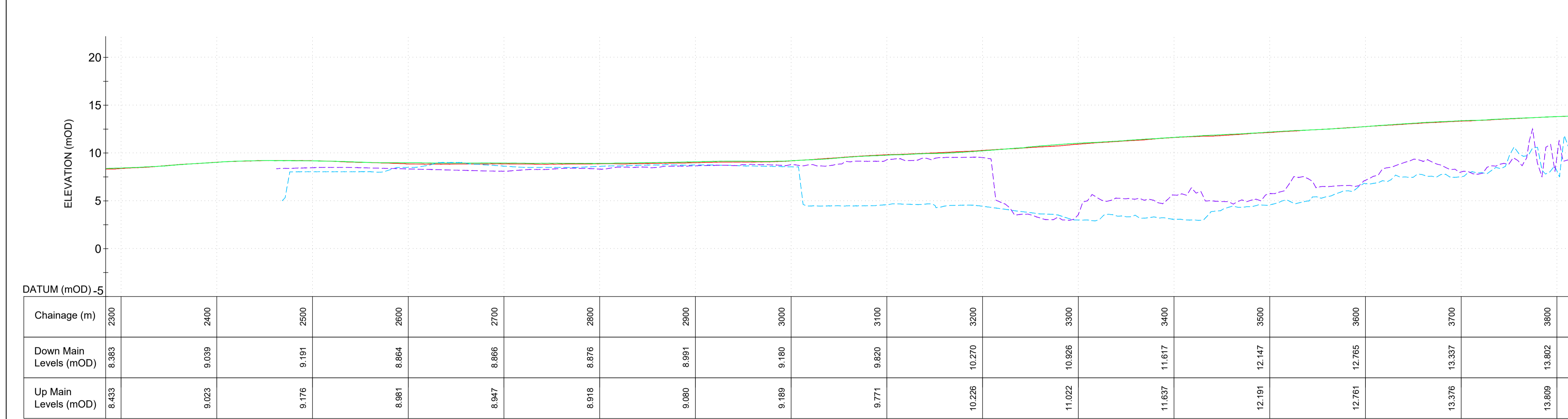
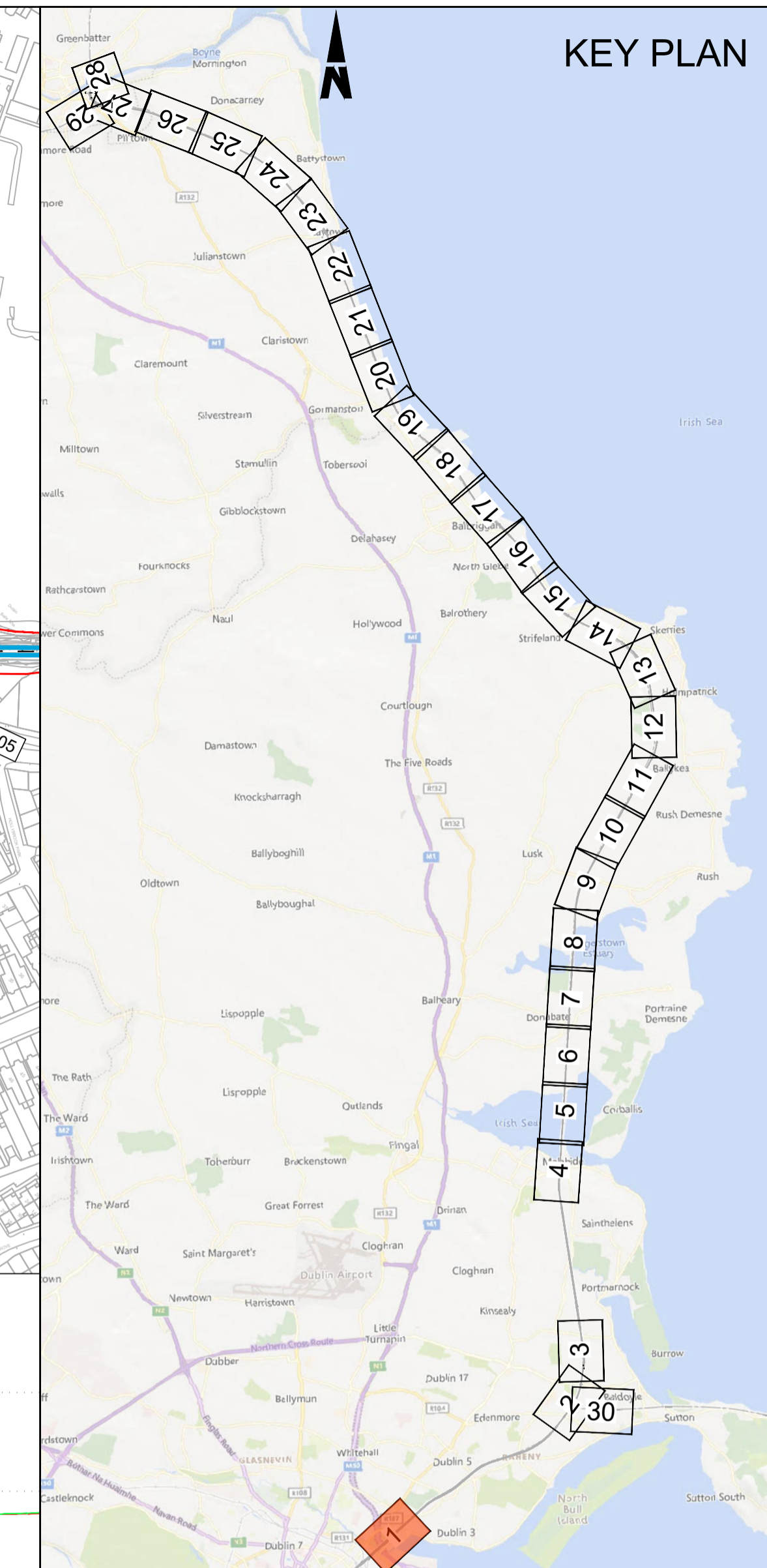
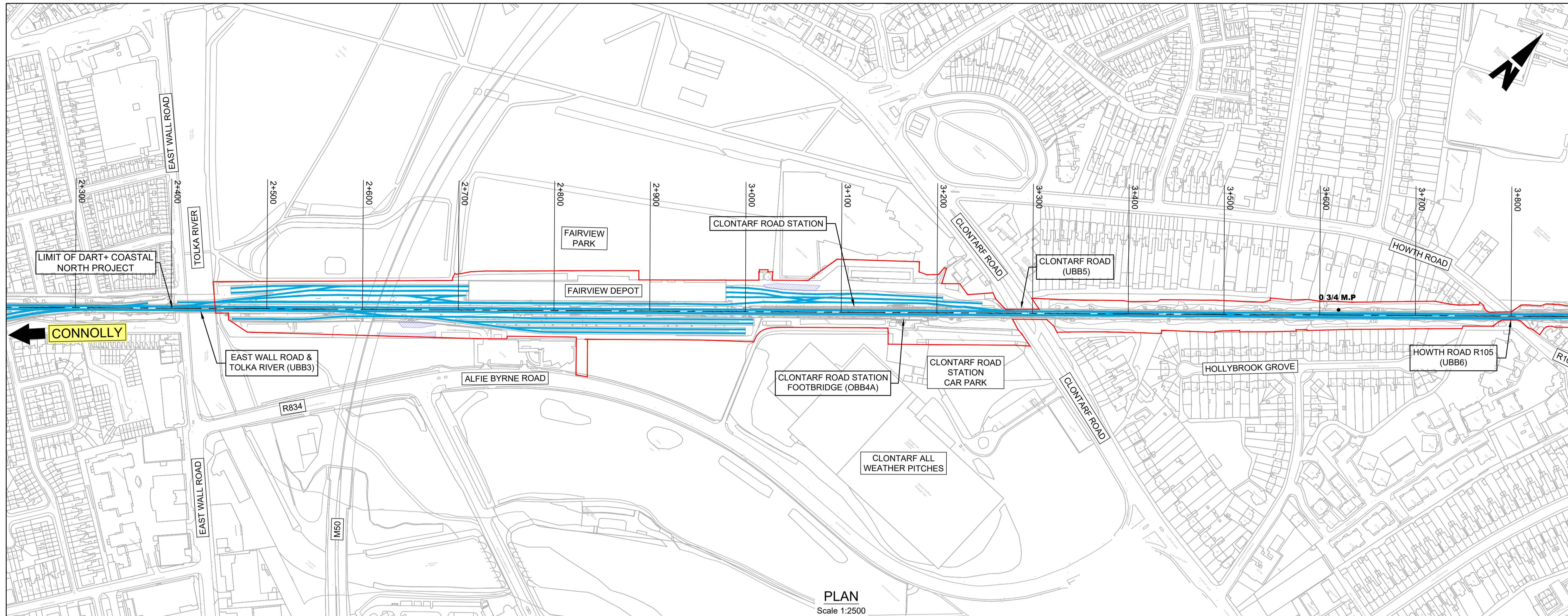


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## **Appendix A9.1**

### **Geological Plan and Profile**

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**LEGEND:**

**PLAN**

- TRACK CENTRE LINE
- NEW ELECTRIFICATION AND TRACK MODIFICATION IN EXISTING RAIL CORRIDOR
- EXISTING ELECTRIFIED RAIL CORRIDOR - MINIMAL OR NO WORKS REQUIRED
- NEW ELECTRIFICATION IN EXISTING RAIL CORRIDOR
- PROPOSED SUBSTATION
- MINOR WORK/ INTERVENTION REQUIRED
- CONSTRUCTION COMPOUND
- EXISTING STATION

**GI SYMBOL**

- NA-BH CABLE PERCUSSION
- NA-BH CABLE PERCUSSION WITH S-GEOBOR
- NA-BH CABLE PERCUSSION WITH ROTARY CORE FOLLOW-ON
- NA-BH S-GEOBOR
- NA-BH ROTARY CORE
- NA-SC STRUCTURAL CORING
- NA-DP DYNAMIC PROBING
- NA-WS WINDOW SAMPLE AND DYNAMIC PROBING
- NA-FIP FOUNDATION PIT INSPECTION
- NA-OP OBSERVATION PIT
- NA-ST SLIT TRENCH
- NA-SA SOAK AWAY
- NA-TP TRIAL PIT
- R1 ERT PROFILE
- S1 SEISMIC REFRACTION PROFILE
- NA-SRES YES (SEE FACTUAL REPORTS FOR RESULTS)

**PROFILE**  
SCALE 1:2500 (H) 1:250 (V)

**LEGEND:**

Blow counts exceed 20. Hole offset is +ve to the RIGHT of the section line. See Note 3. SPT N value, \* denotes N extrapolated: \* from main blows \*\* from seating blows. Typical Dynamic Probe plot with depth. N20°.

**COLOUR LEGEND**

- Made Ground [MG]
- Railway Ballast [RB]
- Topssoil [TOP]
- Peat [Peat]
- Clay [Clay]
- Sand [Sand]
- Gravel [Gravel]
- Silt [Silt]
- Mudstone [Mud]
- Limestone [Lst]
- Diorite or Basalt [IN]
- Sandstone [SS]
- Siltstone [Sist]
- Conglomera [Cng]
- Breccia [BR]
- Weathered Rock [WrR]
- Masonry Wall [Masonry]
- Open Hole [OH]

**MATERIALS**

- Fill (MADE GROUND)
- Sandy gravelly CLAY
- SANDY GRAVELLY SILT
- SAND
- Silty gravelly SAND
- Silty sandy GRAVEL
- SANDY GRAVEL
- Made Ground - FILL
- SAND and GRAVEL
- SANDY GRAVELLY COBBLY CLAY
- SANDSTONE
- Clayey sandy GRAVEL
- Silty sandy cobbly GRAVEL
- Silty sandy gravelly CLAY
- Silty sandy CLAY
- SANDY CLAY
- Clayey gravelly SAND
- Clayey silty sandy GRAVEL
- TOPSOIL
- Clayey SAND
- Clayey GRAVEL
- Medium Grained Igneous
- MUDSTONE
- Silty SAND
- Clayey GRAVEL

**Rev** | **Date** | **Drn** | **Chk'd** | **App'd** | **Description**

P01	20/11/2023	EAM	MT	MF	PLANNING ISSUE
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**Client:** Iarnród Éireann Irish Rail

**Engineering Designer:** ARUP

**Project Title:** DART+ COASTAL NORTH

**Drawing Title:** PREFERRED OPTION - GEOLOGICAL PLAN & PROFILE  
CLONTARF ROAD STATION AND SURROUNDS

**Date:** 06/07/2023 | **Scale:** 1:2500 @ A1, 1:5000 @ A3

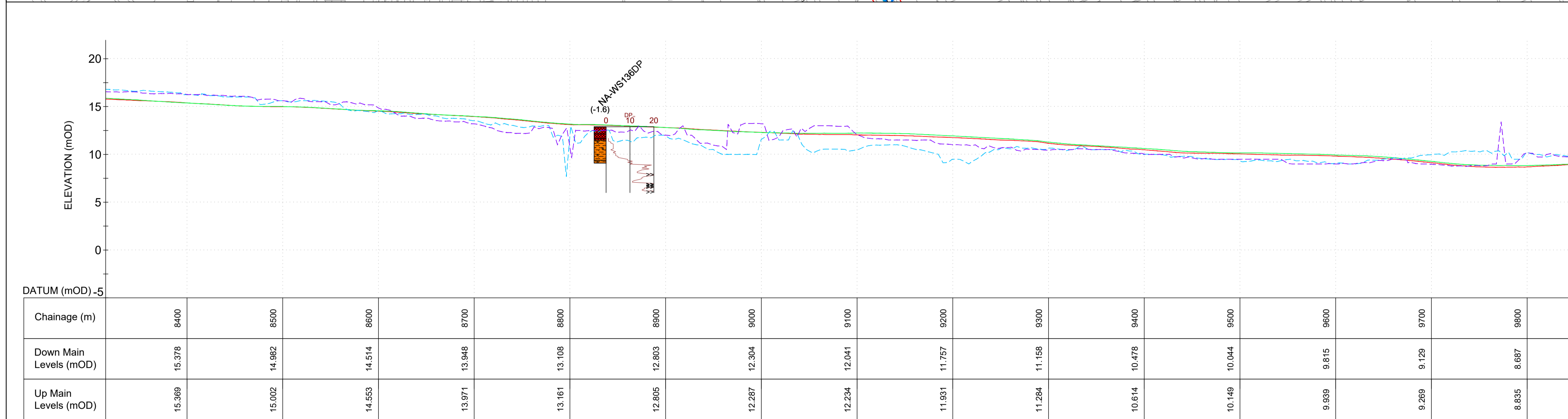
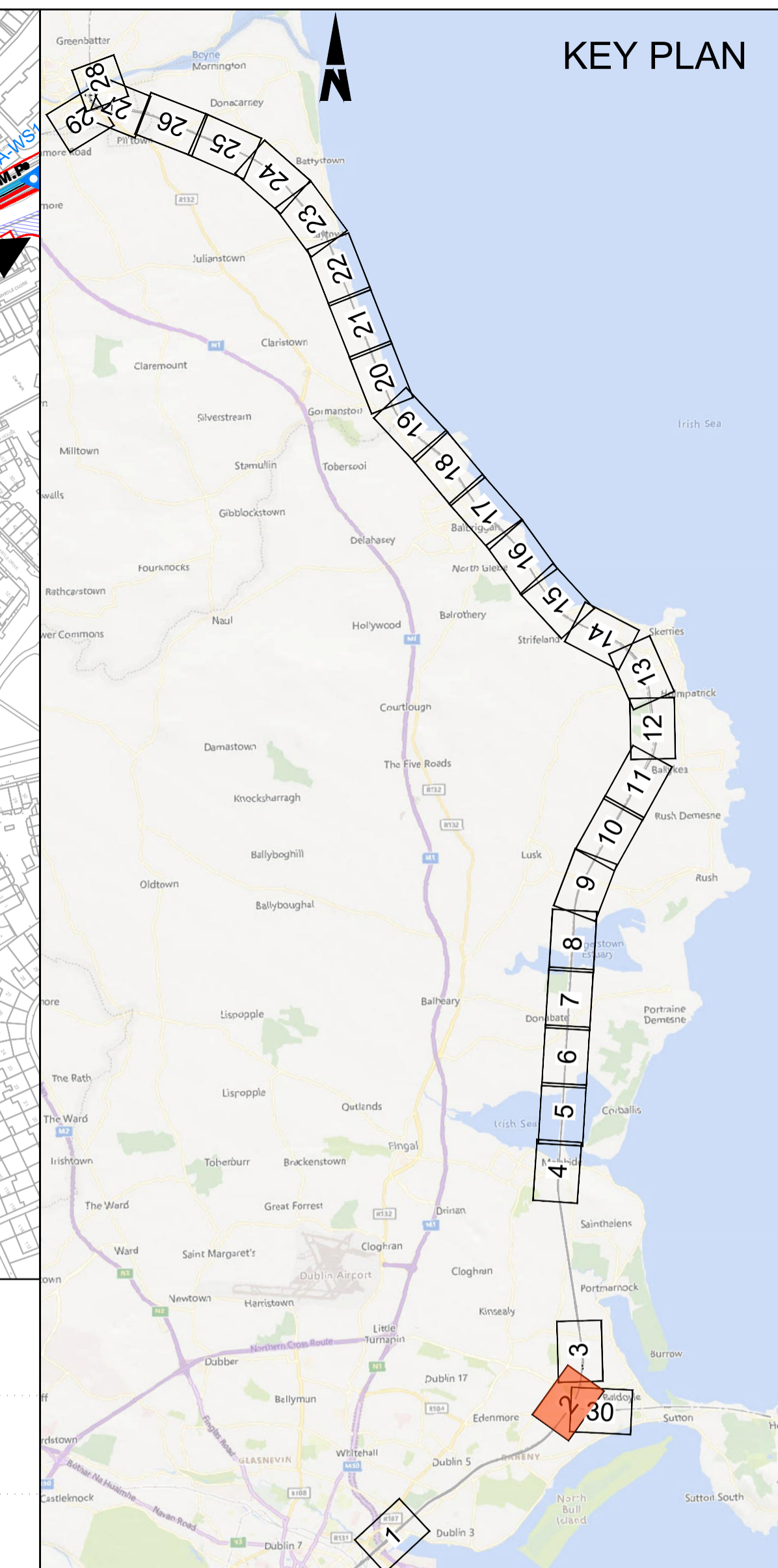
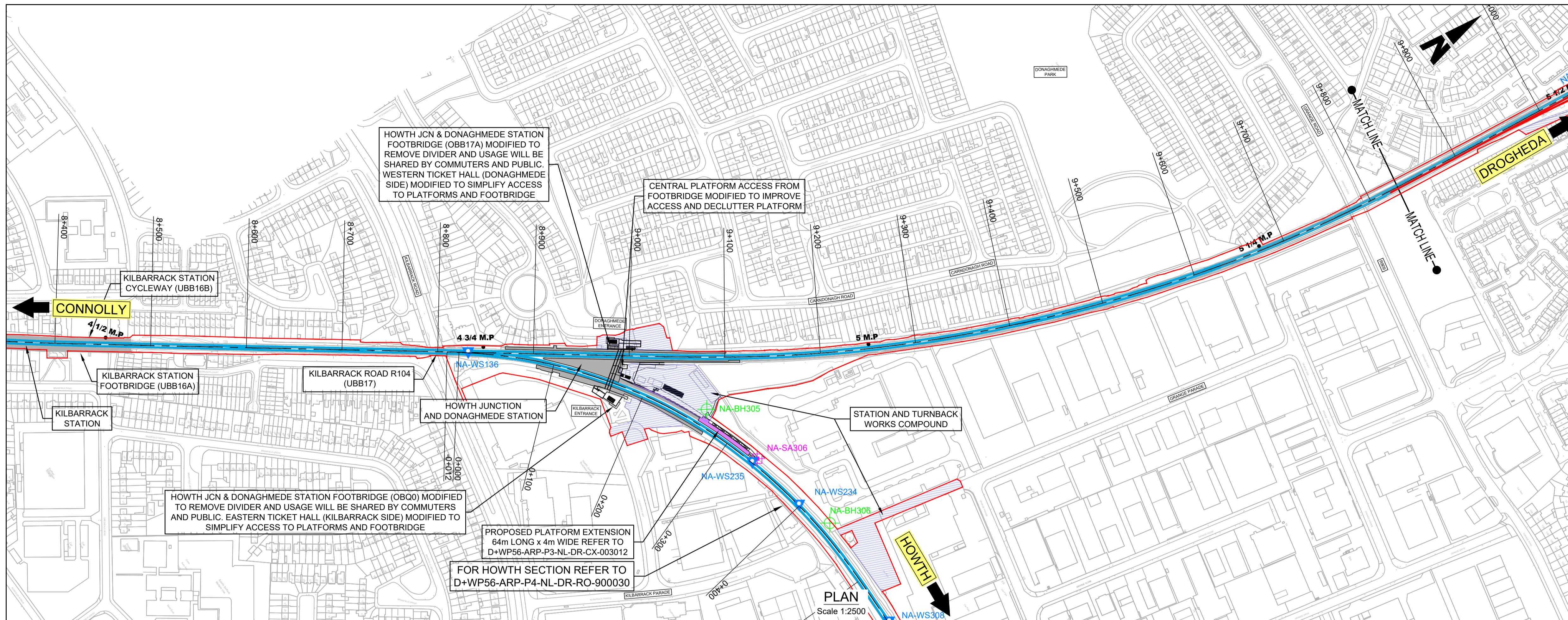
**Project Code:** D+WP56 | **Originator Code:** ARP | **QMS Code:** 280275-00

**Drawing File Name:** D+WP56-ARP-P4-NL-DR-RO-900001 | **Sheet Number:** 01 of 30 | **Status:** S3 | **Rev:** P01

**NOTE:**

- FACTUAL GROUND INVESTIGATION INFORMATION PRESENTED IS BASED ON CAUSEWAY GEOTECH LTD (2023), DART+ NORTH & BEMU STAGE A GROUND INVESTIGATION.
  - VOLUME 1 - DROGHEDA STATION, DEPOT & BEMU, REPORT NO. 21-1711A, REV A10, OCTOBER 2023;
  - VOLUME 2 - DROGHEDA TO MALAHIDE ELECTRIFICATION, REPORT NO. 21-1711B, REV A05, OCTOBER 2023; AND
  - VOLUME 3 - MALAHIDE, CLONGRIFFIN & HOWTH JUNCTION, REPORT NO. 21-1711C, REV A06, OCTOBER 2023.
- DOWN MAIN AND UP MAIN BOUNDARY LEVEL BASED ON TOPOGRAPHICAL LEVELS TAKEN FROM 2012 LIDAR ALONG IE PROPERTY BOUNDARY.
- GEOLOGICAL STICK LOGS PRESENTED ON PROFILES ARE PROJECTED TO A CENTRE LINE BETWEEN THE UP AND DOWN MAIN LINES AND SHOULD BE READ WITH IN THE CONTEXT OF INCREASING CHAINAGE.
- DYNAMIC PROBES PRESENTED ARE DPSH-B AND RESULTS RELATE TO BLOW COUNTS PER 100mm.

DO NOT SCALE USE FIGURED DIMENSIONS ONLY



Chainage (m)	8400	8500	8600	8700	8800	8900	9000	9100	9200	9300	9400	9500	9600	9700	9800
Down Main Levels (mOD)	15.378	14.982	14.514	13.948	13.108	12.803	12.304	12.041	11.757	11.158	10.478	10.044	9.815	9.129	8.687
Up Main Levels (mOD)	15.389	15.002	14.553	13.971	13.161	12.805	12.287	12.234	11.931	11.284	10.614	10.149	9.939	9.269	8.835

**LEGEND:**

**PLAN**

- TRACK CENTRE LINE
- NEW ELECTRIFICATION AND TRACK MODIFICATION IN EXISTING RAIL CORRIDOR
- EXISTING ELECTRIFIED RAIL CORRIDOR - MINIMAL OR NO WORKS REQUIRED
- NEW ELECTRIFICATION IN EXISTING RAIL CORRIDOR
- PROPOSED SUBSTATION
- MINOR WORK/ INTERVENTION REQUIRED
- CONSTRUCTION COMPOUND
- EXISTING STATION

**GI SYMBOL**

- NA-BH CABLE PERCUSSION
- NA-BH CABLE PERCUSSION WITH S-GEOBOR
- NA-BH CABLE PERCUSSION WITH ROTARY CORE FOLLOW-ON
- NA-BH S-GEOBOR
- NA-BH ROTARY CORE
- NA-SC STRUCTURAL CORING
- NA-DP DYNAMIC PROBING
- NA-WS WINDOW SAMPLE AND DYNAMIC PROBING
- NA-FIP FOUNDATION PIT INSPECTION
- NA-OP OBSERVATION PIT
- NA-ST SLIT TRENCH
- NA-SA SOAK AWAY
- NA-TP TRIAL PIT
- R1 ERT PROFILE
- S1 SEISMIC REFRACTION PROFILE
- NA-SRES YES (SEE FACTUAL REPORTS FOR RESULTS)

**LEGEND:**

**PROFILE**

- Blow counts exceed 20
- Hole offset is +ve to the RIGHT of the section line. see Note 3.
- SPT N value, \* denotes N extrapolated: \* from main blows \*\* from seating blows
- Typical Dynamic Probe plot with depth
- Offset
- Topographical data along railway boundary is ± 0.5m
- Down Main IÉ Boundary Ground Level (West)
- Up Main IÉ Boundary Ground Level (East)
- Down Main Levels
- Up Main Levels

**COLOUR LEGEND**

- Made Ground [MG]
- Sand [Sand]
- Diorite or Basalt [IN]
- Weathered Rock [WrR]
- Railway Ballast [RB]
- Gravel [Gravel]
- Sandstone [SS]
- Masonry Wall [Masonry]
- Topsoil [TOP]
- Silt [Silt]
- Siltstone [Silt]
- Open Hole [OH]
- Peat [Peat]
- Mudstone [Mud]
- Conglomera [Cng]
- Clay [Clay]
- Limestone [Lst]
- Breccia [BR]

**MATERIALS**

- Fill (MADE GROUND)
- Silty sandy GRAVEL
- Clayey sandy GRAVEL
- Clayey gravelly SAND
- Medium Grained Igneous
- Sandy gravelly CLAY
- Sandy GRAVEL
- Silty sandy cobbly GRAVEL
- Clayey silty sandy GRAVEL
- MUDSTONE
- Sandy gravelly SILT
- Made Ground - FILL
- Silty sandy gravelly CLAY
- TOPSOIL
- Silty SAND
- SAND
- SAND and GRAVEL
- Silty sandy CLAY
- Clayey SAND
- Clayey GRAVEL
- Silty gravelly SAND
- Sandy gravelly cobbly CLAY
- Sandy CLAY
- SANDSTONE

**NOTE:**

- FACTUAL GROUND INVESTIGATION INFORMATION PRESENTED IS BASED ON CAUSEWAY GEOTECH LTD (2023), DART+ NORTH & BEMU STAGE A GROUND INVESTIGATION.
  - VOLUME 1 - DROGHEDA STATION, DEPOT & BEMU, REPORT NO. 21-1711A, REV A10, OCTOBER 2023;
  - VOLUME 2 - DROGHEDA TO MALAHIDE ELECTRIFICATION, REPORT NO. 21-1711B, REV A05, OCTOBER 2023; AND
  - VOLUME 3 - MALAHIDE, CLONGRIFFIN & HOWTH JUNCTION, REPORT NO. 21-1711C, REV A06, OCTOBER 2023.
- DOWN MAIN AND UP MAIN BOUNDARY LEVEL BASED ON TOPOGRAPHICAL LEVELS TAKEN FROM 2012 LIDAR ALONG IÉ PROPERTY BOUNDARY.
- GEOLOGICAL STICK LOGS PRESENTED ON PROFILES ARE PROJECTED TO A CENTRE LINE BETWEEN THE UP AND DOWN MAIN LINES AND SHOULD BE READ WITH IN THE CONTEXT OF INCREASING CHAINAGE.
- DYNAMIC PROBES PRESENTED ARE DPHS-B AND RESULTS RELATE TO BLOW COUNTS PER 100mm.



Rev	Date	Drn	Chk'd	App'd	Description
P01	20/11/2023	EAM	MT	MF	PLANNING ISSUE

Client: **Iarnród Éireann Irish Rail**

Engineering Designer: **ARUP**

Date: 06/07/2023 | Scale: 1:2500 @ A1, 1:5000 @ A3

Project Code: D+WP56 | Originator Code: ARP

QMS Code: 280275-00

Drawn: SR | Checked: MT | Approved: MF

Project Title: **DART+ COASTAL NORTH**

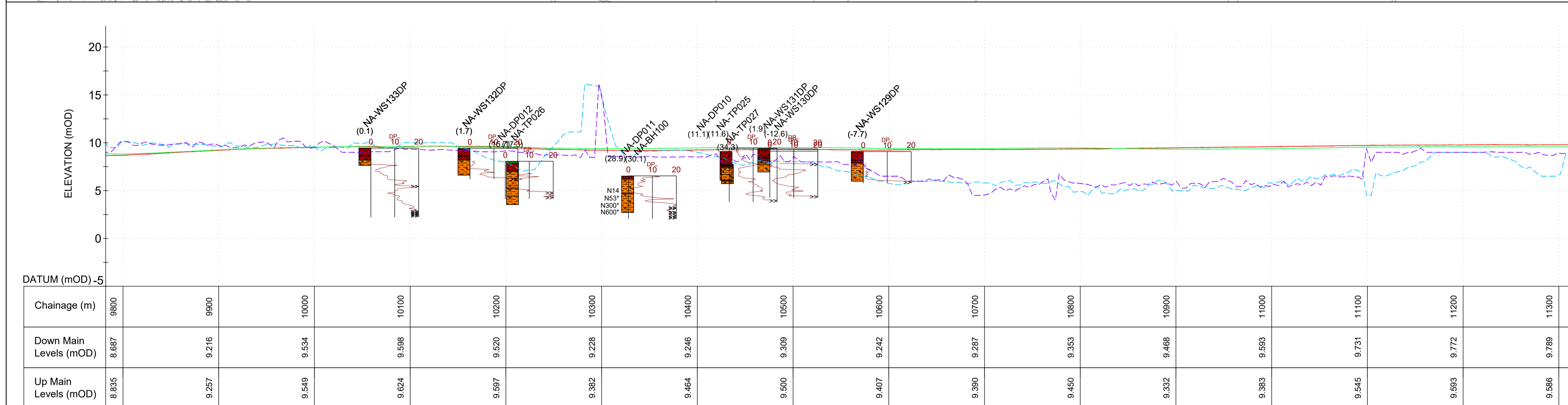
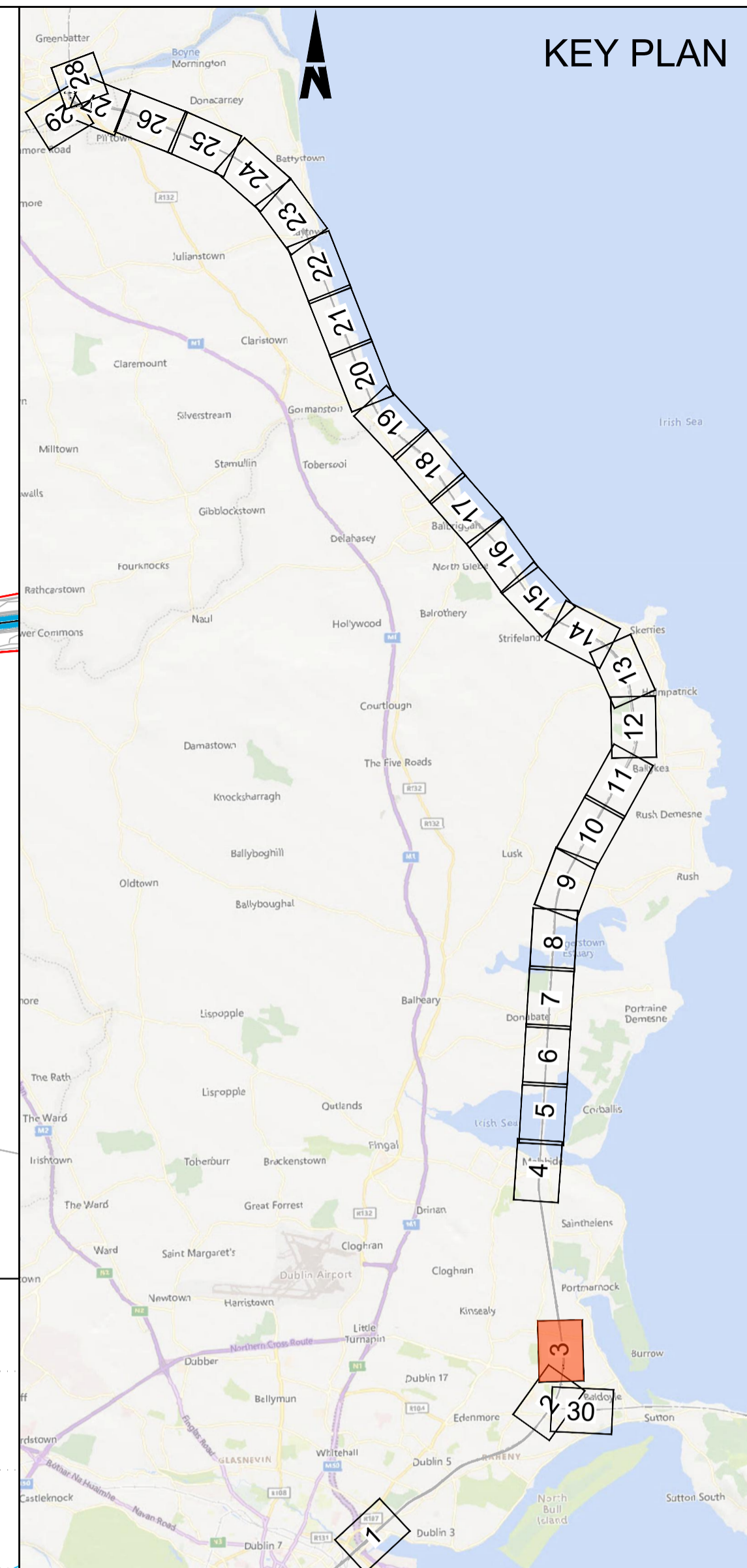
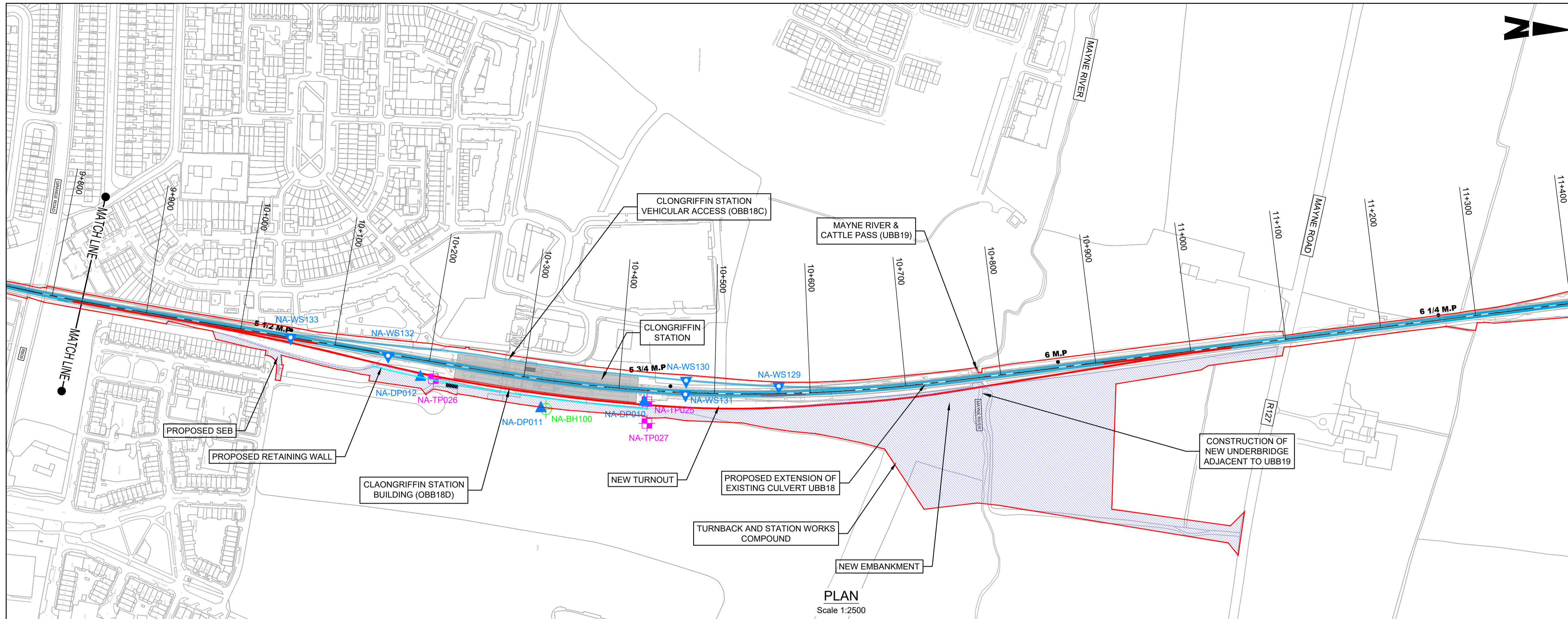
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Drawing File Name: D+WP56-ARP-P4-NL-DR-RO-900002

Sheet Number: 02 of 30 | Status: S3 | Rev: P01

DO NOT SCALE USE FIGURED DIMENSIONS ONLY

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Chainage (m)	9800	9900	10000	10100	10200	10300	10400	10500	10600	10700	10800	10900	11000	11100	11200	11300
Down Main Levels (mOD)	8.687	9.216	9.534	9.598	9.520	9.228	9.246	9.309	9.242	9.287	9.353	9.468	9.593	9.731	9.772	9.789
Up Main Levels (mOD)	8.835	9.257	9.549	9.624	9.597	9.382	9.464	9.500	9.407	9.390	9.450	9.332	9.383	9.545	9.583	9.586

**LEGEND:**

**PLAN**

- TRACK CENTRE LINE
- NEW ELECTRIFICATION AND TRACK MODIFICATION IN EXISTING RAIL CORRIDOR
- EXISTING ELECTRIFIED RAIL CORRIDOR - MINIMAL OR NO WORKS REQUIRED
- NEW ELECTRIFICATION IN EXISTING RAIL CORRIDOR
- PROPOSED SUBSTATION
- CONSTRUCTION COMPOUND
- EXISTING STATION
- PROPOSED RETAINING WALL

**GI SYMBOL**

- NA-BH CABLE PERCUSSION
- NA-BH CABLE PERCUSSION WITH S-GEOBOR
- NA-BH CABLE PERCUSSION WITH ROTARY CORE FOLLOW-ON
- NA-BH S-GEOBOR
- NA-BH ROTARY CORE
- NA-SC STRUCTURAL CORING
- NA-DP DYNAMIC PROBING
- NA-WS WINDOW SAMPLE AND DYNAMIC PROBING
- NA-FIP FOUNDATION PIT INSPECTION
- NA-OP OBSERVATION PIT
- NA-ST SLIT TRENCH
- NA-SA SOAK AWAY
- NA-TP TRIAL PIT
- R1 ERT PROFILE
- S1 SEISMIC REFRACTION PROFILE
- NA-SRES VES (SEE FACTUAL REPORTS FOR RESULTS)

**LEGEND:**

**PROFILE**

- Blow counts exceed 20
- Hole offset is +ve to the RIGHT of the section line. see Note 3.
- SPT N value, \* denotes N extrapolated: \* from main blows \*\* from seating blows
- Typical Dynamic Probe plot with depth
- Hole ID
- Topographical data along railway boundary is ± 0.5m
- Down Main IÉ Boundary Ground Level (West)
- Up Main IÉ Boundary Ground Level (East)
- Down Main Levels
- Up Main Levels

**COLOUR LEGEND**

- Made Ground [MG]
- Railway Ballast [RB]
- Topsail [TOP]
- Peat [Peat]
- Clay [Clay]
- Sand [Sand]
- Gravel [Gravel]
- Silt [Silt]
- Mudstone [Mud]
- Limestone [Lst]
- Diorite or Basalt [IN]
- Sandstone [SS]
- Siltstone [Sist]
- Conglomera [Cng]
- Breccia [BR]
- Weathered Rock [WrR]
- Masonry Wall [Masonry]
- Open Hole [OH]

**MATERIALS**

- FILL (MADE GROUND)
- Sandy gravelly CLAY
- SANDY GRAVELLY SILT
- SAND
- Silty gravelly SAND
- Silty sandy GRAVEL
- SANDY GRAVEL
- Made Ground - FILL
- SAND and GRAVEL
- SANDY GRAVELLY COBBLY CLAY
- Clayey sandy GRAVEL
- SANDY GRAVELLY SAND
- Silty sandy COBBLY GRAVEL
- Silty sandy gravelly CLAY
- Silty sandy CLAY
- SANDY CLAY
- Clayey sandy GRAVEL
- Clayey silty sandy GRAVEL
- TOPSOIL
- Clayey SAND
- SANDSTONE
- Medium Grained Igneous
- MUDSTONE
- Silty SAND
- Clayey GRAVEL

**NOTE:**

- FACTUAL GROUND INVESTIGATION INFORMATION PRESENTED IS BASED ON CAUSEWAY GEOTECH LTD (2023), DART+ NORTH & BEMU STAGE A GROUND INVESTIGATION:
  - VOLUME 1 - DROGHEDA STATION, DEPOT & BEMU, REPORT NO. 21-1711A, REV A10, OCTOBER 2023;
  - VOLUME 2 - DROGHEDA TO MALAHIDE ELECTRIFICATION, REPORT NO. 21-1711B, REV A05, OCTOBER 2023; AND
  - VOLUME 3 - MALAHIDE, CLONGRIFFIN & HOWTH JUNCTION, REPORT NO. 21-1711C, REV A06, OCTOBER 2023.
- DOWN MAIN AND UP MAIN BOUNDARY LEVEL BASED ON TOPOGRAPHICAL LEVELS TAKEN FROM 2012 LIDAR ALONG IÉ PROPERTY BOUNDARY.
- GEOLOGICAL STICK LOGS PRESENTED ON PROFILES ARE PROJECTED TO A CENTRE LINE BETWEEN THE UP AND DOWN MAIN LINES AND SHOULD BE READ WITH IN THE CONTEXT OF INCREASING CHAINAGE.
- DYNAMIC PROBES PRESENTED ARE DPHS-B AND RESULTS RELATE TO BLOW COUNTS PER 100mm.

Rev	Date	Drn	Chk'd	App'd	Description
P01	20/11/2023	EAM	MT	MF	PLANNING ISSUE

Client: **Iarnród Éireann Irish Rail**

Engineering Designer: **ARUP**

Date: 06/07/2023 Scale: 1:2500 @ A1, 1:5000 @ A3

Drawn: SR Checked: MT Approved: MF

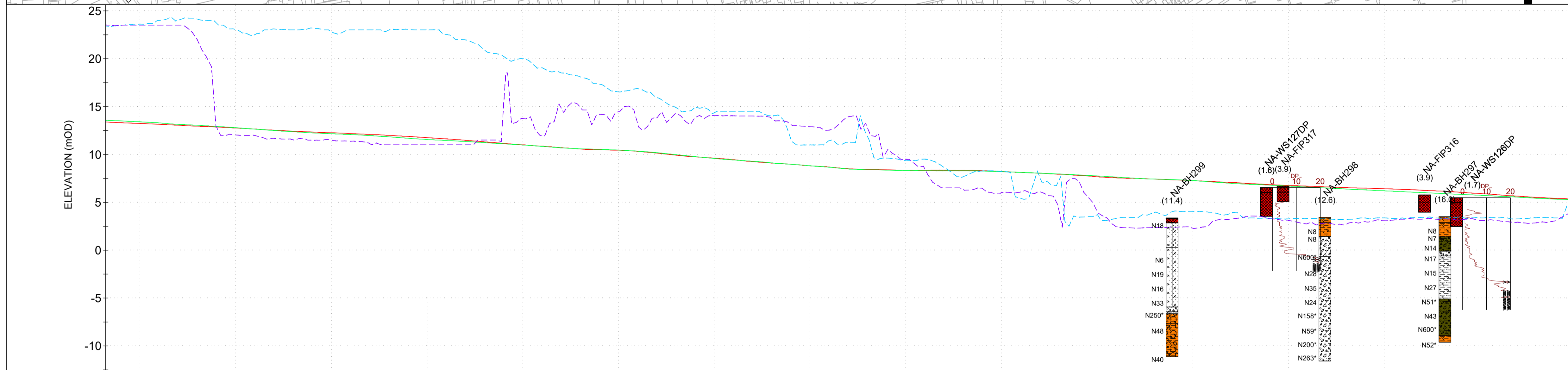
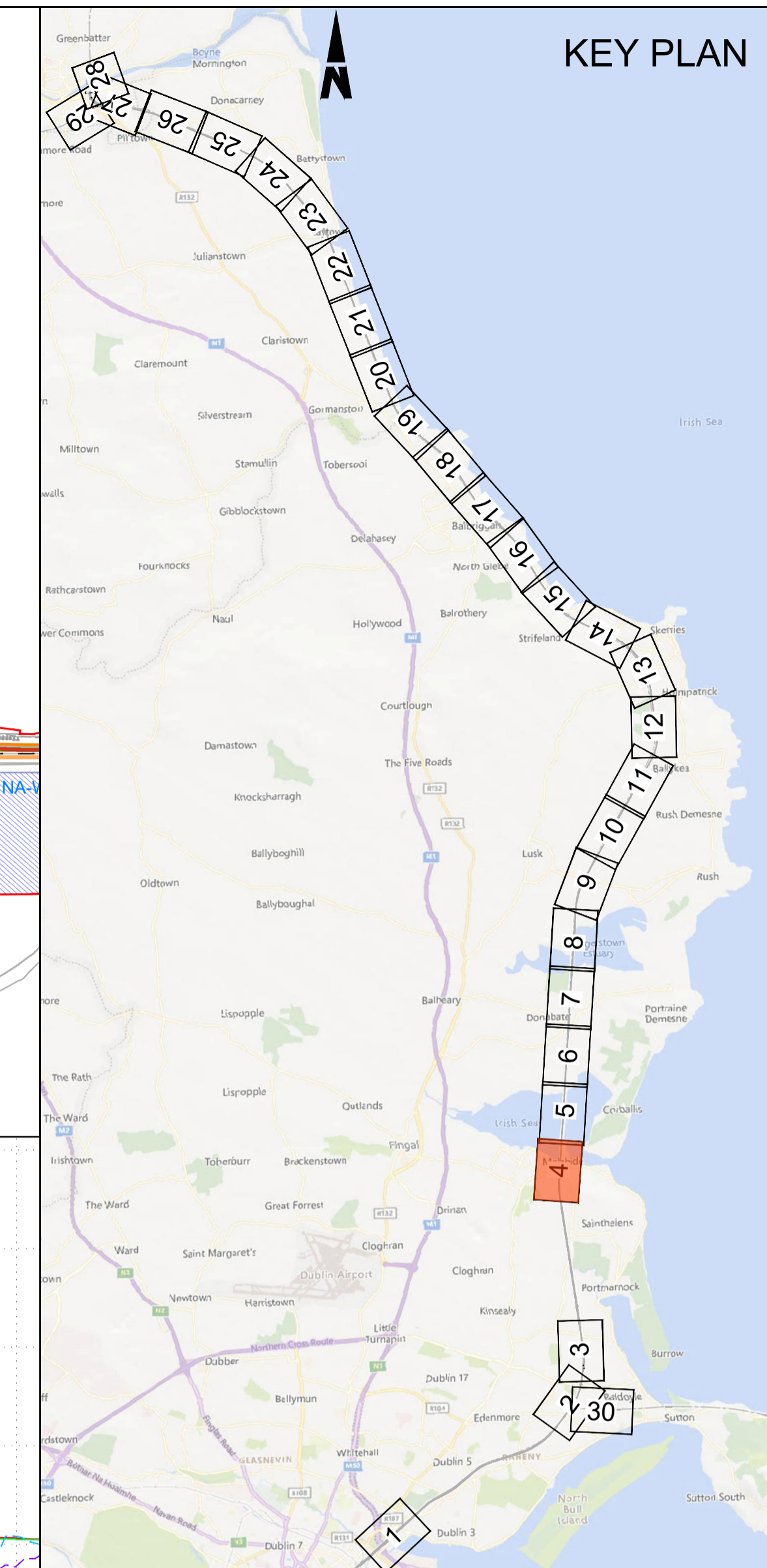
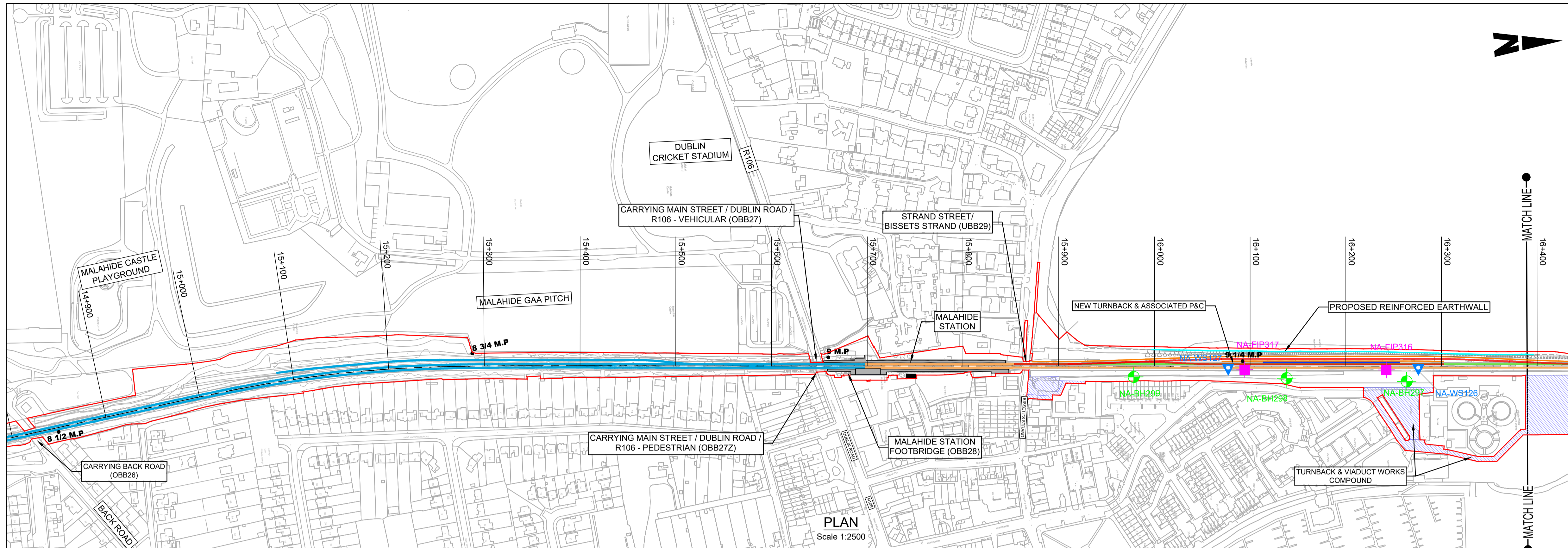
Project Code: D+WP56 Originator Code: ARP QMS Code: 280275-00

Project Title: **DART+ COASTAL NORTH**

Drawing Title: **PREFERRED OPTION - GEOLOGICAL PLAN & PROFILE CLONGRIFFIN STATION AND SURROUNDS**

Drawing File Name: D+WP56-ARP-P4-NL-DR-RO-900003 Sheet Number: 03 of 30 Status: S3 Rev: P01

DO NOT SCALE USE FIGURED DIMENSIONS ONLY



Chainage (m)	14900	15000	15100	15200	15300	15400	15500	15600	15700	15800	15900	16000	16100	16200	16300	16400
Down Main Levels (mOD)	13.237	12.764	12.268	11.760	11.010	10.441	9.622	8.816	8.347	8.230	7.675	7.271	6.760	6.422	5.928	5.333
Up Main Levels (mOD)	13.408	12.797	12.172	11.569	10.988	10.462	9.963	8.822	8.334	8.201	7.763	7.277	6.703	6.210	5.739	5.270

**LEGEND:**

**PLAN**

- TRACK CENTRE LINE
- NEW ELECTRIFICATION AND TRACK MODIFICATION IN EXISTING RAIL CORRIDOR
- EXISTING ELECTRIFIED RAIL CORRIDOR - MINIMAL OR NO WORKS REQUIRED
- NEW ELECTRIFICATION IN EXISTING RAIL CORRIDOR
- PROPOSED SUBSTATION
- CONSTRUCTION COMPOUND
- EXISTING STATION
- PROPOSED REINFORCED EARTHWALL

**GI SYMBOL**

- NA-BH: CABLE PERCUSSION
- NA-BH: CABLE PERCUSSION WITH S-GEOBOR
- NA-BH: CABLE PERCUSSION WITH ROTARY CORE FOLLOW-ON
- NA-BH: S-GEOBOR
- NA-BH: ROTARY CORE
- NA-SC: STRUCTURAL CORING
- NA-DP: DYNAMIC PROBING
- NA-WS: WINDOW SAMPLE AND DYNAMIC PROBING
- NA-FIP: FOUNDATION PIT INSPECTION
- NA-OP: OBSERVATION PIT
- NA-ST: SLIT TRENCH
- NA-SA: SOAK AWAY
- NA-TP: TRIAL PIT
- R1: ERT PROFILE
- S1: SEISMIC REFRACTION PROFILE
- NA-SRES: YES (SEE FACTUAL REPORTS FOR RESULTS)

**LEGEND:**

**PROFILE**

- Blow counts exceed 20
- Hole offset is +ve to the RIGHT of the section line, see Note 3.
- SPT N value, \* denotes N extrapolated: \* from main blows, \*\* from seating blows
- Typical Dynamic Probe plot with depth
- Hole ID
- Topographical data along railway boundary is ± 0.5m
- Down Main IÉ Boundary Ground Level (West)
- Up Main IÉ Boundary Ground Level (East)
- Down Main Levels
- Up Main Levels

**COLOUR LEGEND**

- Made Ground [MG]
- Railway Ballast [RB]
- Topssoil [TOP]
- Peat [Peat]
- Clay [Clay]
- Sand [Sand]
- Gravel [Gravel]
- Silt [Silt]
- Mudstone [Mud]
- Limestone [Lst]
- Diorite or Basalt [IN]
- Sandstone [SS]
- Siltstone [Sist]
- Conglomera [Cng]
- Breccia [BR]
- Weathered Rock [WrR]
- Masonry Wall [Masonry]
- Open Hole [OH]

**MATERIALS**

- Fill (MADE GROUND)
- Sandy gravelly CLAY
- SANDY GRAVELLY SILT
- SAND
- Silty gravelly SAND
- Silty sandy GRAVEL
- SANDY GRAVEL
- Made Ground - FILL
- SAND and GRAVEL
- SANDY GRAVELLY COBBLY CLAY
- SANDY CLAY
- Clayey sandy GRAVEL
- Silty sandy cobbly GRAVEL
- Silty sandy gravelly CLAY
- Silty sandy CLAY
- SANDY CLAY
- Clayey gravelly SAND
- Clayey silty sandy GRAVEL
- TOPSOIL
- Clayey SAND
- SANDSTONE
- Medium Grained Igneous
- MUDSTONE
- Silty SAND
- Clayey GRAVEL

**NOTE:**

- FACTUAL GROUND INVESTIGATION INFORMATION PRESENTED IS BASED ON CAUSEWAY GEOTECH LTD (2023), DART+ NORTH & BEMU STAGE A GROUND INVESTIGATION.
- VOLUME 1 - DROGHEDA STATION, DEPOT & BEMU, REPORT NO. 21-1711A, REV A10, OCTOBER 2023.
- VOLUME 2 - DROGHEDA TO MALAHIDE ELECTRIFICATION, REPORT NO. 21-1711B, REV A05, OCTOBER 2023, AND
- VOLUME 3 - MALAHIDE, CLONGRIFFIN & HOWTH JUNCTION, REPORT NO. 21-1711C, REV A06, OCTOBER 2023.

2. DOWN MAIN AND UP MAIN BOUNDARY LEVEL BASED ON TOPOGRAPHICAL LEVELS TAKEN FROM 2012 LIDAR ALONG IÉ PROPERTY BOUNDARY.

3. GEOLOGICAL STICK LOGS PRESENTED ON PROFILES ARE PROJECTED TO A CENTRE LINE BETWEEN THE UP AND DOWN MAIN LINES AND SHOULD BE READ WITH IN THE CONTEXT OF INCREASING CHAINAGE.

4. DYNAMIC PROBES PRESENTED ARE DPSH-B AND RESULTS RELATE TO BLOW COUNTS PER 100mm.

Rev	Date	Drn	Chk'd	App'd	Description
P01	20/11/2023	EAM	RS	MF	PLANNING ISSUE

**Client**

**Iarnród Éireann Irish Rail**

**Engineering Designer**

**ARUP**

Date: 06/07/2023 | Scale: 1:1250 @ A1, 1:2500 @ A3

Drawn: SR | Checked: RS | Approved: MF

Project Code: D+WP56 | Originator Code: ARP | QMS Code: 280275-00

**Project Title**

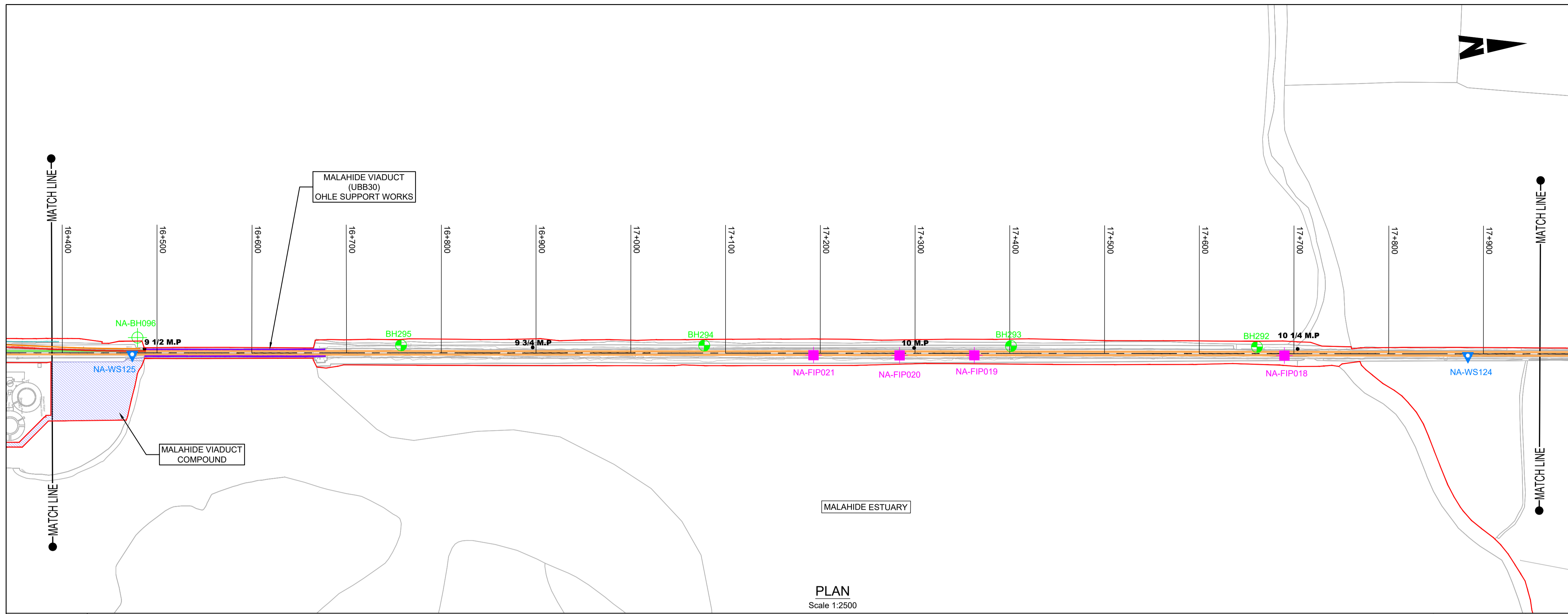
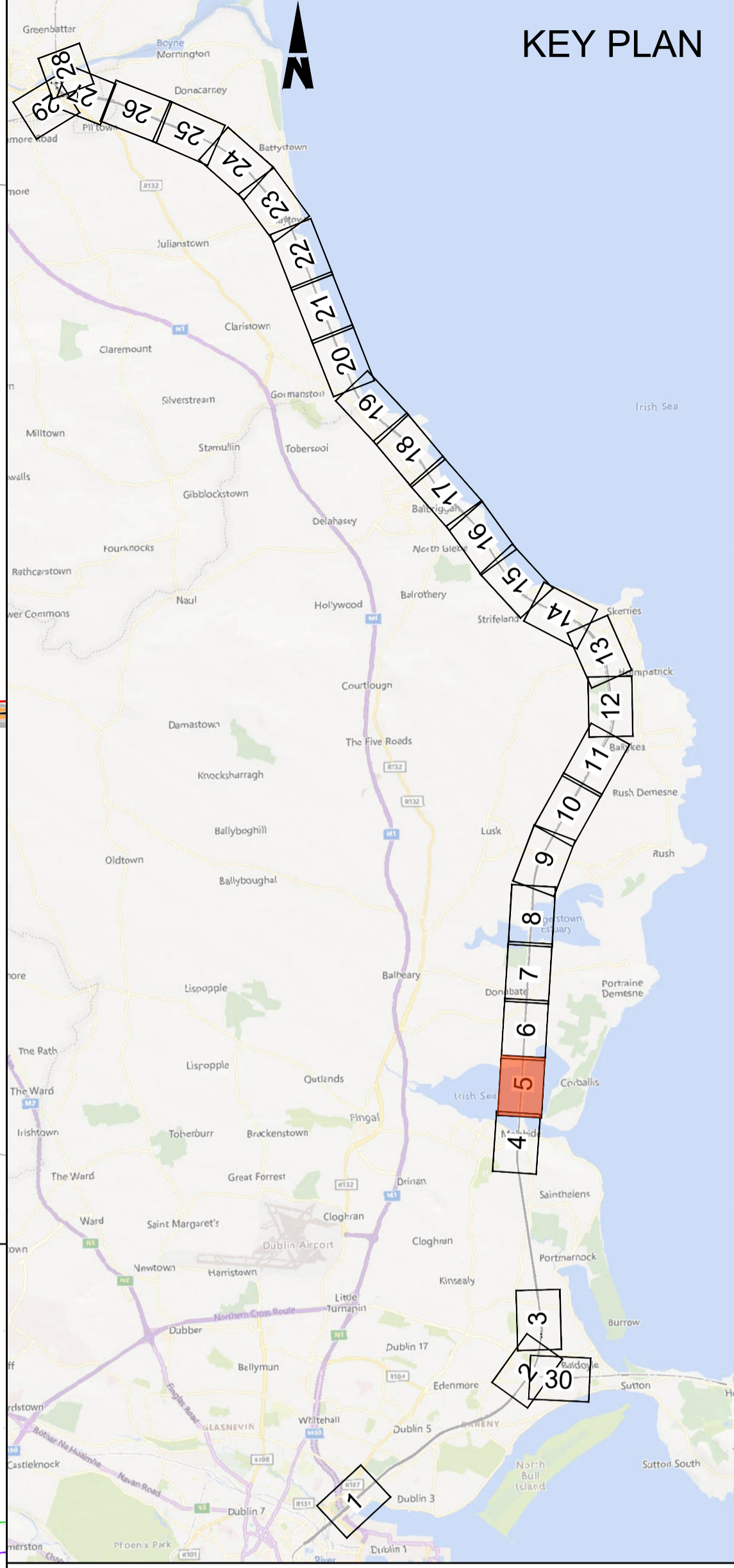
**DART+ COASTAL NORTH**

**Drawing Title**

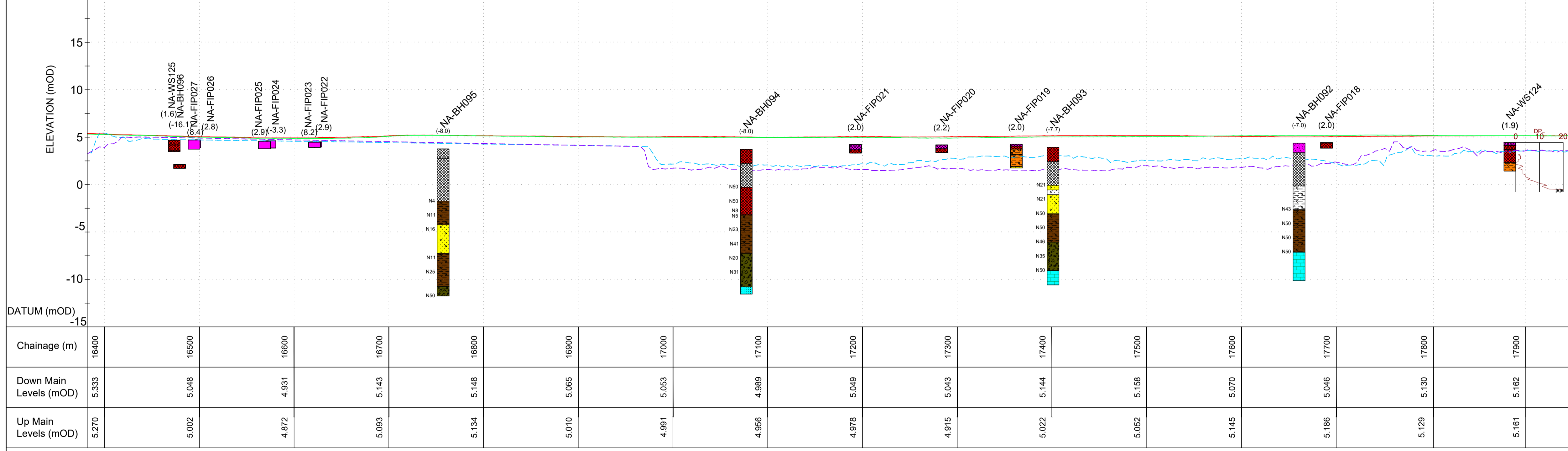
**PREFERRED OPTION - GEOLOGICAL PLAN & PROFILE MALAHIDE STATION AND SURROUNDS**

Drawing File Name: D+WP56-ARP-P4-NL-DR-RO-900004 | Sheet Number: 04 of 30 | Status: S3 | Rev: P01

DO NOT SCALE USE FIGURED DIMENSIONS ONLY



PLAN Scale 1:2500



PROFILE SCALE 1:2500 (H) 1:250 (V)

LEGEND: TRACK CENTRE LINE, NEW ELECTRIFICATION AND TRACK MODIFICATION IN EXISTING RAIL CORRIDOR, EXISTING ELECTRIFIED RAIL CORRIDOR - MINIMAL OR NO WORKS REQUIRED, NEW ELECTRIFICATION IN EXISTING RAIL CORRIDOR, PROPOSED SUBSTATION, CONSTRUCTION COMPOUND, EXISTING STATION, OHLE SUPPORT ON VIADUCT. Includes GI SYMBOL and COLOUR LEGEND.

NOTE: 1. FACTUAL GROUND INVESTIGATION INFORMATION PRESENTED IS BASED ON CAUSEWAY GEOTECH LTD (2023), DART+ NORTH & BEMU STAGE A GROUND INVESTIGATION... 2. DOWN MAIN AND UP MAIN BOUNDARY LEVEL BASED ON TOPOGRAPHICAL LEVELS TAKEN FROM 2012 LIDAR ALONG IE PROPERTY BOUNDARY... 3. GEOLOGICAL STICK LOGS PRESENTED ON PROFILES ARE PROJECTED TO A CENTRE LINE BETWEEN THE UP AND DOWN MAIN LINES AND SHOULD BE READ WITH IN THE CONTEXT OF INCREASING CHAINAGE... 4. DYNAMIC PROBES PRESENTED ARE DP5H-B AND RESULTS RELATE TO BLOW COUNTS PER 100MM.

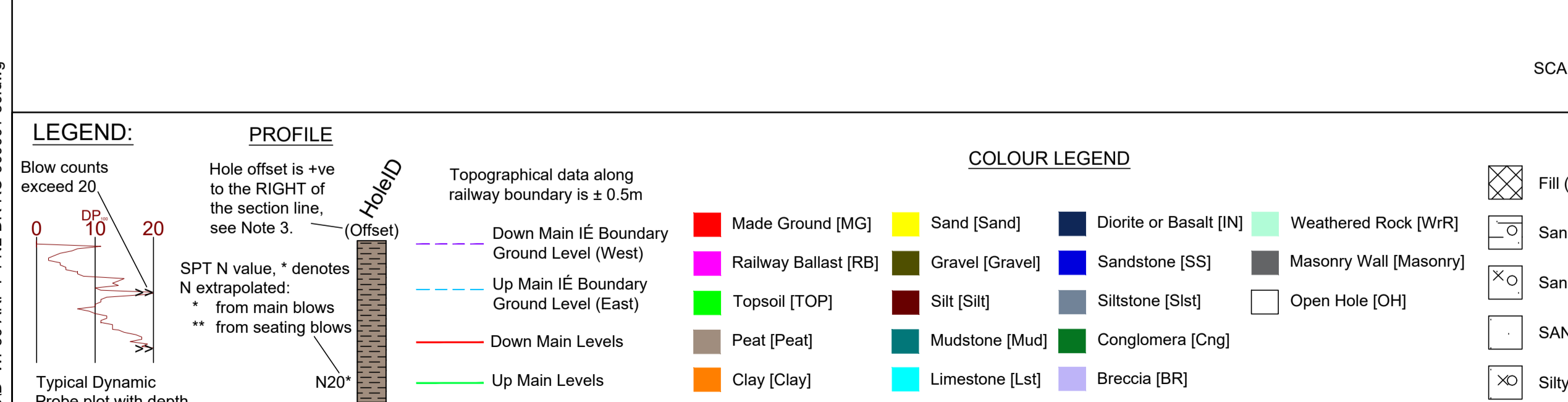
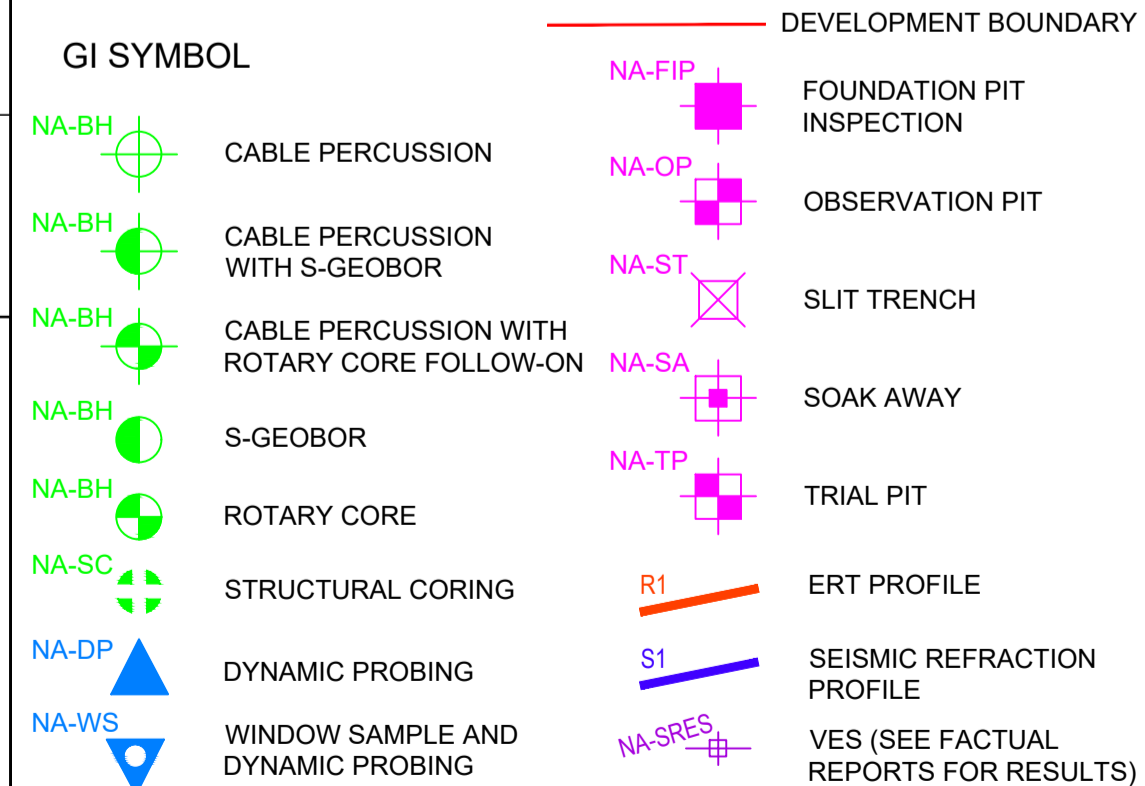
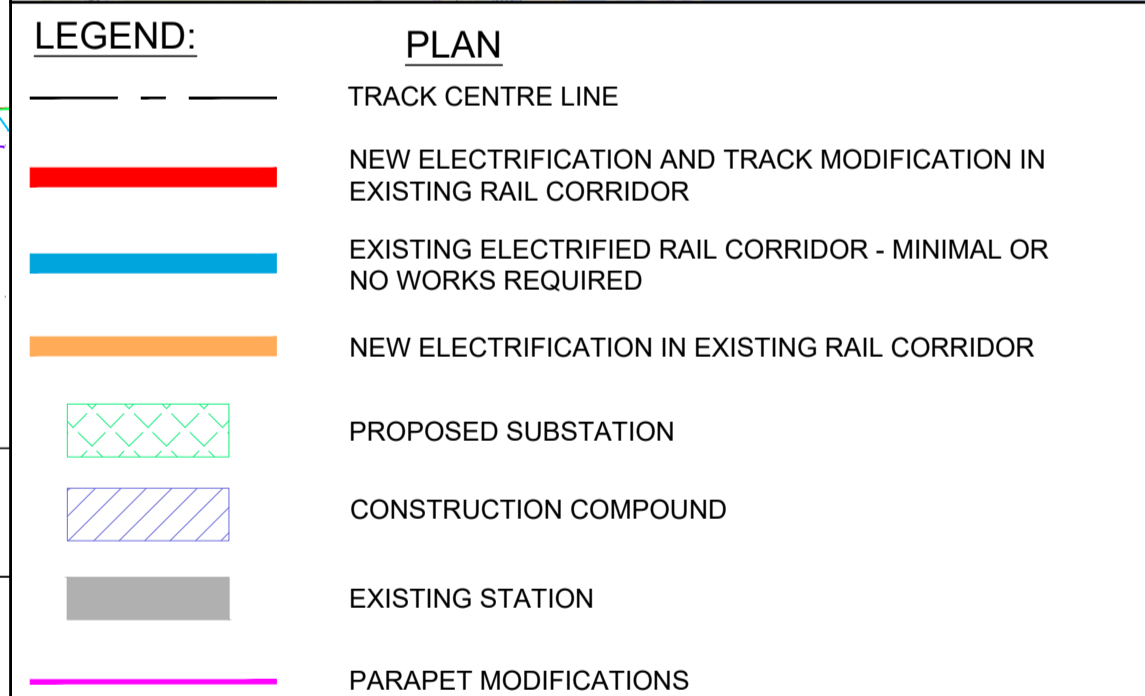
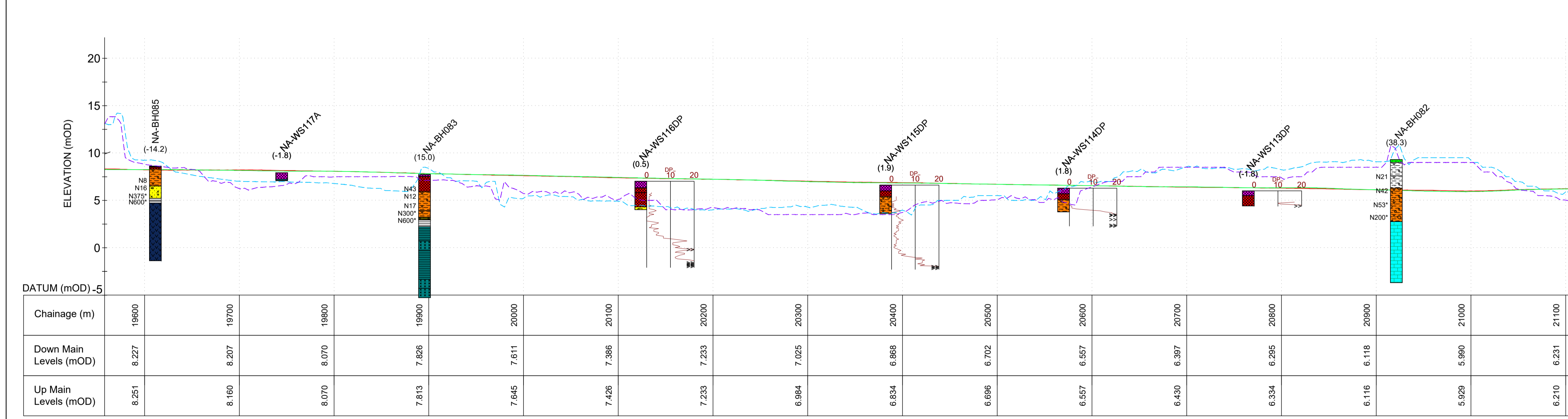
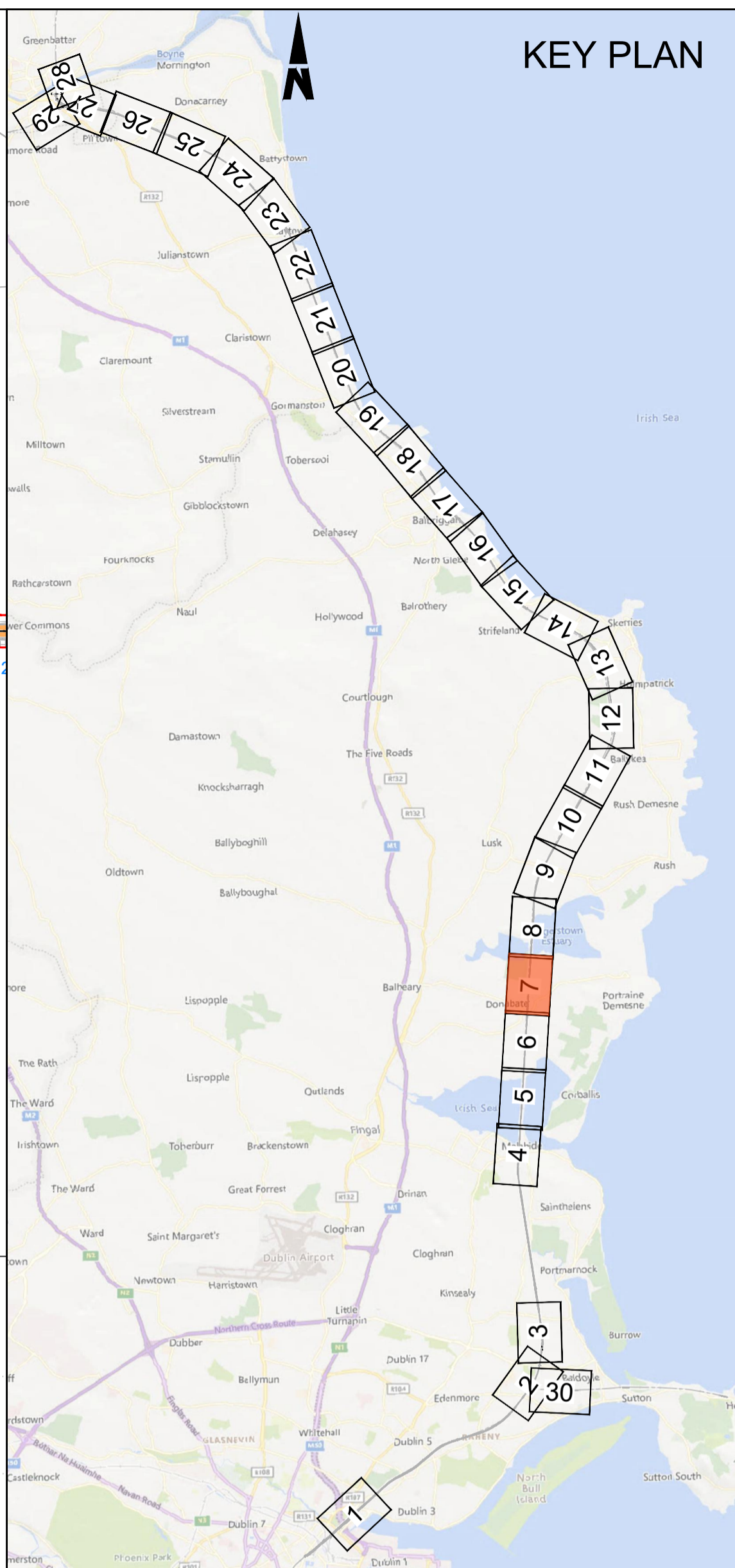
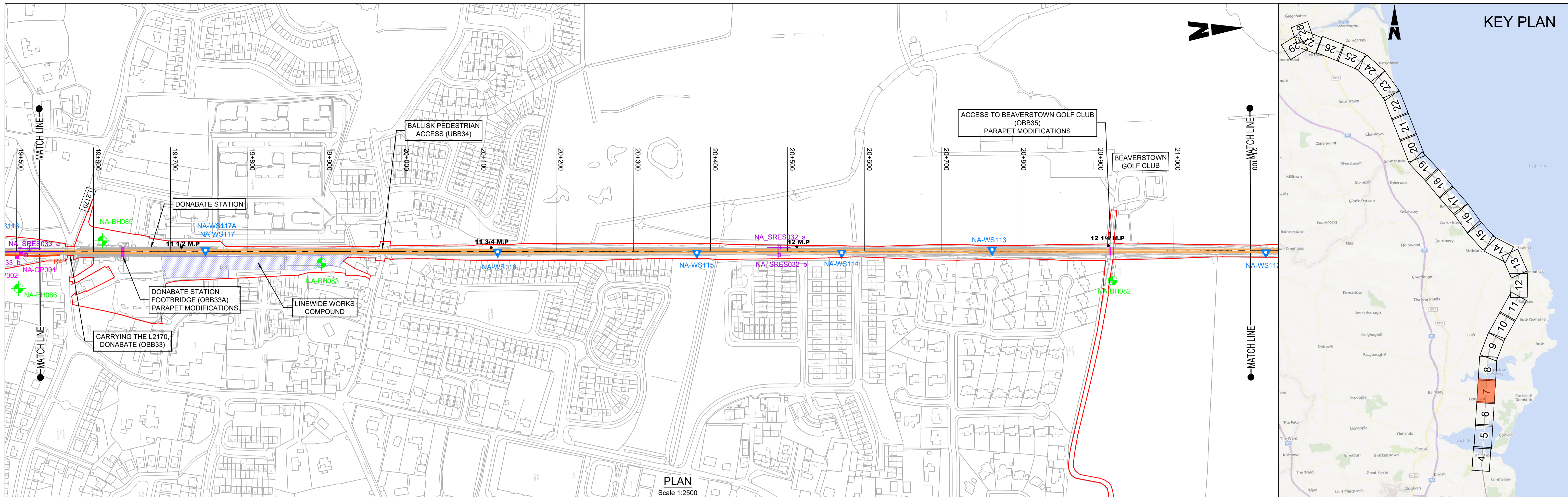


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Client: Iarnród Éireann Irish Rail. Engineering Designer: ARUP. Date: 06/07/2023. Scale: 1:2500 @ A1, 1:5000 @ A3. Drawn: SR, Checked: MT, Approved: MF.

Project Title: DART+ COASTAL NORTH. Drawing Title: PREFERRED OPTION - GEOLOGICAL PLAN & PROFILE MALAHIDE VIADUCT AND SURROUNDS. Drawing File Name: D+WP56-ARP-P4-NL-DR-RO-900005. Sheet Number: 05 of 30. Status: S3. Rev: P01.





**NOTE:**

- FACTUAL GROUND INVESTIGATION INFORMATION PRESENTED IS BASED ON CAUSEWAY GEOTECH LTD (2023), DART+ NORTH & BEMU STAGE A GROUND INVESTIGATION.
  - VOLUME 1 - DROGHEDA STATION, DEPOT & BEMU, REPORT NO. 21-1711A, REV A10, OCTOBER 2023;
  - VOLUME 2 - DROGHEDA TO MALAHIDE ELECTRIFICATION, REPORT NO. 21-1711B, REV A05, OCTOBER 2023; AND
  - VOLUME 3 - MALAHIDE, CLONGRIFFIN & HOWTH JUNCTION, REPORT NO. 21-1711C, REV A06, OCTOBER 2023.
- DOWN MAIN AND UP MAIN BOUNDARY LEVEL BASED ON TOPOGRAPHICAL LEVELS TAKEN FROM 2012 LIDAR ALONG IE PROPERTY BOUNDARY.
- GEOLOGICAL STICK LOGS PRESENTED ON PROFILES ARE PROJECTED TO A CENTRE LINE BETWEEN THE UP AND DOWN MAIN LINES AND SHOULD BE READ WITH IN THE CONTEXT OF INCREASING CHAINAGE.
- DYNAMIC PROBES PRESENTED ARE DPHS-B AND RESULTS RELATE TO BLOW COUNTS PER 100MM.

Rev	Date	Drn	Chk'd	App'd	Description
P01	20/11/2023	EAM	MT	MF	PLANNING ISSUE

Client: **Iarnród Éireann Irish Rail**

Engineering Designer: **ARUP**

Date: 06/07/2023 | Scale: 1:2500 @ A1, 1:5000 @ A3

Project Code: D+WP56 | Originator Code: ARP

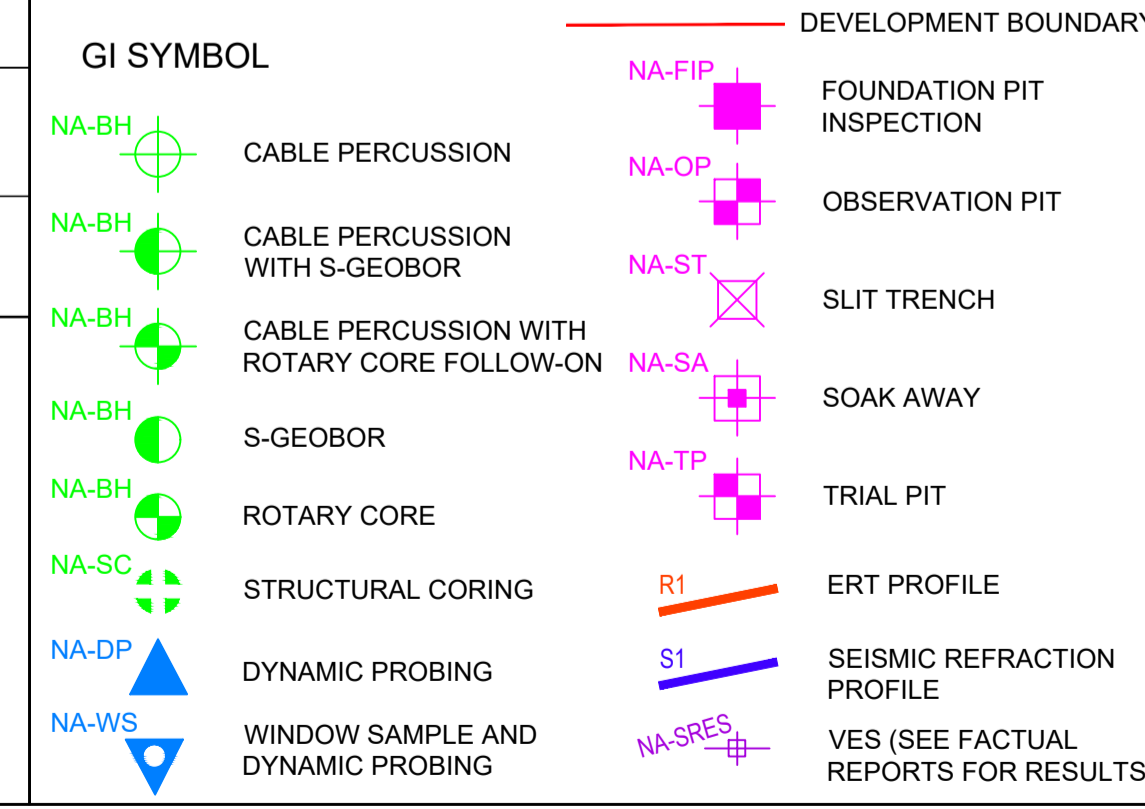
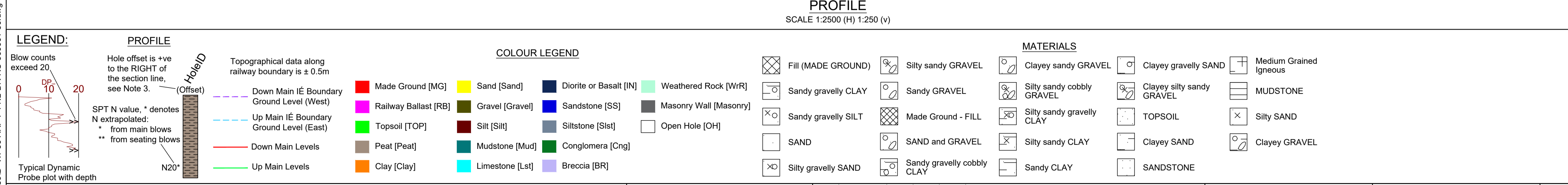
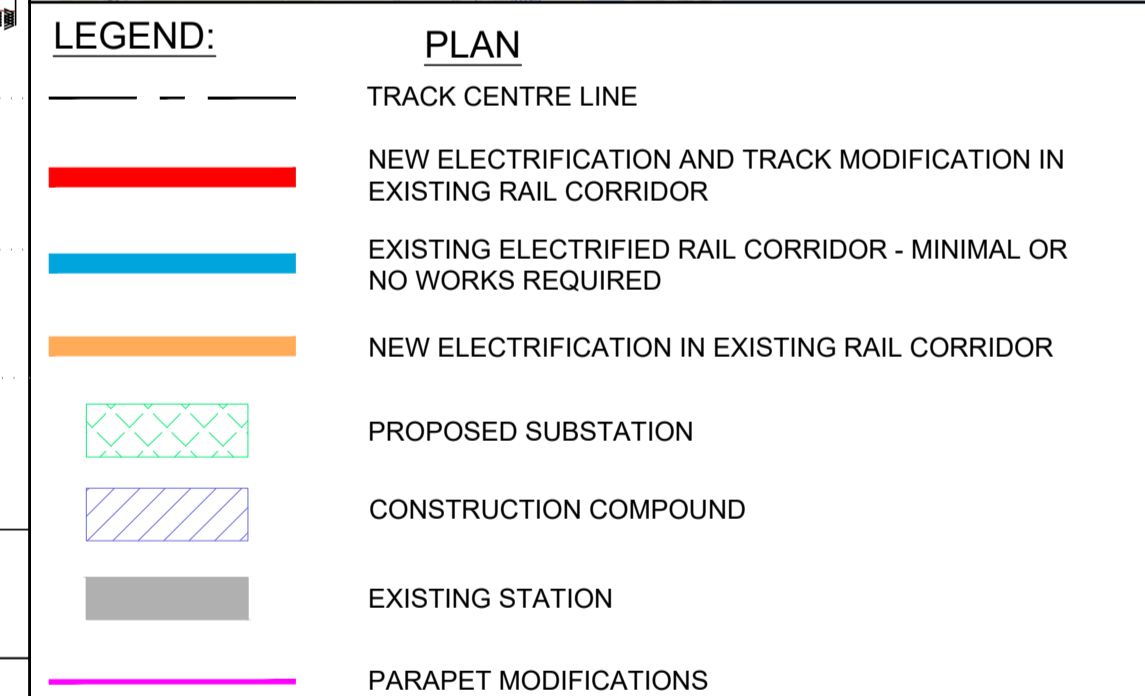
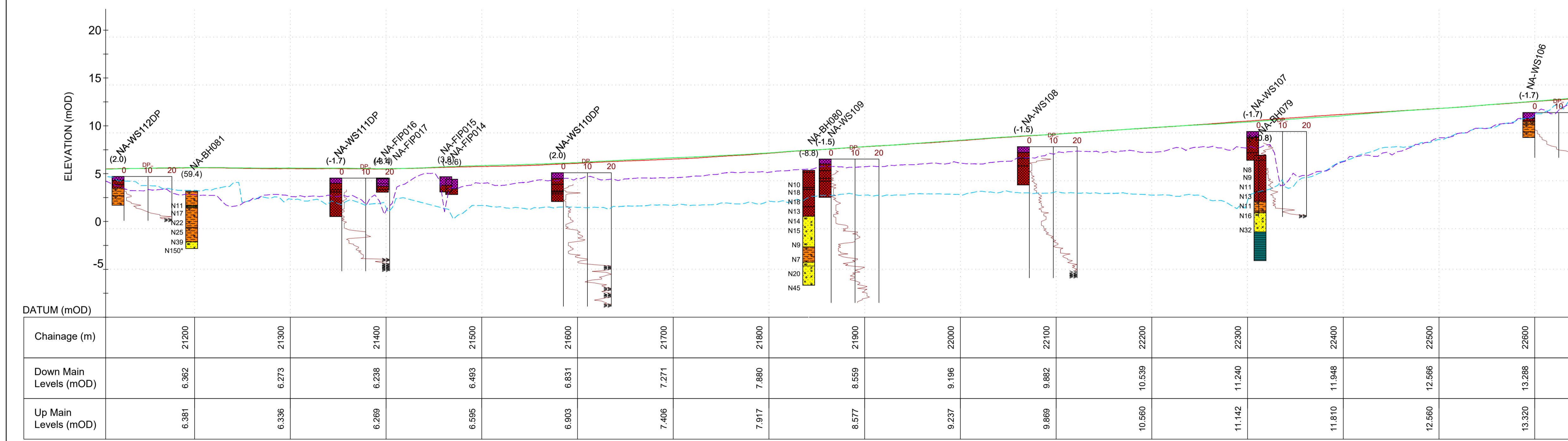
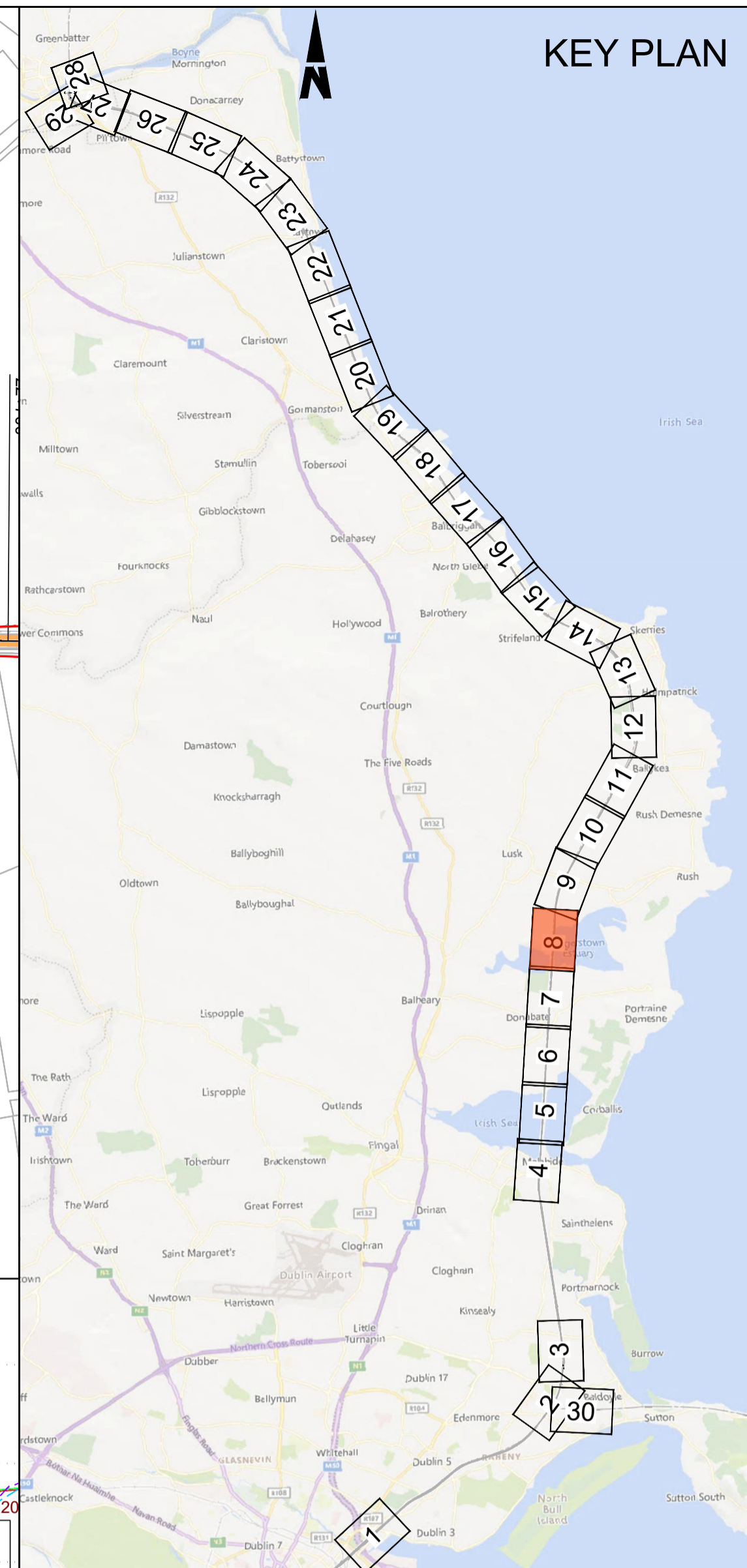
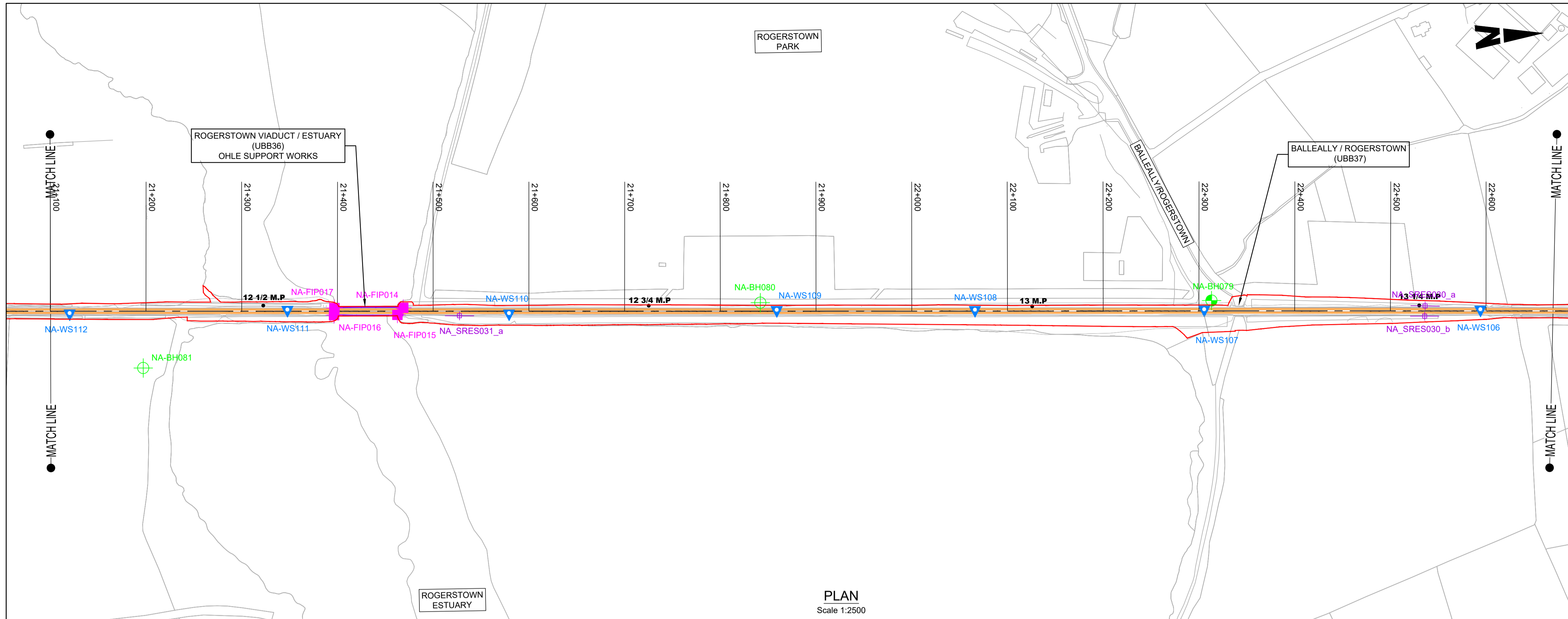
QMS Code: 280275-00

Project Title		Drawing Title		Drawing File Name		Sheet Number	Status	Rev
DART+ COASTAL NORTH		PREFERRED OPTION - GEOLOGICAL PLAN & PROFILE DONABATE STATION AND SURROUNDS		D+WP56-ARP-P4-NL-DR-RO-900007		07 of 30	S3	P01

DO NOT SCALE USE FIGURED DIMENSIONS ONLY

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NOTE:

- FACTUAL GROUND INVESTIGATION INFORMATION PRESENTED IS BASED ON CAUSEWAY GEOTECH LTD (2023), DART+ NORTH & BEMU STAGE A GROUND INVESTIGATION:
  - VOLUME 1 - DROGHEDA STATION, DEPOT & BEMU, REPORT NO. 21-1711A, REV A10, OCTOBER 2023;
  - VOLUME 2 - DROGHEDA TO MALAHIDE ELECTRIFICATION, REPORT NO. 21-1711B, REV A05, OCTOBER 2023; AND
  - VOLUME 3 - MALAHIDE, CLONGRIFFIN & HOWTH JUNCTION, REPORT NO. 21-1711C, REV A06, OCTOBER 2023.
- DOWN MAIN AND UP MAIN BOUNDARY LEVEL BASED ON TOPOGRAPHICAL LEVELS TAKEN FROM 2012 LIDAR ALONG IE PROPERTY BOUNDARY.
- GEOLOGICAL STICK LOGS PRESENTED ON PROFILES ARE PROJECTED TO A CENTRE LINE BETWEEN THE UP AND DOWN MAIN LINES AND SHOULD BE READ WITH IN THE CONTEXT OF INCREASING CHAINAGE.
- DYNAMIC PROBES PRESENTED ARE DPHS-B AND RESULTS RELATE TO BLOW COUNTS PER 100mm.



Rev	Date	Drn	Chk'd	App'd	Description
P01	20/11/2023	EAM	MT	MF	PLANNING ISSUE

Client: **Iarnród Éireann Irish Rail**

Engineering Designer: **ARUP**

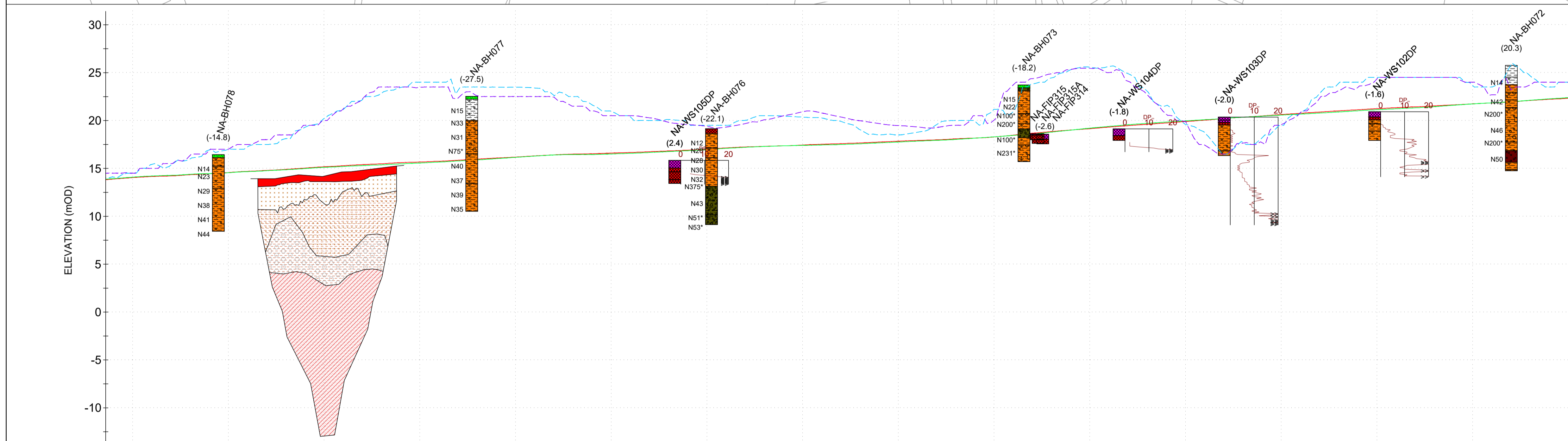
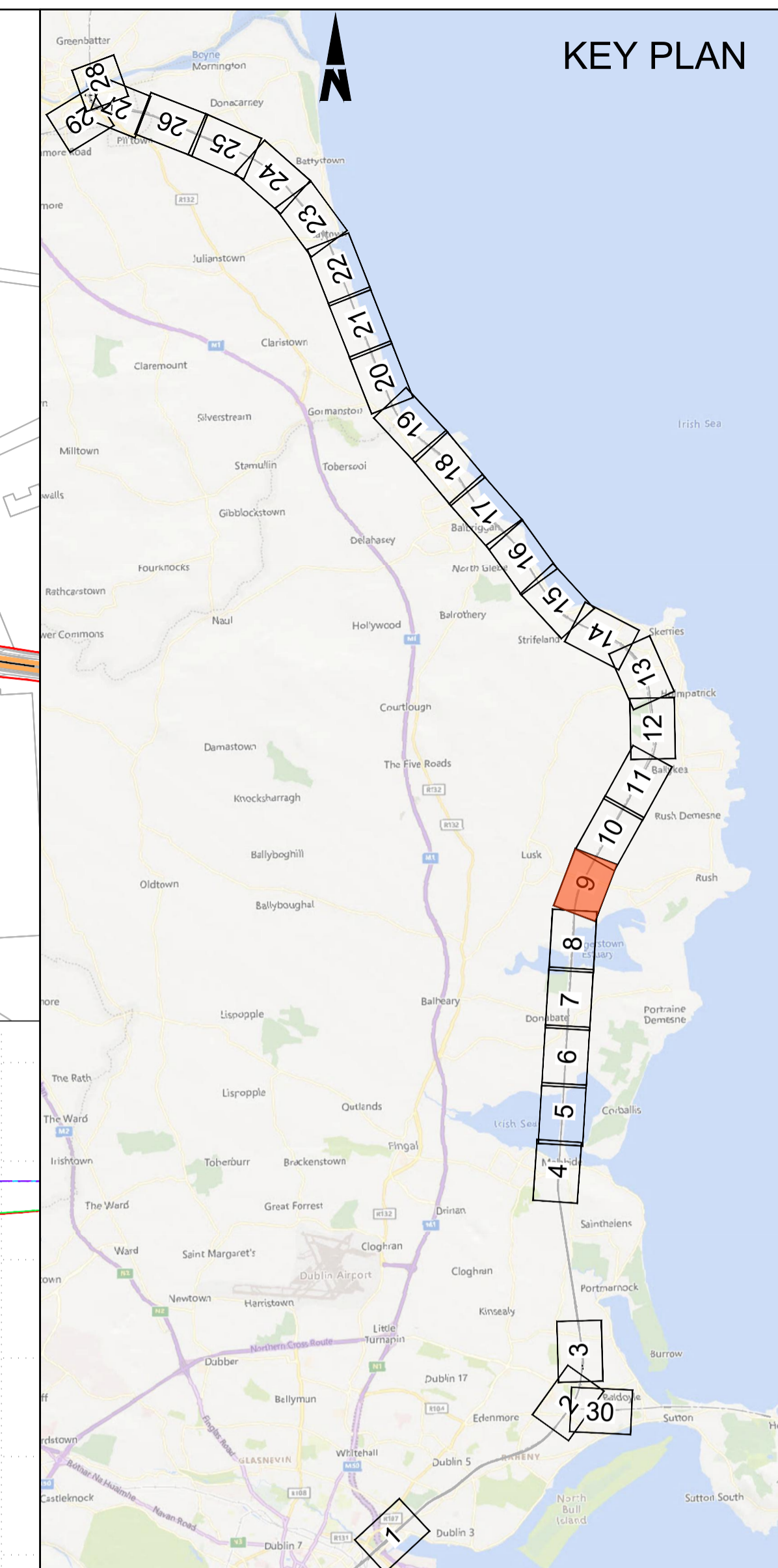
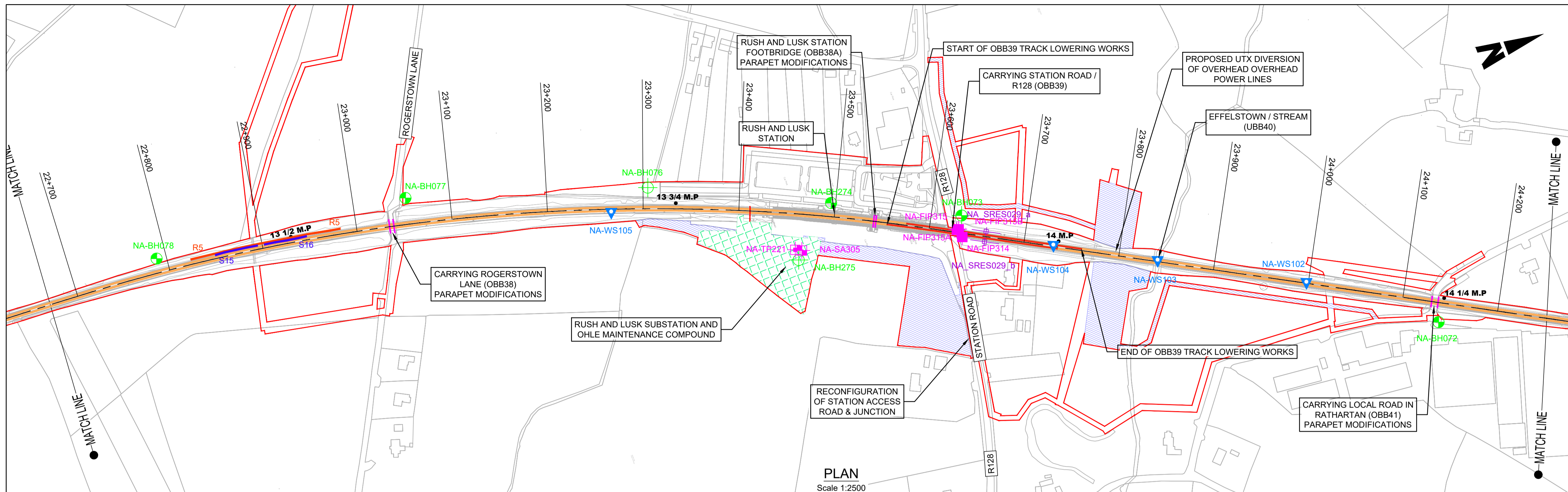
Date: 06/07/2023 Scale: 1:2500 @ A1, 1:5000 @ A3

Drawn: SR Checked: MT Approved: MF

Project Code: D+WP56 Originator Code: ARP QMS Code: 280275-00

Project Title: <b>DART+ COASTAL NORTH</b>			
Drawing Title: <b>PREFERRED OPTION - GEOLOGICAL PLAN &amp; PROFILE DONABATE STATION AND SURROUNDS</b>			
Drawing File Name: <b>D+WP56-ARP-P4-NL-DR-RO-900008</b>	Sheet Number: <b>08 of 30</b>	Status: <b>S3</b>	Rev: <b>P01</b>

DO NOT SCALE USE FIGURED DIMENSIONS ONLY



Chainage (m)	22700	22800	22900	23000	23100	23200	23300	23400	23500	23600	23700	23800	23900	24000	24100	24200
Down Main Levels (mOD)	14.041	14.567	15.187	15.666	16.185	16.598	17.016	17.441	17.842	18.280	19.145	19.895	20.625	21.234	21.740	22.326
Up Main Levels (mOD)	14.085	14.544	15.111	15.560	16.150	16.502	16.968	17.405	17.750	18.296	19.203	19.962	20.568	21.126	21.732	22.389

**LEGEND:**

**PLAN**

- TRACK CENTRE LINE
- NEW ELECTRIFICATION AND TRACK MODIFICATION IN EXISTING RAIL CORRIDOR
- EXISTING ELECTRIFIED RAIL CORRIDOR - MINIMAL OR NO WORKS REQUIRED
- NEW ELECTRIFICATION IN EXISTING RAIL CORRIDOR
- PROPOSED SUBSTATION
- CONSTRUCTION COMPOUND
- EXISTING STATION
- PARAPET MODIFICATIONS

**GI SYMBOL**

- NA-BH Cable Percussion
- NA-BH Cable Percussion with S-Geobor
- NA-BH Cable Percussion with Rotary Core Follow-on
- NA-BH S-Geobor
- NA-BH Rotary Core
- NA-SC Structural Coring
- NA-DP Dynamic Probing
- NA-WS Window Sample and Dynamic Probing
- NA-FIP Foundation Pit Inspection
- NA-OP Observation Pit
- NA-ST Slit Trench
- NA-SA Soak Away
- NA-TP Trial Pit
- R1 ERT Profile
- S1 Seismic Refraction Profile
- NA-SRES Yes (See Factual Reports for Results)

**LEGEND:**

**PROFILE**

- Blow counts exceed 20
- Hole offset is +ve to the RIGHT of the section line, see Note 3.
- SPT N value, \* denotes N extrapolated:
  - \* from main blows
  - \*\* from seating blows
- Typical Dynamic Probe plot with depth
- Hole ID
- Topographical data along railway boundary is ± 0.5m
- Down Main IE Boundary Ground Level (West)
- Up Main IE Boundary Ground Level (East)
- Down Main Levels
- Up Main Levels

**COLOUR LEGEND**

- Made Ground [MG]
- Railway Ballast [RB]
- Topsoil [TOP]
- Peat [Peat]
- Clay [Clay]
- Sand [Sand]
- Gravel [Gravel]
- Silt [Silt]
- Mudstone [Mud]
- Limestone [Lst]
- Diorite or Basalt [IN]
- Sandstone [SS]
- Siltstone [Sist]
- Masonry Wall [Masonry]
- Open Hole [OH]
- Weathered Rock [WrR]
- Masonry Wall [Masonry]
- Open Hole [OH]

**MATERIALS**

- Fill (MADE GROUND)
- Sandy gravelly CLAY
- SANDY GRAVELLY SILT
- SAND
- Silty gravelly SAND
- Silty sandy GRAVEL
- SANDY GRAVEL
- Made Ground - FILL
- SAND and GRAVEL
- SANDY GRAVELLY COBBLY CLAY
- SANDY CLAY
- Clayey sandy GRAVEL
- Silty sandy cobbly GRAVEL
- Clayey silty sandy GRAVEL
- TOPSOIL
- Clayey SAND
- SANDSTONE
- Medium Grained Igneous
- MUDSTONE
- Silty SAND
- Clayey GRAVEL

**GEOPHYSICAL (for factual data refer to Note 1)**

- Soft SILT/CLAY
- Firm - Stiff SILT/CLAY
- Stiff-Very Stiff SILT/CLAY
- Stiff-Very Stiff sandy gravelly SILT/CLAY
- Slightly weathered - Fresh SANDSTONE/SILTSTONE

**NOTE:**

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  - VOLUME 1 - DROGHEDA STATION, DEPOT & BEMU, REPORT NO. 21-1711A, REV A10, OCTOBER 2023;
  - VOLUME 2 - DROGHEDA TO MALAHIDE ELECTRIFICATION, REPORT NO. 21-1711B, REV A05, OCTOBER 2023; AND
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- DYNAMIC PROBES PRESENTED ARE DPSH-B AND RESULTS RELATE TO BLOW COUNTS PER 100MM.

**Rev** | **Date** | **Drn** | **Chk'd** | **App'd** | **Description**

P01	20/11/2023	EAM	MT	MF	PLANNING ISSUE
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**Client** | **Engineering Designer** | **Project Title**

**Client:** Iarnród Éireann Irish Rail | **Engineering Designer:** ARUP | **Project Title:** DART+ COASTAL NORTH

**Date:** 06/07/2023 | **Scale:** 1:2500 @ A1, 1:5000 @ A3 | **Drawn:** SR | **Checked:** MT | **Approved:** MF

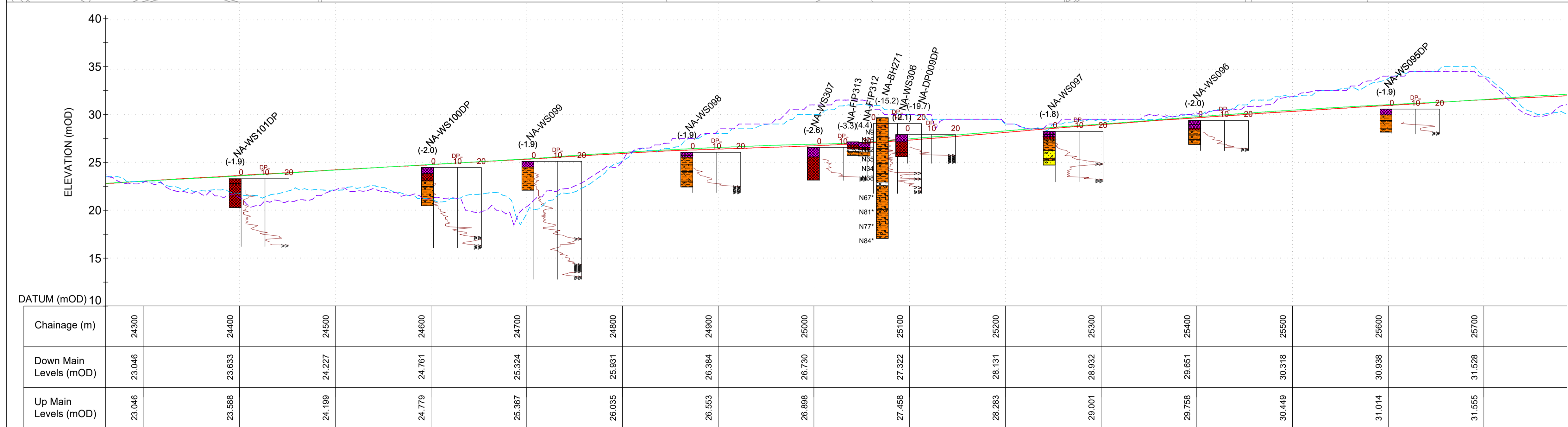
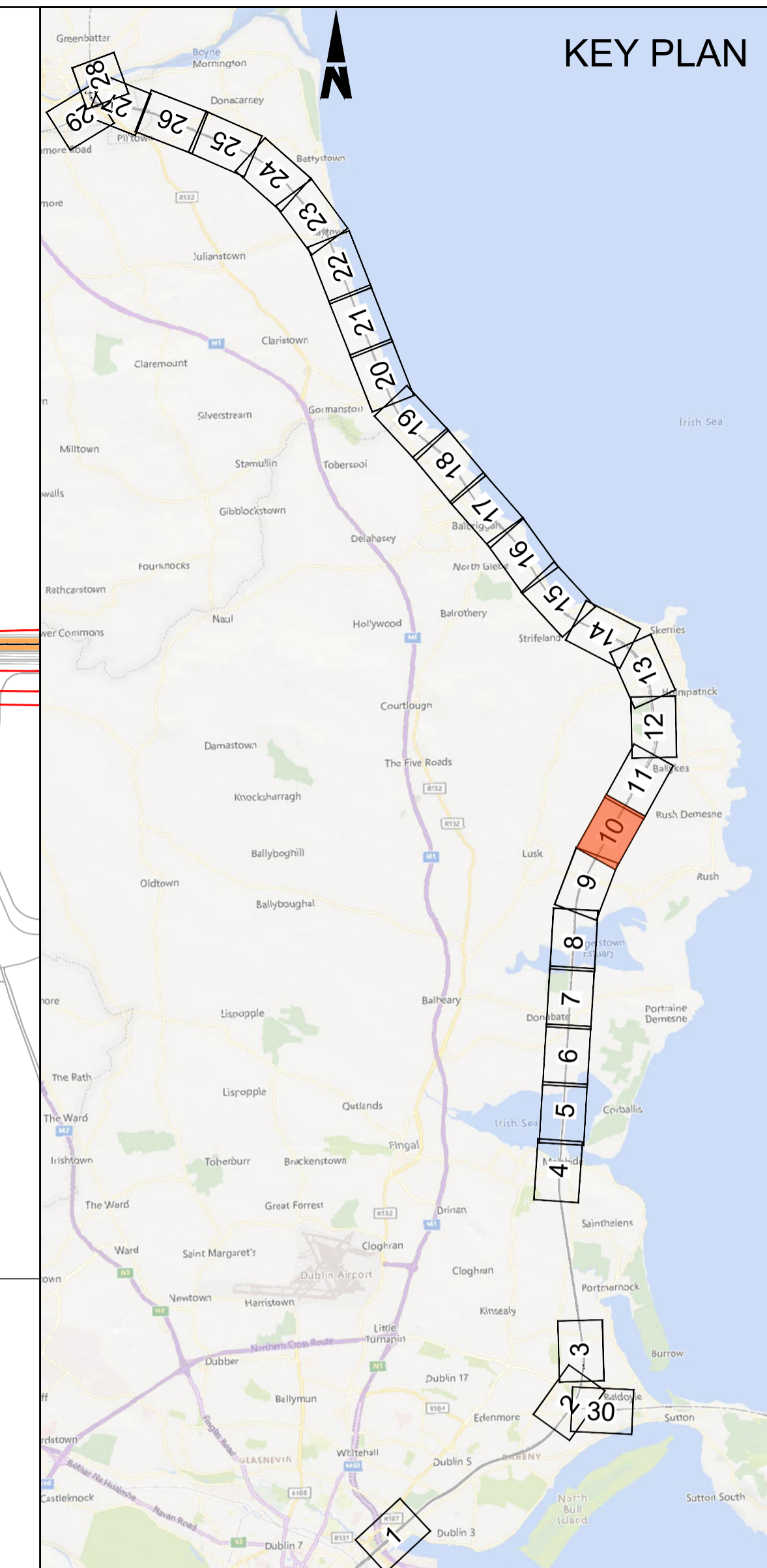
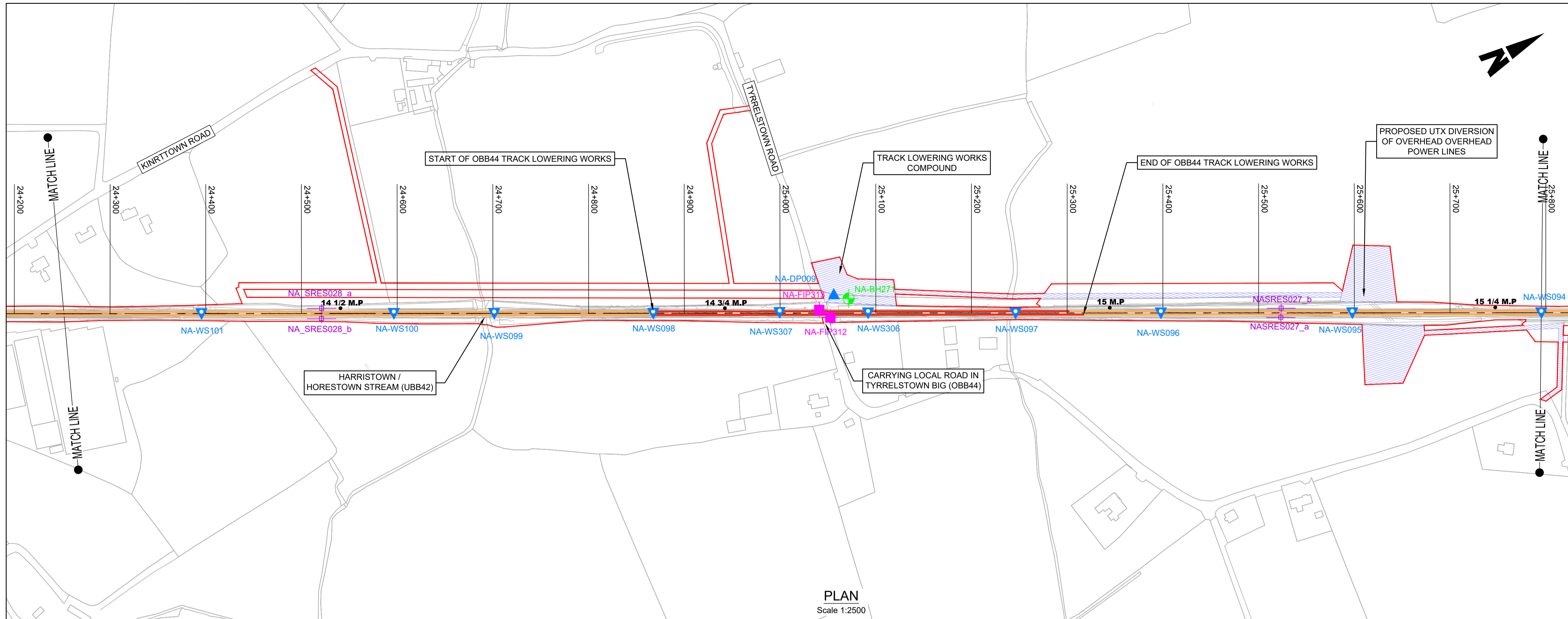
**Project Code:** D+WP56 | **Originator Code:** ARP | **QMS Code:** 280275-00

**Drawing Title:** PREFERRED OPTION - GEOLOGICAL PLAN & PROFILE RUSH AND LUSK STATION AND SURROUNDS

**Drawing File Name:** D+WP56-ARP-P4-NL-DR-RO-900009 | **Sheet Number:** 09 of 30 | **Status:** S3 | **Rev:** P01

DO NOT SCALE USE FIGURED DIMENSIONS ONLY

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Chainage (m)	24300	24400	24500	24600	24700	24800	24900	25000	25100	25200	25300	25400	25500	25600	25700
Down Main Levels (mOD)	23.046	23.633	24.227	24.761	25.324	25.931	26.384	26.730	27.322	28.131	28.932	29.651	30.318	30.938	31.528
Up Main Levels (mOD)	23.046	23.588	24.199	24.779	25.367	26.035	26.553	26.898	27.458	28.283	29.001	29.758	30.449	31.014	31.555

**LEGEND:**

**PLAN**

- TRACK CENTRE LINE
- NEW ELECTRIFICATION AND TRACK MODIFICATION IN EXISTING RAIL CORRIDOR
- EXISTING ELECTRIFIED RAIL CORRIDOR - MINIMAL OR NO WORKS REQUIRED
- NEW ELECTRIFICATION IN EXISTING RAIL CORRIDOR
- PROPOSED SUBSTATION
- CONSTRUCTION COMPOUND
- EXISTING STATION
- PARAPET MODIFICATIONS

**GI SYMBOL**

- NA-BH CABLE PERCUSSION
- NA-BH CABLE PERCUSSION WITH S-GEOBOR
- NA-BH CABLE PERCUSSION WITH ROTARY CORE FOLLOW-ON
- NA-BH S-GEOBOR
- NA-BH ROTARY CORE
- NA-SC STRUCTURAL CORING
- NA-DP DYNAMIC PROBING
- NA-WS WINDOW SAMPLE AND DYNAMIC PROBING
- NA-FIP FOUNDATION PIT INSPECTION
- NA-OP OBSERVATION PIT
- NA-ST SLIT TRENCH
- NA-SA SOAK AWAY
- NA-TP TRIAL PIT
- R1 ERT PROFILE
- S1 SEISMIC REFRACTION PROFILE
- NA-SRES VES (SEE FACTUAL REPORTS FOR RESULTS)

**LEGEND:**

**PROFILE**

- Blow counts exceed 20
- Hole offset is +ve to the RIGHT of the section line, see Note 3.
- SPT N value, \* denotes N extrapolated: \* from main blows, \*\* from seating blows
- Typical Dynamic Probe plot with depth
- Offset
- Topographical data along railway boundary is ± 0.5m
- Down Main IÉ Boundary Ground Level (West)
- Up Main IÉ Boundary Ground Level (East)
- Down Main Levels
- Up Main Levels

**COLOUR LEGEND**

- Made Ground [MG]
- Railway Ballast [RB]
- Topsail [TOP]
- Peat [Peat]
- Clay [Clay]
- Sand [Sand]
- Gravel [Gravel]
- Silt [Silt]
- Mudstone [Mud]
- Limestone [Lst]
- Diorite or Basalt [IN]
- Sandstone [SS]
- Siltstone [Sist]
- Conglomera [Cng]
- Breccia [BR]
- Weathered Rock [WrR]
- Masonry Wall [Masonry]
- Open Hole [OH]

**MATERIALS**

- Fill (MADE GROUND)
- Sandy gravelly CLAY
- SANDY GRAVELLY SILT
- SAND
- Silty gravelly SAND
- Silty sandy GRAVEL
- SANDY GRAVEL
- Made Ground - FILL
- SAND and GRAVEL
- SANDY GRAVELLY COBBLY CLAY
- SANDY CLAY
- Clayey sandy GRAVEL
- Silty sandy cobbly GRAVEL
- Silty sandy gravelly CLAY
- Silty sandy CLAY
- SANDY CLAY
- Clayey gravelly SAND
- Clayey silty sandy GRAVEL
- TOPSOIL
- Clayey SAND
- SANDSTONE
- Medium Grained Igneous
- MUDSTONE
- Silty SAND
- Clayey GRAVEL

**NOTE:**

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Rev	Date	Drn	Chk'd	App'd	Description
P01	20/11/2023	EAM	MT	MF	PLANNING ISSUE

Client: **Iarnród Éireann Irish Rail**

Engineering Designer: **ARUP**

Date: 06/07/2023 | Scale: 1:2500 @ A1, 1:5000 @ A3

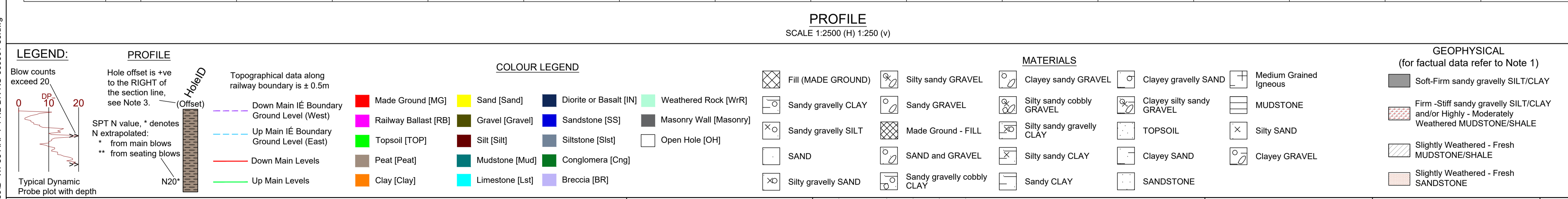
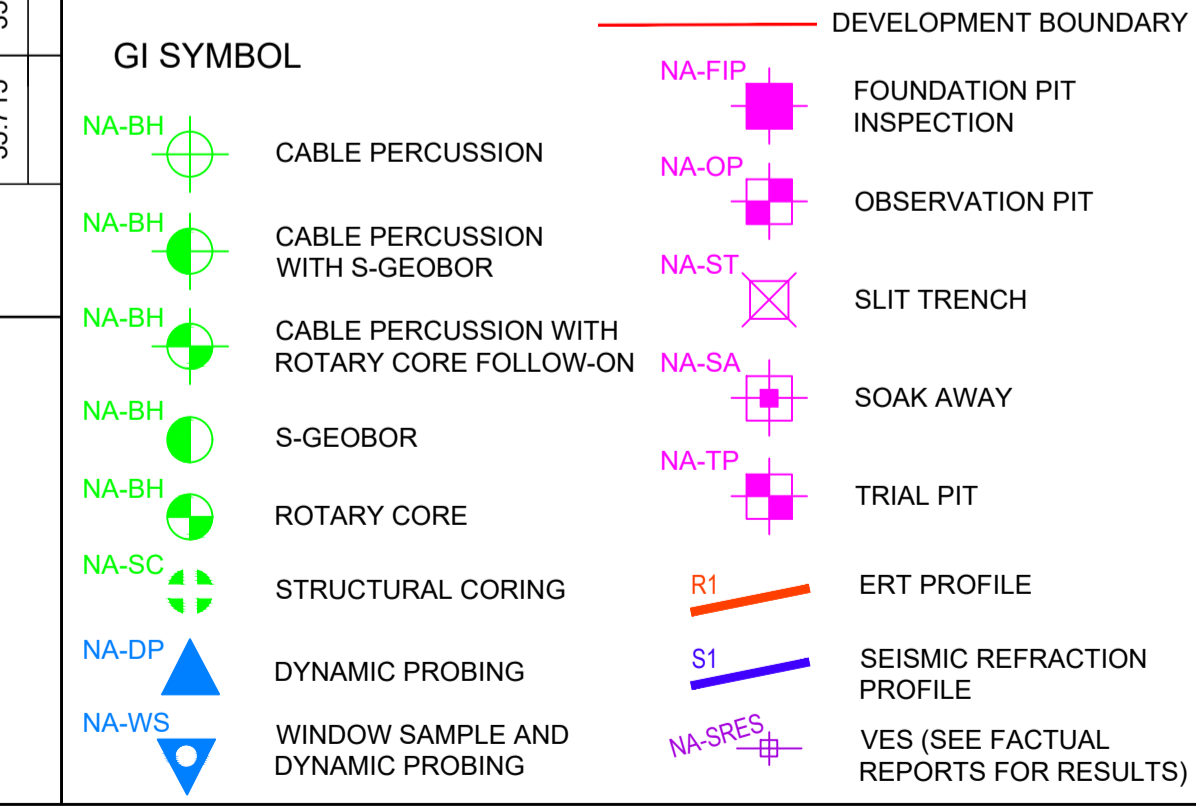
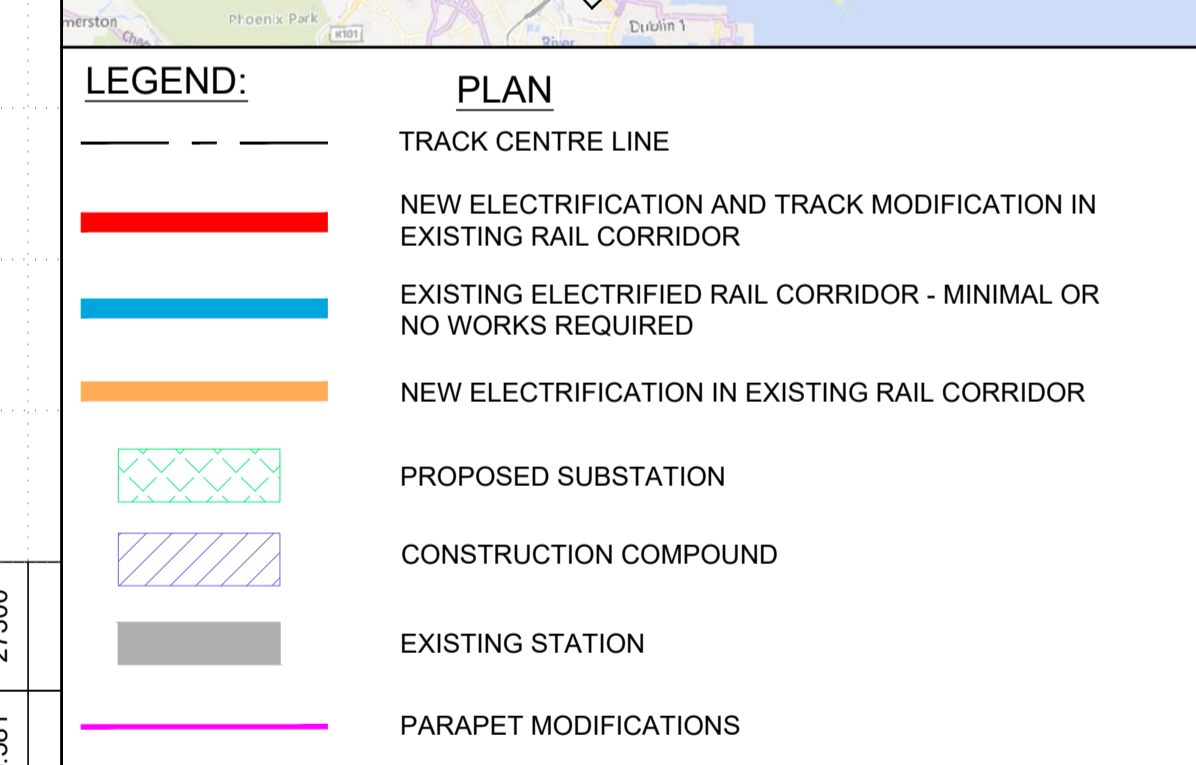
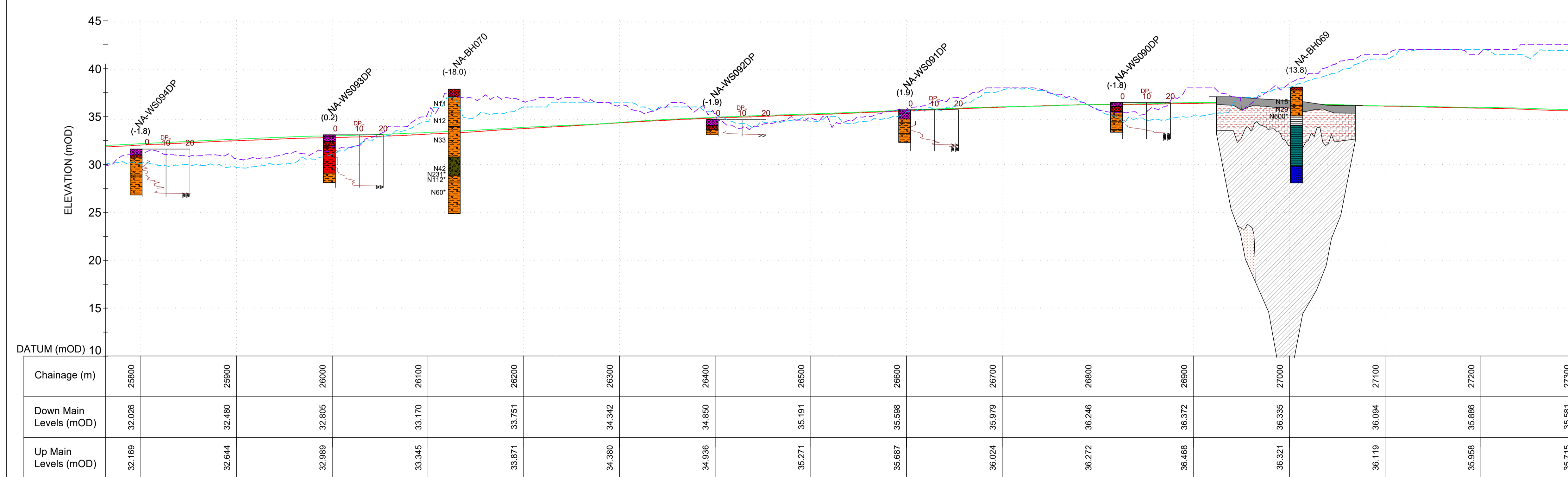
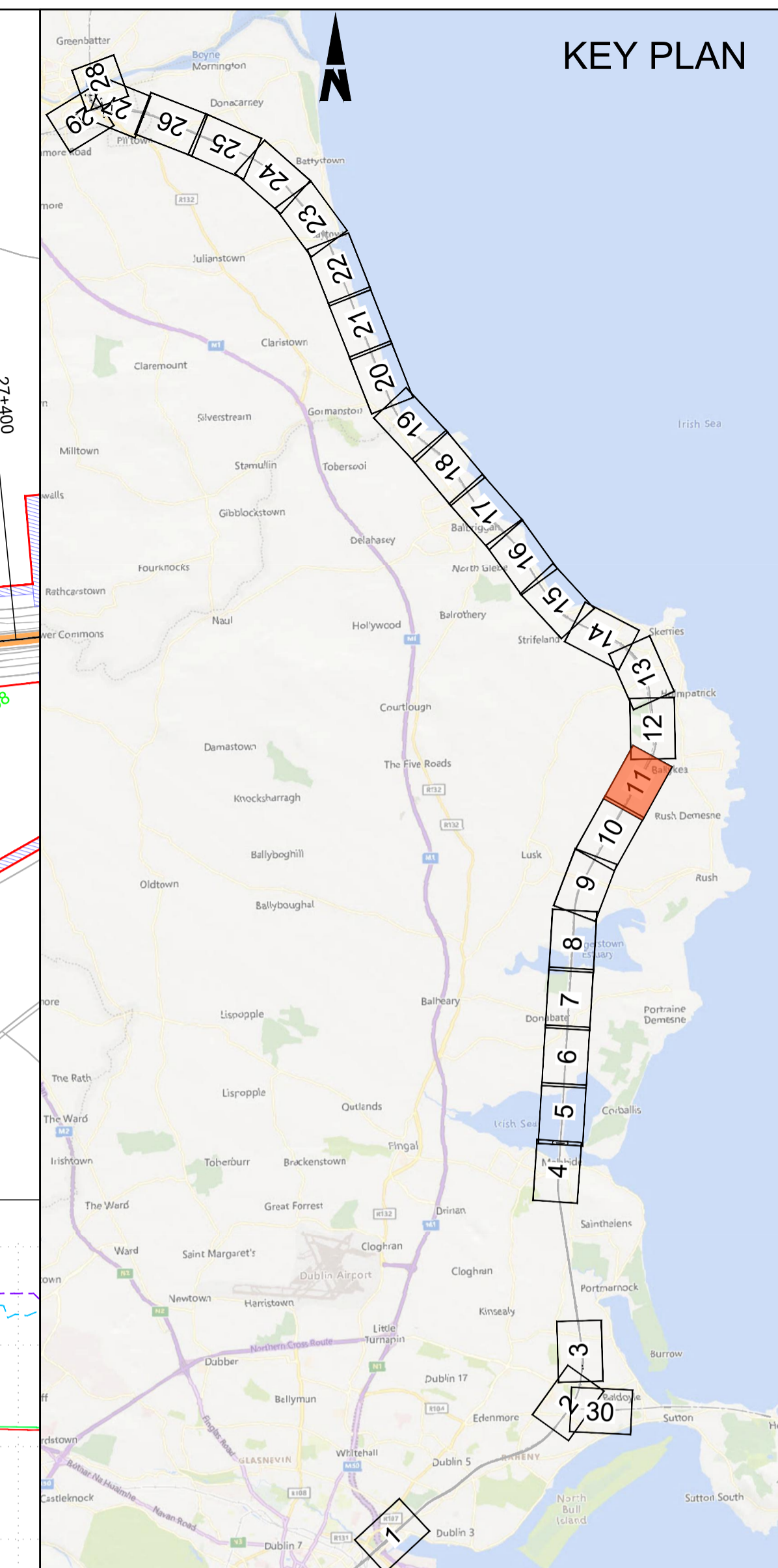
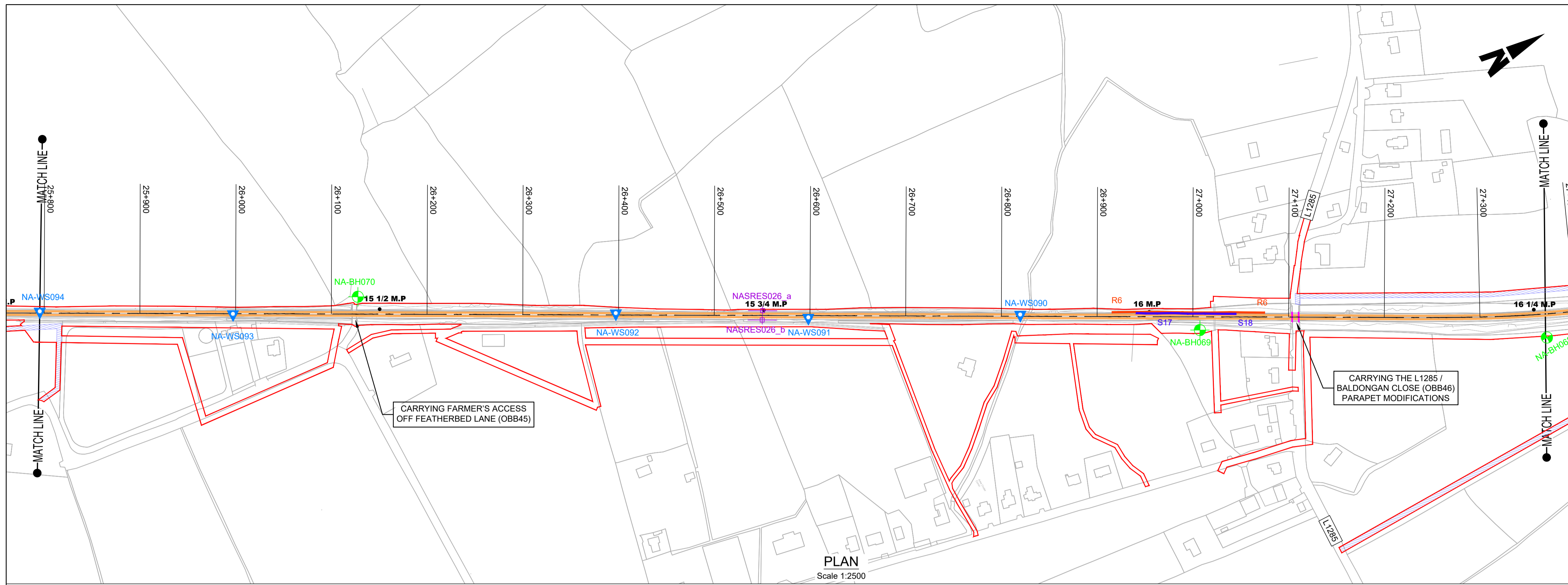
Project Code: D+WP56 | Originator Code: ARP

QMS Code: 280275-00

Project Title: **DART+ COASTAL NORTH**

Drawing Title: **PREFERRED OPTION - GEOLOGICAL PLAN & PROFILE RUSH AND LUSK STATION AND SURROUNDS**

Drawing File Name: D+WP56-ARP-P4-NL-DR-RO-900010 | Sheet Number: 10 of 30 | Status: S3 | Rev: P01



**NOTE:**

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Rev	Date	Drn	Chk'd	App'd	Description
P01	20/11/2023	EAM	MT	MF	PLANNING ISSUE

Client: **Iarnród Éireann Irish Rail**

Engineering Designer: **ARUP**

Date: 06/07/2023 | Scale: 1:2500 @ A1, 1:5000 @ A3

Project Code: D+WP56 | Originator Code: ARP

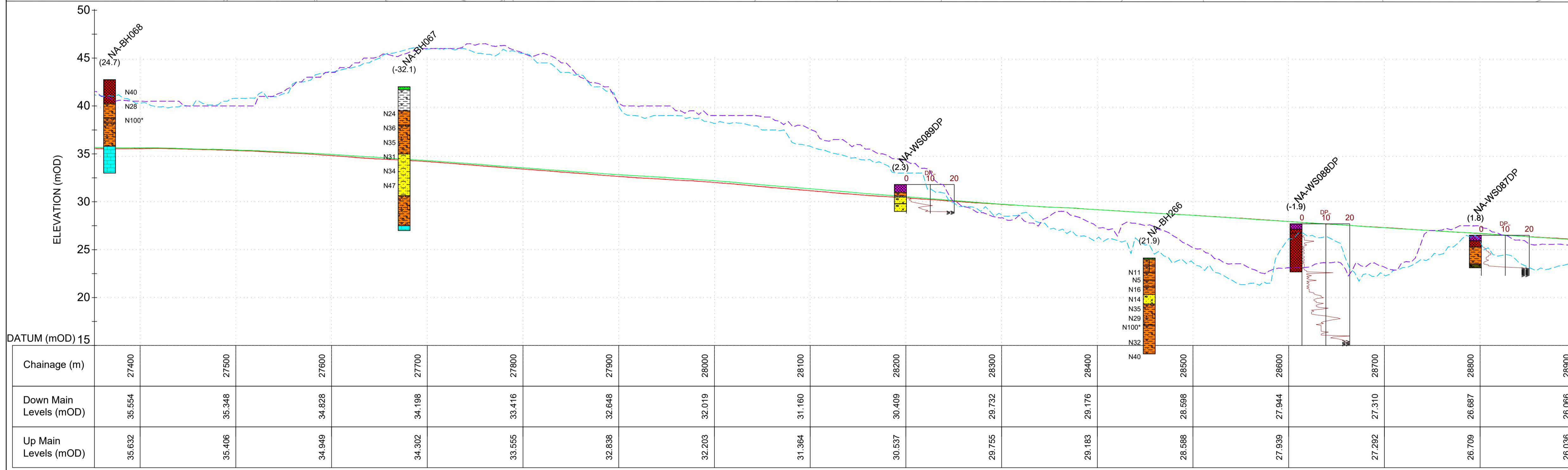
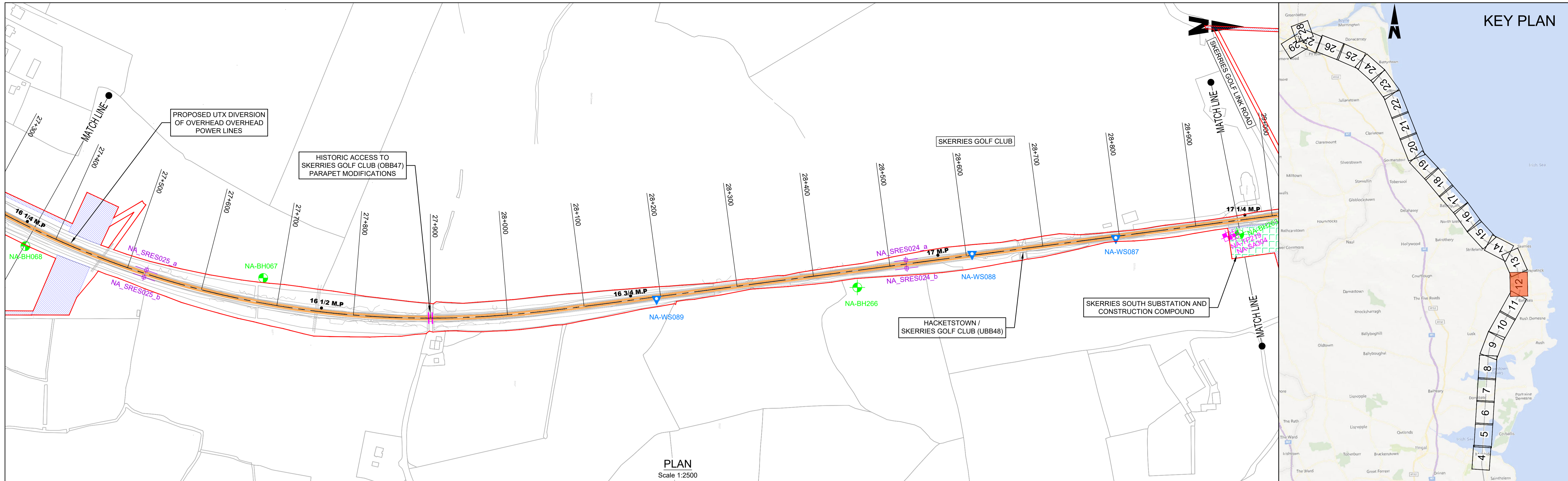
QMS Code: 280275-00

Project Title: **DART+ COASTAL NORTH**

Drawing Title: **PREFERRED OPTION - GEOLOGICAL PLAN & PROFILE SKERRIES GOLF CLUB AND SURROUNDS**

Drawing File Name: D+WP56-ARP-P4-NL-DR-RO-900011

Sheet Number: 11 of 30 | Status: S3 | Rev: P01



**LEGEND:**

- TRACK CENTRE LINE
- NEW ELECTRIFICATION AND TRACK MODIFICATION IN EXISTING RAIL CORRIDOR
- EXISTING ELECTRIFIED RAIL CORRIDOR - MINIMAL OR NO WORKS REQUIRED
- NEW ELECTRIFICATION IN EXISTING RAIL CORRIDOR
- PROPOSED SUBSTATION
- CONSTRUCTION COMPOUND
- EXISTING STATION
- PARAPET MODIFICATIONS

**GI SYMBOL**

- NA-BH: CABLE PERCUSSION
- NA-BH: CABLE PERCUSSION WITH S-GEOBOR
- NA-BH: CABLE PERCUSSION WITH ROTARY CORE FOLLOW-ON
- NA-BH: S-GEOBOR
- NA-BH: ROTARY CORE
- NA-SC: STRUCTURAL CORING
- NA-DP: DYNAMIC PROBING
- NA-WS: WINDOW SAMPLE AND DYNAMIC PROBING
- NA-FIP: FOUNDATION PIT INSPECTION
- NA-OP: OBSERVATION PIT
- NA-ST: SLIT TRENCH
- NA-SA: SOAK AWAY
- NA-TP: TRIAL PIT
- R1: ERT PROFILE
- S1: SEISMIC REFRACTION PROFILE
- NA-SRES: YES (SEE FACTUAL REPORTS FOR RESULTS)

**COLOUR LEGEND**

- Made Ground [MG]
- Sand [Sand]
- Diorite or Basalt [IN]
- Weathered Rock [WrR]
- Railway Ballast [RB]
- Gravel [Gravel]
- Sandstone [SS]
- Masonry Wall [Masonry]
- Topssoil [TOP]
- Silt [Silt]
- Siltstone [Silt]
- Open Hole [OH]
- Peat [Peat]
- Mudstone [Mud]
- Conglomerate [Cng]
- Clay [Clay]
- Limestone [Lst]
- Breccia [BR]

**MATERIALS**

- Fill (MADE GROUND)
- Silty sandy GRAVEL
- Clayey sandy GRAVEL
- Clayey gravelly SAND
- Medium Grained Igneous
- Sandy gravelly CLAY
- Sandy GRAVEL
- Silty sandy cobbly GRAVEL
- Clayey silty sandy GRAVEL
- MUDSTONE
- Sandy gravelly SILT
- Made Ground - FILL
- Silty sandy gravelly CLAY
- TOPSOIL
- Silty SAND
- SAND
- SAND and GRAVEL
- Silty sandy CLAY
- Clayey SAND
- Clayey GRAVEL
- Silty gravelly SAND
- Sandy gravelly cobbly CLAY
- Sandy CLAY
- SANDSTONE

**NOTE:**

- FACTUAL GROUND INVESTIGATION INFORMATION PRESENTED IS BASED ON CAUSEWAY GEOTECH LTD (2023), DART+ NORTH & BEMU STAGE A GROUND INVESTIGATION.
  - VOLUME 1 - DROGHEDA STATION, DEPOT & BEMU, REPORT NO. 21-1711A, REV A10, OCTOBER 2023;
  - VOLUME 2 - DROGHEDA TO MALAHIDE ELECTRIFICATION, REPORT NO. 21-1711B, REV A05, OCTOBER 2023; AND
  - VOLUME 3 - MALAHIDE, CLONGRIFFIN & HOWTH JUNCTION, REPORT NO. 21-1711C, REV A06, OCTOBER 2023.
- DOWN MAIN AND UP MAIN BOUNDARY LEVEL BASED ON TOPOGRAPHICAL LEVELS TAKEN FROM 2012 LIDAR ALONG IE PROPERTY BOUNDARY.
- GEOLOGICAL STICK LOGS PRESENTED ON PROFILES ARE PROJECTED TO A CENTRE LINE BETWEEN THE UP AND DOWN MAIN LINES AND SHOULD BE READ WITH IN THE CONTEXT OF INCREASING CHAINAGE.
- DYNAMIC PROBES PRESENTED ARE DPSH-B AND RESULTS RELATE TO BLOW COUNTS PER 100MM.

**Rev** | **Date** | **Drn** | **Chk'd** | **App'd** | **Description**

P01	20/11/2023	EAM	MT	MF	PLANNING ISSUE
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**Client:** Iarnród Éireann Irish Rail

**Engineering Designer:** ARUP

**Project Title:** DART+ COASTAL NORTH

**Drawing Title:** PREFERRED OPTION - GEOLOGICAL PLAN & PROFILE SKERRIES GOLF CLUB AND SURROUNDS

**Date:** 06/07/2023 | **Scale:** 1:2500 @ A1, 1:5000 @ A3 | **Drawn:** SR | **Checked:** MT | **Approved:** MF

**Project Code:** D+WP56 | **Originator Code:** ARP | **QMS Code:** 280275-00

**Drawing File Name:** D+WP56-ARP-P4-NL-DR-RO-900012 | **Sheet Number:** 12 of 30 | **Status:** S3 | **Rev:** P01

DO NOT SCALE USE FIGURED DIMENSIONS ONLY