INSPECTION & TEST PLAN

Inspection and Test Plan and Number	OP06_f01 Inspection & Test Plan Workbook		
Project Name	KiwiRail – North Auckland Line Recovery – CH 125.603	**Version:**	2
Date:	23/04/24	**Approved in RFI#:**	TBC
Documents / Specifications Referenced:	ENGEO NAL 125.603KM IFC DESIGN		

ITP#	Work Pack Element(s)	Drawing / Specification Ref.	Specification Detail Summary	Acceptance Criteria	Test Spec & Frequency	Control Type i.e. Checksheet / IANZ Records	Hold / Witness	Internal / External	PS3 Owner	Hold / Witness	PS4 Owner Sign Off
1.0 PRE-CONSTRUCTION											
1.01	Check IFC Drawings	IFC issued	Ensure latest revision is being used	Correct drawings	Prior to works, updated accordingly based on formal correspondence	Controlled IFC drawings being used – Checkpoint on QA	HOLD	Internal	JFC	WITNESS	ENGEO
1.02	Erosion and Sediment Control	ENGEO – NAL CH 125.603: Drawing 15 Section 1.1	The contractor is responsible for protecting earthworks and erosion control measures and must develop a site-specific Environmental Control Plan (ESCP) that KiwiRail must review before construction begins.	Contractor to ensure effective erosion and sedimentation control measures shall be installed and maintained in accordance with Auckland Council Resource Consent Requirements, and the ESCP.	Before construction begins	ESCP Documentation, Photos, Daily and Weekly Audits	HOLD	Internal	JFC	HOLD	ENGEO
1.03	Pre-start meeting – Construction Methodology (Drilling)	ENGEO – NAL CH 125.603: Drawing 15 Section 1.0	A pre-start meeting with Engineer and Contractor is needed to ensure understanding of construction methodology, review work plan and methodology for Geotechnical Professional with specific attention to the drilling methodology and ensure safety measures are in place.	Construction methodology (drilling) agreed between Contractor and Engineer	Prior to commencement of works	Written Confirmation of Engineer's approval	HOLD	Internal	JFC	HOLD	ENGEO
1.04	Pre-start Meeting - Retaining Wall Construction)	ENGEO – NAL CH 125.603: Drawing 15 Section 1.1	Pre-start meeting and health and safety plan for retaining wall construction	Construction methodology of retaining wall and health and safety plan agreed between Contractor and Engineer	Prior to commencement of works	Written Confirmation of Engineer's approval	HOLD	Internal	JFC	HOLD	ENGEO
1.05	Survey and Setting Out	ENGEO – NAL CH 125.603: Drawing 15 Section 1.1	Contractor responsible for survey or set out required. Engineer shall be given opportunity to witness the works	Acceptable as-built tolerance for the locations of the pile holes +- 75mm.	Engineer notified 48 hours in advance	Written Confirmation from Engineer, Survey Records	HOLD	Internal	JFC	HOLD	ENGEO
1.06	Locations of Steel Posts, Anchors, and Walers	ENGEO – NAL CH 125.603: Drawing 15 Section 1.0	The Engineer shall confirm on-site the locations of steel posts, anchors, walers and proposed retained heights as set out by the Contractor	Locations and proposed retaining heights confirmed by the Engineer.	Prior to installation of steel posts, anchors, and walers.	Written Confirmation from Engineer, Survey Records, QA Checksheet(s)	HOLD	Internal	JFC	HOLD	ENGEO
2.0 STORMWATER DRAINAGE										**ENGINEER**	
2.01	Materials	ENGEO – NAL CH 125.603: Drawing 13-14	Materials as per the design drawings	All drainage materials comply with the drawings	Prior to use of materials on site	Dockets, QA Checksheet(s), Photos	HOLD	Internal	JFC	REVIEW	ENGEO
2.02	Installation	ENGEO – NAL CH 125.603: Drawing 13-14	Drainage works to be installed in accordance with the design drawings.	Drainage works constructed in accordance with the drawings	Engineer to check prior to backfill of drainage items	Photos, QA Checksheet(s), Written Confirmation of Engineer's Approval	HOLD	Internal	JFC	REVIEW	ENGEO
2.03	Swale Improvement	ENGEO – NAL CH 125.603: Drawing 13	Swale improvement as per the design drawings	Swale improvement comply with C-ST-CD-4102	For every section of swale improvement works	Photos, QA Checksheet(s)	HOLD	Internal	JFC	REVIEW	ENGEO
2.1 Culvert Crossing											
2.11	Materials	ENGEO – NAL CH 125.603km: Drawing 8	All materials as per the design drawings	All materials comply with the drawings	Prior to use of materials on site	Dockets	HOLD	External	JFC	REVIEW	ENGEO

ITP#	Work Pack Element(s)	Drawing / Specification Ref.	Specification Detail Summary	Acceptance Criteria	Test Spec & Frequency	Control Type i.e. Checksheet / IANZ Records	Hold / Witness	Internal / External	PS3 Owner	Hold / Witness	PS4 Owner Sign Off
2.12	Culvert Bedding	ENGEO – NAL CH 125.603km: Drawing 8	Bedding thickness min. 150mm GAP20	Engineer to confirm GAP 20 compacted to 90% MDD or CIV of 25 with Clegg Impact Hammer (in accordance with NZS 3725:2007) Where culvert subgrade >60kPa is achieved, 100mm pipe bedding thickness is required. Where culvert subgrade <60kPa is achieved, undercut up to 300mm and backfill with geotextile-encapsulated compacted site-won hardfill (e.g. ballast) to underside of pipe bedding level.	Engineer to check prior to installation of manhole and pipe	NDM and or Clegg Test Results, Photos, QA Checksheet(s), Written Confirmation of Engineer's Approval	HOLD	External	JFC	HOLD	ENGEO
2.13	Haunching	ENGEO – NAL CH 125.603km: Drawing 8	SP20 Compacted in 150mm layers to widest pipe width	Engineer to confirm SP20 compacted to at least 95% MDD	Engineer to check every 150mm thick compacted layer	NDM Test Results, Photos, QA Checksheet(s), Written Confirmation of Engineer's Approval	HOLD	External	JFC	HOLD	ENGEO
2.14	Culvert Trench Backfill	ENGEO – NAL CH 125.603km: Drawing 8	Backfill to comprise of GAP65 or geotechnically approved material in max. 200mm lifts	Engineer to confirm GAP65 or approved equivalent compacted to 95% MDD (in accordance with NZS 3725:2007)	Engineer to check every 200mm thick compacted layer	NDM Results, Photos, QA Checksheet(s), Written Confirmation of Engineer's Approval	HOLD	External	JFC	HOLD	ENGEO
2.15	Wingwall Bedding	ENGEO – NAL CH 125.603km: Drawing 8 & 14	AP20 aggregate or approved equivalent	200mm thick AP20 compacted to at least 90% MDD	Engineer to check every 150mm thick compacted layer	NDM Test Results, Photos, QA Checksheet(s), Written Confirmation of Engineer's Approval	HOLD	External	JFC	HOLD	ENGEO
2.16	Installation	ENGEO – NAL CH 125.603km: Drawing 8	Drainage works to be installed in accordance with the design drawings.	Engineer to confirm that the drainage is connected as shown on the plans.	Engineer to check prior to backfill of drainage items	Photos, QA Checksheet(s), Written Confirmation of Engineer's Approval	HOLD	External	JFC	HOLD	ENGEO
3.0 RETAINING WALL CONSTRUCTION										**ENGINEER**	
3.01	Material - Steel	ENGEO – NAL CH 125.603: Drawing 16 Section 1.5.1	· Steel piles shall be grade 300 and pile lengths and spacing shall be as detailed on the design drawings. · Steel components, excluding UB piles, must be galvanized with hot dip galvanising to HDG600, following AS/NZS 2312:2002, Not required per email Divya Rajasekaran 31-01-24 (RFI 07 email trail) · Steel cuts must be painted with approved zinc-rich primer and "black beauty" within one day, with a protective layer and malthoid as a separation between the two materials.	All steel supplied and installed comply with drawings and specifications	For all supplied and installed steel	Dockets, Photos, QA Checksheet(s)	HOLD	Internal	JFC	REVIEW	ENGEO
3.02	Material - Timber	ENGEO – NAL CH 125.603: Drawing 16 Section 1.5.2	· All lagging shall be radiata pine treated to specification H5, SG8 (wet) verified timber. · Timber must be marked with TPA identification brands upon delivery to the site and protected against damage during storage and handling. · Avoid timber cutting whenever possible and if necessary, flood exposed surfaces with a copper napthenate wood preservative.	All timber supplied and installed comply with drawings and specifications	For all supplied and installed timber	Dockets, Photos, QA Checksheet(s)+	HOLD	Internal	JFC	REVIEW	ENGEO
~~3.03~~	~~Material - Concrete~~										

ITP#	Work Pack Element(s)	Drawing / Specification Ref.	Specification Detail Summary	Acceptance Criteria	Test Spec & Frequency	Control Type i.e. Checksheet / IANZ Records	Hold / Witness	Internal / External	PS3 Owner	Hold / Witness	PS4 Owner Sign Off
3.04	Material - Geotextile Fabric	ENGEO – NAL CH 125.603: Drawing 15 +16 Section 1.9	The geotextile fabric should be placed according to the drawings and must be of unwoven strength Class B, such as Bidim A29 or Duraforce AS280. The lap width of adjacent strips of geotextile sheets shall be a minimum of 1m.	Geotextile material and installation in accordance with the drawings and specifications Engineer shall inspect the lagging and drainage fabric prior to placement of backfill	For all supplied and installed geotextile material Engineer shall inspect the lagging and drainage fabric prior to placement of backfill	Dockets, Photos, QA Checksheet(s)	HOLD	Internal	JFC	HOLD	ENGEO
3.05	Material – Timber Railing and Fixing	ENGEO – NAL CH 125.603: Drawing 15 Section 2.1	Rails (or lagging) must be made from Radiata Pine, bore, cut, machined, processed, and treated to H5 according to the drawings Timber lagging shall be rough EX sizing, e.g. 150 x 50mm not 145 x 45mm dressed sizes.	All timber rails and fixing comply with drawings and specifications	For all supplied timber rails and fixings	Dockets, Photos, QA Checksheet(s)	HOLD	Internal	JFC	REVIEW	ENGEO
3.06	General Tolerances	ENGEO – NAL CH 125.603: Drawing 15 Section 1.6	The assembly of component parts must adhere to the specified tolerances, ensuring they are not twisted or damaged. General tolerances: · Straightness 2mm / 500mm length · Structural dimensions + 3mm · Plan position of structural members 5mm · Level of structural members + 40mm · Pile toe level + 25mm Vertically 1H:75V	Tolerances specified on the drawings and specifications always adhered to.	For all assembled components	QA Checksheet(s), Survey As-buitls	HOLD	Internal	JFC	REVIEW	ENGEO
3.07	Excavation and pile install		Driven Piles to depths & position shown on drawings.	Tolerances given in 3.06	Every Pile	Pile Card	HOLD	Internal	JFC	REVIEW	ENGEO
3.08	Backfilling	ENGEO – NAL CH 125.603: Drawing 15 Section 2.0	Backfilling shall be undertaken as indicated on the drawings. Backfill requiring compaction should be placed behind the retaining wall and compacted using lightweight equipment in lifts no thicker than 200mm within the upper 1m. Allow for 7 days concrete curing of pile holes prior to backfilling. A perforated subsoil drain should be placed and surrounded by free draining material with an invert below ground levels, connected to a uPVC pipe and outlet via a rock splashpad in the site plan's approximate location.	Backfill compaction requirements: >90% MDD (NDM) and/or CIV 20 (Cleggs) Engineer approval of the lagging and drainage fabric prior to placement of backfill	Bckfill tested every 500mm (vertical) Engineer shall inspect the lagging and drainage fabric prior to placement of backfill.	QA Checksheet(s), NDM and/or Clegg Results	HOLD	Internal	JFC	HOLD	ENGEO
3.09	Timber Rail and Fixings	ENGEO – NAL CH 125.603: Drawing 15 Section 2.1	Timber lagging should start at the wall's bottom, with careful selection and placement of horizontal timbers to maintain minimum thickness near the base and achieve neat lines at the top. Surfaces exposed to pressure treatment, including bolt holes, should be protected with a liberal brush application of copper naphthenate, colored to leave a visible stain.	Timber rails and fixings constructed in accordance with the drawings and specifications.	For every section of timber rail and fixings installed Engineer shall observe installation of the PFC walers	Photos, QA Checkshee(s)	HOLD	Internal	JFC	HOLD	ENGEO
3.10	Inspection of Completed Wall	ENGEO – NAL CH 125.603: Drawing 15 Section 1.0	The engineer will inspect the finished wall, while the contractor will provide as-built drawings detailing the final construction of remedial works, including any amendments made during construction.	Finished wall approved by the Engineer End details of the wall agreed with the Engineer and constructed accordingly.	Upon completion of wall	Photos, QA Checkshee(s), As-builts	HOLD	Internal	JFC	HOLD	ENGEO
4.0 ANCHOR INSTALLATION										ENGINEER	

ITP#	Work Pack Element(s)	Drawing / Specification Ref.	Specification Detail Summary	Acceptance Criteria	Test Spec & Frequency	Control Type i.e. Checksheet / IANZ Records	Hold / Witness	Internal / External	PS3 Owner	Hold / Witness	PS4 Owner Sign Off
4.01	Materials – Anchor	ENGEO – NAL CH 125.603: Drawing 16 Section 1.1	Refer to design drawings for specific detail of the anchors at each location.	Anchors adheres to design drawings	For every anchor installed	Photos, Dockets, QA Checksheet(s)	HOLD	Internal	JFC	REVIEW	ENGEO
4.02	Materials – Anchor Components	ENGEO – NAL CH 125.603: Drawing 16 Section 1.2	·The anchor components and accessories must adhere to the manufacturer's specifications and installation guidelines. ·AS/NZS 4680 requires hot dip galvanization of steel plates, brackets, nuts, and bearing wedge plates to ~~HDG900.~~ RFI 06 HDG600 ·All anchors shall be epoxy coated	Anchor components adheres to the specifications	For every anchor components	Photos, Dockets, QA Checksheet(s)	HOLD	Internal	JFC	REVIEW	ENGEO
4.03	Materials – Grout	ENGEO – NAL CH 125.603: Drawing 16 Section 1.3	·The cement rich grout shall comprise ordinary Portland cement with potable water. · Water cement ratio shall not be less than 0.35 or greater than 0.45. · Standard cured compressive strength shall not be less than 25 MPa at 7 days and 40 MPa at 28 days.	Grout adheres to the specifications. Compressive strength test results for grout at 7 days min 25MPa and 28 days min 40MPa	For every anchor grouting works	Dockets, QA Checksheet(s), Concrete Test Results	HOLD	Internal	JFC	REVIEW	ENGEO
4.04	Anchor Drilling	ENGEO – NAL CH 125.603: Drawing 16 Section 2.1	·Anchor holes must be drilled to align with the required anchorage locations, as per drawings and site assessment by a Geotechnical Professional. ·Drilling fluids other than air should not be used during drilling unless agreed upon with the Geotechnical Designer beforehand. ·Anchors must be drilled and grouted within a day, and their holes should not remain open overnight. ·The drill bit's diameter must not be less than the specified diameter as depicted in the design drawings.	Anchor drilling adheres to the specifications.	For every anchor drilling works	Photos, QA Checksheet(s)	HOLD	Internal	JFC	REVIEW	ENGEO
4.05	Anchor Drilling – Drilling Log	ENGEO – NAL CH 125.603: Drawing 16 Section 2.1	The Driller shall maintain a drilling log for each anchor recording the following: a. Anchor location or number. b. Date and time of the start and finish of drilling. c. Depth, diameter and inclination of hole. d. Length of bar installed. e. Flushing medium. f. Method of drilling hole. g. Water losses from hole. h. Water seepage from hole. i. Ground conditions encountered and ease of drilling. j. Nominal and actual volume of grout placed. k. Length of casing used (if any). l. Problems such as caving that occurred during drilling. m. Drilling equipment used.	The drilling logs maintained and logs adhere to the specifications. Approval of drilling logs by the Geotechnical Professional.	The Geotechnical Professional must receive a drill log within 24 hours of drilling each anchor hole.	Drilling Log	HOLD	Internal	JFC	REVIEW	ENGEO

ITP#	Work Pack Element(s)	Drawing / Specification Ref.	Specification Detail Summary	Acceptance Criteria	Test Spec & Frequency	Control Type i.e. Checksheet / IANZ Records	Hold / Witness	Internal / External	PS3 Owner	Hold / Witness	PS4 Owner Sign Off
			n. In situ material type description and comment on any material changes or interfaces o. Rate of penetration during drilling p. moisture content of material and any changes to moisture content during drilling								
4.06	Anchor Insertion	ENGEO – NAL CH 125.603: Drawing 16 Section 2.2	·The anchor must be inserted into the hole within two hours of drilling, unless agreed upon by the Engineer. If the anchor becomes jammed, the hole must be grouted and the anchor cut off. A new hole must be drilled within 300mm of the jammed anchor.	Anchors inserted as per the specification. Insertion approved by the Engineer.	For every anchor insertion Engineer shall observe installation of tie-back anchors.	QA Checksheet(s), Photos	HOLD	Internal	JFC	HOLD	ENGEO
4.07	Anchor Grouting	ENGEO – NAL CH 125.603: Drawing 16 Section 2.2 & 2.3	· Grouting should occur during or after anchor installation to prevent hole collapse or restriction, and no hole should remain open overnight without Engineer's approval. Contractor must provide grouting methodology to ensure full grout return and minimize 'birds peaks'. · Anchor installation does not anticipate grout loss, and if over 300% of theoretical hole volume is lost, the Geotechnical Engineer must be notified. Proposed measures must be approved by the Designer.	Grouting methodology approved by the Engineer and adhered to by the Contractor. Proposed measures for grouting loss (if required) approved by the Engineer. Compressive strength test results for grout at 7 days min 25MPa and 28 days min 40MPa	For every anchor grouting works Compressive testing at 7 and 28 days for grout placed. Engineer shall observe installation of tie-back anchors.	Grouting Methodology Submission, Concrete Lab Test Results @ 7 and 28 days, Written Confirmation from Engineer	HOLD	Internal	JFC	HOLD	ENGEO
5.0 ANCHOR TESTING										**ENGINEER**	
5.01	Anchor Testing – General	ENGEO – NAL CH 125.603: Drawing 16 Section 3.1	·Load cells calibrated within the last 6 months are used for sacrificial and production anchor testing, conducted by a qualified laboratory. Calibrations must be certified. ·The sacrificial and production anchor load tests will only be conducted once the grout has reached the specified 7-day strength. ·Design loads are specified in the design drawings attached. ·The construction team is required to record all data and provide it to the Geotechnical Professional within two working days of the tests' completion.	Anchor testing adheres to the specifications	Data submitted to the Geotechnical Professional within two working days of test completion	QA Checksheet(s), Test Results, Photos	HOLD	Internal	JFC	REVIEW	ENGEO
5.02	Sacrificial Anchor Testing	ENGEO – NAL CH 125.603: Drawing 16 Section 3.2	Sacrificial anchor tests demonstrate tieback anchor failure load and grout bond stress in soil and rock masses, not mesh anchors. Engineering sign off and PS4 provided after completion of the following: · Contractor shall submit a proposed test methodology prior to work commencing · The displacement of the sacrificial anchors are to be measured at each of the loading points outlined in Table 3 (snippet below) · The locations of the anchors to be tested shall be decided onsite with the Geotechnical Professional. · Sacrificial test anchors drill hole diameter is to be the same as production anchors. · The locations of the anchors to be tested shall be decided onsite with the Geotechnical Professional.	Sacrificial anchor testing adheres to the specifications. Anchor test results, sacrificial and proof tests, including load vs displacement plots in accordance with Tables 3 and 4 (snippet below) Proposed test methodology reviewed and approved by the Engineer and adhered to by the Contractor. Test locations agreed between Contractor and Geotechnical Professional.	· Sacrificial anchor tests are to be carried out before works commence · Proposed test methodology submitted at least 2 working days prior to work commencing. · Sacrificial testing is to be completed a minimum 7 days after installation or when grout has reached 25 MPa as confirmed by grout cube testing. · Engineer shall observe testing of tie-back anchors.	QA Checksheet(s), Photos, Approved Test Methodology, Load Testing Sheet, Written Confirmation from Engineer/Geotechnical Professional	HOLD	Internal	JFC	HOLD	ENGEO

ITP#	Work Pack Element(s)	Drawing / Specification Ref.	Specification Detail Summary	Acceptance Criteria	Test Spec & Frequency	Control Type i.e. Checksheet / IANZ Records	Hold / Witness	Internal / External	PS3 Owner	Hold / Witness	PS4 Owner Sign Off
			· Sacrificial testing is to be completed a minimum 7 days after installation or when grout has reached 25 MPa as confirmed by grout cube testing. · Bond lengths shall be confirmed by the Engineer. · Testing Schedule is given in Table 4 (snippet below) · Items to be recorded on the load testing sheet shall include: 1. Name of company undertaking test. 2. Anchor number and location. 3. Name of person supervising test. 4. Date and time of start of test 5. Jack and pump model and number and calibration details. 6. Hole diameter. 7. Bond length. 8. Free length (measures from top of jack to top of bond). 9. Hole inclination. 10. Bond material type. 11. Proposed and achieved loads and cell pressures before and after each load step. 12. Time of each loading step. 13. Duration of each load step.	Sacrificial Testing only completed once grout has reached 25MPa Load Testing sheet includes all necessary details as listed on the specification and filled out to its entirety. Approval of testing and results by the Engineer (PS4)	· The locations of the anchors to be tested shall be decided onsite with the Geotechnical Professional. · All stressing data shall be recorded by the Constructor and issued to the Geotechnical Designer within 2 working days of the completion of the stressing of each anchor.						

Table 3: Sacrificial Testing Schedule (Tieback anchors only)

Load Increment (kN)								Minimum Period of Observation (min)
1st Cycle	2nd Cycle	3rd Cycle	4th Cycle	5th Cycle	6th Cycle	7th Cycle	8th Cycle	
4	8							1
8	17	34	51	68	85	101	118	1
13	25	42	59	76	93	110	127	1
17	34	51	68	85	101	118	135	15
13	25	34	51	68	68	85	85	1
8	17	17	25	34	34	51	51	1
4	8	8	8	8	8	8	8	1

Table 4: Tieback Production Anchor Testing Schedule

Load Increment (kN)		Time (min)	Movement
1st Cycle	2nd Cycle		
5	5	1	
23	23	1	
45	45	1	
68	68	15	
45	45	1	
23	23	1	
5	5	1	

Table 2: Sacrificial Test Anchors

Bonded Length	DeBonded Length	Anchor Type (or approved alternative)	Drill Hole Diameter
5.0m	8.5m	RB20	150mm

Snippets from ENGEO – NAL CH 125.603: Drawing 17

5.03	Production Anchor Testing	ENGEO – NAL CH 125.603: Drawing 16 Section 3.3	The acceptance testing aims to demonstrate that the anchor can withstand the design loading. The following must be completed for Engineering sign off (and PS4) to be provided: · 15% of the anchors shall be proof tested. The displacement of the production anchors are to be measured at each of the loading points outlined in Table 4 (snippet below) · The locations of the anchors to be tested shall be decided onsite with the Geotechnical Professional. · Test loads will be supplied by the Designer prior to acceptance testing. · Anchor testing criteria in accordance with New Zealand Ground Anchor design Guideline Section 7.4.5 of the 'FHWA-IF-99-	Acceptance testing adheres to the specifications. Test results comply with The New Zealand Ground Anchor Design Guidance - Figure 73 in 'FHWA-IF-99-015-ground anchors and anchored systems' Test locations agreed between Geotechical Engineer and Contractor Test loads supplied by the Designer used for the acceptance testing.	15% of the anchors shall be tested. Locations to be decided on site with the Geotechnical Professional	QA Checksheet(s), Photos, Testing Results, Written Confirmation from Engineer/Geotechnical Professional	HOLD	Internal	JFC	HOLD	ENGEO

ITP#	Work Pack Element(s)	Drawing / Specification Ref.	Specification Detail Summary	Acceptance Criteria	Test Spec & Frequency	Control Type i.e. Checksheet / IANZ Records	Hold / Witness	Internal / External	PS3 Owner	Hold / Witness	PS4 Owner Sign Off
			015-Ground Anchors and Anchored Systems'. Anchors must meet the following acceptance criteria: 1. In order for the load test to be considered stable the total movement measured during the required load hold at the design test load should not exceed 1 mm between 1 to 10 minutes. If it is greater than 1 mm the load shall be held for an additional 50 minutes - in this time the creep shall not exceed 2 mm between 6 to 60 minutes. If creep is greater than 2 mm following this time period contact the Geotechnical Designer or design team representative for guidance. 2. The apparent free length shall not be greater than the jack length plus 100% of the unbonded length plus 50% of the bonded length. The apparent free length is back calculated from the elastic movement measured during the load test, contact the geotechnical designer or design team representative for guidance	Approval of testing and results by the Engineer (PS4)							

Table 4: Mesh Production Anchor Testing Schedule

Load Increment (kN)		Time (min)	Movement
1st Cycle	2nd Cycle		
3	3	1	
15	15	1	
30	30	1	
45	45	15	
30	30	1	
15	15	1	
3	3	1	

Snippet from ENGEO – NAL CH 125.603: Drawing 17

6.0 FORMATION CONSTRUCTION										ENGINEER	
6.01	Structural Fill	ENGEO – NAL CH 125.603: Drawing 15 CAN-01,RFI 001	900mm thick structural fill (GAP65 or GAP40 or PAP40 or PAP 65 with geogrid) RFI 001	Compaction min CIV = 25 (95% MDD)	Clegg Hammer Tests Email 8/3/24 from KH Every 250mm with 1st lift calibrated to NDM Every 20m (email 19/3/24 J Thomas)	Photos, Clegg Test Results	HOLD	Internal	JFC	REVIEW	ENGEO
6.02	Sub-ballast	ENGEO – NAL CH 125.603: Drawing 15 CAN-01,RFI 001	150mm thick sub-ballast (M4-AP40 or PAP40) RFI 001	Compaction min CIV = 30 (98% MDD)	Clegg Hammer Tests Email 8/3/24 from KH Every 250mm with 1st lift calibrated to NDM Every 20m (email 19/3/24 J Thomas)	Photos, Clegg Test Results	HOLD	Internal	JFC	REVIEW	ENGEO

ITP#	Work Pack Element(s)	Drawing / Specification Ref.	Specification Detail Summary	Acceptance Criteria	Test Spec & Frequency	Control Type i.e. Checksheet / IANZ Records	Hold / Witness	Internal / External	PS3 Owner	Hold / Witness	PS4 Owner Sign Off
6.03	Construction of formation (ballast)	ENGEO – NAL CH 125.603: Drawing 15 CAN-01,RFI 001, RFI 028	Formation construction as per KiwiRail Standard C-ST-FO-4110 Formation	KiwiRail Standard C-ST-FO-4110 Formation for construction compliance. Ballast to be 390-410mm below top of rail	For every section of formation as shown on the drawings	QA Checksheet(s), Photos	HOLD	Internal	JFC	REVIEW	ENGEO
7.0 As-builts and close out										**ENGINEER/KiwiRail**	
7.01	Site Clearance and Final Inspection	ENGEO – NAL CH 125.603 Drawing 19	Walkover observation of finished site	Engineer's & KiwiRail acceptance	At ballast handover & at completion	NTC	Witness	Internal	JFC	HOLD	ENGEO
7.02	As built drawings	ENGEO – NAL CH 125.603 Drawing 19	As built drawings to be provided by the contractor to detail the final construction of the remedial works including any amendments established during the construction	Engineer's & KiwiRail acceptance	At ballast handover & at completion	NTC	Witness	Internal	JFC	HOLD	ENGEO
7.03	As built Culvert drawings	ENGEO – NAL CH 125.603 Drawing 19	As built drawings to be provided by the contractor to detail the final construction of the remedial works including any amendments established during the construction	Engineer's & KiwiRail acceptance	At ballast handover & at completion	KR documents: M37c & As-Built Requirements for Culvert Renewals 441048-03-CC-COM-QA-NAL-CU	Witness	Internal	JFC	HOLD	ENGEO

Sub-contractor ITPs (Refer to OP06_f09 ITP Index for Subcontractors)

ITP#	Work Pack Element(s)	Drawing / Specification Ref.	Specification Detail Summary	Acceptance Criteria	Test Spec & Frequency	Control Type i.e. Checksheet / IANZ Records	Hold / Witness	Internal / External	PS3 Owner	Hold / Witness	PS4 Owner
Sub Activity 1 (INSERT QA SHEET NAME)							(ENTER SUBCONTRACTOR)			ENGINEER	
30											
31											
32											
33											
34											
Sub Activity 2 (INSERT QA SHEET NAME)							(ENTER SUBCONTRACTOR)			ENGINEER	
35											
36											
37											
38											
39											

ITP Induction Sign On

ITP Induction Sign-on		
Name	Date	Signature

THIS DOCUMENT IS UNCONTROLLED WHEN PRINTED
