



COMMONWEALTH OF AUSTRALIA

*Sections 226 and 708
Offshore Petroleum and Greenhouse Gas Storage Act 2006*

**VARIATION OF PIPELINE LICENCE WA-21-PL
(HALYARD FLOWLINE) (02-2024)**

I, **STEVEN ROBERT TAYLOR**, Delegate of the National Offshore Petroleum Titles Administrator, on behalf of the Commonwealth–Western Australia Offshore Petroleum Joint Authority hereby vary Pipeline Licence WA-21-PL, dated 20 January 2011 (the Licence), for which:

**Santos WA Southwest Pty Limited
(ACN 050 611 688)**

is the registered titleholder, as set out below.

The variation takes effect on the day on which this notice of variation is published in the *Australian Government Gazette*.

Made under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006*
of the Commonwealth of Australia

STEVEN ROBERT TAYLOR
DELEGATE OF THE TITLES ADMINISTRATOR
ON BEHALF OF THE COMMONWEALTH–WESTERN AUSTRALIA
OFFSHORE PETROLEUM JOINT AUTHORITY

- Annexure B is varied by deleting all the current text and replacing with the following:

The route of the Greater East Spar system of pipes is described in the table hereunder, commencing at the Halyard-2 Christmas Tree (XT) Connector and terminating at the western tie-in flange on the East Spar Manifold. Coordinates are based on Geodetic Datum of Australia (GDA94).

Main Halyard Flowline System Co-Ordinates				
	Feature Name	KP	Easting (m)	Northing (m)
1.	Halyard-2 XT Connector	0.00	283 147	7 720 608
2.	Greater East Spar PLEM	0.02	283 157	7 720 584
3.	Greater East Spar Subsea Cooling Skid	0.05	283 171	7 720 557
4.	Halyard 10" Flowline KP0.0	0.06	283 175	7 720 553
5.	Halyard 10" Flowline KP1.0	1.00	283 612	7 719 875
6.	Halyard 10" Flowline KP2.0	2.00	284 204	7 719 160
7.	Halyard 10" Flowline KP3.0	3.00	284 361	7 718 445
8.	Halyard 10" Flowline KP4.0	4.00	284 811	7 717 553
9.	Halyard 10" Flowline KP5.0	5.00	285 263	7 716 662
10.	Halyard 10" Flowline KP6.0	6.00	285 715	7 715 771
11.	Halyard 10" Flowline KP7.0	7.00	286 086	7 714 869
12.	Halyard 10" Flowline KP8.0	8.00	286 535	7 713 976
13.	Halyard 10" Flowline KP9.0	9.00	286 985	7 713 084
14.	Halyard 10" Flowline KP10.0	10.00	287 434	7 712 191
15.	Halyard 10" Flowline KP11.0	11.00	287 881	7 711 297
16.	Halyard 10" Flowline KP12.0	12.00	288 330	7 710 405
17.	Halyard 10" Flowline KP13.0	13.00	288 778	7 709 512
18.	Halyard 10" Flowline KP14.0	14.00	289 226	7 708 619
19.	Halyard 10" Flowline KP15.0	15.00	289 674	7 707 729
20.	Halyard 10" Flowline KP15.6	15.59	290 088	7 707 280
21.	East Spar PLEM	15.60	290 091	7 707 279
22.	East Spar Manifold western flange tie-in spool (end)	15.61	290 101	7 707 291

Route of Spar-2 Tie-in 8" Flowline Co-Ordinates				
	Feature Name	KP	Easting (m)	Northing (m)
1.	Spar-2 Christmas Tree (start)	0.00	281 791	7 719 735
2.	Spar-2 8" Flowline	1.00	282 605	7 720 276
3.	Spar-2 8" Flowline (end) (GES PLEM)	1.68	283 154	7 720 585

2. Annexure C “Basis of Design” is varied by updating the items in bold and italics:

General Details																																		
1.	Pipeline Name (meaningful to industry)		Halyard Flowline																															
2.	<i>Total Length of Pipeline (km)</i>		<i>17.4 (approximate)</i>																															
3.	<i>Start point Description</i>		<i>Halyard-2 Christmas Tree Connector</i>																															
4.	<i>‘Start Point of Pipeline Coordinates (GDA94)</i> a) <i>Northing:</i> b) <i>Easting:</i>		<i>Zone 50</i> <i>283 147 mN</i> <i>7 720 608 mE</i>																															
5.	End Point Description		East Spar Manifold																															
6.	<i>‘End’ Point of Pipeline Coordinate (GDA94)</i> a) Northing: b) Easting:		<i>Zone 50</i> <i>7 707 290.800 mN</i> <i>290 101.200 mE</i>																															
7.	Substance to be Conveyed:		Wet Gas and Condensate																															
8.	Characteristics of Substance to be Conveyed; a) Gas Composition:		<table border="0"> <tr><td>Methane (C1)</td><td>87.24 (mol %)</td></tr> <tr><td>Ethane (C2)</td><td>4.98 (mol %)</td></tr> <tr><td>Propane (C3)</td><td>1.92 (mol %)</td></tr> <tr><td>Butane (C4)</td><td>0.87 (mol %)</td></tr> <tr><td>Pentane (C5)</td><td>0.42 (mol %)</td></tr> <tr><td>Hexane (C6)</td><td>0.26 (mol %)</td></tr> <tr><td>Heptane (C7)</td><td>0.15 (mol %)</td></tr> <tr><td>Water (H2O)</td><td>0.00 (mol %)</td></tr> <tr><td>Carbon Dioxide (CO2)</td><td>3.23 (mol %)</td></tr> <tr><td>Nitrogen (N2)</td><td>0.93 (mol %)</td></tr> <tr><td>Helium (He)</td><td>0.00 (mol %)</td></tr> <tr><td>Mercury (Hg)</td><td>0.00 (mol %)</td></tr> <tr><td>Hydrogen Sulphide (H2S)</td><td>0.00 (mol %)</td></tr> </table>						Methane (C1)	87.24 (mol %)	Ethane (C2)	4.98 (mol %)	Propane (C3)	1.92 (mol %)	Butane (C4)	0.87 (mol %)	Pentane (C5)	0.42 (mol %)	Hexane (C6)	0.26 (mol %)	Heptane (C7)	0.15 (mol %)	Water (H2O)	0.00 (mol %)	Carbon Dioxide (CO2)	3.23 (mol %)	Nitrogen (N2)	0.93 (mol %)	Helium (He)	0.00 (mol %)	Mercury (Hg)	0.00 (mol %)	Hydrogen Sulphide (H2S)	0.00 (mol %)
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Design Details			Halyard -1 10” Flowline	Spar-2 8” Flowline	GES PLEM	GES SCS	<i>Halyard-2 6” Tie-In Spool</i>	GES PLEM – SCS 6” Tie-In Spool																										
9.	Pipe Dimensions	Outside Diameter (mm)	328.9	268.1	168.3	168.3	<i>168.3</i>	168.3																										
		Inside Diameter (mm)	254	203.2	139.7	146.3	<i>131.8</i>	131.8																										
		Length of Pipeline (km)	15.554	1.679	0.05	0.94	<i>0.019 to 0.026</i>	0.022 (±0.003)																										
10.	Nominal Wall Thickness	Standard Wall (mm)	37.3	32.5	14.3	11.0	<i>18.3</i>	18.3																										
		Heavy Wall (mm)	37.5	N/A	N/A	N/A	<i>N/A</i>	N/A																										

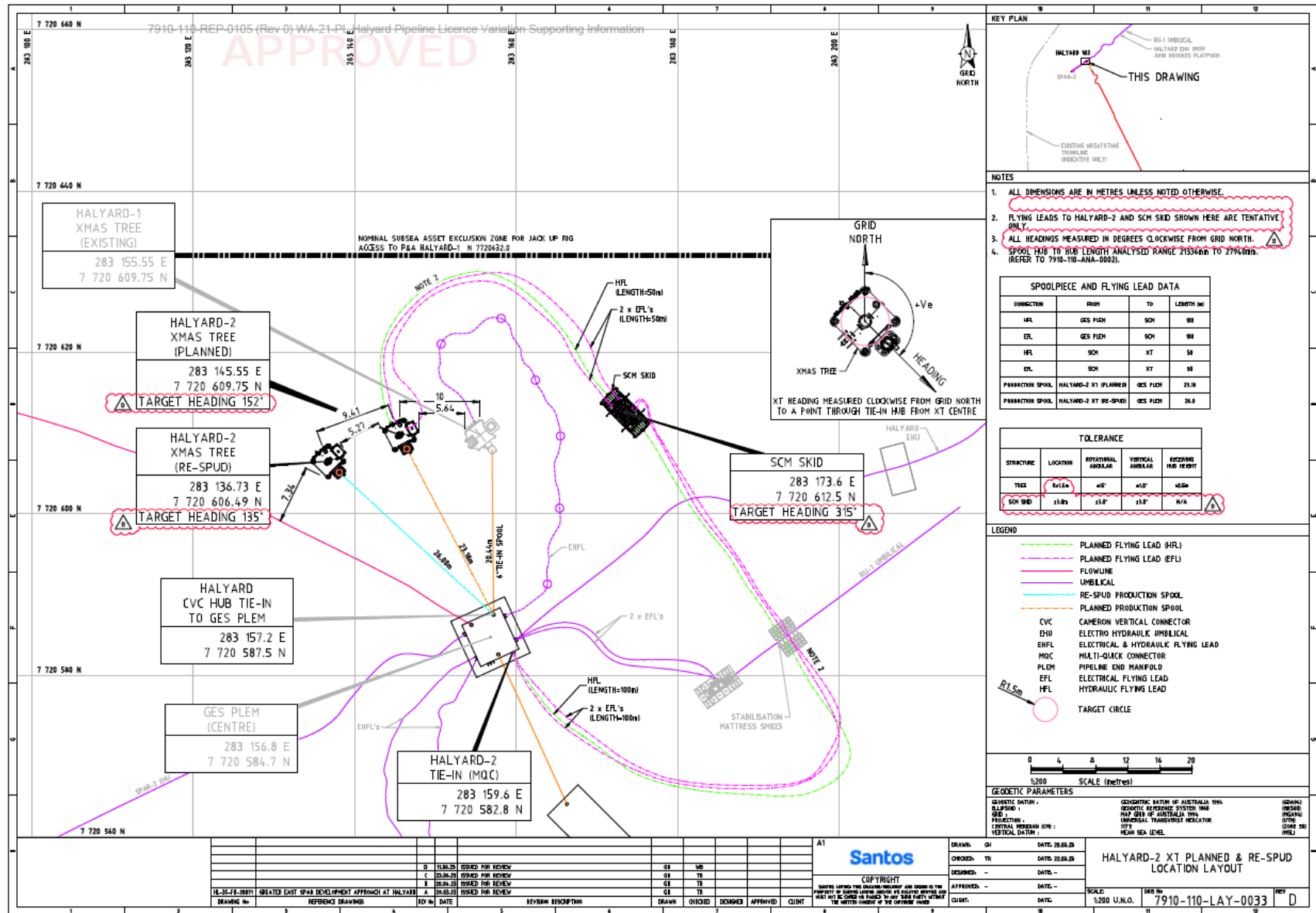
11.	Design N.B. Assumes nominal contents density of 114 kg/m ³	Initial Design Capacity (TJ/d)	99.0	95	150	150	95 (90 MMscf/d)	150
		Max Design Capacity (TJ/d)	250	317	164	164	150 (141 MMscf/d)	150
		Design life (years)	20	20	20	20	10	20
		Erosional Velocity (m/s)	50	40	40	40	40	40
12.	Pipeline Corrosion Allowance	Internal (mm)	NIL	NIL	NIL	NIL	NIL	NIL
		External (mm)	NIL	NIL	NIL	NIL	NIL	NIL
13.	Pipe Steel Specification and grade	Pipeline	API 17J Duplex 2101 (7.2 mm thick)	API Spec 17J Duplex 2101	UNS 31803, 22% Cr Duplex 2205	UNS 31803, 22% Cr Duplex 2205	UNS 31803, 22% Cr Duplex 2205	UNS 31803, 22% Cr Duplex 2205
		Riser	N/A	N/A	N/A	N/A	N/A	N/A
14.	Joint type (welded, Mechanical etc)	Mechanical Graylock connectors						
15.	Pipe Free Span (m) at Location (KP)	Not Applicable						
16.	Yield Strength of Pipe Steel a) Burst Pressure: b) Collapse Pressure c) Failure Pressure	44 MPag 2.8 MPag 2.9 2848 kN						
Temperature and Pressure Details			Halyard - 1 10" Flowline	Spar-2 8" Flowline	GES PLEM	GES SCS	Halyard-2 6" Tie-In Spool	GES PLEM – SCS 6" Tie-In Spool
17.	Design Temperature	Pipeline (°C)	110	110	121	121	121	121
		Facilities (°C)	55	55	55	55	55	55
18.	Maximum Operating Temperature	Pipeline (°C)	98	105	105	105	105	105
		Facilities/stations (°C)	55	55	55	55	55	55
19.	Minimum Operating Temperature	Pipeline (°C)	-20	-20	-18	-18	-18	-18
		Facilities/stations (°C)	-18	-20	-20	-20	-20	-20
20.	Design Pressure (MPag)	22.8	22.8	34.5	22.8	34.5	34.5	
21.	Inlet Pressure Range (MPag)	6.0 to 21.2	6.0 to 21.5	6.0 to 21.5	6.0 to 21.5	6.0 to 21.5	6.0 to 21.5	
22.	Outlet Pressure Range (MPag)	6.0 to 21.2	6.0 to 21.5	6.0 to 21.5	6.0 to 21.5	6.0 to 21.5	6.0 to 21.5	
23.	Maximum Allowable Operating Pressure (MPag)	22.8 at 110°C	22.8 at 110°C	22.8 at 110°C	22.8 at 110°C	22.8 at 110°C	22.8 at 110°C	

24.	Field Test Pressure a) Proposed Field Test Pressure: b) Minimum Field Test Pressure [] x MAOP = [] MPag	22.80 Minimum Field Test Pressure [1.10] x MAOP = 25.08 MPag
Pipeline Coatings		
25.	Protective External Coating Specification and Thickness (mm):	API 17 J; outer sheath MDPE 8 mm
26.	Weight Coating Design Specification and Thickness (mm):	None
27.	Field Joint Coating:	Not Applicable
28.	Pipe-to-Pipe Joint Coating:	NORSOK M-501 System 7
Control Monitoring		
29.	Pressure and Flow Controls Description:	Located on Halyard Well and John Brookes Platform
30.	Safety and Emergency Shutdown Description:	Located on Halyard Well and John Brookes Platform
31.	Telemetry Control:	SCADA or equivalent located on John Brookes Platform
32.	Pigging Facilities a) General Facilities: b) Description of Pigging Facilities:	Not Applicable Not Applicable
33.	Provisions for cathodic protection of the pipeline:	Sacrificial Al-Zn-In Anodes at flowline end fittings
34.	Cathodic Potential Monitoring:	Not Applicable
35.	Cathodic Protection Test Posts:	Not Applicable
Valves & Inline Facilities		
36.	Fittings, Valves and Flanges specifications a) Fittings: b) Valves: c) Flanges: d) Halyard-2 Spool:	ASME B16.5; ASME VIII; DNV OS F101 API 6D; DNV OS F101 ASME B16.5; ASME VII; DNV OS F101 ASME B31.8
37.	Mainline Valves a) Number of: b) Type: c) Location (at KP): d) Details of Mainline Valves:	0
38.	Location of future Off-take Tees (at KP):	None
39.	Number of Pipeline Inlet Facilities:	0
40.	Pipeline Inlet Facilities Description:	Not Applicable
41.	Number of Pipeline Outlet Facilities:	0

42.	Pipeline Outlet Facilities Description:	Not Applicable
43.	Compressor Stations (if applicable) a) Number of: b) Location (at KP):	0
44.	Other Inline Facilities:	None
Crossings & Pipeline Stabilisation		
45.	Location of the crossing:	Not Applicable
46.	Pipeline Crossing Type:	Not Applicable
47.	Crossings Design Standard:	Not Applicable
48.	Minimum Earth Cover or Other Means of Stabilisation:	None
49.	Anchoring Details:	Not Applicable
Pipeline Management		
50.	Environmental Design Criteria Description:	100 year cyclonic criteria
51.	Marine Growth Allowance (mm):	None
52.	Risk Management Description:	DNV OS F101
PLEM-ES Manifold Tie-in Spool (Rigid Pipe)		
53.	Pipe Outside Diameter (mm)	355.6 mm
54.	Pipe Wall Thickness (mm)	19.05 mm
55.	Pipe Steel Grade and Specification:	Duplex Stainless Steel AA 928 UNS31803
56.	Pipe Length (m):	15
57.	Design Pressure (MPag):	22.8
58.	Design Temperature (°C):	55
59.	Design Code:	ASME B 31.8

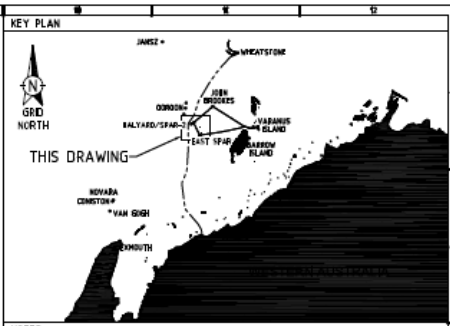
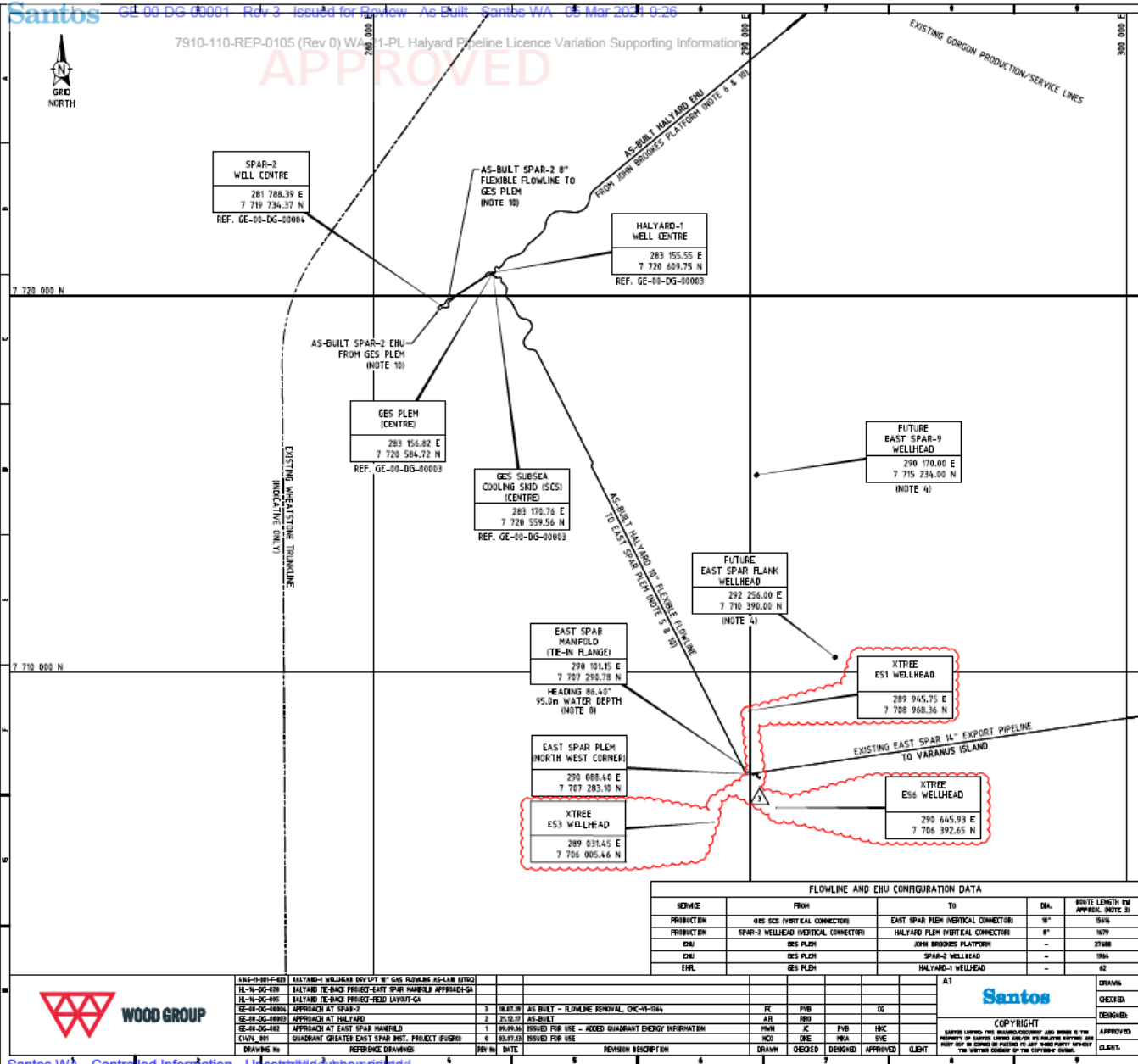
3. The WA-21-PL Pipeline Route Map at Annexure A is deleted and replaced with the maps at **Attachment 1**.

Attachment 1



7910-110-REP-0105 (Rev 0) W 1-PL Halyard Pipeline Licence Variation Supporting Information

APPROVED



- NOTES**
- ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE. ALL HEADINGS ARE IN DEGREES AND ARE RELATIVE TO GRID NORTH.
 - THIS DRAWING HAS BEEN PREPARED BY WOOD GROUP BASED ON ENGINEERING GUIDANCE FROM QUADRANT ENERGY.
 - FLOWLINE AND UMBILICAL ROUTE LENGTHS ARE APPROXIMATE ONLY AND DO NOT ALLOW FOR SEABED PROFILE, MANUFACTURE OR INSTALLATION TOLERANCES.
 - WELLHEAD CO-ORDINATES FOR FUTURE EAST SPAR-9 AND FUTURE EAST SPAR FLANK WELLS ARE PROVIDED BY APACHE ENERGY LIMITED.
 - 10" FLEXIBLE FLOWLINE HAS BEEN DIS-CONNECTED FROM HALLYARD-1 WELLHEAD AND RE-CONNECTED TO THE GES SUBSEA COOLING SKID (SCS).
 - EHU FROM JOHN BROOKES HAS BEEN DIS-CONNECTED FROM THE HALLYARD-1 WELLHEAD AND RE-CONNECTED TO THE GES PLEM.
 - EAST SPAR AS-BUILT INFORMATION TAKEN FROM DOF SUBSEA DOC. No. 220072-SV-R-004-R0.
 - TIE-IN FLANGE CO-ORDINATE ON EAST SPAR MANIFOLD IS EXTRACTED FROM THE LOCATION SHOWN IN UTGZ DRAWING 6146-11-201-F-023 Rev 2.
 - EAST SPAR PLEM NORTH-WEST CORNER AS-BUILT COORDINATE IS BASED ON DRAWING HL-14-DG-028 REV 2 - HALLYARD TIE-BACK PROJECT-EAST SPAR MANIFOLD APPROACH-GENERAL ARRANGEMENT (AS-BUILT).
 - AS-BUILT ROUTES ARE BASED ON INFORMATION TAKEN FROM DRAWING HL-14-DG-005 REV 2 - HALLYARD TIE-BACK PROJECT FIELD LAYOUT-GENERAL ARRANGEMENT (AS-BUILT). ADDITIONAL AS-BUILT INFORMATION FOR THE SPAR 2 XMAS TREE TIE-IN AND HALLYARD RE-ROUTE HAS BEEN TAKEN FROM FUGRO DRAWING No. C1474_001 REV 1 - QUADRANT GREATER EAST SPAR INSTALLATION PROJECT.

- LEGEND**
- AS-BUILT FLOWLINE
 - AS-BUILT UMBILICAL
 - EXISTING PIPELINES (OTHER OPERATORS)
 - EHU ELECTRO HYDRAULIC UMBILICAL
 - EHFL ELECTRICAL & HYDRAULIC FLYING LEAD
 - PLEM PIPELINE END MANIFOLD

FLOWLINE AND EHU CONFIGURATION DATA

SERVICE	FROM	TO	DA	ROUTE LENGTH IN APPROX. (NOTE 3)
PRODUCTION	GES SCS (VERTICAL CONNECTOR)	EAST SPAR PLEM (VERTICAL CONNECTOR)	"	1679
PRODUCTION	SPAR-2 WELLHEAD (VERTICAL CONNECTOR)	HALLYARD PLEM (VERTICAL CONNECTOR)	"	2748
EHU	GES PLEM	JOHN BROOKES PLATFORM	-	3765
EHU	GES PLEM	SPAR-2 WELLHEAD	-	3765
EHU	GES PLEM	HALLYARD-1 WELLHEAD	-	62

GEODETIC PARAMETERS

GEODETIC DATUM : SLP/PRISM PROJ 1 : PROJECTION : CENTRAL MERIDIAN (M) : TRUE NORTH DATUM :	GEODETIC DATUM OF AUSTRALIA 1984 GEODETIC REFERENCE SYSTEM 1984 MAP GRID OF AUSTRALIA 1984 UNIVERSAL TRANSVERSE MERCATOR TRUE NORTH DATUM : LATEST ASTRONOMICAL TIME	(COORD) (COORD) (EASTING) (NORTH) (Easting) (North) (Easting) (North)
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DRAWN: J. EDWARDS DATE: 01/04/2011
 CHECKED: A. STEVENSON DATE: 01/04/2011
 DESIGNED: DATE:
 APPROVED: DATE:
 CLIENT: DATE:

SCALE: 1:50000
 Dwg No: **GE-00-DG-00001** REV **3**



REV	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	DESIGNED	APPROVED	CLIENT
1	08/07/10	ISSUED FOR USE - ADDED QUADRANT ENERGY INFORMATION	MMW	JC	PMB	TRC	
2	21/12/07	ISSUED FOR USE	BCD	ONE	HEA	ONE	
3	18/07/08	AS-BUILT - FLOWLINE REMOVAL OTC-N-044	FC	PMB	OG		
4	21/12/07	AS-BUILT	AR	PRO			

