# INSPECTION & TEST PLAN

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| Inspection and Test Plan and Number | OP06\_f01 Inspection & Test Plan Workbook | | |
| Project Name | KiwiRail – North Auckland Line Recovery – CH 134.620 | **Version:** | 2 |
| Date: | 23/04/24 | **Approved in RFI#:** | TBC |
| Documents / Specifications Referenced: | ENGEO NAL 136.620KM DETAILED DESIGN REPORT PRE-IFC ISSUE | | |

| **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** |
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| **1.0 PRE-CONSTRUCTION WORKS** | | | | | | | | | | | |
| 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 | REVIEW | ENGEO |
| 1.02 | Erosion and Sediment Control | ENGEO – Detailed Design Report - NAL CH 134.620km: Section 6 | 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 | Environmental and Ecological Assessment | ENGEO – Detailed Design Report - NAL CH 134.620km: Section 7 | An ecologist from KiwiRail must be consulted and on-site to assess the site before and during the removal of vegetation and trees. | The contractor to collaborate with the appointed ecologist from KiwiRail and adhere to the proposed controls. | Prior to commencement of works | RFI for Clarity and record purposes | HOLD | Internal | JFC | HOLD | ENGEO |
| **2.0 SITE CLEARANCE** | | | | | | |  | | | **ENGINEER** | |
| 2.01 | Site Clearance | ENGEO Technical Specification – NAL 134.620km: Section 2 | The Contractor must set out the working area shown on the Construction Drawings, under observation by ENGEO. The clearing extent on the plans must be agreed on-site after pegging the earthworks area. Clearing will not begin until the agreed extent is established through pegging or paint marking by the Contractor and ENGEO. Adequate silt control measures must be installed. | Agreed extent is established by the Contractor and ENGEO. | After setting out of clearing area and prior to all clearing | Written Confirmation of ENGEO’s approval | HOLD | Internal | JFC | HOLD | ENGEO |
| **3.0 EARTHWORKS** | | | | | | |  | | | **ENGINEER** | |
| 3.01 | Protection of Earthworks and Erosion and Sediment Control | ENGEO Technical Specification – NAL 134.620km: Section 3.1 | The contractor is responsible for protecting earthworks, implementing erosion and sediment control measures, and conducting surface drainage within work limits. | The KiwiRail Erosion and Sediment Control Management Plan and associated drawings must be followed for the installation and maintenance of effective erosion and sedimentation control measures. | Prior to commencement of any earthworks | Photos, Daily and Weekly audits | HOLD | Internal | JFC | REVIEW | ENGEO |
| 3.02 | Materials | ENGEO Technical Specification – NAL 134.620km: Section 3.2 | The Earthworks Quality Plan must include a mass haul diagram detailing imported materials and their locations for placement. All imported fill must be certified as free of contamination at source, and reported to ENGEO and the Principal before importation. | Approval of site-won and imported granular fill material by ENGEO and or the Principal. | Prior to fill being imported to site | Material report & certification, Written Confirmation of ENGEO/Principal’s approval | HOLD | Internal | JFC | HOLD | ENGEO |
| **4.0 EARTHWORKS - EXCAVATION** | | | | | | |  | | | **ENGINEER** | |
| 4.01 | Removal of unsuitable material | ENGEO Technical Specification – NAL 134.620km: Section 4.1 | All unsuitable material removed prior to filling | Inspection and approval by ENGEO that all unsuitable material removed prior to filling | Inspection prior to filling | Photos, Written Instruction/Confirmation from ENGEO | HOLD | Internal | JFC | HOLD | ENGEO |
| 4.02 | Fill Benching | ENGEO Technical Specification – NAL 134.620km: Section 4.2 | To ensure proper filling, any sliding slope with a steeper slope of six horizontal to one vertical (ten degrees) must be benched before filling, while slopes shallower require scarification. ENGEO should assess cut and fill slopes for additional recommendations. | Cut and Fill Slopes to be assessed by  ENGEO. Any additional recommendations to be implemented when required. | Inspection of all cut and fill slopes | Photos, Written Instruction/Confirmation from ENGEO | HOLD | Internal | JFC | HOLD | ENGEO |
| **5.0 EARTHWORKS - FILL** | | | | | | |  | | | **ENGINEER** | |
| 5.01 | Site-won Material | ENGEO Technical Specification – NAL 134.620km: Section 5.1 | Site-won materials used as engineered fill must be free of topsoil, organic matter, and rubbish, with a maximum particle size of 100mm, and mixed or crushed efficiently. | Material compacted to achieve like for like with surrounding soils, and/or shear vanes of > SU=100 kPa and 12% air voids. Standard of compaction may be re-assessed and specified onsite by ENGEO if applicable. | Testing every layer (250mm) to be completed by ENGEO. Relaxation of testing frequency may be taken at the discretion of ENGEO | Test Results, Written Confirmation of ENGEO’s approval | HOLD | Internal | JFC | WITNESS | ENGEO |
| 5.02 | Imported Hardfill for the Toe Buttress (if required) | ENGEO Technical Specification – NAL 134.620km: Section 5.2 | Hardfill (imported) for the toe buttress (if required) shall comprise a graded, unweathered, durable, crushed rock product (AP65) approved by ENGEO, with a grading suitable for compaction | Hardfill product approved by ENGEO | Prior to hardfill being imported to site | Material Test Results/Certs, Confirmation of ENGEO’s approval | HOLD | Internal | JFC | HOLD | ENGEO |
| 5.03 | Hardfill Testing | ENGEO Technical Specification – NAL 134.620km: Section 5.2 | Hardfill placed and compacted in 200mm lifts and tested. | Hardfill compacted to 95% of the Maximum Dry Density (MDD) | One test per 500m3 of hardfill placed with not less than one test per 500mm lift of filling for each fill area | MDD Results, QA Checksheet(s) | HOLD | Internal | JFC | HOLD | ENGEO |
| 5.04 | As-builts | ENGEO Technical Specification – NAL 134.620km: Section 8 | The contractor is required to provide ENGEO with as-built information for a MSQA Geotechnical Completion Report, including surveying items before filling, which should form a hold point in the construction sequence.  ENGEO to receive as-built drawings for:  • The depth of filling placed including all benching, undercuts, and shear keys and counterfort drainage, underfill drainage and swales. | As-built approved by ENGEO | Items to be surveyed before filling. As-builts to be provided upon completion of works | As-builts | HOLD | Internal | JFC | HOLD | ENGEO |
| **6.0 COUNTERFORT DRAINAGE** | | | | | | |  | | | **ENGINEER** | |
| 6.01 | Review of Drainage and Fill Materials | ENGEO Technical Specification – NAL 134.620km: Section 6.2  ENGEO – NAL 134.620km: Drawing 4 | Drainage and fill materials installed within the site to the detail provided in the design drawings.  -Geotextile Class C (Bidim A29 or equiv), -Perforated Subsoil Drain ((Megaflo 170, Novaflo Hi-way grade 160mm or approved equiv)  -Angular no fines drainage rock (7-20mm or 40-20mm drainage) | Drainage and fill materials approved by the Geotechnical Engineer. | Prior to installation of drainage and fill materials | Material specs/certs, Written Confirmation/Approval from Geotechnical Engineer | HOLD | Internal | JFC | HOLD | ENGEO |
| 6.02 | Review of Location and Setout | ENGEO Technical Specification – NAL 134.620km: Section 6.2 | Counterfort drains installed within the site in the locations provided in the design drawings | Locations agreed between the Contractor and Geotechnical Engineer | Prior to commencement of counterfort drain works | Written Confirmation/Approval from Geotechnical Engineer, Photos, QA Checksheet(s) | HOLD | Internal | JFC | HOLD | ENGEO |
| 6.03 | Installation of Counterfort Drains | ENGEO Technical Specification – NAL 134.620km: Section 6.2  ENGEO – NAL 134.620km: Drawing 4 | Installation should be undertaken in short sections (<5m lengths) and during period of dry weather  The Counterfort Drainage will consist of a 500mm wide trench, 2m deep, tapering up to outlet into the reformed swale adjacent to the rail formation.  The counterfort drainage should be lined with Geotextile, have a perforated subsoil drain at the base, and be backfilled with angular, no fines drainage rock.  The Geotextile should fully wrap the drainage material, and the excavation should have a minimum cohesive soil cap of 0.5m thick | Counterfort drains installed as per the drawings and specifications.  Installation approved by the Geotechnical Engineer | Post earthworks fill and Prior to filling counterfort drain | Written Confirmation/Approval from Geotechnical Engineer, Photos, QA Checksheet(s) | HOLD | Internal | JFC | HOLD | ENGEO |
| 6.04 | Flushing of Drains | ENGEO Technical Specification – NAL 134.620km: Section 6.2 | The invert level of outlets must be aligned with the design drawings' levels to ensure proper drainage throughout the design life. | Drains are operational and proved by the Geotechnical Engineer. | For every section of drain installed | Written Confirmation/Approval from Geotechnical Engineer, Photos, QA Checksheet(s) | HOLD | Internal | JFC | HOLD | ENGEO |
| 6.05 | Observation of Flushing Point and Outlet | ENGEO Technical Specification – NAL 134.620km: Section 6.2 | Flushing point and outlet to be observed | Flushing point and outlet observed by the Geotechnical Engineer. | For every section of drain installed | Written Confirmation/Approval from Geotechnical Engineer, Photos, QA Checksheet(s) | HOLD | Internal | JFC | HOLD | ENGEO |
| 6.06 | As-builts – Surface and sub-surface drainage | ENGEO Technical Specification – NAL 134.620km: Section 8 | The contractor is required to provide ENGEO with as-built information for a MSQA Geotechnical Completion Report, including surveying items before filling, which should form a hold point in the construction sequence and proof of function of the counterfort drainage.  ENGEO to receive as-built drawings for: • The location and invert of all surface and sub-surface drainage | .  As-built approved by ENGEO | Upon completion of works and prior to any filling | As-builts | HOLD | Internal | JFC | HOLD | ENGEO |
| **7.0 INSPECTION AND HOLD POINTS (IN ADDITION TO WHAT HAS ALREADY BEEN LISTED ABOVE)** | | | | | | |  | | | ENGINEER | |
| ~~7.01~~ | ~~Geogrid Placement, Retaining Wall Drainage, and Keystone Placement~~ |  | Not Required |  |  |  |  |  |  |  |  |
| 7.02 | Drainage and Counterfort Drainage | ENGEO Technical Specification – NAL 134.620km: Section 7 | ENGEO inspection of completed drainage and counterfort drainage | Approved by ENGEO | For every section of completed drainage works | Written Confirmation of ENGEO’s approval, Photos, QA Checksheet(s) | HOLD | Internal | JFC | HOLD | ENGEO |
| 7.03 | Finished Surfaces | ENGEO Technical Specification – NAL 134.620km: Section 7  ENGEO – NAL 134.620km: Drawing 4 | ENGEO inspection of the finished surfaces prior to revegetation (may also be required for survey purposes as required by ENGEO)  Revegetation in accordance with KiwiRail Corridor Schedule (2023) | Approved by ENGEO | For every section of finished surface prior to revegetation | Written Confirmation of ENGEO’s approval, Photos, QA Checksheet(s) | HOLD | Internal | JFC | HOLD | ENGEO |
| 7.04 | Hydroseeding | ENGEO Technical Specification – NAL 134.620km: Section 7  ENGEO – NAL 134.620km: Drawing 4 | ENGEO inspection of completed hydroseeding.  Hydroseeding in accordance with KiwiRail Corridor Schedule (2023) | Approved by ENGEO | For every section upon completion of hydroseeding | Written Confirmation of ENGEO’s approval, Photos | HOLD | Internal | JFC | HOLD | ENGEO |
| **8.0 FORMATION** | | | | | | |  | | | **ENGINEER** | |
| 8.01 | Structural Fill | N/A |  |  |  |  |  |  |  |  |  |
| 8.02 | Sub-ballast | N/A |  |  |  |  |  |  |  |  |  |
| 8.03 | Construction of formation (ballast) | ENGEO – NAL 134.620km: Drawing 5 CAN-01,RFI 001, RFI 028 | Formation construction as per KiwiRail Standard C-ST-FO-4110 Formation and task instruction C-TI-FO-4207 | KiwiRail Standard C-ST-FO-4110 Formation and task instruction C-TI-FO-4207 for construction compliance. Ballast to be 390-410mm below top of rail | For every section of formation shown on the drawings | QA Checksheet(s), Photos | HOLD | Internal | JFC | REVIEW | ENGEO |
| **9.0 Culvert – Directional Drilled** | | | | | | | | | | **ENGINEER** | |
| 9.01 | Materials | ENGEO – NAL 134.620km: Drawing 8 | All materials as per the design drawings | All materials comply with the drawings | Prior to use of materials on site | Dockets | HOLD | Internal | JFC | witness | ENGEO |
| 9.01 | Installation | ENGEO – NAL 134.620km: 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 | witness | Internal | JFC | HOLD | ENGEO |
| 9.02 | Wingwall Bedding | ENGEO – NAL 134.620km: Drawing 8 | Compacted hardfill min 200mm thk | 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 | witness | ENGEO |
| 9.03 | As built Culvert drawings | ENGEO – NAL 134.620km: Drawing 8 | As built drawings to be provided by the contractor to detail the final  construction of the 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 |
| **10..0 POST CONSTRUCTION** | | | | | | | | | | **ENGINEER** | |
| 10.01 | Revegetation |  | The slope will be revegetated using native hydroseeding, native shrub planting, or a combination of both, approved by a KiwiRail environmental scientist and ecologist. | Revegetation planting comply with KiwiRail approved corridor planting schedule 2023. | Shrubs to be approved by KiwiRail environmental scientist and ecologist before planting or seeding. | List of native shrub, Written Confirmation from KiwiRail Environmental Specialist | witness | Internal | JFC | HOLD | ENGEO |
| 10.02 | As-builts | ENGEO Technical Specification – NAL 134.620km: Section 8 | Following the construction, ENGEO should be provided with as built documentation to append their MSQA documentation.  ENGEO provided with as built documentation of the: -monitoring fence -drainage -rip rap to append to our MSQA documentation. | As-built approved by ENGEO & KiwiRail (subgrade, excavations, pipe inverts, wingwalls, rip rap excavations & extents, drainage string (culvert, swales etc.) completion levels | 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 |
| 10.03 | As built Culvert drawings | ENGEO – NAL 134.620km: Drawing 8 | 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** |
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| **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** | |
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| 36 |  |  |  |  |  |  |  |  |  |  |  |
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### ITP Induction Sign On

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| ITP Induction Sign-on | | |
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