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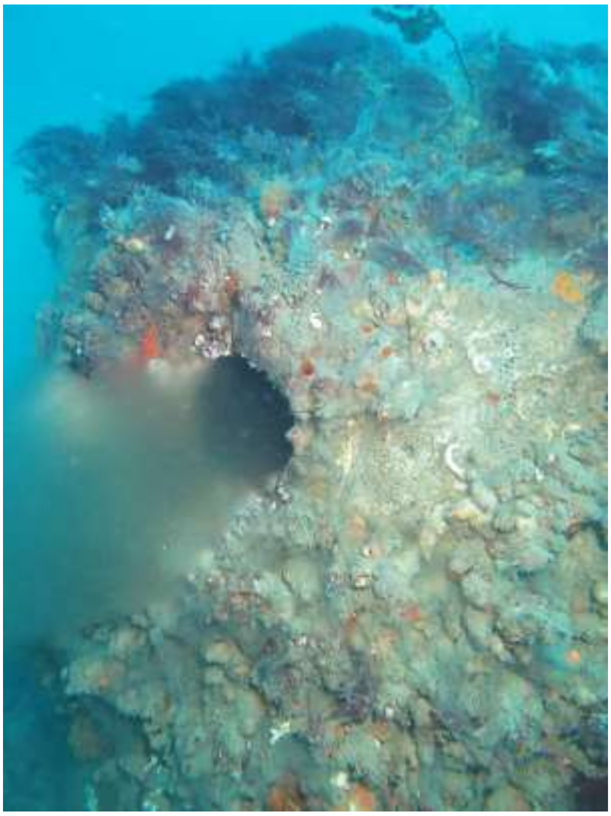

UNDERSEA VERIFICATION SURVEY

VEOLIA WATER
MOA POINT WASTEWATER OUTFALL PIPELINE – ANNUAL INSPECTION
March 2025

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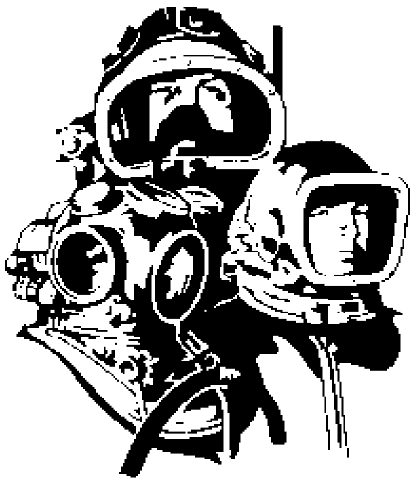

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1. PREFACE

Assets such as Outfall Pipelines and other Coastal Structures are typically subjected to harsh operational and environmental degradation; therefore, for these reasons they are particularly susceptible to numerous and considerable deteriorating processes. For Government Agencies, Facilities Management Companies, and other Stakeholder Parties to obtain the maximum working life and return on their initial investment from assets in marine environments it is important that they be maintained to an acceptable, operational efficient, and safe working standard.
Their life cycle management represents major planning and engineering efforts; therefore, to ensure the continuing operational functionality performance of their asset; programmed inspections and monitoring are crucial to verify that operational and structural integrity are maintained at an acceptable level.

When Coastal Pipeline Outfall Structures and their ancillary components come into service, it is hoped that they're free of all significant defects. This of course depends on the professional standards applied to quality assurance and quality control by the various Parties involved in design and planning; component fabrication; asset construction and installation.
To ensure a continuous working life for any asset, it is necessary to maintain an adequate Asset Integrity Management (AIM) programme. Such a programme must be capable of detecting potential problems at an early stage; thus, allowing the designers and engineers time to analyse the inspection information and suggest remedial action(s) if required.

Experience has shown that the vast majority of all faults; damage / defects / deterioration found in marine structures and their components, have been done so visually. Visual information is of utmost importance, in both programmed visual condition assessment inspections, and in general asset management.
Throughout the progression of these inspections, qualified personnel observe and record data on numerous components in varying condition states.
The consequences of failure to what initially may only be a minor fault; especially sudden failure, can be catastrophic and very expensive, both in terms of repairs; lost business; and risks to health, safety and the environment.
Programmed condition assessment inspections and monitoring, along with asset audits; and subsequent service maintenance and repairs, are completed to ensure the continued operational integrity and functional efficiency of structures are maintained throughout their life. Providing the Asset Owner, and all Stakeholder Parties with an assurance of reliability in the integrity of the structure.

Condition assessment is an important step in the life cycle management process of Structural Assets; particularly those in marine and hazardous environments.
One of UCL's major specialties of work and experience is in the inspections, condition assessment and reporting on numerous inshore coastal, offshore, and underwater structural assets throughout New Zealand and Internationally. It's a facet of work the Company derive immense satisfaction from: being able to detect potential problems at an early stage, then working in partnership with Clients towards achieving common goals and economic solutions. Thus, minimising risk and therefore maintaining the Clients valuable asset in safe and efficient operational condition – "fitness-for-service".

2. ASSET INTEGRITY MANAGEMENT (AIM)

Introduction

Asset Integrity Management (AIM) is the process of ensuring a Structural Asset's fitness-for-service over its entire life; from conceptual engineering (design) to potential life extension.
It is a process for managing the effects of deterioration, changes in loading, accidental damage, and responses to component failure.
The objectives of an AIM process include detection of possible degradation or failure of a component at a sufficiently early stage to allow for remedial action. The integrity management process also provides a record of inspection, maintenance, and service data; all of which that will be required when considering future life extension.

The key components of AIM are illustrated in Figure 1: where the AIM process starts as early as the conceptual engineering phase and continues all the way to a potential life extension.

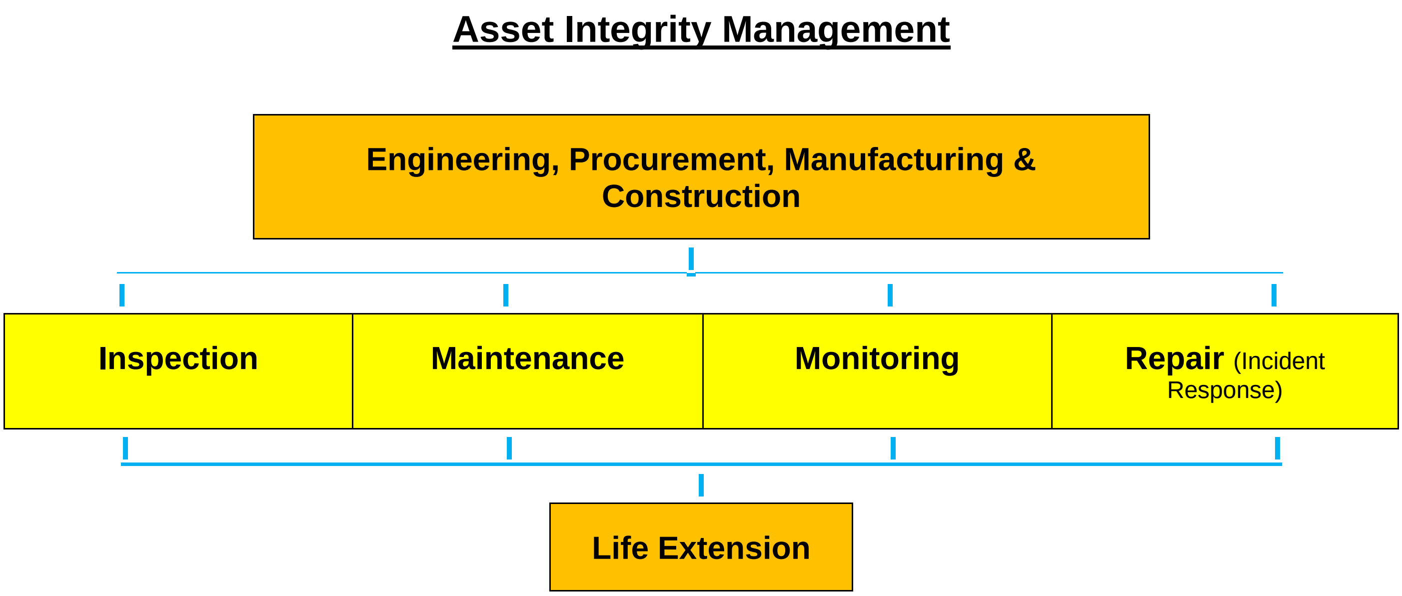

Figure 1: Components of Asset Integrity Management

Managing Asset Integrity Performance

The integrity management process provides the opportunity for Asset Owners and their Engineers to adopt risk-based principles for developing strategies that take into account the current condition of the structure, the likelihood of damage or degradation of an integral component, and the potential consequences.
A risk-based approach recognises that structures with higher risks can warrant more frequent and more focused inspection than structures with lower risks (i.e. aging structures verses recent constructions). During the development of an inspection strategy, the structure's risk category can be used for determining inspection intervals and work scopes.

The inspection work scope should take into account the latest lessons learned from other similar structures; changes in the design environmental conditions and their subsequent impacts; local anomolies; and the documented experiences of other Asset Owners with similar designed structures and service requirements.

Asset Integrity Management combine the processes of periodic inspection and testing, and the assessment and interpretation of the resultant data to provide an indication of the current condition of a specific asset, as to, the determination of the requirement for remedial action.
Asset condition assessments determine the current physical state of an asset that may affect the performance of the asset and the ability of the asset to provide the required level of service.

The benefits of knowing the current condition of an asset are:

- The ability to plan and manage the delivery of the required level of service to the asset.
- Avoiding premature asset failure by providing the option of cost-effective remediation.
- Providing an accurate estimate of future expenditure that is required.
- Determination and refinement of maintenance and rehabilitation strategies.

Asset maintenance to be undertaken over the balance of a marine structures service life is a major challenge to provide reliable and sustainable operation. Operating ageing structures efficiently and safely requires an asset maintenance cycle that includes; inspection diagnosis, evaluation and implementation of remediation processes.
It is a critical part of asset management to determine the remaining lifecycle of an asset and the capability of the asset to meet the designed performance and level of service requirements.

Being unaware of the current condition of an asset may lead to the premature failure of the asset; leaving limited options to the Asset Owner: with replacement being the most expensive option. Unforeseen failure of an asset provides major consequences that constitute a risk to business operations or potential loss to the Asset Owner. The benefits of knowing the current condition of an asset are; the ability to plan and manage the delivery of the required level of service to the asset; avoiding premature asset failure by providing the option of cost-effective remediation; providing an accurate estimate of future expenditure that is required; and the determination and refinement of maintenance and rehabilitation strategies.

Often there is limited information and drawings on original design; with drawings and construction and installation records often being partial and without update detail to manage “as built” changes.
Baseline data along with periodic asset condition assessment inspection plays a critical role in asset management for Owners and Stakeholders; as good inspection practices prevent failure incidents caused by the poor condition of structural components. Good record-keeping of inspections, monitoring, and repairs and maintenance are intended to function as the cornerstones for asset maintenance strategies; in which components of the structure are prioritised, aligned with their degree of deterioration and loss of function.

Assessment of damaged or deteriorated marine structures should only be made by qualified and experienced people specialising in this field of work; and the process should always include the aspects of the condition of the structure including all visible, non-visible and potential damage and defects, a review of the past, current and future operational functionality and service requirements.

An understanding of marine structures is critical in being able to provide comprehensive reporting on all aspects of the Asset Integrity Envelope. Prior to diagnosing the causes of defects or failure within a structure it is important to understand that defects result from several factors: design; construction and installation practices; materials; the environment; stress and loading applied to the structures components.
Structural failure can be defined as the inability of a structure to serve its intended function with the desired levels of safety and serviceability.

Remediation / rehabilitation of structures
Over the past few decades, the desire of extending the useful service life of structures has become of paramount significance. Where ageing structures are a serious problem faced by countries across the world; premature deterioration has also emerged as a major problem that results in reduced service life of structural assets.

Failure of a structure or component of a structure may be attributed to a number of independent or interrelated factors.
In marine environments a structures components are constantly subjected to multiple fatigue and risk factors that result in deterioration over the course of their service lives.
Asset Condition Assessment gathered information assists with the determination of the remaining service life of an asset, and the scheduling of remediation requirements that are needed to reinstate the level of service that is provided by the asset to meet the desired standard.

With most damaged or deteriorated marine structures, Asset Owners have a number of options which will effectively decide the appropriate remediation strategy that will meet the future service requirements of the structure. These options will include doing nothing; downgrading the capacity or functional operation of the structure; preventing or reducing further damage without repair; improving, strengthening or refurbishing the structure; reconstructing all or part of the structure; or demolishing the structure.

Proper remediation methodology begins with inspection and testing to identify the type and extent of defects and degradation mechanisms; and the overall condition and quality of the structure. Remediation projects are prone to increasing in volume and costs once work has commenced – investing in comprehensive and accurate Asset Condition Assessments before remediation begins has proven cost effective in the long term.

3. 'AIM' SUMMARY

Structural assets exposed to the marine environment are subjected to considerable deteriorating processes. Of course, engineers take this into account when designing the various components that are used to construct marine assets; however local anomalies do occur and some detailed aspects of potential problems are often imperfectly understood.

All marine structures warrant careful monitoring on safety and engineering grounds. This indicates a need for documentation for marine assets; and the importance of these records should not be underestimated. The average working life of structures designed for marine environments is predicted to be between 15 – 50 years. During that life cycle, it would be reasonable to assume that defects of one type or another will occur. It therefore makes good sense, for both operational safety; engineering and economic reasons for any such defects / damage / deterioration to be dealt with on a planned basis: 'AIM'.

4. GENERAL, OVERVIEW & POSITIONAL DATA

General

The Moa Point Ocean Outfall Pipeline is approximately 1858m in length; from position 'A' at the roadside southern embankment inspection chamber, then traversing in a southerly direction through Lyall Bay to the pipeline's southernmost diffuser (position 'F') in a water depth of approximately 23 metres and a GPS position of 41° 21.119' S 174° 48.080' E.

Wellington City Council holds Resource Consent WGN080003 (26180) to discharge treated wastewater from the Moa Point Wastewater Treatment Plant into Lyall Bay via the 1.8km offshore outfall pipeline.

Following correspondence between Tobias La Riviere and Rik Lawlor (Veolia), and Wayne Angus (Undersea Construction Ltd.), in respect to carrying out underwater condition assessment inspections of the Moa Point Wastewater Outfall Pipeline; a Scope of Works was agreed to; as to, approval from Veolia to proceed with the work: Ref: Veolia P.O. 7300433897.

Following completion of the onsite works/inspection survey investigations, all resultant data is processed and compiled into a QMS Report for issue to the Client.

Overview

The emphasis of the inspections being to complete a thorough assessment as per the Scope of Work; with reporting being separated into the following items:

- Exposed Inshore Pipeline Section & Seabed,
- Buried Pipeline Outfall Route & Seabed,
- Offshore Diffuser Section – General Survey,
- Diffuser Section Cathodic Potential Survey.

Report prepared for:
Tobias La Riviere; Compliance and H&S Support Officer, &
Rik Lawlor;
Moa Point WWTP
Veolia Australia & NZ (Client)

Survey Inspection Investigations and Report completed by:
Wayne Angus, Civil Engineer / Construction Diver
Undersea Construction Ltd. (UCL) Marine Civil Works Engineering & Diving Contractor

Following completion of a Health & Safety Plan, Safe Work Method Statement (SWMS) and regulatory compliance documentation; UCL staff engaged in a brief 'toolbox' discussion on the survey scope and objectives, followed by staff completing the onsite underwater survey inspection activities as per the 'Scope' for the Moa Point Wastewater Ocean Outfall Pipeline and Seabed 2025 Survey.

Pipeline Positional Data (as illustrated in Figure 2 Labelling)

MOA POINT WASTEWATER OUTFALL PIPELINE Geographic Positioning Data – 2025			
Position	**Designation / Description**	**UTM 60G**	**dd° mm.mmm'**
A	On shore manhole access to buried pipeline	316670 x – east 5421594 y – north	41° 20.178' S 174° 48.542' E
B	Mean High Water (MHW)	316652 x – east 5421545 y – north	41° 20.204' S 174° 48.528' E
C	Exposed pipeline – shallow water section – shoreward end	316636 x – east 5421517 y - north	41° 20.219' S 174° 48.516' E
D	Exposed pipeline – shallow water section – seaward end	316598 x – east 5421434 y - north	41° 20.263' S 174° 48.487' E
E	Shoreward end of pipeline diffuser section	316100 x – east 5419923 y - north	41° 21.073' S 174° 48.103' E
F	Seaward end (southern-most) of pipeline diffuser section	316070 x – east 5419836 y - north	41° 21.119' S 174° 48.080' E

Table 1: Geographic Positioning Data

Distance between points – (in metres)						
Reference	**A**	**B**	**C**	**D**	**E**	**F**
A	00.0	52.0	84.2	175.0	1765.0	1858.0
B	52.0	00.0	32.2	123.0	1713.0	1805.0
C	84.2	32.2	00.0	91.3	1682.0	1774.0
D	175.0	123.0	91.3	00.0	1591.0	1683.0
E	1765.0	1713.0	1682.0	1591.0	00.0	92.1
F	1858.0	1805.0	1774.0	1683.0	92.1	00.0

Table 2: Distances between 'label' designated positions

Figure 2: Moa Point Wastewater Outfall Pipeline – route through Lyall Bay

5. SCOPE OF WORK

- Formulate a survey inspection activity plan.
- Submit Worksafe NZ Notification of Work (Diving – Notifiable work).
- Produce a task orientated Health & Safety Plan, Safe Work Method Statement (SWMS) & Emergency Plan.
- Task assessments, hazard analysis, & a site-specific risk assessment.
- Specialised equipment preparation & calibration.
- Visual survey inspection of pipeline components:
  a) inshore exposed pipeline section; 2.5 – 8.0 metre water depth (positions 'C – D'),
  b) buried pipeline route from diffuser # 18 (position 'E') on a heading back to position 'D',
  c) outfall diffuser section from southernmost diffuser # 1 (position 'F') to diffuser # 18 (position 'E').
  d) Cathodic Potential monitoring at diffuser test point & outlet nozzles.
- Dimensional measure of scour:
  a) at inshore exposed pipeline section (positions 'C – D'). With reference to existing markers, set at 10 metre increments along the length of exposed pipe to establish repetitive monitoring reference at fixed positions,
  update CAD drawing for 2025 reference & reporting purposes,
  b) at offshore diffuser section.
- Photograph items of interest.
- Monitor inshore exposed pipeline section, & compare data against historic values.
- Log all observations; defect / damage / deterioration etc., & assessment of general condition.
- Process recorded data, compile & submit a report covering all inspection results and observations.

Methodology / Procedure

Operating on both standard SCUBA, light-weight contaminated water equipment (Divator positive pressure masks), and using a breathing gas mixture of Nitrox 40 (40% O^2 / 60% N^2); divers working from a dive support vessel descended a down-line to the seafloor adjacent the southern-most diffuser, then inspected pipeline components as per the programmed Scope of Work: firstly the outfall diffuser section from southern-most diffuser # 1 (position 'F') to diffuser # 18 (position 'E'), completing visual survey of the diffusers and surrounding seabed, checking Cathodic Potential values, and elevation (scour depth) measurements of the diffusers – seafloor to top of diffuser casings.

Followed with a diver using a DPV to travel the buried pipeline route from diffuser # 18 (position 'E') on a heading of 18° East of True North until reaching position 'D', the Shallow Water exposed pipe section.

Then, diving from the shoreline, inspecting the Shallow Water exposed pipeline section 3.0 – 8.0 metre water depth (positions 'C – D').

Divers completed the tasks as detailed within the scope of work: carrying out specific investigations, while also observing for any evidence of abnormal or aggressive wear, defect, damage, or deterioration, then logging all details accordingly.

Refer to relevant section of Report for further details.

UNDERSEA CONSTRUCTION LTD.

SUBSEA ENGINEERING, MARINE CIVIL, OFFSHORE MOORINGS, & COMMERCIAL DIVING SPECIALISTS.

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P. O. BOX 31081,
LOWER HUTT 5040
NEW ZEALAND.

DAILY RECORD OF INSPECTION OR NDT

DATES OF DIVES: 19th & 27th March 2025
INSPECTION PERSONNEL: Scott McChesney, Jacques Angus, Rian Kriel, Wayne Angus
CLIENT: Veolia Australia & NZ
LOCATION: Moa Point WWTP, Lyall Bay, Wellington
INSPECTION COMPONENT: Wastewater Ocean Outfall Pipeline and Seabed – Annual Survey

TYPE OF DIVE:

SCUBA	SURFACE SUPPLY	MIXED GAS	OTHER
X		Nitrox 40 (40% O^2 / 60% N^2)	Divator + pressure mask

DIVE DETAILS: (multiple dives over the course of 2 days)

	DIVE 1	DIVE 2	DIVE 3	DIVE 4	DIVE 5
MAXIMUM DEPTH OF DIVE	24.0m max.	24.0m max.	23.0m max.	8.0m max.	
BOTTOM TIME (minutes)	29 Diffusers CP	20 Diffusers General	30 Pipeline route	39 Inshore section	

METHOD | **CHECK** | **PARTICULARS / EQUIPMENT**

VISUAL INSPECTION

GENERAL SURVEY:	X	Visual condition assessment of inspection components, & CP survey
STILL PHOTOGRAPHY:	X	Photograph items of interest; i.e. diffusers & surrounding seabed
VIDEO SURVEY:		

NDT

POTENTIAL MEASUREMENT:	X	Cathodic Potential readings
DIMENSIONAL SURVEY:	X	Obtain seabed scour measurements – around diffusers, & inshore pipeline section
REMEDIAL GRINDING:		
M.P.I.:		
ULTRASONIC:		
OTHER:		

ANY OTHER REMARKS: Refer to this Report for Inspection data results.

APPROVED
NAME OF SUPERVISOR: Wayne Angus
SIGNATURE: *W. T. Angus*
DATE: 11th May 2025

NAME OF CLIENT'S REP: Tobias La Riviere
SIGNATURE:
DATE:

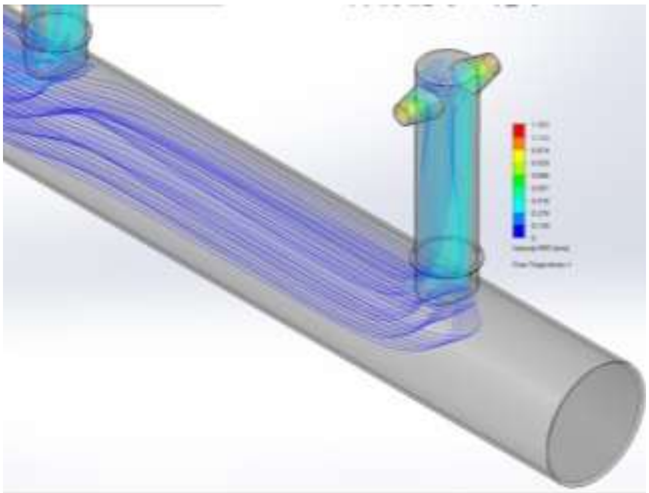
"To solve it easily, detect it early"

6. REFERENCE

Note:
For ease of interpretation, this document is separated into 4 individual reporting items; as follows:

- ⚓ Exposed Inshore Pipeline Section & Seabed
- ⚓ Buried Pipeline Outfall Route & Seabed
- ⚓ Offshore Diffuser Section – General Survey
- ⚓ Diffuser Section Cathodic Potential Survey

7. INSPECTION OBSERVATIONS



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MOA POINT WASTEWATER OCEAN OUTFALL PIPELINE & SEABED 2025 SURVEY

- **Exposed Inshore Pipeline Section & Seabed**
- **Buried Pipeline Outfall Route & Seabed**
- **Offshore Diffuser Section – General Survey**
- **Diffuser Section Cathodic Potential Survey**

Exposed Inshore Pipeline Section & Seabed

Figure 3: Shallow Water Section – Exposed Pipeline between positions C & D

SCOUR DEPTH DATA			
Position [m]	2025		
	West (mm)	East (mm)	Comment
C 00.0	150	150	
10.0	150	150	
20.0	300	300	
30.0	450	500	
M 40.0	600	650	
50.0	800	800	
60.0	900	950	
70.0	950	1050	
80.0	750	800	
D 90.0	150	150	

Table 3: Seabed scour depth adjacent exposed pipe

The exposed inshore pipeline section (position ‘C’) commences at approximately 32.2M below the MHWL (B) at a water depth of 2.5M, and extends approximately 90M to a water depth of 7.5M.

Over the past year (between the 2024 to 2025 Inspections) the area has experienced frequent southerly swells. While severe events have been rare, the slight to moderate swell conditions that have prevailed, result in increased scour adjacent the exposed pipeline section; with erosion of sand and fine gravels from the well-defined scour channels.

While neither the length of exposed pipe nor the maximum scour depth have increased, the average scour depth over the length was found to be greater.

Due to the nature of this coastline and its exposure to severe southerly storms: wave action and strong currents will inevitably continue to result in erosion and aggregate migration along the shoreline and tidal shallow water reaches. This coupled with the shallow depth of burial of the inshore pipeline’s transition from land to sea, determines that scour adjacent to the pipe will always remain active and a factor requiring monitoring.

The exposed length of pipeline has remained relatively constant throughout the years since inspection and monitoring commenced.
Over the period between the 2024 to 2025 annual inspections, exposed pipe length has remained constant, and maximum scour depth adjacent to the pipeline remains stable; however, the average scour depth within the ‘M’ to ‘D’ positional zone has increased over the period.
The occurrence of scour being predominately due to the cyclic effect of repetitive southerly sea states, resulting in sand and light gravel deposit migration within the shallows and along the shoreline.

Figure 4: Zone C – shoreward position at which pipe exposure commences

Figure 5: Position M – shoreward end of zone M to D

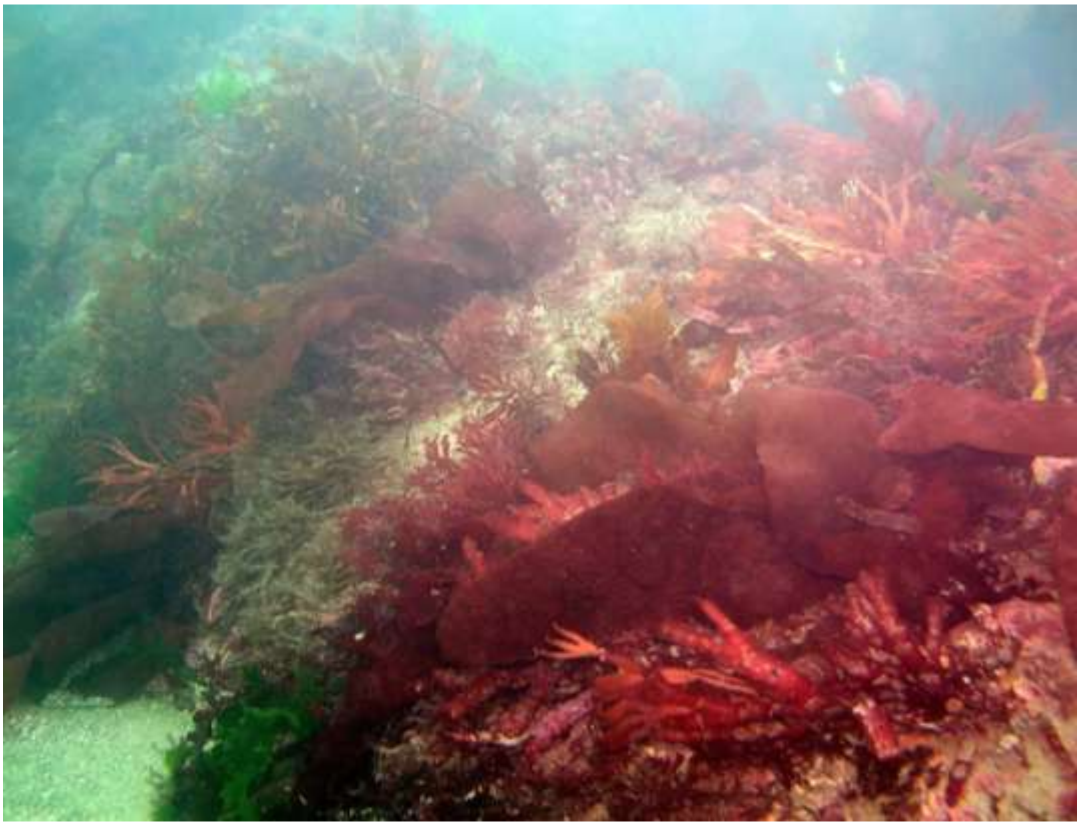


Figure 6: Zone M to D – 60m position

Figure 7: Zone M to D – 80m position

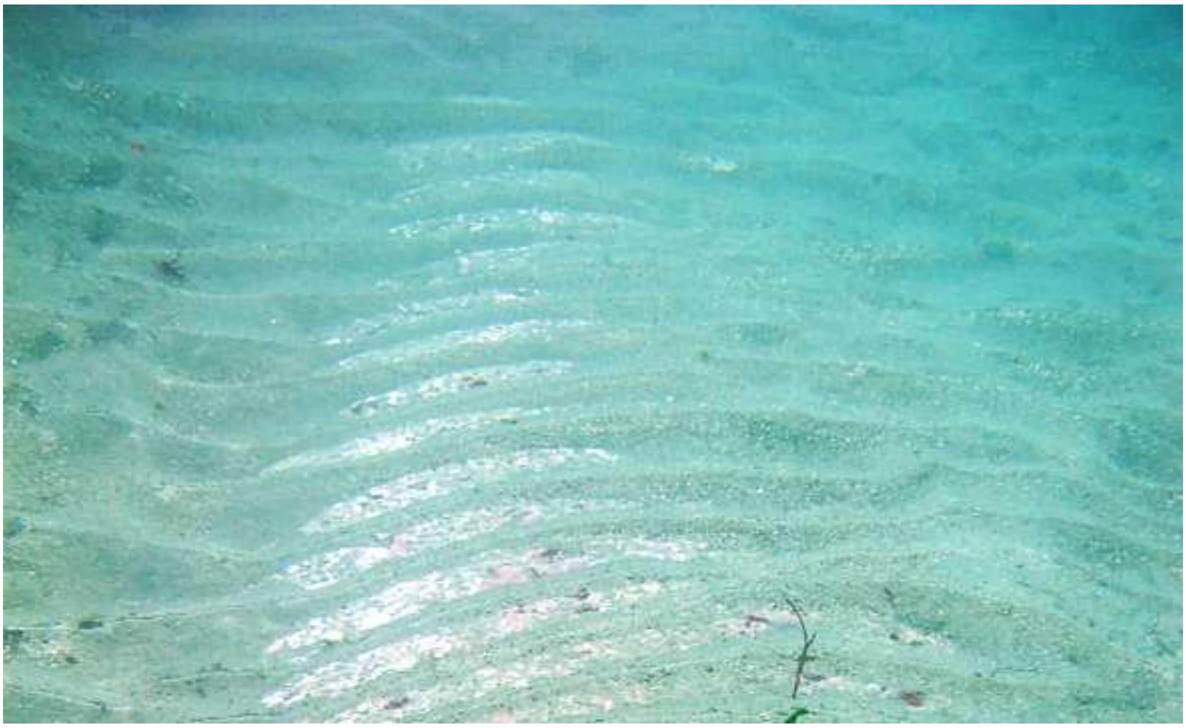


Figure 8: Position D – seaward position of pipeline departure back below seabed

Buried Pipeline Outfall Route & Seabed

Figure 9: Pipeline route

Using the drop line marker deployed at Diffuser # 1, the Inspection Diver equipped with a DPV (Diver Propelled Vehicle) descended to the seafloor at position ‘F’, and then set both the Diver’s underwater computer compass and the DPV compass on a Heading of 18.5º East of True North. The Diver then travelled from position ‘F’/Diffuser # 1 along the diffuser section to position ‘E’/Diffuser # 18, where inspection of the buried pipeline route commenced. Travelling the pipeline route from position ‘E’ shoreward to position ‘D’.

Travelling just above the seabed along the pipeline route, the Diver kept observation for any exposed pipeline sections, or evidence of fouling or other notable detail.

Due to swell common wave heights of 0.5m at the diffusers, and increasing in height to 1.0m closer inshore, visibility along the route was fair; ranging from 2.0 to 3.0 metres.

The diver made no observations of exposed pipe, nor any evidence of fouling by foreign objects.

The offshore seabed, consisting of rocks, and coarse gravels and sand, forms a profile of undulating peaks and depressions of +/- 300mm.

The inner route seabed, consisting of coarse sand and gravels forms a profile of undulating peaks and depressions of +/- 150mm.

Seafloor deposits of gravel and sand in the form of undulating peaks and depressions that mirror wave direction are typical and commonplace in this type of coastal environment.

The result of the underwater inspection of the pipeline route being; no areas of concern observed.

Figure 10: Typical seafloor profile and aggregate composition at seaward end of pipeline route. Approaching closer to position ‘D’ the aggregate sizing reduces, primarily to small gravel and coarse sand. Then returns to a combination of rocky outcrops, small to large boulders, and coarse gravels through the shallower shoreline surf zone.

Offshore Diffuser Section – General Survey

Divers inspected the general condition of diffusers, measuring scour depths around riser pipes, and checking for any evidence of fouling, damage, defect, or deterioration.

The inspection commenced at the seaward most diffuser, this being position ‘F’/Diffuser # 1, and finished at the shoreward most diffuser, this being position ‘E’/Diffuser # 18.

Visual investigations were completed around the diffusers that exhibited the greatest scour depths to ensure that none of the bed stabilisation mats were exposed. No exposed erosion control mat material was observed.
With reference to the ‘as built’ drawings, it should be noted that at the specified design depth, several of the current recorded reduced scour depths are below the specified depth of the erosion stabilisation matting; however, no stabilisation matting material is evident.
Visibility ranging between 3.0 – 6.0 metres was satisfactory, during the underwater inspection of the wastewater pipeline Diffuser section.

All 18 diffusers had their height of exposure measured using the current reduced seabed level as a datum. All heights ranged between 1400 to 1750 mm.

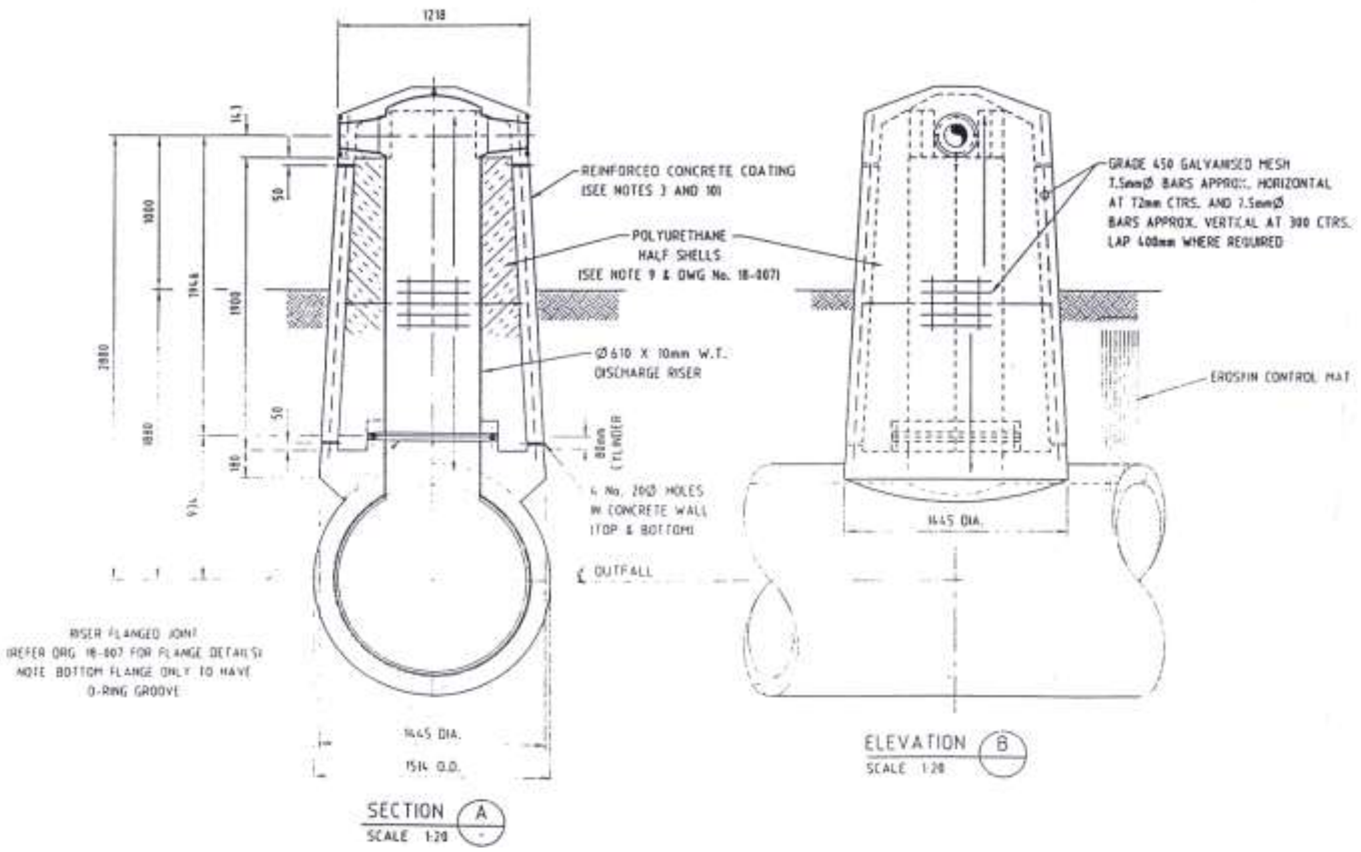


Figure 11: Diffuser ‘as built’ Cross-section

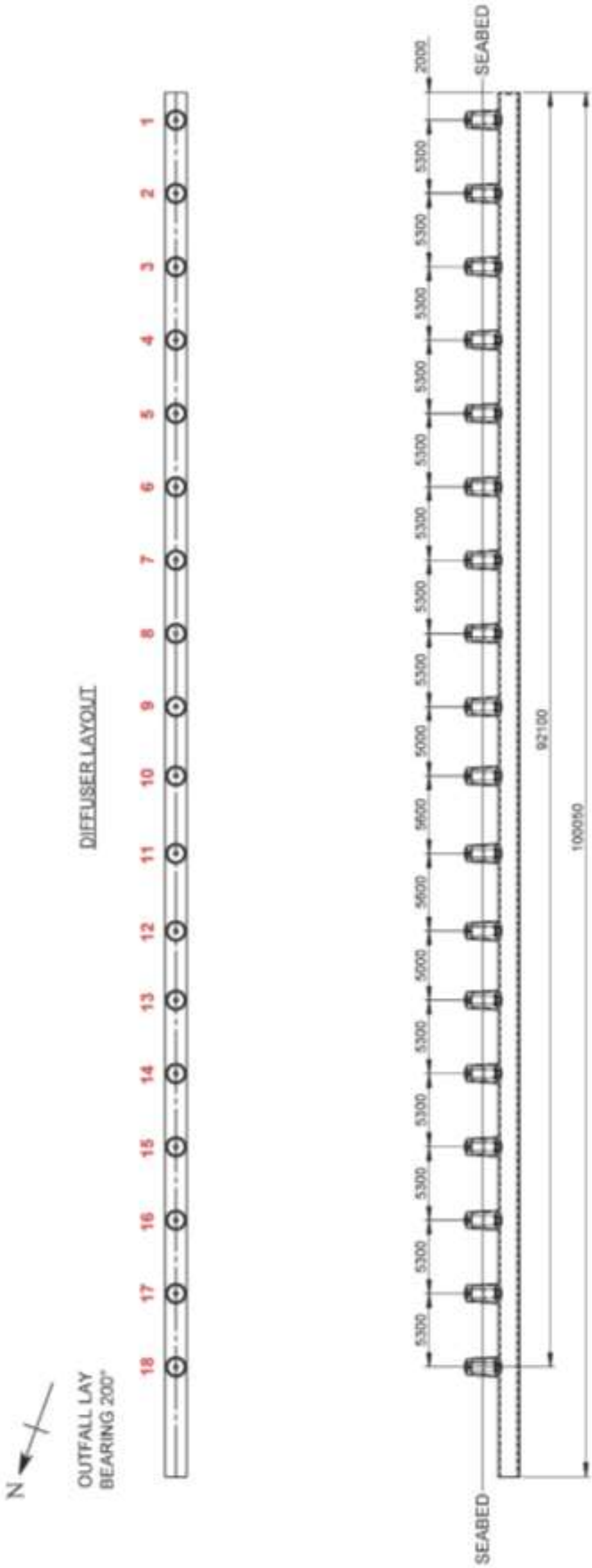


Figure 12: Diffuser section layout

Diffuser # from seaward to shoreward	Diffuser Exposed Height out of Seabed (mm)		Open Ports X	
	North face	South face	West	East
1	1650	1600	X	X
2	1650	1700	X	X
3	1750	1650	X	X
4	1650	1600	X	X
5	1700	1600	X	X
6	1600	1600	X	X
7	1650	1600	X	X
8	1750	1700	X	X
9	1700	1650		X
10	1750	1650	X	
11	1700	1600		X
12	1600	1600	X	
13	1650	1600		X
14	1600	1550	X	
15	1550	1500		X
16	1500	1550	X	
17	1450	1400		X
18	1400	1400	X	

Table 4: Exposed heights of diffusers (seabed scour around diffuser positions)
X – Open diffuser ports

No evidence was observed of any damage or deterioration to any of the 18 diffuser assemblies. About the diffuser positions, seafloor deposits of rocks, course gravels and sand form undulating peaks and depressions traversing the seafloor in west / east orientation, typically of +/- 300mm in height and mirroring wave direction.

Figures 13, 14, 15, &16: Typical seafloor profile and aggregate composition around the Diffusers 1, 11, 12, 18 (as per photo order)

Figures 17 & 18: Diffusers in operation

Diffuser Section Cathodic Potential Survey

CP Design Arrangement

The sacrificial anode cathodic protection system consists of 26 x WZ18 zinc alloy sacrificial anodes.

- Anode Type: WZ18
- Nett Mass: 17.0 Kg
- Gross Mass: 18.3 Kg
- Material: Zinc Base Alloy
- Specification: AS 2239 Designation ZI

The anodes are located on the pipeline in 13 sets of two. The anodes in each set are diametrically opposed. The spacing between each anode set is 150 ± 15 metres.

Each anode is embedded longitudinally in the concrete weight coating, with the outer face exposed end flush with the concrete external surface. Each anode is in electrical contact with the pipeline by two studs at the appropriate height and spacing centres. Each stud is attached to the pipe surface by means of weld process. Anodes are electrically isolated from all weight coating steel reinforcement.

The design also includes provision of a test point at the shore end of the pipeline to facilitate the retrofitting of a future impressed current cathodic protection system.

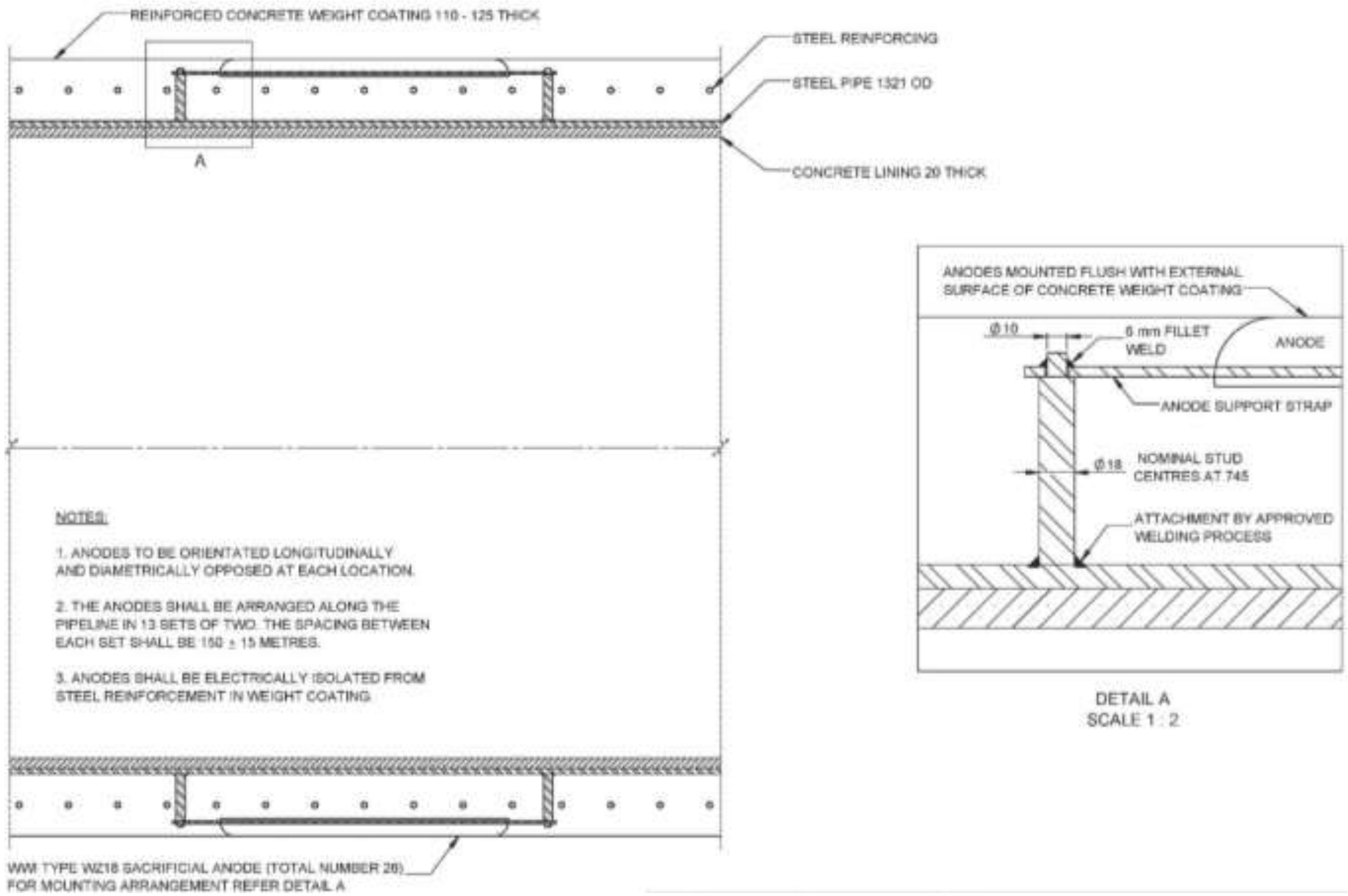


Figure 19: CP Sacrificial Anode Design Arrangement

Pre & Post Dive CP Meter Calibration Checks

On the surface pre-dive, the BathyCorrometer Instrument (BCM) calibration is checked with a Cal-Checker Pro'. The display reading was -1.901V; this being within the manufacturer's specification range of -1.900V (±0.002V).
Once on the seafloor adjacent Diffuser #1, the Inspection Diver again checked the BCM calibration against a certified (Zinc) Test Block. The BCM display value provided in this instance was -1.050V. Following obtaining Cathodic Potential values from contact with several of the Diffuser discharge nozzles, and prior to returning to the surface, the Inspection Diver again obtained a 'close-off' value from the Zinc Test Block; in this instance the value was -1.048V.

The specialised Cathodic Potential Instrument used to extrapolate data was:

- BUCKLEYS BathyCorrometer (BCM), Serial No. BUC587.
  Certificate of Calibration: S.41610, Det Norske Veritas (D.N.V.)

As standard procedure with the use of this type of instrument; prior to taking Cathodic Potential readings a calibration check is carried-out using a Zinc (Zn) test block; against the BCM Silver / Silver Chloride (Ag/AgCl) electrode.

- BUCKLEYS BCM Cal-Checker Pro, Serial No. 59630/10.
  Certificate No. BUC48680.

- BUCKLEYS Zinc Test Block
  Certificate of Analysis:
  Anode : ZM3303
  Type : Zinc Alloy
  Batch No. : M07720
  Buckley's Ref. : P46540

ANALYSES

%	%	%	%	%	%
Al	Cd	Fe	Cu	Pb	Zn
0.33	0.0567	<0.00026	<0.0002	0.00053	99.6

Note: Analysed by Spark Spectrometry.

Figure 20: BCM (Cathodic Potential Meter) in operation

<u>Methodology</u>

Using SCUBA kitted with a light-weight Divator positive pressure mask designed for exposure to contaminated water, and a Nitrox 40 (40% O^2 / 60% N^2) breathing gas, the Inspection Diver descends a drop line to the seafloor adjacent to Diffuser # 1, the southern-most (seaward) of the 18 Diffusers.

Following performing and recording a BCM instrument calibration check against a certified test block, the Inspection Diver takes Cathodic Potential values from a number of the Diffuser discharge nozzles. This process always includes Diffusers # 1 & 18, and a few in between to ensure electrical passage continuity throughout the Diffuser section.

Upon completion of gathering Cathodic Potential values, the Inspection Diver takes a further value from the test block prior to returning to the surface.

Cathodic Potential Data

<table>
<tr><td colspan="4">MOA POINT WASTE WATER OUTFALL PIPELINE
OFFSHORE DIFFUSER SECTION
CATHODIC PROTECTION TESTING
27th March 2025</td></tr>
<tr><td colspan="2">CP Instrument</td><td colspan="2">Calibration Check Values
Against Zinc Alloy Test Block</td></tr>
<tr><td colspan="2">Buckleys BCM (Cathodic Potential Meter)
Reference Electrode: Ag/AgCl</td><td>Prior
-1.050V</td><td>Post
-1.048V</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>Diffuser #</td><td>Discharge Nozzle or Test Plate</td><td>Pipe Potential verses Ag/AgCl reference</td><td>Time: (NZDST)
approx. only</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>1</td><td>Test Plate</td><td>-1.007V</td><td>09.45</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>West</td><td>-1.001V</td><td>09.48</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>7</td><td>West</td><td>-1.002V</td><td>09.53</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>11</td><td>East</td><td>-0.993mV</td><td>09.59</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>17</td><td>East</td><td>-1.005V</td><td>10.05</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

Table 5: Pipe Potential values

Figure 21: Diffuser nozzle steel port face, where CP values are checked

Figure 22: Cathodic Potential reading taken at Diffuser # 1

Figure 23: Cathodic Potential reading taken at Diffuser # 3

Figure 24: Cathodic Potential reading taken at Diffuser # 7

Figure 25: Cathodic Potential reading taken at Diffuser # 11

Figure 26: Cathodic Potential reading taken at Diffuser # 17

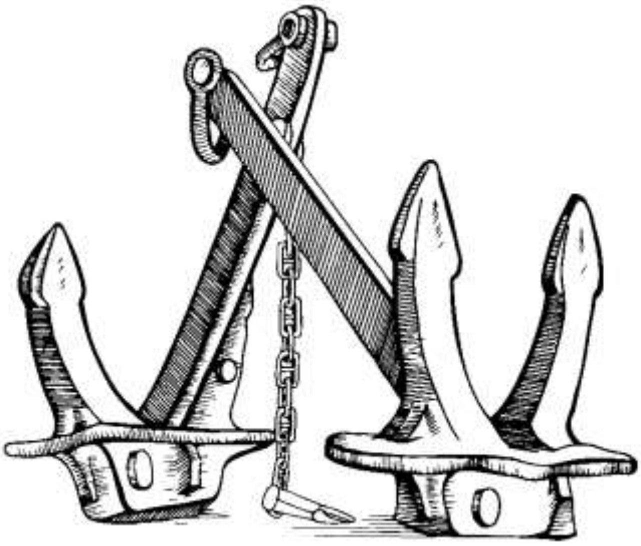
Wellington Tide Table for 27th March 2025 (date of offshore Diffuser & CP survey)

27	0220	1.6
Thu	0850	0.5
	1450	1.5
	2100	0.5

Figure 27: Tide – 27th March 2025

8. SUMMARY

During the inspection processes, no observations nor test results raise concerns.



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