

<b>Repair Task:</b>	<b>Task 12 – Rock Scaling 355.42 - 355.79</b>
<b>Track Location:</b>	Rail Chainage 355.42-355.79
<b>Description:</b>	Cliff face areas require scaling to remove significant rock fall hazard.
<b>Required Works</b>	
<b>Scale/ Scope/Volumes:</b>	Allow to scale cliff face Allow to put 20 tonne excavator up on bench and remove collected rocks - push out onto formation bench below. Remove track and sleeper sets prior.
<b>Construction Comment:</b>	Require expert assistance to define scale and scope of problem - prelim budget 12 days of actual abseil work on site.
<b>Designer Comment:</b>	Require expert assistance to define scale and scope of problem - prelim budget 12 days of actual abseil work on site.
<b>Rail Operations:</b>	Work trains past site, including deliveries for Dropout 3 & 4.



Rock scaling areas essentially bracket Dropout 3. Note previous benching operations on northern side of dropout.













View into Dropout 3 looking towards Tunnel 23 beyond.





Typical rock fall debris between dropout and Tunnel 23 (note accumulated over 7 years)











Views of rock face north of dropout 3 – note catch bench in above photo (requires clearance)-.



View looking back to Tunnel 24 Area

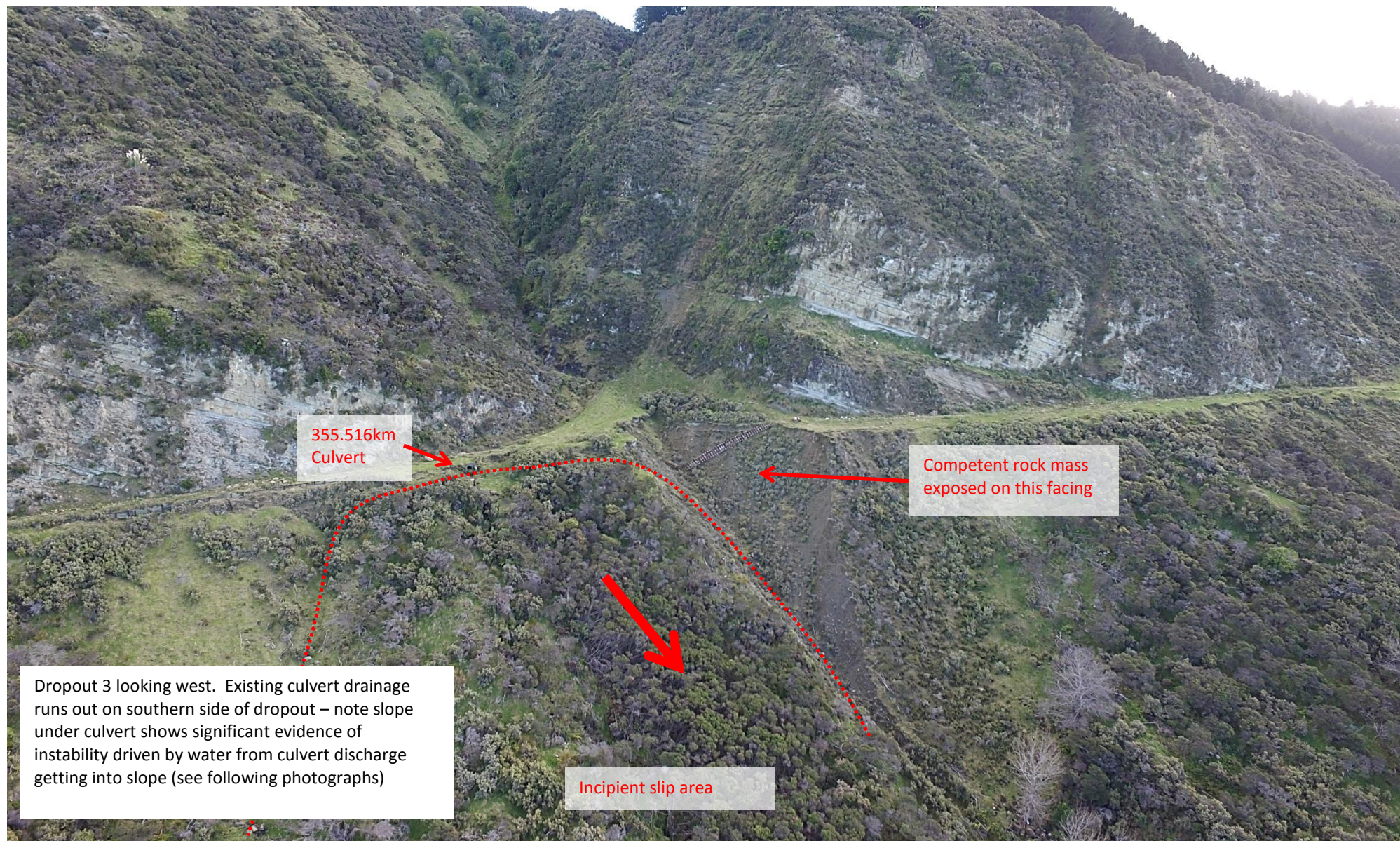


SCOPE OF WORKS	
DRAWING PACKAGE:	
SITE ACCESS:	
SITE PREPARATION:	
SUBSOIL DRAINAGE:	
STORMWATER DRAINAGE:	
EARTHWORKS:	
OTHER 1:	
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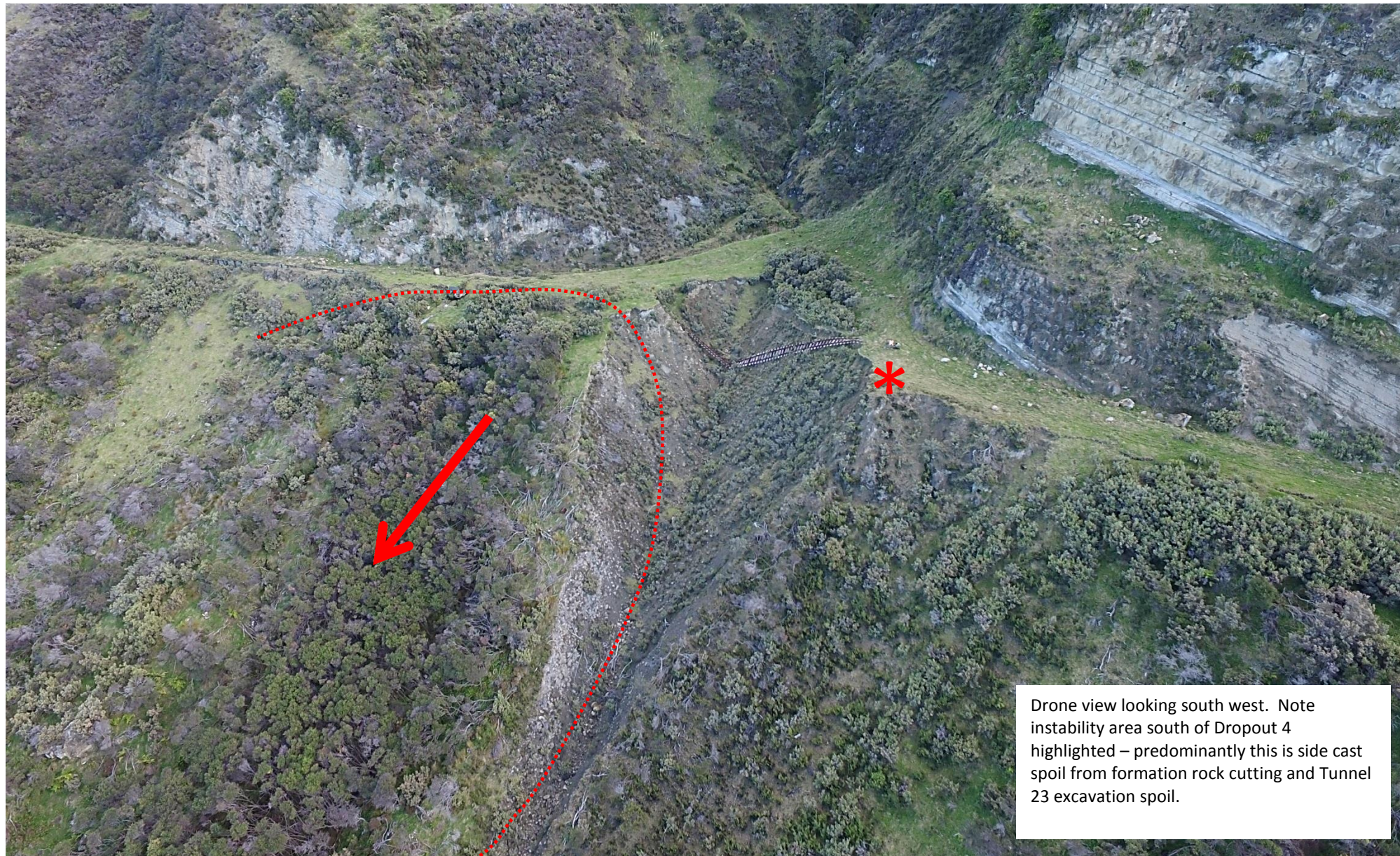
METHODOLOGY – SITE SPECIFIC:		
SITE SPECIFIC RISK ITEMS	SPECIFIC ACTIVITIES	RESPONSIBILITY
<b>ITEM 1</b> <b>ITEM 2</b> <b>ITEM 3</b>	1.1	Site management Contractors
	1.2	Site management Contractors
	1.3	Site management Contractors
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	1.5	Site management Contractors
	1.6	Site management Contractors
	1.7	Site management Contractors
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<b>Repair Task:</b>	<b>Task 13 – Dropout 3</b>
<b>Track Location:</b>	Rail Chainage 355.57km
<b>Description:</b>	Reshape and bench out the washout area prior to installing either a 2V:1H (63 degree) sloping Paragrid reinforced MSE slope faced off with hybrid 0.5m high gabion baskets filled with local site soils or a vertically faced retaining wall structure backfilled with Paraweb reinforced GAP 80/ 100 greywacke derived hardfill.
<b>Required Works</b>	As per above
<b>Scale/ Scope/Volumes:</b>	<p>Dropout dimensions are in the order of 45m wide by 90m long and nominally 15 metres deep on the outer edge of track formation. Upstream catchment is some 0.3km<sup>2</sup> with relatively complicated and ineffective drainage system, destabilising the immediate downhill formation slope with potential for a significant landslide event to occur south of immediate dropout area. No secondary or emergency drainage system available.</p> <p>TOR is nominally RL 134m +/- . Base of the dropout on the outer formation edge is around RL120m +/- with the toe of the dropout at nominal RL90, some 60m to 70m downstream of rail centreline.</p> <p>Install new primary drainage system under track formation and discharge to north – current drainage is destabilising adjacent slope below rail formation. Consider use of 1750Ø arch box culvert set nominal 4m deep in intact rockmass, discharge onto Rip Rap or similar, on northern side of fill.</p> <p>Repair culvert outfall at 355.516km - extend outfall out and down to better discharge position, reconfigure as emergency system only.</p>
<b>Construction Comment:</b>	Area uphill of old tunnel lining proposed as fill source for dropout 3
<b>Designer Comment:</b>	<p>Consider design with nominal Ru value for wet soils</p> <p>Consider subsoil drainage design, drainage aggregate, geotextile protection, megaflo Ultra 300 high strength pipe, benching works into underlying SST/ZST - rock breaker required?</p> <p>Culvert outfall extension – steel flume nominal 20m long plus 10m drop structure.</p> <p>Upstream catchment 0.3km<sup>2</sup>, Q100 flood design 5.4m<sup>3</sup>/s</p> <p>Base culvert:</p> <ul style="list-style-type: none"> <li>• New 1750Ø culvert has excess capacity with option to pass significant washed in sediment in flood event. Nominal 10m<sup>3</sup>/s @ 2.0m head – invert depth around 4m to allow sufficient granular backfill over top of arch.</li> <li>• Existing 0.9*1.2 arch culvert at 355.516km has 2.1m<sup>3</sup>/s @ 1.2m head - reconfigure for emergency bypass only.</li> </ul>
<b>Rail Operations:</b>	Work trains past site, including deliveries for Dropout 3 & 4.







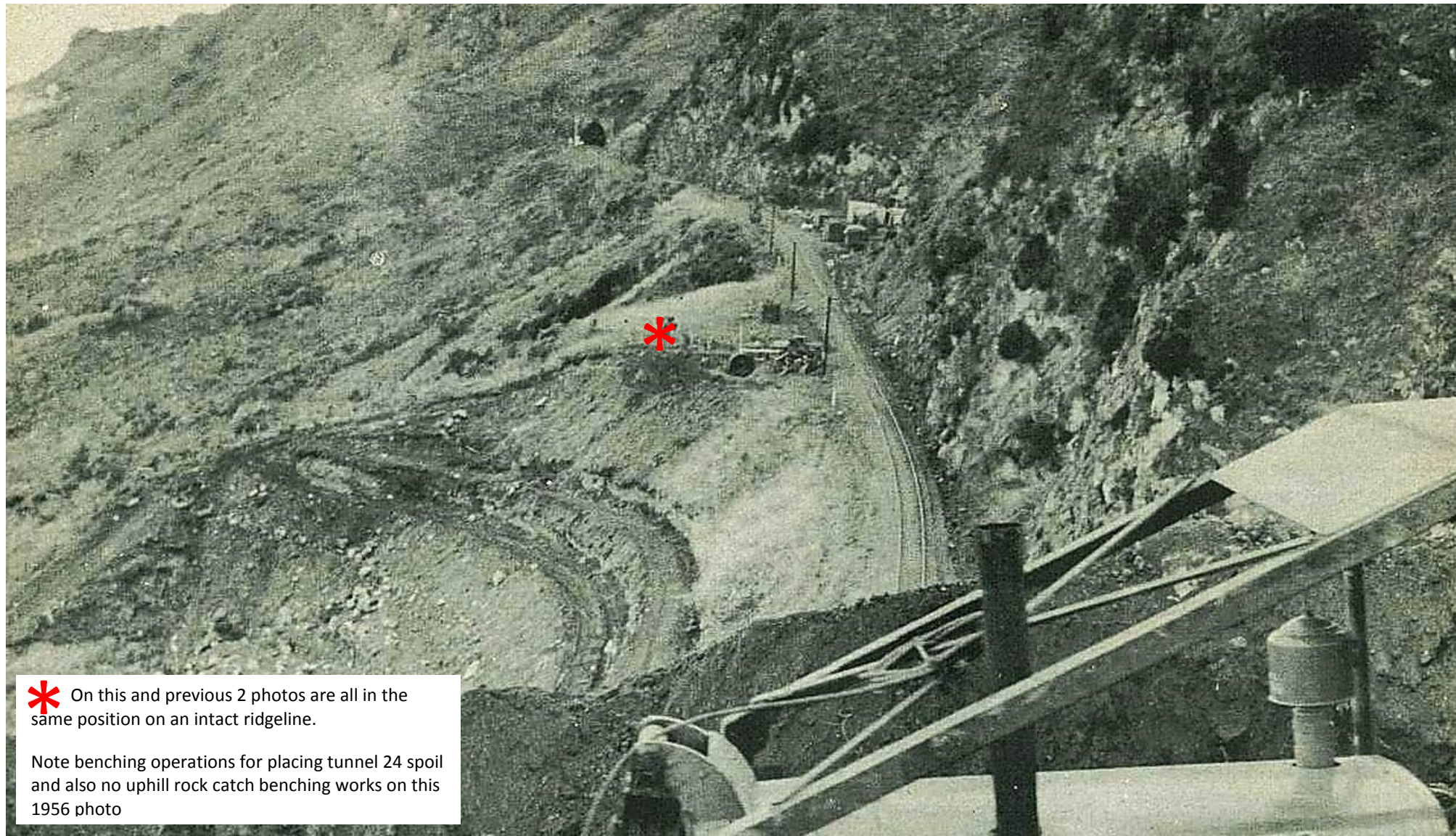


Drone view looking south west. Note instability area south of Dropout 4 highlighted – predominantly this is side cast spoil from formation rock cutting and Tunnel 23 excavation spoil.









\* On this and previous 2 photos are all in the same position on an intact ridgeline.

Note benching operations for placing tunnel 24 spoil and also no uphill rock catch benching works on this 1956 photo





2013 photographs of dropout 3 - looking south (above), north (below)







Outlet culvert@ 355.516km – 2013 photo above, 2019 photo below. Note slope movement / head scarp and ground pulling away from under culvert edge. Nominal 400mm downwards movement over 6 years due to water getting into slope from culvert discharge







Existing flume details – require upgrading and replacement





SCOPE OF WORKS	
DRAWING PACKAGE:	
SITE ACCESS:	
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SUBSOIL DRAINAGE:	
STORMWATER DRAINAGE:	
EARTHWORKS:	
OTHER 1:	
OTHER 2:	

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<b>Repair Task:</b>	<b>Task 14a – Tunnel 23 Northern Portal</b>
<b>Track Location:</b>	Rail Chainage 355.354km
<b>Description:</b>	Drainage works @ Northern Portal
<b>Required Works</b>	Clean out swale and outfall drainage at northern portal Establish where significant sound of water coming from nominal 355.28km inside tunnel - google & drone images suggest deeply scoured narrow gully on slope above tunnel centreline, is water getting down in behind tunnel lining ?
<b>Scale/ Scope/Volumes:</b>	Scale & volumes TBC Predominantly clean up work, minor works package
<b>Construction Comment:</b>	
<b>Designer Comment:</b>	Tunnel drainage in generally good condition – clean out outfall, track down exterior lining inflow. Note tunnel is acting as drainage under slope to south, inflow unlikely to be an issue provided tunnel lining is not exposed
<b>Rail Operations:</b>	Work trains past site, including deliveries for dropout 4.









Tunnel 23 drainage outlet in picture foreground – requires cleanout.



SCOPE OF WORKS	
DRAWING PACKAGE:	
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SUBSOIL DRAINAGE:	
STORMWATER DRAINAGE:	
EARTHWORKS:	
OTHER 1:	
OTHER 2:	

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<b>Repair Task:</b>	<b>Task 14b – Tunnel 23 Southern Portal</b>
<b>Track Location:</b>	Rail Chainage 355.41km
<b>Description:</b>	Drainage works @ Southern Portal
<b>Required Works</b>	Clean out swale drainage - extend and deepen towards south. Install new 900mm diameter culvert adjacent to existing culvert @ 355.420km as additional bypass capacity
<b>Scale/ Scope/Volumes:</b>	Scale & volumes TBC
<b>Construction Comment:</b>	Two 455mm diameter culverts recorded on KR culvert log (positions need checked against mobile road data): 355.411km, 455mm diameter, 10m long, 1.5m deep ( note seen on site – blocked) 355.420km, 10m long, 1.5km deep ( next to portal)
<b>Designer Comment:</b>	Evidence of water and silt flowing back into tunnel for 50 to 100m – additional outlet capacity required plus swale cleanouts. Extend swale cleanout southwards to Tikiwhata stream next to Bridge 271 – approx. meterage 355.080km New 900mm culvert.
<b>Rail Operations:</b>	Work trains past site, including deliveries for Dropout 4.





Tunnel 23 Southern Portal – note blocked swale drains





2013 Photographs – blocked swale drainage and culvert inlet (assumed 355.420km location)



View south looking to Bridge 271 – note blocked swales



SCOPE OF WORKS	
DRAWING PACKAGE:	
SITE ACCESS:	
SITE PREPARATION:	
SUBSOIL DRAINAGE:	
STORMWATER DRAINAGE:	
EARTHWORKS:	
OTHER 1:	
OTHER 2:	

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<b>Repair Task:</b>	<b>Task 15 – Rock Scaling 355- 355.2</b>
<b>Track Location:</b>	Rail Chainage 354-354.2km
<b>Description:</b>	Cliff face areas require scaling to remove minor rock fall hazard.
<b>Required Works</b>	
<b>Scale/ Scope/Volumes:</b>	Allow to scale cliff face - significantly less work than around Dropout 3. Rockmass dipping into slope, cut face appears to be relatively stable with minimal rock in adjacent swale. Allow for any minor scaling as part of scaling works further north.
<b>Construction Comment:</b>	Require expert assistance to define scale and scope of problem - prelim budget 3 days of actual abseil work on site.
<b>Designer Comment:</b>	Require expert assistance to define scale and scope of problem - prelim budget 3 days of actual abseil work on site.
<b>Rail Operations:</b>	Work trains past site, including deliveries for Dropout 4.





Drone view looking northwest into rock facing. Bedding dips into slope, note two ballast deck bridges (B269 & B270), SPG span bridge (B271). Minimal rock fall issues expected.









2019 Photos – looking across Bridge 270 to north (above), Bridge 271 to south (below)





SCOPE OF WORKS	
DRAWING PACKAGE:	
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SITE PREPARATION:	
SUBSOIL DRAINAGE:	
STORMWATER DRAINAGE:	
EARTHWORKS:	
OTHER 1:	
OTHER 2:	

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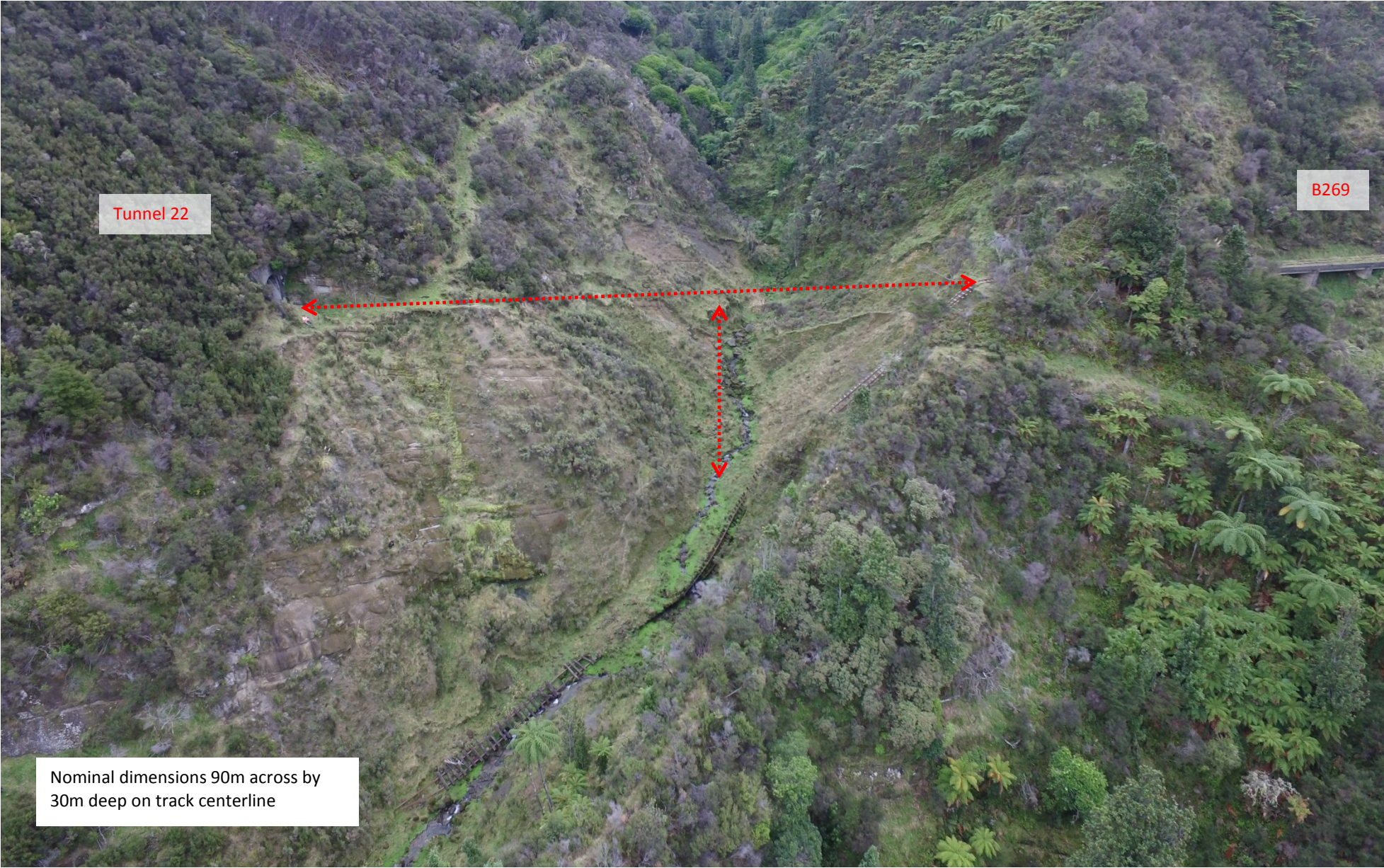


<b>Repair Task:</b>	<b>Task 16 – Dropout 4</b>
<b>Track Location:</b>	Rail Chainage 353.95km
<b>Description:</b>	Rebuild track formation using combination of downstream Paraweb reinforced imported hardfill with vertical facing block walls to limit fill footprint in valley and Paragrid reinforced local cohesive backfill soils on top for rail formation and on upstream slope to act as groundwater cut off into embankment structure. Allow for short span bridge at southern end to limit downstream fill requirements as well as permit emergency spillway under extreme flood flow events
<b>Required Works</b>	As per description
<b>Scale/ Scope/Volumes:</b>	Dropout Four straddles a deeply incised gully (up to 30 metres deep on track centreline and some 90 plus metres wide at formation level), track level at nominal RL 150m +/- with the base of the dropout at nominal RL 120 on track centreline and some 20 metres lower at the downstream end of the former embankment fill area.  The site sits towards the base of a deeply incised upstream catchment having a nominal area of some 0.95 km <sup>2</sup> and a Q <sub>100</sub> discharge of (rounded up) 18m <sup>3</sup> /s. Dropout 4 is the largest failure requiring repair between Wairoa and Gisborne.
<b>Construction Comment:</b>	Rail access is complicated by dropouts on either side as well as the need to rebuild several hundred metres of track within the Beach Loop area to the north prior to accessing the site by rail. Overland access is available into the site through the HFF Forestry Block to the north and along the old PWD access road to Tikiwhata Camp and down into the southern end of Tunnel 23 through Paritu Station.  Additional tracking is required to get earthworks equipment down to and across Tikiwhata stream and into the base of the site. A HNHO72 design standard bridge is also required to get materials into the site.
<b>Designer Comment:</b>	MSE design requirements - Stonestrong blocks required to arch and key into base and side of slope, drainage design, geotextile protection, battered fill slopes  Imported hardfill requirements – allow for GAP80 / 100 materials ex Matawai Quarry or alternative Nuhaka Beach quarry all in sand and gravel mix product.  Significant logistic exercise to construct.  Bridge options – found on shallow foundations tied down into underlying rockmass using GFRP anchors, span across onto MSE bridge abutment
<b>Rail Operations:</b>	Work train deliveries to site available once Dropouts 1,2,3 repaired and passable

























2013 view looking south. Note remnant tunnel spoil in base of gully along base of southern facing – this is mostly eroded away in 2019 photos





April 2012 photograph above showing intact rail line, balance 2013 photographs







Drainage drive photos – above is nominal 2.5\*2.5 tunnel section for 60m downstream of arch culvert





1.22 wide by 1.8m high arch culvert, 30m long @ upstream end. Note blocked inlet





SCOPE OF WORKS	
DRAWING PACKAGE:	
SITE ACCESS:	
SITE PREPARATION:	
SUBSOIL DRAINAGE:	
STORMWATER DRAINAGE:	
EARTHWORKS:	
OTHER 1:	
OTHER 2:	

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<b>Repair Task:</b>	<b>Task 17 – Tikiwhata Short Tunnels 20-21-22</b>
<b>Track Location:</b>	Rail Chainage 353.39-353.78km
<b>Description:</b>	Add walkways to Bridge 267A & 268 as part of southern hardfill import option ( required for rail operators & access works )
<b>Required Works</b>	This is partially superseded by overland working and rail supply from north; however opportunity available to undertake works while work crews in area.
<b>Scale/ Scope/Volumes:</b>	Add walkways to Bridge 267A, 268, 269 Clean out drainage @ end of Tunnel 19 - inlet area is choked with debris Assess ground above Tunnel 19 portal - minor rock fall on track Check drainage around other tunnels
<b>Construction Comment:</b>	
<b>Designer Comment:</b>	
<b>Rail Operations:</b>	Work trains past site, including deliveries for dropout 4 from southern end

















View looking into Tunnel 19 northern portal – note minor slip above portal entrance with debris on track. Bridge 268A in foreground.





Bridge 269 and northern Tunnel 20 portal in top photo, Tunnel 21 in bottom photo.





Available laydown area north of Tunnel 21

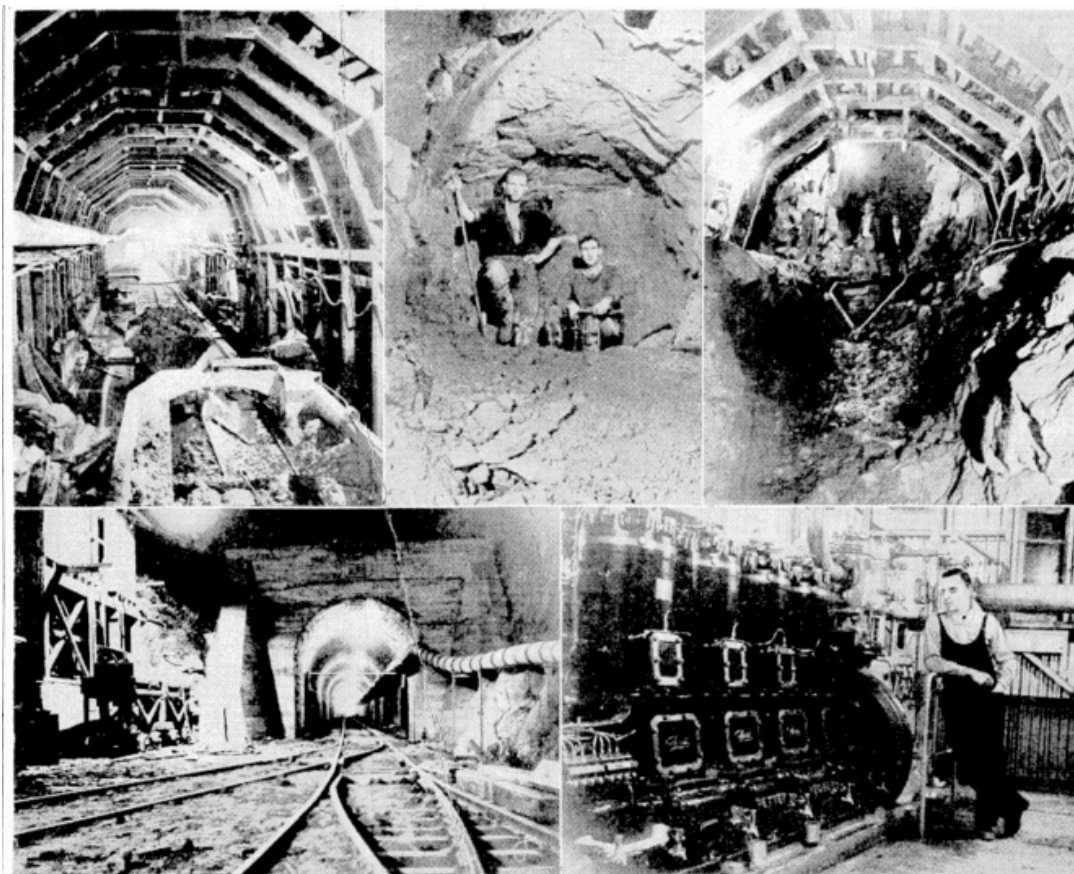


SCOPE OF WORKS	
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SITE ACCESS:	
SITE PREPARATION:	
SUBSOIL DRAINAGE:	
STORMWATER DRAINAGE:	
EARTHWORKS:	
OTHER 1:	
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<b>Repair Task:</b>	<b>Task 18 – Tikiwhata Tunnel 19 Lining</b>
<b>Track Location:</b>	Rail Chainage 352km+/- ( nominal)
<b>Description:</b>	Crackling in concrete tunnel lining
<b>Required Works</b>	Allow for baseline lazer scan survey through tunnel (Woods Consultants) as part of track reopening works
<b>Scale/ Scope/Volumes:</b>	Assess concrete lining cracking - has been in place for nearly 80 years, in good condition for age. No physical works anticipated
<b>Construction Comment:</b>	Assess concrete lining cracking - has been in place for nearly 80 years, in good condition for age. No physical works anticipated
<b>Designer Comment:</b>	
<b>Rail Operations:</b>	Survey works early in program – no work trains expected during survey operations.



Historical photos of Tikiwhata Tunnel construction – refer Task 4 (Wharekakaho Tunnel) for additional tunnel construction photographs



SCOPE OF WORKS	
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EARTHWORKS:	
OTHER 1:	
OTHER 2:	

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<b>Repair Task:</b>	<b>Task 19 Tikiwhata Tunnel 19 Southern Portal</b>
<b>Track Location:</b>	Rail Chainage 350.4km
<b>Description:</b>	Drainage Works
<b>Required Works</b>	Clean out swales at southern portal cutting & tunnel entrance , cut back vegetation and open up area
<b>Scale/ Scope/Volumes:</b>	Clean out swales at southern portal cutting & tunnel entrance , cut back vegetation and open up area
<b>Construction Comment:</b>	
<b>Designer Comment:</b>	
<b>Rail Operations:</b>	Unlikely to have rail operations during works







SCOPE OF WORKS	
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STORMWATER DRAINAGE:	
EARTHWORKS:	
OTHER 1:	
OTHER 2:	

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<b>Repair Task:</b>	<b>Task 20 Tikiwhata Tunnel Southern Bridges</b>
<b>Track Location:</b>	Rail Chainage 350.25km
<b>Description:</b>	Erosion Protection Bridge 266 & 267
<b>Required Works</b>	
<b>Scale/ Scope/Volumes:</b>	Allow to use large rock to provide additional erosion protection on northern bridge abutment 266 Check erosion protection on bridge 267
<b>Construction Comment:</b>	
<b>Designer Comment:</b>	
<b>Rail Operations:</b>	Unlikely to have rail operations during works





Bridge 266 above showing minor erosion repair works, Bridge 267 below.





SCOPE OF WORKS	
DRAWING PACKAGE:	
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SITE PREPARATION:	
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OTHER 1:	
OTHER 2:	

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<b>Repair Task:</b>	<b>Task 21 – Railway Road Culvert Works</b>
<b>Track Location:</b>	Rail Chainage 349.32km
<b>Description:</b>	Upgrade base culvert entrance and repair outfall, install larger high level emergency bypass for Q100 flood design requirements
<b>Required Works</b>	Upgrade base culvert entrance and repair outfall, install larger high level emergency bypass for Q100 flood design requirements
<b>Scale/ Scope/Volumes:</b>	<p>Clean out upstream outlet area; install new railway iron protection works around inlet and additional rail iron screen upstream. Install all-weather track into culvert headwall &amp; screen areas so emergency access is available 24/7 from Railway Road for timber slash clearance.</p> <p>Install a high level culvert inlet (nominal 1500/1800mm manhole riser with a scruffy dome top) or similar box structure to provide a high level inlet on the base culvert.</p> <p>Install a single set of 1.7m dimensioned arch box culverts set nominally 5 m below TOR to act as an emergency overflow as well as provide additional Q<sub>100</sub> flood capacity. . Excavate in rockmass following the line of the tunnelled culvert below, will replace the current 1050Ø pipeline and will discharge over the rockmass slope above the existing outlet.</p>
<b>Construction Comment:</b>	Access down Railway Road – JNL forestry access.
<b>Designer Comment:</b>	<p>Upstream catchment 2.05km<sup>2</sup>; Q<sub>100</sub> =37m<sup>3</sup>/s flood flows.</p> <p>Base culvert size is 1.3m wide by 2.0m high, 20m long, 10m deep @ 90 skew. Discharge 28.5m<sup>3</sup>/s with 8m of driving head in extreme event. KR culvert log advises secondary outlet of 1050Ø pipe @ 3m deep – discharge 4.0m<sup>3</sup>/s with 3m head (floodwater@ sleeper level). This pipe not seen on site – inlet overgrown / blocked with recent earthworks? (TBC)</p> <p>Additional 4.5m<sup>3</sup>/s required for Q<sub>100</sub> event.</p> <p>Allow to replace 1050Ø pipe with nominal 20m length of 1.75Ø arch box culvert @ 5m invert depth – capacity of 18.5m<sup>3</sup>/s which provides significant additional coverage in the event of the main culvert being partially blocked with timber slash.</p> <p>Downstream lower outlet is undermining back into bank – scour protection required ( large rock / concrete)</p>
<b>Rail Operations:</b>	Potential for work trains past site, including deliveries for dropout 4 /6 from southern or northern ends.



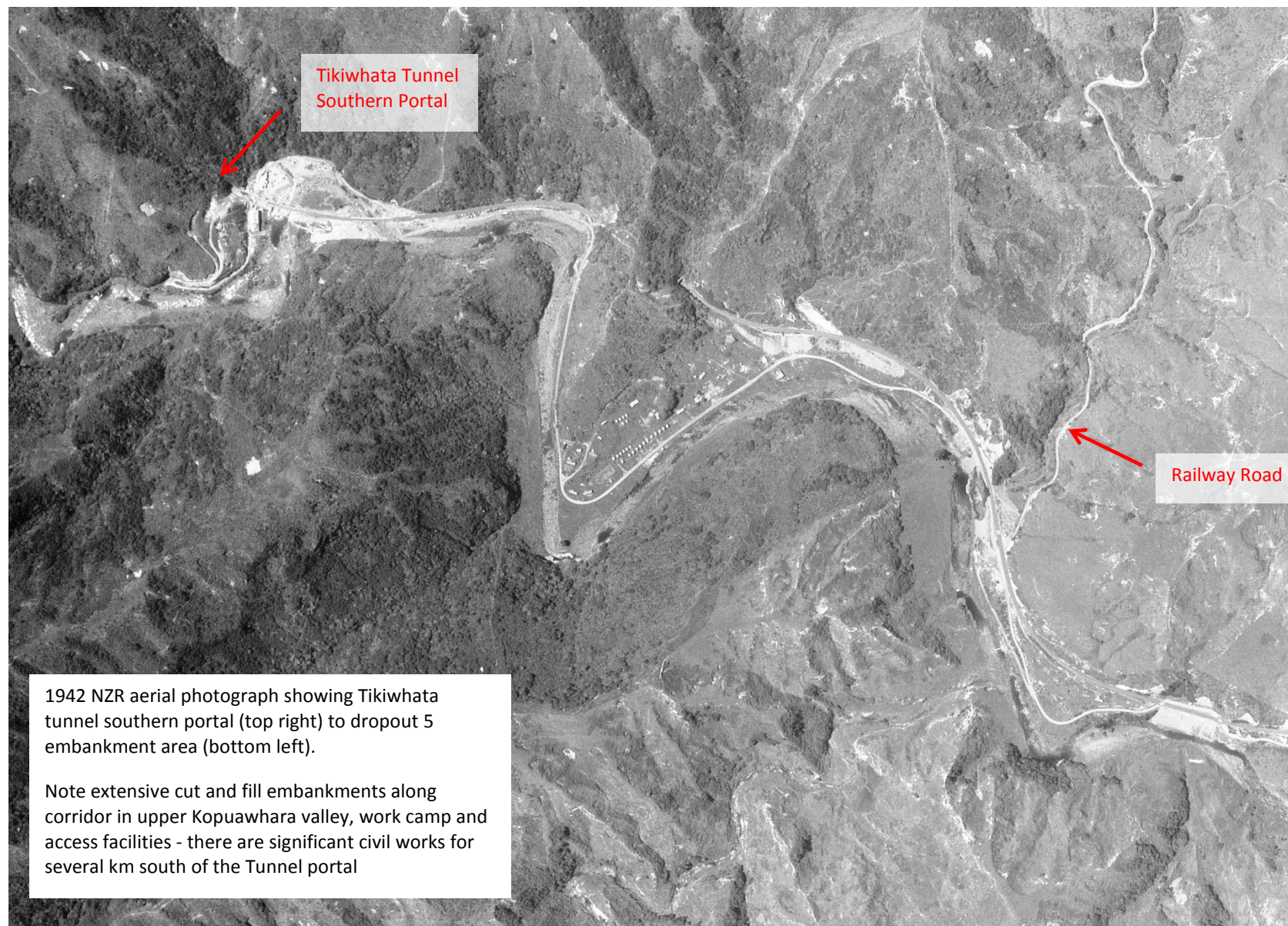






View looking upstream into gully area above culverts





1942 NZR aerial photograph showing Tikiwhata tunnel southern portal (top right) to dropout 5 embankment area (bottom left).

Note extensive cut and fill embankments along corridor in upper Kopuawhara valley, work camp and access facilities - there are significant civil works for several km south of the Tunnel portal





1942 NZR aerial photograph - enlarged to show  
Railway Road area



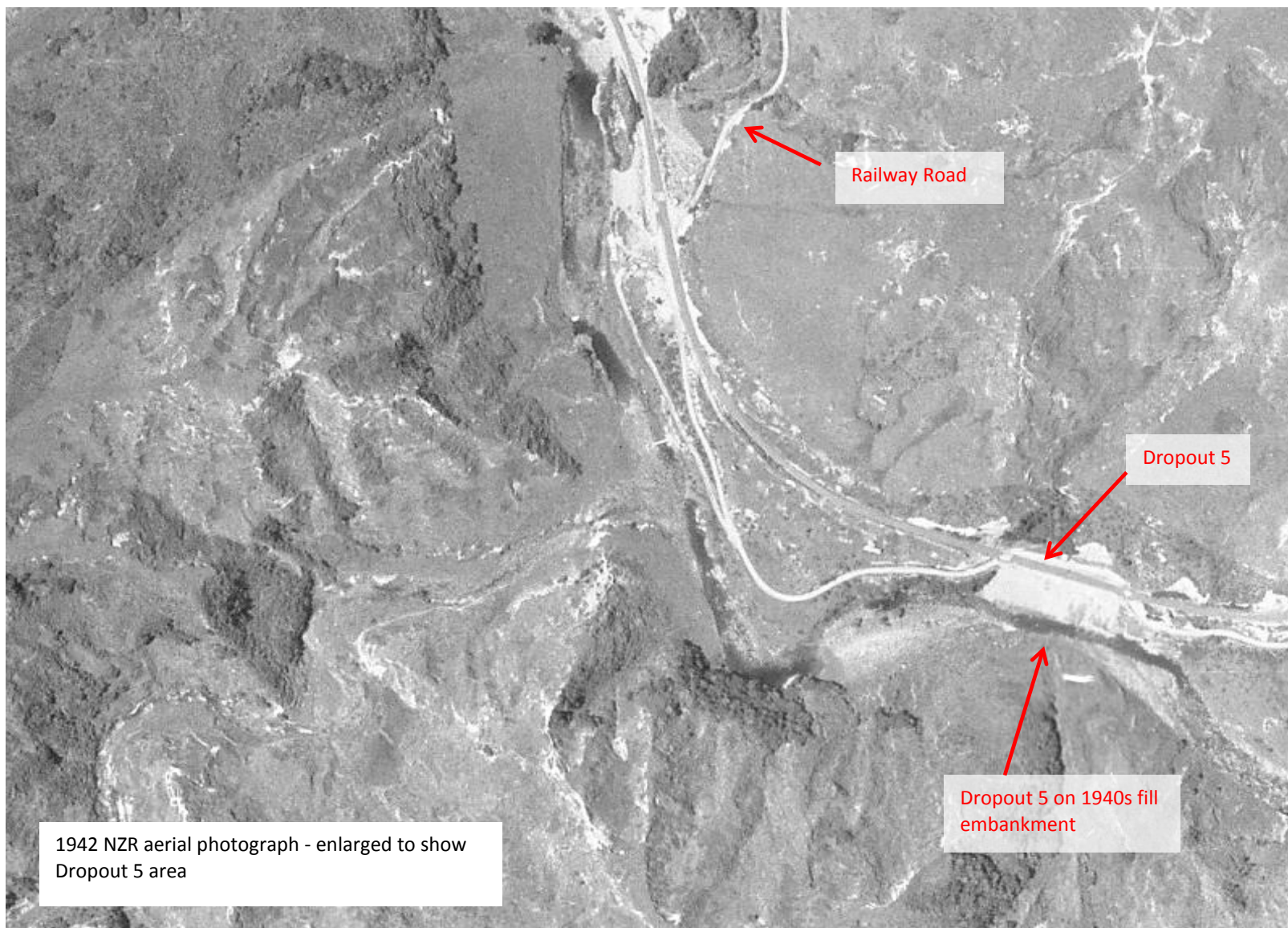
SCOPE OF WORKS	
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<b>Repair Task:</b>	<b>Task 22 – Dropout 5</b>
<b>Track Location:</b>	Rail Chainage 349km
<b>Description:</b>	Formation repair, track drainage upgrade, possible minor track slew
<b>Required Works</b>	
<b>Scale/ Scope/Volumes:</b>	<p>Repair scour under track and reinstate formation with low height concrete block walls.</p> <p>Assess swale drainage and upgrade water movement - likely blocked culverts, may require additional culverts or upgrading.</p> <p>Track slew dependant on rebuild proximity to bank - significant erosion has occurred immediately downstream. Consider large rock scour protection or short river structure to push water out from bank toe.</p>
<b>Construction Comment:</b>	Relatively minor works to repair; additional erosion protection should be considered while plant and machinery are in area.
<b>Designer Comment:</b>	<p>Dropout 5 constructed on extensive 1940s embankment filling – see photos.</p> <p>Repair scour under track and reinstate formation with concrete block walls. Consider additional erosion protection at toe of embankment.</p> <p>Assess swale drainage and upgrade water movement - likely blocked culverts, may require additional culverts or upgrading.</p> <p>Track slew dependant on rebuild proximity to bank - significant erosion has occurred immediately downstream. Consider large rock scour protection or short river structure to push water out from bank toe.</p>
<b>Rail Operations:</b>	Work trains past site, including deliveries for Dropout 4/6 from southern or northern ends





1942 NZR aerial photograph - enlarged to show Dropout 5 area





Drone shot looking down on Dropout 5 – note extensive retaining works in various states of repair, south of current washout area















SCOPE OF WORKS	
DRAWING PACKAGE:	
SITE ACCESS:	
SITE PREPARATION:	
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STORMWATER DRAINAGE:	
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METHODOLOGY – SITE SPECIFIC:		
SITE SPECIFIC RISK ITEMS	SPECIFIC ACTIVITIES	RESPONSIBILITY
<b>ITEM 1</b> <b>ITEM 2</b> <b>ITEM 3</b>	1.1	Site management Contractors
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	1.3	Site management Contractors
	1.4	Site management Contractors
	1.5	Site management Contractors
	1.6	Site management Contractors
	1.7	Site management Contractors
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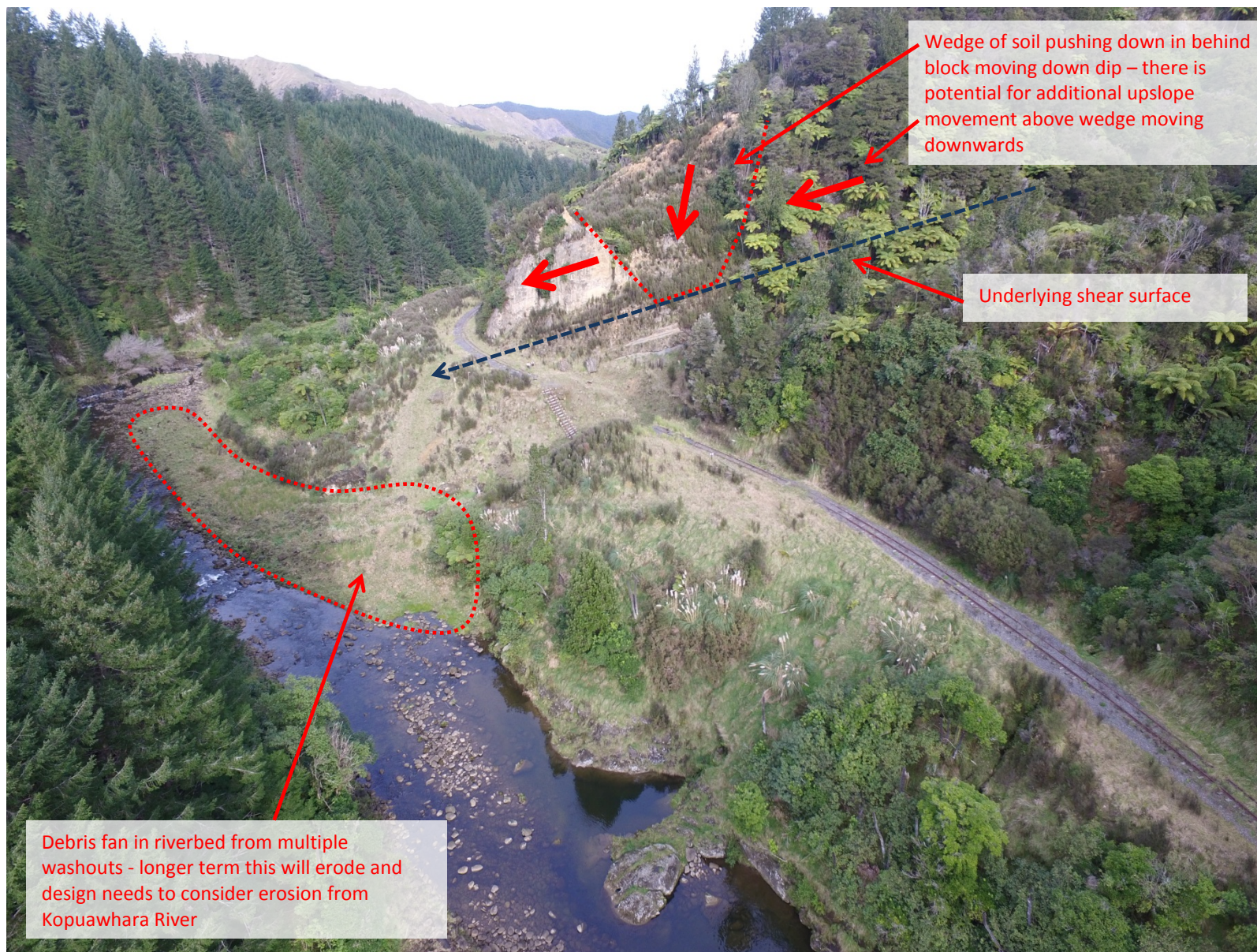


<b>Repair Task:</b>	<b>Task 23 – Dropout 6</b>
<b>Track Location:</b>	Rail Chainage 347.73m
<b>Description:</b>	Drop out six nominal upstream catchment area of some 0.3km <sup>2</sup> , washout dimensions nominal 30m wide by 40m long by 10 – 12 metres deep.
<b>Required Works</b>	Requires formation repair, track drainage upgrade, possible minor track slew around bluff to south
<b>Scale/ Scope/Volumes:</b>	<p>Note this work is additional track damage post March 2012 event – failed sometime in 2014 / 2016 ( date unknown)</p> <p>Repair overtopping washout under track and reinstate formation with steep reinforced MSE slope on downstream edge, local cohesive fill on upslope side. Use either imported Nuhaka Quarry fill or GAP 80/ 100 from Maraetaha Station stockpile for MSE block.</p> <p>Cleanout existing culvert to act as low level bypass and install new higher level culvert as emergency bypass. ( note existing culvert is not on KR culvert list)</p> <p>Assess swale drainage and upgrade water movement on either side of washout - likely blocked culverts, may require additional culverts or upgrading.</p>
<b>Construction Comment:</b>	<p>No rockmass likely to be exposed at the toe – fill will need to be keyed a couple of metres deeper for scour protection from the adjacent Kopuawhara river. Some reworking of larger rock in the Dropout 6 washout materials within the Kopuawhara riverbed may be used for upstream river / erosion protection.</p> <p>Subsoil drainage comprising megaflo Ultra 300, Bidim geotextile and imported granular aggregates is required to maintain the internal stability of the MSE block</p>
<b>Designer Comment:</b>	<p>The upstream catchment area of 0.3 km<sup>2</sup> has a nominal NIWA Q<sub>100</sub> flood estimate in the order of 5.4m<sup>3</sup>/s. The proposed 1.7 arch box culvert has a capacity of 5.4m<sup>3</sup>/s at 1.2m head depth above invert.</p> <p>Alternative consider predominantly site soil filling – summer weather constraints on this option as well as stability of downstream slope area</p> <p>Check erosion on adjacent Kopuawhara river at gully outlet.</p>
<b>Rail Operations:</b>	Work trains past site, including deliveries for the site from southern or northern end













Drone shot looking northwest into Dropout 6









Existing culvert under washout – note details not on KR culvert log (Dimensions TBC)





SCOPE OF WORKS	
DRAWING PACKAGE:	
SITE ACCESS:	
SITE PREPARATION:	
SUBSOIL DRAINAGE:	
STORMWATER DRAINAGE:	
EARTHWORKS:	
OTHER 1:	
OTHER 2:	

METHODOLOGY – SITE SPECIFIC:		
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<b>Repair Task:</b>	<b>Task 24 – Culverts around Tunnel 13 – 19</b>
<b>Track Location:</b>	Rail Chainage 345km-350.25km
<b>Description:</b>	Culvert and swale cleanouts and repairs
<b>Required Works</b>	Multiple culvert & swale issues extending from Kopuawhara viaduct through to Tikiwhata Tunnel 19 – culvert cleanout, outlet protection, scour protection, excavation / cleanout and reshaping of swale drains
<b>Scale/ Scope/Volumes:</b>	
<b>Construction Comment:</b>	Several specific culverts have tasks against them – this is a generic culvert assessment and swale cleanout task to cover other culverts not specifically inspected and addressed. At least 40 culverts between Kopuawhara Viaduct and Tikiwhata Tunnel southern portal – at least 9 with dimensions greater than 800mm or larger. All require assessment for cleanout and swale deepening and cleaning.
<b>Designer Comment:</b>	
<b>Rail Operations:</b>	Potential for work trains past site, including deliveries for dropout 4, 5 & 6 from southern and northern ends, dependant on program timing





Typical culvert and swale photos in area of interest – note heavily blocked swales, blocked culvert inlets and outlets, over grown vegetation.





Swale and drain areas looking north into tunnel 15



SCOPE OF WORKS	
DRAWING PACKAGE:	
SITE ACCESS:	
SITE PREPARATION:	
SUBSOIL DRAINAGE:	
STORMWATER DRAINAGE:	
EARTHWORKS:	
OTHER 1:	
OTHER 2:	

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<b>Repair Task:</b>	<b>Task 25 – Slip Area south of Tunnel 13</b>
<b>Track Location:</b>	Rail Chainage 344.73km
<b>Description:</b>	Counterfort Drainage assessment
<b>Required Works</b>	Current visual geotechnical assessment is that the site area is stable as it currently stands; allow for further investigation / assessment work if project proceeds.
<b>Scale/ Scope/Volumes:</b>	
<b>Construction Comment:</b>	
<b>Designer Comment:</b>	Some counterfort drainage may be beneficial above and below track from 344.7 back to tunnel 13 Entrance – history of slope movement in area, assess current performance of installed stabilisation drainage works
<b>Rail Operations:</b>	Work trains past site, including potential deliveries for Dropouts 4 – 6 from southern end, dependant on program timing.



SCOPE OF WORKS	
DRAWING PACKAGE:	
SITE ACCESS:	
SITE PREPARATION:	
SUBSOIL DRAINAGE:	
STORMWATER DRAINAGE:	
EARTHWORKS:	
OTHER 1:	
OTHER 2:	

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<b>Repair Task:</b>	<b>Task 26 – Rock Cuttings South Of Kopuawhara Viaduct</b>
<b>Track Location:</b>	Rail Chainage 341.18km – 344.5km
<b>Description:</b>	Rockfall assessment from track cuttings through hard rockmass.
<b>Required Works</b>	Current visual geotechnical assessment is that site areas are relatively stable with the odd rock dropout; however this should be evaluated further while construction plant is in area. Note outside edge of cuttings are hard rockmass; material may be suitable for coastal protection works further south at Opoutama
<b>Scale/ Scope/Volumes:</b>	
<b>Construction Comment:</b>	
<b>Designer Comment:</b>	
<b>Rail Operations:</b>	Work trains past site, including potential deliveries for Dropouts 4 – 6 from southern end, dependant on program timing.



SCOPE OF WORKS	
DRAWING PACKAGE:	
SITE ACCESS:	
SITE PREPARATION:	
SUBSOIL DRAINAGE:	
STORMWATER DRAINAGE:	
EARTHWORKS:	
OTHER 1:	
OTHER 2:	

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