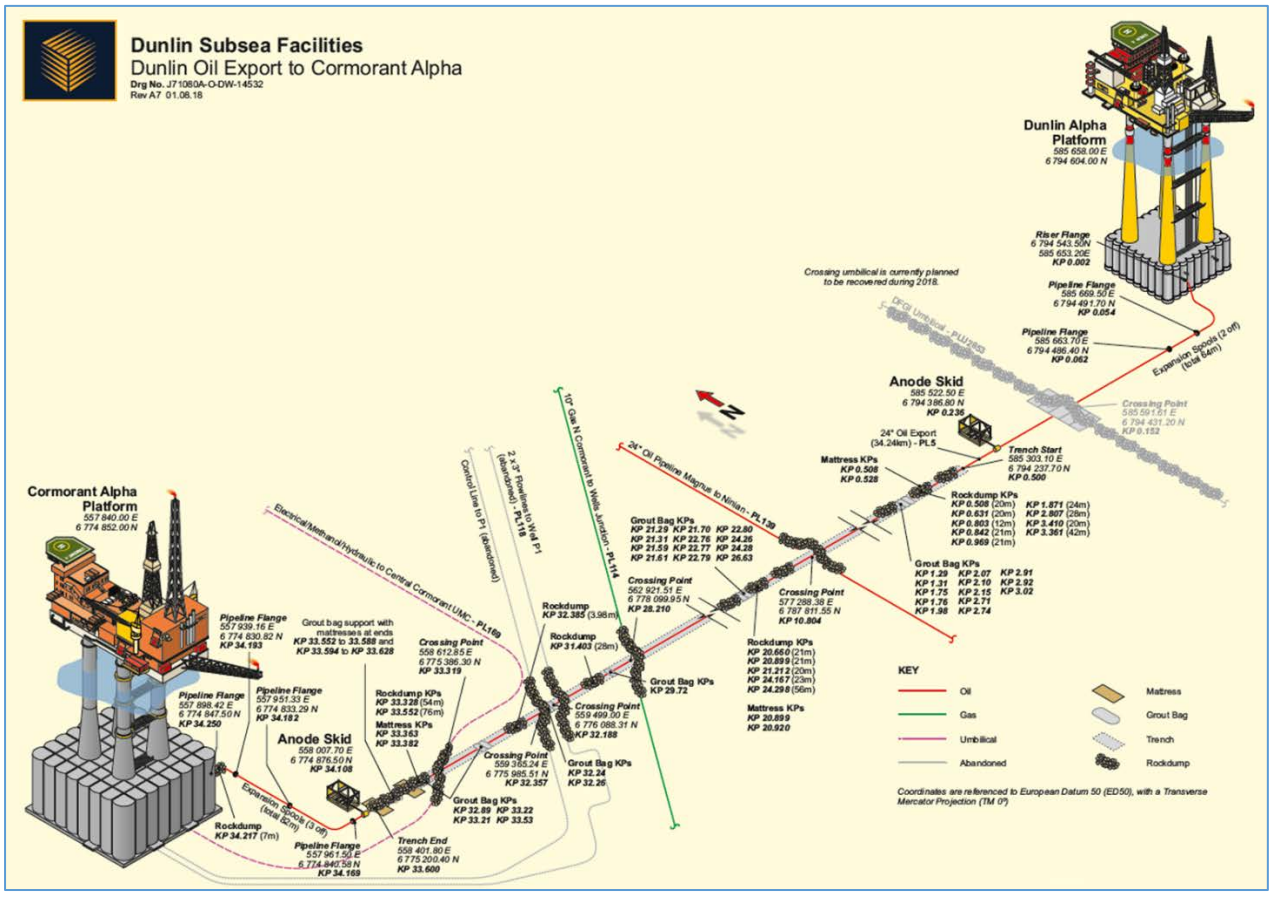
Fairfield Betula Limited

Dunlin Alpha to Cormorant Alpha Pipeline (PL5)
Final Decommissioning Programme

FBL-DUN-DUNA-HSE-01-PLN-00004



Document Control

Approvals

	Name	Signature	Date
Prepared by	Jonathan Bird		17/6/19
Reviewed by	Jeff Burns		17/6/19
Approved by	Peter Lee		17/6/19

Revision Control

Revision N°.	Reference	Changes / Comments	Issue Date
R1	Issued for Comment (Fairfield & OPRED initial review)	Internal draft	27 July 2018
A1	Issued for Use (Fairfield, OPRED & Owner review)	Owners comments included	22 Jan 2019
A2	Issued for Use (OPRED review)	A1 comments included	1 Mar 2019
A3	Issued for Consultation	A2 comments included	25 Mar 2019
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A6	Formal submission of Final DP	Co-owner Letters of support inserted	17 Jun 2019

Distribution List

Name	Company/Organisation
Offshore Decommissioning Unit	Offshore Petroleum Regulator for Environment and Decommissioning (OPRED)
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Stephen Brown	CNR International (U.K.) Limited
Paul Davis	ConocoPhillips (U.K.) Limited
Will Black	EnQuest Heather Limited
Fumio Ichishima	MCX Dunlin (UK) Limited

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Contents

Terms and Abbreviations

Abbreviation	Explanation
CA	Comparative Assessment
CGBS	Concrete Gravity Base Substructure
COP	Cessation of Production
CNRI	Canadian Natural Resources International (U.K.) Limited
DCPA	Dunlin Cormorant Pipeline Agreement
DFGI	Dunlin Fuel Gas Import
DPI	Dunlin Power Import
EA	Environmental Appraisal
ESDV	Emergency Shut Down Valve
FBL	Fairfield Betula Limited
FEL	Fairfield Energy Limited
HSE	Health & Safety Executive
JNCC	Joint Nature Conservation Committee
KP	Kilometre Point (distance reference along pipeline in direction of flow)
LSA	Low Specific Activity (related to NORM)
MCDA	Multi Criteria Decision Analysis
N/A	Not Applicable
NORM	Naturally Occurring Radioactive Material (related to LSA)
ODU	Offshore Decommissioning Unit
OGUK	Oil & Gas UK
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo Paris Convention
PLU	Pipeline Umbilical
PMT	Project Management Team
PWA	Pipeline Works Authorisation
QRA	Quantitative Risk Assessment
S29	Section 29 Notices
SSIV	Subsea Safety Isolation Valve
ToP	Top of Pipe
UK	United Kingdom
UKCS	United Kingdom Continental Shelf

Units of measure

Unit	Explanation
”	Inch (0.0254 m)
m (dimension)	Metre
m (currency)	Million
mm	Millimetre
kg	Kilogramme
km	Kilometre (one thousand metres)
m^2	Square metres
m^3	Cubic metres
%	Percentage
t	Metric tonne

Figures

Tables

1 EXECUTIVE SUMMARY

1.1 Decommissioning Programme

This document sets out the Decommissioning Programme for the Dunlin Alpha to Cormorant Alpha pipeline (PL5), herein referred to as PL5, as required by the relevant Section 29 (S29) Notice, issued April 2018. Note that this Decommissioning Programme is for the PL5 pipeline and associated equipment only. The Dunlin subsea facilities are the subject of separate, approved Decommissioning Programmes[1], while the Decommissioning Programme for the Dunlin Alpha installation is currently under consideration by the relevant authorities[2].

1.2 Requirement for a Decommissioning Programme

Fairfield Betula Limited is the appointed pipeline operator for PL5, under an amended agreement for the construction, maintenance and decommissioning of PL5, effective 19th August 2017. PL5 is owned by three joint venture groups, as follows:

Dunlin Field Group, which owns 32.9 % equity interest in PL5, comprising MCX Dunlin (UK) Limited, who holds 100 % of the Dunlin share;

Thistle Field Group, which owns 39.3 % equity interest in PL5, comprising Britoil Limited, who holds 81.71875 % of the Thistle share of decommissioning, ConocoPhillips (U.K.) Limited, who holds 18.28125 % of the Thistle share of decommissioning and EnQuest Heather Limited, who holds 0 % of Thistle share of decommissioning but retains legacy liability; and

Murchison Field Group, which owns 27.8 % equity share in PL5, comprising CNR International (U.K.) Limited, who holds 100 % of Murchison share.

In conjunction with statutory, public and regulatory consultation, this Decommissioning Programme is submitted in compliance with national regulations and guidance notes. The schedule outlined in this document spans from Cessation of Use to completion of the Close-Out Report. Once approved, it will form part of the overall Greater Dunlin Area decommissioning activity.

1.2.1 Installations

Not applicable. There are no installations included in the PL5 Decommissioning Programme.

1.2.2 Pipelines

In accordance with the Petroleum Act 1998, the S29 notice holders of the Dunlin Alpha to Cormorant Alpha pipeline (see Table 1-2) are applying to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval for decommissioning the pipeline detailed in section 2 of this programme (see also Section 8 Partner Letters of Support).

[1] See www.gov.uk/guidance/oil-and-gas-decommissioning-of-offshore-installations-and-pipelines

[2] For details of the Dunlin Alpha Decommissioning Programme, see 'Table of draft decommissioning programmes under consideration' at: www.gov.uk/guidance/oil-and-gas-decommissioning-of-offshore-installations-and-pipelines

1.3 Introduction

The Greater Dunlin Area consists of the Dunlin, Dunlin South West, Osprey and Merlin Fields, located in the Shetland Basin of the northern North Sea. The Dunlin Alpha platform served as the production facility for the Greater Dunlin Area and is located in block 211/23a, approximately 137 km north east of Shetland and 11 km from the UK / Norwegian median line, in a water depth of 151 m.

Termination of Production from the Greater Dunlin Area was announced in May 2015, having Maximised Economic Recovery (MER) from these oilfields. Termination of Production was agreed with the Oil & Gas Authority (OGA) on 9th July 2015, with Cessation of Production (COP) on 15th June 2015, confirmed by letter dated 15th January 2016.

This Decommissioning Programme has been prepared to support decommissioning of the Dunlin Alpha to Cormorant Alpha pipeline (PL5) and associated infrastructure which is part of a wider suite of decommissioning programmes for the Greater Dunlin Area.

Pipeline PL5 is a rigid 34.2 km concrete-clad 24" diameter pipeline installed in 1975. PL5 historically transported stabilised production fluids from Thistle Alpha, Murchison and the Dunlin cluster into the Brent Pipeline System. It now only transports fluids from Thistle Alpha and this arrangement will be terminated in 2019.

The development of the Decommissioning Programme for PL5 (as well as other elements of the Greater Dunlin Area detailed in separate programmes) is in compliance with OPRED decommissioning guidance notes and the Oil & Gas UK (OGUK) guidelines on Comparative Assessment (CA). The recommendations have been derived following the CA of decommissioning options with an Environmental Appraisal (EA) of the preferred option. Stakeholder engagement has underpinned this process.

1.3.1 PL5 Project Execution Decommissioning Summary

The recommendation from the CA is for the surface laid ends of the pipeline to be cut and removed for recycling, leaving the remainder largely trenched below mean seabed level. In order to mitigate against potential snagging hazards, rock cover will be applied at the cut locations of the exposed pipeline ends and identified areas of spanning. Partially buried concrete mattresses will also be removed, together with the anode skids and spools at the Dunlin Alpha platform and the spools at the Cormorant Alpha platform.

Buried deposits (concrete mattresses and grout bags) and grout bags that continue to provide pipeline stability to protect against movement and spans will be decommissioned *in situ* and rock coverage will be applied to prevent snagging hazards. Any oilfield debris within the pipeline corridor will be recovered as part of debris clearance operations. Once complete, seabed clearance surveys will be conducted and used to initiate a monitoring regime with the regulator and its consultees.

1.4 Overview of Pipeline Being Decommissioned

1.4.1 Pipeline

Table 1-1: Pipeline Being Decommissioned			
Field	Dunlin	**Production Type (Oil/Gas/Condensate)**	Oil
Water Depth (m)	151	**UKCS blocks**	211/23 211/22 211/27 211/26
Number of Pipelines	One	**Description**	(see Section 2)

Table 1-2: Pipeline S29 Notice Holders Details		
S29 Notice Holders	**Registration Number**	**Equity Interest (%)**
Britoil Limited	**SC077750**	**32.12 %**
CNR International (U.K.) Limited	**00813187**	**27.80 %**
ConocoPhillips (U.K.) Limited	**00524868**	**7.18 %**
ConocoPhillips (U.K.) Theta Limited	01491002	0%
EnQuest Heather Limited	02748866	0%
EnQuest Thistle Limited[3]	04487223	0%
Esso Exploration and Production UK Limited	00207426	0%
Fairfield Betula Limited	04465204	0%
Total E&P North Sea UK Limited[4]	03682299	0%
MCX Dunlin (UK) Limited	**06451712**	**32.90 %**
Shell U.K. Limited	00140141	0%
Siccar Point Energy E&P Limited[5]	01504603	0%
Equinor UK Limited[6]	01285743	0%
Wintershall Norge AS	985224323	0%

[3] EnQuest Thistle Limited were formerly Lundin Thistle Limited
[4] Total E&P North Sea UK Limited have acquired Maersk Oil North Sea UK Limited
[5] Siccar Point Energy E&P Limited have acquired OMV (U.K.) Limited
[6] Equinor UK Limited were formerly Statoil (UK) Limited

1.5 Summary of Proposed Decommissioning Programme

Table 1-3: Summary of Decommissioning Programme		
Selected Option	**Reason for Selection**	**Proposed Decommissioning Solution**
1. Subsea Installations		
N/A	N/A	N/A
2. Pipelines, Flowlines and Umbilicals[7]		
Group 1: Subsea structures (Anode skids)	Meets OPRED regulatory requirements.	Full Removal.
Group 2: Deposits (Partially buried)	Meets OPRED regulatory requirements.	Full Removal.
Group 3: Deposits (Buried)	CA indicates that decommissioning *in situ* provides the best option particularly on Safety, Technical and Environmental grounds.	Leave *in situ.*
Group 4: Deposits (Pipeline support)	CA indicates that decommissioning *in situ* provides the best option particularly on Technical and Environmental grounds.	Leave *in situ* with minimum intervention. Spot rock cover over snag hazards will be added to provide an overtrawlable berm profile.
Group 5: Dunlin Alpha (Topsides items)	Meets OPRED regulatory requirements.	Remove with Dunlin Alpha topsides.
Group 6: Dunlin Alpha (Riser within Concrete Gravity Base Substructure)	Dunlin Alpha CA indicates that decommissioning *in situ* provides the best option particularly on Safety, Technical and Environmental grounds.	Leave *in situ* within Dunlin Alpha Concrete Gravity Base Substructure.
Group 7: Pipeline (Surface laid spools)	Meets OPRED regulatory requirements.	Full Removal.
Group 8: Pipeline (Trenched)	CA indicates that decommissioning *in situ* provides the best option particularly on Environmental and joint technical grounds.	Leave *in situ* with minimum intervention. Pipeline ends will be removed and remedial rock cover provided.
3. Wells		
N/A	N/A	N/A
4. Drill Cuttings		
N/A	N/A	N/A

[7] A-301649-S17-TECH-001 - Dunlin Alpha to Cormorant Alpha Pipeline CA – Specific Scope Technical Note, Appendix A: Depth of Burial & Lowering Charts. See also Appendix 3 of this document.

Table 1-3: Summary of Decommissioning Programme		
Selected Option	**Reason for Selection**	**Proposed Decommissioning Solution**
5. Interdependencies		
The Dunlin Alpha to Cormorant Alpha pipeline (PL5) crosses under the following infrastructure: 1) Dunlin Fuel Gas Import (DFGI) SSIV umbilical PLU2853 (to be decommissioned under a separate approved Decommissioning Programme) 2) 24" oil pipeline from Magnus to Ninian PL139 (operational) 3) 10" gas pipeline from North Cormorant to wells junction PL114 (operational) 4) 2 x 3" flowlines to well P1 PL118 (abandoned) 5) Control line to well P1 (abandoned) 6) Electrical/hydraulic/chemical umbilical to the Central Cormorant Underwater Manifold Centre PL169 (operational)		

1.6 Field Location including Field Layout and Adjacent Facilities

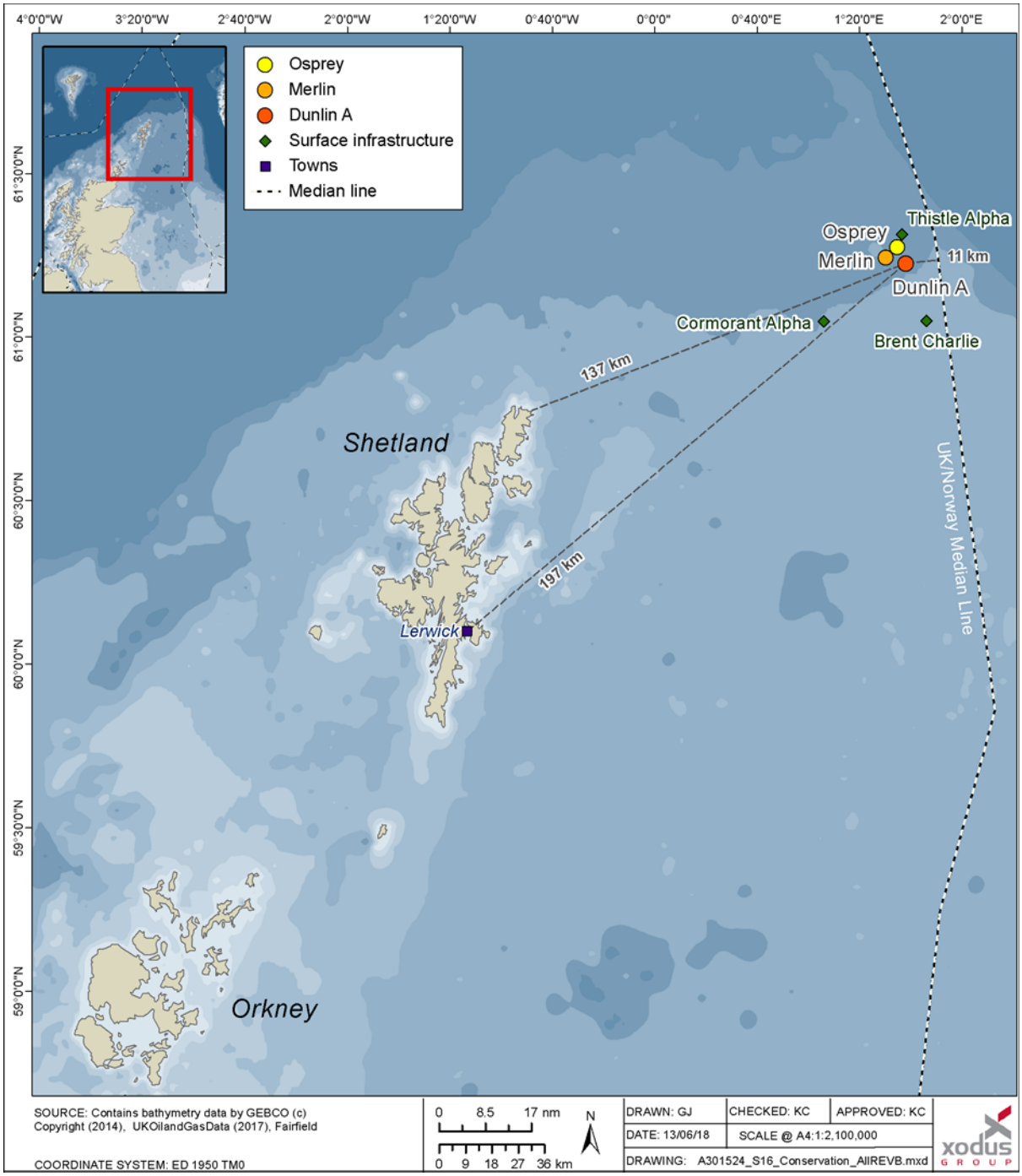


Figure 1-1: Field Location in UKCS

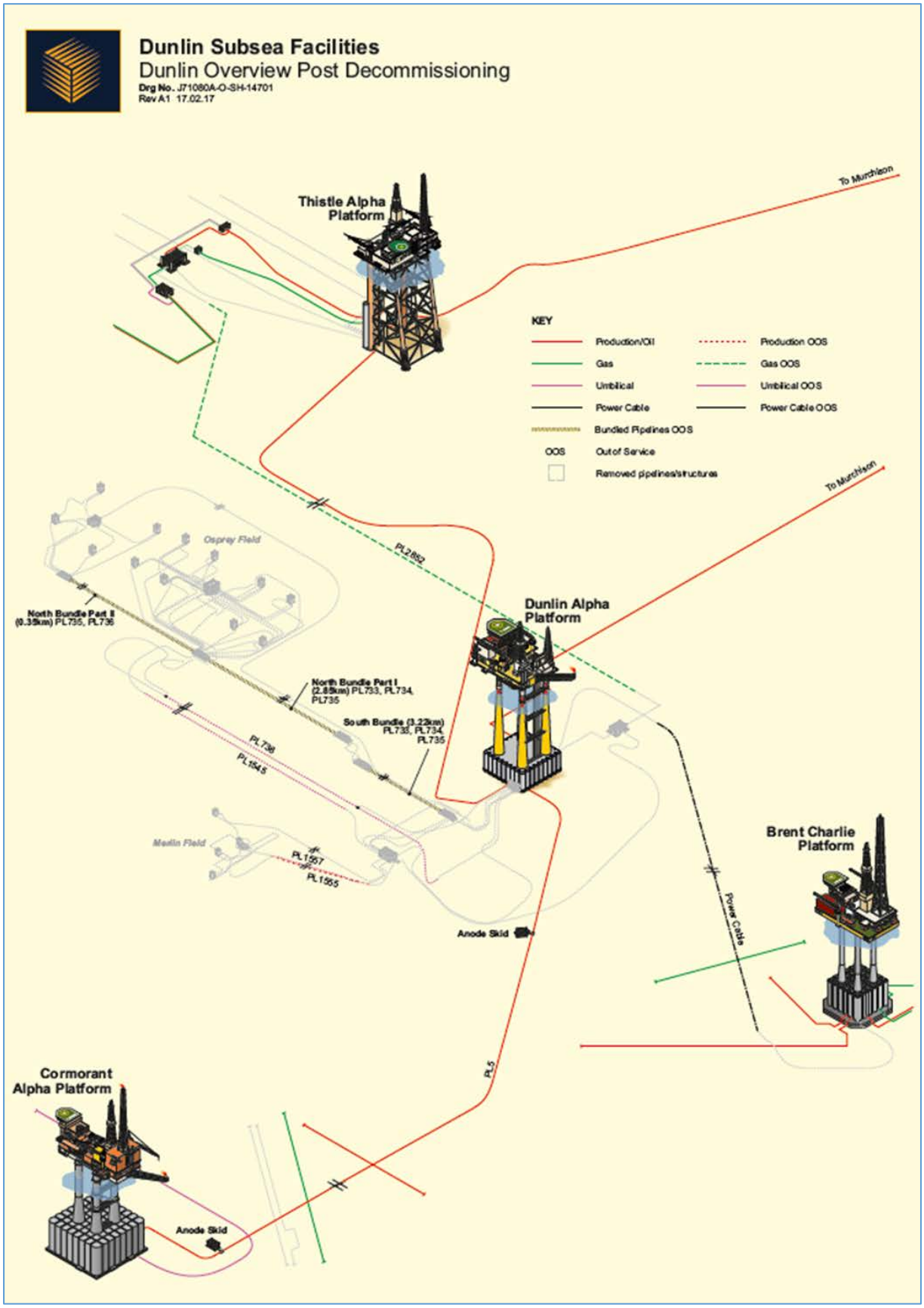


Figure 1-2: Greater Dunlin Area Field Layout

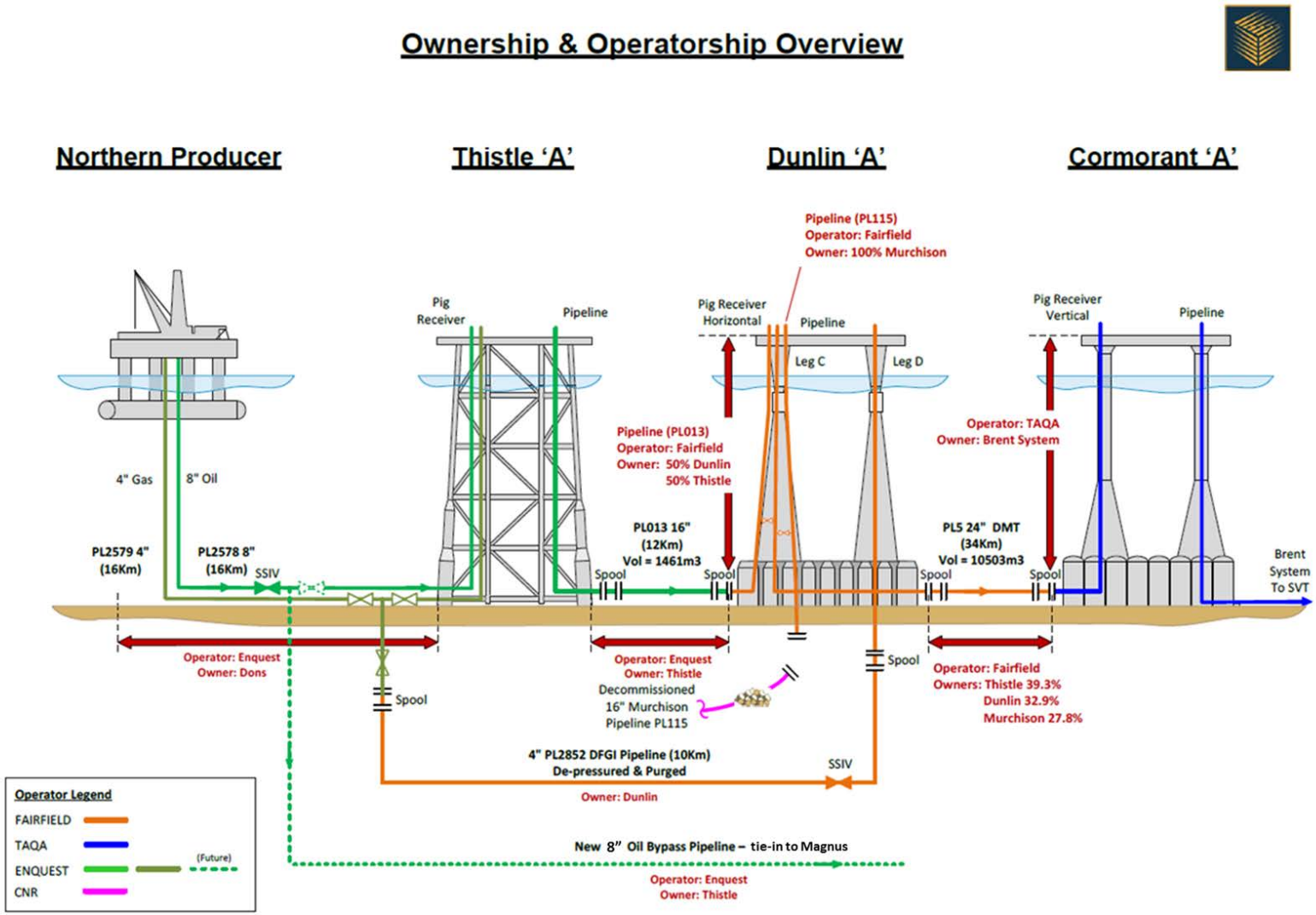


Figure 1-3: Dunlin Cormorant Pipeline (PL5) Agreement

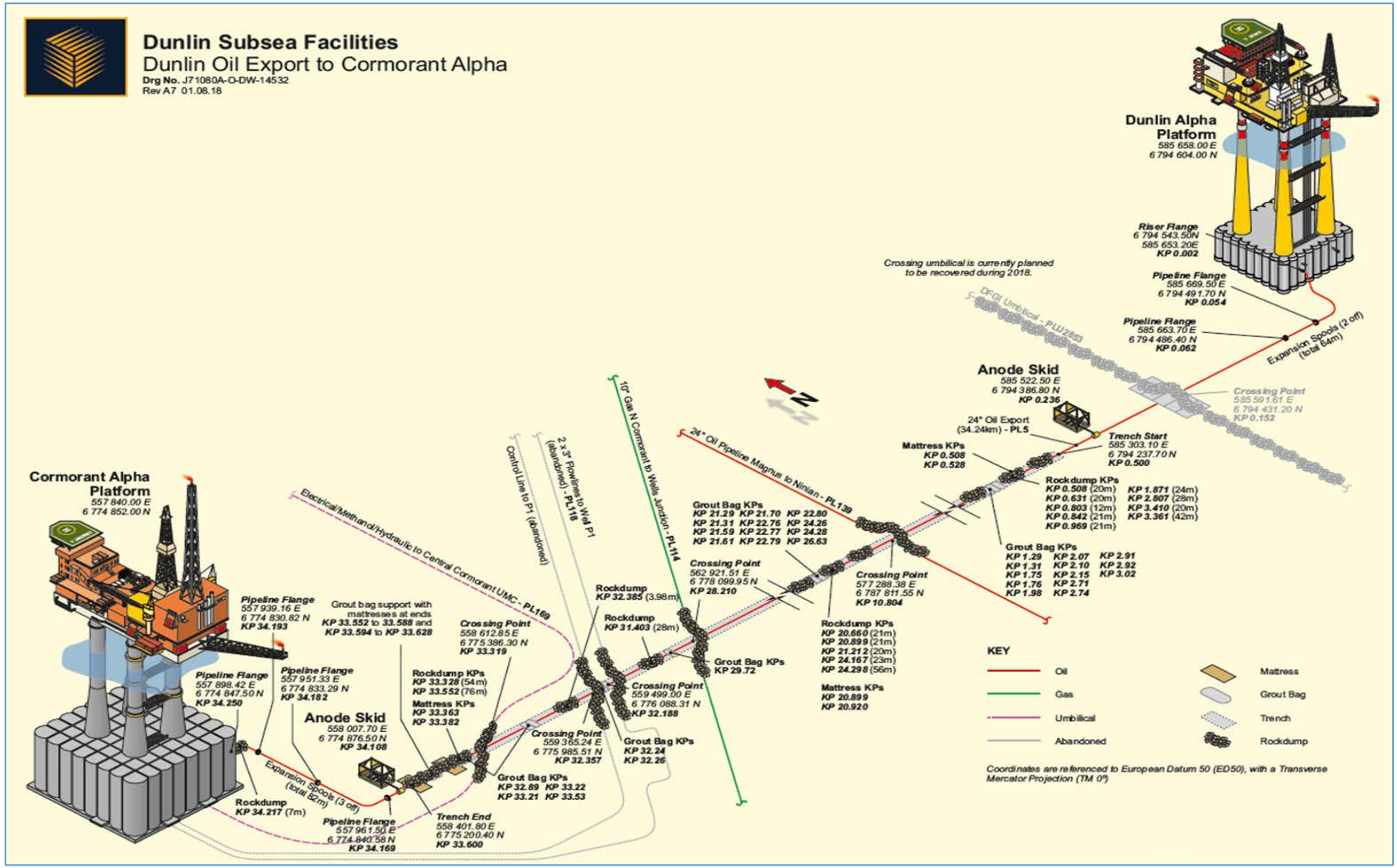


Figure 1-4: Dunlin Alpha to Cormorant Alpha pipeline (PL5)

Table 1-4: Adjacent Facilities					
Owner	**Name**	**Type**	**Distance / Direction**	**Information**	**Status**
Fairfield Betula Limited	Dunlin Alpha	Installation	PL5 pipeline from Dunlin Alpha – Cormorant Alpha 34.12 km (21.33 miles) south west	Dunlin Alpha exported production fluids via the PL5 pipeline and Brent Pipeline System to Sullom Voe Terminal	COP, out of use, being decommissioned
TAQA	Cormorant Alpha	Installation		Cormorant Alpha exports into the Brent Pipeline System to Sullom Voe Terminal	Operational
EnQuest	Thistle Alpha	Installation	Dunlin Alpha – Thistle Alpha 9.87 km (6.17 miles) north north west	Thistle Alpha exports production fluids via Dunlin Alpha to Cormorant Alpha PL5 pipeline and Brent Pipeline System to Sullom Voe Terminal	Operational
CNRI	Murchison	Installation	Dunlin Alpha - Murchison 15.89 km (9.93 miles) north east	Disconnected from Dunlin Alpha	Currently being decommissioned
MCX Osprey (UK)	Osprey	Subsea tie-back	Dunlin Alpha – Osprey 6.11 km (3.8 miles) north west	Dunlin Alpha is host to Osprey	COP, out of use, being decommissioned
MCX Osprey (UK)	Merlin	Subsea tie-back	Dunlin Alpha – Merlin 6.98 km (4.36 miles) north west	Dunlin Alpha is host to Merlin	COP, out of use, being decommissioned
Shell UK	Brent Charlie	Installation	Dunlin Alpha - Brent Charlie 20.99 km (13.12 miles) south east	Provided electrical power and communications to Dunlin Alpha	Operational
Impacts of Decommissioning Proposals					
PL5 and related subsea infrastructure will be decommissioned by Fairfield together with Osprey, Merlin, Dunlin Alpha and associated infrastructure. See also Table 1-3 ‘Interdependencies’ for pipeline crossing details. The removal of the PL5 expansion spools at either end will result in limited disturbance of the drill cuttings. This has been assessed and is predicted to result in no significant environmental impact.					

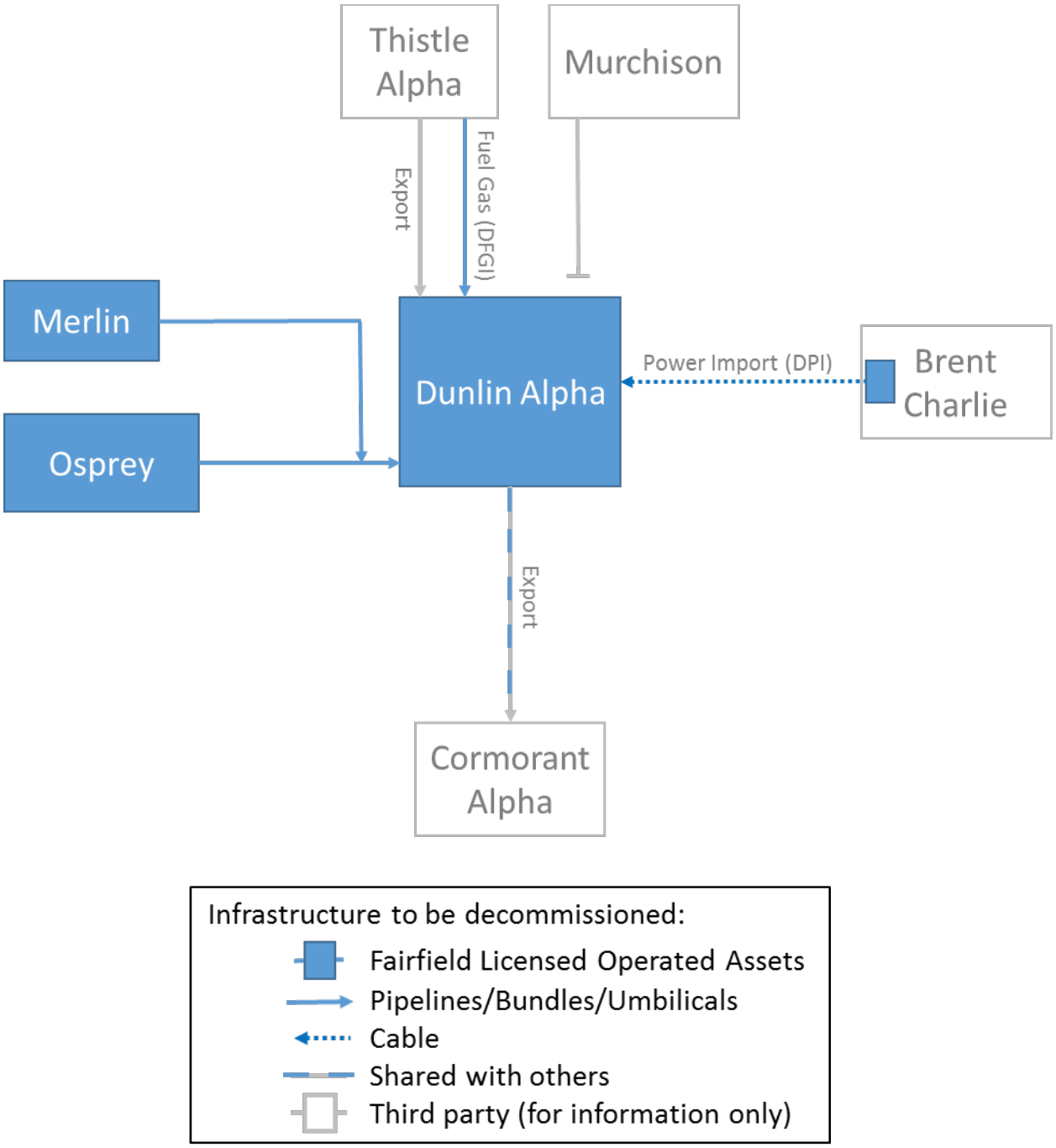


Figure 1-5: Greater Dunlin Area Adjacent Facilities

1.7 Industrial Implications

The Greater Dunlin Area decommissioning programme will be managed by Fairfield in Aberdeen. There will be a number of specialist contract services required for the execution of the programme including, but not limited to: Engineering Studies; Subsea Infrastructure Decommissioning; Topsides Preparation for Removal, Topsides Removal; Recycling and/or Disposal.

In planning, preparing and executing the programme, Fairfield will ensure that all contracts are raised and administered in a consistent and effective manner and that they:

- Adhere to the ethical and safety standards of the company
- Meet the requirements of legislation and all other relevant external organisations
- Are processed and awarded with tight and proper controls
- Are focussed on safe, efficient and cost effective decommissioning service delivery

Fairfield will continue to work with the OGA Decommissioning and Supply Chain teams, including development of a Supply Chain Action Plan (SCAP), and will also engage with the industry supply chain to identify effective technological solutions that are environmentally acceptable and safe.

2 DESCRIPTION OF ITEMS TO BE DECOMMISSIONED

2.1 Pipeline including Stabilisation Features

	Table 2-1: Pipeline / Flowline / Umbilical Information									
Item[8]	Description	Pipeline Number (as per PWA)	Diameter (inches)	Length (m)[9]	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status	Pipeline Status	Current Content
1	Dunlin Alpha pig launcher	PL5	30	5.73	Steel	Oil	Dunlin Alpha	N/A	Operating	Oil
2	Dunlin Alpha pig launcher to ESDV	PL5	24	11.45	Steel	Oil	Dunlin Alpha	N/A	Operating	Oil
3	Dunlin Alpha riser ESDV	PL5	24	1.55	Steel	Oil	Dunlin Alpha leg	N/A	Operating	Oil
4	Dunlin Alpha riser	PL5	24	175.40	Steel	Oil	Dunlin Alpha leg	N/A	Operating	Oil
5	Tie-in expansion spools to Dunlin Alpha	PL5	24	64.80	Steel 1 x Expansion spool (~56 m) 1 x Closing spool (~8 m)	Oil	Dunlin Alpha 500 m zone	Surface laid partially covered in drill cuttings	Operating	Oil

[8] Note that this Decommissioning Programme is for items 5, 6 and 7 only. Items 1 to 4 are part of the Dunlin Alpha Decommissioning Programme and items 8 to 11 will form part of the Cormorant Alpha Decommissioning Programme.

[9] Lengths taken from Pipeline Works Authorisation (14/W/11 variation 351/V/17) dated 29th November 2017. Total system length from Dunlin Alpha pig launcher to Cormorant Alpha pig receiver is 34,794.40 m.

	Table 2-1: Pipeline / Flowline / Umbilical Information									
Item[8]	Description	Pipeline Number (as per PWA)	Diameter (inches)	Length (m)[9]	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status	Pipeline Status	Current Content
6	PL5 pipeline	PL5	24	34,217.87	Steel, concrete clad with layer of asphalt enamel	Oil	Dunlin Alpha to Cormorant Alpha	Trenched (31.7 km)	Operating	Oil
7	Tie-in expansion spools to Cormorant Alpha	PL5	24	82.80	Steel 2 x Expansion spools (~69 m) 1 x Closing spool (~13 m)	Oil	Cormorant Alpha 500 m zone	Surface laid partially covered in drill cuttings	Operating	Oil
8	Cormorant Alpha riser	PL5	24	191.00	Steel	Oil	Cormorant Alpha leg	N/A	Operating	Oil
9	Cormorant Alpha riser ESDV	PL5	24	1.40	Steel	Oil	Cormorant Alpha leg	N/A	Operating	Oil
10	Cormorant Alpha ESDV to pig receiver	PL5	24	35.00	Steel	Oil	Cormorant Alpha leg	N/A	Operating	Oil
11	Cormorant Alpha pig receiver	PL5	23 - 30	7.40	Steel	Oil	Cormorant Alpha leg	N/A	Operating	Oil

Table 2-2: Subsea Pipeline Stabilisation Features				
Stabilisation Feature	**Total Number**	**Weight (t)**	**Locations**	**Status**
Concrete mattresses (6 m x 3 m x 0.15 m)	8	54 (6.75 t each)	Various along PL5 around KP 0.505, KP 0.525, KP 20.922, KP 33.363, KP 33.380, KP 33.556, KP 33.587 and KP 33.593	Partially Buried
Concrete mattresses (6 m x 3 m x 0.15 m)	9	61 (6.75 t each)	Various along PL5 around KP 0.508, KP 0.528, KP 20.899, KP 20.920, KP 33.363 and KP 33.382	Buried
Grout bags	4340	109 (25 kg each)	Various along PL5 for pipeline stabilisation	Buried (1840) Pipeline support (2500)
Sand bags	N/A	(25 kg each)	N/A	N/A
Formwork	N/A	N/A	N/A	N/A
Frond mats	N/A	N/A	N/A	N/A
Rock cover	-	6,650	Free span rectification (17 locations)	Exposed
Anode skids (3.3 m x 2.7 m x 1.8 m)	2	14.64 (7.3 t each)	1 x on seabed within Dunlin Alpha 500 m zone, and 1 x on seabed within Cormorant Alpha 500 m zone.	Exposed

2.2 Wells

Table 2-3: Well Information			
Platform Wells	**Designation**	**Status**	**Category of Well**
N/A	N/A	N/A	N/A
Subsea Wells			
N/A	N/A	N/A	N/A

2.3 Drill Cuttings

There are no drill cuttings directly associated with the PL5 pipeline itself. One PL5 expansion spool at the Dunlin Alpha end is covered by drill cuttings along 16 m of its length. Disturbance of these cuttings is addressed in section 3.4. One PL5 expansion spool at the Cormorant Alpha end is partly covered around its lower circumference. The drill cuttings piles at either end of the PL5 pipeline will be addressed in the respective installations' Decommissioning Programmes.

Table 2-4: Drill Cuttings Pile Information		
Location of Pile Centre (Latitude / Longitude)	**Seabed Area (m^2)**	**Estimated volume of cuttings (m^3)**
N/A	N/A	N/A

2.4 Inventory Estimates

Table 2-5 provides an estimate of the total weight of materials associated with the PL5 Pipeline and Structures Decommissioning Programme. A further breakdown of the inventory estimates for the PL5 subsea pipeline is provided in Figure 2-1.

Table 2-5: Inventory of Material Associated with PL5 Subsea Pipeline and Structures		
Material	**Description**	**Mass (t)**
Metals	Ferrous (steel - all grades)	7,995
	Non-ferrous (copper; aluminium; zinc; indium)	54
Concrete	Aggregates (pipeline coating; mattresses; grout bags)	8,512
Plastics	Polymers (pipeline coating[10]; rubbers)	925
Hazardous	Residual Fluids[11] (hydrocarbons; chemicals)	trace
	NORM Scale[12]	trace
	Total (tonnes)	**≈ 17,486**

[10] Pipeline protection coatings (polymers) will contain some hazardous materials
[11] There may be small volumes of residual fluids remaining post-pigging flushing activities
[12] Samples from operational flushing activities have indicated no (or only trace) NORM contamination

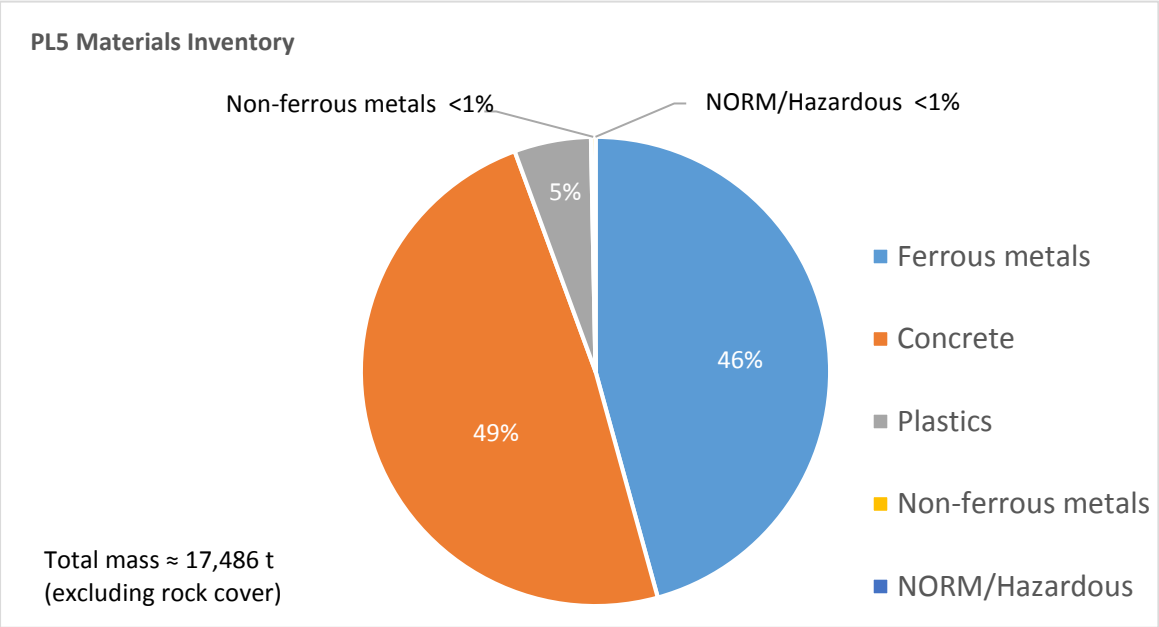


Figure 2-1: Pie Chart of Estimated Inventory

Refer to the Dunlin Alpha to Cormorant Alpha PL5 Pipeline Decommissioning Environmental Appraisal for further details.

3 REMOVAL AND DISPOSAL METHODS

As operator of the Greater Dunlin Area, Fairfield recognises its Duty of Care for all waste materials generated from PL5 decommissioning activities. Fairfield has therefore developed a Waste Management Strategy for the project in order to outline the processes and procedures necessary to ensure that waste is managed in a manner that complies with legislative requirements and prevents harm to people and the environment.

The strategy is underpinned by the waste hierarchy, shown in Figure 3-1, which is based on the principle of waste disposal only where reuse, recycling and waste recovery cannot be undertaken. In line with these principles, reuse of the pipeline and associated infrastructure (or parts thereof) is first in the order of preferred decommissioning options for assessment.

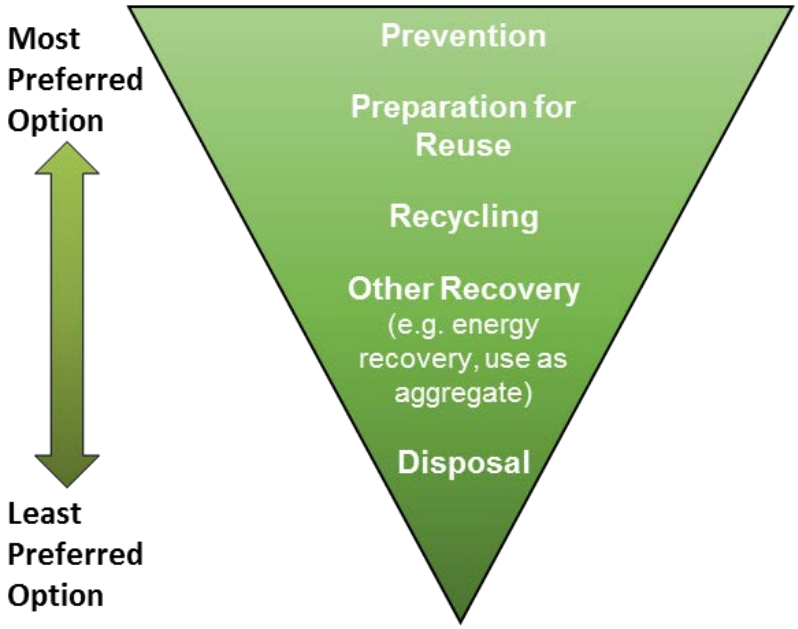


Figure 3-1: Waste Hierarchy

The reuse of the PL5 pipeline was not considered an option as it has come to the end of its service life. Recovered concrete mattresses and grout bags will be cleaned of marine growth onshore if required, and either reused, recovered as aggregate for infrastructure projects, or sent to landfill.

A disposal facility has not yet been selected. However, the selection process will ensure that the chosen facility is able to demonstrate a proven track record and waste stream management throughout the deconstruction process, as well as the ability to deliver innovative reuse/recycling options. Locations of potential disposal yards may require the consideration of Trans-Frontier Shipment of Waste (TFSW), including hazardous materials. Engagement with the regulatory authority will continue to ensure any issues with TFSW are addressed.

Fairfield will continue to engage with other companies and wider industries to discuss reuse opportunities. However, Fairfield believes that any further reuse or resale opportunities will be best achieved through the tendering and selection of a waste management contractor with the required knowledge and experience in this area.

Final disposal routes and historical performance will be a key consideration within the tendering process to ensure the aims of the waste hierarchy are best achieved.

3.1 Pipeline

3.1.1 Decommissioning Options

Table 3-1: Pipeline or Pipeline Groups Decommissioning Options			
Pipeline or Group (as per PWA)	**Condition of Line / Group (Surface Laid / Trenched / Buried / Spanning)**	**Whole or part of Pipeline / Group**	**Decommissioning Options Considered**
Group 1: Subsea structures (anode skids)	Surface (seabed) located	Part – Corrosion protection	Full removal
Group 2: Deposits (mattresses)	Partially buried	Pipeline stabilisation / protection	Full removal Leave *in situ*
Group 3: Deposits (mattresses and grout bags)	Buried	Pipeline stabilisation / protection	Full removal Leave *in situ*
Group 4: Deposits (grout bags)	Partially buried	Pipeline stabilisation / protection	Full removal Leave *in situ* (min. intervention)
Group 5: Dunlin Alpha topsides items	Located on Dunlin Alpha topsides	Part – Dunlin Alpha topsides	Full removal
Group 6: Dunlin Alpha PL5 riser	Located within Dunlin Alpha CGBS leg	Part – riser section in Dunlin Alpha CGBS leg	Leave *in situ*
Group 7: Pipeline tie-in spools	Surface laid	Part of pipeline	Full removal
Group 8: Pipeline	Trenched	Whole pipeline	Full removal Leave *in situ* (min. intervention) Leave *in situ* (full rock cover) Leave *in situ* (retrench)

3.1.2 Comparative Assessment Methodology

Comparative Assessment (CA) is a core part of the overall decommissioning planning and approval process. Fairfield's strategy for the CA process is aligned with OPRED Guidance Notes (May 2018) and Oil & Gas UK Guidelines (October 2015). Figure 3-2 outlines the CA process applied to the Dunlin Alpha to Cormorant Alpha pipeline (PL5) Decommissioning Programme.

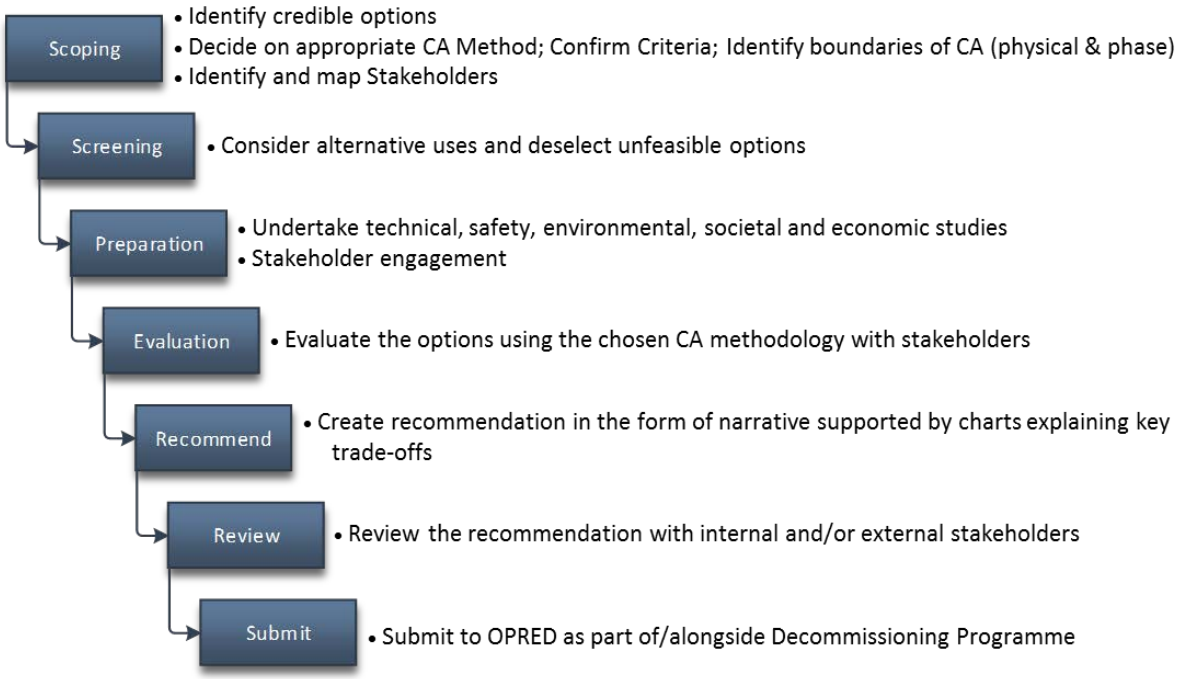


Figure 3-2: Comparative Assessment Process

The CA evaluation process uses the five assessment criteria of Safety, Environment, Technical, Societal and Economic to compare the relative merits of each option. The assessment criteria are equally weighted in order not to single out any criterion as more important as any other. The main criteria and associated sub-criteria are given in Table 3-2.

Table 3-2: CA Main Criteria and Sub Criteria		
Main Criteria	**Weighting**	**Sub Criteria**
Safety	20%	Operations Personnel
		Other Users
		Legacy Risk
Environmental	20%	Operational Marine Impacts
		Atmospheric Emissions and Consumptions
		Legacy Marine Impacts
Technical	20%	Project Technical Risk
Societal	20%	Fishing Industry
		All Other Groups
Economic	20%	Operational & Legacy Costs

An external consultancy was employed and used Multi Criteria Decision Analysis (MCDA) pairwise software to facilitate the CA process. The evaluation team consisted of Fairfield specialists, industry experts and key statutory stakeholders. The evaluation session was attended by OPRED and its regulatory advisors who, while not responsible for scoring, were nevertheless able to raise questions and provide insights to inform the process. Representatives from the pipeline partner groups were also present.

For each assessment criterion the participants analysed the relative merit of each option against the other options and looked for a differentiator, using terms such as ‘stronger than’ or ‘weaker than’. This was inputted using the software to allow numerical weightings to be derived for the various competing criteria, a standard part of any MCDA activity. Once all options were assessed and compared, the MCDA approach allowed the evaluations to be portrayed in the form of stacked bar charts. Sensitivity testing was also applied in some cases to explore the outcomes and test their robustness.

The CA output is captured in the PL5 Comparative Assessment Report which supports this Decommissioning Programme.

3.1.3 Outcome of Comparative Assessment

Table 3-3: Outcomes of Comparative Assessment		
Pipeline or Group	**Recommended Option**	**Justification**
Group 2: Deposits (partially buried)	Full Removal	These eight mattresses are partially buried and are accessible for full removal.
Group 3: Deposits (buried)	Leave *in situ*	These nine mattresses and 1,840 grout bags are buried and stable. These will be left *in situ*.
Group 4: Deposits (pipeline support)	Leave *in situ* with minimum intervention	These 2,500 grout bags are packed under/alongside the pipeline and stable. These will be left *in situ*. Spot rock cover over snag hazards will be added to provide an overtrawlable berm profile.
Group 8: Pipeline (trenched)	Leave *in situ* with minimum intervention	With the exception of the end sections, PL5 is trenched along the majority of the route. There are also five pipeline crossings over PL5. Where there are exposures, spans or areas of low cover that may present hazards to other users of the sea, these will be rock covered. The exposed ends will also be cut, removed and rock covered.

3.2 Pipeline Stabilisation Features

Table 3-4: Pipeline Stabilisation Features			
Stabilisation features	**Number**	**Option**	**Disposal Route (if applicable)**
Concrete mattresses (6 m x 3 m x 0.15 m)	8 Partially buried	Full removal	Recover and transport ashore for disposal
Concrete mattresses (6 m x 3 m x 0.15 m)	9 Buried	Leave *in situ*	N/A
Grout bags	4,340	Leave *in situ*	N/A
Sand bags	N/A	N/A	N/A
Formwork	N/A	N/A	N/A
Frond mats	N/A	N/A	N/A
Rock cover (t) Existing	6,650	To remain *in situ*. Located along PL5 and pipeline crossings	N/A
Anode skids	2	Recover both the anode skids	Recover and transport ashore for disposal

3.3 Wells

Table 3-5: Well Plug and Abandonment
N/A

3.4 Drill Cuttings

The removal of the PL5 expansion spools at either end will result in limited disturbance of the drill cuttings. This has been assessed in the PL5 Spool Removal Cuttings Disturbance Modelling Report and addressed within the Environmental Appraisal. These activities are predicted to result in no significant environmental impact.

Table 3-6: Drill Cuttings Decommissioning Options				
How many drill cuttings piles are present?	Removal of PL5 expansion spools will result in limited disturbance of the Dunlin Alpha and Cormorant Alpha drill cuttings piles.			
Tick options examined: ☐Remove and re-inject ☐Leave in place ☐Cover ☐Relocate on seabed ☐Remove and treat onshore ☐Remove and treat offshore ☑ Other (removal of the PL5 expansion spools will displace a small amount of the Dunlin Alpha and Cormorant Alpha drill cuttings that will quickly redistribute in the immediate area).				
Review of pile characteristics	Pile 1	Pile 2	Pile 3	Pile 4
How has the cuttings pile been screened?	N/A	N/A	N/A	N/A
Dates of sampling (if applicable)	N/A	N/A	N/A	N/A
Sampling to be included in pre-decommissioning survey?	N/A	N/A	N/A	N/A
Does it fall below both OSPAR thresholds?	N/A	N/A	N/A	N/A
Will the drill cuttings pile have to be displaced in order to remove the jacket?	N/A	N/A	N/A	N/A
What quantity (m^3) would have to be displaced / removed?	N/A	N/A	N/A	N/A
Will the drill cuttings pile have to be displaced in order to remove any pipelines?	Yes	N/A	N/A	N/A
What quantity (m^3) would have to be displaced / removed?	7.5	N/A	N/A	N/A
Have you carried out a CA of options for the cuttings pile?	No[13]	N/A	N/A	N/A

3.4.1 CA Method

Not applicable.

3.4.2 Outcome of Drill Cuttings CA

Not applicable.

[13] PL5 Spool Removal Cuttings Disturbance Modelling has been completed (A-301524-S12-TECH-001)

3.5 Waste Streams

Waste stream information is provided below.

Table 3-7: Waste Stream Management Methods	
Waste Stream	**Removal and Disposal method**
Bulk liquids	The PL5 pipeline will be pigged and flushed prior to disconnection. Any residual fluids within the pipeline and associated infrastructure will be discharged in compliance with approved regulatory permits.
Marine growth	Where practical, marine growth will be removed offshore. Any remaining marine growth recovered to onshore will be managed and disposed of at an appropriately licensed facility.
NORM / LSA scale	NORM contamination is not anticipated. However, any NORM/LSA contaminated equipment will be transported to shore and treated by qualified professionals at a suitably licensed facility. Stabilised NORM waste will then be transported to a specialist permitted site for disposal.
Asbestos	For the cut and recovered ends, asbestos associated with PL5 protective coating will be treated as hazardous waste and transported onshore for disposal at an appropriately licensed facility.
Other hazardous wastes	Any other hazardous waste streams identified will be classified accordingly and transported onshore for disposal at an appropriately licenced facility.
Onshore dismantling sites	A disposal facility has not yet been selected. However, the selection process will ensure that the chosen facility is able to demonstrate a proven track record of waste stream management throughout the deconstruction process, as well as the ability to deliver innovative reuse/recycling options. Locations of potential disposal yards may require the consideration of TFSW, including hazardous materials. Early engagement with the regulatory authority will ensure any issues with TFSW are addressed.

Table 3-8 summarises the disposition of materials planned for recovery to shore and materials to be left *in situ*. Further details can be found within the PL5 Comparative Assessment Report.

Table 3-8: Inventory Disposition			
	Total Inventory Tonnage (t)	**Planned Tonnage to Shore (t)**	**Planned Left *in situ* (t)**
Installations	N/A	N/A	N/A
Pipeline incl. tie-in spools	17,247	552[14]	16,695
Stabilisation features: Anode skids	15	15	N/A
Mattresses	115	54	61
Grout bags	109	N/A	109
Total (excluding rock)	**17,486**	**621**	**16,865**
Rock	6,650	N/A	24,550[15]

Table 3-9 indicates Fairfield's disposal aspirations for materials recovered to shore. Steel and other recyclables will account for the majority of materials to be removed and disposed of and a high rate of recycling (95%) is anticipated.

Table 3-9: Waste Disposal Aspirations				
Waste Stream	**Reuse**	**Recycle**	**Other Recovery**	**Landfill**
Ferrous metal	0 to 15%	95 to 98%	0%	0 to 5%
Non-ferrous metal	0%	95 to 98%	0%	0 to 5%
Concrete (aggregates)[16]	0 to 50%	0%	50 to 100%	0 to 25%
Plastics	0%	50 to 75%	15 to 40%	0 to 10%
Residual hydrocarbons	0%	0%	85 to 100%	0 to 15%
NORM scale[17]	0%	0%	0%	100%
Marine growth	0%	0%	75 to 100%	0 to 25%

[14] Corresponds to approximately 1,100 m of spools and pipeline ends
[15] This figure includes 17,900 tonnes of rock to be added for pipeline stabilisation and anti-snagging
[16] Reuse and recovery opportunities will be dependent on mattress condition and the availability of infrastructure projects.
[17] NORM may be sent for incineration prior to landfill in order to reduce volume.

4 ENVIRONMENTAL APPRAISAL

An Environmental Appraisal (EA) of the proposed decommissioning operations has been prepared in support of the Dunlin Alpha to Cormorant Alpha Pipeline (PL5) Decommissioning Programme. The EA process involved the identification of key environmental sensitivities in the project area in order to assess potential impacts arising from decommissioning operations, and identify management measures required to minimise impact on the environment. A summary of the EA is provided below.

4.1 Environmental Sensitivities (Summary)

Table 4-1: Environmental Sensitivities

Environmental Receptor	Main Features
Conservation interests	None of the survey work undertaken in the project area has identified any seabed habitats or species that are of specific conservation significance, apart from low numbers of juvenile ocean quahog (*Arctica islandica*), which is considered to be a threatened species. There are also no designated or proposed sites of conservation interest in the project area; the closest designated site, the European Site of Community Importance 'Pobie Bank Reef' Special Area of Conservation lies approximately 98 km to the south west of Dunlin, off the east coast of Shetland.
Seabed	The habitat assessment undertaken for the project determined the sediments to be mainly muddy sand and mixed sediment. The visible animals found across the survey area included polychaete worms, crustaceans and molluscs. Species were generally considered to be intolerant of hydrocarbon contaminations. Surveys showed the seabed to host a relatively diverse range of species, with little variation across the area. Ocean quahog has been observed, however it is well distributed in the North Sea and the project area is not considered a particularly important area for ocean quahog.
Fish	The fish populations in the project area are characterised by species typical of the northern North Sea, including long rough dab, hagfish and Norway pout. Basking shark, tope and porbeagle are all also likely to occur in small numbers. The project area is located within the spawning grounds of cod, haddock, Norway pout, whiting and saithe, meaning that these species may use the area for breeding. Nursery grounds, where juvenile fish remain to feed and grow, for angler fish, cod, blue whiting, European hake, haddock, herring, ling, mackerel, horse mackerel, place, sandeel, saithe, sprat, Norway pout, spurdog and whiting are also found in the wider area.
Fisheries	Saithe and mackerel (often targeted by the larger pelagic vessels in January and February) are the key commercial species landed from the project area. However, they are of relatively low value when compared to total landings into Scotland; combined, landings of these species from the wider area within which the project sits comprise only 0.1% of the value of landings into Scotland. Other species of commercial value include megrim, cod and monkfish/anglers.

Table 4-1: Environmental Sensitivities	
Environmental Receptor	**Main Features**
Marine mammals	Spatially and temporally, harbour porpoises, white-beaked dolphins, minke whales, killer whales and white-sided dolphins are the most regularly sighted cetacean species in the North Sea. Given the distance to shore, species such as the bottlenose dolphin and grey and harbour seals are unlikely to be present in the project area.
Birds	The project area is important for fulmar, northern gannet, great black-backed gull, Atlantic puffin, black-legged kittiwake and common guillemot for the majority of the year. The seasonal vulnerability of seabirds to oil pollution in the immediate vicinity of the project area has been derived from Joint Nature Conservation Committee (JNCC) data; the months of November to January are those when seabird species in the project area are considered most vulnerable to surface pollution. Overall annual seabird vulnerability is reported to be low.
Onshore communities	Whilst the decommissioning yard is yet to be selected, Fairfield expect the site to be in the UK or elsewhere in Europe. Fairfield procedures require approved facilities; including site visits, review of permits and consideration of how facility construction and design has been developed to minimise impact. All onshore yards at which decommissioned material will be handled will already deal with potential environmental issues and community relations as part of their existing site management plans.
Other users of the sea	There is very little shipping activity in the project area, and no sites of renewable or archaeological interest. There is also limited infrastructure related to other oil and gas developments.
Atmosphere	Atmospheric emissions generated from vessels can contribute to local air quality issues; the absence of vulnerable receptors in the offshore area means this is not an issue for the Dunlin area. Emissions to air can also act cumulatively with those from other activities (such as onshore power generation and use of vehicles) to contribute to global climate change. These emissions may come from vessel use but also through linked activities such as the recycling of materials brought onshore.

4.2 Potential Environmental Impacts and their Management

4.2.1 Environmental Appraisal Summary

The planned operations have been rigorously assessed through the CA and EA processes, resulting in recommendation of a set of proposals which are thought to present the least risk of environmental impact whilst satisfying safety, technical, societal and economic requirements. Based on the findings of the EA and the identification and subsequent application of the mitigation measures identified for each potentially significant environmental impact, it is concluded that operations associated with the decommissioning of the PL5 pipeline will not result in any significant environmental impact. Mitigation will be managed through the Fairfield Environmental Management System.

4.2.2 Overview

Table 4-2: Environmental Impact Management		
Activity	**Main Impacts**	**Management**
Topsides removal	N/A	N/A
Jacket/floating facility removal	N/A	N/A
Subsea installations removal	N/A	N/A
Subsea pipeline decommissioning scope of work	Discharges to sea when disconnecting equipment.	The pipeline will be pigged and flushed to remove residual fluids to the lowest practicable achievable level prior to removal. Planned discharges of chemicals and residual hydrocarbons will be under an approved permit or consent. General vessel activities are not anticipated to discharge any contaminants. Fairfield will ensure selected contractors employ industry best practice and all vessels are MARPOL 73/78 (Marine Pollution) compliant.
	Seabed disturbance from equipment removal/rock coverage.	Any dredging required to enable recovery of infrastructure on the seabed will be localised and controlled by diver or ROV. Rock will be placed using a flexible fall pipe, assisting with positional accuracy and controlling the spread of the material.
	Underwater noise from vessel usage and cutting operations.	The duration of the noise emitting activities will be limited by deploying vessels only where necessary and limiting the number of cuts as far as is practicable. A campaign approach will be prepared allowing vessels to undertake multiple tasks.
	Atmospheric emissions from vessel usage.	Planning of removal operations to reduce vessel numbers and durations. Onshore facilities will have appropriate management procedures in place to ensure that atmospheric emissions are below levels that could affect local air quality.
	Impacts on other users.	Infrastructure decommissioned *in situ* will be buried to a sufficient depth and spot rock cover applied to any exposed areas and end cuts. Post-decommissioning surveys will be undertaken to verify that the seabed has been left in a condition that does not present a hazard to commercial fishing. Admiralty Charts and FishSafe system will also be updated to identify infrastructure remaining *in situ*.
Decommissioning stabilisation features	See above.	See above.

Decommissioning drill cuttings	Redistribution of drill cuttings pile as a result of disturbance.	The PL5 infrastructure does not have any drill cuttings in its own right; however the removal of the PL5 expansion spools at either end will result in limited disturbance of drill cuttings. Any disturbance of drill cuttings will be minimised through careful project planning and control of operations. Resettlement of disturbed drill cuttings will be localised within existing safety zones. Safety zones will continue to be marked on Admiralty charts and FishSafe plotter files, highlighting the presence of the installations to other users of the sea. The location of the drill cuttings at the centre of the safety zone around Dunlin Alpha will assist in reducing the likelihood of overtrawling occurrences, allowing the cuttings pile to naturally degrade over time.
Onshore management of waste	Landfill use Odour Light pollution Noise	The selection of a competent decommissioning and waste management contractor will be key to managing potential onshore impacts. Fairfield has developed a waste management strategy for the project in order to outline the processes and procedures necessary to ensure that waste is managed in a manner that complies with legislative requirements and prevents harm to people and the environment.

5 INTERESTED PARTY CONSULTATIONS

5.1 Consultations Summary

The table below summarises the principal engagement undertaken during the preparation of the PL5 Draft DP. Note that many elements of the stakeholder engagement activity were undertaken in conjunction with other aspects of the Greater Dunlin Area decommissioning pre-planning.

Table 5-1: Summary of Stakeholder Activity (Pre-Submission)		
Date	**Comment**	**Response/Outcome**
Informal Consultations		
March 2016	Decommissioning pages of FEL website redesigned/updated	Accessibility for wider public to information on pre-planning for decommissioning the Greater Dunlin Field
May 2016	Statutory Consultees: Introductory approaches through telephone meetings with the four statutory consultees (GMS, NFFO, NIFF, and SFF)	Personal contact established with key representatives of each statutory consultee and pre-planning process outlined ahead of later contact
May 2016	UK Fisheries Legacy Trust Fund Ltd introductory meeting	Awareness raised of project focus and potential legacy implications
May 2016	Introductory contact with SEPA to raise awareness of pre-planning activity	Meeting held to share project overview and explore SEPA expectations in more depth, especially on Duty of Care, trans-frontier shipment of waste, radioactive and hazardous waste
October 2016	Meeting with SEPA to discuss pre-planning in more detail and gain regulatory insights to optimise project delivery	Questions answered on a range of regulatory expectations and advice received on process, including waste hierarchy and waste management strategy requirements
February 2017	Consultation on the Environmental Impact Assessment Draft Scoping Report, shared with 17 environmentally-focused regulatory and NGO organisations	Comments received from OPRED (Environmental Management Team), JNCC, Marine Scotland, Scottish Fishermen's Federation (SFF). Recommendations incorporated into scope for the Environmental Impact Assessment process and reported in Environmental Appraisal Report
February 2017	Presentation to Norwegian Petroleum Society Decommissioning Conference on Greater Dunlin Area decommissioning	Sharing of experiences to date and capturing of learnings from others to input into ongoing development of decommissioning pre-planning

Table 5-1: Summary of Stakeholder Activity (Pre-Submission)		
Date	**Comment**	**Response/Outcome**
September 2017	Scoping workshop held with PL5 partners (BP and EnQuest attended) to identify, define and validate options for decommissioning. Advance briefing and workshop minutes circulated to all partners including those unable to attend on the day.	Endorsement of decommissioning options to be taken forward
September 2017	PL5 Scoping Document was issued to OPRED, JNCC, Marine Scotland and SFF as a pre-read for Screening External Stakeholder Workshop.	Issued for information
October 2017	Offshore Contractors Association introductory meeting	Provided opportunity for mutual understanding of respective areas of interest
October 2017	Screening workshop held with regulatory bodies (OGA and Marine Scotland) and Statutory Consultees (SFF). JNCC and OPRED were unable to attend but pre-read documentation sent for advance briefing and minutes circulated to all parties.	Agreement reached on decommissioning options to be carried forward to CA evaluation phase
October 2017	Draft Environmental Impact Assessment Scoping Report shared with all stakeholders (whether attending or not) as a pre-read for the November stakeholder workshop, with comments invited. (Note: original distribution to 17 environmentally focused organisations, both regulatory and NGO, was carried out in February 2017 – see above)	No further comments received in response to re-circulation of Draft Environmental Impact Assessment Scoping Report.
October/ November/ December 2017	SEPA and Environment Agency liaison on Fairfield's Waste Management Strategy	Waste Management Strategy confirmed as thorough and comprehensive. Further information received from Environment Agency and discussion held (with SEPA) on latest guidance and expectations on recycling, waste and trans-frontier shipment procedures

Table 5-1: Summary of Stakeholder Activity (Pre-Submission)		
Date	**Comment**	**Response/Outcome**
November 2017	Major stakeholder workshop attended by 63 external stakeholders presenting the current status of the project, a number of which had been involved in the Phase 1 engagement. Post-event report circulated to all stakeholders (not just attendees) for comment/correction	Opportunity for refreshing and informing awareness of the project, and to gain feedback from stakeholders of particular areas of interest and/or concern; final version of event report circulated to all stakeholders and put on line in January 2018; comments and queries, including questions on research and development, addressed. Specific request made post-event for JNCC (in addition to SFF) to be kept advised regarding the size and types of any rock which may be used during pipeline decommissioning.
November 2017	University of Aberdeen Decommissioning MSc Programme meeting to establish areas of potential collaboration	Sources of information and contacts shared by Fairfield to facilitate real-world experience of MSc students
November 2017	Oil & Gas UK / Decom North Sea Offshore Decommissioning Conference attended	Sharing of experiences to date and capturing of learnings from others to input into ongoing development of decommissioning pre-planning
December 2017	Scottish Parliament short presentation made to MSPs and industry guests giving overview of Dunlin Alpha opportunities for the supply chain	Awareness raised of potential work stream opportunities for Scottish supply chain
January 2018	SEPA meeting held as follow-up to November 2018 stakeholder workshop, exploring waste issues in more detail	Greater understanding gained by Fairfield of detail of revised regulatory expectations
January 2018	Decom North Sea Environmental Appraisal guidance review participation	Lessons from Dunlin Alpha decommissioning shared and greater awareness gained of forthcoming requirements for Environmental Appraisal that will replace previous approach to environmental reporting of impact assessment in support of decommissioning programmes
February 2018	Norwegian Petroleum Society Decommissioning Conference update presentation and attendance	Sharing of experiences to date and capturing of learnings from others to input into ongoing development of decommissioning pre-planning

Table 5-1: Summary of Stakeholder Activity (Pre-Submission)		
Date	**Comment**	**Response/Outcome**
March 2018	'Design 4 Decommissioning' marine science and industry workshop attended for input into areas where innovation required and the development of potential solutions	Greater awareness of academic interest in key areas noted, with opportunities for follow up and joint industry projects as research develops
May 2018	Decom North Sea 'Decom Offshore Conference' attended	Sharing of experiences to date and capturing of learnings from others to input into ongoing development of decommissioning pre-planning
May 2018	Second external stakeholder workshop included specific briefing on PL5. Post-event report circulated to all stakeholders (not just attendees) for comment/correction	No issues or questions raised in connection with PL5 at event or after report distribution
August 2018	Workshop held with partner representatives (BP, CNRI, EnQuest, MCX attended) to seek input with provisional scoring of decommissioning options and identify any further aspects to be explored before external stakeholder CA	Verification of regulatory rules on drill cuttings disturbance sought from OPRED following workshop
September 2018	Bilateral meeting with SFF to pre-brief and explore provisional scoring in further detail in terms of the optimal programme from the fishing community's perspective ahead of the CA workshop later in September	Clarity gained on fishing community's views regarding potential decommissioning solutions
September 2018	CA scoring workshop held with external stakeholders (attended by OPRED ODU, HSE, JNCC, Marine Scotland) and partners (BP, CNRI, MCX)	Scoring confirmed for options and sensitivity analyses undertaken on selected areas as detailed in CA Report
Quarterly updates	Throughout the period of PL5 decommissioning pre-planning, regular meetings have been held with OPRED ODU and OGA to update on progress and seek guidance where required	Enabled greater understanding of regulatory requirements and clarification of OPRED Guidance Notes
Throughout	All decommissioning pre-planning documents associated with PL5 were issued to partners for review/comment; consolidated updates were provided to partners at quarterly meetings	Comments discussed and explored as required for incorporation into pre-planning

5.2 Consultations Summary – Post-Consultation Responses

Responses to the statutory and public consultation on the Draft Decommissioning Programme will be described below.

Table 5-2: Summary of Statutory and Public Consultation Responses		
Stakeholder	**Comment**	**Response/Outcome**
Statutory Consultation Responses		
Global Marine Systems Limited	No comment	n/a
National Federation of Fishermen's Organisations (NFFO)	No comment	n/a
Northern Ireland Fish Producers Organisation (NIFPO)	Responded to advise that area covered by the DP is outside area of operations therefore no comment to make. See appendix 2.	n/a
Scottish Fishermen's Federation (SFF)	While total removal to shore is SFF's published policy position, nevertheless accepts reasoning of the PL5 decommissioning recommendation. Wishes to place on record appreciation of information provided and discussions held at various engagement sessions, including comparative assessment workshop. See appendix 2.	Noted
Public Consultation Responses		
Public	No responses	n/a

6 PROGRAMME MANAGEMENT

6.1 Project Management and Verification

A Project Management Team (PMT) has been appointed to manage suitable sub-contractors for the decommissioning of the Dunlin Alpha to Cormorant Alpha pipeline PL5. Standard procedures for operational control and hazard identification and management will be used. Where possible the work will be coordinated with other decommissioning operations in the Northern North Sea. The PMT will monitor and track the progress of consents and the consultations required as part of this process. Any changes in detail to the offshore Decommissioning Programme will be controlled by Fairfield via Management of Change processes and discussed and agreed with OPRED.

6.2 Post-Decommissioning Debris Clearance and Verification

During site clearance activities, Fairfield will undertake best endeavours to recover any dropped objects. All recovered seabed debris related to offshore oil and gas activities will be returned for onshore recycling or disposal in line with existing disposal methods. A post-decommissioning site survey will be carried out within a 100 m wide corridor along the pipeline route (50 m either side of the pipeline[18]). This will be followed by independent verification and a certificate of seabed clearance provided to relevant authorities. The 500 m radii of the installations will be surveyed as part of the respective installation Decommissioning Programmes.

[18] As per OPRED guidance notes Nov 2018

6.3 Schedule

6.3.1 PL5 Pipeline Project Schedule

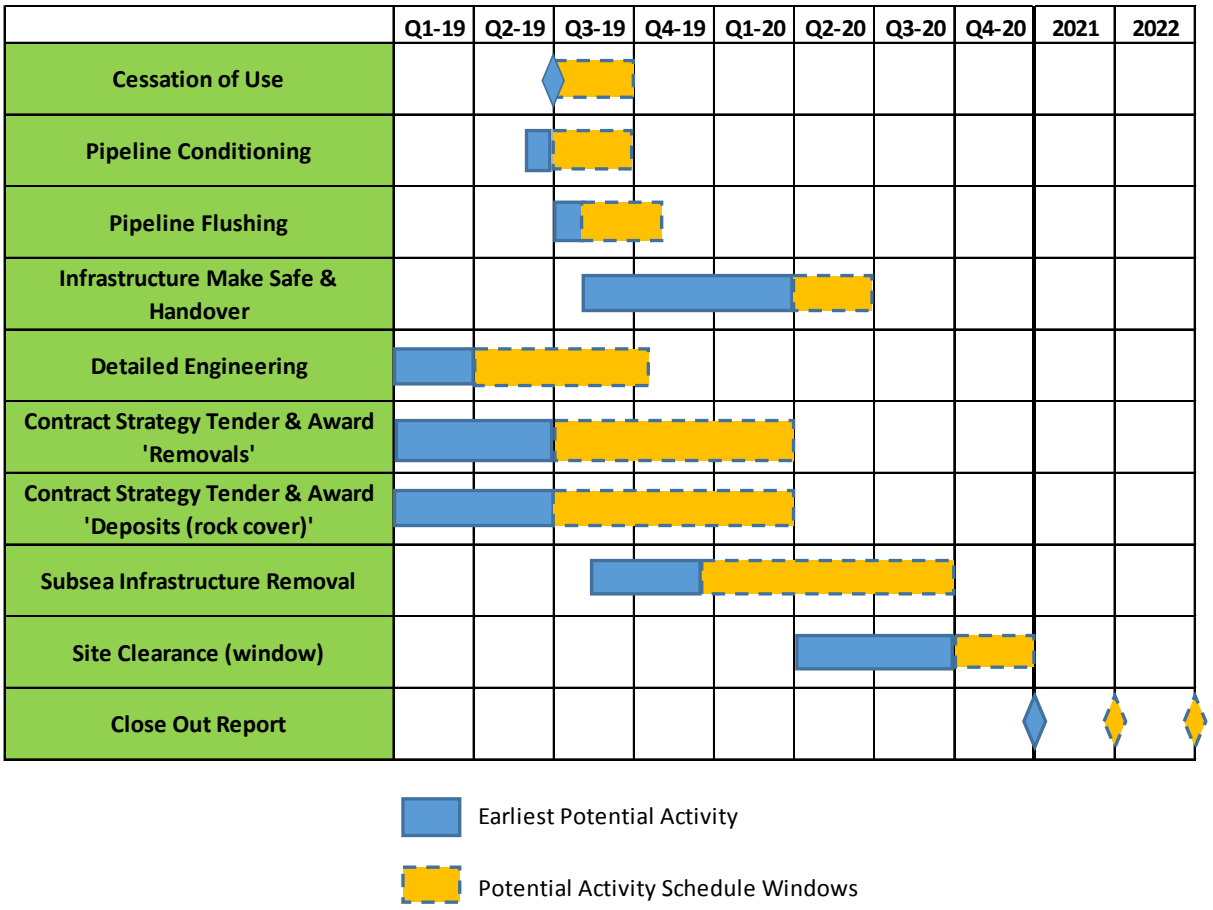


Figure 6-1: Gantt Chart of Project Schedule

6.4 Costs

Fairfield is following OGUK Guidelines on Decommissioning Cost Estimation (Issue 3, September 2013) for the decommissioning of the Greater Dunlin Area.

Table 6-1: Provisional Decommissioning Programme Costs	
Item	**Estimated Cost (£)**
Installation Preparation / Removal and Disposal	N/A
Pipeline Decommissioning	Provided to OPRED separately
Subsea Installations and Stabilisation Features	Provided to OPRED separately
Well Decommissioning	N/A
Continuing Liability – Future Pipeline and Environmental Survey Requirements	Provided to OPRED separately
TOTAL	Provided to OPRED separately

6.5 Close Out

In accordance with the regulatory requirements, a close out report will be submitted to OPRED explaining any applicable variations from the Decommissioning Programme within 12 months of the completion of the Greater Dunlin Area offshore decommissioning scope. This will include details of debris removal and independent verification of seabed clearance together with the first post-decommissioning environmental survey. In the interim, quarterly reports on progress of the decommissioning operations will be provided to the regulator.

6.6 Post-Decommissioning Monitoring and Evaluation

6.6.1 Post-decommissioning environmental surveys

A post-decommissioning environmental seabed survey, centred around sites along the pipeline will be carried out. The survey will focus on chemical and physical disturbances of the decommissioning scope of work and be compared with the pre-decommissioning environmental baseline assessment to assess recovery. Results of this survey will be provided to OPRED and its regulatory consultees/advisers once the work is complete. Typically a minimum of two post-decommissioning environmental surveys is expected.

6.6.2 Pipeline surveys

All pipeline routes and installation sites will be the subject of surveys when decommissioning activity has concluded. After the surveys have been reviewed by OPRED, a post-decommissioning survey regime will be agreed by both parties.

6.6.3 Evaluation and Mitigation

The main risk from infrastructure remaining *in situ* is the potential for interaction with other sea users, specifically from fishing related activity. Fairfield has conducted a Fishing Quantitative Risk Assessment that reviewed the historical fishing activity in the area and the impact this could have from the PL5 infrastructure. Where the infrastructure is fully trenched and buried or contained within the limits of the Dunlin Alpha Platform 500 m safety zone which is expected to remain in place, the effect on other sea users is considered to be negligible.

Risks to fishermen were evaluated for the PL5 pipeline, based on criteria including the type and intensity of fishing activity undertaken within the area, the number of crossings made over the infrastructure while actively fishing, and the seabed condition due to the installation features of the infrastructure, e.g. areas of low cover, spans, exposures, etc.

The PL5 infrastructure is currently shown on Admiralty Charts and on the FishSafe System. Once decommissioning activities are complete, updated information on infrastructure which remains *in situ* will be notified to the UK Hydrographic Office (Admiralty charts), FishSafe and OPRED to enable their records to be amended.

The infrastructure to remain *in situ*, outwith the Dunlin Alpha Platform, is largely below Mean Sea Bed Level and rock covered to remove any snag hazards and will be confirmed as such during decommissioning. Due to the location and low seabed mobility, infrastructure remaining *in situ* is unlikely to become exposed. Should future surveys find evidence of any exposures, spans or interactions that exceed the regulatory criteria, these will be submitted for inclusion within the FishSafe database.

Post-decommissioning monitoring will be undertaken as required in discussion with OPRED and its advisors. The frequency of surveying will be determined through a risk-based approach. During the period over which monitoring is required, the status of the infrastructure decommissioned *in situ* or deferred would be reviewed and any necessary remedial action undertaken to ensure it does not pose a risk to other sea users.

The final decommissioned status of the PL5 pipeline is shown below.

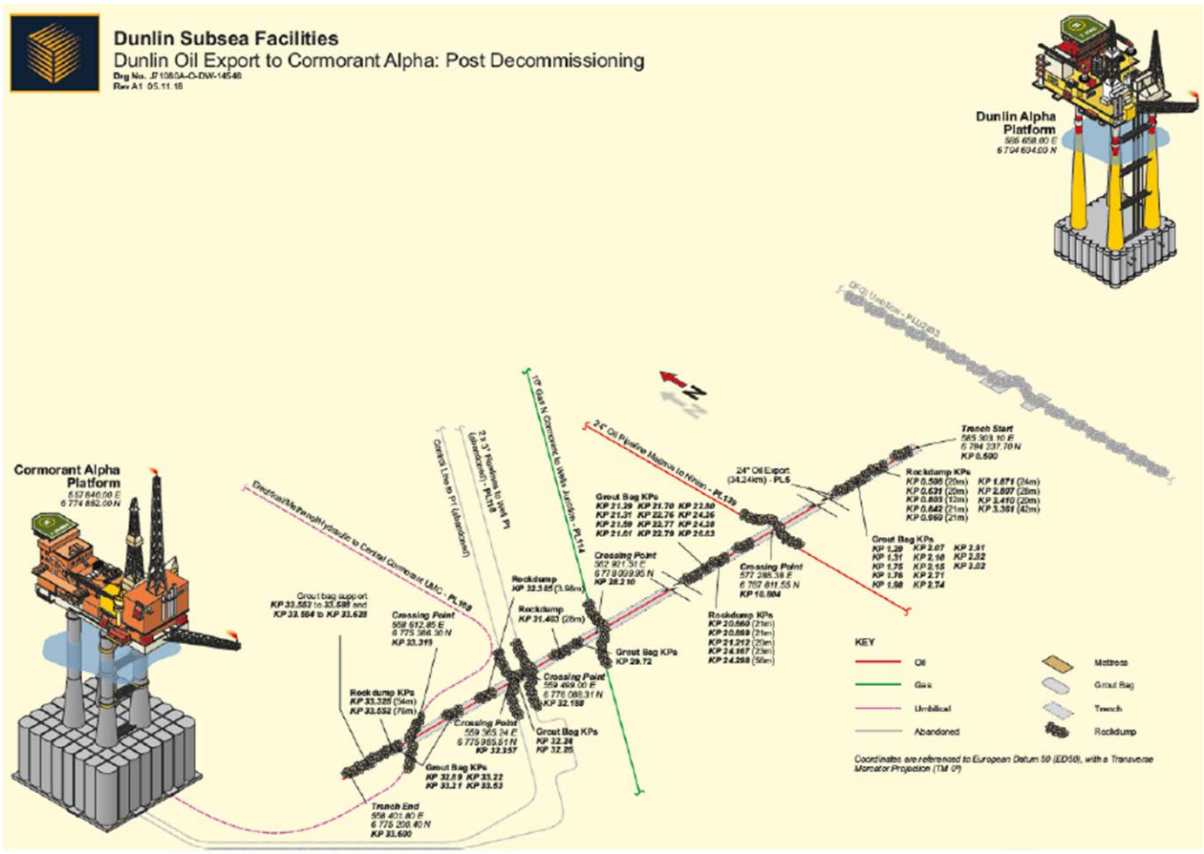


Figure 6-2: Dunlin Alpha to Cormorant Alpha pipeline (PL5) - Post Decommissioning Overview

7 SUPPORTING DOCUMENTS

Table 7-1: Supporting Documents	
Title	**Document Number**
Fairfield Waste Management Strategy	FBL-DUN-HSE-STR-00003
PL5 Spool Removal Cuttings Disturbance Modelling	A-301524-S12-TECH-001
PL5 Comparative Assessment Report	A-301649-S17-REPT-003
PL5 Environmental Appraisal Report	XOD-DUN-HSE-RPT-00006
PL5 Cost Summary Report (confidential, issued to OPRED only)	FBL-DUN-DUNA-HSE-01-RPT-00006

For latest document versions, see http://www.fairfield-energy.com/

Table 7-2: Reference Documents	
Title	**Document Number**
OPRED Decommissioning of Offshore Oil and Gas Installations and Pipelines Guidance Notes	Nov 2018 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/760560/Decom_Guidance_Notes_November_2018.pdf
Oil and Gas UK Guidelines for Comparative Assessment in Decommissioning Programmes	Issue 1 Oct 2015 https://oilandgasuk.co.uk/product/en038/
Dunlin Alpha Consultation Draft Decommissioning Programme (2018)	FBL-DUN-DUNA-HSE-01-PLN-0001
Dunlin Fuel Gas Import (DFGI) / Dunlin Power Import (DPI) Pipelines & Structures Decommissioning Programmes (Approved)	FBL-DUN-DUNA-HSE-01-PLN-00002 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/668458/DFGI-DPI_Final_DP_.pdf
Dunlin Alpha to Cormorant Alpha Pipeline CA Fisheries QRA Report	A-301649-S17-REPT-006
Dunlin Alpha to Cormorant Alpha Pipeline CA – Specific Scope Technical Note	A-301649-S17-TECH-001

8 PARTNER LETTERS OF SUPPORT

bp

Jessica Howe
Decommissioning Business Manager
North Sea

Britoil Limited
North Sea Headquarters
1 Wellheads Avenue
Dyce
Aberdeen
AB21 7PB

27th June 2019

Department for Business, Energy and Industrial Strategy (BEIS)
Offshore Decommissioning Unit
AB1 Building, 3rd Floor
Crimon Place
ABERDEEN
AB10 1BJ
Attention: Brenda Muirhead

Mobile 07880054969
Jessica.howe@bp.com

Dear Sir or Madam,

PETROLEUM ACT 1998
Dunlin Alpha to Cormorant Alpha Pipeline ("PL5 Pipeline") Decommissioning Programme

We, Britoil Limited, confirm that we hereby authorise Fairfield Betula Limited to submit on our behalf abandonment programmes relating to the PL5 Pipeline as directed by the Secretary of State in April 2018.

We confirm that we support the proposals detailed in the Fairfield Betula Limited Decommissioning Programme for the PL5 Pipeline Revision A6, dated June 2019, which is to be submitted by Fairfield Betula Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,

Jessica Howe

Britoil public limited company
Registered in Scotland NO 77750
Registered branch office at 1 Wellheads Avenue, Dyce, Aberdeen AB21 7PB

CNR International

Department for Business, Energy and Industrial Strategy (BEIS)
Offshore Decommissioning Unit
AB1 Building, 3rd Floor
Crimon Place
ABERDEEN
AB10 1BJ
FAO: Brenda Muirhead

2nd July 2019

Dear Sir or Madam,

PETROLEUM ACT 1998
Dunlin Alpha to Cormorant Alpha Pipeline ("PL5 Pipeline") Decommissioning Programme

We, CNR International (U.K.) Limited, confirm that we hereby authorise Fairfield Betula Limited to submit on our behalf abandonment programmes relating to the PL5 Pipeline as directed by the Secretary of State on 11th June 2019.

We confirm that we support the proposals detailed in the Fairfield Betula Limited Decommissioning Programme for the PL5 Pipeline dated June 2019, which is to be submitted by Fairfield Betula Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,

Roy Aspden
Decommissioning Project Manager
For and on behalf of CNR International (U.K.) Limited

CNR International (U.K.) Limited Company Number 00813187 (England and Wales)
St Magnus House, Guild Street, Aberdeen, AB11 6NJ United Kingdom
Registered office: c/o Pinsent Masons LLP, 30 Crown Place, London, EC2A 4ES United Kingdom.
Switchboard +44(0)1224 303600
Fax +44(0)1224 303888

ConocoPhillips (U.K.) Limited
Rubislaw House
Anderson Drive
Aberdeen AB15 6FZ

Tel: 01224 205000
Fax: 01224 205222

ConocoPhillips

Department for Business, Energy and Industrial Strategy (BEIS)
Offshore Decommissioning Unit
AB1 Building, 3rd Floor
Crimon place
Aberdeen
AB10 1BJ

Attention Brenda Muirhead

Dear Sir or Madam,

PETROLEUM ACT 1998
Dunlin Alpha to Cormorant Alpha Pipeline ("PL5 Pipeline") Decommissioning Programme

ConocoPhillips (U.K.) Limited, confirm that we hereby authorise Fairfield Betula Limited to submit on our behalf abandonment programmes relating to the PL5 Pipeline as directed by the Secretary of State in April 2018.

We confirm that we support the proposals detailed in the Fairfield Betula Limited Decommissioning Programme for the PL5 Pipeline Revision A6, dated June 2019, which is to be submitted by Fairfield Betula Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,

Michael Burnett
Strategy & Integration Manager

For and on behalf of ConocoPhillips (U.K.) Limited

MCX DUNLIN (UK) LTD.
Mid City Place, 71 High Holborn
London, WC1V 6BA, United Kingdom

Offshore Petroleum Regulator for Environment & Decommissioning
Offshore Decommissioning Unit
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ

June 25, 2019

Dear Sir or Madam,

Decommissioning Programme – Dunlin Alpha to Cormorant Alpha Pipeline (PL5)

MCX Dunlin (UK) Limited confirm that we hereby authorise Fairfield Betula Limited to submit on our behalf the Dunlin Alpha to Cormorant Alpha Pipeline (PL5) Decommissioning Programme as directed by the Secretary of State in April 2018.

We confirm that we support the proposals detailed in the Dunlin Alpha to Cormorant Alpha Pipeline (PL5) Decommissioning Programme Revision A6, dated June 2019, which is to be submitted by Fairfield Betula Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under Section 29 of the Petroleum Act 1998.

Yours Sincerely,

M. Kawamata

Michio Kawamata
Director
MCX Dunlin (UK) Limited

APPENDIX 1 – PUBLIC NOTICES

Printed in the Press & Journal (Aberdeen), The Shetland Times, The Edinburgh Gazette and The Guardian (UK national) newspapers on Friday 5th April 2019:

PUBLIC NOTICE

The Petroleum Act 1998

DUNLIN ALPHA TO CORMORANT ALPHA PIPELINE (PL5) DECOMMISSIONING PROGRAMME

Fairfield Betula Limited has submitted for the consideration of the Secretary of State for Business, Energy and Industrial Strategy a draft Decommissioning Programme for the Dunlin Alpha to Cormorant Alpha pipeline (PL5), in accordance with the provisions of the Petroleum Act 1998. It is a requirement of the Act that interested parties be consulted on such decommissioning proposals.

The 34 km export pipeline, including associated infrastructure, is located in Blocks 211/23, 211/22, 211/27 and 211/26 in the Northern North Sea. At its closest points, the pipeline lies 11 km west of the UK/Norwegian median line (at the Dunlin Alpha platform), and 106 km north east of Shetland (at the Cormorant Alpha platform). The related infrastructure includes expansion spools, anode skids, and pipeline stabilisation features.

Fairfield Betula Limited hereby gives notice that the draft Decommissioning Programme can be viewed online at www.fairfield-energy.com/public-consultation. Alternatively a digital copy of the Decommissioning Programme can be requested from, or hard copies inspected at:

Reception
Fairfield Energy Limited
19 Abercrombie Court
Prospect Road
Arnhall Business Park
Westhill, Aberdeen AB32 6FE
Tel: 01224 320500

Representations regarding the draft Dunlin Alpha to Cormorant Alpha Pipeline (PL5) Decommissioning Programme should be submitted by email to stakeholder.mailbox@fairfield-energy.com before the consultation closing date, 8 May 2019, and should state the grounds upon which any representations are being made. Representations can also be made in writing to Peter Lee, Regulatory Affairs & Stakeholder Engagement Manager, at the above address.

APPENDIX 2 – STATUTORY CONSULTEE CORRESPONDENCE

SCOTTISH FISHERMEN'S FEDERATION

Our Ref:

Your Ref:

15 April 2019

Scottish Fishermen's Federation
24 Rubislaw Terrace
Aberdeen, AB10 1XE
Scotland UK

T: +44 (0) 1224 646944
F: +44 (0) 1224 647058
E: sff@sff.co.uk

www.sff.co.uk

Peter Lee
Regulatory Affairs & Stakeholder Engagement Manager
Fairfield Energy Limited
19 Abercrombie Court, Prospect Road
Arnhall Business Park, Westhill
Aberdeen AB32 6FE

Dear Peter,

Dunlin Alpha to Cormorant Alpha Pipeline (PL5) Decommissioning Programme Consultation Draft

I refer to the Consultation Draft Decommissioning Programme and key supporting documents described in Fairfield's Stakeholder email of 5 April 2019 and provided via email link and hard copy.

The Scottish Fishermen's Federation (SFF) appreciates the clearly laid out and detailed explanation of Fairfield Energy's proposals for this particular decommissioning programme and place on record our appreciation of the information provided and discussions held at various Engagement sessions, including the Stakeholder Comparative Assessment Workshop of 28 September 2018.

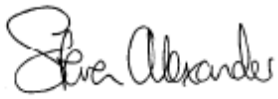
We would highlight to Fairfield that the Federation's decommissioning preference(s) with regard to pipelines and flowlines can be summarised as follows:

- *Pipelines & flowlines (including trunk lines, pipeline bundles and umbilicals)*: **total removal to shore**. Failing that; trenching and burial with a proactive monitoring programme put in place. With regard to *pipeline ends, where a trenched and buried pipeline is cut and removed at the point where it previously emerged from the trench to tie-in to a subsea installation*, preference is for burial along with an element of rock dump returning to mean seabed level.

* The SFF's Oil and Gas Decommissioning Policy and accompanying Key Principles document can be viewed via the SFF's website using the following link: https://www.sff.co.uk/sff-offshore-oil-gas-decommissioning-policy/.

The Federation having stated the above position, accepts the reasoning behind the recommendation from the September 2018 Stakeholder Comparative Assessment Workshop and awaits with interest details of the monitoring regime to be implemented.

Yours sincerely,



Steven Alexander
Offshore Liaison

Carol Barbone

From: Carol Barbone
Sent: 05 April 2019 15:42
To: 'Harry Wick'
Subject: RE: Pipeline PL5 Consultation Launched

Very many thanks for advising, Harry.

Kind regards

Carol

Carol Barbone
Stakeholder Relations

T +44 (0)1224 320779
M +44 (0)7775 523091
E carol.barbone@fairfield-energy.com

Fairfield Energy Limited
19 Abercrombie Court, Prospect Road, Arnhall Business Park, Westhill, Aberdeen, AB32 6FE
T +44 (0)1224 320500 F +44 (0)1224 320501 W www.fairfield-energy.com
Registered in England and Wales under registration number 5562373

From: Harry Wick <Harry.Wick@nifpo.co.uk>
Sent: 05 April 2019 15:36
To: Carol Barbone <Carol.Barbone@fairfield-energy.com>
Subject: RE: Pipeline PL5 Consultation Launched

Hi Carol,

This particular work is outside our are of operations so a nil return from me.

Thanks,

Harry

From: Carol Barbone <Carol.Barbone@fairfield-energy.com>
Sent: 05 April 2019 09:50
To: Harry Wick <Harry.Wick@nifpo.co.uk>
Subject: Pipeline PL5 Consultation Launched

Dear Harry

I am writing to confirm that the consultation on the draft Decommissioning Programme (DP) has opened today for the 34 km Dunlin Alpha to Cormorant Alpha pipeline and its associated infrastructure and will

1

run until the close of business on 8 May. I hope you received the two sets of the printed copy of the DP and supporting documents (Comparative Assessment and Environmental Appraisal reports) in this morning's post.

As a reminder, the proposal is for the surface laid ends of the pipeline to be cut and removed for recycling, leaving the remaining pipeline largely trenched below the seabed. To protect against potential snagging hazards, rock will be applied to cover the cut locations of the exposed pipeline ends and any identified areas of spanning. Partially-buried concrete mattresses will be removed, together with the anode skids and pipeline connection spools. Buried grout bags and mattresses that continue to provide pipeline stability and protect against movement and spans will remain in place and rock cover applied where needed to prevent snagging hazards. Any oilfield debris adjacent to the pipeline will be recovered and a seabed clearance survey conducted. The survey results will be used as the basis for developing a monitoring regime for the decommissioned pipeline with the regulator and its consultees.

The consultation documents are also on the BEIS website at the following link:

https://www.gov.uk/guidance/oil-and-gas-decommissioning-of-offshore-installations-and-pipelines

Please do let me know if you have any queries or need any further information ahead of your formal response and I will do my best to assist.

Kind regards

Carol

Carol Barbone
Stakeholder Relations

T +44 (0)1224 320779
M +44 (0)7775 523091
E carol.barbone@fairfield-energy.com

Fairfield Energy Limited
19 Abercrombie Court, Prospect Road, Arnhall Business Park, Westhill, Aberdeen, AB32 6FE
T +44 (0)1224 320500 F +44 (0)1224 320501 W www.fairfield-energy.com
Registered in England and Wales under registration number 5562373

APPENDIX 3 – PL5 BURIAL PROFILE

The graphs below show the Fugro seabed survey from 2016. The Y-axis shows the elevation of the features relative to Mean Seabed Level (MSBL) at 0 m, the X-axis shows the pipeline profile along its length with each graphic representing 1 km sections. The two red lines show the top and bottom of PL5. The pipeline is laid in an open trench and therefore the vast majority of the pipeline is below MSBL. The blue line shows the top of the infill, be it natural silty backfill or rock cover.

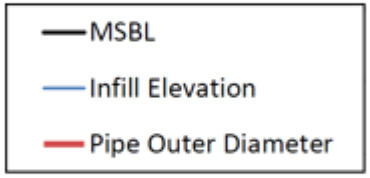
2016 Survey:

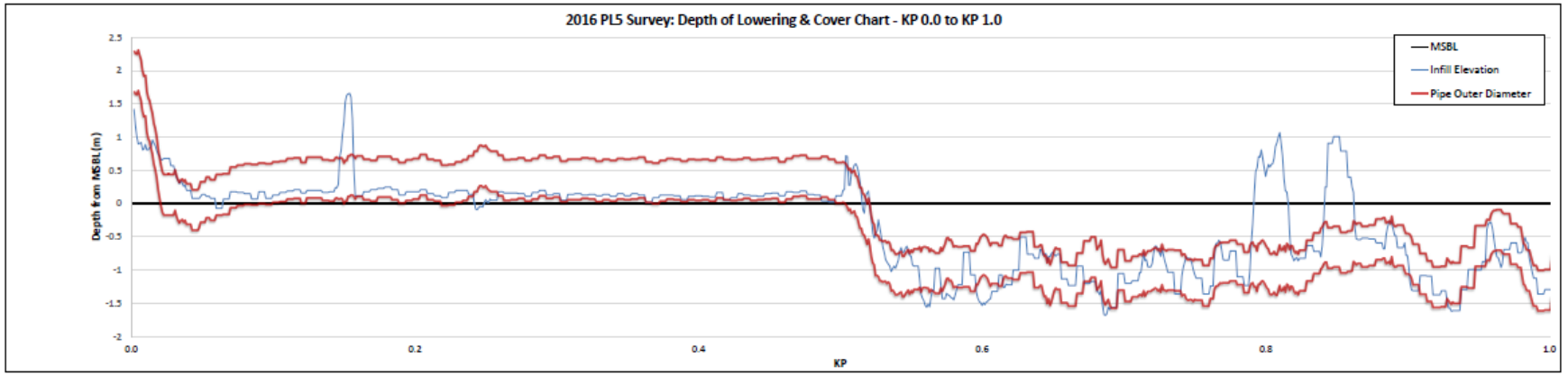
KP 0.0 to KP 2.0
KP 2.0 to KP 4.0
KP 4.0 to KP 6.0
KP 6.0 to KP 8.0
KP 8.0 to KP 10.0
KP 10.0 to KP 12.0
KP 12.0 to KP 14.0
KP 14.0 to KP 16.0
KP 16.0 to KP 18.0
KP 18.0 to KP 20.0
KP 20.0 to KP 22.0
KP 22.0 to KP 24.0
KP 24.0 to KP 26.0
KP 26.0 to KP 28.0
KP 28.0 to KP 30.0
KP 30.0 to KP 32.0
KP 32.0 to KP 34.3

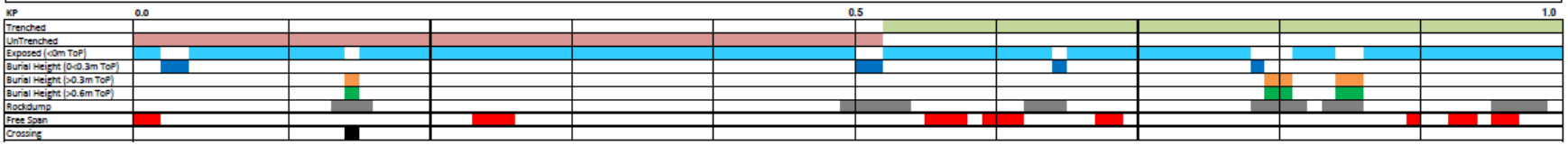
Key:

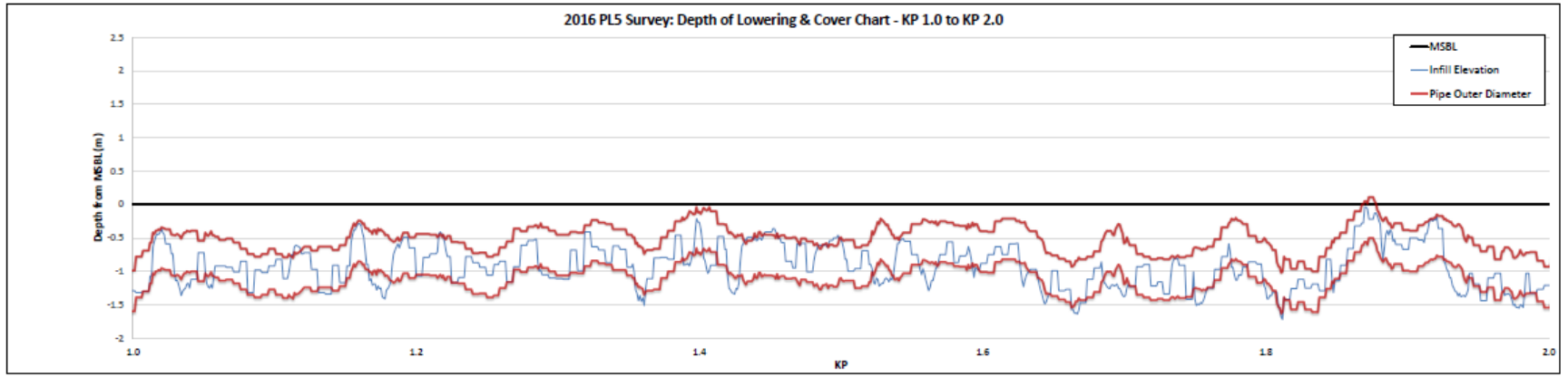
Survey features and conditions:

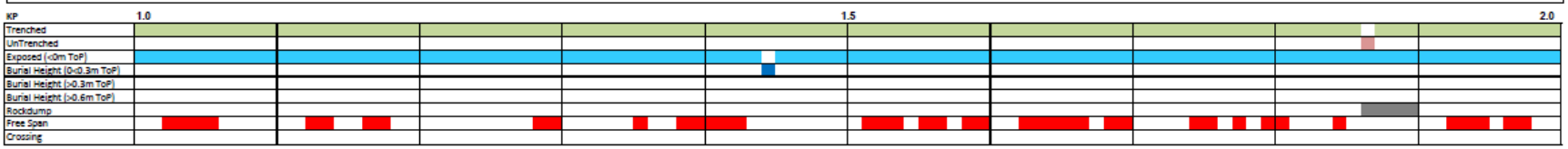
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing

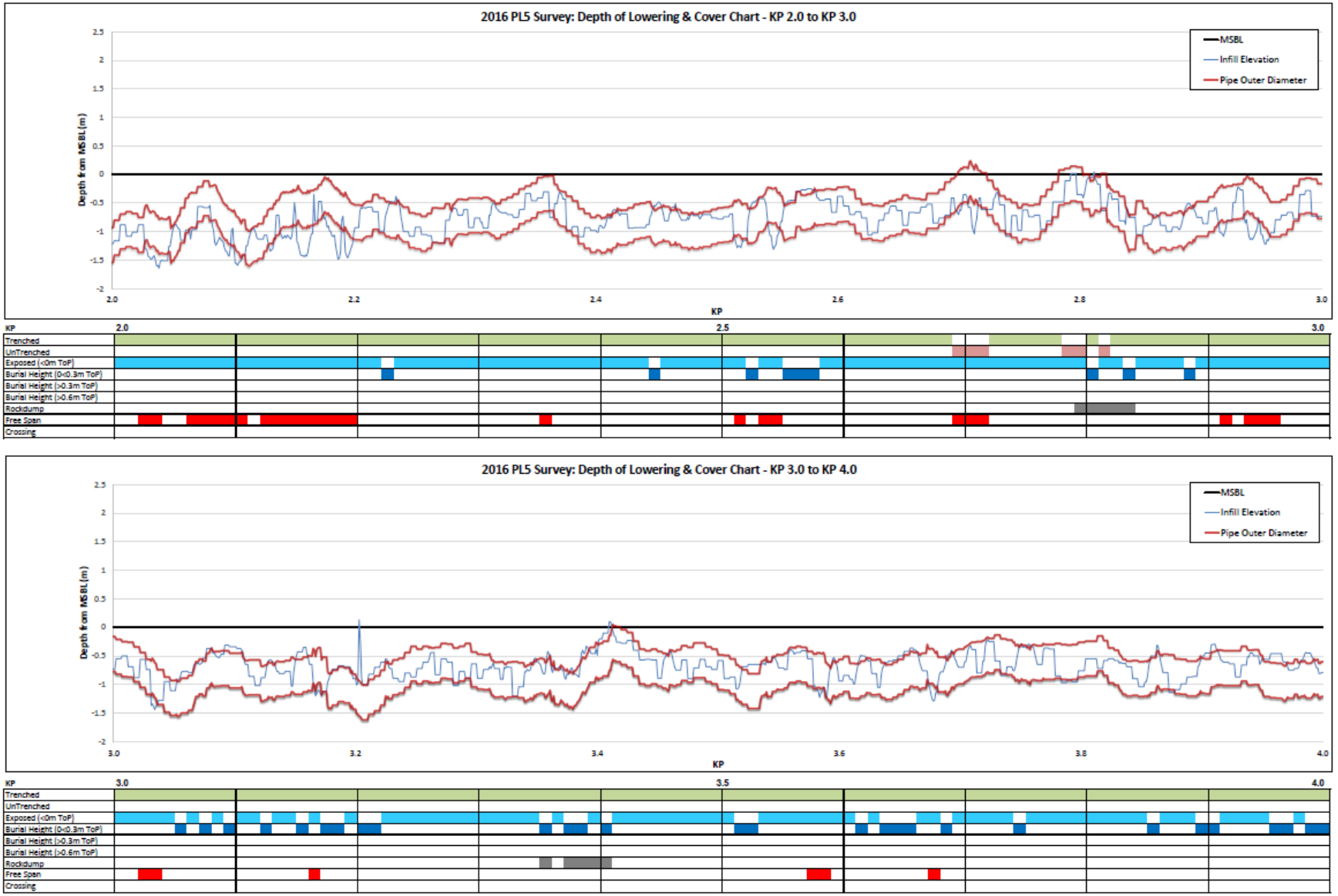


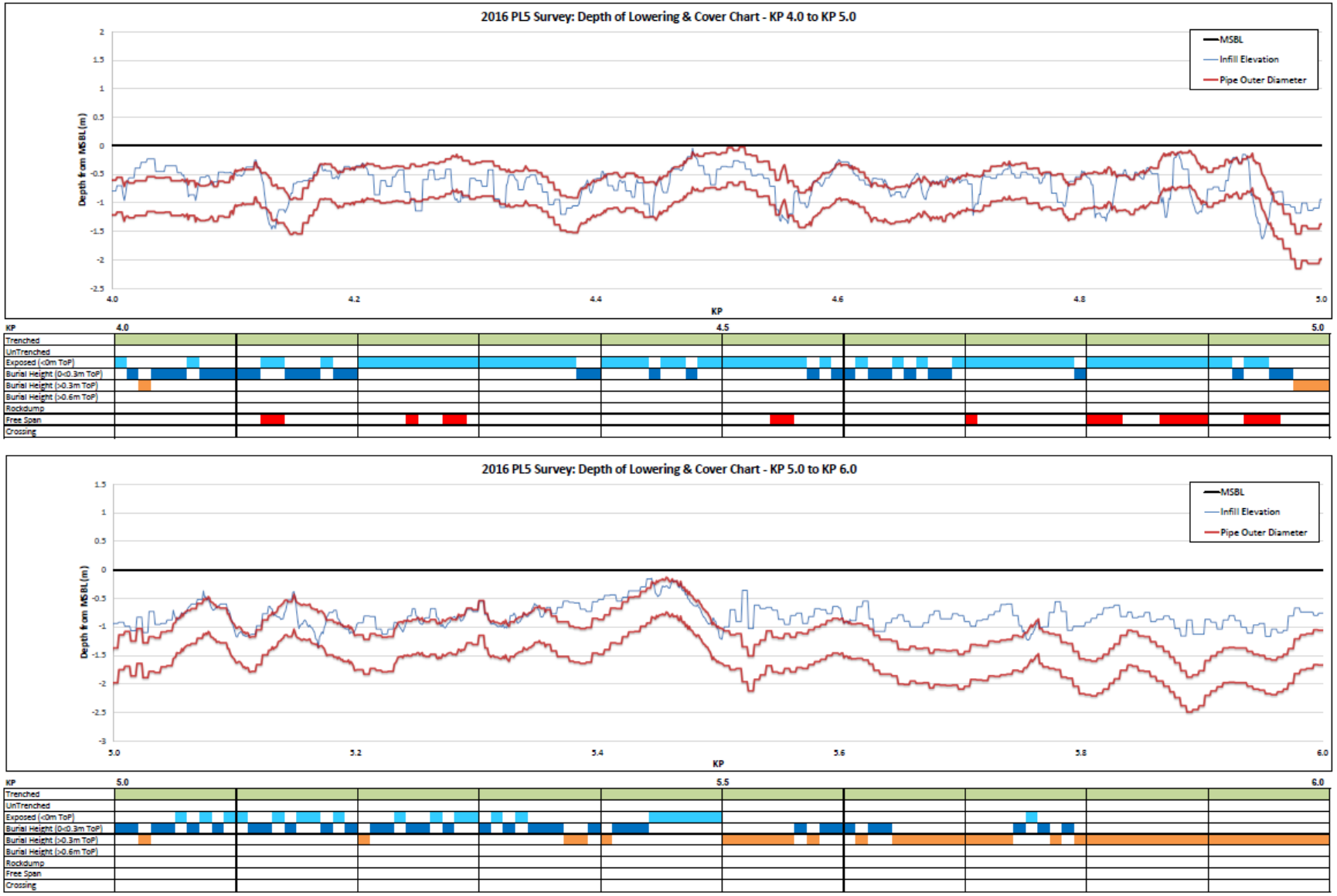

2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 0.0 to KP 1.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
0.0
0.2
0.4
0.6
0.8
1.0
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2

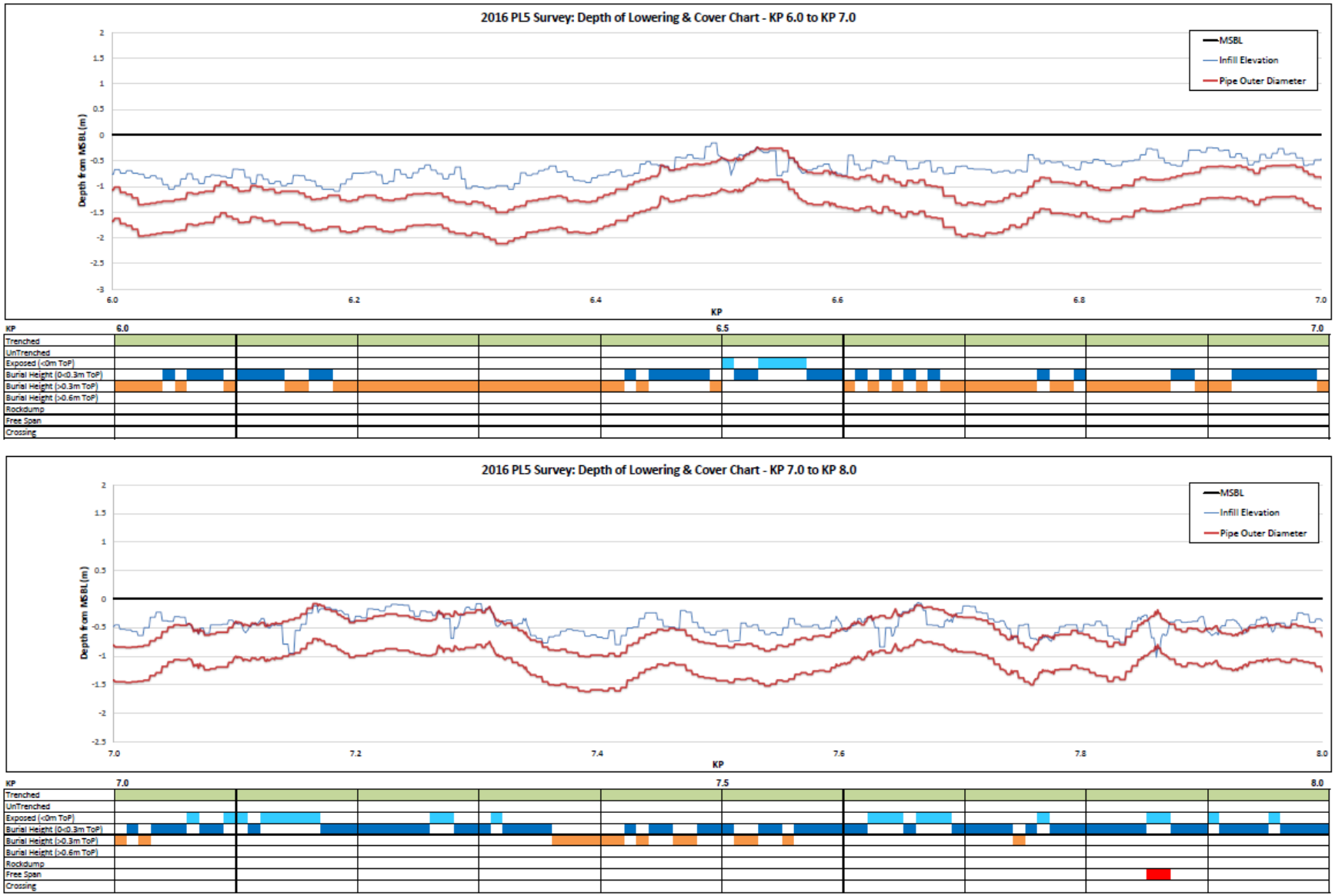

KP
0.0
0.5
1.0
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing

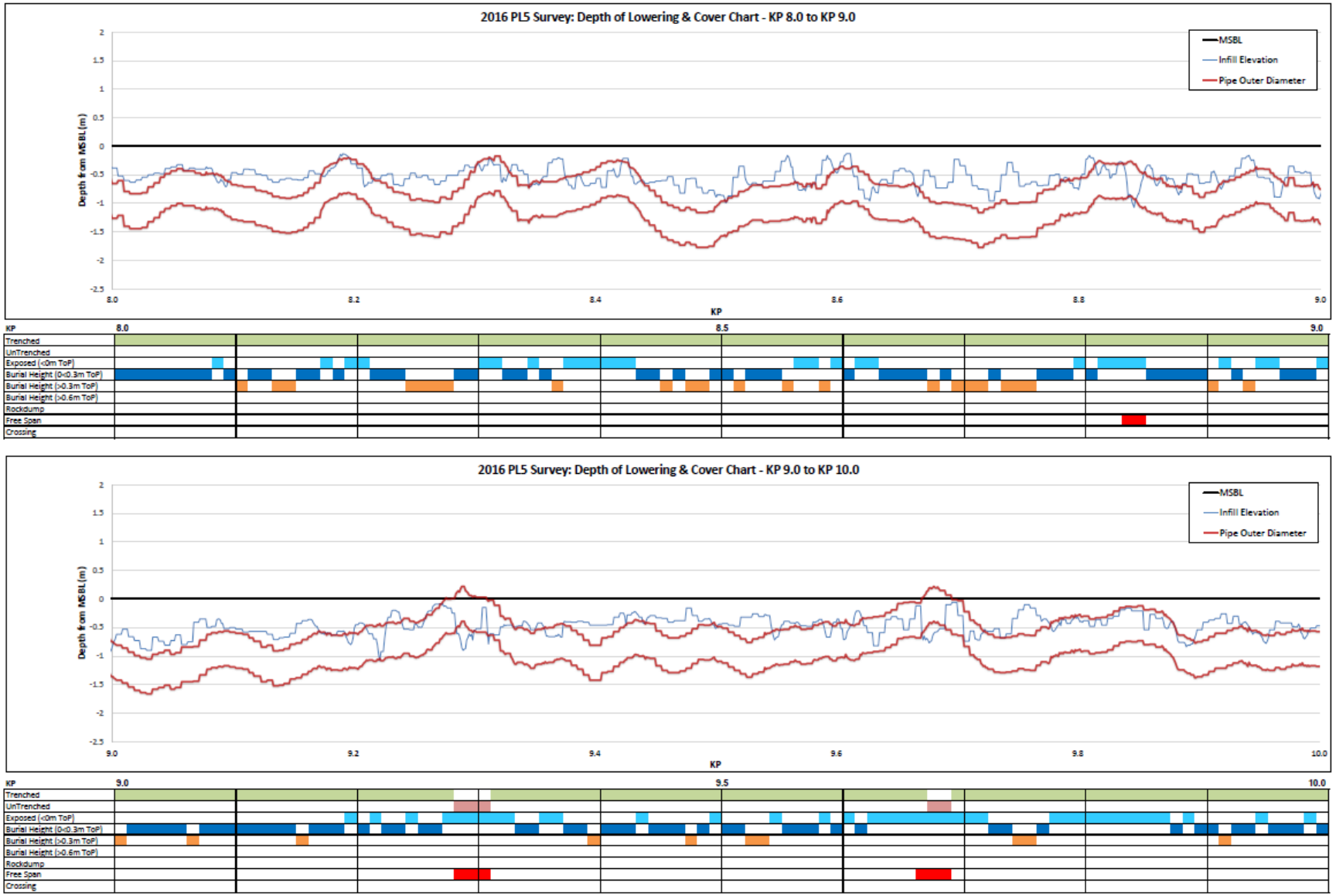

2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 1.0 to KP 2.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
1.0
1.2
1.4
1.6
1.8
2.0
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2

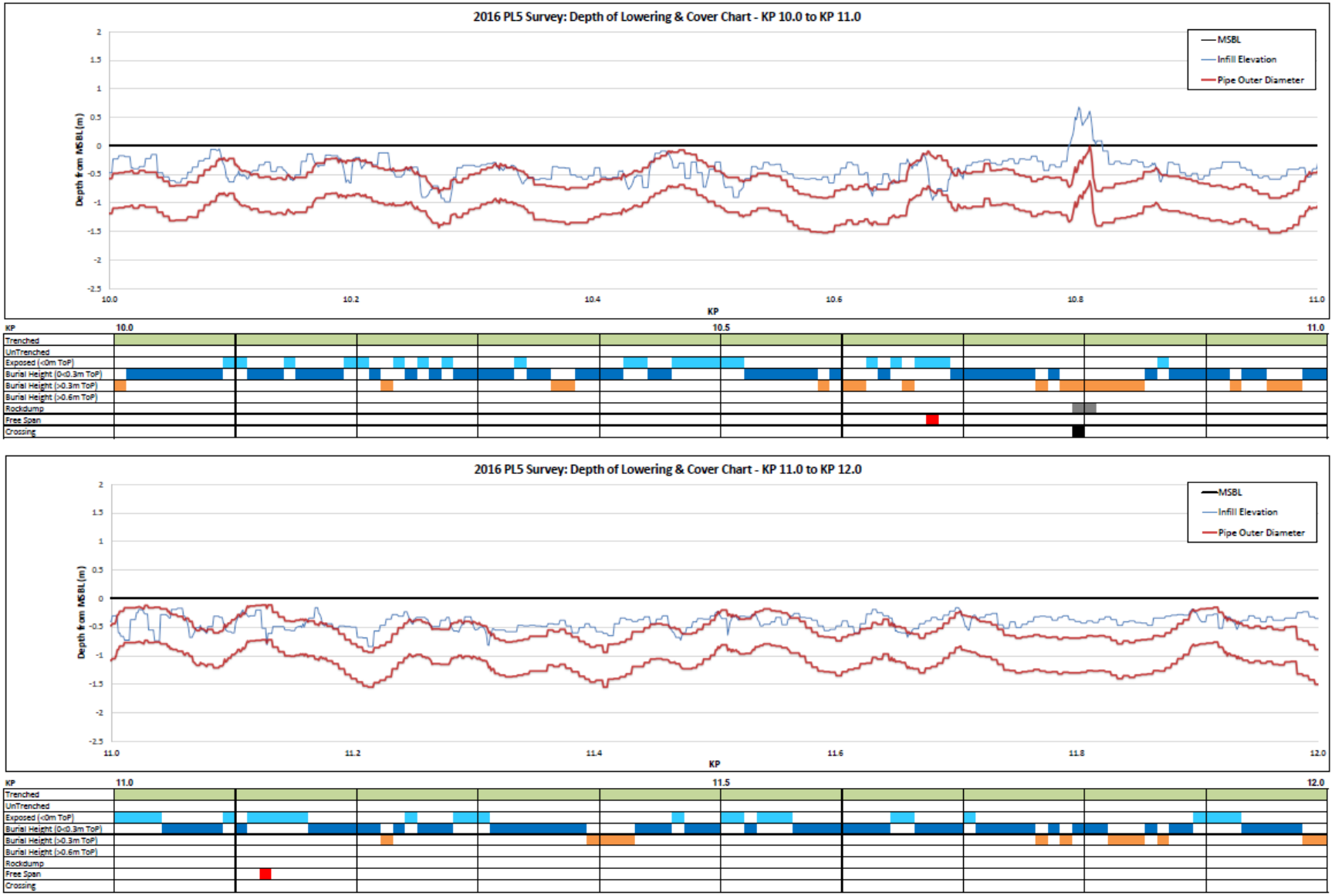

KP
1.0
1.5
2.0
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing

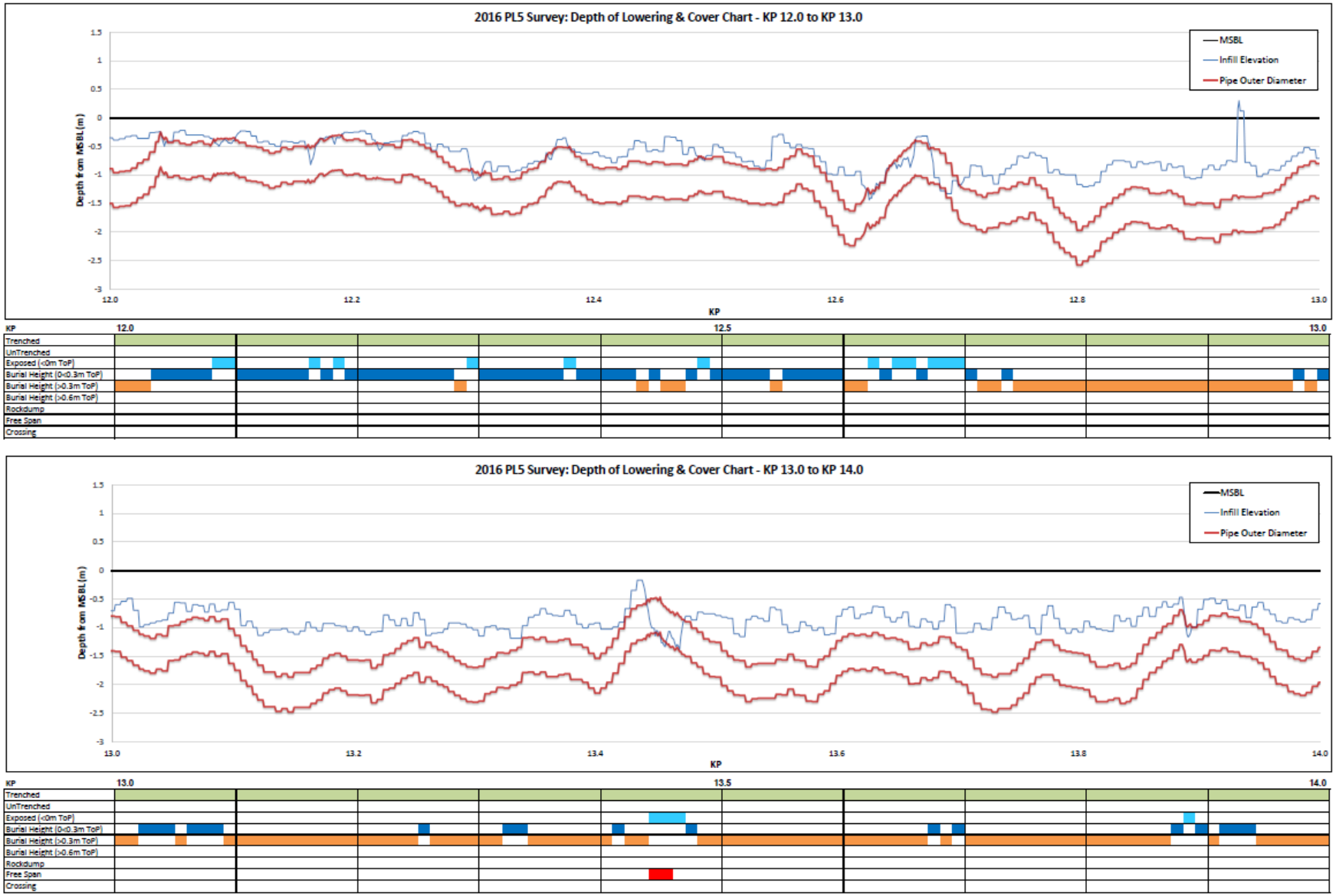

2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 2.0 to KP 3.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
2.0
2.2
2.4
2.6
2.8
3.0
2.5
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 3.0 to KP 4.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
3.0
3.2
3.4
3.6
3.8
4.0
3.5
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing

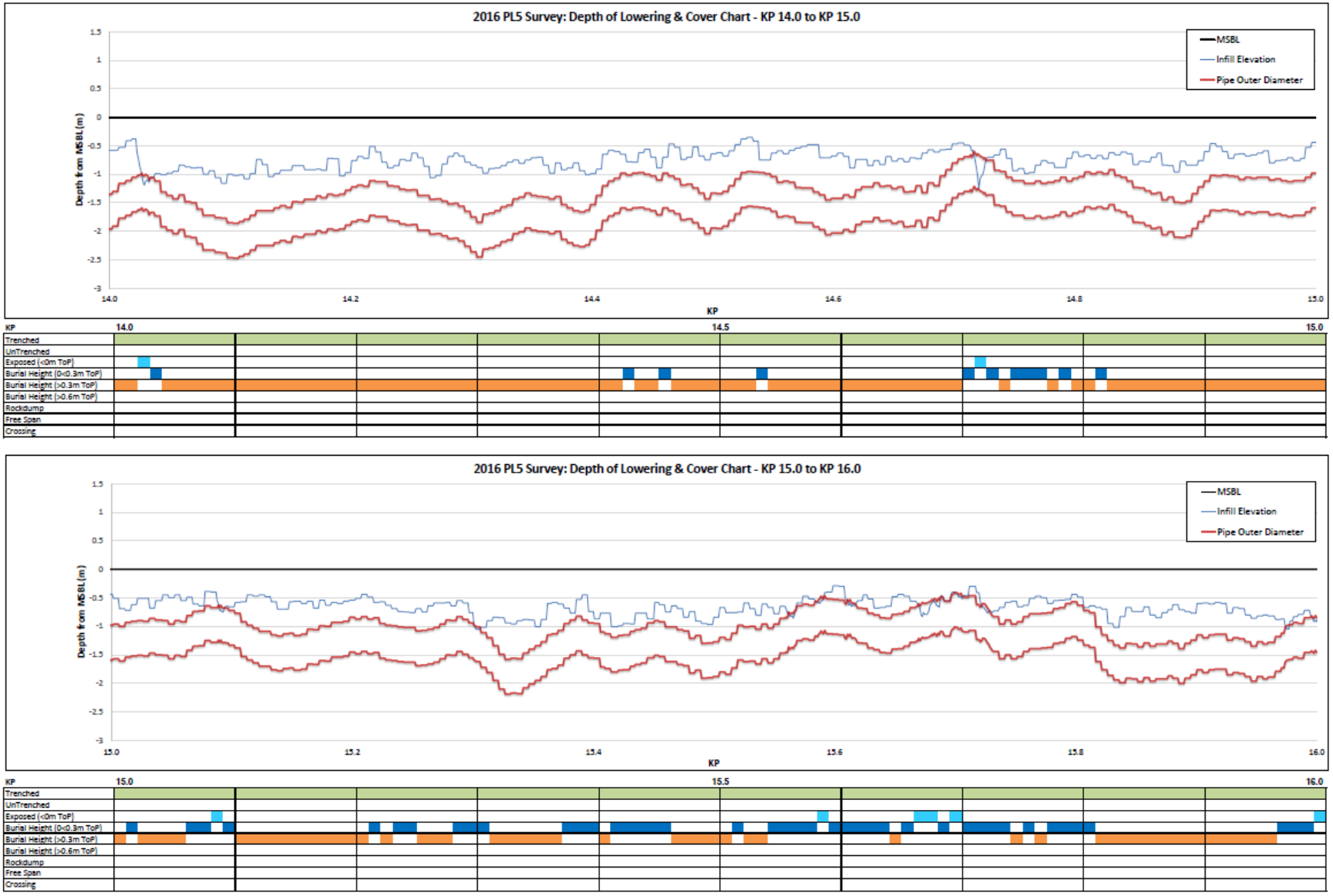

2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 4.0 to KP 5.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 5.0 to KP 6.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing

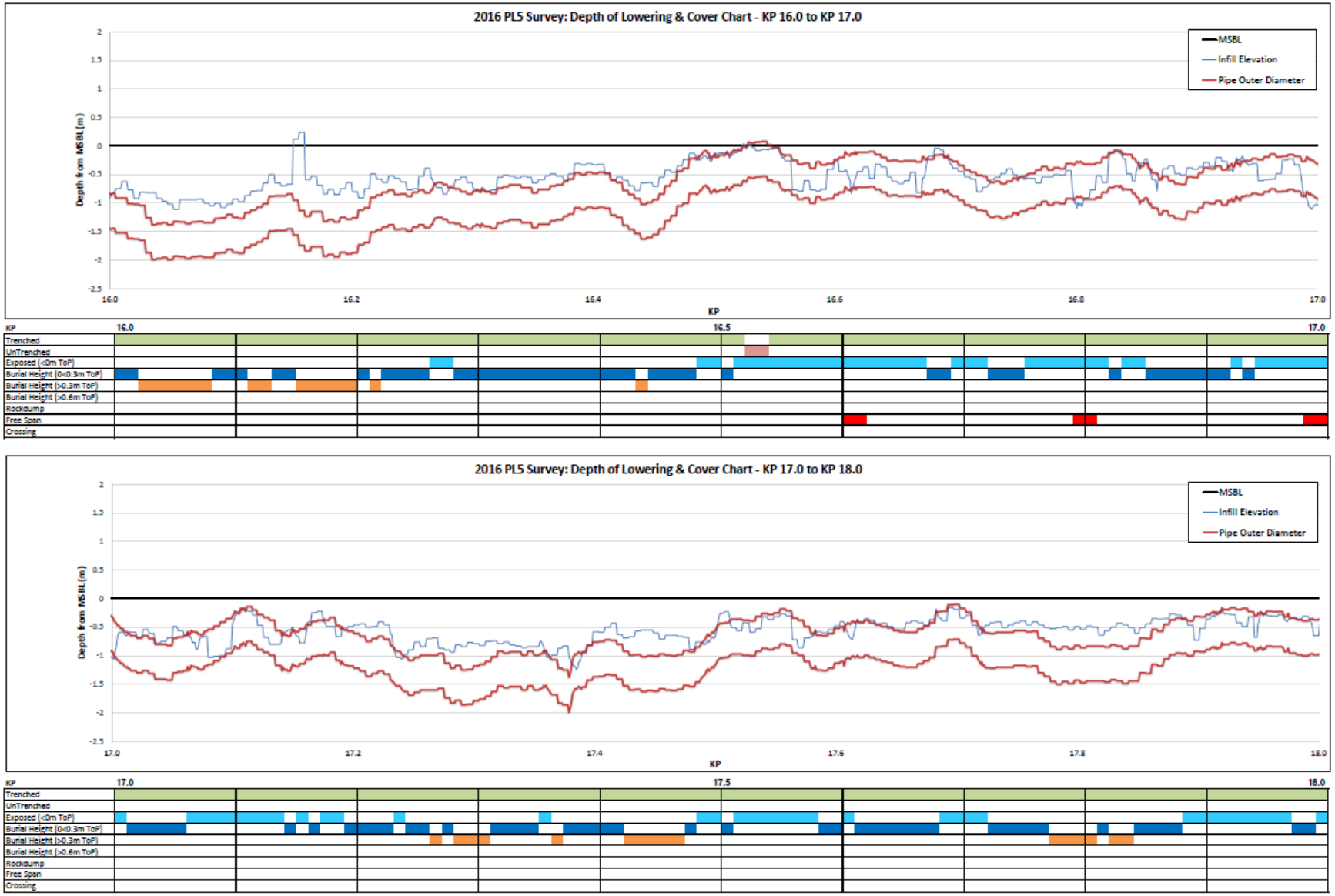

2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 6.0 to KP 7.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
6.0
6.2
6.4
6.6
6.8
7.0
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 7.0 to KP 8.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
7.0
7.2
7.4
7.6
7.8
8.0
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing

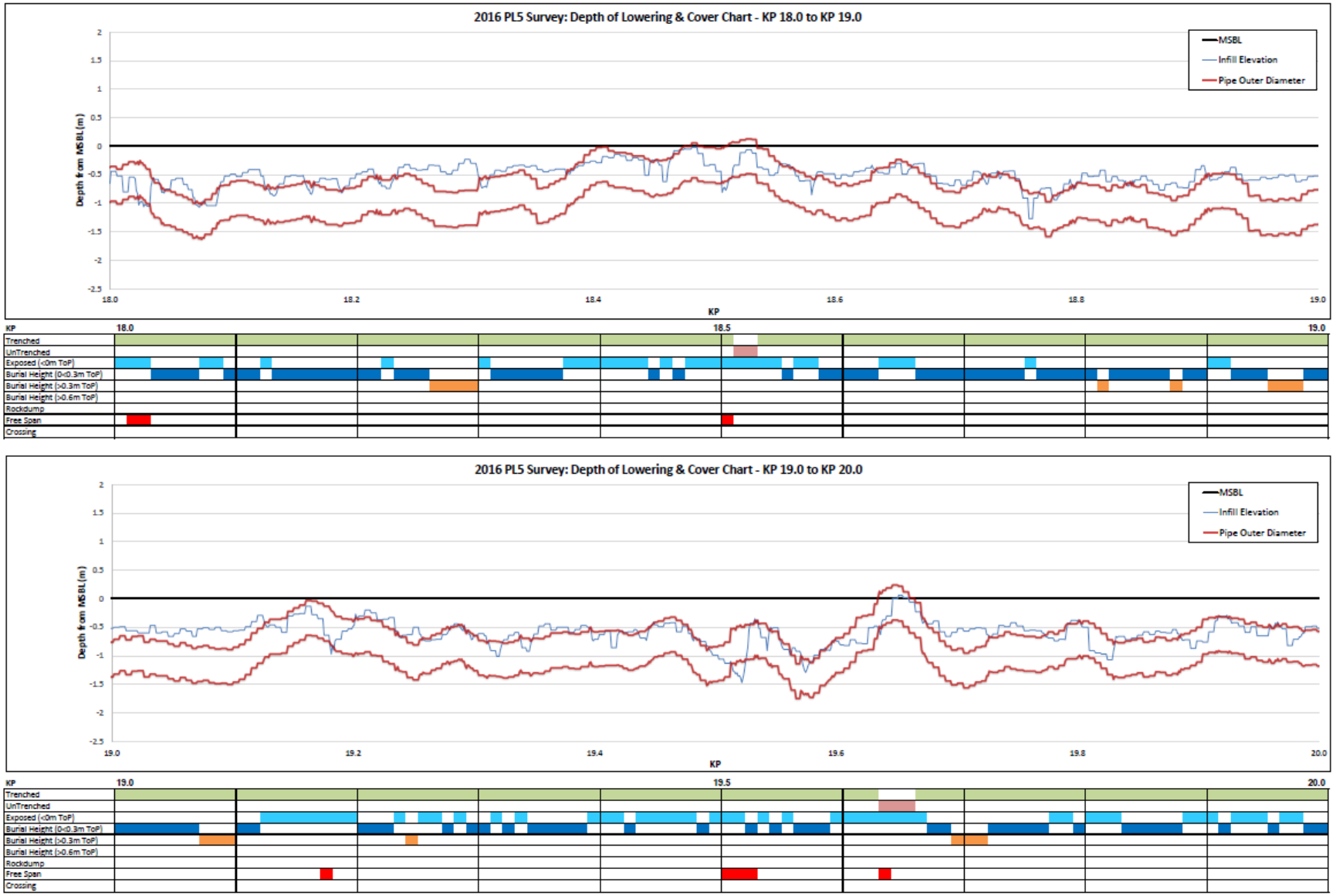

2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 8.0 to KP 9.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 9.0 to KP 10.0

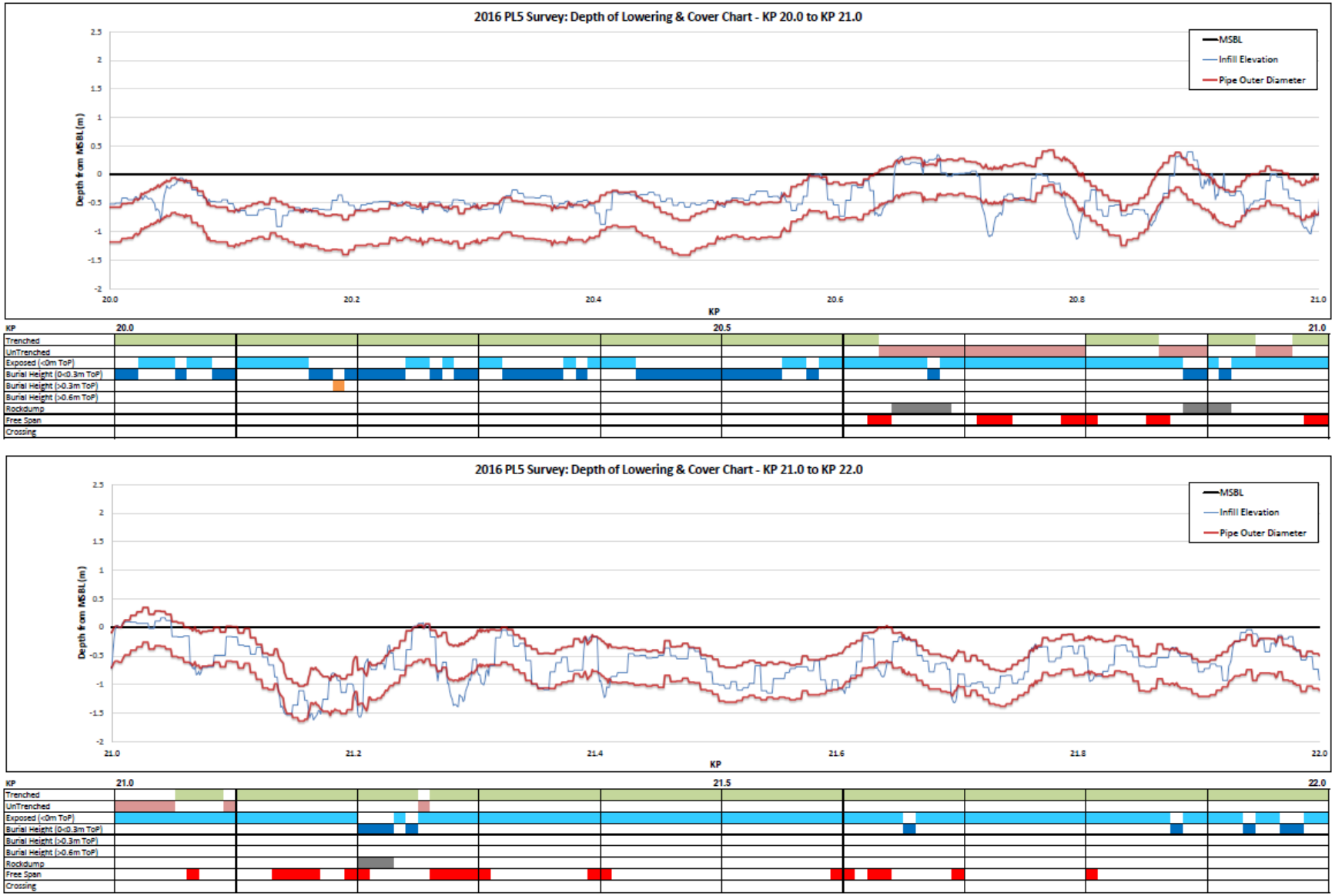

2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 10.0 to KP 11.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 11.0 to KP 12.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing

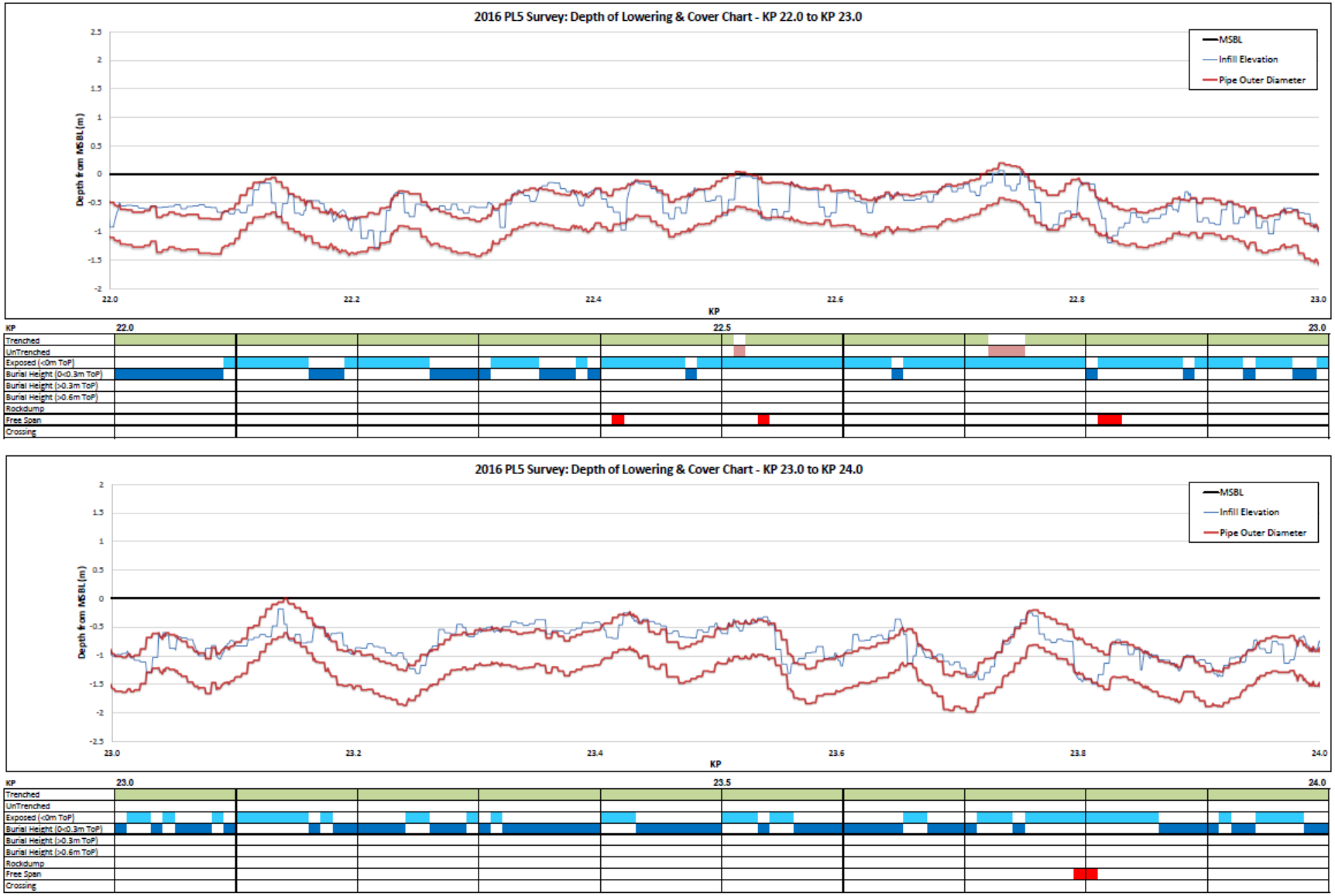

2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 12.0 to KP 13.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
12.0
12.2
12.4
12.6
12.8
13.0
12.5
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 13.0 to KP 14.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
13.0
13.2
13.4
13.6
13.8
14.0
13.5
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing

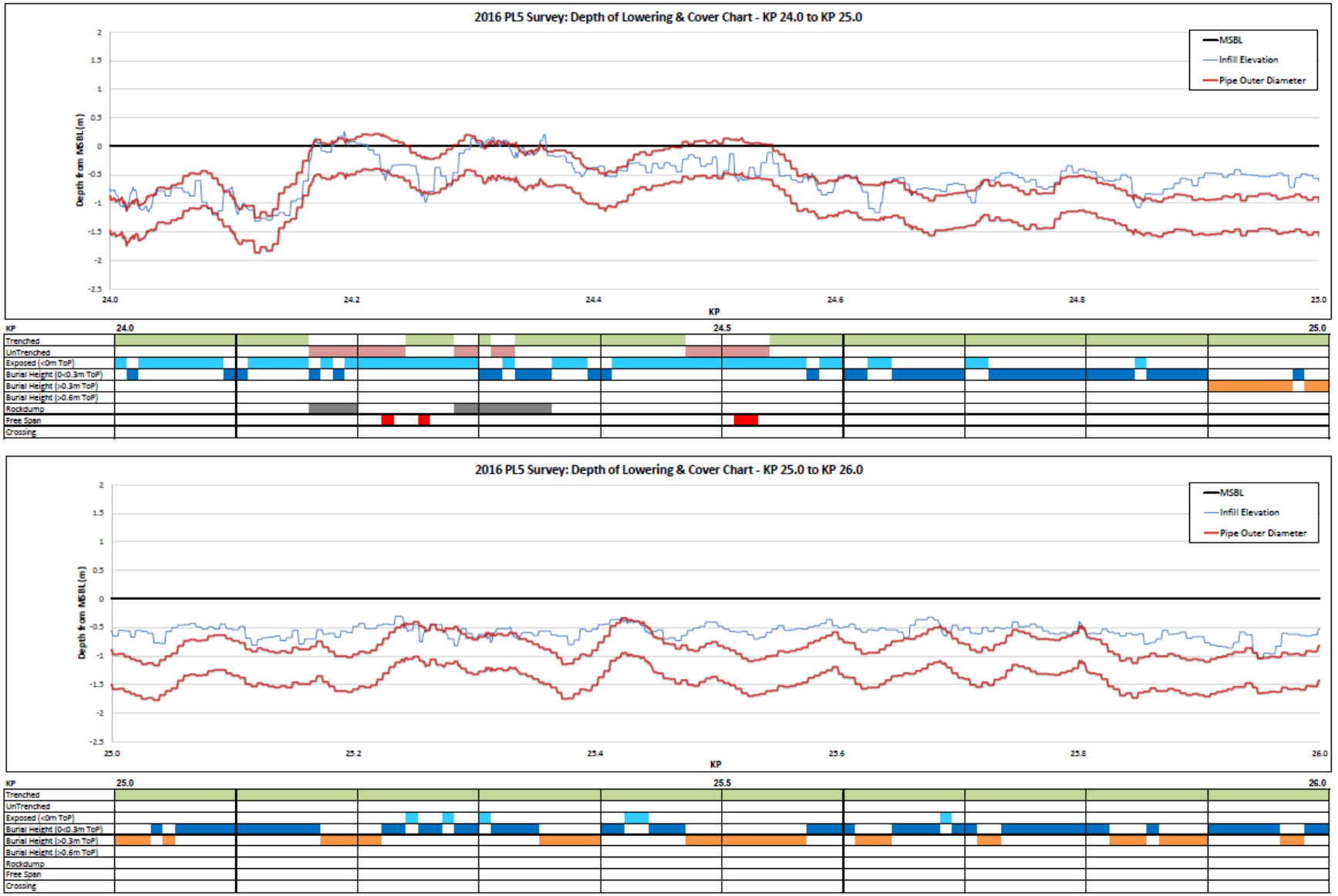

2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 14.0 to KP 15.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
14.0
14.2
14.4
14.6
14.8
15.0
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 15.0 to KP 16.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
15.0
15.2
15.4
15.6
15.8
16.0
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing

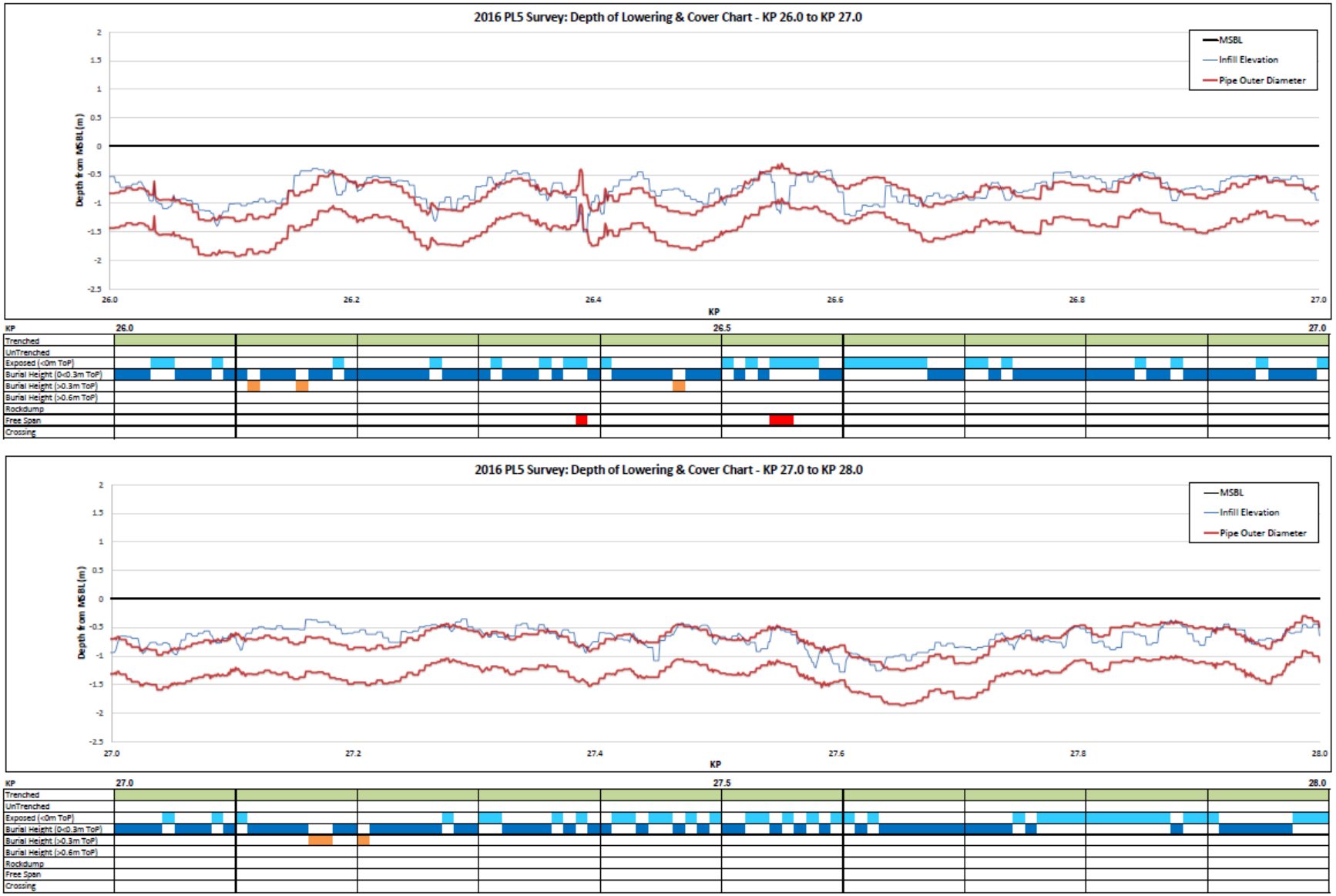

2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 16.0 to KP 17.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 17.0 to KP 18.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing

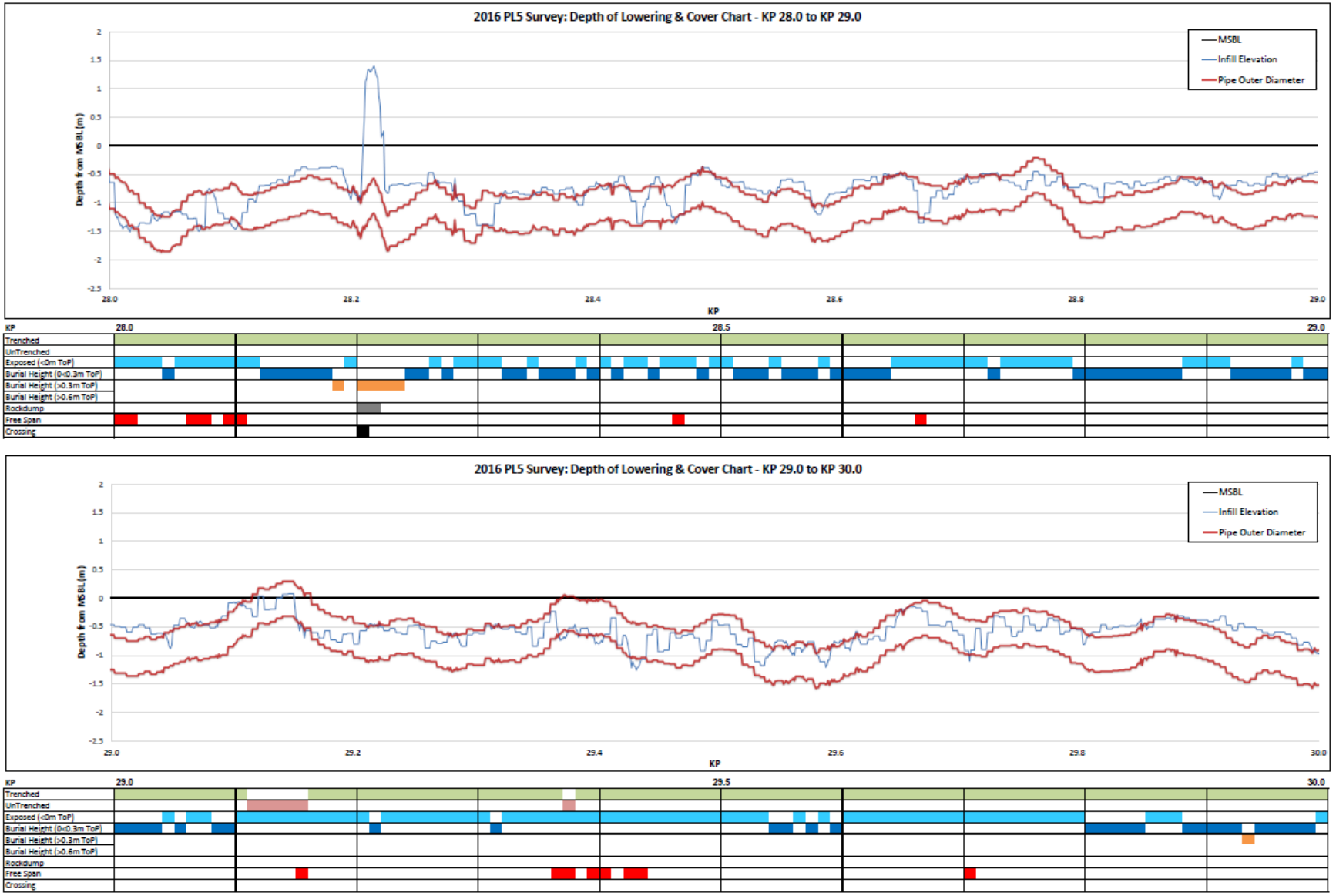

2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 18.0 to KP 19.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
18.0
18.2
18.4
18.6
18.8
19.0
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 19.0 to KP 20.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
19.0
19.2
19.4
19.6
19.8
20.0
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing

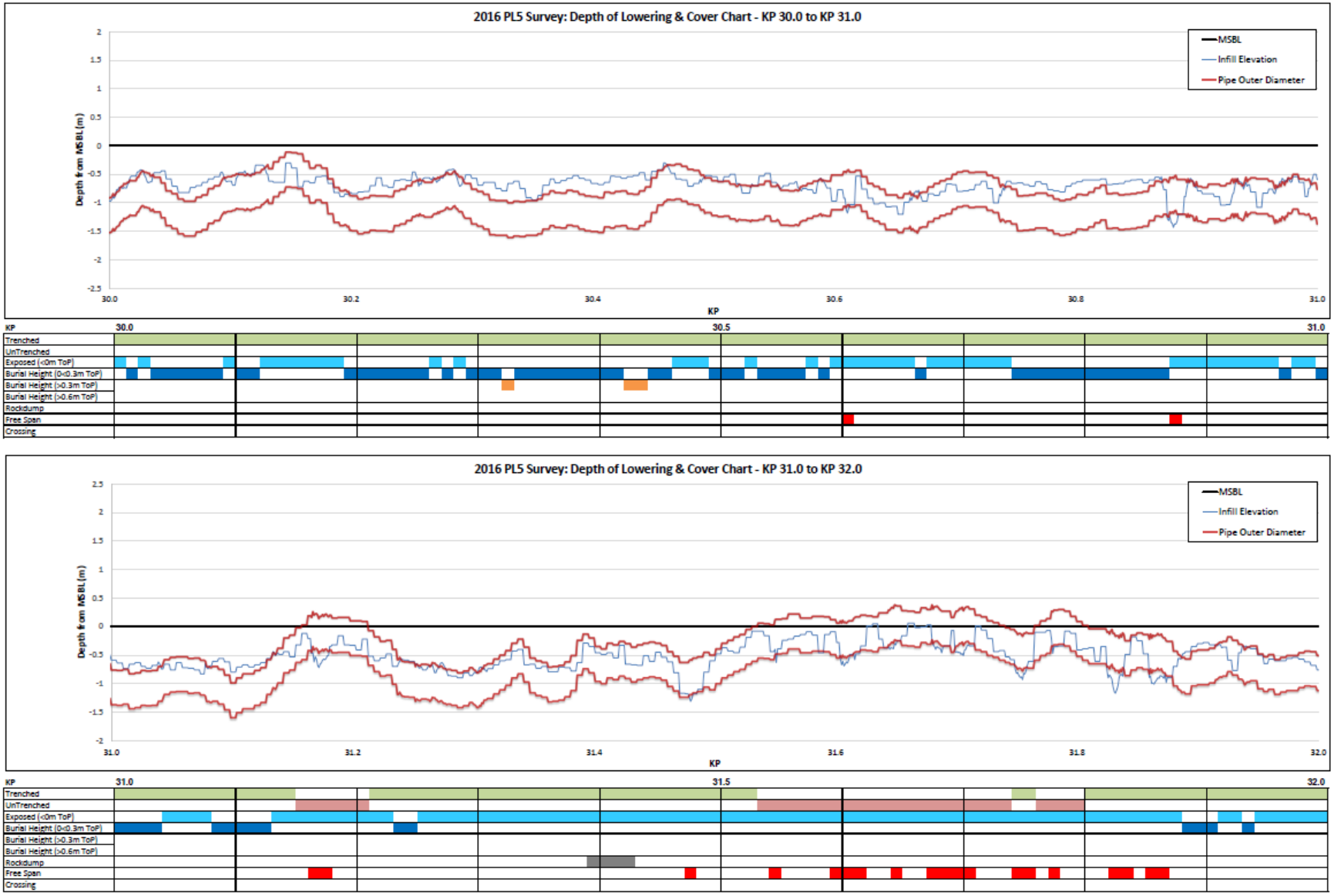

2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 20.0 to KP 21.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
20.0
20.2
20.4
20.6
20.8
21.0
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 21.0 to KP 22.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
21.0
21.2
21.4
21.6
21.8
22.0
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing

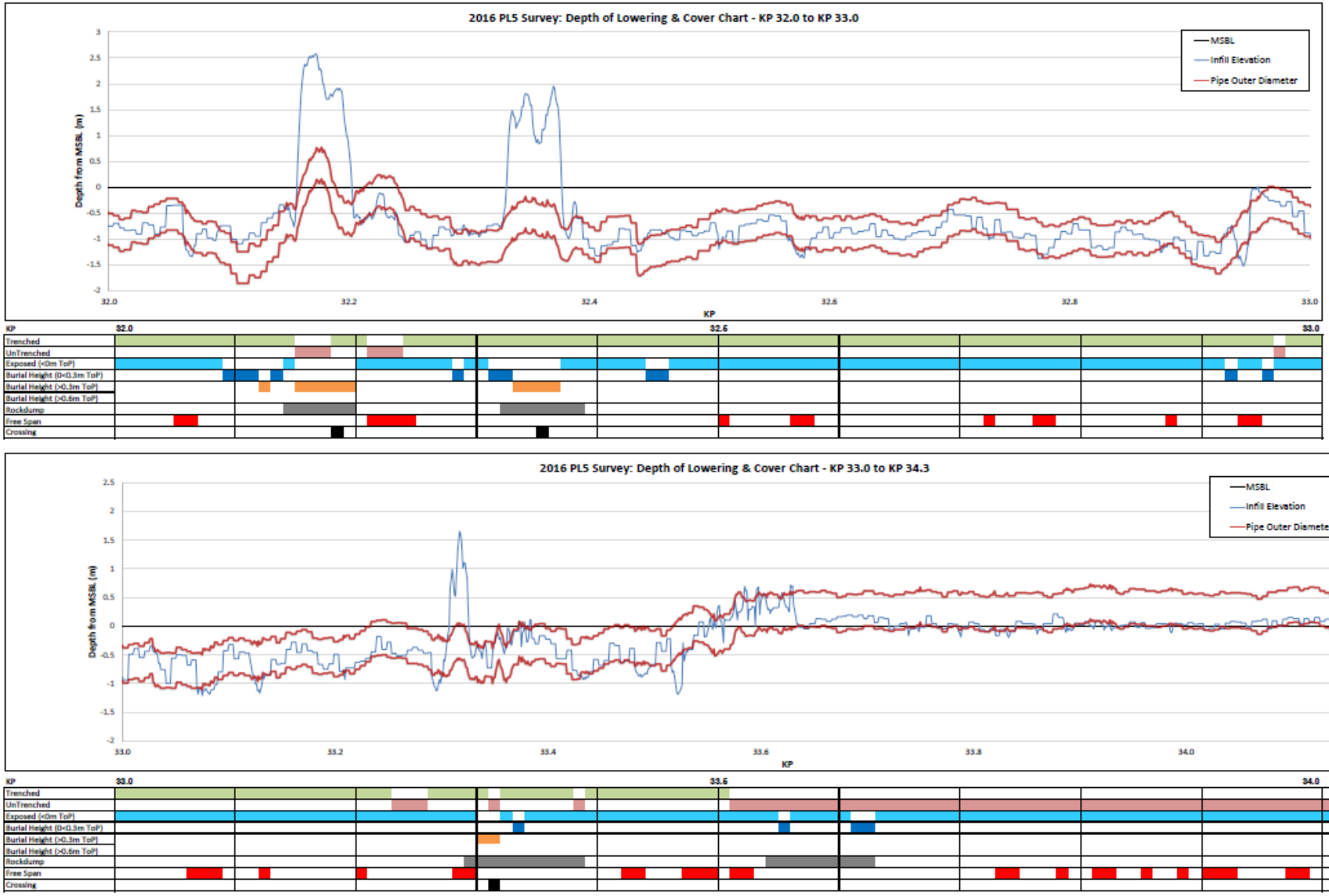

2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 22.0 to KP 23.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
22.0
22.2
22.4
22.6
22.8
23.0
22.5
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 23.0 to KP 24.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
23.0
23.2
23.4
23.6
23.8
24.0
23.5
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing


2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 24.0 to KP 25.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 25.0 to KP 26.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing


2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 26.0 to KP 27.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
26.0
26.2
26.4
26.6
26.8
27.0
26.5
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 27.0 to KP 28.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
27.0
27.2
27.4
27.6
27.8
28.0
27.5
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing


2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 28.0 to KP 29.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
28.0
28.2
28.4
28.6
28.8
29.0
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
28.5
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 29.0 to KP 30.0
29.0
29.2
29.4
29.6
29.8
30.0
29.5


2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 30.0 to KP 31.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
30.0
30.2
30.4
30.6
30.8
31.0
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 31.0 to KP 32.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
31.0
31.2
31.4
31.6
31.8
32.0
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing


2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 32.0 to KP 33.0
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing
2016 PL5 Survey: Depth of Lowering & Cover Chart - KP 33.0 to KP 34.3
MSBL
Infill Elevation
Pipe Outer Diameter
Depth from MSBL (m)
KP
Trenched
UnTrenched
Exposed (<0m ToP)
Burial Height (0<0.3m ToP)
Burial Height (>0.3m ToP)
Burial Height (>0.6m ToP)
Rockdump
Free Span
Crossing