Rix's Creek Mine West Pit

Free draining backfilled mine final landform

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1 Introduction

This document is intended to articulate the logic used for the development of the existing proposed final landform for the West Pit at Rix's Creek Mine that formed a landform with a final depression. Additionally, it looks conceptually at the potential use of handling additional waste after the completion of the West Pit to create a backfilled surface that is free draining, what that would require and potentially what it could look like.

Figure 1 shows a picture of the West Pit with the abstract situation of the pit having been mined without the waste dumps placed back in the hole. It illustrates the nature of the steep zone, the pit floor and the near to natural surface of the area around the pit.

1.1 Existing final landform

The strategy used to develop the final landforms was to mine the pit from the south to the north maintaining close backfill dumping in the pit void to minimise the void. Commencement of the adjacent North Pit at the completion of mining in the West Pit then allows the use of a large amount of the North Pit waste to be used to rehabilitate some areas of the West Pit void. This landform from prior work is shown in Figure 2.

1.2 Free draining final landform

The approach used to develop the free draining landform was similar to that of the existing landform but at the completion of the waste movement of the mining operations additional waste material would be excavated to achieve this free draining surface.

This conceptual landform is shown in Figure 3.

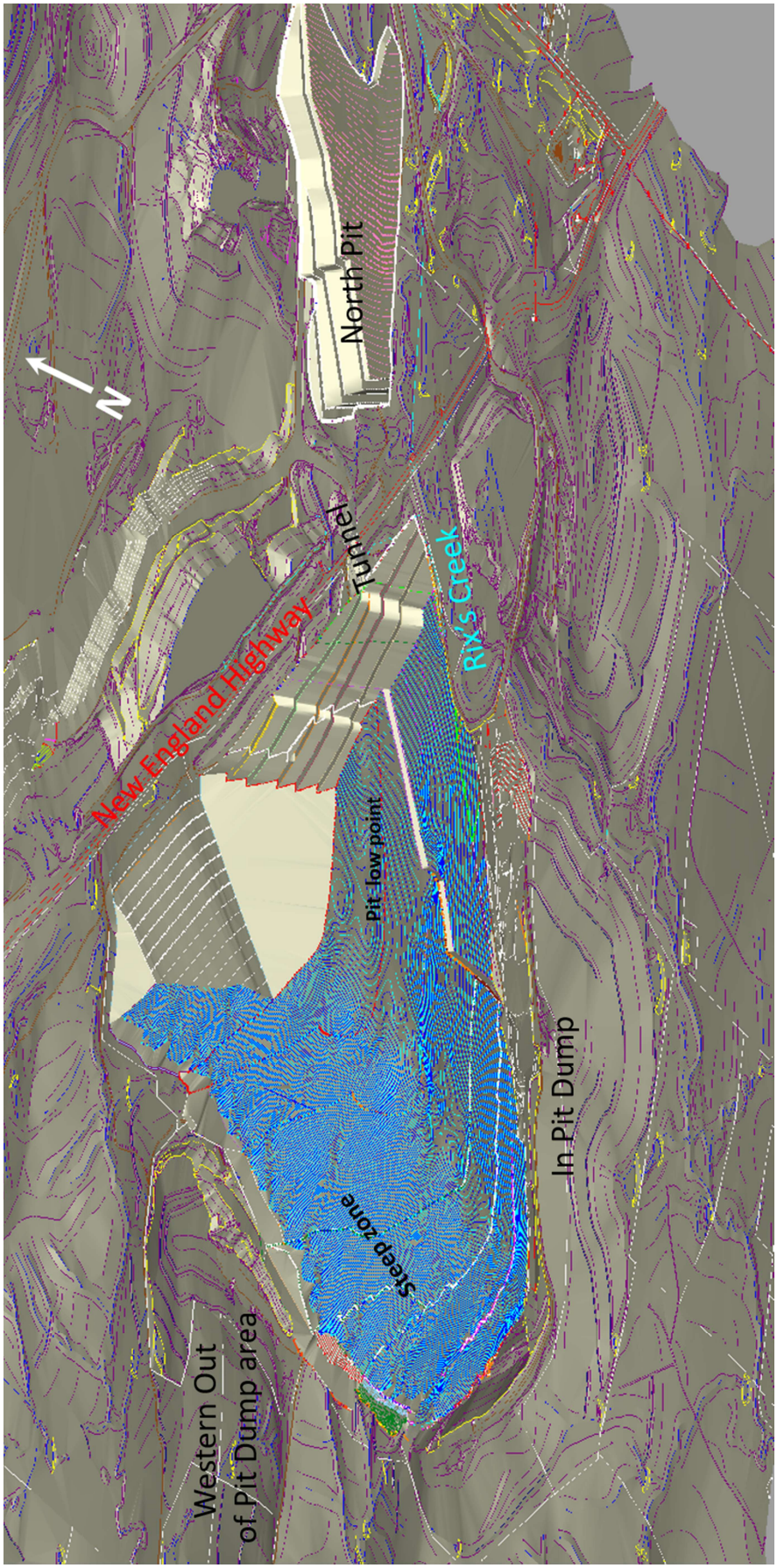

Figure 1: West Pit and surrounds with mining resource removed for visualisation purposes

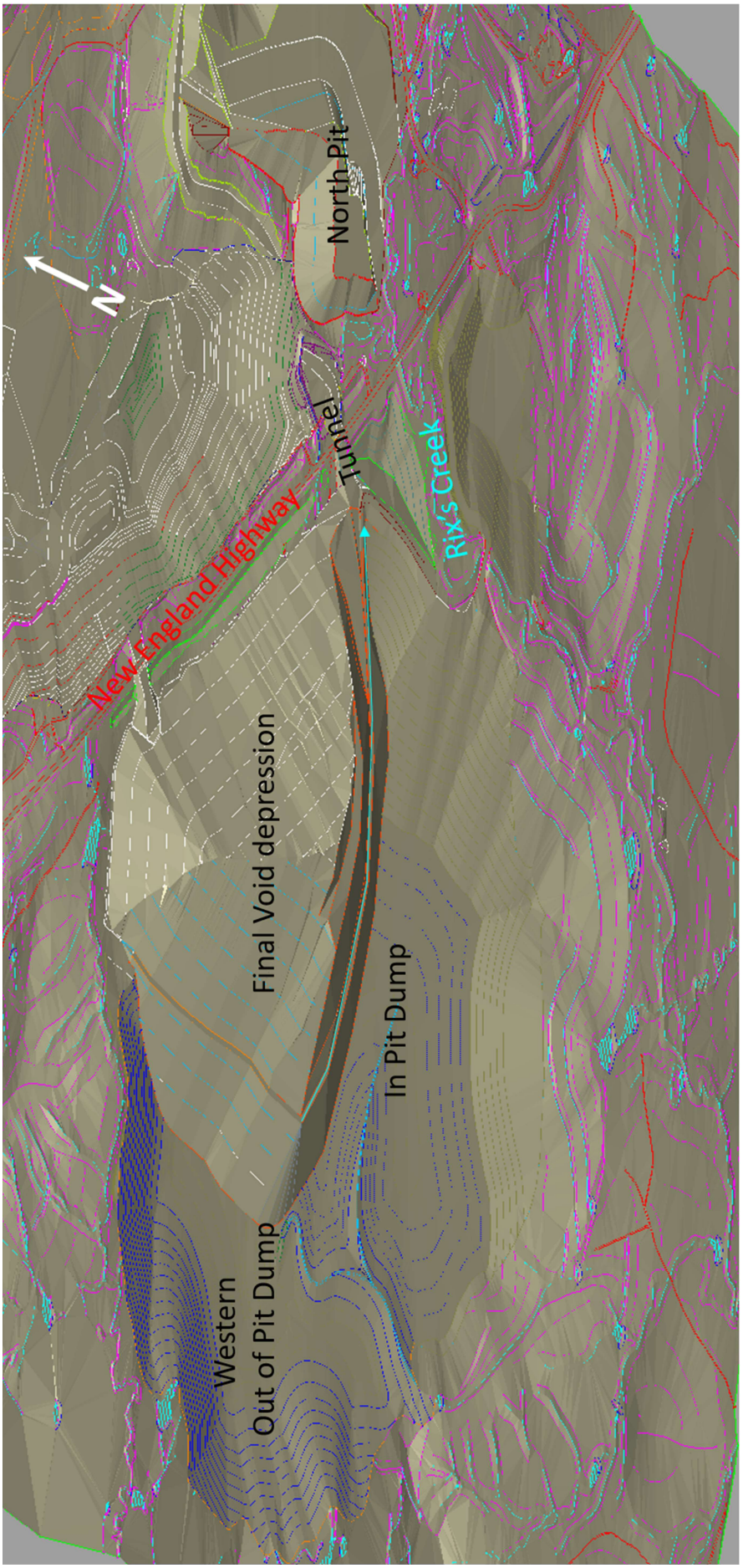

Figure 2: Existing final void with depression

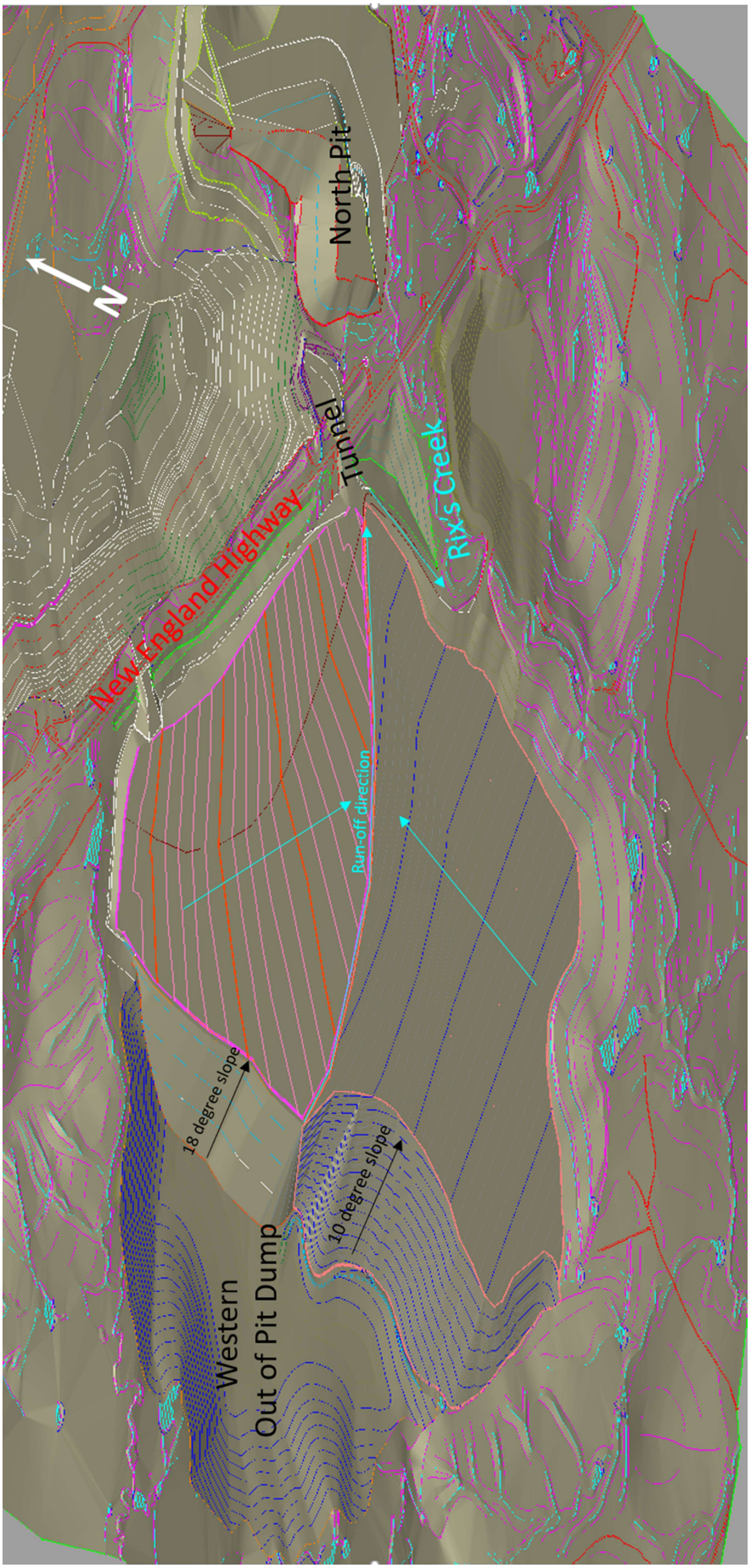

Figure 3: Final conceptual backfilled landform with drainage and slopes shown

2 Landform design

2.1 Logic of prior form

The existing final landform design was created with the strategy that access was based around the tunnel under the New England Highway. This then established accesses down to the pit floor and up to the dump crest in the face of the dump with several switchback ramps. This was established for reasons including:

- Requirement to build dumps from the bottom up
- Geotechnical instability of dumps placed on the steep western coal floor in excess of 25 degrees
- Coal access required through the highway tunnel back to the CHPP facilities
- Mining of the West Pit already established from the south
- Diminishing waste backfill generated as the pit develops away from its deepest point

These factors established the approach to the landform that was proposed as representative of the final landform that could be potentially achieved following a logical mining progression of the West Pit at the Rix's Creek mine. The landform developed was a depression of 18 degree maximum side slopes as shown in Figure 2.

2.2 Approach of backfilling free draining design

A potential backfilled final void landform was designed that was free draining achieved by the handling of additional material back into the depression of the previously proposed final landform. The approach of this design and some of the constraints is briefly discussed in this section.

The design criteria used was:

- free draining landform back to Rix's Creek near the existing highway tunnel
- minimum drain grade to creek of 0.75% (1 in 133)
- minimum surface drainage grades of 1% (1 in 100)

The constraints of the design are:

- not cutting below the natural surface at the western edge of the pit
- following the present development strategy of the pit from south to north and the access system that facilitates this development in a geotechnically viable manner.
- As the fill material is to be mined from existing waste (overburden) dumps the digging sequence must be from the top down. This is to ensure the geotechnical competence of the digging areas and associated benches.
- The grade across the digging benches to be such that surface water runoff is directed to the mine water in the final depression, not the clean water courses but still maintain stable working areas.

2.3 The resultant backfilled pit design

Basing the backfilling of the dump on the previous final landform shown in

Figure 2 material used for back-fill design used fill material cut from the existing In Pit Dump south of the remnant final void depression. This material was selected as it:

- is adjacent to the depression
- can be hauled via the access system for mining and dumping of the pit
- allows the dumps to be established from the south-eastern side and from the lower levels which is geotechnically sound
- required no on-going blasting of material to generate fill

Material from the Western Out of Pit Dump was not suggested as:

- if hauled directly into the void would pose a geotechnical risk as the coal floor is at or greater than 25 degrees and would not support un-buttressed roads
- subsequently would require much longer haulage to be around the outside of the excavation crest and back to the tunnel to get down to the dumping level
- generating of a final profile would require excavation of the dump below natural surface beyond the crest of the pit which would require further on-going blasting

3 Task of backfill to develop free draining landform

3.1 Quantities

The quantity of material expected to be required to develop the free draining landform presented here is approximately 60 million cubic metres.

3.2 Equipment

At the cessation of coal mining in this area it is considered that the existing mining equipment be used for this task and therefore would involve the use of a single large excavator (800t class), a truck fleet of 220t class trucks and ancillary support fleet such as graders and watercarts.

3.3 Haulage

As suggested the haulage system would be based on a route that hinges around the tunnel mouth. Figure 4 illustrates the envisioned path from the centroid of the dump material being rehandled and the centroid of the void to be filled.

3.4 Production calculations and timing

It is expected that in the initial phase of operation that excavation of waste to produce the landform would be from the upper benches of the dump and would be treated as a restricted daylight hours operation and limited to an average of 10 productive digger hours per day operation. As the excavation would all be above the highway level at this proportion is assumed at two thirds of the excavation quantity or 40 million cubic metres. The remaining 20 million cubic metres would be produced at the full day productive hours of 16.23 hours per day. These assumptions are included in Table 1 along with the subsequent quantity calculations. Additionally, the timing is to follow on from the completion of the North Pit in 2042 with the same equipment.

			JFY2043	JFY2044	JFY2045	JFY2046	JFY2047	JFY2048	JFY2049	JFY2050	JFY2051	JFY2052	
		Unit	Period31	Period32	Period33	Period34	Period35	Period36	Period37	Period38	Period39	Period40	
Rehandle	9800 Unit numbers	units	1	1	1	1	1	1	1	1	1	0.87	
	Daily Hours of Operation	hrs	10.0	10.0	10.0	10.0	10.0	10.0	10.0	16.2	16.2	16.2	
	Days per week of operation	days/week	5	5	5	5	5	5	5	5	5	5	
	Total Operating days per year	days	241	247	241	241	241	241	248	241	241	241	2,423
	Truck trips per operating hour	loads/hr	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	
	Truck loads/year	Lloads/yr	56,876	58,292	56,876	56,876	56,876	56,876	58,528	92,310	92,310	80,309	666,129
	Load per truck	Bcm	90	90	90	90	90	90	90	90	90	90	
	Total waste movement	Bcm	5,118,840	5,246,280	5,118,840	5,118,840	5,118,840	5,118,840	5,267,520	8,307,877	8,307,877	7,227,853	59,951,608

Table 1: Backfilling excavation quantity and timing calculations

The duration of the backfilling of the final landform is approximately 10 years from commencement.

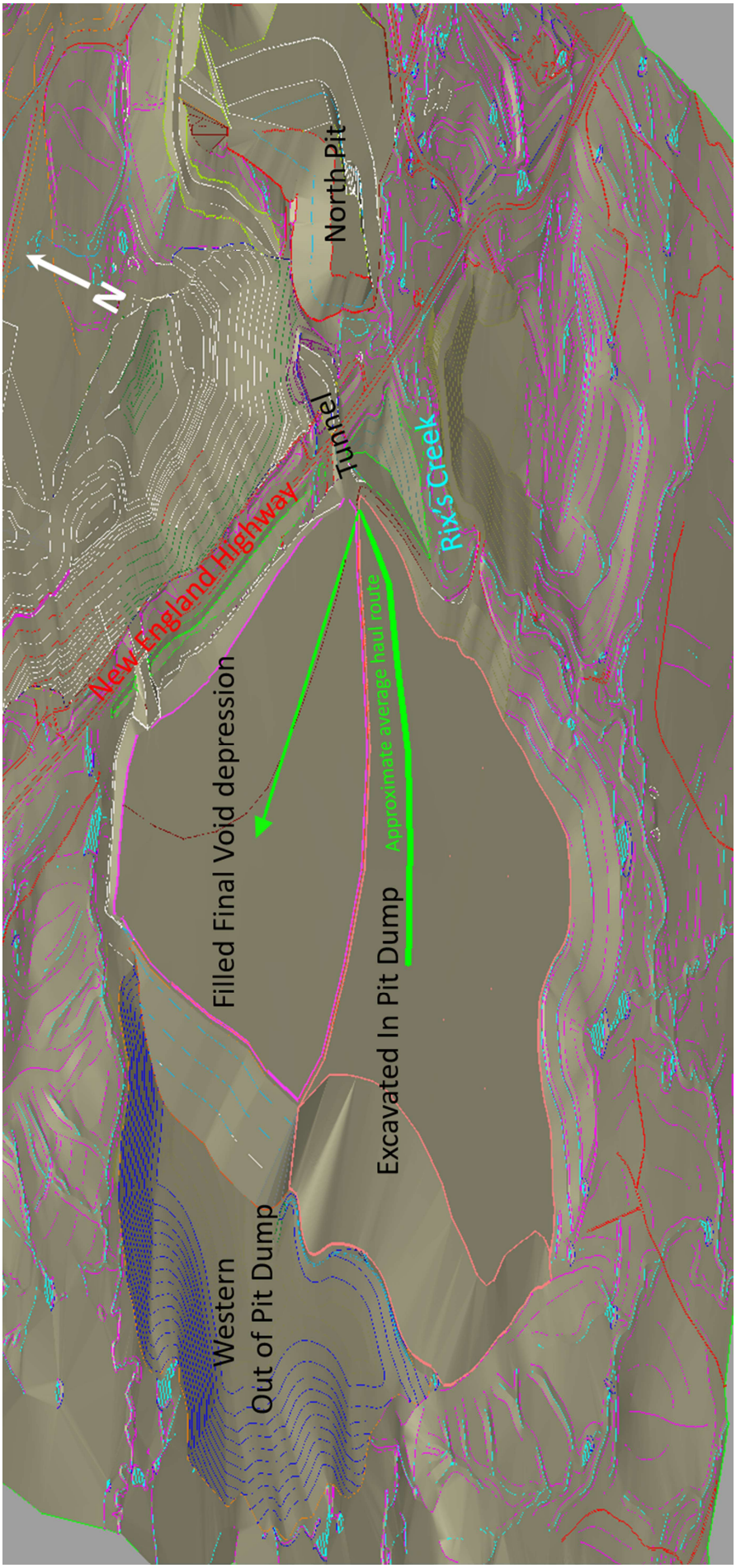

Figure 4: Proposed backfill haulage path (centroid to centroid)