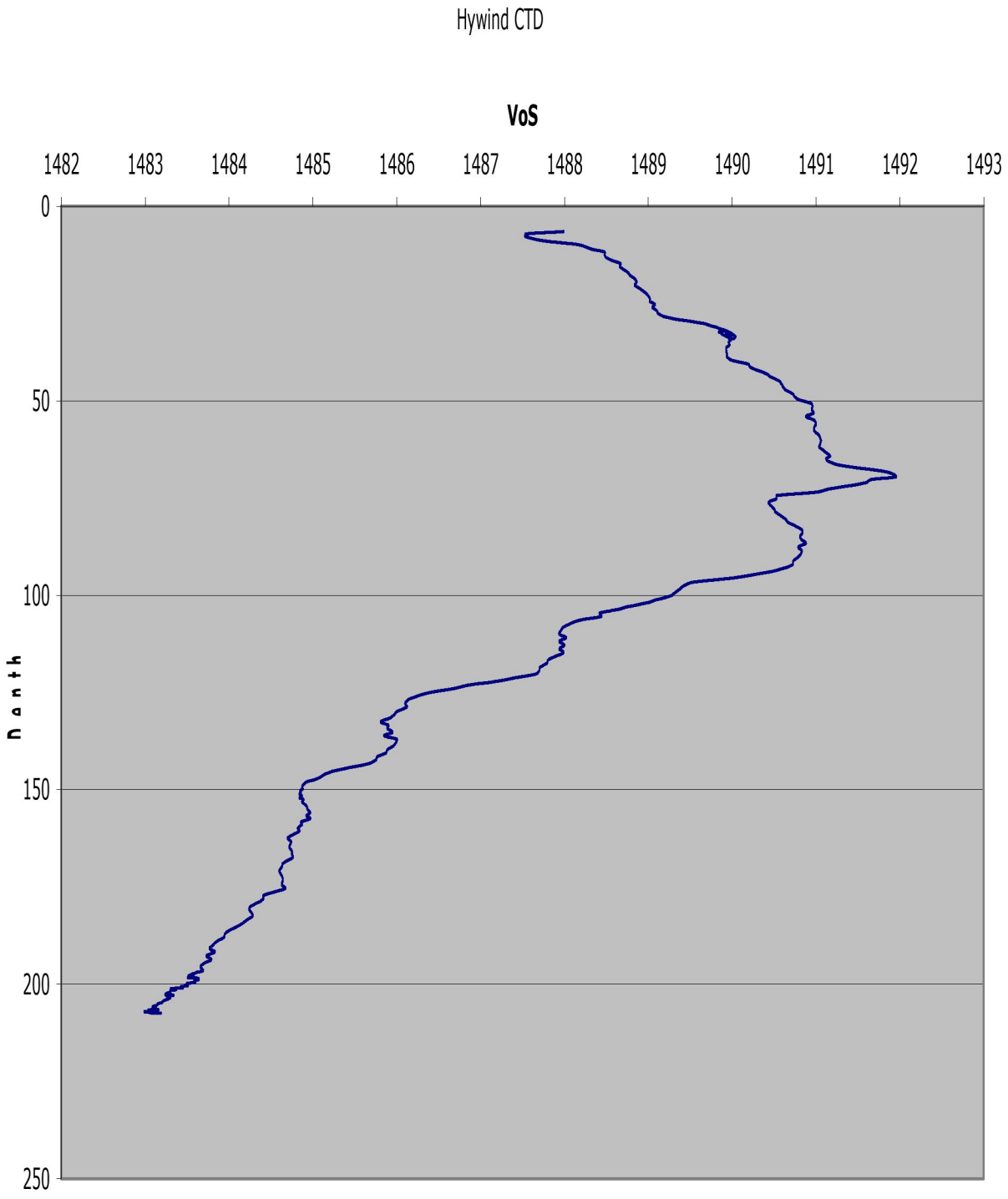


Figure 1 Velocity of sound profile

APPENDIX II – TIDAL DATA

The Vertical Datum was referenced to Mean Sea Level (MSL).

For ROV based survey bathymetric data was reduced to Mean Seabed Level by use of predicted tides obtained from the Polpred software package provided by the Proudman Oceanographic Laboratory.

Predicted tidal data was calculated for the Hywind Cable Route survey area and used for the duration of the survey.

Hywind Cable Route Survey: 59° 8' 40.0" N 5° 6' 30.0" E

APPENDIX III –FIRST HAND REPORTS

First Hand Report - *Acergy Viking*

To: Erik Nygaard and Martin Hovland StatoilHydro Representatives	Date: 17.11.2008
Copy: Dave Mackay Offshore Manager, Acergy Viking	File Ref: *Fhr_61003100_093_ROV_ Seabat Calibration.doc*
From: Jørgen Blix Senior Surveyor	Ref: **ST08538 Scope of Work. Hywind ROV Survey. Cable route alt 5**

Subject: ROV Mounted 7125 Seabat Calibration

On 15th November 2008 the Acergy Viking undertook a multibeam echosounder calibration for the ROV mounted 7125 Seabat.

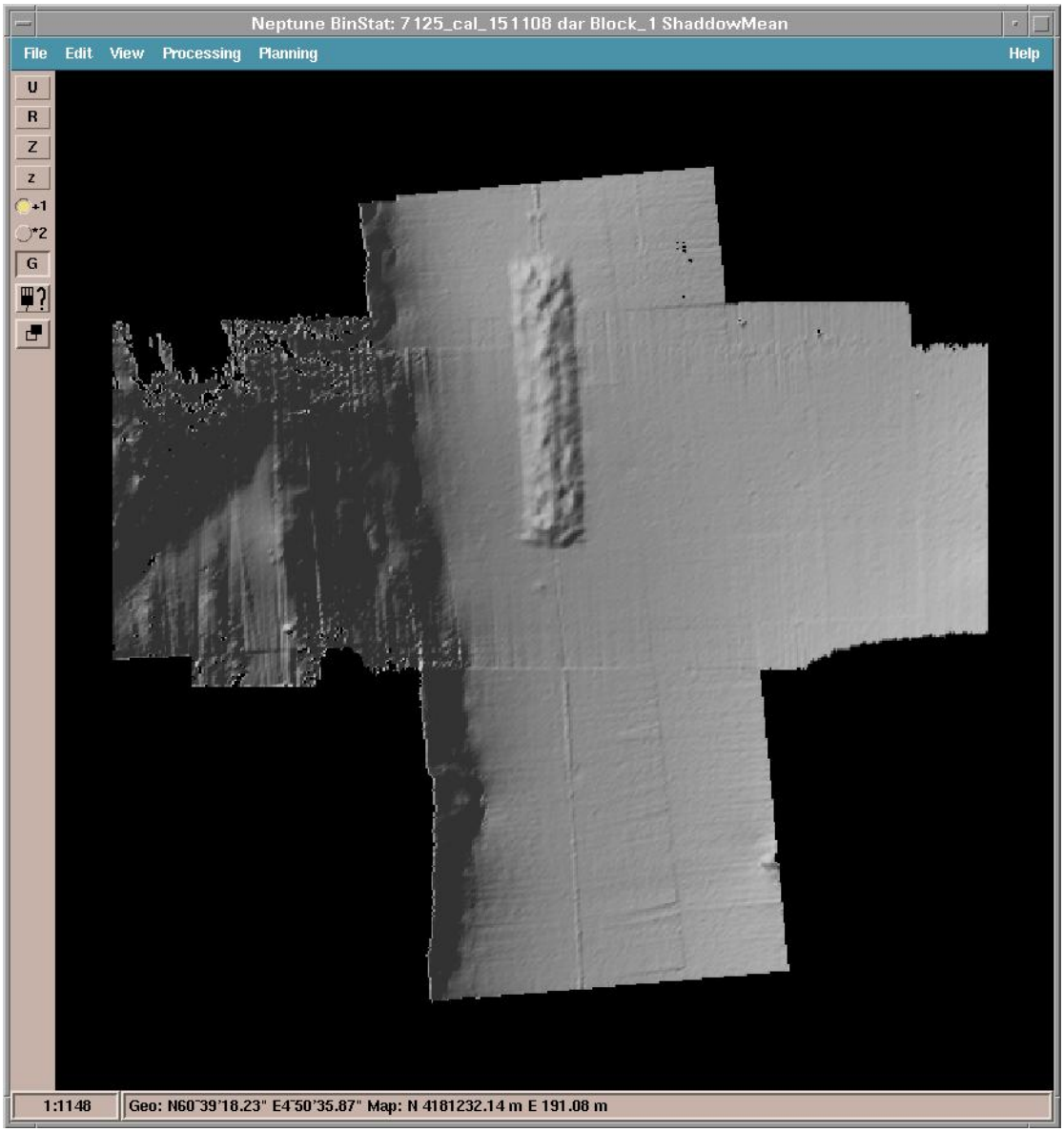
The calibration procedure states that the following lines are to be run to obtain roll, pitch, heading and timing offsets:

- Run two lines in opposite directions for the roll calibration.
- Run two lines in opposite directions, up and down a slope, for the pitch calibration.
- Run the same line twice in the same direction with two different velocities for the time offset calibration.
- Run two parallel lines in the same direction on each side of a distinct object for heading verification

We were able to combine the pitch and roll lines required as on the same line there was a sufficient area of flat ground for the roll aspect and a distinct feature for the pitch aspect. The location chosen was at KP 12.4 on the P86D Vestprosess Pipeline as it provided the required distinct feature required for the pitch and heading aspect of the calibration.

MBE head alignment for the two heads:

Head	Angle
Port	16.45°
Starboard	-17.42°



The values obtained from the calibration were as follows:

Correction	Value Applied
Roll	0.15°
Pitch	0.70°
Heading	0.00°
Time	0.00s

These values will be continuously reviewed every time new data is acquired and if need be altered to correct any change.

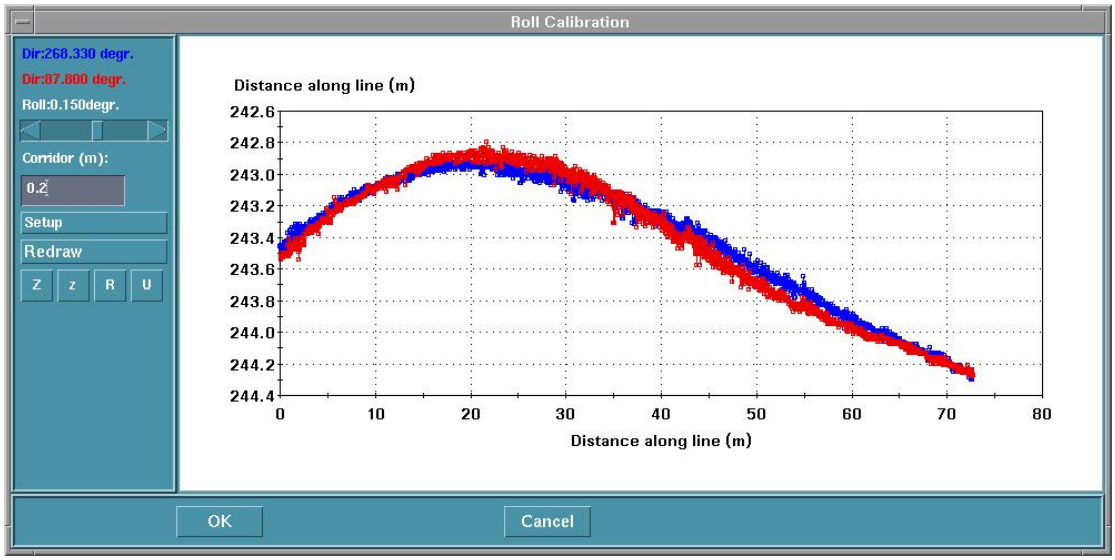


Figure 1.2 Roll Offset applied to data (0.15°)

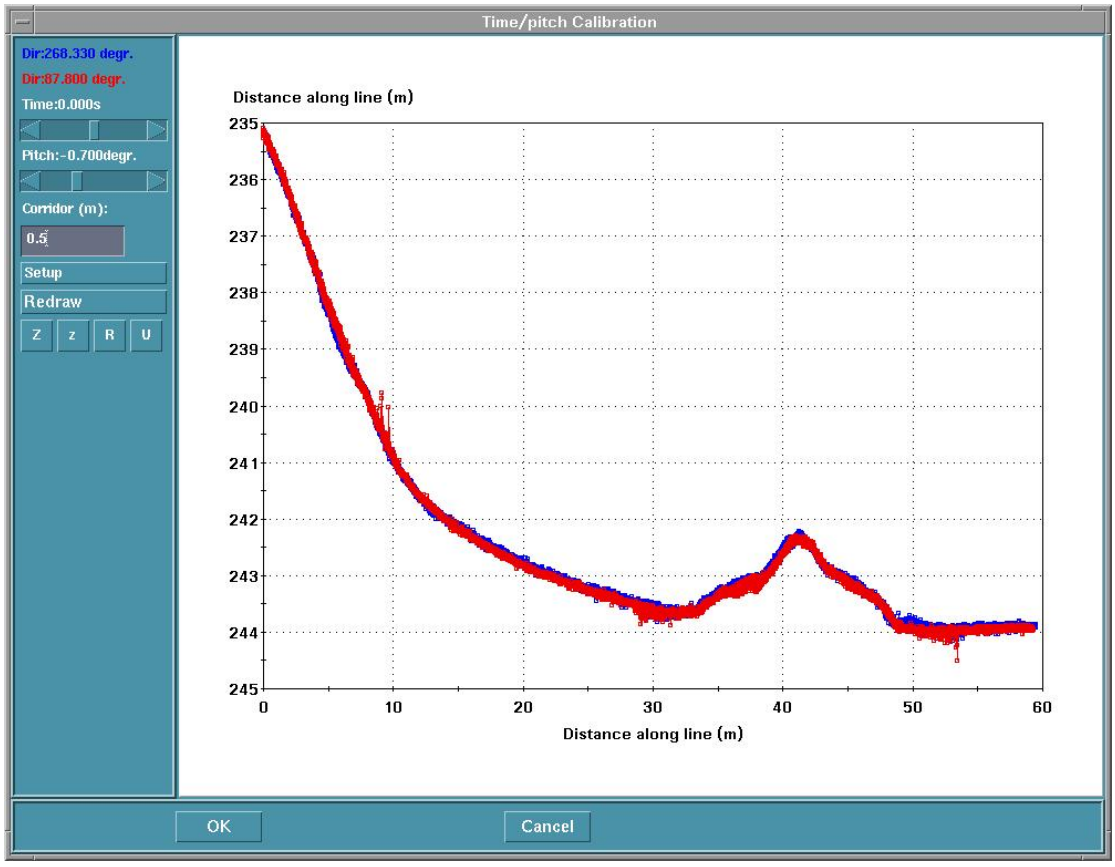


Figure 1.3 Pitch Offset applied to data (-0.70°) – No time offset applied (0°)

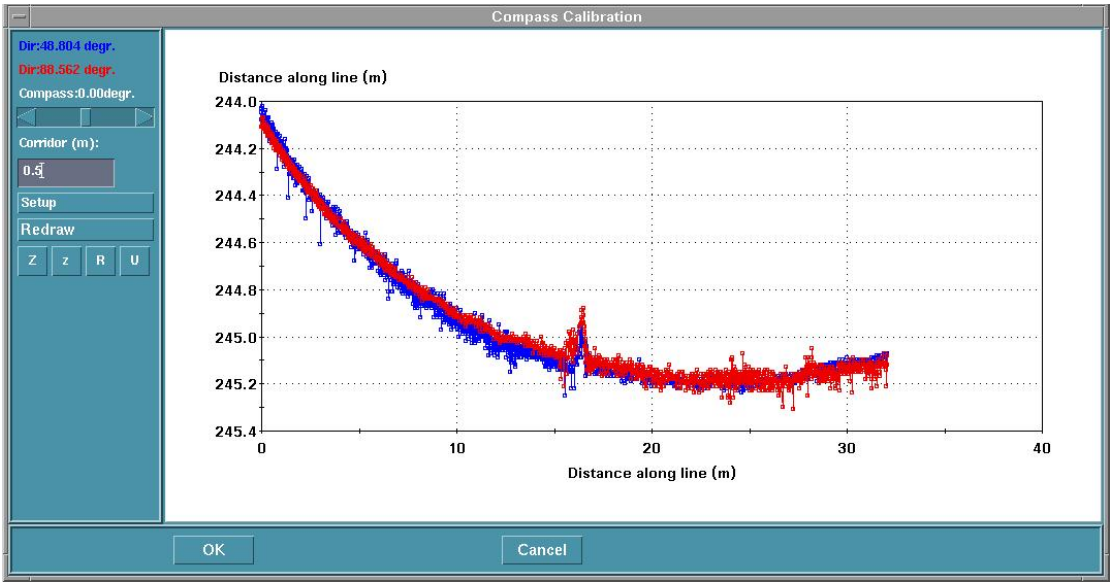


Figure 1.4 Heading Offset applied to data (0.00°)

First Hand Report - *Acergy Viking*

To: Chris Ince, Statoil Representative	Date: 01.12.2008
Copy: Bjarne Bakke Offshore Manager, Acergy Viking	File Ref: *Fhr_61003100_097_Hywind_Cable_Route_Alt5_Observed_Mine.doc*
From: Lee Blinco, Senior surveyor Acergy Viking	Client Ref: **ST08538 Hywind Cable Route Alt.5 Observed Mine**

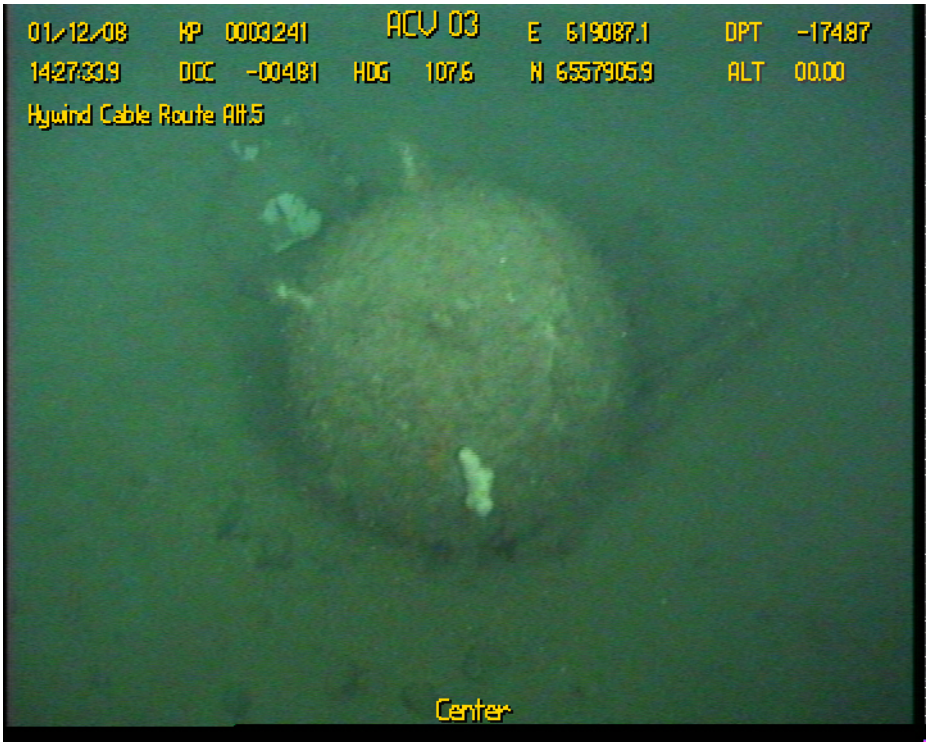
Subject: Visual Inspection Mine on Hywind Cable Route Alt.5

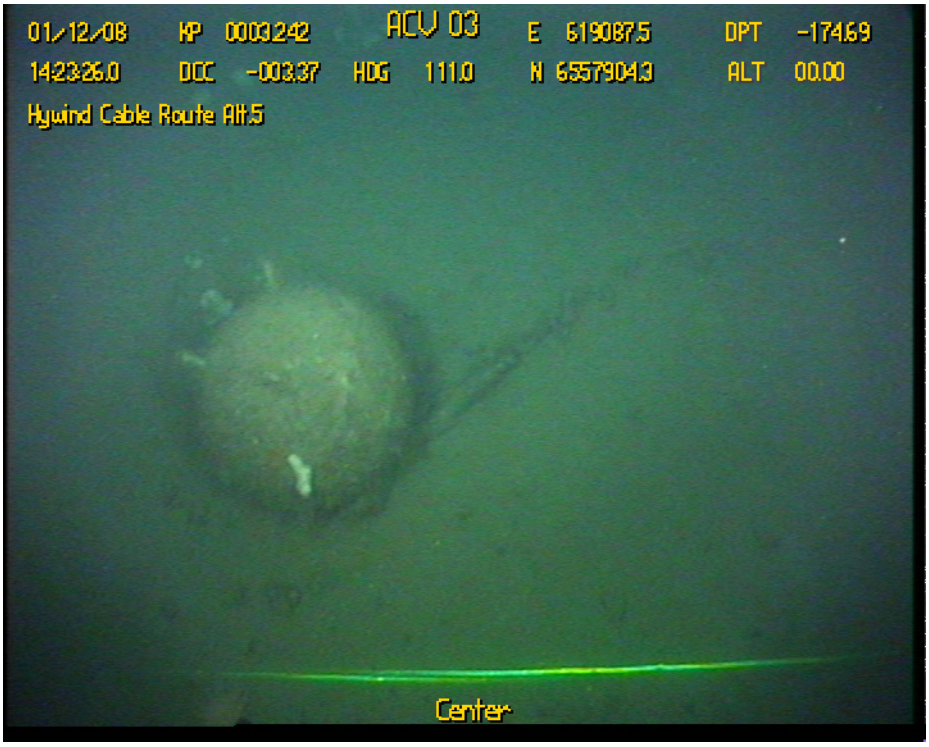
Digital Video File: 20081201 141831

On the 01st of December 2008 *Acergy Viking* performed a visual survey of the Hywind Cable Route, alternative 5, utilising the *ACV03* ROV. While performing the survey a probable mine was observed in the starboard camera. The survey was stopped and a close inspection of the mine was performed. The mine did not appear to be attached to a sinker, the mooring line led a few metres from the mine and then went below the seabed surface. The position of the mine and digital stills are presented below:

	Easting m	Northing m	KP	DCC (north of route) m	Depth m
Mine	619088.04	6557904.88	3.242	4.06	175

The positions are referenced to ED50 zone 31, South of 62N datum transformation.


01/12/08 KP 0003.241 ACV 03 E 619087.1 DPT -174.87
14:27:33.9 DCC -004.81 HDG 107.6 N 6557905.9 ALT 00.00
Hywind Cable Route Alt:5
Center


01/12/08 KP 0003.242 ACV 03 E 619087.5 DPT -174.69
14:23:26.0 DCC -003.37 HDG 111.0 N 6557904.3 ALT 00.00
Hywind Cable Route Alt:5
Center

First Hand Report - *Acergy Viking*

To: Arnfinn Johnsen, Statoil Representative	Date: 06.12.2008
Copy: Vidar Andersen Offshore Manager, Acergy Viking	File Ref: *Fhr_61003100_099_Hywind_Targets.doc*
From: Niall Maclachlan, Senior surveyor Acergy Viking	Ref: **ST08538**

Subject: Hywind Cable Route Alt 5 - SSS and Visual Survey Target Listings.

On the 1 st of December 2008 *Acergy Viking* performed the Hywind Cable Route Alt 5 ROV survey.

A full list of visual events and side scan sonar targets observed during the survey are listing in two tables overleaf.

Visual Events – Seabed Features

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			Off set	Side Of Pipe	Target No.	Description	Comment
							L	H	W					
SEABF	SFBO	01.12.08	15:54:08	0.290	616427.78	6557845.88	0.5	0.3	0.3	1.5	South	811611	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	15:45:35	0.668	616695.09	6558113.03	0.6	0.3	0.4	0.5	North	811612	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	15:45:24	0.676	616700.74	6558118.59	0.5	0.3	0.3	1	South	811613	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	15:37:26	1.018	616956.47	6558344.52	0.5	0.3	0.5	2.5	South	811614	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	15:35:14	1.114	617043.61	6558385.26	0.6	0.8	0.6	0.4	South	811615	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	15:32:18	1.243	617167.28	6558417.28	0.6	0.4	0.5	3	South	811617	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	15:26:45	1.507	617429.32	6558398.93	0.5	0.4	0.5	1.4	North	811618	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	15:24:04	1.643	617560.73	6558365.10	0.5	0.5	0.5	2.7	North	811619	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	15:23:30	1.671	617588.07	6558357.87	0.7	0.3	0.6	2.5	North	811620	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	15:20:52	1.805	617717.48	6558325.04	0.5	0.4	0.5	4.5	North	811621	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	15:19:51	1.857	617768.22	6558311.82	0.6	0.4	0.6	4.5	North	811622	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	15:14:29	2.140	618042.02	6558242.21	0.5	0.3	0.5	1.3	North	811623	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	15:02:06	2.779	618655.22	6558064.49	1.0	0.5	0.7	1.6	North	811624	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:55:59	2.913	618777.75	6558009.66	0.6	0.8	0.8	2.5	South	811625	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:55:30	2.938	618800.34	6557999.33	0.5	0.4	0.5	1.7	South	811626	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:54:51	2.970	618829.19	6557986.24	0.6	0.4	0.8	0	On Track	811627	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:54:46	2.975	618833.43	6557984.10	0.5	0.3	0.7	1	North	811628	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:54:09	3.006	618862.14	6557971.11	0.4	0.3	0.5	1.2	North	811629	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:53:04	3.062	618914.26	6557950.13	0.5	0.5	0.5	2.5	North	811631	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:52:53	3.071	618922.38	6557946.61	0.6	0.4	0.7	3	North	811632	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:52:47	3.076	618927.31	6557945.10	0.5	0.3	0.5	5	South	811633	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:52:45	3.078	618928.98	6557944.64	0.7	0.4	0.7	4.5	North	811634	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:50:44	3.184	619030.25	6557914.02	0.6	0.4	0.6	1.8	North	811636	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:50:40	3.187	619033.31	6557913.21	0.5	0.3	0.5	1.5	North	811637	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:50:39	3.188	619034.55	6557912.91	0.8	0.4	0.8	1.3	North	811638	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:49:28	3.248	619093.18	6557899.85	0.6	0.4	0.6	1.6	North	811640	Seabed Feature-Boulder	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			Off set	Side Of Pipe	Target No.	Description	Comment
							L	H	W					
SEABF	SFBO	01.12.08	13:48:44	3.286	619130.09	6557891.56	0.7	0.3	0.5	2	South	811641	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:47:06	3.367	619208.65	6557873.55	0.5	0.3	0.5	3.5	North	811642	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:47:00	3.372	619213.84	6557872.50	0.5	0.2	0.5	2	South	811643	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:46:57	3.375	619216.23	6557872.04	0.5	0.3	0.5	2	North	811644	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:45:54	3.425	619265.48	6557860.78	0.5	0.4	0.5	3.5	South	811645	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:43:52	3.522	619359.92	6557839.81	0.5	0.1	0.5	2	North	811646	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:43:23	3.544	619381.81	6557834.78	0.5	0.3	0.5	2	South	811647	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:42:33	3.583	619419.39	6557826.23	0.5	0.4	0.5	3	North	811648	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:42:14	3.599	619434.92	6557822.94	0.5	0.2	0.5	1.5	North	811649	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:40:44	3.668	619502.73	6557807.67	0.5	0.3	0.5	3	South	811650	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:40:34	3.676	619510.60	6557806.04	1.3	0.6	1.3	0.1	South	811651	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:39:33	3.724	619557.37	6557795.51	0.5	0.2	0.5	1.5	South	811652	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:39:20	3.735	619567.55	6557793.00	0.6	0.2	0.4	1.2	North	811653	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:39:14	3.739	619572.23	6557791.84	0.5	0.3	0.5	2	North	811654	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:38:49	3.759	619590.83	6557787.88	0.5	0.3	0.5	2.5	South	811655	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:38:48	3.760	619592.06	6557787.68	0.7	0.4	0.5	2.5	South	811656	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:38:45	3.762	619594.25	6557787.23	0.5	0.3	0.5	2.6	South	811657	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:38:44	3.762	619594.64	6557787.16	0.6	0.4	0.6	3	North	811658	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:37:50	3.805	619636.63	6557779.74	0.5	0.5	0.5	3.5	North	811659	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:37:12	3.836	619667.00	6557775.82	0.5	0.3	0.5	1.6	South	811660	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:37:02	3.843	619674.59	6557774.91	0.8	0.6	0.8	1.7	North	811661	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:36:57	3.847	619678.25	6557774.40	0.7	0.3	0.7	3	North	811662	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:36:56	3.848	619679.05	6557774.29	0.5	0.3	0.5	1.6	North	811663	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:36:42	3.859	619690.15	6557772.99	0.6	0.3	0.6	3	North	811664	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:36:20	3.875	619706.49	6557771.30	0.5	0.3	0.5	0	On Track	811665	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:36:19	3.876	619707.22	6557771.25	0.7	0.7	0.7	3.5	North	811666	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:36:07	3.886	619716.67	6557770.81	0.6	0.3	0.5	0.3	North	811667	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:36:06	3.886	619717.36	6557770.76	0.6	0.3	0.6	3	South	811668	Seabed Feature-Boulder	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			Off set	Side Of Pipe	Target No.	Description	Comment
							L	H	W					
SEABF	SFBO	01.12.08	13:35:28	3.917	619748.31	6557769.01	0.5	0.3	0.5	0	On Track	811669	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:35:10	3.932	619762.86	6557768.41	0.8	0.4	0.8	0	On Track	811670	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:34:41	3.955	619785.89	6557768.02	0.5	0.4	0.5	3	North	811671	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:33:10	4.034	619864.77	6557768.91	0.5	0.3	0.4	0	On Track	811672	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:32:50	4.051	619882.34	6557769.04	0.5	0.4	0.5	3.5	North	811673	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:32:50	4.052	619882.76	6557769.03	0.5	0.3	5.0	1.6	South	811674	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:32:49	4.053	619883.73	6557769.09	0.6	0.3	0.5	1.6	South	811675	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:32:06	4.089	619920.19	6557769.71	0.6	0.5	0.6	1.2	South	811676	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:29:19	4.234	620065.01	6557772.16	0.6	0.3	0.5	0	On Track	811677	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:28:53	4.257	620088.08	6557772.65	1.0	0.8	1.5	2.5	North	811678	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:28:14	4.291	620122.17	6557774.42	0.6	0.6	0.6	3	North	811679	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:28:04	4.300	620130.94	6557774.88	0.7	0.6	0.8	3	North	811680	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:26:13	4.397	620227.40	6557786.72	0.7	0.4	0.6	0.5	North	811681	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:26:12	4.398	620228.13	6557786.88	0.5	0.4	0.5	1.5	North	811682	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:26:03	4.406	620235.90	6557787.80	0.8	0.6	0.8	4.5	North	811683	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:25:46	4.420	620249.86	6557790.74	0.6	0.3	0.6	0.7	South	811684	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:23:35	4.536	620362.92	6557817.38	0.5	0.2	0.5	1	South	811685	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:23:29	4.542	620368.23	6557818.74	0.7	0.3	0.5	0.6	South	811686	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:21:38	4.642	620465.74	6557841.24	0.5	0.4	0.5	3	North	811687	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:20:46	4.687	620510.20	6557849.10	0.5	0.4	0.5	3.5	North	811688	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:20:46	4.687	620510.67	6557849.13	0.5	0.3	0.5	3	North	811689	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:20:32	4.700	620522.95	6557850.65	0.6	0.5	0.6	0	On Track	811690	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:20:13	4.716	620539.15	6557852.91	0.8	0.4	0.8	5	South	811691	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:19:37	4.747	620570.30	6557855.85	0.5	0.3	0.5	1	South	811692	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:19:26	4.757	620579.85	6557856.63	0.5	0.2	0.4	0	On Track	811693	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:18:56	4.782	620604.96	6557858.38	0.5	0.3	0.5	0	On Track	811694	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:15:07	4.971	620792.89	6557872.44	0.6	0.3	0.6	1.7	North	811695	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:15:06	4.971	620793.39	6557872.46	0.5	0.3	0.5	1.5	South	811696	Seabed Feature-Boulder	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			Off set	Side Of Pipe	Target No.	Description	Comment
							L	H	W					
SEABF	SFBO	01.12.08	13:14:09	5.019	620840.80	6557876.14	0.5	0.2	0.5	1	North	811697	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:14:03	5.024	620846.35	6557876.44	0.5	0.2	0.5	0.5	North	811698	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:12:59	5.077	620898.47	6557880.25	0.5	0.3	0.5	0.3	North	811699	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:12:08	5.117	620938.94	6557882.64	0.6	0.3	0.6	1.5	North	811700	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:11:48	5.133	620954.63	6557882.98	0.5	0.3	0.5	1.6	South	811701	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:11:47	5.134	620955.60	6557883.04	0.6	0.2	0.6	1.5	North	811702	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:11:39	5.140	620961.48	6557882.98	0.6	0.4	0.6	1.3	North	811703	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:10:39	5.188	621009.83	6557882.72	0.5	0.4	0.5	1.5	North	811704	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:10:33	5.192	621014.27	6557882.67	0.5	0.2	0.5	0	On Track	811705	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:10:29	5.196	621017.67	6557882.62	0.5	0.2	0.5	1.5	North	811706	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:10:28	5.197	621018.56	6557882.59	0.5	0.3	0.5	0	On Track	811707	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:10:24	5.200	621021.49	6557882.49	0.6	0.4	0.6	3	South	811708	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:10:22	5.201	621023.35	6557882.50	0.6	0.5	0.6	4	South	811709	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:10:20	5.203	621024.43	6557882.47	0.5	0.5	0.5	2	North	811710	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:10:06	5.214	621035.69	6557882.24	0.5	0.4	0.5	3.2	South	811711	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:09:28	5.243	621065.27	6557882.12	0.5	0.3	0.5	0.2	North	811712	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:09:18	5.252	621073.53	6557881.75	0.7	0.4	0.5	0.6	South	811713	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:06:15	5.395	621216.83	6557879.86	0.5	0.3	5.0	0	On Track	811714	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:05:36	5.426	621247.72	6557879.12	0.8	0.4	0.8	0.4	South	811715	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:05:18	5.440	621262.25	6557878.83	0.6	0.5	0.6	4	South	811716	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:03:54	5.505	621326.67	6557878.28	0.6	0.3	0.6	2.9	North	811717	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:02:54	5.550	621372.02	6557877.55	0.7	0.5	0.7	0	On Track	811718	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:02:10	5.584	621405.88	6557876.91	0.5	0.4	0.5	0	On Track	811719	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:01:04	5.633	621454.52	6557876.28	0.5	0.4	0.6	0.2	South	811720	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	13:00:20	5.666	621487.52	6557875.82	0.6	0.3	0.5	3.2	North	811721	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:59:29	5.706	621528.19	6557875.36	0.6	0.4	0.5	1	North	811722	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:59:25	5.709	621530.83	6557875.35	0.5	0.4	0.5	1.5	South	811723	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:59:24	5.710	621532.02	6557875.26	0.6	0.2	0.3	1	North	811724	Seabed Feature-Boulder	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			Off set	Side Of Pipe	Target No.	Description	Comment
							L	H	W					
SEABF	SFBO	01.12.08	12:59:11	5.719	621541.30	6557875.05	0.5	0.3	0.5	1	North	811725	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:57:52	5.773	621594.96	6557874.34	0.6	0.3	0.6	0	On Track	811727	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:57:51	5.773	621595.19	6557874.35	0.5	0.2	0.5	0.3	North	811728	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:57:50	5.774	621595.98	6557874.37	0.5	0.2	0.5	0	On Track	811729	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:56:35	5.823	621644.72	6557873.82	0.5	0.2	0.5	3.2	North	811730	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:52:51	5.968	621789.89	6557871.51	0.6	0.5	0.6	3	North	811731	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:52:39	5.976	621797.63	6557871.39	0.6	0.3	0.5	1.6	South	811732	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:52:34	5.978	621800.20	6557871.18	0.7	0.3	0.7	1.2	North	811733	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:52:02	6.000	621821.35	6557871.03	0.4	0.1	0.5	0.2	South	811734	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:50:31	6.063	621884.62	6557870.13	0.5	0.3	0.5	2	South	811735	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:50:30	6.064	621885.50	6557870.11	0.5	0.3	0.5	0.1	South	811736	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:49:09	6.119	621940.91	6557869.17	0.5	0.5	0.5	1	North	811737	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:46:01	6.250	622072.17	6557867.48	0.5	0.3	0.5	0.8	South	811738	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:44:58	6.292	622113.59	6557866.57	0.5	0.3	0.4	0.1	South	811739	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:44:56	6.293	622115.19	6557866.49	0.5	0.3	0.5	0.2	South	811740	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:42:09	6.406	622227.39	6557865.03	0.5	0.4	0.5	3	South	811741	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:41:59	6.413	622234.90	6557864.74	0.8	0.3	0.7	0	On Track	811742	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:38:29	6.572	622393.25	6557859.68	0.7	0.5	0.7	2.5	North	811743	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:37:23	6.623	622444.15	6557858.18	0.7	0.5	0.7	0.5	South	811744	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:37:14	6.630	622451.15	6557858.02	0.7	0.7	0.7	2.5	South	811745	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:36:25	6.666	622487.70	6557856.86	0.6	0.3	0.4	2	South	811746	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:36:20	6.670	622491.38	6557856.78	0.5	0.5	0.5	1.8	South	811747	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:35:34	6.703	622524.83	6557855.63	0.7	0.5	0.7	3	North	811748	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:35:24	6.710	622532.07	6557855.68	0.7	0.5	0.6	0.5	North	811749	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:35:21	6.713	622534.48	6557855.55	0.6	0.4	0.5	2.6	North	811750	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:35:20	6.713	622534.74	6557855.53	0.5	0.5	0.5	2.3	North	811751	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:35:12	6.719	622540.77	6557855.44	0.5	0.3	0.5	1.2	North	811752	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:35:11	6.720	622541.40	6557855.40	0.5	0.3	0.5	1.8	South	811753	Seabed Feature-Boulder	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			Off set	Side Of Pipe	Target No.	Description	Comment
							L	H	W					
SEABF	SFBO	01.12.08	12:35:11	6.720	622541.40	6557855.40	0.5	0.3	0.5	1	North	811754	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:35:08	6.722	622544.02	6557855.14	0.5	0.3	0.5	1.8	South	811755	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:35:07	6.723	622544.53	6557855.11	0.7	0.4	0.5	2	South	811756	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:35:07	6.723	622544.90	6557855.09	0.5	0.4	0.5	1.8	South	811757	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:35:05	6.725	622546.37	6557855.01	0.6	0.4	0.6	2	South	811758	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:34:58	6.729	622550.86	6557854.97	0.7	0.4	0.7	1	South	811759	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:34:55	6.732	622553.65	6557854.89	1.3	0.5	0.6	2.5	South	811760	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:33:35	6.792	622613.94	6557852.90	0.6	0.5	0.6	0	On Track	811761	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:33:03	6.817	622638.48	6557852.09	0.6	0.5	0.6	3	North	811762	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:32:58	6.821	622642.75	6557851.88	0.5	0.4	0.5	1.5	South	811763	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:32:54	6.824	622645.29	6557851.74	0.6	0.3	0.6	2.5	South	811764	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:32:51	6.826	622647.45	6557851.73	0.5	0.5	0.5	2.5	North	811765	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:32:44	6.831	622652.67	6557851.52	0.5	0.3	0.5	1.3	South	811766	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:32:29	6.842	622663.98	6557851.35	0.5	0.2	0.5	1.5	South	811767	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:32:11	6.856	622677.51	6557850.96	0.8	0.6	0.8	1.5	North	811768	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:31:54	6.869	622690.07	6557850.45	0.5	0.4	0.5	3	North	811769	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:31:52	6.870	622691.06	6557850.43	0.5	0.3	0.5	2	North	811770	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:30:33	6.929	622750.94	6557848.32	0.5	0.2	0.5	1	South	811771	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:30:25	6.936	622757.14	6557848.18	0.5	0.3	0.7	1	North	811772	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:30:08	6.948	622769.67	6557847.88	0.5	0.2	0.4	1	South	811773	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:30:06	6.950	622771.08	6557847.84	0.5	0.2	0.5	2.5	North	811774	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:29:03	6.995	622816.51	6557846.24	0.6	0.5	0.6	2.5	North	811775	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:28:52	7.003	622824.64	6557845.86	0.5	0.3	0.5	0.4	South	811776	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:28:28	7.020	622840.96	6557845.23	0.5	0.3	0.5	1	North	811777	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:28:17	7.027	622848.81	6557845.06	0.7	0.4	0.7	0.8	North	811778	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:27:36	7.056	622877.35	6557844.07	0.6	0.3	0.6	0.4	North	811779	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:26:02	7.126	622947.35	6557842.42	0.5	0.4	0.5	2.3	North	811780	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:26:01	7.127	622948.58	6557842.38	0.5	0.4	0.5	2	North	811781	Seabed Feature-Boulder	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			Off set	Side Of Pipe	Target No.	Description	Comment
							L	H	W					
SEABF	SFBO	01.12.08	12:25:53	7.133	622954.64	6557842.19	0.5	0.3	0.5	0.4	South	811782	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:25:51	7.135	622956.26	6557842.16	0.6	0.4	0.6	1.3	South	811783	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:25:41	7.142	622963.67	6557841.92	0.4	0.5	0.4	2	South	811784	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:23:22	7.239	623060.35	6557838.17	0.5	0.4	0.5	0.2	South	811785	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:23:21	7.240	623060.90	6557838.18	0.5	0.3	0.5	0.8	South	811786	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:23:19	7.241	623062.24	6557838.22	0.5	0.2	0.5	0.2	South	811787	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:23:13	7.245	623066.13	6557838.16	0.6	0.5	0.6	2	North	811788	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:23:09	7.248	623069.04	6557837.86	0.5	0.3	0.5	2	South	811789	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:23:09	7.248	623069.23	6557837.84	0.5	0.4	0.6	2	South	811790	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:23:06	7.250	623071.02	6557837.81	0.5	0.4	0.5	1	North	811791	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:23:06	7.250	623071.21	6557837.82	0.5	0.4	0.5	2	South	811792	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:23:01	7.253	623074.58	6557837.83	1.0	0.5	1.0	0	On Track	811793	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:22:59	7.255	623076.30	6557837.69	1.0	0.6	1.0	1	South	811794	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:21:12	7.327	623148.46	6557835.28	0.6	0.5	0.6	0.6	North	811795	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:21:10	7.329	623150.03	6557835.28	0.5	0.3	0.5	0.3	North	811796	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:21:06	7.332	623152.94	6557835.20	0.5	0.4	0.5	0.3	North	811797	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:20:15	7.368	623189.26	6557834.27	0.5	0.3	0.5	2.5	South	811798	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:19:52	7.386	623207.00	6557833.75	0.5	0.4	0.5	1	North	811799	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:19:40	7.395	623215.89	6557833.62	0.5	0.4	0.5	0.6	South	811800	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:19:40	7.395	623216.04	6557833.62	0.5	0.4	0.5	1	South	811801	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:19:40	7.395	623216.07	6557833.62	0.4	0.3	0.5	1.5	North	811802	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:19:37	7.397	623218.51	6557833.56	0.5	0.3	0.5	1	South	811803	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:19:36	7.397	623218.63	6557833.56	0.6	0.3	0.5	1.5	South	811804	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:19:22	7.408	623229.26	6557833.14	0.5	0.3	0.5	0.3	South	811805	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:19:00	7.424	623245.60	6557832.88	0.5	0.3	0.4	0.3	South	811806	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:19:00	7.425	623246.25	6557832.85	0.5	0.4	0.5	0.3	North	811807	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:18:56	7.428	623248.88	6557832.66	0.8	0.5	0.8	0.4	South	811808	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:18:33	7.445	623265.93	6557832.15	0.5	0.3	0.5	1	North	811809	Seabed Feature-Boulder	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			Off set	Side Of Pipe	Target No.	Description	Comment
							L	H	W					
SEABF	SFBO	01.12.08	12:16:13	7.548	623368.87	6557827.45	0.5	0.5	0.5	2.2	North	811810	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:16:12	7.548	623369.41	6557827.40	0.5	0.4	0.5	1.2	North	811811	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:15:07	7.592	623412.73	6557823.91	0.5	0.3	0.5	1	North	811812	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:15:03	7.594	623415.26	6557823.65	0.5	0.4	0.4	0.3	North	811813	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:12:53	7.688	623508.55	6557813.53	0.5	0.2	0.5	0.1	South	811814	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:12:34	7.704	623523.82	6557811.44	0.5	0.3	0.5	0.1	South	811815	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:01:04	8.270	624077.91	6557693.06	0.6	0.3	0.6	1.5	South	811816	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:00:45	8.288	624095.62	6557689.45	0.5	0.2	0.5	1.5	South	811817	Seabed Feature-Boulder	
SEABF	SFBO	01.12.08	12:00:38	8.296	624103.27	6557687.54	0.5	0.3	0.5	0.1	South	811818	Seabed Feature-Boulder	
SEABF	SFBE	01.12.08	11:47:29	8.858	624610.23	6557745.35	5.0	0.5	3.0	0.8	South	811820	Seabed Feature-Bedrock	Possible bedrock

Visual Events - Debris

Obs Type	Event Name	Date	Time	KP	Easting	Northing	L	H	W	Offset	Side Of Pipe	Description	Comment
DEBRI	DEME	01.12.08	15:34:58	1.126	617054.72	6558389.64	0.40	0.40	0.40	0	On Track	Debris-Metal	Possible metal - unidentified object
DEBRI	DEOT	01.12.08	13:54:04	3.010	618865.89	6557969.43	0.60	0.30	0.60	1.2	North	Debris-Other	Tire
MINE	MISO	01.12.08	13:52:43	3.081	618931.38	6557943.88	0.8	0.1	0.8	0	On Track	Mine-Sinker Only	Possible sinker
MINE	MION	01.12.08	13:49:35	3.243	619087.56	6557901.08	1.0	1.0	1.0	3.2	North	Mine-Mine Only	HORNMINE with chain
DEBRI	DECW	01.12.08	12:58:17	5.756	621578.22	6557874.74	43.00	0.20		0	On Track	Debris-Cable/Wire	Start of: Cable or plastic pipe coiled. Diam ca 5cm. Start and end not seen - could be buried - length and width unknown.
DEBRI	DECW	01.12.08	12:57:12	5.799	621620.40	6557873.98	43.00	0.20		0	On Track	Debris-Cable/Wire	End of: Cable or plastic pipe coiled. Diam ca 5cm. Start and end not seen - could be buried - length and width unknown.
DEBRI	DEME	01.12.08	11:53:44	8.601	624397.12	6557611.86	0.60	0.80	0.10	1	South	Debris-Metal	Folding chair - aluminium and plastic

Other Visual Events

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Description	Comment
OTHER	OTHE	01.12.2008	11:35:42	9.385	624968.26	6558125.52	Other-Other Observation	Possible organic
OTHER	OTHE	01.12.2008	10:14:50	11.336	625369.91	6559841.08	Other-Other Observation	Large Unidentified object _ Could be natural seabed features- No measurable L W H.

Side Scan Sonar Targets

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			DCC	Target Number	Description	Comment
							L	H	W				
TARGT	TAUN	01.12.2008	15:59:21	0.054	616255.99	6557683.69	1.2	0.5	0.9	-6.86	T0811201	Target-Unidentified	Possibly manmade.
TARGT	TAUN	01.12.2008	15:56:17	0.192	616368.31	6557767.51	1.2	0.3	0.9	13.29	T0811202	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:52:58	0.344	616450.39	6557900.41	0.7	0.2	0.5	-22.65	T0811203	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:52:41	0.357	616454.50	6557913.70	0.7	0.3	0.9	-29.13	T0811204	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:52:38	0.360	616441.38	6557932.01	1.1	0.2	1.0	-51.36	T0811205	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:52:31	0.364	616464.02	6557914.94	0.9	0.5	1.1	-23.28	T0811206	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:45:56	0.653	616670.09	6558117.59	0.8	0.4	1.1	-20.86	T0811207	Target-Unidentified	Possibly manmade.
TARGT	TAUN	01.12.2008	15:45:35	0.669	616668.37	6558141.68	1.8	0.4	1.6	-39.11	T0811208	Target-Unidentified	Possibly manmade.
TARGT	TAUN	01.12.2008	15:34:44	1.134	617071.99	6558363.15	1.3	0.4	1.2	30.73	T0811209	Target-Unidentified	Possibly manmade.
TARGT	TAUN	01.12.2008	15:31:32	1.278	617200.08	6558447.27	1.5	0.2	1.0	-25.72	T0811210	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:31:26	1.282	617204.45	6558448.58	1.5	0.3	1.3	-26.66	T0811211	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:29:00	1.395	617316.20	6558396.24	1.2	0.4	0.9	24.36	T0811212	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:28:58	1.396	617317.54	6558395.10	0.8	0.3	0.6	25.35	T0811213	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:28:46	1.406	617327.37	6558399.31	0.9	0.3	0.9	20.01	T0811214	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:28:44	1.407	617328.61	6558395.42	1.0	0.3	0.9	23.71	T0811215	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:28:22	1.424	617344.17	6558389.86	1.4	0.3	1.0	26.99	T0811216	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:28:15	1.433	617349.89	6558377.91	1.2	0.1	0.9	37.86	T0811217	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:28:07	1.437	617354.28	6558378.13	1.2	0.1	0.6	36.87	T0811218	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:28:07	1.437	617353.19	6558371.71	1.3	0.2	1.1	43.38	T0811219	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:27:13	1.484	617402.80	6558390.50	1.2	0.3	0.7	14.35	T0811220	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:27:12	1.488	617422.01	6558448.00	1.3	0.2	1.0	-46.11	T0811221	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:27:08	1.492	617425.40	6558444.70	0.9	0.1	0.4	-43.76	T0811222	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:26:56	1.500	617408.46	6558345.93	1.4	0.1	0.7	56.13	T0811223	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:26:50	1.503	617422.30	6558387.60	1.3	0.2	0.9	12.33	T0811224	Target-Unidentified	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			DCC	Target Number	Description	Comment
							L	H	W				
TARGT	TAUN	01.12.2008	15:26:44	1.507	617424.55	6558380.63	1.3	0.3	0.9	18.54	T0811225	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:24:28	1.623	617548.10	6558395.42	1.2	0.2	0.9	-26.37	T0811226	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:24:25	1.625	617546.63	6558382.22	1.2	0.4	1.0	-13.22	T0811227	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:24:18	1.632	617555.65	6558390.03	0.9	0.3	0.6	-23.02	T0811228	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:24:02	1.645	617564.48	6558373.17	0.9	0.3	0.6	-8.87	T0811229	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:24:01	1.645	617565.51	6558374.32	0.9	0.3	0.6	-10.23	T0811230	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:23:55	1.650	617569.29	6558368.51	0.8	0.4	0.6	-5.54	T0811231	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:18:38	1.923	617837.40	6558318.47	1.1	0.2	0.6	-23.40	T0811232	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:18:32	1.927	617840.64	6558312.66	1.3	0.3	1.0	-18.57	T0811233	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:17:45	1.967	617865.62	6558248.08	1.1	0.1	0.6	37.83	T0811234	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:17:10	1.997	617898.90	6558257.12	0.9	0.2	1.0	20.84	T0811235	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:13:34	2.189	618092.58	6558242.28	1.5	0.3	1.1	-12.71	T0811236	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:13:21	2.201	618105.80	6558244.88	1.1	0.3	0.9	-18.50	T0811237	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:09:48	2.390	618281.72	6558170.90	1.5	0.6	1.3	9.66	T0811238	Target-Unidentified	Possibly manmade.
TARGT	TAUN	01.12.2008	15:08:36	2.450	618350.76	6558195.03	0.7	0.2	1.0	-30.81	T0811239	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:08:04	2.475	618358.22	6558124.22	1.2	0.2	0.8	35.95	T0811240	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:07:59	2.482	618367.08	6558131.36	1.2	0.3	1.1	26.85	T0811241	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:07:53	2.487	618382.30	6558170.07	1.0	0.3	0.6	-14.43	T0811242	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:05:50	2.590	618484.28	6558153.14	0.8	0.2	1.0	-23.36	T0811243	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:05:42	2.596	618488.49	6558144.89	0.9	0.2	0.9	-16.53	T0811244	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:04:05	2.677	618550.03	6558073.31	1.4	0.4	1.2	32.88	T0811245	Target-Unidentified	
TARGT	TAUN	01.12.2008	15:04:03	2.679	618551.29	6558070.86	1.3	0.2	0.7	34.74	T0811246	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:56:08	2.906	618792.22	6558060.31	1.0	0.0	0.7	-52.59	T0811247	Target-Unidentified	
TARGT	TAUN	01.12.2008	14:59:19	2.906	618792.22	6558060.26	1.0	0.1	0.7	-52.55	T0811248	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:56:04	2.909	618773.33	6558009.88	1.0	0.4	1.0	1.14	T0811249	Target-Unidentified	
TARGT	TAUN	01.12.2008	14:59:13	2.909	618773.50	6558009.72	1.1	0.3	1.6	1.21	T0811250	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:55:54	2.919	618793.15	6558030.84	1.0	0.2	0.9	-26.14	T0811251	Target-Unidentified	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			DCC	Target Number	Description	Comment
							L	H	W				
TARGT	TAUN	01.12.2008	14:58:59	2.919	618793.69	6558030.71	1.0	0.2	0.7	-26.24	T0811252	Target-Unidentified	
TARGT	TAUN	01.12.2008	14:58:29	2.938	618814.96	6558033.06	1.2	0.1	0.9	-37.17	T0811253	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:55:25	2.942	618796.58	6557982.74	0.7	0.1	0.5	16.26	T0811254	Target-Unidentified	
TARGT	TAUN	01.12.2008	14:58:24	2.942	618796.70	6557982.69	0.7	0.2	0.9	16.25	T0811255	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:55:22	2.944	618797.53	6557979.54	0.5	0.2	0.5	18.78	T0811256	Target-Unidentified	
TARGT	TAUN	01.12.2008	14:58:19	2.944	618797.81	6557979.69	0.5	0.2	0.7	18.52	T0811257	Target-Unidentified	
TARGT	TAUN	01.12.2008	14:58:15	2.947	618799.11	6557974.61	0.8	0.2	0.6	22.61	T0811258	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:55:18	2.947	618799.25	6557974.62	1.4	0.4	0.9	22.55	T0811259	Target-Unidentified	
TARGT	TAUN	01.12.2008	14:57:37	2.971	618836.46	6557998.96	0.8	0.2	1.0	-14.99	T0811260	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:54:51	2.972	618836.89	6557999.10	0.7	0.2	0.8	-15.29	T0811261	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:54:43	2.977	618839.21	6557990.72	0.9	0.2	0.6	-8.62	T0811262	Target-Unidentified	
TARGT	TAUN	01.12.2008	14:57:28	2.977	618839.37	6557990.52	0.8	0.3	0.5	-8.50	T0811263	Target-Unidentified	
TARGT	TAUN	01.12.2008	14:57:21	2.982	618827.22	6557953.12	1.1	0.1	0.8	30.57	T0811264	Target-Unidentified	
TARGT	TAUN	01.12.2008	14:57:08	2.991	618835.02	6557948.48	1.1	0.2	0.7	31.58	T0811265	Target-Unidentified	
TARGT	TAUN	01.12.2008	14:56:36	3.011	618863.05	6557959.66	0.7	0.2	0.4	9.95	T0811266	Target-Unidentified	
TARGT	TAUN	01.12.2008	14:56:08	3.029	618875.61	6557943.26	0.9	0.2	0.7	20.14	T0811267	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:53:19	3.049	618914.21	6557985.62	1.2	0.3	0.5	-33.59	T0811268	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:53:18	3.050	618912.18	6557979.27	0.9	0.4	1.1	-26.92	T0811269	Target-Unidentified	
TARGT	TAUN	01.12.2008	14:55:30	3.050	618912.27	6557979.31	0.8	0.4	0.8	-26.99	T0811270	Target-Unidentified	
TARGT	TAUN	01.12.2008	14:55:19	3.054	618916.05	6557976.69	0.6	0.2	1.0	-25.93	T0811271	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:53:02	3.061	618902.68	6557921.74	1.3	0.2	0.9	30.18	T0811272	Target-Unidentified	
TARGT	TAUN	01.12.2008	14:55:00	3.061	618902.71	6557921.81	1.0	0.1	1.4	30.11	T0811273	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:52:10	3.109	618949.21	6557905.78	1.1	0.2	0.6	29.87	T0811274	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:52:06	3.113	618952.54	6557903.48	1.4	0.4	1.3	31.03	T0811275	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:50:46	3.181	619021.96	6557892.20	1.0	0.1	0.5	23.02	T0811276	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:50:43	3.184	619024.19	6557889.29	1.2	0.2	0.7	25.33	T0811277	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:49:43	3.237	619088.41	6557932.33	1.2	0.2	0.7	-30.92	T0811278	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:49:39	3.240	619090.20	6557926.49	1.1	0.2	0.5	-25.62	T0811279	Target-Unidentified	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			DCC	Target Number	Description	Comment
							L	H	W				
TARGT	TAUN	01.12.2008	13:49:38	3.240	619085.23	6557904.31	0.7	0.7	0.8	-2.89	T0811280	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:49:37	3.241	619077.03	6557863.36	0.8	0.2	0.7	38.86	T0811281	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:49:32	3.245	619094.15	6557918.84	0.7	0.2	0.7	-19.02	T0811282	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:49:27	3.249	619092.68	6557893.94	1.2	0.4	0.9	5.60	T0811283	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:49:15	3.260	619110.37	6557923.72	0.9	0.3	0.7	-27.33	T0811284	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:49:09	3.263	619095.37	6557841.05	2.0	0.1	1.4	56.61	T0811285	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:48:58	3.274	619110.83	6557860.28	0.9	0.3	0.6	34.46	T0811286	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:47:38	3.342	619188.22	6557896.13	0.7	0.3	0.7	-17.49	T0811287	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:47:04	3.370	619219.25	6557907.63	1.1	0.2	0.7	-35.51	T0811288	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:47:01	3.372	619214.84	6557878.78	0.9	0.2	0.4	-6.40	T0811289	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:46:47	3.381	619216.21	6557843.57	1.0	0.1	0.6	27.66	T0811290	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:46:44	3.386	619233.45	6557896.55	0.8	0.2	0.4	-27.82	T0811291	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:46:38	3.390	619227.36	6557853.13	0.9	0.3	0.6	15.89	T0811292	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:46:37	3.390	619228.96	6557857.01	0.9	0.2	0.7	11.74	T0811293	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:46:20	3.404	619247.48	6557876.21	0.9	0.2	0.5	-11.05	T0811294	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:45:20	3.452	619287.60	6557837.82	0.7	0.2	0.9	17.61	T0811295	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:45:20	3.452	619284.40	6557823.43	1.2	0.2	0.7	32.36	T0811296	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:45:08	3.461	619296.52	6557837.16	0.8	0.2	0.7	16.30	T0811297	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:44:19	3.501	619344.84	6557869.29	1.7	0.3	0.8	-25.65	T0811298	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:44:02	3.514	619350.20	6557834.13	0.9	0.3	0.9	7.49	T0811299	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:43:07	3.556	619388.16	6557811.60	1.0	0.3	0.9	21.15	T0811300	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:42:58	3.564	619404.90	6557847.35	1.3	0.2	0.8	-17.40	T0811301	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:42:56	3.566	619406.88	6557848.28	1.0	0.2	0.6	-18.75	T0811302	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:42:52	3.569	619409.25	6557846.44	0.9	0.2	0.3	-17.48	T0811303	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:42:50	3.570	619410.61	6557846.72	1.0	0.2	0.4	-18.04	T0811304	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:41:38	3.625	619454.36	6557789.64	0.8	0.2	0.5	28.05	T0811305	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:41:15	3.643	619472.71	6557789.40	0.9	0.2	0.6	24.26	T0811306	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:41:12	3.645	619474.82	6557788.62	0.5	0.2	0.4	24.57	T0811307	Target-Unidentified	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			DCC	Target Number	Description	Comment
							L	H	W				
TARGT	TAUN	01.12.2008	13:41:10	3.648	619476.61	6557784.54	1.3	0.2	0.6	28.15	T0811308	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:41:10	3.649	619475.53	6557776.47	0.9	0.1	0.5	36.26	T0811309	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:41:00	3.654	619478.97	6557768.32	1.2	0.1	1.3	43.46	T0811310	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:41:00	3.657	619499.08	6557841.75	1.2	0.1	0.6	-32.59	T0811311	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:40:54	3.661	619499.37	6557827.39	1.1	0.2	0.7	-18.65	T0811312	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:40:49	3.664	619501.06	6557817.53	1.1	0.3	0.6	-9.40	T0811313	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:40:49	3.665	619503.33	6557825.22	0.8	0.2	0.4	-17.40	T0811314	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:40:17	3.689	619519.79	6557788.63	1.0	0.3	1.2	14.69	T0811315	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:40:11	3.694	619522.34	6557776.72	1.0	0.2	1.0	25.75	T0811316	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:40:09	3.696	619523.63	6557774.81	1.4	0.3	0.7	27.33	T0811317	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:39:59	3.704	619528.45	6557758.56	0.7	0.1	1.1	42.13	T0811318	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:38:43	3.764	619598.98	6557801.31	1.1	0.3	0.8	-14.68	T0811319	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:38:32	3.773	619607.14	6557796.26	0.6	0.2	0.7	-11.26	T0811320	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:38:32	3.773	619609.74	6557808.43	0.8	0.3	0.7	-23.70	T0811321	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:38:31	3.774	619607.24	6557793.46	0.8	0.3	0.9	-8.53	T0811322	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:38:07	3.793	619629.31	6557808.23	1.0	0.3	1.0	-26.90	T0811323	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:38:02	3.796	619628.54	6557788.07	0.7	0.3	0.7	-6.89	T0811324	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:37:38	3.815	619648.39	6557789.56	1.2	0.5	0.9	-11.38	T0811325	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:37:28	3.823	619655.86	6557785.84	0.7	0.5	0.5	-8.74	T0811326	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:37:19	3.830	619662.09	6557785.11	1.2	0.5	0.8	-8.81	T0811327	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:37:18	3.831	619662.54	6557780.76	0.7	0.4	0.4	-4.56	T0811328	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:37:15	3.833	619665.53	6557783.57	1.0	0.7	0.7	-7.73	T0811329	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:37:05	3.843	619679.49	6557820.50	1.1	0.1	0.7	-46.07	T0811330	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:36:49	3.853	619681.80	6557753.67	1.1	0.4	1.3	20.11	T0811331	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:36:24	3.872	619704.62	6557784.65	0.8	0.4	0.7	-12.92	T0811332	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:36:01	3.892	619725.00	6557798.62	1.3	0.1	0.9	-28.38	T0811333	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:35:44	3.904	619736.39	6557789.63	0.9	0.2	1.0	-20.10	T0811334	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:35:40	3.906	619735.12	6557733.99	1.2	0.3	0.8	35.54	T0811335	Target-Unidentified	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			DCC	Target Number	Description	Comment
							L	H	W				
TARGT	TAUN	01.12.2008	13:35:37	3.910	619741.48	6557781.63	0.9	0.5	1.1	-12.38	T0811336	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:35:05	3.937	619767.99	6557785.26	0.9	0.4	1.1	-16.94	T0811337	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:34:25	3.970	619800.57	6557810.61	1.2	0.2	1.2	-42.43	T0811338	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:33:49	4.000	619830.81	6557755.15	0.6	0.2	0.6	13.45	T0811339	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:33:46	4.002	619833.63	6557755.61	1.0	0.2	0.7	13.04	T0811340	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:33:43	4.005	619835.79	6557757.38	0.9	0.3	0.5	11.30	T0811341	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:33:38	4.011	619841.36	6557787.55	1.2	0.4	0.7	-18.78	T0811342	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:33:35	4.012	619842.51	6557790.24	2.0	0.3	1.6	-21.46	T0811343	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:32:59	4.044	619875.09	6557757.70	1.3	0.1	0.3	11.56	T0811344	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:32:50	4.051	619882.74	6557748.36	0.8	0.2	0.5	21.02	T0811345	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:32:47	4.054	619885.11	6557746.69	0.9	0.2	0.7	22.73	T0811346	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:32:38	4.060	619891.58	6557735.07	1.0	0.1	0.9	34.44	T0811347	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:32:14	4.083	619914.05	6557796.34	0.9	0.2	0.6	-26.49	T0811348	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:32:04	4.091	619922.24	6557738.90	0.7	0.2	0.5	31.07	T0811349	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:31:53	4.101	619931.63	6557762.97	0.8	0.3	0.5	7.14	T0811350	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:31:52	4.103	619933.34	6557799.89	0.6	0.1	0.6	-29.75	T0811351	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:31:50	4.103	619934.04	6557763.24	0.8	0.2	0.8	6.91	T0811352	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:31:37	4.115	619945.56	6557784.76	0.9	0.2	0.7	-14.44	T0811353	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:30:58	4.149	619979.55	6557780.06	1.1	0.3	0.6	-9.23	T0811354	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:30:15	4.185	620016.03	6557795.10	1.4	0.2	0.9	-23.72	T0811355	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:30:08	4.192	620022.49	6557790.86	1.1	0.2	0.9	-19.39	T0811356	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:30:03	4.195	620026.60	6557757.79	0.8	0.5	0.8	13.73	T0811357	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:30:03	4.196	620026.35	6557790.22	1.6	0.3	1.3	-18.69	T0811358	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:30:02	4.197	620027.44	6557786.53	1.3	0.3	0.9	-14.99	T0811359	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:29:44	4.212	620043.37	6557744.47	1.0	0.4	0.8	27.31	T0811360	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:29:32	4.224	620054.17	6557801.53	1.6	0.4	0.3	-29.58	T0811361	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:29:19	4.234	620065.27	6557755.68	1.2	0.5	1.0	16.43	T0811362	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:29:18	4.236	620066.44	6557782.95	1.6	0.2	0.7	-10.83	T0811363	Target-Unidentified	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			DCC	Target Number	Description	Comment
							L	H	W				
TARGT	TAUN	01.12.2008	13:29:11	4.240	620071.73	6557749.87	1.2	0.3	0.7	22.33	T0811364	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:28:58	4.253	620084.42	6557749.20	1.2	0.3	0.8	23.26	T0811365	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:28:56	4.254	620084.66	6557774.19	1.4	0.5	1.5	-1.70	T0811366	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:28:52	4.259	620087.95	6557822.98	2.0	0.1	0.9	-50.36	T0811367	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:27:34	4.326	620154.10	6557803.06	1.3	0.5	0.5	-26.05	T0811368	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:26:05	4.404	620239.28	6557757.59	1.2	0.2	0.9	30.84	T0811369	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:26:00	4.407	620240.46	6557771.87	0.9	0.2	0.6	17.02	T0811370	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:25:55	4.412	620247.75	6557759.81	1.1	0.2	0.7	30.21	T0811371	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:25:43	4.423	620258.16	6557765.62	1.3	0.3	0.9	26.50	T0811372	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:25:13	4.448	620279.99	6557783.13	1.6	0.3	0.9	13.92	T0811373	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:25:09	4.452	620285.81	6557774.48	0.8	0.2	0.7	23.64	T0811374	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:25:10	4.452	620278.62	6557806.94	1.5	0.3	1.3	-9.61	T0811375	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:25:03	4.456	620290.24	6557776.26	1.3	0.3	0.8	22.91	T0811376	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:25:05	4.456	620282.60	6557808.33	0.9	0.4	0.9	-10.06	T0811377	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:22:42	4.582	620418.91	6557779.81	1.4	0.0	1.2	50.11	T0811378	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:22:36	4.588	620420.34	6557800.85	2.2	0.2	1.3	30.02	T0811379	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:22:25	4.598	620430.60	6557798.64	0.7	0.1	1.0	34.56	T0811380	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:22:00	4.619	620451.78	6557800.02	1.0	0.1	1.1	37.87	T0811381	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:21:56	4.625	620453.88	6557815.16	1.2	0.2	1.0	23.50	T0811382	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:21:50	4.630	620458.19	6557818.56	0.9	0.3	0.7	21.01	T0811383	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:21:03	4.674	620493.34	6557872.07	1.4	0.2	1.0	-25.43	T0811384	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:20:55	4.680	620507.33	6557819.55	0.7	0.3	0.6	28.60	T0811385	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:20:54	4.680	620507.25	6557824.17	1.4	0.2	0.8	24.02	T0811386	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:20:39	4.693	620515.59	6557857.64	0.8	0.3	0.7	-7.92	T0811387	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:20:32	4.697	620525.96	6557809.05	2.0	0.2	1.4	41.63	T0811388	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:19:48	4.738	620559.27	6557872.16	0.9	0.4	0.4	-17.38	T0811389	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:19:23	4.758	620582.43	6557838.71	1.3	0.3	0.9	17.87	T0811390	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:19:24	4.759	620581.21	6557863.55	0.8	0.2	1.0	-6.99	T0811391	Target-Unidentified	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			DCC	Target Number	Description	Comment
							L	H	W				
TARGT	TAUN	01.12.2008	13:19:18	4.763	620587.04	6557840.39	1.3	0.4	0.9	16.54	T0811392	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:19:13	4.767	620591.40	6557840.00	0.7	0.3	1.3	17.26	T0811393	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:18:27	4.805	620630.04	6557826.37	0.9	0.2	0.4	33.75	T0811394	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:18:21	4.810	620634.98	6557831.31	1.3	0.3	0.7	29.19	T0811395	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:18:21	4.810	620636.13	6557819.60	0.8	0.2	0.8	40.95	T0811396	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:17:32	4.852	620673.65	6557869.98	0.8	0.4	0.7	-6.48	T0811397	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:17:30	4.854	620675.31	6557876.80	1.0	0.3	0.7	-13.16	T0811398	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:17:12	4.868	620690.69	6557857.32	0.9	0.3	0.8	7.42	T0811399	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:17:03	4.874	620698.03	6557841.99	1.3	0.3	0.6	23.26	T0811400	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:16:57	4.880	620700.02	6557893.32	1.2	0.2	1.2	-27.79	T0811401	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:15:11	4.968	620788.13	6557901.33	0.9	0.2	0.7	-29.17	T0811402	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:14:58	4.979	620799.83	6557885.31	1.0	0.2	0.6	-12.32	T0811403	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:12:22	5.106	620927.11	6557894.93	0.8	0.3	0.5	-12.87	T0811404	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:12:18	5.110	620930.75	6557909.53	1.1	0.1	0.7	-27.30	T0811405	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:11:51	5.131	620952.49	6557902.51	1.5	0.3	1.1	-19.63	T0811406	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:10:49	5.180	621002.14	6557904.72	0.8	0.3	0.7	-21.98	T0811407	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:10:36	5.191	621013.20	6557904.81	0.8	0.3	0.6	-22.23	T0811408	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:10:33	5.193	621014.86	6557893.68	0.8	0.5	0.9	-11.12	T0811409	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:09:52	5.225	621046.56	6557868.77	1.2	0.2	0.9	13.34	T0811410	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:07:13	5.350	621171.99	6557898.82	1.0	0.2	0.8	-18.49	T0811411	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:06:25	5.388	621210.03	6557894.14	1.2	0.3	0.7	-14.36	T0811412	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:05:20	5.439	621260.43	6557863.50	0.9	0.3	1.0	15.57	T0811413	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:05:18	5.440	621262.45	6557888.35	1.1	0.4	0.9	-9.31	T0811414	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:04:59	5.457	621279.03	6557921.25	1.0	0.1	1.0	-42.44	T0811415	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:04:54	5.459	621280.35	6557864.41	0.6	0.2	0.7	14.37	T0811416	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:04:34	5.471	621292.63	6557846.11	1.8	0.2	0.6	32.49	T0811417	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:04:30	5.479	621301.36	6557894.66	2.1	0.5	1.9	-16.18	T0811418	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:04:29	5.479	621301.32	6557889.46	1.8	0.3	0.8	-10.97	T0811419	Target-Unidentified	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			DCC	Target Number	Description	Comment
							L	H	W				
TARGT	TAUN	01.12.2008	13:04:20	5.486	621308.29	6557892.50	1.2	0.6	0.6	-14.11	T0811420	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:03:27	5.526	621348.01	6557888.46	0.8	0.4	0.8	-10.64	T0811421	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:02:54	5.551	621373.77	6557909.27	1.5	0.3	1.2	-31.81	T0811422	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:02:31	5.568	621389.57	6557888.32	0.8	0.3	0.7	-11.08	T0811423	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:02:31	5.568	621389.50	6557849.40	2.2	0.6	2.3	27.83	T0811424	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:01:55	5.593	621413.86	6557832.61	1.9	0.3	1.2	44.28	T0811425	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:01:55	5.594	621415.35	6557857.63	0.6	0.1	0.7	19.23	T0811426	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:01:47	5.600	621421.70	6557868.32	0.4	0.3	0.8	8.45	T0811427	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:01:46	5.600	621421.63	6557834.50	1.3	0.3	0.6	42.27	T0811428	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:01:03	5.633	621454.55	6557848.32	0.5	0.1	1.8	27.98	T0811429	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:00:13	5.673	621495.14	6557903.63	0.8	0.2	0.7	-27.89	T0811430	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:00:09	5.675	621496.23	6557863.59	1.4	0.4	1.0	12.12	T0811431	Target-Unidentified	
TARGT	TAUN	01.12.2008	13:00:06	5.677	621498.25	6557856.64	2.2	1.2	1.7	19.05	T0811432	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:59:54	5.687	621509.23	6557900.56	2.5	0.4	1.1	-25.03	T0811433	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:58:53	5.732	621553.14	6557856.48	1.4	0.3	1.6	18.43	T0811434	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:58:06	5.763	621584.22	6557852.50	0.9	0.2	0.7	21.97	T0811435	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:58:05	5.765	621587.06	6557882.18	0.6	0.2	0.6	-7.75	T0811436	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:57:48	5.775	621596.06	6557845.41	0.7	0.1	0.9	28.89	T0811437	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:57:50	5.776	621597.87	6557905.17	0.9	0.3	1.6	-30.90	T0811438	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:57:35	5.784	621604.92	6557844.10	0.8	0.2	0.8	30.06	T0811439	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:57:29	5.789	621611.64	6557905.30	1.0	0.4	1.1	-31.22	T0811440	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:55:48	5.855	621676.49	6557878.20	0.9	0.4	0.7	-5.04	T0811441	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:55:43	5.859	621680.74	6557885.43	1.4	0.6	1.0	-12.34	T0811442	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:55:23	5.870	621692.11	6557862.16	1.6	0.8	1.7	10.77	T0811443	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:55:18	5.873	621694.51	6557851.98	1.2	0.2	0.9	20.91	T0811444	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:55:16	5.875	621696.21	6557861.80	0.9	0.4	0.7	11.07	T0811445	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:55:09	5.881	621703.09	6557916.70	1.2	0.4	0.9	-43.92	T0811446	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:52:50	5.969	621791.42	6557885.30	0.5	0.3	1.1	-13.78	T0811447	Target-Unidentified	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			DCC	Target Number	Description	Comment
							L	H	W				
TARGT	TAUN	01.12.2008	12:52:43	5.973	621795.76	6557917.51	1.7	0.5	1.7	-46.05	T0811448	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:51:32	6.020	621841.67	6557863.25	0.8	0.3	0.6	7.55	T0811449	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:50:47	6.052	621874.24	6557882.53	0.9	0.2	1.0	-12.19	T0811450	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:50:35	6.059	621880.72	6557852.91	1.6	0.4	1.1	17.34	T0811451	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:50:26	6.065	621886.53	6557844.30	1.6	0.3	1.4	25.87	T0811452	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:50:20	6.070	621891.49	6557854.94	1.0	0.2	0.7	15.16	T0811453	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:49:53	6.089	621910.62	6557879.45	0.9	0.5	1.0	-9.62	T0811454	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:49:40	6.098	621919.95	6557890.37	0.8	0.2	0.8	-20.68	T0811455	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:49:36	6.101	621922.70	6557892.49	1.0	0.3	0.7	-22.83	T0811456	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:49:28	6.106	621927.68	6557878.40	1.1	0.3	0.7	-8.81	T0811457	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:46:44	6.223	622044.72	6557883.55	0.9	0.3	0.9	-15.63	T0811458	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:44:13	6.324	622146.55	6557900.15	1.2	0.2	0.6	-33.67	T0811459	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:44:08	6.328	622149.67	6557889.66	1.1	0.3	0.6	-23.23	T0811460	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:44:03	6.331	622152.71	6557894.39	1.0	0.2	0.9	-28.00	T0811461	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:43:54	6.336	622158.46	6557887.65	1.1	0.2	0.7	-21.35	T0811462	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:43:31	6.349	622170.66	6557834.95	0.9	0.2	0.8	31.17	T0811463	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:43:00	6.369	622190.69	6557851.70	0.7	0.3	0.9	14.14	T0811464	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:42:59	6.371	622193.61	6557893.17	0.8	0.3	0.9	-27.36	T0811465	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:42:13	6.404	622226.00	6557870.58	0.9	0.2	0.9	-5.52	T0811466	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:42:13	6.404	622226.20	6557873.67	0.7	0.3	0.5	-8.61	T0811467	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:41:55	6.413	622234.69	6557851.21	1.0	0.1	0.6	13.57	T0811468	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:41:47	6.419	622240.17	6557848.05	1.0	0.2	0.9	16.56	T0811469	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:41:26	6.427	622247.01	6557808.47	1.0	0.2	0.8	55.90	T0811470	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:41:25	6.429	622249.20	6557812.20	1.1	0.2	0.6	52.10	T0811471	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:41:36	6.436	622258.24	6557886.74	1.0	0.2	0.7	-22.69	T0811472	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:40:42	6.471	622292.08	6557856.57	0.9	0.2	0.7	6.39	T0811473	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:40:37	6.473	622294.51	6557849.55	0.7	0.3	0.9	13.32	T0811474	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:39:11	6.547	622369.96	6557891.83	0.8	0.3	0.5	-31.34	T0811475	Target-Unidentified	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			DCC	Target Number	Description	Comment
							L	H	W				
TARGT	TAUN	01.12.2008	12:38:52	6.558	622379.73	6557873.91	0.7	0.2	0.6	-13.74	T0811476	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:38:49	6.563	622385.93	6557890.54	1.0	0.2	0.9	-30.56	T0811477	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:38:42	6.567	622389.92	6557883.89	1.0	0.2	0.8	-24.05	T0811478	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:38:36	6.574	622396.21	6557891.32	0.7	0.3	0.9	-31.67	T0811479	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:37:48	6.600	622421.15	6557842.13	1.3	0.3	1.1	16.70	T0811480	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:37:42	6.606	622427.62	6557850.07	1.5	0.6	1.3	8.56	T0811481	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:37:37	6.606	622427.19	6557835.47	1.1	0.3	0.7	23.16	T0811482	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:37:33	6.619	622441.70	6557878.27	1.1	0.3	0.9	-20.08	T0811483	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:37:18	6.626	622447.91	6557856.84	0.8	0.3	0.9	1.14	T0811484	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:37:08	6.632	622453.29	6557850.36	0.6	0.3	0.7	7.45	T0811485	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:37:17	6.632	622454.35	6557878.52	0.9	0.2	0.8	-20.73	T0811486	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:37:00	6.634	622454.99	6557831.96	1.0	0.4	1.1	25.79	T0811487	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:36:59	6.635	622455.32	6557829.88	1.3	0.3	0.7	27.85	T0811488	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:36:32	6.655	622476.22	6557832.85	1.0	0.2	0.7	24.21	T0811489	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:36:18	6.667	622488.35	6557842.15	0.8	0.2	0.6	14.53	T0811490	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:36:10	6.682	622503.85	6557876.11	0.8	0.6	0.6	-19.91	T0811491	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:36:05	6.682	622504.11	6557863.48	1.0	0.1	0.4	-7.29	T0811492	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:35:38	6.701	622522.72	6557860.03	1.1	0.5	0.6	-4.43	T0811493	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:35:29	6.707	622528.68	6557855.79	1.5	0.4	1.6	-0.38	T0811494	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:35:16	6.709	622529.46	6557824.36	1.2	0.2	0.7	31.00	T0811495	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:35:23	6.712	622533.49	6557859.34	1.0	0.2	0.6	-4.09	T0811496	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:35:18	6.716	622538.19	6557862.71	0.8	0.2	0.3	-7.61	T0811497	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:35:09	6.720	622541.71	6557849.05	1.1	0.6	0.3	5.94	T0811498	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:35:13	6.723	622545.07	6557872.00	1.0	0.2	0.8	-17.12	T0811499	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:35:08	6.725	622546.71	6557865.93	1.1	0.2	0.8	-11.10	T0811500	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:34:55	6.729	622550.16	6557842.74	1.3	0.2	0.9	11.97	T0811501	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:35:12	6.730	622552.40	6557892.86	0.9	0.1	1.4	-38.19	T0811502	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:34:56	6.731	622552.13	6557853.08	0.6	0.4	0.9	1.57	T0811503	Target-Unidentified	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			DCC	Target Number	Description	Comment
							L	H	W				
TARGT	TAUN	01.12.2008	12:34:54	6.731	622551.90	6557845.10	0.7	0.2	0.5	9.55	T0811504	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:34:49	6.731	622551.84	6557832.11	0.9	0.3	0.8	22.54	T0811505	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:34:53	6.732	622552.92	6557847.47	0.7	0.2	0.4	7.16	T0811506	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:34:50	6.734	622554.81	6557845.16	0.7	0.3	1.2	9.40	T0811507	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:34:46	6.734	622555.48	6557839.21	1.0	0.3	1.1	15.33	T0811508	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:34:42	6.738	622558.78	6557835.83	1.3	0.4	1.0	18.61	T0811509	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:34:41	6.738	622558.68	6557831.35	0.7	0.2	0.5	23.09	T0811510	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:34:42	6.738	622558.92	6557838.50	1.0	0.3	1.0	15.92	T0811511	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:34:34	6.741	622562.20	6557829.02	0.9	0.2	0.8	25.30	T0811512	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:34:28	6.746	622566.58	6557825.36	1.2	0.1	0.9	28.82	T0811513	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:34:26	6.758	622580.87	6557880.45	0.6	0.2	1.0	-26.70	T0811514	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:34:18	6.764	622586.19	6557874.36	0.9	0.3	0.8	-20.78	T0811515	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:34:21	6.764	622586.73	6557884.86	1.0	0.1	0.9	-31.29	T0811516	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:34:05	6.774	622596.82	6557878.01	1.5	0.3	0.7	-24.77	T0811517	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:33:32	6.788	622609.11	6557823.71	1.0	0.2	0.9	29.11	T0811518	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:33:33	6.789	622609.80	6557830.59	1.1	0.2	0.6	22.21	T0811519	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:33:30	6.790	622610.37	6557821.79	1.1	0.4	1.0	30.99	T0811520	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:33:31	6.790	622611.12	6557826.36	1.2	0.3	1.0	26.39	T0811521	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:33:31	6.792	622613.49	6557838.27	1.5	0.4	1.3	14.42	T0811522	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:33:29	6.794	622614.58	6557836.08	0.7	0.3	0.8	16.57	T0811523	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:33:29	6.794	622615.52	6557839.36	1.6	0.3	1.2	13.27	T0811524	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:33:25	6.795	622615.87	6557831.96	0.6	0.2	0.7	20.65	T0811525	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:33:18	6.809	622630.95	6557867.89	0.7	0.3	0.6	-15.75	T0811526	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:33:17	6.812	622634.35	6557876.11	1.4	0.8	0.9	-24.07	T0811527	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:33:09	6.814	622636.10	6557861.11	0.5	0.3	0.6	-9.14	T0811528	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:33:06	6.817	622639.22	6557863.63	0.9	0.3	0.7	-11.75	T0811529	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:32:47	6.823	622643.20	6557824.07	0.9	0.4	1.0	27.66	T0811530	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:32:43	6.828	622648.69	6557831.15	0.9	0.3	1.2	20.41	T0811531	Target-Unidentified	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			DCC	Target Number	Description	Comment
							L	H	W				
TARGT	TAUN	01.12.2008	12:32:53	6.828	622650.53	6557868.44	1.1	0.3	0.6	-16.92	T0811532	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:32:39	6.830	622651.21	6557832.83	1.1	0.2	1.1	18.66	T0811533	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:32:34	6.833	622653.30	6557824.31	0.8	0.2	0.7	27.10	T0811534	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:32:35	6.833	622653.83	6557829.31	1.0	0.2	0.6	22.08	T0811535	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:32:31	6.834	622654.75	6557820.18	1.8	0.2	1.4	31.18	T0811536	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:32:32	6.835	622655.89	6557826.14	1.3	0.2	1.8	25.19	T0811537	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:32:36	6.839	622660.76	6557859.24	1.0	0.2	0.7	-8.05	T0811538	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:31:27	6.882	622702.62	6557822.12	1.0	0.4	1.3	27.72	T0811539	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:31:00	6.915	622737.62	6557877.49	2.0	0.4	1.4	-28.75	T0811540	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:30:42	6.921	622742.56	6557842.45	0.8	0.5	0.4	6.12	T0811541	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:30:48	6.921	622743.38	6557862.33	1.4	0.4	0.8	-13.77	T0811542	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:30:33	6.933	622754.73	6557863.04	1.1	0.6	0.8	-14.85	T0811543	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:30:29	6.935	622756.54	6557857.64	1.0	0.5	0.8	-9.51	T0811544	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:30:14	6.942	622762.90	6557838.35	0.6	0.4	1.0	9.57	T0811545	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:29:54	6.962	622784.00	6557865.10	1.2	0.5	1.3	-17.84	T0811546	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:29:18	6.982	622803.08	6557835.62	1.0	0.4	1.0	11.02	T0811547	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:29:15	6.983	622804.45	6557832.92	1.3	0.5	1.0	13.67	T0811548	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:28:39	7.010	622830.73	6557835.69	1.5	0.5	0.6	10.06	T0811549	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:28:30	7.024	622846.17	6557870.37	1.2	0.2	0.6	-25.09	T0811550	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:27:41	7.049	622869.82	6557827.51	0.8	0.3	0.6	17.00	T0811551	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:27:42	7.057	622878.70	6557864.33	1.3	0.3	1.1	-20.10	T0811552	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:27:06	7.073	622893.41	6557819.56	1.0	0.2	1.1	24.19	T0811553	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:26:50	7.086	622907.03	6557832.42	1.4	0.6	1.1	10.90	T0811554	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:26:57	7.095	622917.23	6557883.51	1.3	0.3	1.1	-40.49	T0811555	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:26:38	7.104	622926.66	6557871.44	1.6	0.5	1.4	-28.73	T0811556	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:26:08	7.111	622931.58	6557801.42	1.5	0.3	1.3	41.10	T0811557	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:26:24	7.117	622938.95	6557874.27	2.5	1.2	2.2	-31.95	T0811558	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:26:02	7.118	622938.39	6557807.29	1.6	0.4	1.3	35.01	T0811559	Target-Unidentified	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			DCC	Target Number	Description	Comment
							L	H	W				
TARGT	TAUN	01.12.2008	12:26:12	7.120	622941.27	6557849.52	1.0	0.4	1.5	-7.29	T0811560	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:26:02	7.131	622953.35	6557862.93	2.5	1.0	1.4	-21.07	T0811561	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:25:49	7.139	622960.98	6557856.77	1.3	0.5	1.2	-15.16	T0811562	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:25:45	7.141	622962.51	6557851.34	1.6	0.6	1.5	-9.79	T0811563	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:25:20	7.154	622974.74	6557823.64	1.3	0.5	0.8	17.51	T0811564	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:25:21	7.155	622976.25	6557832.73	0.8	0.4	0.8	8.38	T0811565	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:25:19	7.156	622976.91	6557827.39	1.8	0.4	1.1	13.69	T0811566	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:23:42	7.228	623050.00	6557850.07	0.7	0.6	1.2	-11.31	T0811567	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:23:43	7.229	623050.61	6557854.93	0.9	0.4	1.3	-16.18	T0811568	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:23:18	7.235	623055.26	6557811.44	1.2	0.2	1.0	27.13	T0811569	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:23:23	7.240	623061.43	6557848.42	0.9	0.5	1.0	-10.02	T0811570	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:23:16	7.245	623066.89	6557846.42	1.1	0.5	0.8	-8.20	T0811571	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:23:02	7.255	623076.15	6557846.47	0.9	0.4	0.9	-8.54	T0811572	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:22:53	7.255	623076.11	6557820.30	1.0	0.5	1.1	17.62	T0811573	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:22:46	7.259	623079.48	6557813.52	1.0	0.2	1.4	24.28	T0811574	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:22:36	7.267	623088.25	6557823.34	1.0	0.4	1.1	14.19	T0811575	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:22:28	7.270	623090.14	6557808.23	1.0	0.6	1.3	29.23	T0811576	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:22:33	7.276	623098.29	6557855.84	1.0	0.4	1.2	-18.62	T0811577	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:22:35	7.279	623101.73	6557872.97	1.2	0.3	0.6	-35.84	T0811578	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:22:06	7.292	623113.96	6557843.82	1.0	0.6	1.0	-7.10	T0811579	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:21:13	7.323	623144.24	6557819.11	1.4	0.5	1.4	16.63	T0811580	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:21:09	7.325	623145.81	6557817.35	1.5	0.3	0.9	18.34	T0811581	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:21:14	7.329	623151.02	6557850.53	1.4	0.8	1.5	-14.99	T0811582	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:20:50	7.336	623156.73	6557803.98	1.5	0.2	1.0	31.35	T0811583	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:20:34	7.345	623164.90	6557795.82	1.2	0.1	0.5	39.25	T0811584	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:20:18	7.367	623188.63	6557840.23	1.3	0.6	0.9	-5.90	T0811585	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:20:07	7.371	623192.31	6557820.38	1.0	0.2	0.5	13.83	T0811586	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:20:00	7.372	623192.37	6557805.08	1.5	0.2	0.7	29.12	T0811587	Target-Unidentified	

Obs Type	Event Name	Date	Time	KP	Easting	Northing	Dimensions			DCC	Target Number	Description	Comment
							L	H	W				
TARGT	TAUN	01.12.2008	12:20:07	7.373	623193.61	6557827.18	0.8	0.3	0.8	6.99	T0811588	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:19:48	7.382	623202.59	6557807.71	2.0	0.3	1.1	26.16	T0811589	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:18:54	7.427	623247.50	6557820.74	1.1	0.4	1.0	11.71	T0811590	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:18:45	7.445	623267.05	6557870.12	1.3	0.2	1.3	-38.27	T0811591	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:18:39	7.450	623272.07	6557869.92	1.3	0.2	0.8	-38.23	T0811592	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:18:23	7.450	623270.69	6557820.98	0.8	0.3	0.8	10.73	T0811593	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:18:07	7.459	623279.37	6557808.60	1.3	0.4	1.0	22.83	T0811594	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:17:36	7.485	623305.53	6557815.94	0.9	0.3	1.0	14.63	T0811595	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:17:29	7.491	623311.18	6557814.15	1.5	0.4	1.3	16.21	T0811596	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:17:21	7.495	623314.91	6557806.19	1.4	0.3	0.9	24.03	T0811597	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:16:39	7.531	623353.19	6557838.60	1.3	0.3	0.8	-10.18	T0811598	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:16:30	7.537	623358.84	6557836.42	0.9	0.3	0.7	-8.35	T0811599	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:16:29	7.540	623362.50	6557848.52	1.3	0.4	1.4	-20.66	T0811600	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:16:11	7.547	623367.26	6557817.40	0.7	0.3	1.2	10.11	T0811601	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:16:04	7.552	623371.93	6557815.87	1.2	0.5	1.0	11.32	T0811602	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:15:19	7.582	623402.32	6557814.52	1.1	0.2	0.7	10.39	T0811603	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:15:12	7.584	623403.34	6557801.05	0.9	0.2	1.3	23.72	T0811604	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:15:01	7.598	623420.17	6557836.17	1.2	0.4	1.3	-12.74	T0811605	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:14:55	7.602	623423.57	6557833.15	1.6	0.4	1.3	-10.04	T0811606	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:14:53	7.605	623427.71	6557844.63	1.2	0.3	0.8	-21.87	T0811607	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:14:50	7.607	623430.34	6557848.68	1.2	0.3	1.0	-26.15	T0811608	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:01:44	8.234	624045.73	6557714.16	1.5	0.7	1.0	-13.45	T0811609	Target-Unidentified	
TARGT	TAUN	01.12.2008	12:01:26	8.249	624054.33	6557683.31	2.0	0.4	0.8	14.78	T0811610	Target-Unidentified	

APPENDIX IV - SCOPE OF WORK

The SOW issued for the Hywind Cable Route Alt5 Survey is presented in document ST08538 Scope of Work Hywind ROV Survey Cable Route Alt 5 and is listed below.

StatoilHydro

ST08538 Scope of Work. Hywind ROV Survey. Cable route alt 5

StatoilHydro

Title:
ST08538 Scope of Work. Hywind ROV Survey. Cable route alt 5

Document no. :	Contract no.:	Project:
		Hywind

Classification:	Distribution:
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Expiry date: **2008-12-31**	Status **Final**

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Author(s)/Source(s):
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ROV survey along cable route alt 5. Multibeam, Sub Bottom Profile and Video
Remarks:

Valid from:	Updated:
2008-11-05	**2008-11-12**
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Techn. responsible (Organisation unit):	Techn. responsible (Name):	Date/Signature:
TNE MTO PTM MDMG MGI	**Tom Hansen**	
Responsible (Organisation unit): **TNE MTO PTM MDMG Survey**	Responsible (Name): **Egil Ingebretsen**	Date/Signature:
Recommended (Organisation unit):	Recommended (Name):	Date/Signature:
Approved by (Organisation unit): **TNE MTO PTM MDMG Survey**	Approved by (Name): **Bjørn Bakkevig**	Date/Signature:

1 Revision history

Rev	Date	Revisions history	Responsible
01	2008-10-21	Issued for IDC	Tom Hansen
02	2008-1-05	Issued for IDC	Tom Hansen
0	2008-11-12	Issued for use	A.E. Bjåstad

2 Introduction

2.1 Project Name

The Project Name is: Hywind ROV Survey.
StatoilHydro internal survey reference is: ST08538

2.2 Type of Survey

The Type of Survey is:
Seabed survey for cable route.

2.3 Communication

First Hand Reports, Field Memos, etc, shall be issued immediately following observation of critical events.

StatoilHydro:
Contact Person (Survey issues):
Tom Hansen
Telephone: +47 95996297
Email: th7@statoilhydro.com

Survey Contractor:
Acergy Norway AS
Project Contact Person (Survey issues):
Edvart Aune
Telephone: +47 90664062
Email: edvart.aune@acergy-group.com

During the survey, "Daily status reports" shall be copied to:
Leif Delp ldel@statoilhydro.com
Simen Moxnes smox@statoilhydro.com
Pål Johannes Strøm pjst@statoilhydro.com

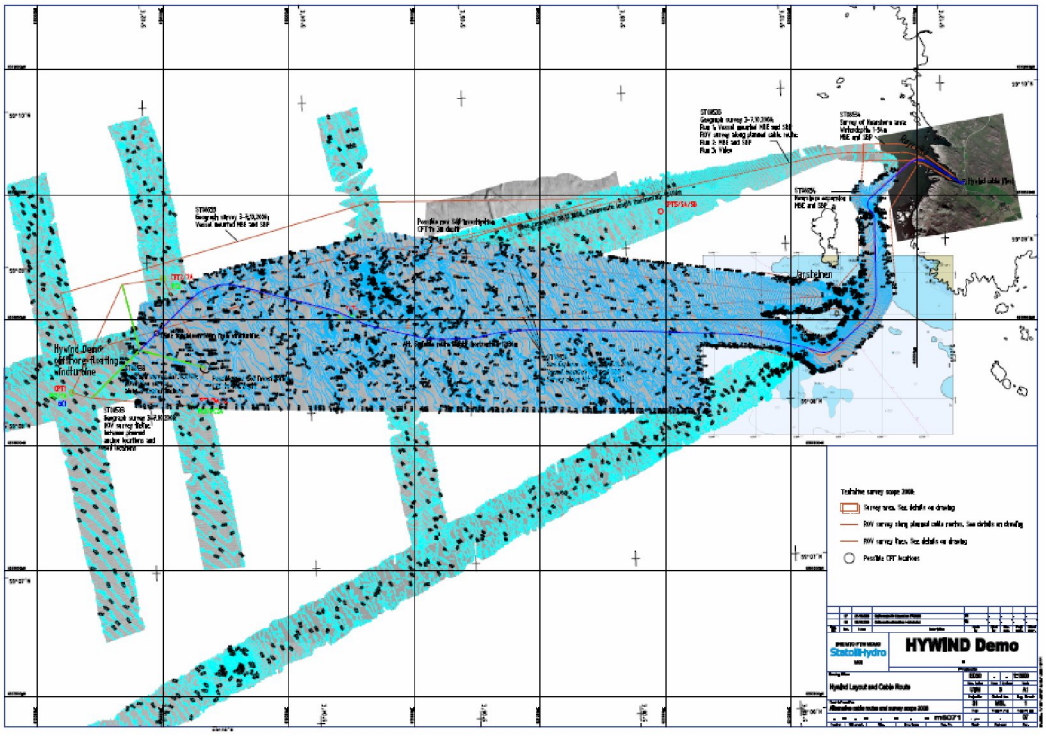
2.4 Objective

The objective of the survey is to perform Multibeam Echosounder, Sub Bottom Profiler and Video survey of Hywind cable route alternative 5. Special attention shall be on seabed topography and sediment conditions related to trenching.

- Acquire data for seabed classification
  - shallow geology
  - sediment distribution

- thickness of soft sediment layers
- High resolution mapping of the seabed topography
- Identify seabed features
- Identify obstructions and/or corals on seabed

2.5 Location



2.6 Definitions & Abbreviations

ASCII	American Standard Code for Information Interchange
CD	Compact Disc
C-O	Computed - Observed
CPI	Company Provided Item
CTD	Conductivity, Temperature and Density
DAT	DTM file in ASCII xyz format
DATUM	Set of reference points on the earth's surface
DGPS	Differential Global Positioning System
DOC	Microsoft Word document format
DTM	Digital Terrain Model
DVD	Digital Versatile Disc
DVL	Doppler Velocity Log
DWG	Autocad drawing file format
ED50	European Datum 1950)
EPSG	European Petroleum Survey Group
GPS	Global Positioning System
HDD	Hard Disk Drive (USB)
IMU	Inertial Motion Unit
INS	Inertial Navigation System
ITRF	International Terrestrial Reference Frame
ITRS	International Terrestrial Reference System
JPG	File format for photographic images
MBE	Multi Beam Echosounder
MPEG2	File format of digital television signals and DVD
MRU	Motion Reference Unit
MSL	Mean Sea Level
MVP	Moving Vessel Profiler
OAS	Obstacle Avoidance Sonar
PDF	Portable Document Format (Adobe)
PGW	Georeference file for the PNG format
PNG	File format for photographic images
ROV	Remotely Operated Vehicle
SBP	Sub Bottom Profiler
SSBL	Super Short Base Line
SSS	Side Scan Sonar
SR	Selskaps Representant (Offshore Company Rep)
TIF	File format for photographic images
USBL	Ultra-short baseline
UTC	Universal Time, Coordinated)
VMS	Vessel position Monitoring SystemWGS 84
WGS84	World Geodetic System 1984

3 Survey requirements

3.1 Introduction

The survey requirements for this project is split into two parts; generic and specific.

The generic requirements are contained within:

- relevant parts of the contract between StatoilHydro and the survey contractor
- StatoilHydro's Governing Documents
- various (named) industry standards, specifications and guidelines

The project specific requirements are contained within this scope of work document.

A CAD file of the required survey coverage/lines are enclosed, see chapter 7.

3.2 Horizontal Datum

The following geodetic parameters shall be used:

Spheroid / Datum
WGS84
a = 6378137.0000m
b = 6356752.3142m
Inverse flattening = 298.257223

International 1924 / ED50
a = 6378388.0000m
b = 6356911.9461m
Inverse flattening = 297.000000

Projection
Universal Transverse Mercator Zone 31
Type of Projection :Transverse Mercator
Latitude of Origin : 0°
Longitude of Origin : 3°East
Northing of Origin : 0m
Easting of Origin : 500000m
Scale at Origin : 0.9996

Transformations from WGS84 to ED50 shall be carried out according to EPSG Guidance Note Number 10 April 2001 "Geodetic Transformations Offshore Norway".

This means that for surveys in areas south of 62° N, the simplified and approximate transformation method and parameters as given in EPSG Guidance Note Number 10 April 2001, section 14 shall be used.

Transformation Parameters	Values
dX	+90.365m
dY	+101.130m
dZ	+123.384m
rX	-1.614µrad (-0.333sec)
rY	-0.373µrad (-0.077sec)
rZ	-4.334µrad (-0.894sec)
dS	-1.994ppm

The reverse transformation (ED50 to WGS84) is code 1613 in the EPSG geodetic parameter database.

The surface positioning systems specified in TR1007 provide positional data in a realisation of the International Terrestrial Reference System (ITRS).

Both the International Terrestrial Reference Frame identification (e.g. ITRF 2000) and the reference epoch for the data should be documented by the survey contractor.

WGS84 is *currently* (April 2001) maintained within 10cm of the ITRS (Source: EPSG Guidance Note Number 10). For the purposes of this project therefore the two can be considered to be approximately the same.

3.3 Vertical Datum

The vertical datum shall be Mean Sea Level (MSL).

3.4 Time

The time reference shall be Universal Time, Coordinated (UTC).

3.5 Test coordinate

Testpoints south of 62° N:

From Datum: WGS 84 to Datum: ED50 south of 62°N 7 parameter formula

Testpoints:
(Format for geographical coordinates: degrees:minutes:seconds)

WGS 84		ED50 south of 62°N			
Lattitude(N)	Longitude(E)	Lattitude(N)	Longitude(E)	UTMz31mN	UTMz31mE
57:59:57.838	3:59:54.600	58:00:00.000	4:00:00.000	6429293.75	559110.83
58:00:00.000	4:00:00.000	58:00:02.162	4:00:05.400	6429361.92	559198.50
60:00:00.000	3:00:00.000	60:00:01.942	3:00:05.895	6651626.77	500091.34
61:59:58.342	2:59:53.652	62:00:00.000	3:00:00.000	6874345.36	500000.00
62:00:00.000	3:00:00.000	62:00:01.658	3:00:06.348	6874396.66	500092.36

3.6 Survey Systems

Survey systems shall satisfy the requirements given in TR1007.

The survey sensors and systems to be used and logged for this particular pipeline inspection project are listed in the table below:

LOGGED	SENSOR/SYSTEM	UPDATE RATE	COVERAGE
Yes	**Surface Positioning (augmented GNSSs)**		
Yes	**Sub-surface Positioning (USBL / DVL / INS)**		
Yes	**Heading / Attitude / Motion – vessel**		
Yes	**Heading / Attitude / Motion – ROV**		
Yes	**Pressure depth sensor + altimeter – ROV**		
Yes	**Depths from Dualhead MBE– ROV**	**> 5Hz**	
Yes	**Sonar data from Dualhead MBE– ROV**		
No	**Depths from Dualhead MBE– Vessel**		
No	**Sonar data from Dualhead MBE– Vessel**		
No	Depths from MBE– AUV		
No	Sonar data from MBE– AUV		
Yes	**Sub Bottom Profiler - ROV**		
No	Sub Bottom Profiler - Vessel		
No	Sub Bottom Profiler – AUV		
No	**Side Scan Sonar (SSS) – ROV – Highres (>400Khz)**		
No	Side Scan Sonar (SSS) – ROV – Lowres		
No	Side Scan Sonar (SSS) – ROV – Paper records		
No	Side Scan Sonar (SSS) – AUV – Highres (>400Khz)		
No	Side Scan Sonar (SSS) – AUV – Lowres		
No	Side Scan Sonar (SSS) – AUV – Paper records		
No	Side Scan Sonar (SSS) – Towed – Highres (>400Khz)		
No	Side Scan Sonar (SSS) – Towed - Lowres		
No	Side Scan Sonar (SSS) – Towed – Paper records		
Yes	**Conductivity, Temperature and Depth (CTD) probes**		
Yes	**Atmospheric pressure sensor**		
No	Cathodic Protection Monitoring System		
No	Pipetracking System		
Yes	**Digital Video System - Centre camera & port and starboard boom cameras**		
Yes	**Digital Still Photo Camera**		

3.7 Project specific calibrations / verifications

The mobilisation, calibration and verification of survey systems shall satisfy the requirements stipulated in TR1007. In particular attention is drawn to Section 2.5.

Before commencing the work a survey system verification shall be performed by running a patch test, MBES calibration on both hullmounted and ROV mounted systems. The calibration result shall be presented as a FHR to the Client rep onboard or StatoilHydro contact person (see chapter 2.3) before survey commence, and also be reflected in the survey report.

Position verification shall be performed by continuous on-line check of INS positions vs. raw USBL positions. Special attention shall be paid to noise on the USBL system.

3.8 Survey Scope and Coverage

The Survey Scope is summarised in the following table:

Description	Survey Area	Comments
Cable route survey	Survey along planned cable route alternative 5	**ROV survey:** Run 1: MBE, SBP. Flying height 10-15m Run 2: Video

4 Procedures, Methods and Reporting

4.1 General

In good time prior to the commencement of any work relating to this project the survey contractor should provide company with a set of procedures / method statements describing how they intent to perform the survey. These procedures may be generic in nature. In such instances they should be accompanied by a 'bridging document' describing the specific requirements of this project together with a list of any deviations from the supplied, standard procedures. Company shall consider / comment on / approve the supplied documentation prior to commencement of field operations.

4.2 Data Processing and Reporting

Data Processing methods/parameters shall be as specified in the various StatoilHydro documents.

The following data shall be delivered:

- Text Report
- Seabed contours
- Interpretation of SBP
- Alignment charts with Bathymetry, SBP interpretation and Video observations along the cable route.
- DTM 0.1m resolution (.dat) (one DTM per logfile)
- DTM 1m resolution (one separate DTM for each area)
- Shaded Relief files (.png, .pgw, .hgr)
- Sub Bottom Profiler records (TIF/JPG)

Sounding files (xyz) shall be delivered in addition to 1m gridded DTM. It is important that sounding files are not merged. Sounding files shall use the normal Eiva Julian day and sequence number convention.

Sub Bottom Profiler acquisition shall be interpreted and reported on the charts.

In the report there shall be a reference to this scope document and revision. The report shall also include chart and technical documentation of survey spread and processing.

4.3 Numbering and Project Identifier

StatoilHydro's project identifier, on the form **STyynnn**, shall be used as the unique tracking identifier in all project and data management operations. Hence, it is of vital importance that all relevant documentation, logs and labels include this identifier.

The Project ID number for this scope is: **ST08538**

All written communication related to the project shall have the Project Identifier as part of the title/subject field.

4.4 Deliverables

First Hand Reports, Field Memos, etc, shall be issued immediately following observation of critical events.

Results shall be delivered to StatoilHydro according to the following procedure:

Once the final report has been compiled it should be issued to StatoilHydro for comments. This shall be Revision 2, "Issued for Client Comments".

A Transmittal form ('hard-copy') should be sent to:

StatoilHydro Forus
Att: Miyoung Kim Won Wold
Forus Øst G-4
4035 Forus

This should accompany the report (including all attachments and data on digital media).

In parallel with this, the text report (pdf format) should be send to Lill Janne Randeberg (kwm@statoilhydro.com) and Tom Hansen (th7@statoilhydro.com) as an email attachment.

Once StatoilHydro has reviewed the report written comments shall be produced and issued to the survey contractor. Once these comments have been addressed the report should be issued again (Revision 0, “Issued for Use”) to the above address.

All deliveries shall be marked with StatoilHydro internal survey reference id ST08538

The deliverables as given in the table below shall be submitted upon completion of the survey.

TABLE OF DELIVERABLES (ref. TR1007, TR1063 and TR2234)

DELIVERABLES	FORMAT	MEDIA	REV 2 COPIES	REV 0 COPIES
REPORT TEXT (TR1007, TR2234)	A4	paper	2	2
REPORT TEXT (TR1007, TR2234)	.pdf	CD/DVD	2	2
REPORT TEXT (TR1007, TR2234)	.doc	CD/DVD	2	2
CHARTS (TR1007, TR2234)	A3	paper	2	2
CHARTS (TR1007, TR2234)	.pdf	CD/DVD	2	2
CHARTS (TR1007, TR2234)	.dwg	CD/DVD	2	2
DTM (TR1063)	.dat	CD/DVD/HDD	2	2
DTM (georeference info for .png file)	.pgw	CD/DVD/HDD	2	2
DTM (Shaded Relief)	.png	CD/DVD/HDD	2	2
VIDEO (TR1007, TR2234)	MPEG2	HDD	0	2
Coverage DTM (TR1063)	.shp	CD/DVD	2	2
Coverage MBE (TR1063)	.shp	CD/DVD	2	2
Coverage SSS (TR1063)	.shp	CD/DVD	0	0
Installations centre positions (TR1063)	.shp	CD/DVD	0	0
Installations outlines (TR1063)	.shp	CD/DVD	0	0
Interventions outlines (TR1063)	.shp	CD/DVD	0	0
Metadata (TR1007)	ASCII	CD/DVD	2	2
Pipelines as-found (TR1063)	.shp	CD/DVD	0	0
SBP (Sub Bottom Profiler - Paper records) (TR1007)	paper	paper	1	0
SBP (Sub Bottom Profiler - Digital) (TR1007)	tif/jpg	CD/DVD/HDD	2	2
SITRAS - Video File list (.VIF) (TR2234)	ASCII	CD/DVD	0	0
SITRAS - 5 point Cross Profile file (.C5P) (TR2234)	ASCII	CD/DVD	0	0
SITRAS - Cathodic Potential Readings (.CPR) (TR2234)	ASCII	CD/DVD	0	0
SITRAS - Delivery File (.DEL) (TR2234)	ASCII	CD/DVD	0	0
SITRAS - Field Gradient Readings (.FGR) (TR2234)	ASCII	CD/DVD	0	0
SITRAS - Full Cross Profile file (.CR2) (TR2234)	ASCII	CD/DVD	0	0
SITRAS - Navigation and Depth file (.NAV) (TR2234)	ASCII	CD/DVD	0	0
SITRAS - Observation file (.OBS) (TR2234)	ASCII	CD/DVD	0	0
SITRAS - Sub Bottom Profiling file (.SBP) (TR2234)	ASCII	CD/DVD	0	0
SITRAS - Survey Description file (.SUR) (TR2234)	ASCII	CD/DVD	0	0
SITRAS - Video File KP / TAG Index (.VII) (TR2234)	ASCII	CD/DVD	0	0
SOUNDINGS (As logged) (TR1007)	.all	CD/DVD/HDD	0	1
SSS (Paper records) (TR1007, TR2234)	paper	paper	0	0
SSS (Side Scan Sonar) (TR1007, TR2234)	tif	CD/DVD/HDD	0	0

Charts accompanying the revision 0 report should be marked as revision 0 even if there is no change from the revision 2 chart issue.

5 Schedule

First Hand Reports, Field Memos, etc, shall be issued immediately following observation of critical events.

5.1 Field work

The field work shall be performed as soon as possible. Fieldwork duration approximately 1 day.

5.2 Reporting and digital data delivery

The schedule for delivery of reports and data are regulated according to Exhibit C, 3 Milestones in the Frame Contract for Survey Services.

Due to tight schedule we ask for as soon as possible delivery of

- Video along route
- Obstrustions, wreck etc that may have influence on planned cable route layout (route alt 5).

6 References

This work shall be performed under the “Frame Contract for Survey Services”.

TR1007 Specification for Seabed Surveys Inspection and Documentation
TR1063 Geographical Information
TR2234 Specification for External Inspection of Offshore Pipelines

7 Attachments

The following items accompany this document:

7.1 Hywind Cable Route alt 5_20081021.dwg

- Autocad DWG file containing cable route alternative 5.

7.2 M6071_07.pdf

Drawing as PDF file: Hywind Layout and Cable Route. Revision 07 dated 21.10.2008

APPENDIX V – TASKPLAN

SURVEY TASK PLAN 64
Hywind ROV Survey – Cable Route Alt. 5
ROV MBE, SSS, SBP and Visual survey
ST08538

Project:	**Statoil Survey Frame Agreement 2008**	
Location:	**Hywind (Karmøy)**	
Task:	**MBE/SSS / SBP and Visual survey of Cable route alt. 5.**	
Procedure reference:	**StatoilHydro: Specific Scope of Work** **ST08538 Scope of Work (Rev. 0)**	
Date Planned	**18.11.2008**	**Sheet 1 of 5**

Task Objective:

The objective of the survey is to perform Multibeam Echosounder, Sub Bottom Profiler and Video survey of Hywind cable route alternative 5. Special attention shall be on seabed topography and sediment condit ions related to trenching.

- Acquire data for seabed classification
  - shallow geology
  - sediment distribution
  - thickness of soft sediment layers
- High resolution mapping of the seabed topography
- Identify seabed features
- Identify obstructions and/or corals on seabed

Scope of work:

The survey shall be done by ROV mounted MBES, SSS and SBP along the 12136m long cable route.

Survey line along route at and flying height and speed of the ROV to ensure good data:

- Calibration of MBE systems.
- The calibration result shall be presented as a FHR to the Client rep onboard or StatoilHydro contact person before survey commence, and also be reflected in the survey report.
- One run along the route logging MBE, SSS and SBP, flying hight 10-15 m. DTM resolution 0.1m.
- One run visual (video) su rvey along the route.
- SBP acquisition shall be interpreted and profiles included on the charts.

Safety Information :

PPE to be worn on deck at all times (coveralls , hardhat, safety shoes, protective glasses & gloves).

General Information:

Acergy Viking uses responder B27 and transponder B28 on *ACV03* ROV.

Water depths in the area ranges from 0 to 210m.

I

SEC	W. Administrator	1	ROV	ACV ROV	6
OM	Offshore Manager	2	ONL	Online	7
StatoilHydro	StatoilHydro Client Rep.	3	OFF	Data Processors	8
SS	Senior Surveyor	4	GEO	Geophysicists	9
BR	Bridge	5	SHS	Shift Supervisor	10

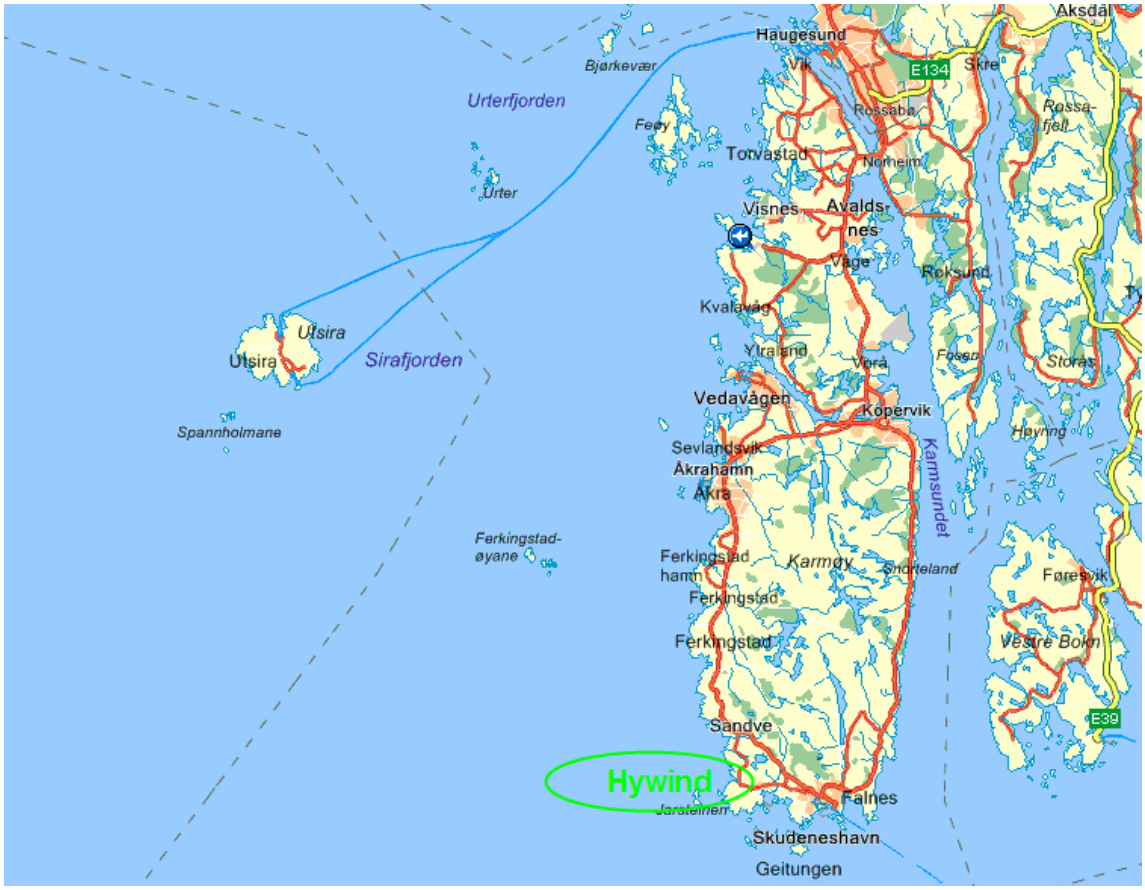
Originator:	Jørgen Blix	Senior Surveyor	
Checker:	Lee Blinco	Senior Surveyor	
Approver:	Dave Mackay	Offshore Manager	

Item	TASK DESCRIPTION	Resp*	Check+
1.	Set up the appropriate logging directories and Hain Mission directory. The geodesy to be used is: Ellipsoid: International 1924, Geodetic Datum: ED50, Map Projection: UTM Zone 31 (CM 3° East) Datum Shift: Method *Normal* , Name *WGS84 to ED50 (Norway EPSG South of 62)* The Datum Transformation Parameters (WGS84 to ED50) that shall be used for the Hywind project are: Simplified 7 parameter shift valid south of 62 deg N. WGS84 to ED50: dX = +90.365 m dY = +101.130 m dZ = +123.384 m rX = -1.614 µrad = -0.333 sec rY = -0.373 µrad = -0.077 sec rZ = -4.334 µrad = -0.894 sec dS = -1.994 ppm Barometer Data to be logged for duration of project.	ONL	
2.	Run line located in: *\Jobs\2008\Statoil\Displaylines\Hywind*	ONL	
3.	ROV to be converted to survey mode.	Shift Sup	
4.	Set up a Hywind databa se in Visualsoft		
5.	Locate vessel to KP -0.100 (100m run-in)	ONL / BR	
6.	Deploy ROV Log CTD during deployment	ONL / ROV	
	MBE Calibration		
7.	A full calibration of the MBE is to be performed. The exact location of this is assessed. Prior to the commencement of the calibration a full CTD profile will be required. Calibration lines to be run as follows: • Run two lines in opposite directions for the roll calibration. • Run two lines in opposite directions, up and down a slope or over a significan t feature, for the pitch calibration. • Run the same line twice in the same direction with two different velocities for the time offset calibration. • Run two parallel lines in th e same direction on each side of a distinct objec t for gyro verification • Run one or two cross-lines to verify that a correct sound velocity profile is used. Line length 200 m Log data in NaviScan		
8.	The calibration result shall be presented as a FHR to the Client rep onboard or StatoilHydro co ntact person before survey commence, and also be reflec ted in the survey report.		
	MBE / SSS / SBP Survey		

Item	TASK DESCRIPTION	Resp*	Check+
9.	Summary of Work: - One MBE/SSS/SBP survey lines shall run along the route *Cable_route_Alt_5.rlx*	ONL	
10.	Save to PDF the NaviPac & Naviscan configuration	ONL	
11.	The following sensors should be logged for ROV MBE survey: **NaviScan** Reson Seabat 7125 (dual-head MBE) Digiquartz pressure sensor ROV position (HAIN), altitude and Doppler ROV CDL gyro (heading, pitch and roll) ROV Octans (heading, pitch and roll) MRU5 (pitch and roll) **NaviPac** Survey, General and Custom Format. **Navitag** – all data. Change file for each survey section. **Hain** – logged on APOS **SSS** on Coda PC (Multilink). Range 100m **Innomar SBP** digital **Reson Settings –** 10p/s, range 100m (max) – try to use gating if there are two online surveyors. Update HiPAP, Navipac and Navisc an with the latest density and sound velocity values/profiles Ensure Seabat is receiving real time SV. Ensure CODA (SBP) is receiving time, navigation and KP Ensure Multilink (SSS) is rece iving time, navigation and KP	ONL	
12.	GEO to be present online during start-up to tune SBP and SSS before the start of survey. Flying height is 10-15m. Target Survey speed is 1m/s (s table ROV, otherwise slow down)	GEO	
13.	Carry out a test log to confirm that correct data is being logged. Seniors, Geos & DPs to check periodically that the correct data is still being logged.	ONL/OFF/ GEO/SS	
	ROV Visual survey		
14.	Carry out a visual survey of th e route recording digital video and position.	Info	

	Processing the Survey Data		
15.	The DP and Geo will process and grid MBE data. Data Processing methods/parameters shall be as specified in the various StatoilHydro documents. The following data shall be delivered: • Text Report • Seabed contours • Interpretation of SBP • Alignment charts with Bathymetry, SBP interpretation and Video observations along the cable route. • DTM 0.1m resolution (.dat) (one DTM per logfile) • DTM 1m resolution (one separate DTM for each area) • Shaded Relief files (.png, .pgw, .hgr) • Sub Bottom Profiler records (TIF/JPG) Sounding files (xyz) shall be delivered in addition to 1m gridded DTM. It is important that sounding files are not merged. Sounding files shall use the normal Eiva Julian day and sequence number convention. Sub Bottom Profiler acquisition shall be interpreted and reported on the charts. Predicted tidal data derived from the Polpred programme will be used to reduce the soundings to MSL.	OFF	
16.	GEO will interp. the ROV base d SSS and SBP from the site surveys.	GEO	

Location


Aksdal
Haugesund
Bjørkevær
Vik
E134
Skre
Urterfjorden
Rossaba
Rossa-fjell
Feøy
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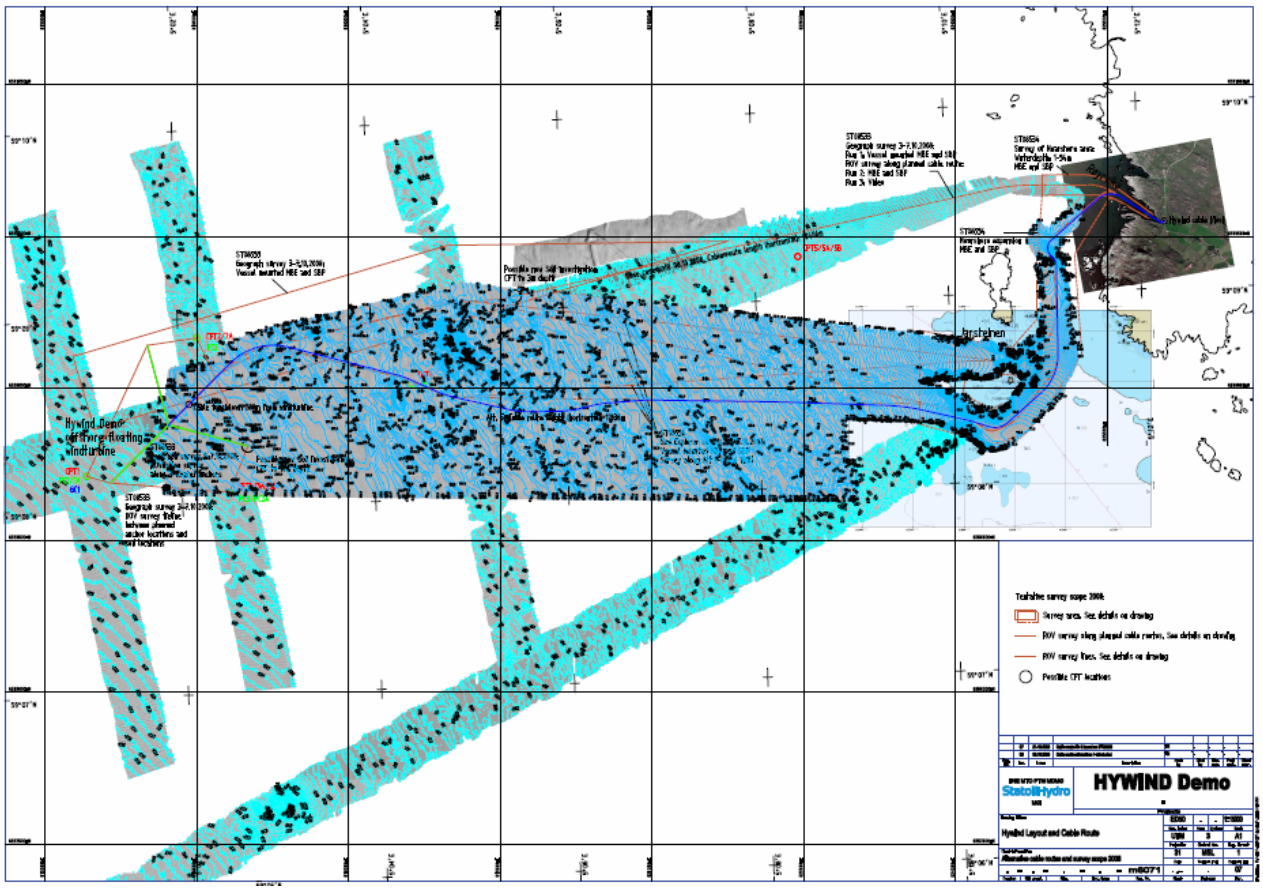
Urter
Visnes
Avaldsnes
Våge
Reksund
Kvalavåg
Utsira
Utsira
Sirafjorden
Ytrasund
Vorå
Foss
Storas
Vedavågen
Kopervik
Høyning
Spannholmane
Sevlandsvik
Åkrahamn
Åkra
Karmsundet
Ferkingstad-øyane
Ferkingstad hamn
Karmøy
Skjoteland
Førresvik
Ferkingstad
Ferkingstad
Vestre Bokn
E39
Sandve
Hywind
Falnes
Jørsteinen
Skudeneshavn
Geitungen


Hywind Demo
HYWIND Demo
Statoil-Hydro

APPENDIX VI – STATOILHYDRO COMMENTS AND REPLIES

The following comments were received from StatoilHydro on reviewing Revision 2 of this report. Where possible these have been actioned and are annotated with the current status overleaf.

Comments on Survey Report by MMG SURVEY

StatoilHydro

Doc. No. STATSURV08-SRV-0046

Document Responsible: Vernon Bridges

Valid from Rev. no. 2

Contractor shall not respond to Company comments in this review document, but implement corrections, or address the comment issue, in the report itself.

REPORT NAME:	Hywind ROV Survey Cable Route Alt 5	
VESSEL:	Acergy Viking	
REPORT NO:	StatoilHydro: None	Contractor: STATSURV08-SRV-0046 Ver 1.0
REPORT DATE:	18 Dec 08	
REVISION	2	

1	Accepted	2	Accepted with comments incorporated	3	Not accepted - revise and resubmit	4	For information only

Item	Tick list - Action	Status	Comments ref.
A	**REPORT**		
A1.1	Logical and understandable sectioning and paragraphing	1	
A1.2	Consistency in naming of pipelines, features, installations etc. throughout the complete report and drawings.	1	
A1.3	Report title and front page, headers and footers correct and descriptive	1	
Acergy: StatoilHydro report no and chart no are include within the final delivery of this document (Rev.0, Issued for Consturction).			
A1.4	ENS- Engineering Numbering System correct incl. rev numbering	1	
A1.5	Version Record sheet	1	
A1.6	Comments to earlier revisions implemented and referenced.	-	
A1.7	Table of Contents integrity.	1	
A1.8	All appendices included	1	

Comments to report No.: ST08538 Hywind ROV Survey Cable Route Alt 5 No document No

Item	Tick list - Action	Status	Comments ref.
A1.8	Field memos/First hand reports included	1	
A1.10	Contractor Task plans included.	1	
A1.11	Brief project description, map overview, purpose of document, responsibilities, definitions and abbreviations, references.	1	
A1.12	Scope of Work description in report with reference and included as appendix	1	
A2.1	Summary of results	1	
A2.2	Actual work performed	1	
A2.3	Statement on deviations from SOW	2	See below
Acergy: Section 2.1 is updated to include a statement on the deviation from SOW for the final revision of this document (Rev.0, Issued for Construction) An Innomar system is used for acquisition and processing of SBP and the resulting raw data files from the system is .ses-format. Unfortunately no hard copy of the SBP data was generated during the Survey. At present no easily accessible Innomar SBP data viewer exists. Screen dumps from the Innomar system as TIF/JPG format of the SBP data are present in Section 4.5. Metadata is delivered with the final issue of the report (Rev.0, Issued for Construction).			
A3.1	Survey description	1	
A3.2	Geodesy, time, vertical datum, tidal information, KP databases	1	
A3.3	Tabularised/list equipment and acquisition parameters, including TSS440	1	
A3.4	Processing method, parameters	1	
A3.5	Deviations from technical specifications	-	
A3.6	Contractor Quality evaluation of results and report	1	
A4.1	Detailed results, logical and clearly presented/ listed	1	
A4.2	Pipeline surveys - ref. SITRAS TR 2234	-	
A4.3	Seabed survey - ref. specific SOW	1	
A4.4	Data samples included - screen dumps, pictures.	1	
A4.5	Correct geotechnical descriptions used.	1	
A4.6	Agreement between video and SSS/SBP data (if available)	1	
A4.7	Agreement with other/ earlier information/ reports when available.	-	
A4.8	References to other reports (e.g geotechnical, survey, etc.)	1	
A5.1	Data index files and names agreement with deliverance and specific SOW	1	

Comments to report No.: ST08538 Hywind ROV Survey Cable Route Alt 5 No document No

Item	Tick list - Action	Status	Comments ref.
Acergy: StatoilHydro report no and chart no are include within the final delivery of this document (Rev.0, Issued for Consturction).			
A6.1	Observation listings ref. SITRAS and/or specific SOW	1	
A6.2	Agreement between listings and drawings/ charting	1	
B	**CHARTS / DRAWINGS**		
B1.1	ENS- Engineering Numbering System correct incl. rev. numbering	1	
B1.2	Chart/ drawing title etc descriptive and correct	1	
B1.3	All relevant structures pipelines, cables, platforms, installations etc included.	1	
B1.4	Correct drawing scale and scale bars. Check with scale ruler.	1	
B1.5	Abnormal depth contours.	1	
B1.6	Depth contours labelled with “highs” and ”lows” (hills and slopes)	-	
B1.7	”Location” map describes correct overview and highlight correct drawing.	1	
B1.8	SSS interpretation included.	1	
B1.9	SBP interpretation included. Available geotechnical information included on drawings	1	
B1.10	Correct geotechnical terms used.	1	
B1.11	Observations/ interpretations from report included in drawings	1	
B1.12	CP measurements included	-	
B1.13	File name reference included	1	
B1.14	Video reference included (tape or file as is adequate)	1	
B1.15	Agreement between legend and actual used line types and colours etc.	1	
B1.16	Reference to report number.	1	
Acergy: StatoilHydro report no and chart no are annotated on the charts for the final delivery of this document (Rev.0, Issued for Consturction).			
B1.17	Presented results are in agreement with adjacent drawings. Match lines correct.	1	
B1.18	Reference to congruent/relevant data from other (own) reports, companies.	1	
B1.19	Merging of several data sets clearly marked or labelled.	1	
B1.20	Survey Outline/perimeter included	1	
B1.21	Hill shading/ shaded relief clearly and “readable”	1	
B1.22	Profiles clearly labelled with correct KP values - longitudinal and cross profiles.	1	

Comments to report No.: ST08538 Hywind ROV Survey Cable Route Alt 5 No document No

Item	Tick list - Action	Status	Comments ref.
C	**DIGITAL DATA** (ref. TR0057 and TR1063 Draft A, version1)		
C1.1	CD / DVD / HD deliverance	1	
C1.1	Contents / Listing and labels correct	1	
C1.2	All files described in report included ref. specific SOW	1	
C1.3	DOC file of Report	1	
C1.4	PDF file of Report	1	
C1.5	DWG or DGN files of drawings	1	
C1.6	PDF files for all documents, drawings etc.	1	
C1.7	Coordinate system, projection, horizontal and vertical datum correct	1	
C1.8	JPG files of pictures	-	
C1.8	Delivered files can be opened/ used - spot check.	1	
	Pipelines and Cables:		
C1.9	Used and New updated KP-file containing complete pipeline coordinates: KP, East, North and depth. (shape or ASCII format)	1	
	Installation:		
C1.10	Shape file of the installation outline (or DWG, DGN, DXF + ASCII) (used)	1	
C1.11	ASCII files containing installation positions	1	
	Survey:		
C1.12	Contour data on shape (or DWG, DGN, DXF + ASCII)	1	
C1.13	Survey outline (closed polygon) on shape file (or DWG, DGN, DXF + ASCII)	1	
C1.14	DTM: filename has max 8 characters + 3 char. Extension (max. 2 decimals)	1	
C1.15	DTM North – South / East – West oriented.	1	
C1.16	DTM, check for spikes / abnormal values (Arc Scene, Surfer, Olex, Imaging, other)	1	
	Intervention:		
C1.17	Separate ASCII file for each type of intervention	-	
C1.18	Intervention outline (closed polygon) in shape format (or DWG, DGN, DXF + ASCII)	-	

Comments to report No.: ST08538 Hywind ROV Survey Cable Route Alt 5 No document No

Item	Tick list - Action	Status	Comments ref.
		-	
D	**VIDEOTAPE - DIGITAL VIDEO**		
D1.1	CD/DVD/HD labelled with report number	2	
Acergy: StatoilHydro report no and chart no are include within the final delivery of this document (Rev.0, Issued for Consturction).			
D1.2	Visualsoft player or SITRAS player included on hard disk	1	
D1.3	Playable (spot check)	1	
D1.4	SITRAS files included (ref TR2234)	-	

Report ref.	SPECIFIC COMMENTS – DETAILS	Status
Section 2.1	Please add in at the end of Section 2.1 a statement similar to " The SOW of work was completed in full "	2
SBP Data	The SOW asks for Paper and Digital copies in TIF/JPG format of the SBP data at Rev 0. Neither were included in Rev 2 and should have been. (SBP data was supplied in SES (Inomar ?) format but we cannot use this format and the SOW asks for TIF/JPG	2
Data	No Metadata supplied	2
Front Page	A Statoil Document number for this report was not given and needs to be added. I have asked Tom Hansen to supply one.	2

Unitech Zefyros. Kilde: Unitech.

Utarbeidet av:

Multiconsult