The Great Grid Upgrade

Sea Link

Sea Link

Volume 9: Examination Submissions

Document 9.113: The Coralline Crag Technical Note

Planning Inspectorate Reference: EN20026

Version: A
February 2026

nationalgrid

Page intentionally blank

Contents

Table of Plates

Executive Summary

Ex1.1 Purpose of the Document

Ex1.1.1 This document provides National Grid Electricity Transmission plc's (the Applicant's) response to Action Points AP76 and AP78 addressed to the Applicant arising at Issue Specific Hearing 2 (ISH2) held 28 to 30 January 2026, in respect of the Sea Link Project.

Ex1.1.2 AP76 and AP78 relate to the interaction between the Horizontal Directional Drill (HDD) exit and the Coralline Crag marine outcrops. This Technical Note illustrates the updated conceptual HDD design at the exit position east of the continuous Coralline Crag outcrop, showing the depth of cover of the bore beneath the Crag as it passes the easternmost extent of the Coralline Crag outcrop on the HDD alignment.

Ex1.1.3 Based on the conceptual design depth and expected ground conditions, the document discusses the stability of the HDD bore and any potential for impacting the stability of the Coralline Crag outcrops.

1. Introduction

1.1.1 As part of the Planning Inspectorate Examination of the Sea Link project, Riggall & Associates (R&A) have been requested to provide information on the location of the proposed Landfall HDD exits at Aldeburgh and their potential impact on the Coralline Crag that outcrops at, and sub-crops beneath, the seafloor along the HDD route at the Suffolk Landfall.

1.1.2 The Coralline Crag is a weakly cemented, slightly gravelly very silty sand with frequent shell fragments. It is an important feature for determining the hydrodynamics, sediment transport patterns and coastal geomorphology in the region.

1.1.3 The Sea Link project has committed to the HDDs exiting in areas that do not have Coralline Crag outcrop at the surface, as well as exiting east of the continuous coralline crag outcrops defined by CEFAS mapping. The commitments are documented in the following two paragraphs.

1.1.4 Application Document **6.2.4.1 Part 4 Marine Chapter 1 Physical Environment. [REP3-020]** Paragraph **1.9.33:** The HDD exit point will target an exit location with sufficient depth of seafloor sediments to ensure the duct end and cable can be buried below the level of the seafloor; therefore it will not be designed such that there is a risk of exiting where the Coralline Crag is at the surface. During detailed design, the HDD contractor will microsite the exit points based on seafloor surveys and ground investigations.

1.1.5 Application Document **9.84 Register of Environmental Actions and Commitments (REAC) [REP3-078]** submitted at Deadline 3. Commitment **GH14**: HDDs at Suffolk will exit East of the continual Coralline Crag outcrop.

1.1.6 The purpose of this Technical Note is to illustrate that the HDD approaches to the exit locations are at more than sufficient depth to avoid any adverse impact on the integrity of the overlying Coralline Crag outcrops.

2. Horizontal Directional Drill Design

2.1.1 The conceptual HDD design drawings previously produced for the project were provided in the Application Document **7.3 Design Development Report [APP-321]**. The drawing for Aldeburgh is presented at the end of this document within the Appendix A Landfall HDD Feasibility Technical Note. The conceptual design indicated an exit 20m beyond the eastern edge of the continuous Coralline Crag outcrop for the 1525m length design. Options for shorter length designs are also indicated on the drawing, but these have since been removed from consideration by the project because they do not exit east of the Coralline Crag and therefore conflict with commitment GH14 in the REAC.

2.1.2 To ensure that the HDD exits sufficiently beyond the Coralline Crag outcrops, the conceptual designs have been reviewed and lengthened by 30m to 1555m length. At the assumed exit angle of 9°, this results in the centre of the HDD being 8.07m beneath the easternmost edge of the Coralline Crag as it approaches the exit. The diameter of the HDD is expected to be 864mm, or less, so the depth of cover from the surface outcrop to the top of the HDD is 7.6m.

2.1.3 Detail of the conceptual design is shown in sectional view in Plate 2.1 and a transverse view is provided in Plate 2.2 to show the relative size and spacing of the HDD bores as they pass the easternmost edge of the Coralline Crag outcrop.

2.1.4 An overview of the final 400m of the HDD and the exit is provided in the plan and section of Plate 2.3. It shows that the southern two HDDs exit 48m to 50m beyond the (CEFAS defined) Coralline Crag outcrop and the northern two HDDs exit more than 50m beyond the assumed position of Coralline Crag sub-crop

2.1.5 To ensure that the lengthened design is captured in the contractor's HDD design, the existing commitment GH14 in the REAC can be amended to the following: HDDs at Suffolk will exit a minimum of 45m East of the continual Coralline Crag outcrop.

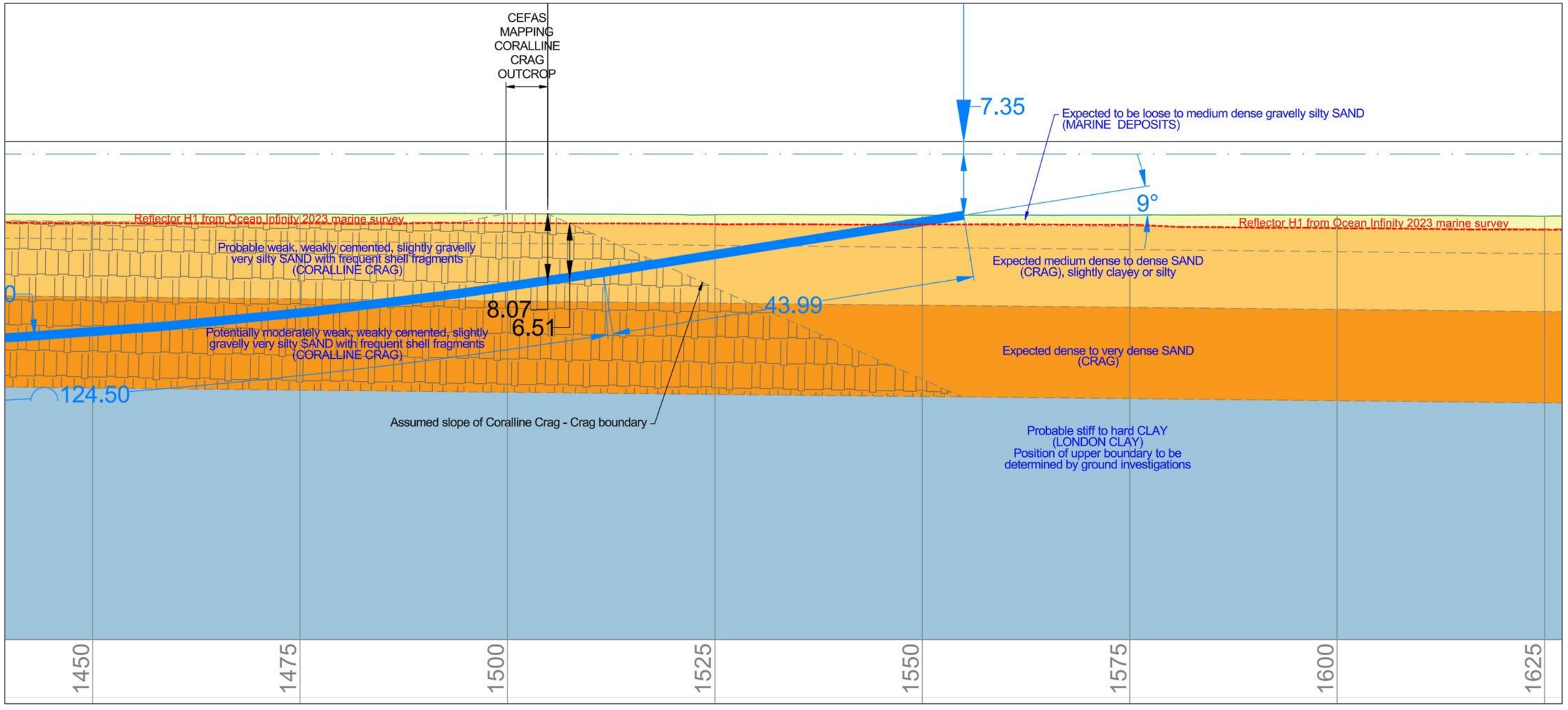

Plate 2.1 Detail of updated HDD Conceptual Design in Sectional View showing exit position and depth below the eastern edge of the continuous Coralline Crag outcrop.

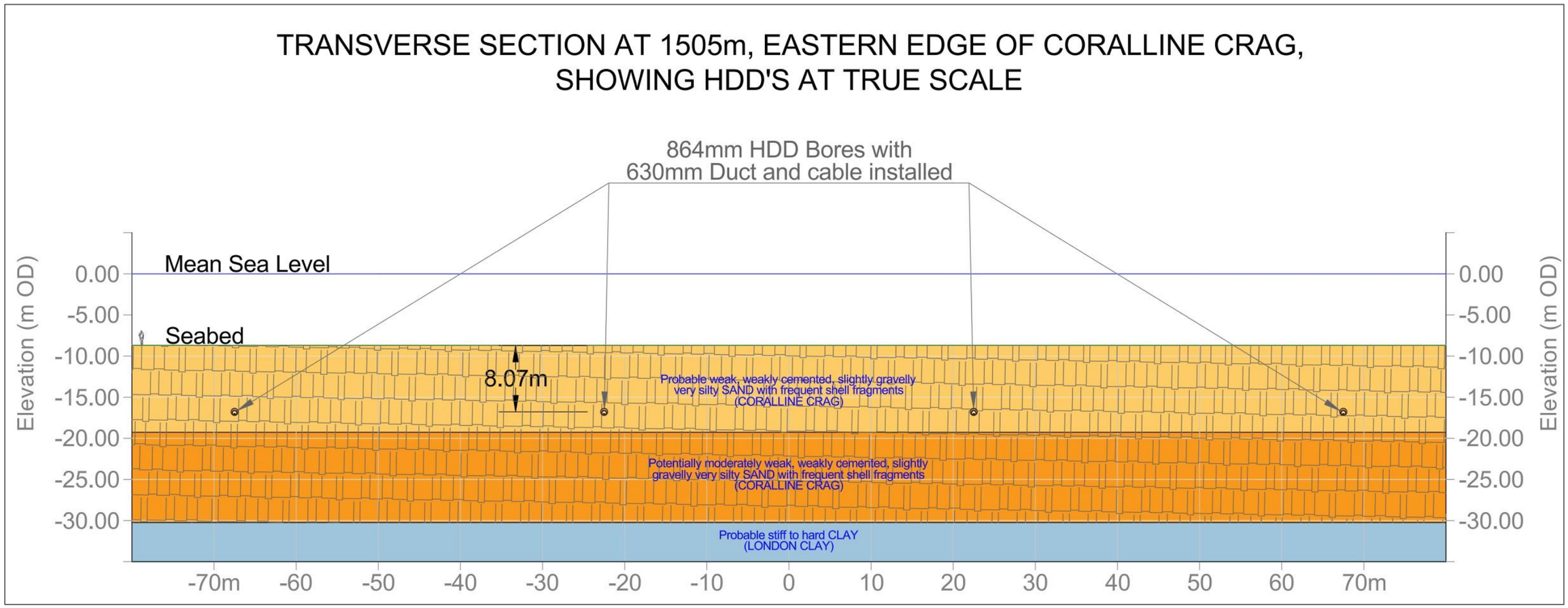

Plate 2.2 Transverse view at the point where the updated HDD Conceptual Design passes the eastern edge of the continuous Coralline Crag outcrop. The HDD bores are shown at true scale.

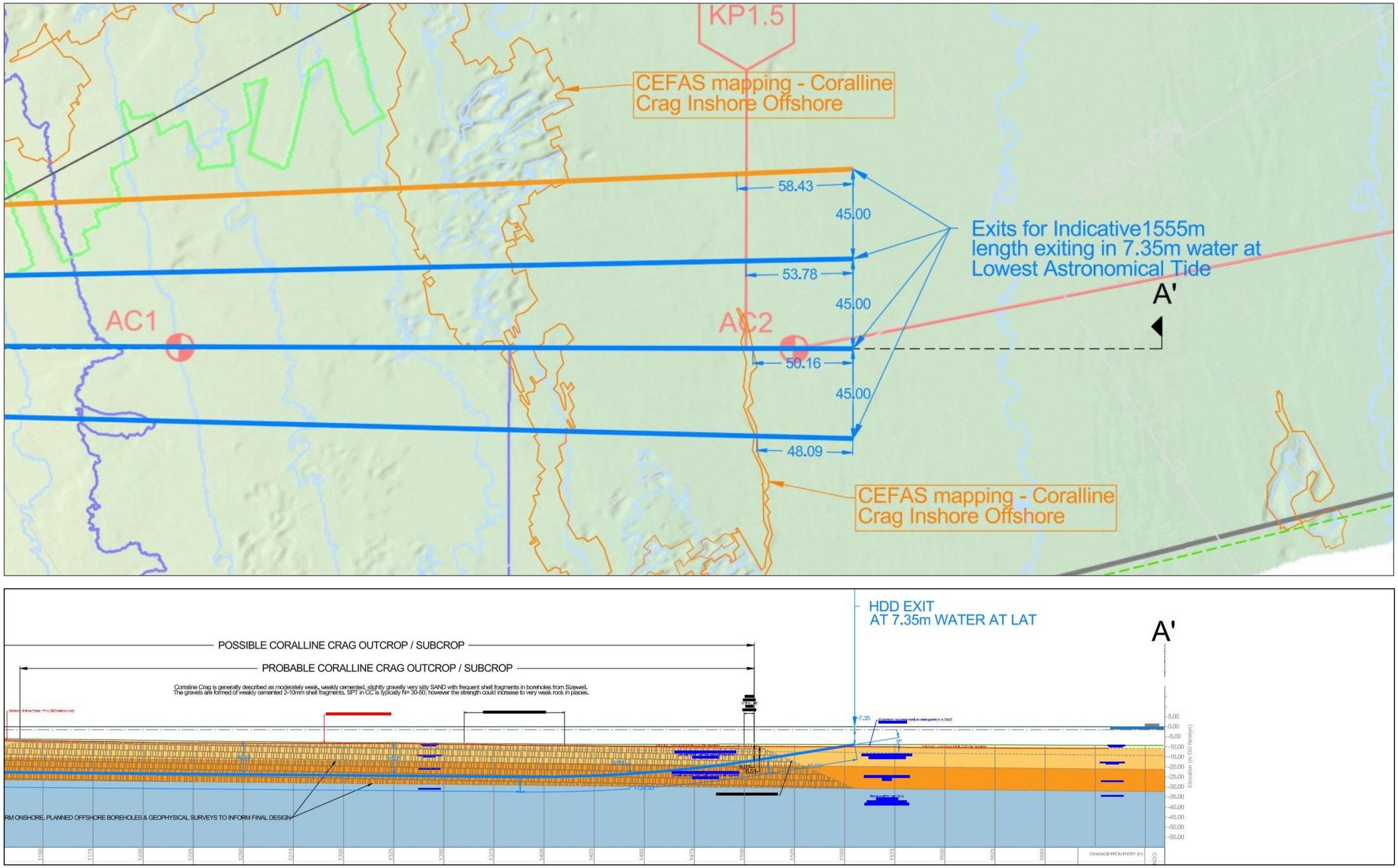

Plate 2.3 Plan and Section views of the final 400m of the HDD for the updated conceptual HDD design.

3. Stability of the HDD Bore

3.1.1 As previous outlined in Section 2.1.3 of the Landfall HDD Feasibility Technical Note **[APP-321]** both the Red Crag and the Coralline Crag are expected to be good drilling, forming a stable borehole. It should be made clear that the weakly cemented Coralline Crag will be stronger than the non-cemented Red Crag; the terminology used in describing the density and strength of the two geological units can be confusing. The Red Crag is described as medium dense to dense, and this relates to its density as a soil. Where the Coralline Crag is described as weak to moderately weak, this is describing its strength as a rock, not a soil. Weak rock has strength parameters many times greater than dense soil.

3.1.2 The keys to ensuring that HDD installations remain stable are suitable ground conditions and ensuring sufficient depth below the surface. Both of these criteria are satisfied as the HDD passes beneath the Coralline Crag outcrops along the route, including at the eastern edge of the Coralline Crag.

3.1.3 An indication of the competence of the weakly cemented Coralline Crag is given by the photograph in Plate 3.1 below. A sample recovered from the onshore ground investigation borehole BH-RP-01, it represents a typical Coralline Crag composition of sand, shells and bryozoan fragments bound together by calcitic cement. As a weak rock it would have the benefit of drilling relatively quickly while also forming a stable, self-supporting bore.

Plate 3.1 Coralline Crag sample recovered from approximately 17m depth in BH-RP-01

3.1.4 Due to being a weak rock, as exemplified by it forming a resistant outcrop on the sea floor, the HDD bore is expected to be self-supporting in the Coralline Crag and there is not expected to be any localised collapse that could migrate upward to the surface outcrops.

3.1.5 If there was no cementing of the grains and shells in the Coralline Crag shown in Plate 3.1 an HDD bore drilling in medium dense sediments of this composition would form a stable bore because the varying grain sizes and angularity of the grains are tightly packed together. Additionally, the bore is supported by the viscous drilling fluid that both seals the perimeter of the bore and supports overlying sediments.

3.1.6 It is assumed that the Red Crag is present in the final 30m to 40m of the HDD. The Red Crag, whilst not cemented, also has a range of grain sizes, and includes considerable shell fragment content, so it is also ideal for HDD, forming a stable bore. The HDD bore through Red Crag on the final approach to exit is not expected to result in any changes in the seabed, noting that the seabed in this area is formed of marine sediments rather than any outcropping Crag.

3.1.7 A visual impression of how unlikely it is that the HDD would destabilise the overlying Coralline Crag is provided in the transverse shown in Plate 2.2 and Plate 3.2 below. The figures show the relative size and spacing of the HDD bores as they pass the easternmost edge of the Coralline Crag outcrop.

3.1.8 It should be remembered that the reamed HDD bore is only open for a relatively short duration (days to weeks) until the duct is installed. The diameter of the duct will be approximately 200mm smaller than the diameter of the bore, so there will be a 100mm radial annulus between the duct and the bore in the long term. This annulus will be filled with the in-situ drilling fluid. Studies have shown that the drilling fluid sets to the consistency of a soft clay or stronger over time, providing long term support if there are any loose sediments above the bore.

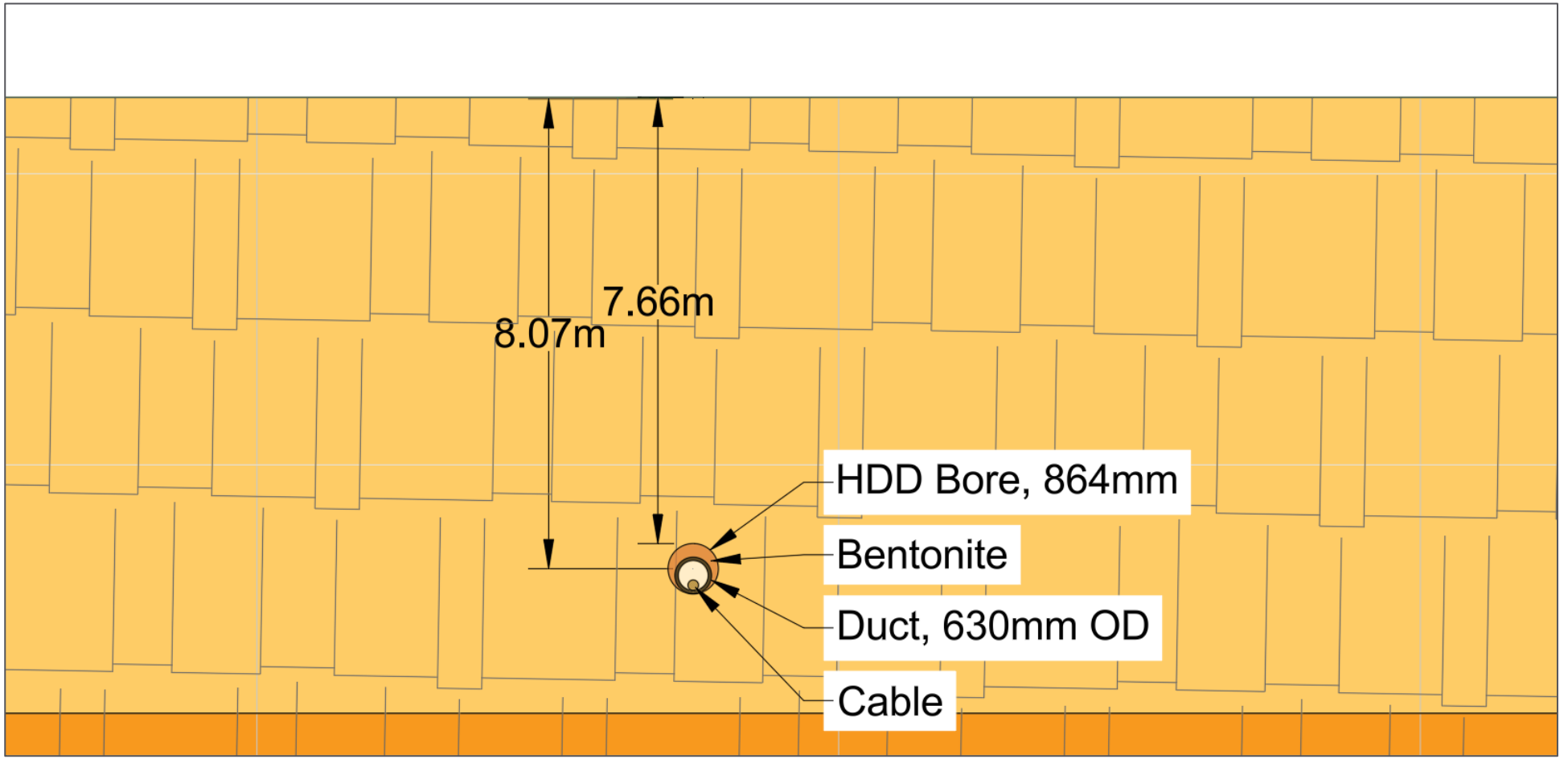

Plate 3.2 Transverse view of a single HDD duct installation at the point where the updated HDD Conceptual Design passes the eastern edge of the continuous Coralline Crag outcrop. The HDD bores are shown at true scale (1 Horizontal = 1 Vertical). Bore and duct diameters have not been finalised; those shown are the expected largest option and the final design may be smaller diameter

Appendix A Detailed Section View

HDD EXIT
AT 7.35m WATER AT LAT

A'

POSSIBLE CORALLINE CRAG OUTCROP / SUBCROP

PROBABLE CORALLINE CRAG OUTCROP / SUBCROP

Corraline Crag is generally described as moderately weak, weakly cemented, slightly gravelly very silty SAND with frequent shell fragments in boreholes from Sizewell.
The gravels are formed of weakly cemented 2-10mm shell fragments. SPT in CC is typically N= 30-50, however the strength could increase to very weak rock in places.

CEFAS MAPPING CORALLINE CRAG OUTCROP

CEFAS MAPPING CORALLINE CRAG OUTCROP

Reflector H1 from Ocean Infinity 2023 marine survey

Reflector H1 from Ocean Infinity 2023 marine survey

-7.35

Expected to be loose to medium dense gravelly silty SAND (MARINE DEPOSITS)

9°

Reflector H1 from Ocean Infinity 2023 marine survey

Expected medium dense to dense SAND (CRAG), slightly clayey or silty

Expected dense to very dense SAND (CRAG)

Probable stiff to hard CLAY (CRAG) CLAY
Position of upper boundary to be determined by ground investigations

Assumed slope of Coralline Crag - Crag boundary

RM ONSHORE. PLANNED OFFSHORE BOREHOLES & GEOPHYSICAL SURVEYS TO INFORM FINAL DESIGN

	1150	1175	1200	1225	1250	1275	1300	1325	1350	1375	1400	1425	1450	1475	1500	1525	1550	1575	1600	1625	1650	
CHAINAGE FROM ENTRY (m)																						
GROUND LEVELS (m) AOM																						
CENTRE OF HDD BORE (m) AOM																						
HDD DEPTH OF COVER (m) BGL																						
DEEPER HDD OPTION																						

CONCEPTUAL DESIGN

Elevation (m OD Newlyn)
5.00
0.00
-5.00
-10.00
-15.00
-20.00
-25.00
-30.00
-35.00
-40.00
-45.00
-50.00
-55.00

National Grid plc
National Grid House,
Warwick Technology Park,
Gallows Hill, Warwick.
CV34 6DA United Kingdom

Registered in England and Wales
No. 4031152
nationalgrid.com