

#### Vattenfall

## **HT1 Hydrogen Demonstrator Project**

**EPS Risk Assessment Appendices** 

80925





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## APPENDIX 1 PROPOSED SURVEY SCHEDULE

The same programme is proposed, with the start date shifted to 15th December 2021 Qtr 1, 2022 Qtr 2, 2022 454.24 days Tue 29-11-22 Wed 1-9-21 Contractual Key Dates Wed 1-9-21 454.24 days Tue 29-11-22 Wed 1-9-21 Wed 1-9-21 1 Sep '21 ♠ 2 Nov '21 10 Jan '22 Mon 10-1-22 Mon 10-1-22 🔷 7 May '22 End of Services Sat 7-5-22 Sat 7-5-22 Defects Correction Period Mon 29-11-21 365 days Tue 29-11-22 WP1: Project Management & Preparation Preparation documentation Project Execution Plan (Operations, Quality, HSE, ERP, HIRA, Mob/Cal and SIT plan) Thu 2-9-21 21 days Technical Kick Off/Workshop Prior to Offshore operations Thu 23-9-21 1 day Fri 24-9-21 10 Mobilisation in port Tue 26-10-21 Fri 29-10-21 Transit to Aberdeen Fri 29-10-21 2 days Sun 31-10-21 WP2: Offshore Geophysical Survey Sun 31-10-21 27.16 days Sat 27-11-21 WP2A: Offshore Geophysical & UXO Survey Sun 31-10-21 8.58 days Mon 8-11-21 Equipment Verification Test & Calibrations Tue 2-11-21 Sun 31-10-21 2 days Tue 2-11-21 Fri 5-11-21 Survey Operations 3.29 days Fri 5-11-21 WP2B: Offshore Non-Ferrous UXO Survey Mon 8-11-21 7.36 days Mon 15-11-21 Mode Change and Equipment Verification Test Mon 8-11-21 1 day Tue 9-11-21 Survey Operations Tue 9-11-21 3.18 days Fri 12-11-21 23 Weather Downtime Allowance Fri 12-11-21 3.18 days Mon 15-11-21 24 Mode change from WP2 to WP3 & WP4 Mon 15-11-21 Wed 17-11-21 22 2 days Mon 15-11-21 Wed 17-11-21 Mode change in Aberdeen 2 days Wed 17-11-21 1.56 days WP3A: Sediment Grabs and Drop Down Video Survey Wed 17-11-21 1.56 days Fri 19-11-21 Environmental Operations (12 Sediment Grabs and 10 DDV Wed 17-11-21 transects) 0.78 days Thu 18-11-21 Thu 18-11-21 0.78 days Fri 19-11-21 WP4: Offshore Geophysical Survey Fri 19-11-21 Tue 23-11-21 WP4A: CPT and Vibrocore Sampling Fri 19-11-21 4.16 days Tue 23-11-21 CPT Operations (12 locations) Fri 19-11-21 0.85 days Sat 20-11-21 Weather Downtime Allowance Sat 20-11-21 0.85 days Sun 21-11-21 34 Mode change between CPT & VC Sun 21-11-21 Sun 21-11-21 0.5 days Sun 21-11-21 Mon 22-11-21 VC Operations (12 locations) 0.98 days Weather Downtime Allowance Mon 22-11-21 0.98 days Tue 23-11-21 Tue 23-11-21 3.5 days Transit back to NL Tue 23-11-21 Thu 25-11-21 Demobilisation Thu 25-11-21 1.5 days Sat 27-11-21 WP5 - Nearshore Survey - Fugro Seeker Sun 17-10-21 36.24 days Mon 22-11-21 Mobilisation Sun 17-10-21 5 days Fri 22-10-21 Sun 17-10-21 3 days Wed 20-10-21 WP5A: Nearshore Geophysical & UXO Survey Fri 22-10-21 19.41 days Wed 10-11-21 Survey Operations Fri 22-10-21 5.82 days Wed 27-10-21 Weather Downtime Allowance Wed 27-10-21 13.59 days Wed 10-11-21 48 WP5B: Near WTG Geophysical & UXO Survey Wed 10-11-21 10.83 days Sun 21-11-21 47 Wed 10-11-21 3.25 days Sat 13-11-21 Survey Operations Sat 13-11-21 7.58 days Sun 21-11-21 Weather Downtime Allowance Sun 21-11-21 55 WP6 - Optional Land/Intertidal Drone Survey Mon 22-11-21 Mon 29-11-21 53 WP6A: Photogrammetry and Magnetometer Drone Survey Mon 22-11-21 7 days Mon 29-11-21 Mobilisation Mon 22-11-21 1 day Tue 23-11-21 Sun 28-11-21 Operations (TBC) Tue 23-11-21 5 days WP7: Reporting and Data Integration Fri 22-10-21 197.16 days Sat 7-5-22 Mobilisation & calibration report per vessel Fri 22-10-21 13 days Thu 4-11-21 Fugro Pioneer Tue 2-11-21 2 days Thu 4-11-21 Fri 22-10-21 Fugro Seeker 2 days Sun 24-10-21 Operations Report per vessel Mon 22-11-21 11.92 days Sat 4-12-21 Sat 27-11-21 Sat 4-12-21 WP7A: Geophysical Survey Interpretive Site Investigation Report Mon 29-11-21 Mon 7-2-22 Draft Final Report Mon 29-11-21 42 days Mon 10-1-22 Mon 10-1-22 14 days Mon 24-1-22 Final Report Mon 24-1-22 14 days Mon 7-2-22 WP7B: Environmental Survey Intepretive Report Sat 27-11-21 126 days Sat 2-4-22 Sat 27-11-21 28 days Sat 25-12-21 Sat 1-1-22 Sample analysis (if required) Sat 27-11-21 84 days Sat 19-2-22 Laboratory testing report (if required) Sat 19-2-22 28 days Sat 19-3-22 Client comments Sat 19-3-22 7 days Sat 26-3-22 Intergration Client comments - Delivery final deliverables Sat 26-3-22 Sat 2-4-22 WP7C: Geotechnical Sampling Factual Report & Laboratory Testing Re|Sat 27-11-21 Sat 5-3-22 Sat 27-11-21 84 days Sat 19-2-22 Sat 26-2-22 Intergration Client comments - Delivery final deliverables Sat 26-2-22 Sat 5-3-22 WP7D: UXO Sign Off Mon 15-11-21 2 days Wed 17-11-21 22 UXO Sign Off Mon 15-11-21 2 days Wed 17-11-21 Sat 2-4-22 WP7E: Data Integration Sat 7-5-22 68;72;80;84 35 days Sat 2-4-22 Sat 23-4-22 21 days Sat 30-4-22 Project: 2016 Combined Vessel Pl Task Milestone • Project Summary External Milestone ♦ Inactive Milestone Manual Task Manual Summary Finish-only Progress Manual Progress External Tasks Inactive Task Inactive Summary ■ Duration-only Start-only Deadline Proposed Colour



## APPENDIX 2 VESSEL AND SURVEY EQUIPMENT SPECIFICATIONS



# **FUGRO**M.V. FUGRO PIONEER

M.V. Fugro Pioneer has been built to the highest standards demanded of a modern internationally operating multi-purpose survey vessel.

The diesel electric propulsion, specially designed hull, resilient engine mounts and rudder propellers maximise station keeping and navigational control while ensuring acoustically quiet running at survey speeds.

Designed with consideration for safety and environment, Fugro Pioneer is a compact flexible platform supporting a wide range of offshore services with a typical operational profile of geophysical, geotechnical survey operations up to 500 m WD.

Its limited 3 m draft adds to its capabilities to operate in shallow water nearshore. The vessel can easily be configured to support light ROV and environmental operations.

The 53 metre-long vessel is prepared for dynamic positioning and equipped with state-of-the-art survey equipment.



State of the Art Kongsberg Dual Head Dual Ping Multibeam in retractable moonpool system



Limited draft makes it specifically suitable for survey nearshore



## M.V. FUGRO PIONEER

#### **Technical Specifications**

General	
Names	Fugro Pioneer
Classifications society	BV
Flag state/ port	Bahamas Maritime Authority / Nassau
Build(er)	September 2014 – Damen Shipyards Galati
IMO/Cal sign	9701645 / C6BH3
Official number	7000674

וט	m	e	ns	10	ns

LOA	53.7 m
Beam	12.5 m
Draft (summer) max.	3.1 m + 0.26 m blister
Net tonnage	1,322 T
Deck area aft	250 m²
Deck strength	5 T / m <sup>2</sup>
Deck load	81,6 T

#### Machinery

Propulsion	2 x Azimuth thrusters (electric)
Bowthrusters	1 x Tunnel thrusters (electric)
Cruising speed	10 kn
Survey speed	Variableas required
Maximum speed	11.2 kn

#### Electric power

Diesel generator sets	4 x 372 kW
UPS supply survey	1 x 30 kVA, 220 vac

#### Capacities

Fuel capacity	305 m <sup>3</sup>
Fuel consumption (FOC t/day)	Survey 3 T / Stationary (DP) 4.2 T / Transit 6 T
Potablewater capacity	115 m³
Watermaking	6 m³ / d

#### Accommodation

Cabins	30+4 bunks / 10 x single cabins, 11 double cabins
Crew (typical)	13 x marine crew, 18 x survey crew
Recreational	1 x dayroom, 1 x gym
Work offices	2 x survey, 1 x meeting room

#### **Control and navigation**

DP system	Imtech DP-0
Radar	Sperry Marine Visionmaster FT CAT 1 / 2 S-band and X-band
Electronic chart	ECDIS Transas (double)
DGPS	1 x Koden KGPGZO / 2 x Fugro Starpack
Magnetic compass	Sperry Jupiter

#### **Deck machinery**

Deck crane aft	Palfinger PK65002 MD
Storage crane forward	Palfinger PK15000 MC
Hydraulics ring main system	300 bar / 200 ltr
T-frame aft (geophysical)	1 x 2 / 3 T SWL
A-frameside(geotechnical)	1 x 9 T SWL
CTD winch / davit	1 x 200 kg / 1000 m (environmental sampling)
Tugger winch aft deck	4 x 3 T SWL
Moonpool	Rectangular 1630 x 883 mm (freespace)
Geophysical tow winch	2 x EMCE (3.5 Te / 1000 m / Rochester)
Geotechnical hoistingwinch	1 x EMCE (9 Te / 1500 m / 19 mm)

#### Communications

GMDSS	Motorola- 3 x VHF handheld
Vsat	2 x Seatel 5009 Ku-band
Iridium	Iridium Openport (Fall back)
UHF/ VHF radios (operational coms)	Motorola- $2 \times VHF$ handheld / $3 \times UHF$ mobile / $9 \times UHF$ portable
CCTV camera system	Orlaco
TVRO	Intellian t40W

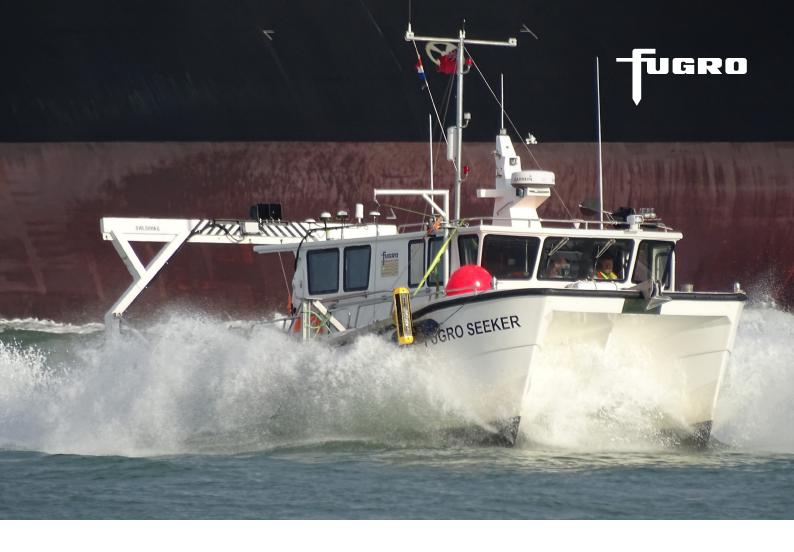
#### Safety

MOB boat	RIB
Liferafts	6 x 20 persons
Survival suits & life jackets	44 pcs
Lifeline Pulley System	Yes
Personal Locator Beacons (PLB)	Ocean M100

#### Survey equipment

DGPS positioning	Fugro Starfix Starpacks
Navigation package	Fugro Starfix Suite
Acoustic positioning	KongsbergHiPap 501 incl Cymbal
Motion Reference Unit	Hydrins + Octans
Echosounder	Simrad EA400
Draft monitoring	2 x Rosemount Pressure Sensors
Multibeam echosounder	Kongsberg Maritime EM 2040 (Dual head/ Dual ping)
Side Scan Sonar	Edgetech 4200FS Dual frequency (different permutations of dual frequency subject to requirements)
Sub Bottom Profiler	Innomar Medium / Massa array 4 x 4 c.w. SES transceiver
Magnetometer	Geometrics G-882 / EIVA 3D Scanfish Katria / Fugro Geowing
Seismic compressor	Hamworthy 185E MK2 / 2 x Wärtsilä Water Systems Ltd
2D & 3D UHR Seismic	as required
Geotechnical sampling	Vibro coring CPT sampling
Environmental sampling	as required





## FUGRO SEEKER

The Fugro Seeker is purpose-built to carry out hydrographic and geophysical surveys safely in water as shallow as 2 m and wave heights up to 0.7 m. Designed for nearshore operations, this 12 m vessel easily accesses small harbours and marinas, and can be configured to sit on the seabed at low tide.

Quickly and easily configured to meet client requirements, with a top speed of 18 knots and the ability to operate up to 60 nm from port, the Fugro Seeker's versatility enables it to be deployed at short notice across north-western Europe by sea or by road.

Facilities including a spacious working deck, communal and wet weather areas, toilet and galley enable the vessel to operate for up to 12 hours. The minimum crew is three, but the Fugro Seeker can comfortably accommodate crews of up to seven.

The Fugro Seeker is permanently mobilised with high-specification hydrographic and geophysical survey equipment as standard. The vessel has a large deck area with low open-stern freeboard, three winch beds with a 500 kg SWL A-frame, rigid survey arms and dedicated survey generators. Additional seismic, unexploded ordnance (UXO), remotely operated vehicle (ROV) and environmental payloads can be accommodated with ease.



Fugro Seeker



Fugro Seeker bridge



## **FUGRO SEEKER**

#### **Technical Specifications**

#### **Vessel Particulars**

Туре	Catapult 396
Length overall	12.00 m
Beam	4.88 m
Maximum draught	1.07 m
Licence	MCA CAT 2
Gross tonnage	17 t
Year built	2012

#### Safety

Maximum safe carrying capacity	12 persons
Operational pattern	12 hrs

#### All equipment certified to Maritime and Coastguard Agency (MCA) SCV2 standard

#### **Navigation Equipment**

Simrad NSS12 evo3 plotters	3
Simrad AP70 autopilot	1
Simrad broadband 4G radar	1
DSC VHF ship-to-shore radios	3
Class A AIS NAVTEX	1

#### **Deck Equipment**

A-frame 500 kg SWL 2.4 m clear height	1
Winch beds	3

#### Survey Equipment

Fugro Starpack GNSS – G2+, G2, XP2
Teledyne RESON SeaBat® 7125-SV2 multibeam echosounder
EdgeTech 4125,4200 or 4205 tri-frequency side scan sonar
Innomar SES-2000 parametric, Standard, Medium or Quattro sub-bottom profiler
Sonardyne Ranger 2 or Applied Acoustics Easytrak Nexus ultra short baseline
Applanix POS MV OceanMaster v5
G882 magnetometer soft or armoured tow
Fugro Miniwing fixed gradiometer with up to four magnetomoters
UHR seismic/boomer/mini-airgun sources, up to 100 m streamer
Observation class ROV (Saab Seaeye Falcon or Tiger)
Various environmental camera and sampling options

#### Propulsion

Iveco NEF 450 main engines	2	
Twin disk gear boxes	2	
Westerbeke marine 5.7 kVA generators	2	
Service speed 15 kn to 18 kn		

#### **Working Conditions**

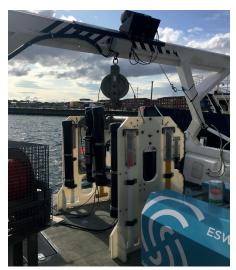
Deck space 5.9 m × 4.8 m	
Spacious and clear working deck	
Large comfortable communal area	

#### Accommodation

Galley		
100 L freshwater		
Wet weather area		
Toilet		



Falcon Seaeye ROV deployment



Fugro Miniwing deployment





# **APPENDIX 3 SURVEY AREA**

