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Rail Study for the Wallarah 2 Coal Project (W2CP)

Report

Rail Management Consultants Australia Pty Ltd

Sydney, 2 September 2010

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Introduction

The Wyong Areas Coal Joint Venture (WACJV) is seeking to develop the Wallarah 2 Coal Project (W2CP) near Wyong on the Central Coast of New South Wales. Kores Australia Pty Ltd is the majority shareholder and Manager of the WACJV.

W2CP will involve the underground extraction of up to 5 Mtpa of thermal coal for up to 50 years. The project is comprised of mine entries, an underground longwall mine, a coal handling plant and storage facilities, rail loop, coal loader and other associated underground mining infrastructure. The mine will produce a single thermal coal product to be marketed for export and domestic electricity generation.

The Project has been identified as a mining project as defined in Schedule 1 of State Environmental Planning Policy (Major Projects) 2005. As such, project approval requires determination from the Minister for Planning under the Part 3A process of the Environmental Planning & Assessment Act (1979).

In August 2009, the Department of Planning issued the Environmental Assessment requirements (EARs) for the environmental assessment of the Project. Included in these EARs was:

Transport: Including a detailed assessment of the project on the capacity, safety and efficiency of the surrounding rail network, having regard to the strategic objectives for passenger and rail freight network (such as the Northern Sydney Freight Rail Corridor project).

This EAR was a response from RailCorp correspondence to the Department of Planning in February 2009 requesting that W2CP "*undertake a capacity impact assessment on the stretch of rail line affected by the W2CP proposal*".

RailCorp and W2CP have been in discussions on the impact of the project's additional coal movement on the rail network since late 2009. It was agreed that the specific issue of W2CP impact on the Northern Sydney Freight Corridor (NSFC) project and the overall rail network be further assessed by W2CP commissioning a rail network modelling study when data from the NSFC project became available.

Rail Management Consultants Australia (RMCA) has been commissioned by W2CP to undertake this modelling. This modelling has been carried out using the RailCorp modelling system and incorporates the NSFC assumptions and the latest available RailCorp network timetable information. RailCorp has provided input and been consulted throughout the modelling process.

This analysis of the W2CP rail system impacts will be submitted to Department of Planning and potentially incorporated into the Planning Assessment Commission (PAC) project assessment process. The PAC report to the Department of Planning will be submitted in mid October 2010.

Project Background

Ownership

The Wyong Areas Coal Joint Venture (WACJV) was formed in 1995 in response to invitations by the New South Wales government to submit a tender for the Wyong Coal Development Areas. COAL, a BHP Billiton subsidiary as manager of the WACJV was granted the right to explore the Wyong Coal Development Areas by the NSW Government in October 1995.

The interests of BHP Billiton were sold to the Kores Australia Pty Ltd (Kores) in 2005. Kores is the current manager of the Joint Venture. The project was renamed the Wallarah 2 Coal Project (W2CP) in 2006.

The composition of the WACJV is illustrated in Table 1 below:

Wyong Areas Coal Joint Venture Ownership

Owner	Parent Company	Nationality	Percentage
Kores Australia Pty Ltd	Korea Resources Corporation	Korea	82.25
Catherine Hill Resources Pty Ltd	Sojitz Corporation	Japan	5.00
Kyungdong Australia Pty Ltd	Kyungdong Co Ltd	Korea	4.25
SK Australia (Wyong) Pty Ltd	SK Corporation	Korea	4.25
SK Networks Resources Pty Ltd	SK Networks Co Ltd	Korea	4.25
			100.00

Table 1 - Coal Joint Venture Ownership

Location

The W2CP is located approximately 70 kilometres south of Newcastle and 80 kilometres north of Sydney near Wyong on the Central Coast of New South Wales. The proposed mine infrastructure is immediately adjacent to the Main Northern Rail Line (Sydney to Newcastle) and the Sydney – Newcastle Freeway (F3 Freeway). The project location is shown in Figure 1.

The two main sites for surface facilities are:

- The Buttonderry (Hue Hue) site west of the freeway, which is the location for the main man transport facilities (the downcast shaft man-riding cage), the two ventilation shafts and the main office.

- The Tooheys Road (Bushells Ridge) site east of the freeway which is the location of the drift for transport of materials, coal conveyance to the surface, coal handling facilities and the rail load out area.

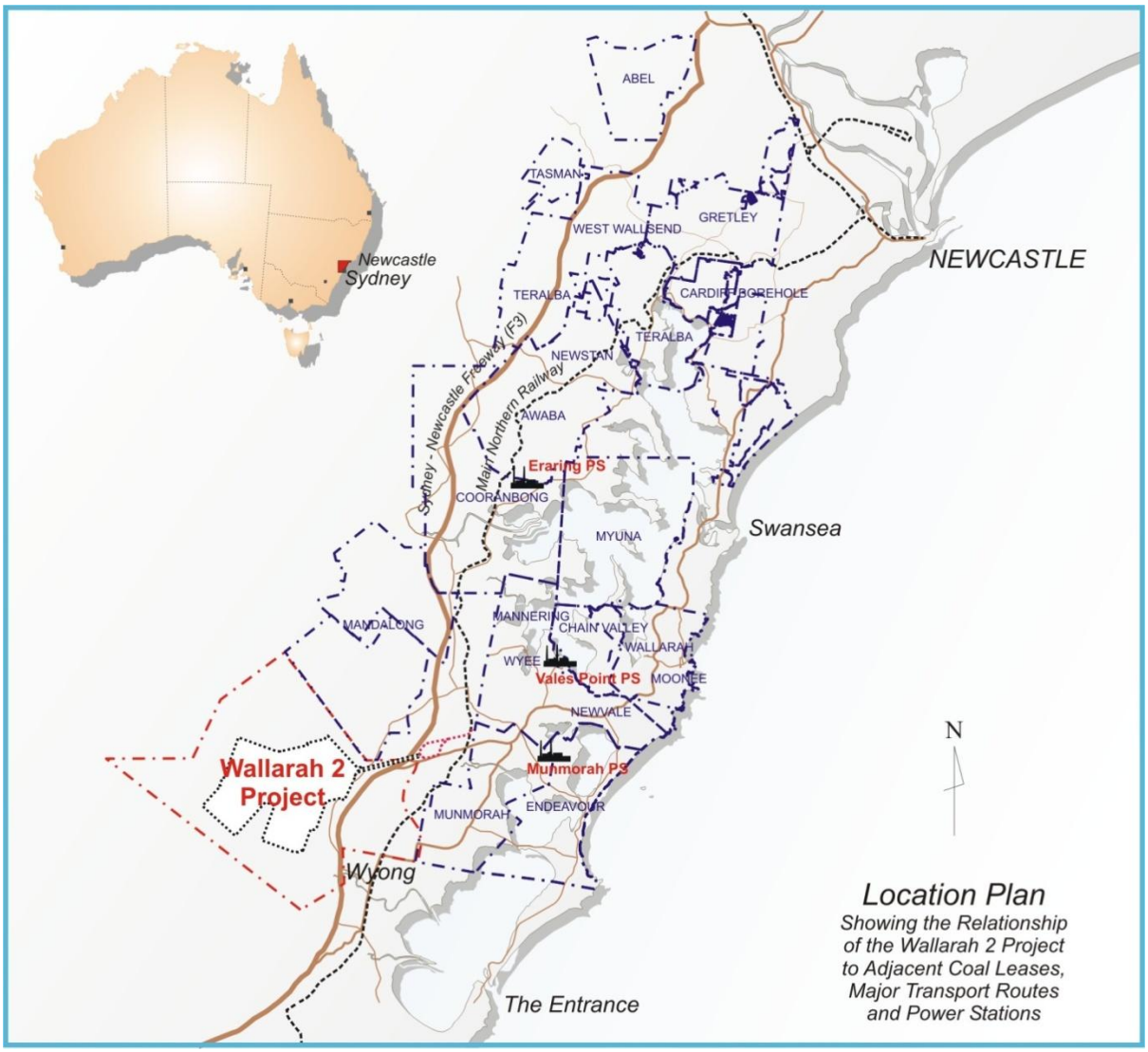


Figure 1 - Mine location map

Mine Operation

The project will involve the extraction of up to 5 million tonnes per annum of export quality thermal coal by underground longwall mining methods. The mine layout incorporates a variety of longwall panel widths (120 – 250m) in order to optimise economic reserve recovery taking into account environmental, subsidence and flood constraints.

Initial production is currently scheduled to commence in late 2013 and phase up to full production levels by 2016. Annual coal production generally varies from 4 - 4.5Mtpa in most years of the project life.

There will be no coal washing plant because coal quality is suitable for both the export and local electricity generation markets without the need for additional processing. All coal produced will be railed off site, either to Newcastle for export or to a domestic power station.

The currently proposed mine layout is shown in Figure 2.

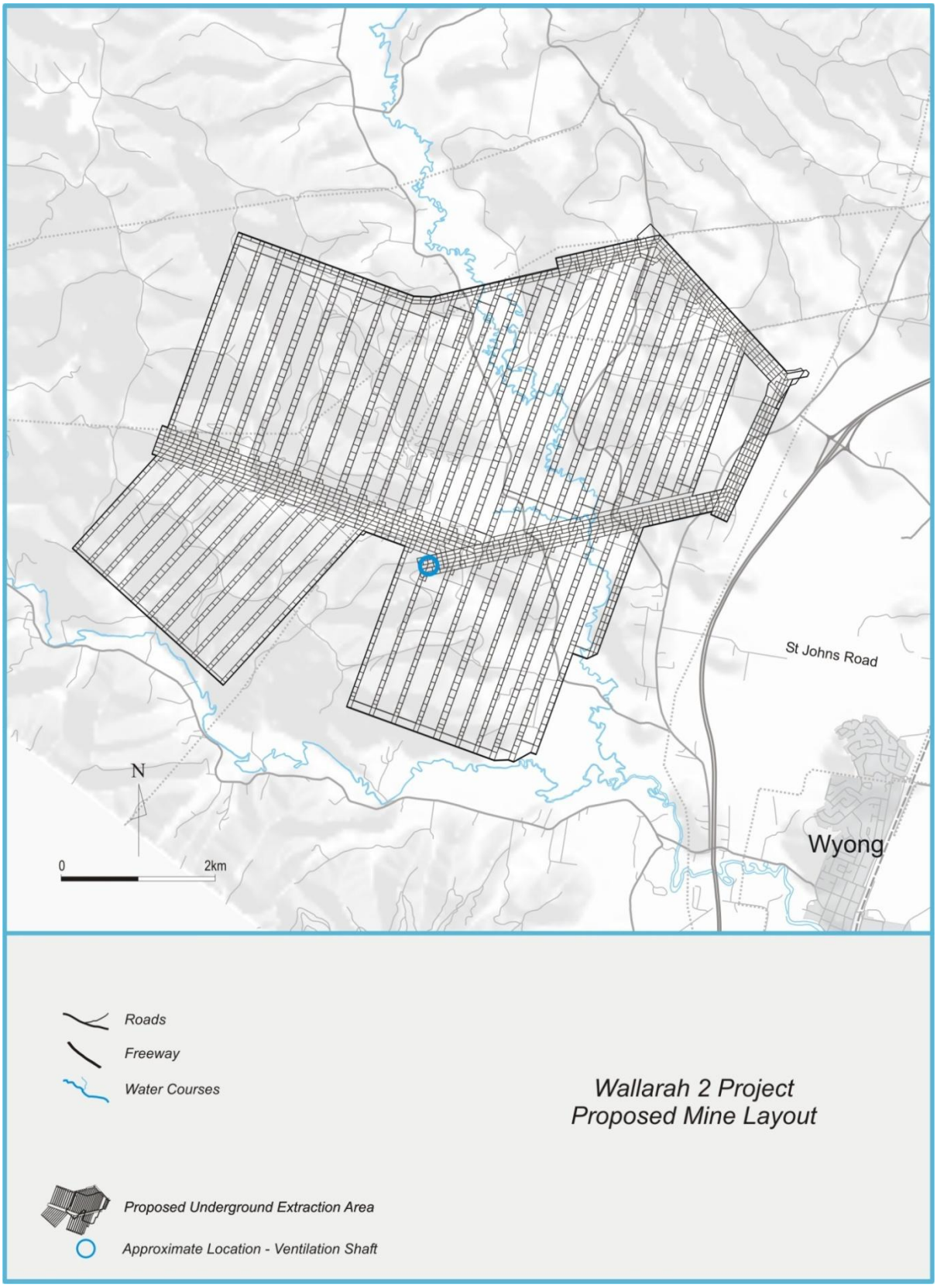


Figure 2 - Mine layout

Coal Handling / Loading

Final engineering design for the coal handling and loading facilities will be completed during the final feasibility study after the project receives Part 3A approval. This design will incorporate any specific conditions of consent and carried out in consultation with all the involved rail transport stakeholders.

The current concept design proposed facilities for handling, stockpiling and loading the coal at the Tooheys Road site consist of:

- A 4,000 t/h receival system
- A 50,000 t raw coal surge stockpile
- A 2,000 t/h raw coal reclaim, crushing and stacking system
- A 2,000 t/h stacker to stack crushed coal on the 250,000 t live product stockpile, or on an equal capacity emergency stockpile
- A portal bridge reclaimer that operates at 3,500 t/h
- A 3,500 t/h train loading system including a 1000 tonne loading bin.
- A balloon loop coming off the main line that will be able to hold at least two trains clear of the main line.

The train loader at Tooheys Road is designed to operate 24 hours per day, 7 days per week, and load trains at 3,500 t/h. There is adequate track length to store at least one train before the train loading bin and at least one train after the loading bin. Trains will travel in a clockwise direction around the loop.

The loop will access the Main Northern Line at about 113 km which is 2km south of Wyee station

Train loading time is planned for less than 90 minutes.

The balloon loop design has currently considered a 40kph speed limit except on the final approach to the loading bin where 15kph is planned.

A general arrangement of the rail loop and coal handling infrastructure is shown in Figure 3.

Figure 3 - Mine rail loop

Rail System Description

Current Rail Transport System

The rail link between W2CP and Newcastle forms part of the Main Northern Rail Line between Sydney and the Queensland border. This particular rail infrastructure is owned and maintained by RailCorp. The line is mainly used for passenger trains between Sydney and the Central Coast and Newcastle. In addition there are general and freight trains with and some coal train movements from Teralba and Newstan to Newcastle or Port Kembla as well as domestic coal shipments from the Hunter Valley to Eraring and Vales Point Power Stations.

The proposed average weekday schedule for 2017 as per RailCorp RailSys model is shown below in Table 2. The numbers include the current level of passenger trains and the proposed 2017 freight and coal operation.

Train Type	Up Direction	Down Direction
Passenger Trains	81	79
General Freight paths	37*)	41
Coal Freight paths	14	13

*) includes 1 brittle path that might not be applicable

Table 2 – Proposed average weekday schedule for 2017

The last section of the rail link beyond Broadmeadow is on the Australian Rail Track Corporation (ARTC) network which is utilised by the main Hunter Valley coal producers for access to the Port Of Newcastle.

The W2CP to Broadmeadow rail link is currently restricted to Total Axle Load (TAL) of 25 tonnes although the line is being upgrading to a 30 tonne TAL as far south as the Eraring Power Station. It is understood that consideration would be given to upgrading the remainder of the track between Eraring and W2Cp if the project goes ahead.

Other limitations on the network result from several steep sections (1:40) north of Dora Creek and at Fassifern and the limited number of available passing opportunities.

The direct railing distances from the W2CP rail loop are:

- Port of Newcastle ~ 60 kilometres
- Vales Point Power Station ~ 8 kilometres
- Eraring Power Station ~ 20 kilometres

A diagram of the Wyong to Newcastle rail network is shown in Figure 4 below.

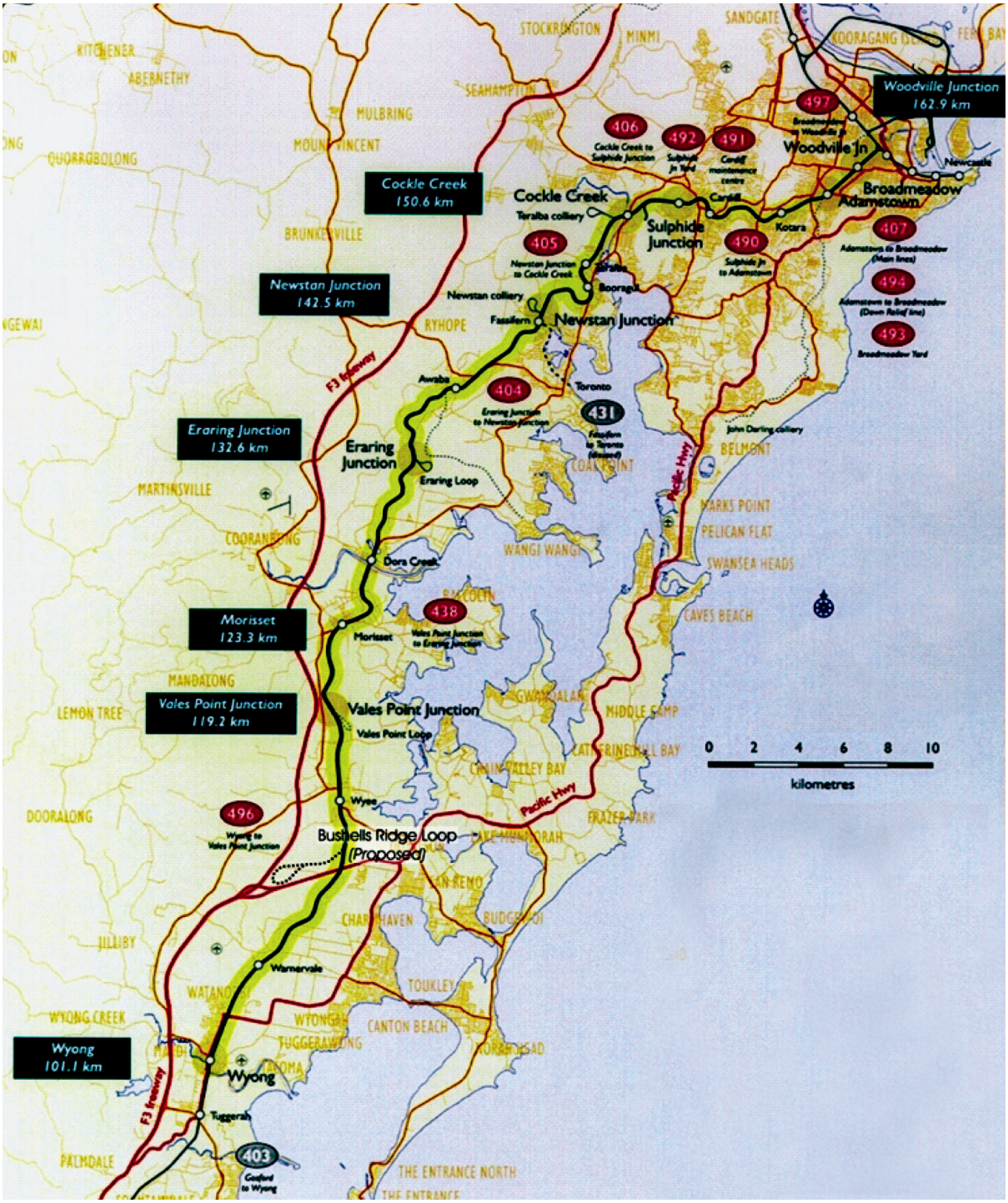


Figure 4 - Main Northern line

Coal Transport Task

Current project planning is that most of the product coal from W2CP will be destined for Asian export markets. The coal quality produced at the mine, especially in the first 25 years, is of higher quality than the relatively high ash, medium energy, low cost coals typically burnt in domestic power stations (transport costs per unit of energy are not such a major cost issue for domestic utilities). The current W2CP development plans have focussed on this marketing strategy. However, it is recognised that due to the proximity of the Vales Point and Eraring Power Stations, it is possible that some coal could possibly be sold to these utilities as a higher quality blending coal.

Due to the nature of the rail link to the Port of Newcastle there is a restriction on the size of export coal trains that can currently operate between W2CP and Newcastle. Net unit trains would currently be restricted to 3,400 tonnes, requiring four 3,000 horse power, class 81 type locomotives. Wagons would be restricted to100 tonnes gross (25 tonne TAL). Therefore rail wagons would need to be either 100 tonne gross, carrying 75 tonnes of coal or a standard 120 tonne gross wagon could only be filled with 75 tonnes of coal rather than 95 tonnes.

It is understood that certification is proceeding that would enable 4,500 horse power AC traction locomotives to operate on the line. This would then enable 4,700 tonne net unit trains to operate on the line reducing to 3 / 4 the number of required return paths.

The export terminal facility used by W2CP at Newcastle is expected to be Port Waratah Coal Services (PWCS) at either Kooragang Island or Carrington. PWCS operates on a cargo assembly system in which stockpile space is allocated to a contracted shipper only at the appropriate time before the designated vessel is due to commence loading. This system maximises use of stockpile space and port capacity but places a limitation on the time in which an export cargo can be assembled. W2CP understand that the typical cargo assembly period is likely to be approximately 5 days by the time W2CP is in operation.

Impact Assessment on Existing Rail System

RailCorp provided Rail Management Consultants Australia (RMCA) with a RailSys model of the proposed Northern Sydney Freight Corridor (NSFC) infrastructure. The model also contained the passenger standard working timetable (SWTT) introduced from October 2009 and Northern freight paths established during the NSFC investigations carried out by RailCorp. The RailCorp model was used to identify 6 UP and 6 DOWN train paths between the mine and Port Waratah Coal Services (PWCS) that can be serviced by either two or three coal train consists. Additional paths for coal trains were identified that provide spare capacity and that are available for contingency.

The ARTC track between Broadmeadow and the port operates on a system of ad-hoc rail paths which are not possible to model. It is understood that access should not present any material problems or delays that are not allowed for in the PWCS turnaround time allocation.

RMCA built a new mine layout infrastructure for W2CP on the Central Coast line near Wyong. The new loop has enough capacity to hold two to three coal trains at one time. The turnout speeds at the mine and the spur towards the loop are 40 km/h. It is assumed that the spur would be fully signalled.

RMCA also added a loop at Awaba into the infrastructure model to assess whether it would provide any benefit in achieving the required train paths. This infrastructure would represent the impact on the network of re-commissioning the currently inactive Awaba loop.

QR National (QR) and Pacific National (PN) provided train consist information for proposed coal train services. Both companies suggest the use of AC traction locomotives with 4500 hp per locomotive. It was not certain at the time of the assessment, whether AC traction locomotives would be allowed to run between the mine and the port. The conventional coal train consist running under as per C2 schedule for this network consist of 4 locomotives of the L3/L4 type with 3000 hp (e.g. 81 class) for a total train weight of 4500 tons.

RMCA calculated the power to weight ratio for the train consists that were proposed by QR and PN and confirmed that the power to weight ratio was equal to or better than the power to weight ratio of the trains associated with coal schedule 2 included in the TOC manual (Figure 5). The comparison of the power to weight ratios for the different proposed train consist is shown in Table 3 below.

Company name	Queensland Rail (QR)	Pacific National (PN)	RailCorp, coal schedule 2
Locomotive type	6000 class	TT100	L3/L4
Locomotives per train	3	3	4
Power per consist [hp]	4500	4500	3000
Power per train [hp]	13500	13500	12000
Weight per train [T]	4599	4599	4500
Power/weight [hp/T]	2.9354	2.9354	2.6666

Table 3 - Comparison between QR, PN, and RailCorp coal train consists

LOADED - DOWN

	Section	Loco type	Single	Double	Triple	Quad	Vehicle Class	Sect Run Times
1	Enfield – Woodville Jct	L3/L4	--	--	--	4500	C	2
2	Enfield – Woodville Jct	L3/L4	--	--	--	4500	F	4
3	Newstan - Woodville Jct	L1	1650	3300	--	--	C	6
4	Newstan - Woodville Jct	L1+L3	--	2700	--	--	F	6
5	Newstan - Woodville Jct	L1+L3+L3	--	--	3700	--	F	6
6	Newstan - Woodville Jct	L3/L4	--	2100	--	4200	F	6
7	Teralba – Woodville Jct	L1	3150	5925 (1) (2)	--	--	C	8
8	Teralba – Woodville Jct	L3/4	2100	4200	5925 (1)	--	F	8
9	Teralba – Woodville Jct	L1			7369 (2)	--	G	8G
10	Teralba – Woodville Jct	L1+L1+L3/4			7369 (2)	--	G	8G
11	Teralba – Woodville Jct	L1		6521 (3)		--	G	8G
12	Teralba – Woodville Jct	L3/4			6521 (3)	--	G	8G

(1) To allow for greater flexibility, train of 72 vehicles can run into Teralba, however due to length restraints under the loader, only the first 55 vehicles are to be loaded. In this instance the total load will be 5925 tonnes.
(2) To allow for greater flexibility, train of up to 80 vehicles can run into Teralba, however due to length restraints under the loader, only the first 57 vehicles are to be loaded. In this instance the total load will be 7369 tonnes.
(3) To allow for greater flexibility, train of up to 60 vehicles can run into Teralba, however due to length restraints under the loader, only the first 53 vehicles are to be loaded. In this instance the total load will be 6521 tonnes.

EMPTY - DOWN

	Section	Loco type	Single	Double	Triple	Quad	Vehicle Class	Sect Run Times
1	Enfield - Woodville Jct	L3/L4	--	1300	--	--	C	1
2	Vales Point - Newstan	L6 + L12	--	900	--	--	C	3
3	Vales Point – Woodville Jct	L3/L4	--	1300	--	--	C	3
4	Eraring – Woodville Jct	L1	--	1400	--	--	G	5
5	Eraring – Woodville Jct	L3/L4	--	1300	--	--	C	5

LOADED - UP

	Section	Loco type	Single	Double	Triple	Quad	Vehicle Class	Sect Run Times
1	Woodville Jct – Enfield	L3/L4	--	--	--	4200	C	2
2	Woodville Jct – Enfield	L3/L4	--	--	--	4200	F	4
3	Woodville Jct – Vales Pt	L3/L4	--	4200	--	--	C	6
4	Woodville Jct – Vales Pt	L3/L4	--	4200	--	--	F	8
5	Woodville Jct – Eraring	L1	3150	6300	--	--	C	6
6	Woodville Jct – Eraring	L1	3150	6300	--	--	F	8
7	Woodville Jct – Eraring	L1+L3	--	4800	--	--	C	6
8	Woodville Jct – Eraring	L1+L3	--	4800	--	--	F	8
9	Woodville Jct – Eraring	L3/L4	2100	4200	--	--	C	6
10	Woodville Jct – Eraring	L3/L4	2100	4200	--	--	F	8
11	Woodville Jct – Eraring	L1+L3+L3	--	--	6600	--	C	6
12	Woodville Jct – Eraring	L1+L3+L3	--	--	6600	--	F	8
13	Newstan – Vales Point	L6 + L12	--	2888	--	--	C	8

EMPTY - UP

	Section	Loco type	Single	Double	Triple	Quad	Vehicle Class	Sect Run Times
1	Woodville Jct - Enfield	L3/L4	--	1300	--	--	C	1
2	Woodville Jct - Teralba	L3/L4	--	1800	--	--	C	3
3	Woodville Jct - Teralba	L1	--	1800	--	--	C	3
4	Woodville Jct - Newstan	L1	--	1300	--	--	C	5
5	Woodville Jct - Newstan	L3/L4	--	1300	--	--	C	5

Figure 5 - Train consists and schedules

The train that was used for the modelling included 4 81-class locomotives on a 4500 tonne train, which runs to the schedule 2 running times (Figure 6).

NORTH COAL TRAIN RUNNING TIMES

DOWN	LOADED					EMPTY		
Sect Run Times	2	4	6	8	8G	1	3	5
Enfield	↘	↘				↘		
Chullora Jct	5	5				5		
Flemington South Jct	8	8				8		
Middle Jct	1	1				1		
Flemington Markets	5	5				5		
Nth Strathfield Jct	5	5				5		
Concord West	3	3				3		
Rhodes	3	3				3		
West Ryde	2	2				2		
Epping	8	11				7		
Thornleigh	14	16				12		
Hornsby	5	6				5		
Mt Kuring-gai x/over	7	10				6		
Berowra	5	6				4		
Cowan	4	4				4		
Boronia x/over	3	3				3		
Hawkesbury River	6	6				6		
Wondabyne x/over	7	8				7		
Woy Woy	9	12				9		
Gosford	6	7				6		
Ronkana	11	14				11		
Wyong	5	6				5		
Wyee	12	15				12		
(1) Vales Point Jct	4	5				4	↘	
Morisset	4	5				4	7	
(2) Eraring Jct ↘	11	14				11	8	↘
Awaba	5	6				5	4	4
Fassifern	5	5				4	6	4
(3) (4) Newstan Coll Jct	1	1	↘			1	1	1
(5) Teralba Coll Jct	6	8	12	↘	↘	6	8	6
Sulphide Junction	3	5	3	6	7	3	4	3
Adamstown	10	13	11	17	19	10	10	10
Broadmeadow	3	3	3	3	5	3	3	3
Woodville Jct	4	4	4	4	4	4	4	4

Notes:
(1) 5 minutes from Vales Point
(2) 5 minutes from Eraring
(3) 6 minutes to/from Newstan Colliery Empty Arriving
(4) 10 minutes to/from Newstan Colliery Loaded Departing
(5) 10 minutes from Teralba Colliery

UP	LOADED				EMPTY		
Sect Run Times	2	4	6	8	1	3	5
Woodville Jct	↘	↘	↘	↘	↘	↘	↘
Broadmeadow	4	4	4	4	4	4	4
Adamstown	3	3	3	3	3	3	3
Sulphide Jct	9	11	15	15	9	11	11
(1) Teralba Coll Jct ↗	2	3	3	3	2	4	3
(2) (3) Newstan Coll Jct ↗	7	9	9	11	6		6
Fassifern	1	1	1	1	1		
Awaba	5	6	5	6	4		
(4) Eraring Jct ↗	5	7	8	8	4		
Morisset	10	13	14	14	10		
(5) Vales Point Jct ↗	3	5	4	5	3		
Wyee	4	5			4		
Wyong	12	16			12		
Ronkana	5	6			5		
Gosford	11	14			11		
Woy Woy	9	9			8		
Wondabyne x/over	7	9			7		
Hawkesbury River	8	9			8		
Boronia x/over	18	21			16		
Cowan	8	9			7		
Berowra	7	9			6		
Mt Kuring-gai x/over	4	5			4		
Hornsby	5	6			5		
Thornleigh	4	5			4		
Epping	5	6			5		
West Ryde	4	5			4		
Rhodes	2	2			2		
Concord West	3	3			3		
Nth Strathfield Jct	3	3			3		
Flemington Markets	5	5			5		
MiddleJct	5	5			5		
Flemington South Jct	1	1			1		
Chullora Jct	8	8			8		
Enfield	5	5			5		

Notes:
(1) 12 minutes to Teralba Colliery (To clear Down Main)
(2) 6 minutes to Newstan Colliery (Empty Arriving)
(3) 10 minutes to Newstan Colliery (Loaded Departing)
(4) 4 minutes to Eraring
(5) 5 minutes to Vales Point

Figure 6 - North Coal Train Running Times

Timetabling

RMCA ensured that the runtimes of the coal train consists used in RailSys were based on the runtime information shown in Figure 6. This would ensure that the train paths of the coal trains are consistent to real life runtimes. If the supplied rolling stock does not meet the proposed standard and the power to weight ratio is below the Coal Schedule 2, then the proposed train paths may not be valid anymore.

The turnaround times at the mine and PWCS were provided by the potential train operators and are shown in Table 4 below. The times are required for loading and unloading the trains, as well as performing some minor additional activities. RMCA scheduled the services in order to achieve optimal turnaround times for each coal service.

	Mine	PWCS
Minimum turnaround time	75mins	90mins
Optimal turnaround time	90mins	120mins

Table 4 - Mine and PWCS turnaround times

RMCA prepared the train template in RailSys and then determined the train paths available for the coal services to run throughout the day. The available train paths for the entire day were identified.

The maximum requirements for the future operation of W2CP, based on current standards, were that a total of 6 UP and 6 DOWN train paths should be available for an entire day, thus providing for about 20,000 tons of coal per day to be shipped from the mine to the port. The train paths would need to provide continuous schedules for a maximum of 3 train consists throughout a 24 hour period, while meeting the schedule 2 running times and the required turnaround times. Further analysis aimed at achieving the same amount of coal services with a lesser amount of consists, i.e. only 2 physical train sets. It is likely that a lower number of services might be required in the future when AC traction locomotives will be approved for operation, and/or the allowed axle load will be increased. However, this study uses the conservative assumption of the current standards.

The detailed train graphs for the identified paths are enclosed in the appendix.

Results

RMCA undertook an analysis into the total number of available train paths available both in the UP and the DOWN direction using the existing current timetable provided by RailCorp. The available train paths for the coal train consists to run throughout the entire day were recorded (Figure 7).

A summary of the available train paths is provided in Table 5.

	Mine – PWCS	PWCS – Mine
Total paths available without conflicts	14	23

Table 5 - Available train paths

Depart Mine	Arrive PWCS
0:25	1:34
4:28	5:37
4:39	5:48
6:00	7:10
8:16	9:25
13:30	14:39
14:29	15:38
14:48	15:57
17:14	18:23
18:15	19:24
20:54	22:03
22:30	23:39
22:52	0:01
23:39	0:48

Depart PWCS	Arrive Mine
0:16	1:24
2:38	3:47
3:03	4:11
3:36	4:45
4:01	5:09
4:45	5:53
5:35	6:44
5:57	7:05
9:36	10:44
10:36	11:44
10:50	11:58
11:35	12:44
11:57	13:05
12:25	13:34
12:35	13:43
13:55	15:04
15:25	16:33
15:38	16:46
18:12	19:20
19:41	20:49
21:16	22:25
22:21	23:29
23:29	0:37

Figure 7 - Available train paths

24 hour schedule for 3 coal train consists without Awaba loop

RMCA designed a schedule for running 3 coal train consists with 2 cycles each throughout the entire day without using the Awaba loop. A cycle includes one return trip either from the mine to the port and back to the mine, or from the port to the mine and back to the port. The schedules are only indicative and demonstrate the general feasibility of such operation. The total number of possible paths allows for a variation of the pathing at any time.

The schedule for each coal train consist is shown in Figure 8.

Coal 1	Time		Coal 2	Time		Coal 3	Time
Dep Mine	0:26		Dep PWCS	0:17		Dep PWCS	5:32
Arr PWCS	1:34		Arr Mine	1:23		Arr Mine	6:37
Dep PWCS	3:03		Dep Mine	4:29		Dep Mine	11:43
Arr Mine	4:08		Arr PWCS	5:36		Arr PWCS	12:50
Dep Mine	8:16		Dep PWCS	9:37		Dep PWCS	18:12
Arr PWCS	9:24		Arr Mine	10:43		Arr Mine	19:18
Dep PWCS	15:31		Dep Mine	13:31		Dep Mine	20:20
Arr Mine	16:37		Arr PWCS	14:38		Arr PWCS	21:28

Figure 8 - Trains paths for 3 coal train consists and without Awaba

The graphical timetable view of the train paths for each of the three coal train consists is shown in Figure 9 below.

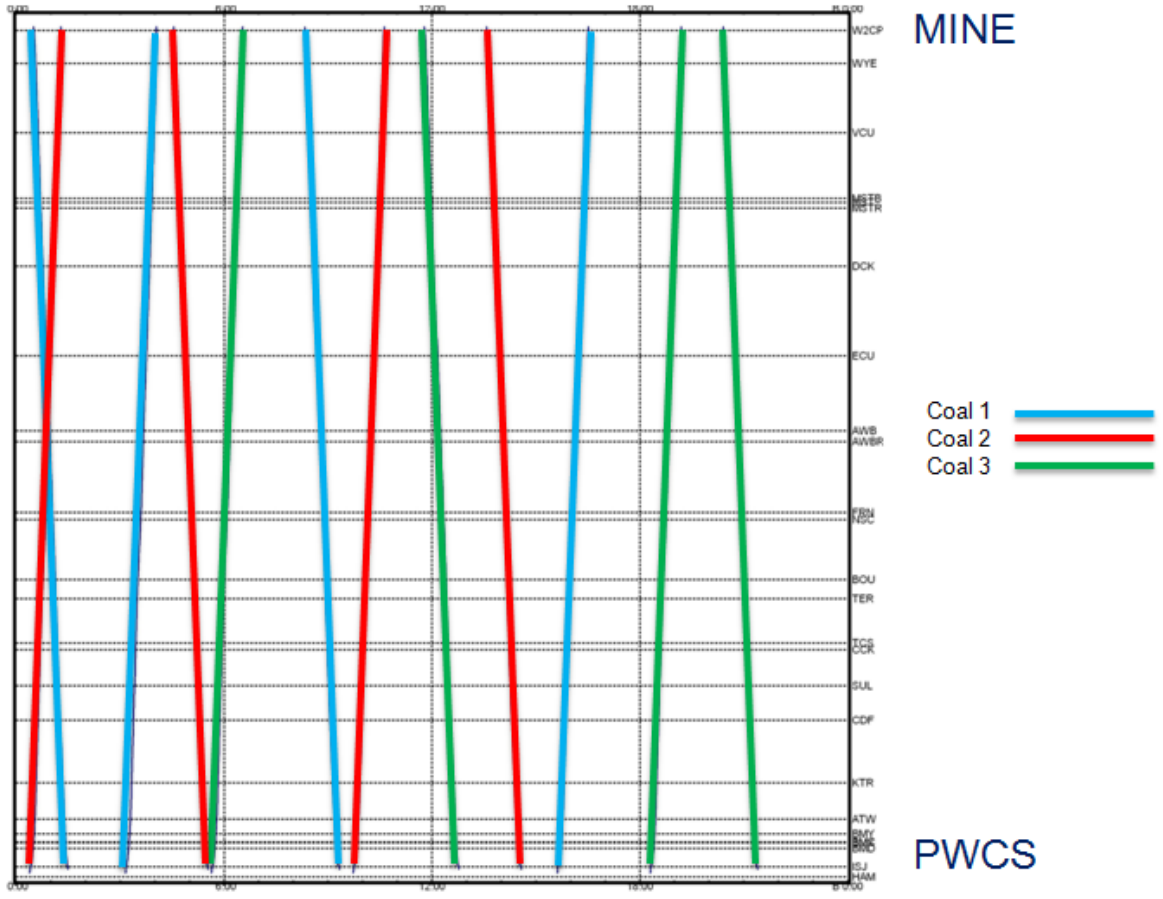


Figure 9 - Graphical timetable (3 coal train consists without Awaba)

Figure 10 below shows the runtimes and turnaround times for running 3 coal train consists without the Awaba loop. There are two cases where the turnaround at the mine was less than the minimum of 75mins which led RMCA to use the Awaba loop with the existing 3 coal train consists to determine whether it would improve this schedule.

Coal 1	Runtime			Turnaround
Mine - PWCS	1:07			
			PWCS Turnaround	1:29
PWCS - Mine	1:05			
			Mine Turnaround	4:07
Mine - PWCS	1:07			
			PWCS Turnaround	6:07
PWCS - Mine	1:06			
Total Runtime				4:27
Total Turnaround				11:43
Total Runtime + Total Turnaround				16:10

Coal 2	Runtime			Turnaround
PWCS - Mine	1:05			
			Mine Turnaround	3:05
Mine - PWCS	1:07			
			PWCS Turnaround	4:00
PWCS - Mine	1:05			
			Mine Turnaround	2:47
Mine - PWCS	1:07			
Total Runtime				4:26
Total Turnaround Time				9:54
Total Runtime + Total Turnaround Time				14:21

Coal 3	Runtime			Turnaround
PWCS - Mine	1:05			
			Mine Turnaround	5:05
Mine - PWCS	1:07			
			PWCS Turnaround	5:21
PWCS - Mine	1:06			
			Mine Turnaround	1:02
Mine - PWCS	1:07			
Total Runtime				4:27
Total Turnaround Time				11:29
Total Runtime + Total Turnaround Time				15:56

Figure 10 - Running and turnaound times for 3 coal train consists without Awaba loop

24 hour schedule for 3 coal train consists with Awaba loop

The use of the Awaba loop was tested by RMCA and was proven to be non beneficial since only 2 train paths out of a total of 12 were able to use the Awaba loop. The schedule using three coal train consists and the Awaba loop is shown below. Only coal train consist 2 uses Awaba loop for the train paths from the mine to PWCS, for the train paths at '2:55' and '8:36'.

Coal 1	Time		Coal 2	Time		Coal 3	Time
Dep Mine	0:25		Dep PWCS	0:17		Dep PWCS	11:57
Arr PWCS	1:33		Arr Mine	1:23		Arr Mine	13:03
Dep PWCS	3:03		Dep Mine	2:55		Dep Mine	14:48
Arr Mine	4:09		Arr PWCS	4:20		Arr PWCS	15:56
Dep Mine	6:01		Dep PWCS	5:57		Dep PWCS	18:12
Arr PWCS	7:08		Arr Mine	7:03		Arr Mine	19:18
Dep PWCS	9:36		Dep Mine	8:36		Dep Mine	20:55
Arr Mine	10:42		Arr PWCS	10:06		Arr PWCS	22:03

Figure 11 - Trains paths for 3 coal train consists and with Awaba

The graphical timetable for the Figure 11 schedule is represented in Figure 12 below.

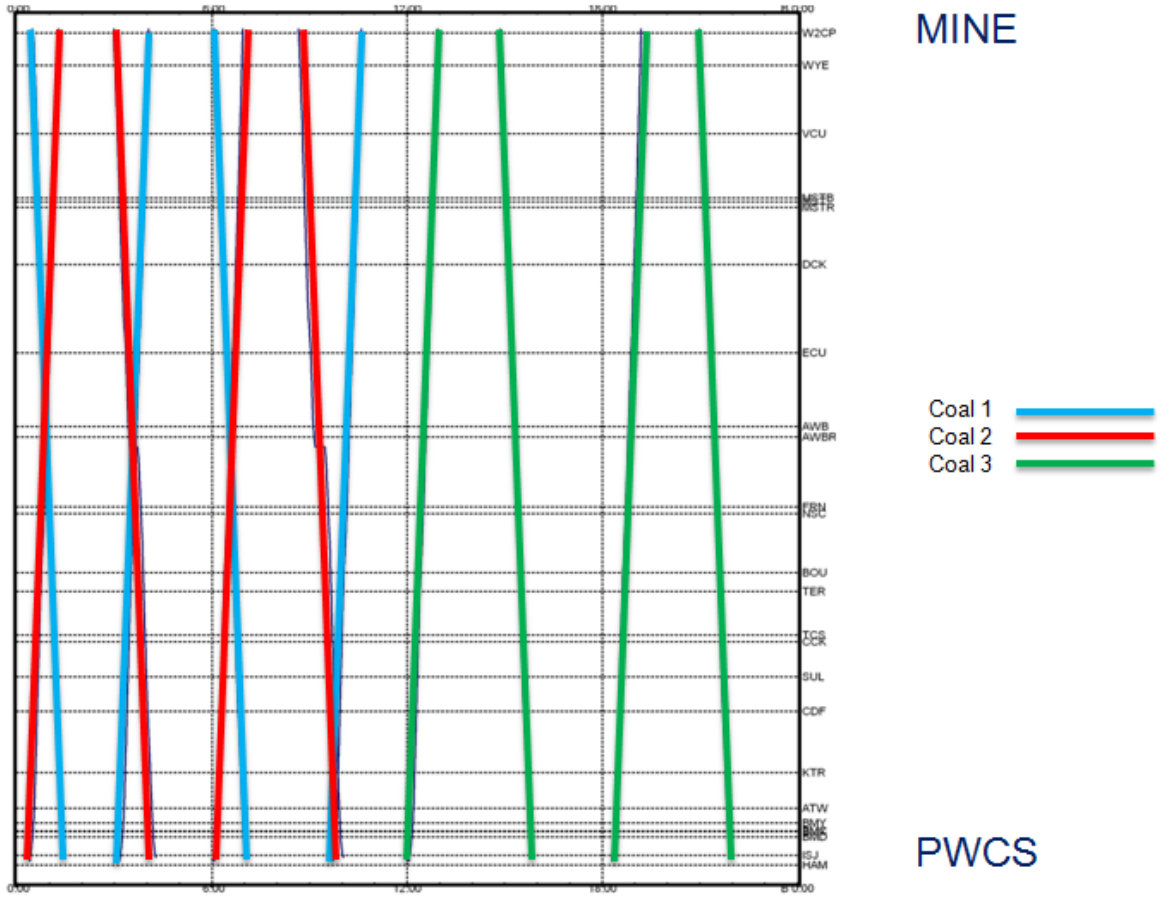


Figure 12 - Graphical timetable (3 coal train consists with Awaba)

Figure 13 illustrates improved runtimes and turnaround times with the use of the Awaba loop since some further train paths that became available could be used by the other coal train consists. A minimum of 90 minutes was available for each coal train both at the mine and the port, allowing for sufficient time to load, unload and perform minor maintenance or other technical activities.

Coal 1	Runtime			Turnaround
Mine - PWCS	1:07			
			PWCS Turnaround	1:30
PWCS - Mine	1:06			
			Mine Turnaround	1:51
Mine - PWCS	1:07			
			PWCS Turnaround	2:27
PWCS - Mine	1:06			
Total Runtime				4:27
Total Turnaround				5:49
Total Runtime + Total Turnaround				10:16

Coal 2	Runtime			Turnaround
PWCS - Mine	1:05			
			Mine Turnaround	1:32
Mine - PWCS	1:25			
			PWCS Turnaround	1:36
PWCS - Mine	1:06			
			Mine Turnaround	1:32
Mine - PWCS	1:30			
Total Runtime				5:07
Total Turnaround Time				4:41
Total Runtime + Total Turnaround Time				9:49

Coal 3	Runtime			Turnaround
PWCS - Mine	1:06			
			Mine Turnaround	1:45
Mine - PWCS	1:07			
			PWCS Turnaround	2:16
PWCS - Mine	1:06			
			Mine Turnaround	1:37
Mine - PWCS	1:07			
Total Runtime				4:27
Total Turnaround Time				5:38
Total Runtime + Total Turnaround Time				10:05

Figure 13 - Running and turnaound times for 3 coal train consists with Awaba loop

It was noted by RMCA that coal train consist 3 commences from PWCS approximately 1 hour 50mins after coal train consist 2 finishes at PWCS for the day. This led RMCA to proposing the possibility of using two coal train consists in order to achieve the total 6 UP direction and 6 DOWN direction train paths, since the train paths completed by coal train consist 2 and coal train consist 3 could be completed by one consist. This arrangement would also have the advantage of improved rolling stock utilisation and therefore lower unit transport coast.

RMCA realised that it would be possible to achieve the required train paths with the use of two consist since Coal 2 and Coal 3 could be combined.

24 hour schedule for 2 coal train consists without Awaba loop

RMCA investigated using 2 coal train consists with each consist completing 3 cycles each throughout the day. The schedule for 2 coal train consists completing 3 UP and 3 DOWN train paths each is shown in Figure 14 below.

Coal 1	Time		Coal 2	Time
Dep Mine	0:25		Dep PWCS	0:54
Arr PWCS	1:33		Arr Mine	2:00
Dep PWCS	3:37		Dep Mine	5:09
Arr Mine	4:43		Arr PWCS	6:17
Dep Mine	6:08		Dep PWCS	10:50
Arr PWCS	7:15		Arr Mine	11:56
Dep PWCS	9:36		Dep Mine	14:30
Arr Mine	10:42		Arr PWCS	15:38
Dep Mine	13:30		Dep PWCS	18:12
Arr PWCS	14:37		Arr Mine	19:18
Dep PWCS	17:52		Dep Mine	20:55
Arr Mine	18:58		Arr PWCS	22:03

Figure 14 - Trains paths for 2 coal train consists and without Awaba

The graphical timetable of the train paths completed by each coal train consist is shown in Figure 15 below.

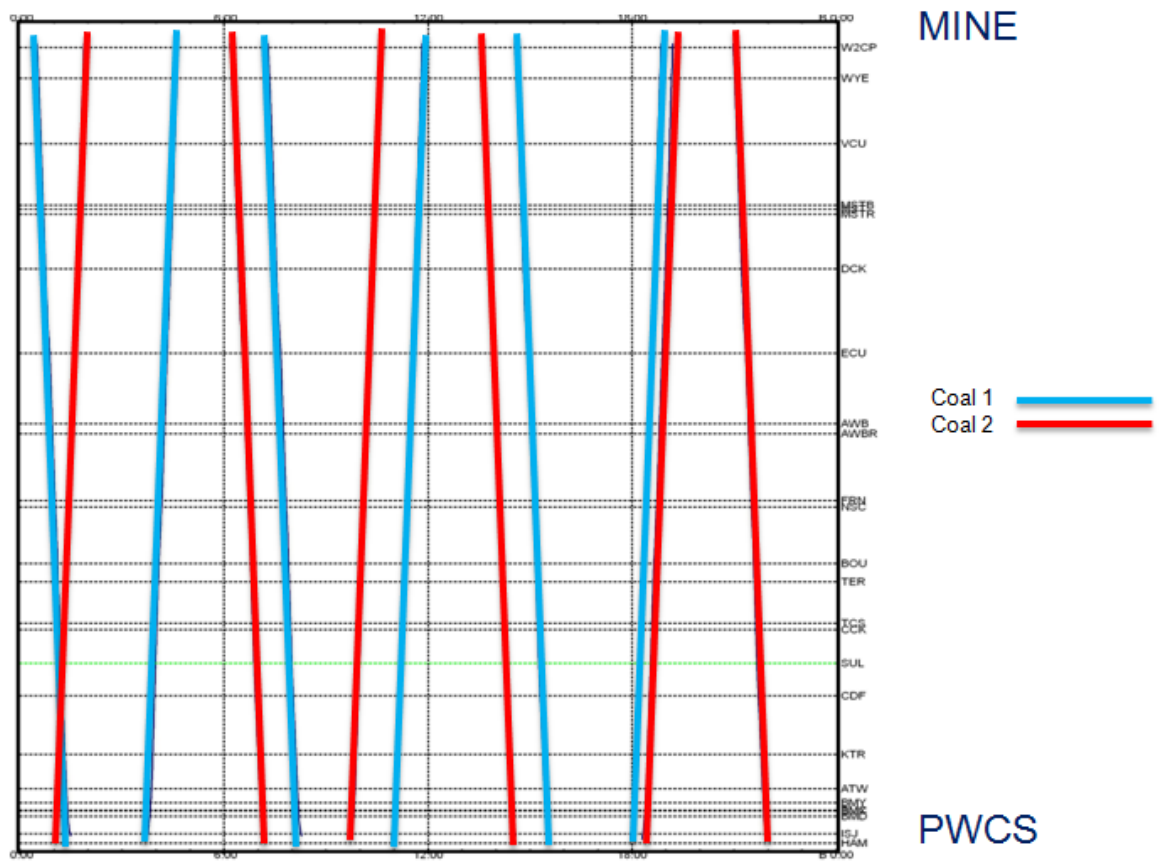


Figure 15 - Graphical timetable (2 coal train consists without Awaba)

It was ensured by RMCA that the minimum turnaround times at the mine and PWCS could be met by each coal train consist. In most cases RMCA managed to meet the optimal turnaround times required at the mine and PWCS. The runtimes and turnaround times of the two coal train consists without the Awaba loop are shown below in Figure 16.

Coal 1	Runtime			Turnaround		Coal 2	Runtime			Turnaround
Mine - PWCS	1:07					PWCS - Mine	1:06			
			PWCS Turnaround	2:04					Mine Turnaround	3:09
PWCS - Mine	1:06					Mine - PWCS	1:07			
			Mine Turnaround	1:24					PWCS Turnaround	4:33
Mine - PWCS	1:07					PWCS - Mine	1:06			
			PWCS Turnaround	2:20					Mine Turnaround	2:34
PWCS - Mine	1:06					Mine - PWCS	1:07			
			Mine Turnaround	2:47					PWCS Turnaround	2:33
Mine - PWCS	1:07					PWCS - Mine	1:06			
			PWCS Turnaround	3:14					Mine Turnaround	1:37
PWCS - Mine	1:06					Mine - PWCS	1:07			
Total Runtime				6:41		Total Runtime				6:41
Total Turnaround				11:51		Total Turnaround Time				14:27
Total Runtime + Total Turnaround				18:33		Total Runtime + Total Turnaround Time				21:09

Figure 16 - Running and turnaound times for 2 coal train consists without Awaba loop

Conclusion

RMCA were provided with a RailSys model of the proposed Northern Sydney Freight Corridor (NSFC) infrastructure by RailCorp. This model also contained the passenger standard working timetable introduced from October 2009 and northern freight paths established during the NSFC investigations carried out by RailCorp.

The ARTC track between Broadmeadow and the port operates on a system of ad-hoc rail paths which are not possible to model. It is understood that access should not present any material problems or delays that are not allowed for in the PWCS turnaround time allocation.

RMCA undertook an analysis into the total number of spare train paths available both in the UP (Port to Mine) and the DOWN (Mine – Port) direction using the current timetable. This analysis indicated there were a total of 23 UP and 14 DOWN paths potentially available without any conflicts.

RMCA modelled a new mine layout infrastructure for Wallarah 2 Coal Project (W2CP) on the Central Coast line near Wyong. The new loop has enough capacity to hold two to three coal trains at one time. RMCA also added a loop at Awaba into the infrastructure model to assess whether it would provide any benefit in achieving the required train paths.

The daily port delivery capacity required by W2CP is approximately 13-20,000 tonnes depending on the particular marketing/shipping strategy undertaken. This results in return train path requirements varying from 3 - 6 depending on the particular train configuration and operating environment assumed.

Project port deliveries can be satisfied by 4-6 return daily services if current conventional train consists are utilised (3,400 tonnes net capacity train powered by 3,000hp locomotives).

QR National (QR) and Pacific National (PN) provided train consist information for proposed coal train services. Both companies propose the use of AC traction locomotives with 4500 hp per locomotive. It was not certain at the time of the assessment, whether AC traction locomotives would be allowed to run between the mine and the port. The use of this consist configuration could result in the project requirement to be satisfied by as few as 3 return daily services.

The modelling undertaken by RMCA on the RailSys model has indicated that 6 return services can comfortably run between the mine and the port, which can be executed by 2 conventional train consists of the coal schedule 2 makeup. This modelling did not utilise nor require the Awaba Loop. The high number of available paths (23 UP and 14 DOWN) relative to this maximum project requirement indicates a large amount of spare capacity that can be used for contingency.

The additional modelling work undertaken indicated that only minor enhancements were achieved by implementing and using the Awaba Loop.

Appendices

Detailed train graphs for:

- The running of 6 coal services between mine and port, and
- All available potential paths without any conflict.

The graphs display the running of the trains for 6 hour periods: from 0:00 to 6:00, from 6:00 to 12:00, from 12:00 to 18:00, and from 18:00 to 24:00.

Colour coding

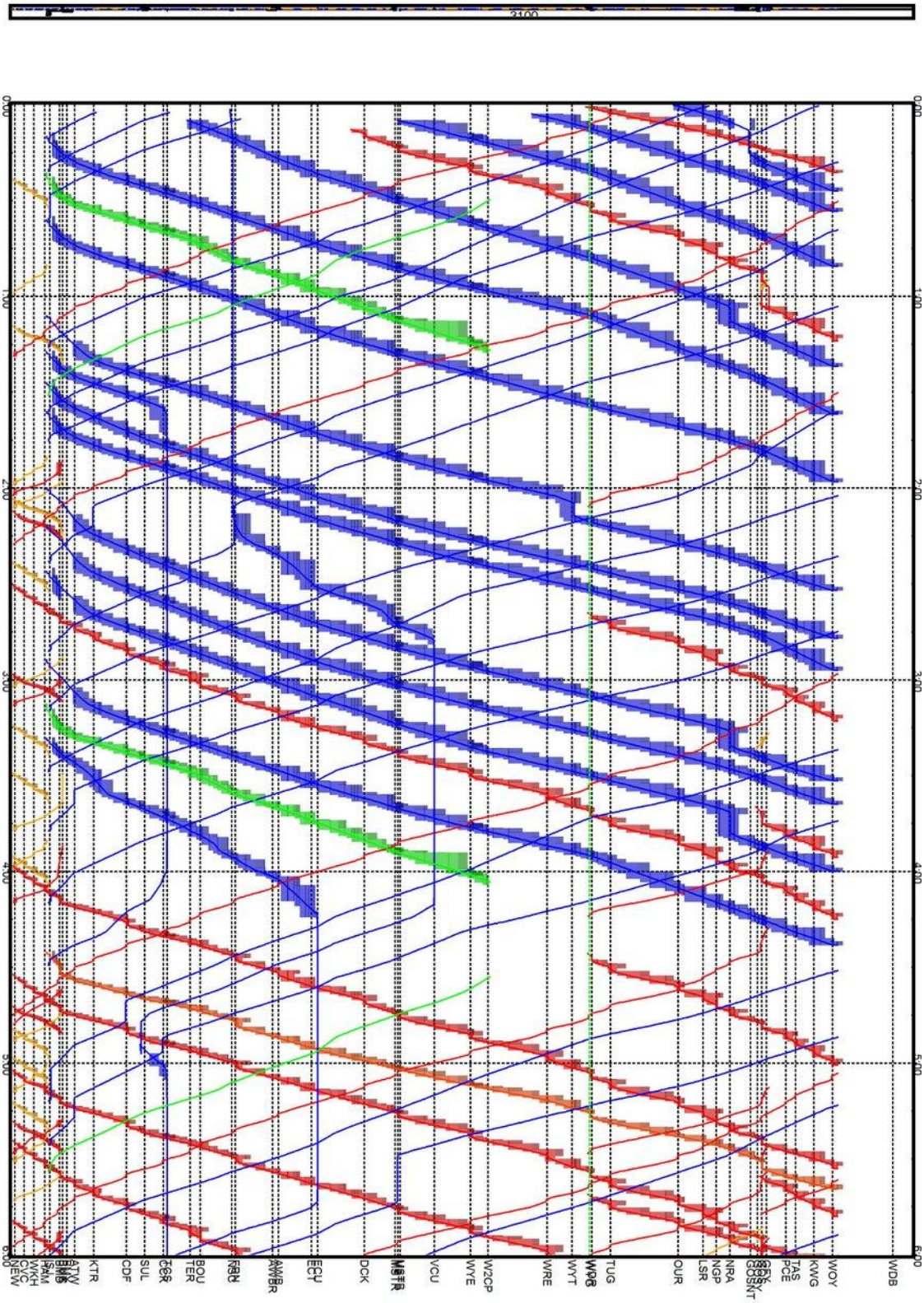
- RailCorp passenger trains are displayed ion **red**
- Country services are displayed in **orange**
- Existing freight services are displayed in **blue**
- The additional coal paths identified for W2CP are displayed in **green**.

The 3 letter codes for representative locations include:

WOY	:	Woy Woy
OUR	:	Ourimbah
TUG	:	Tuggerah
W2CP	:	Wallarah 2 Coal Project site
DCK	:	Dora Creek
ECU	:	Eraring Power Station
TER	:	Teralba
SUL	:	Sulphide Junction
CDF	:	Cardiff
ATW	:	Adamstown

Graphical timetable for the running of 6 coal services between mine and port

Up direction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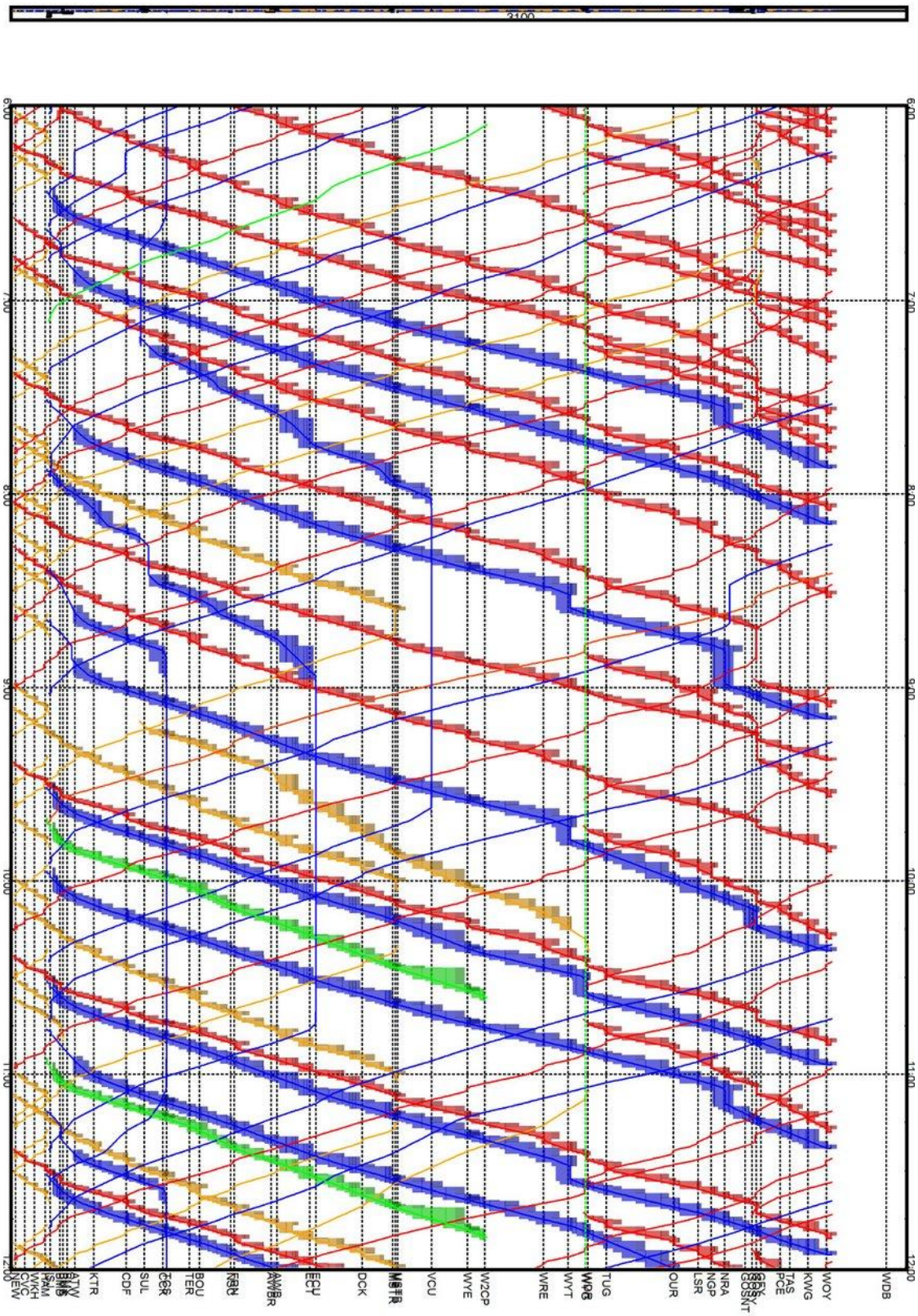
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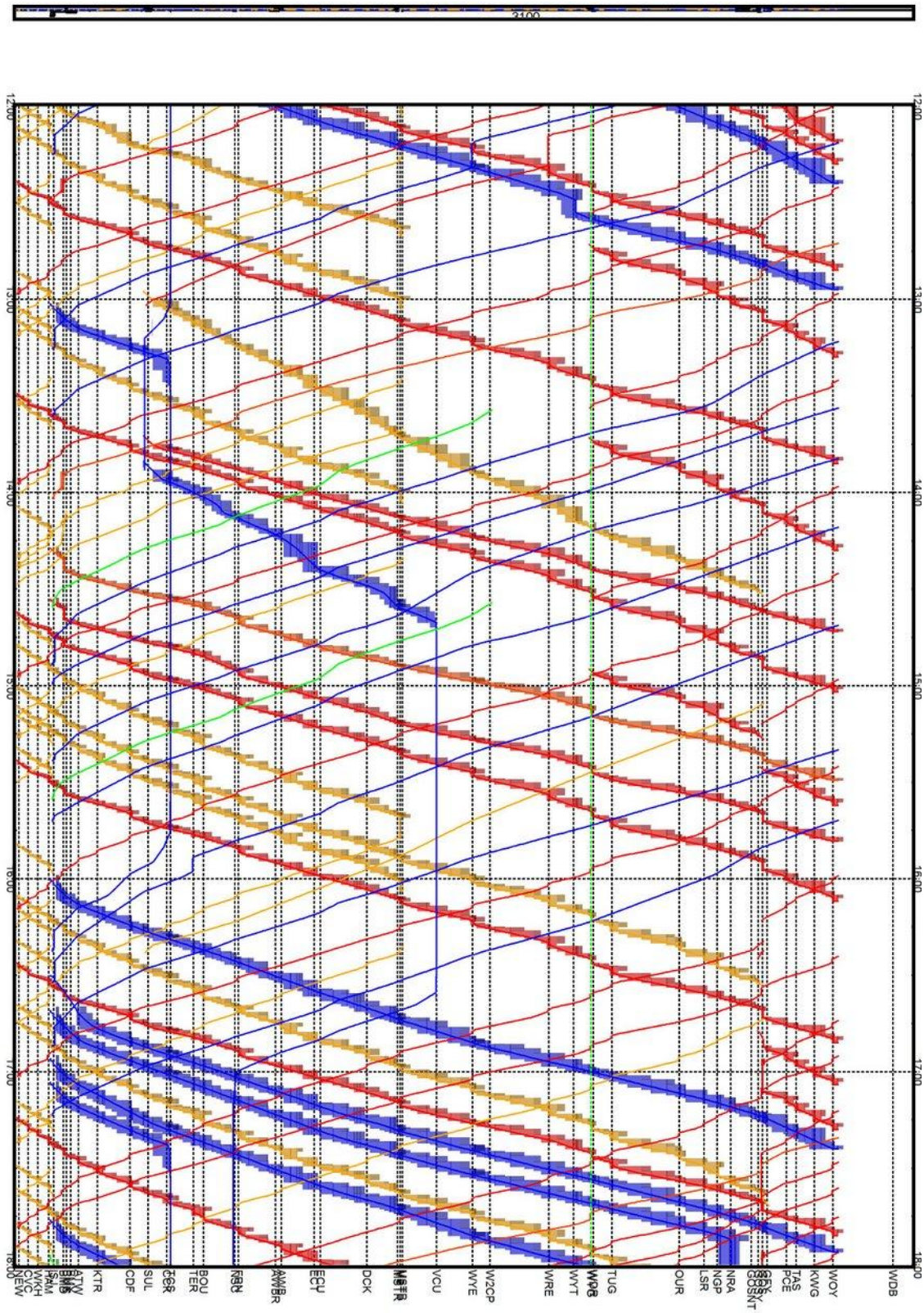
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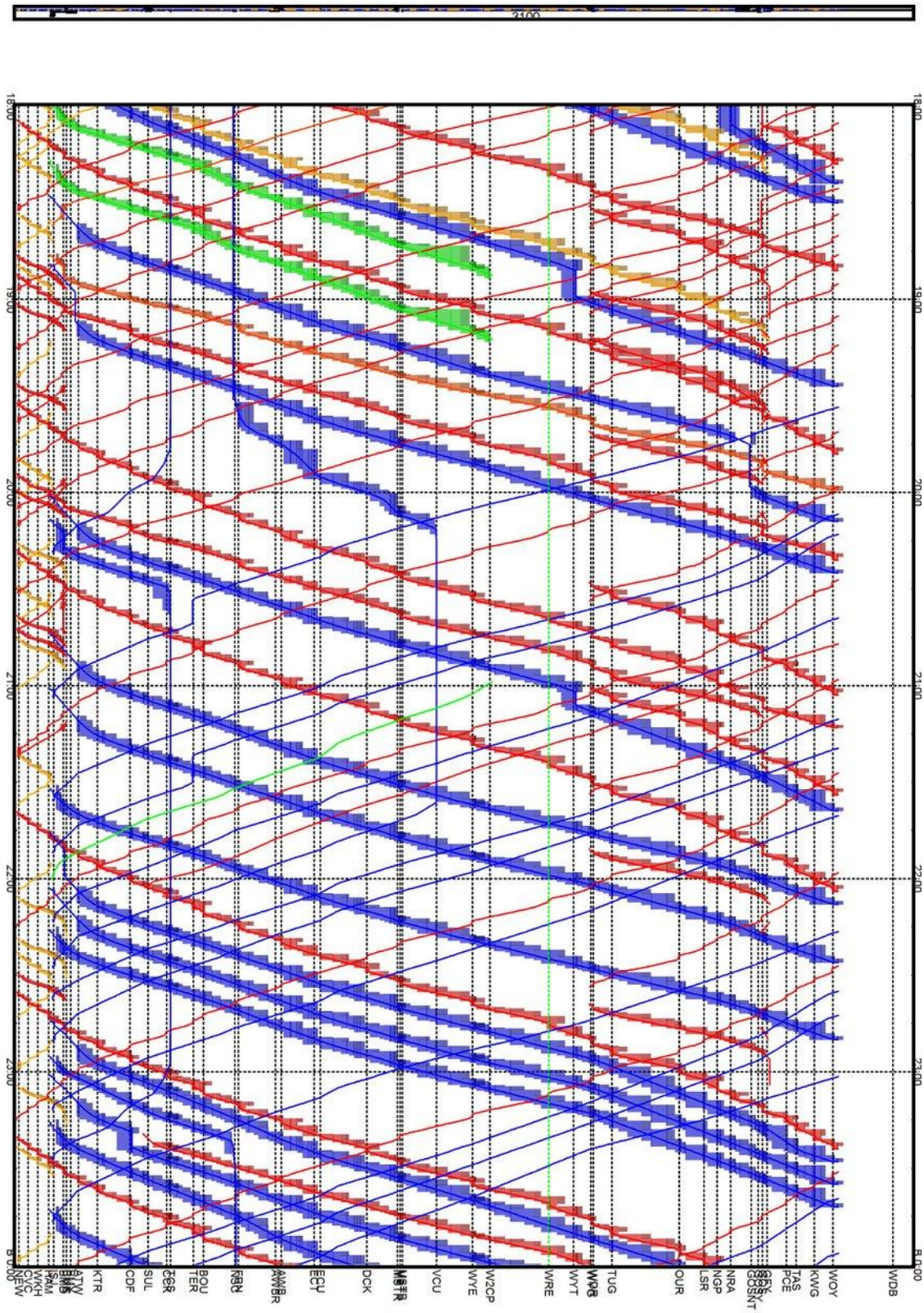
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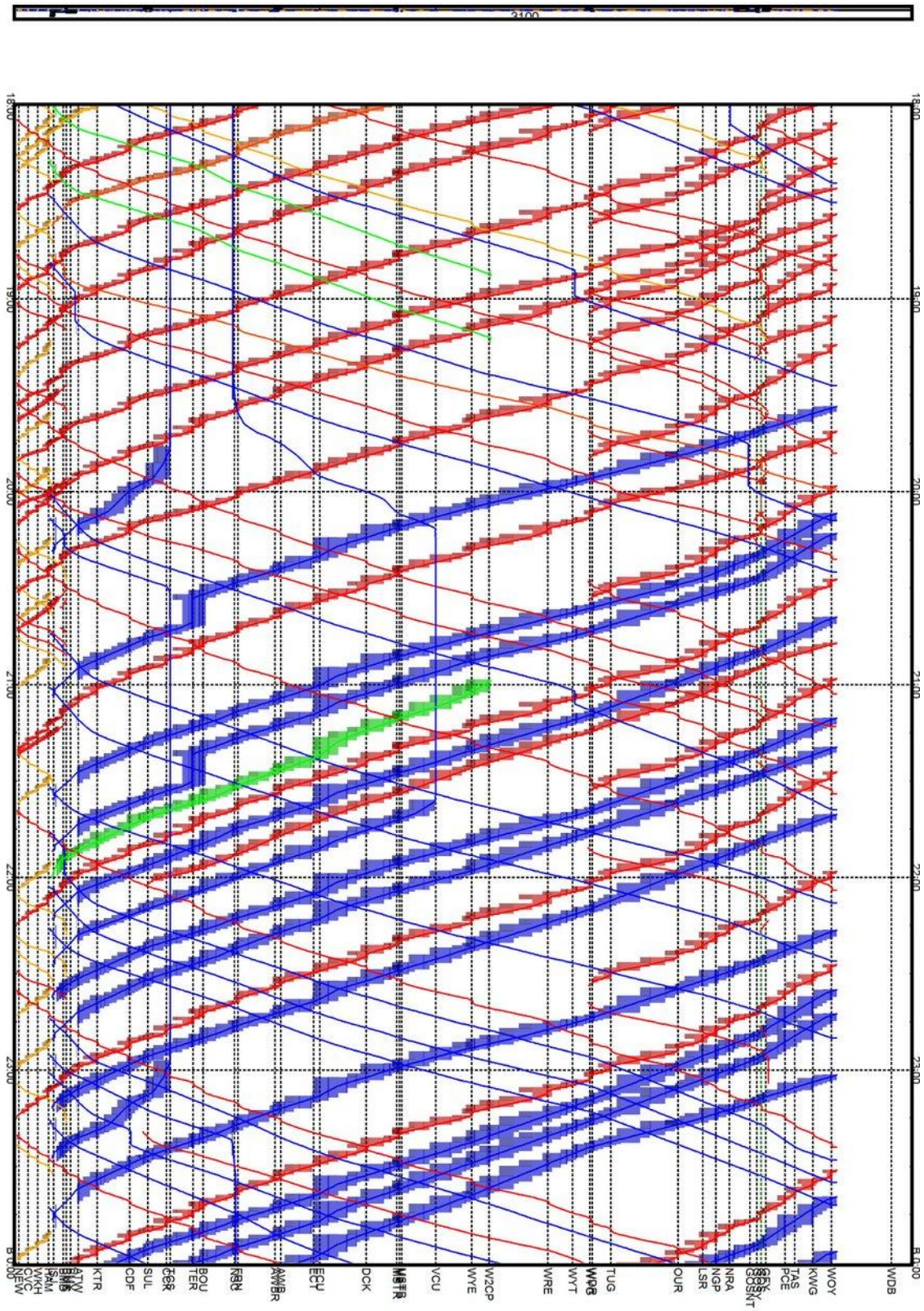
Graphical timetable for the running of 6 coal services between mine and port

Down direction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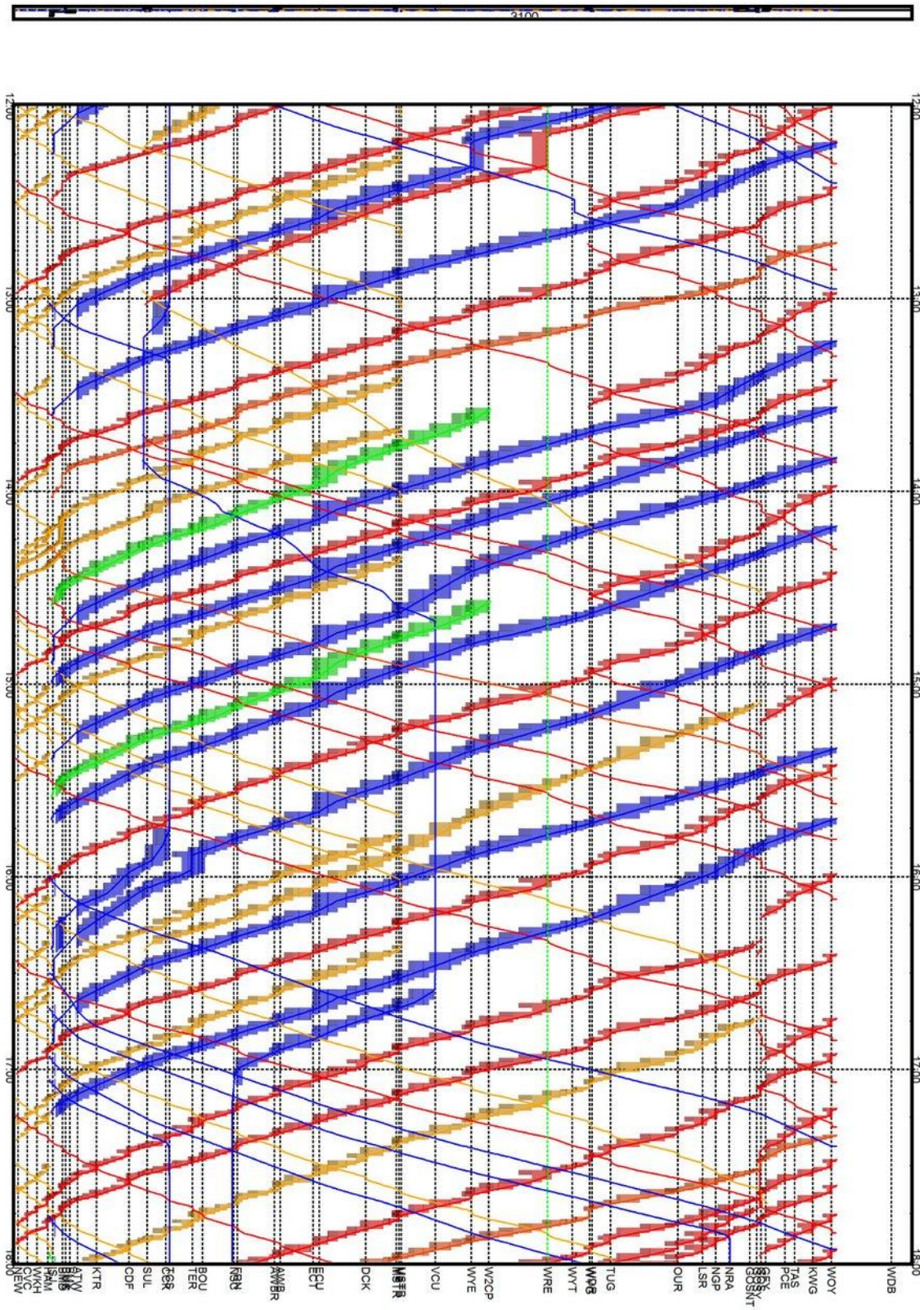
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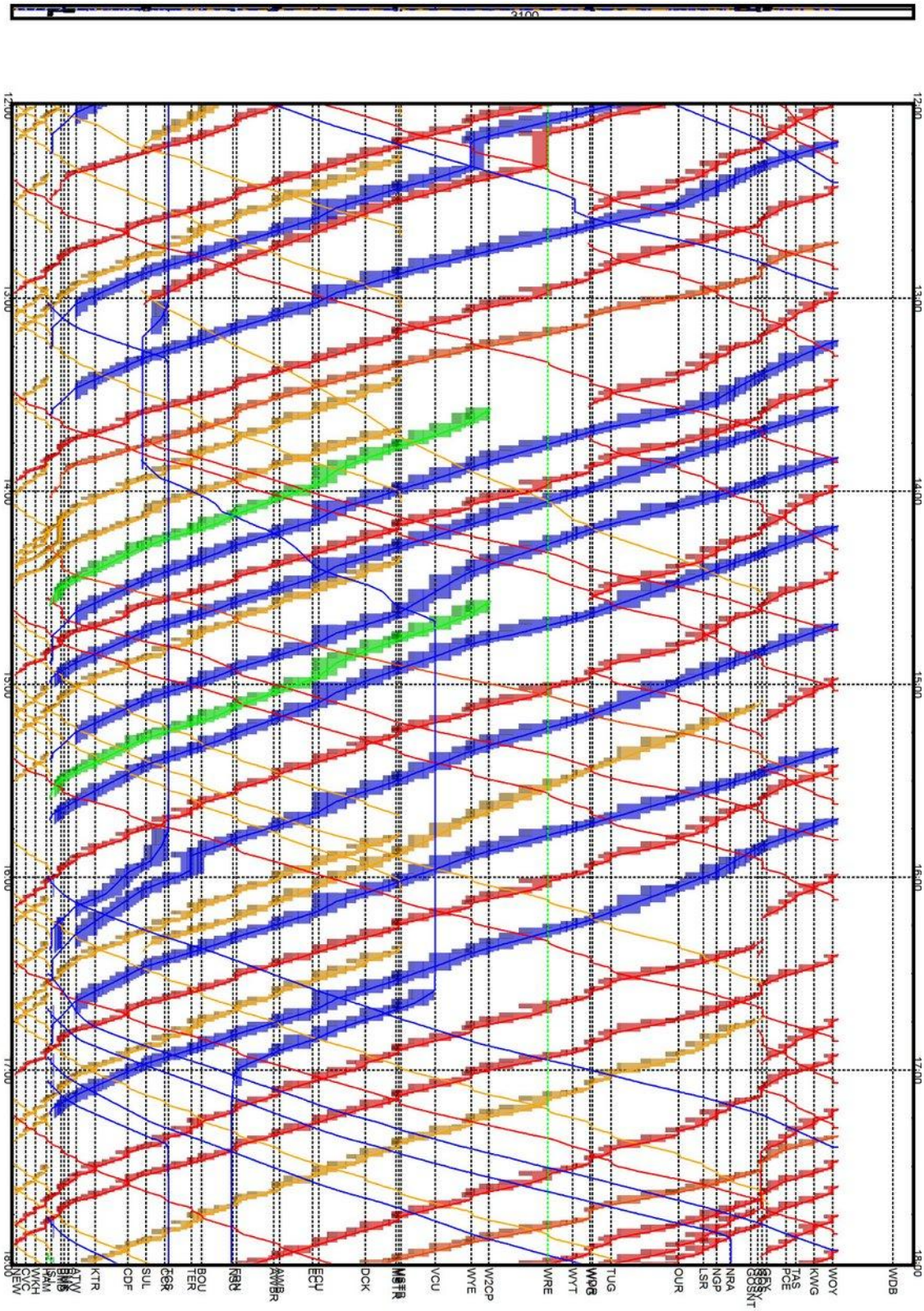
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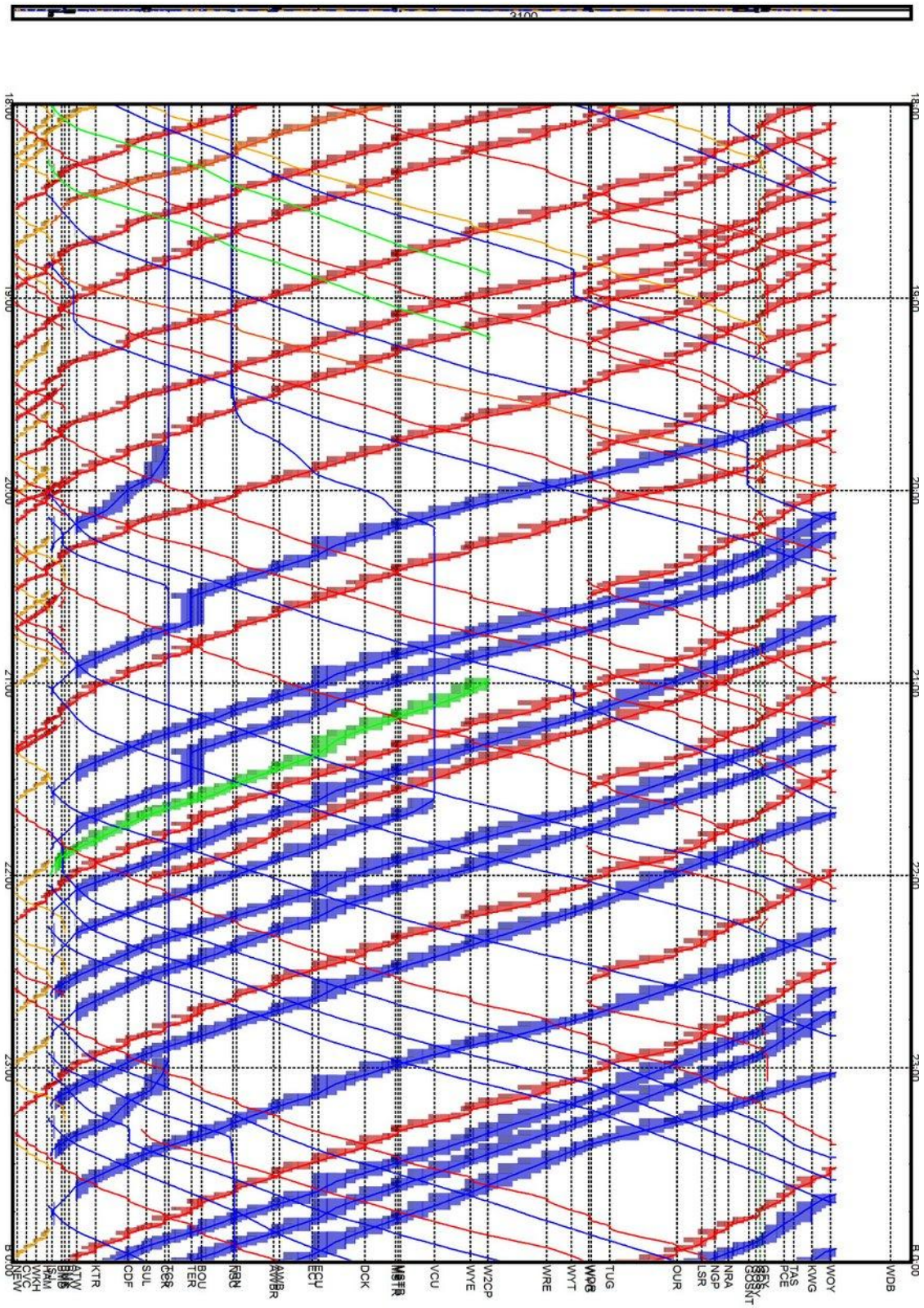
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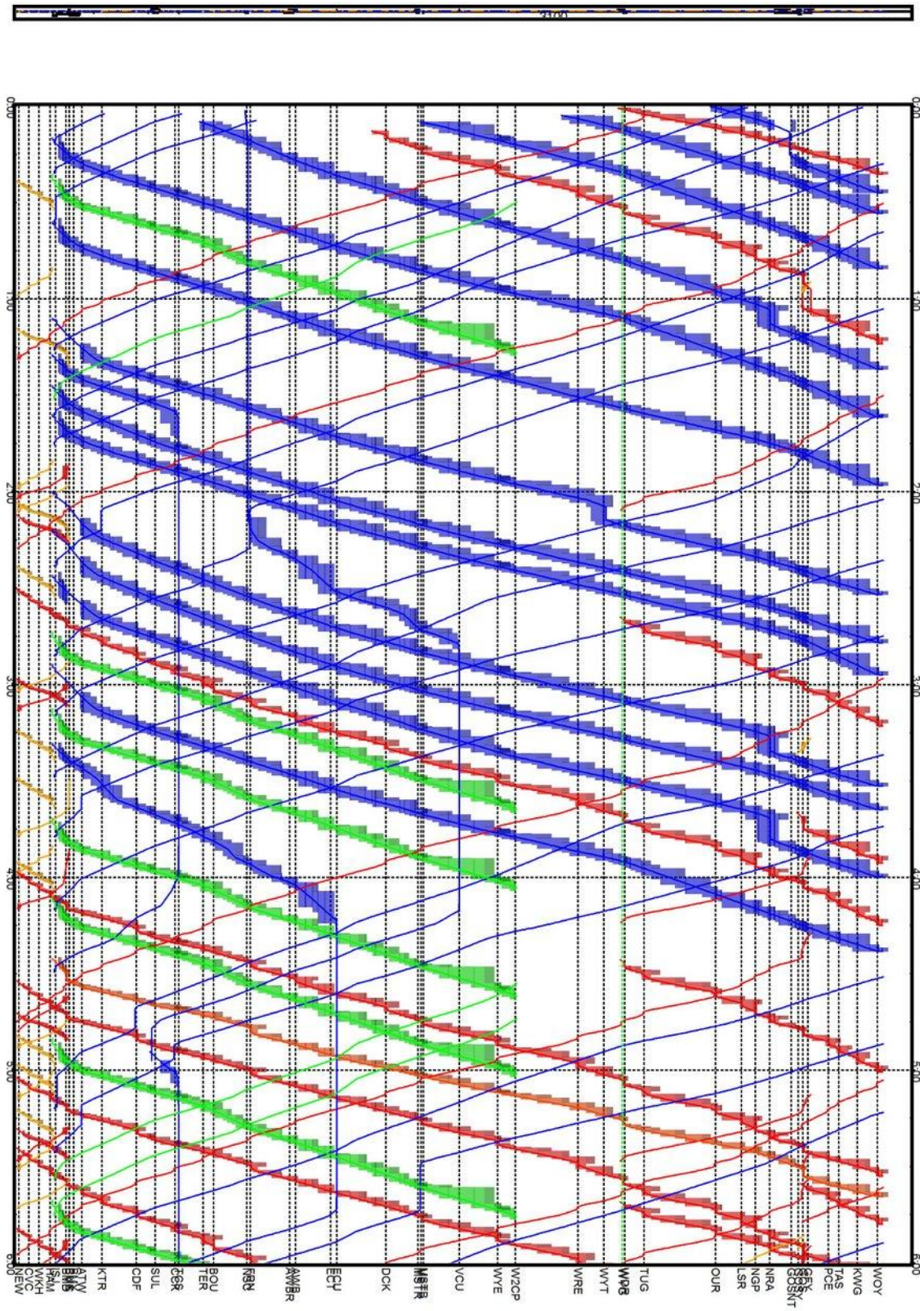
Graphical timetable for all available potential paths without any conflict

Up direction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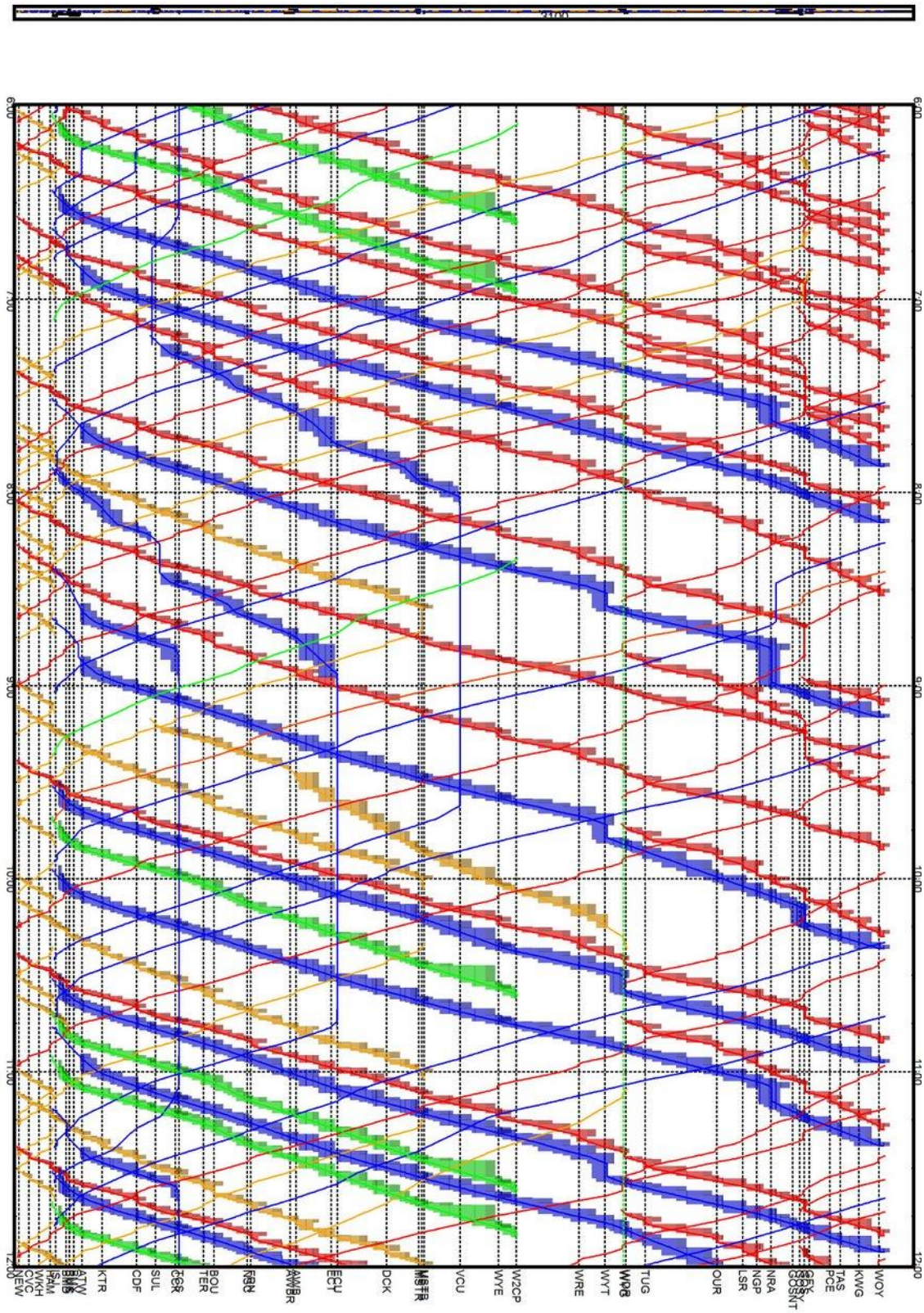
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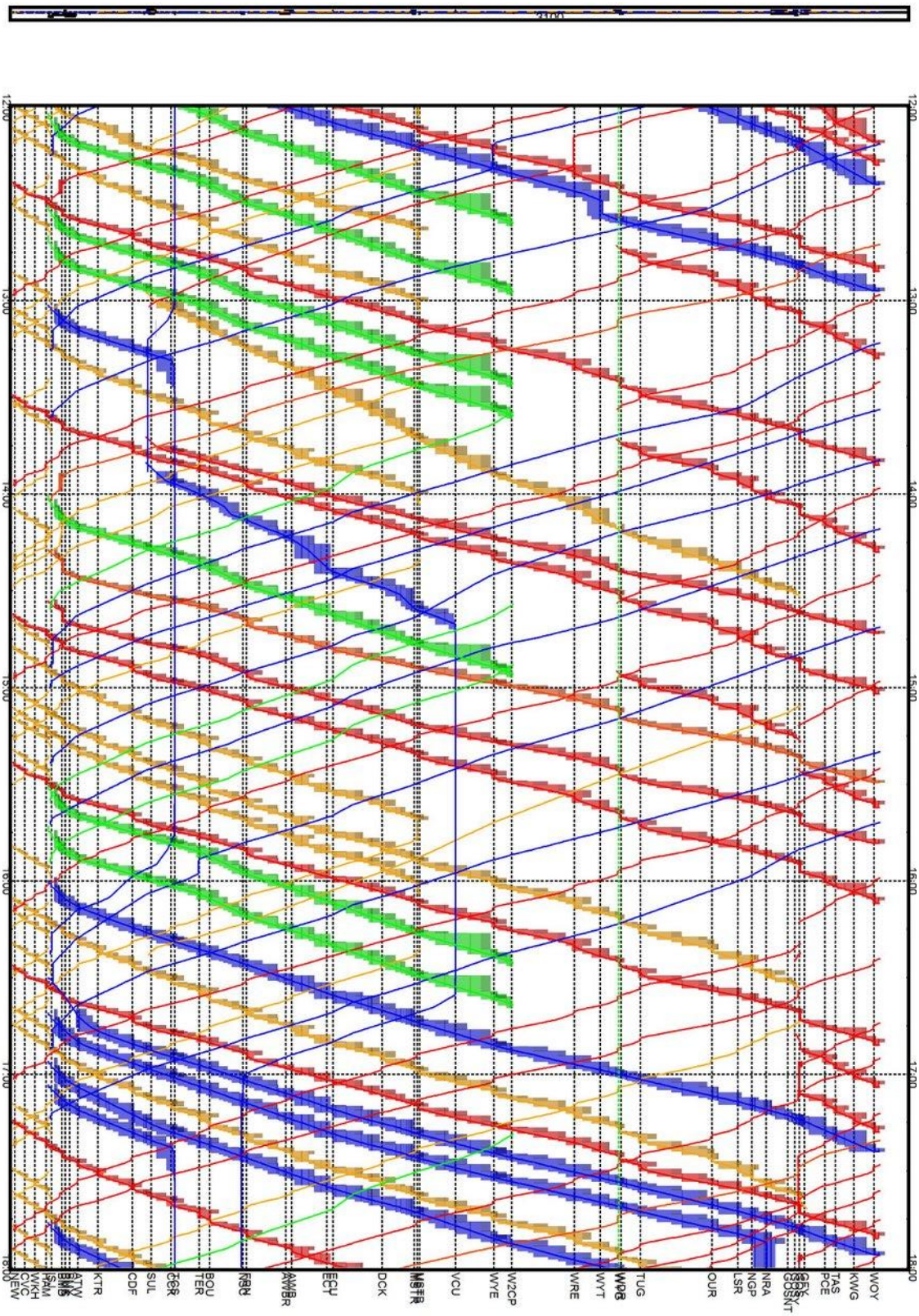
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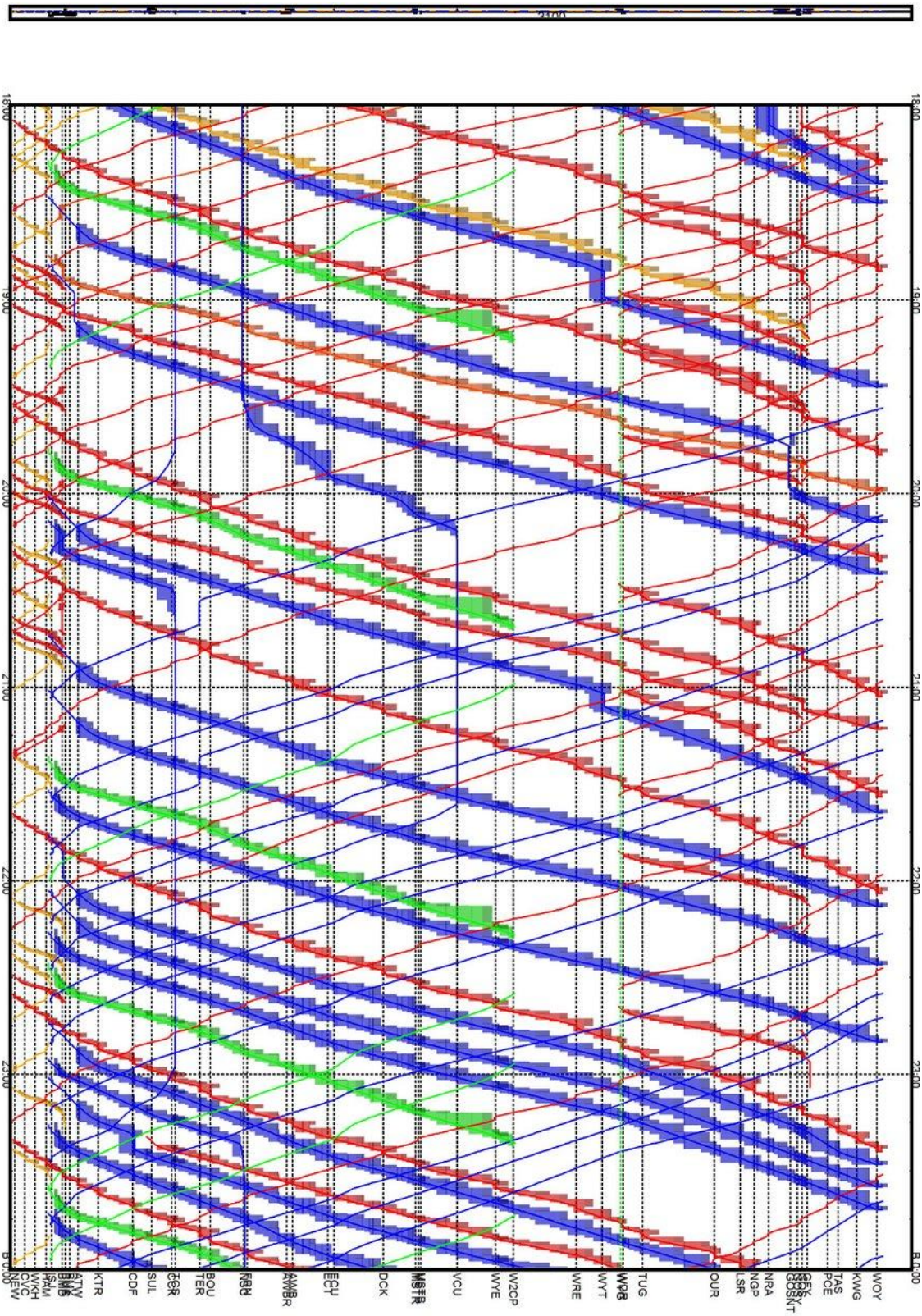
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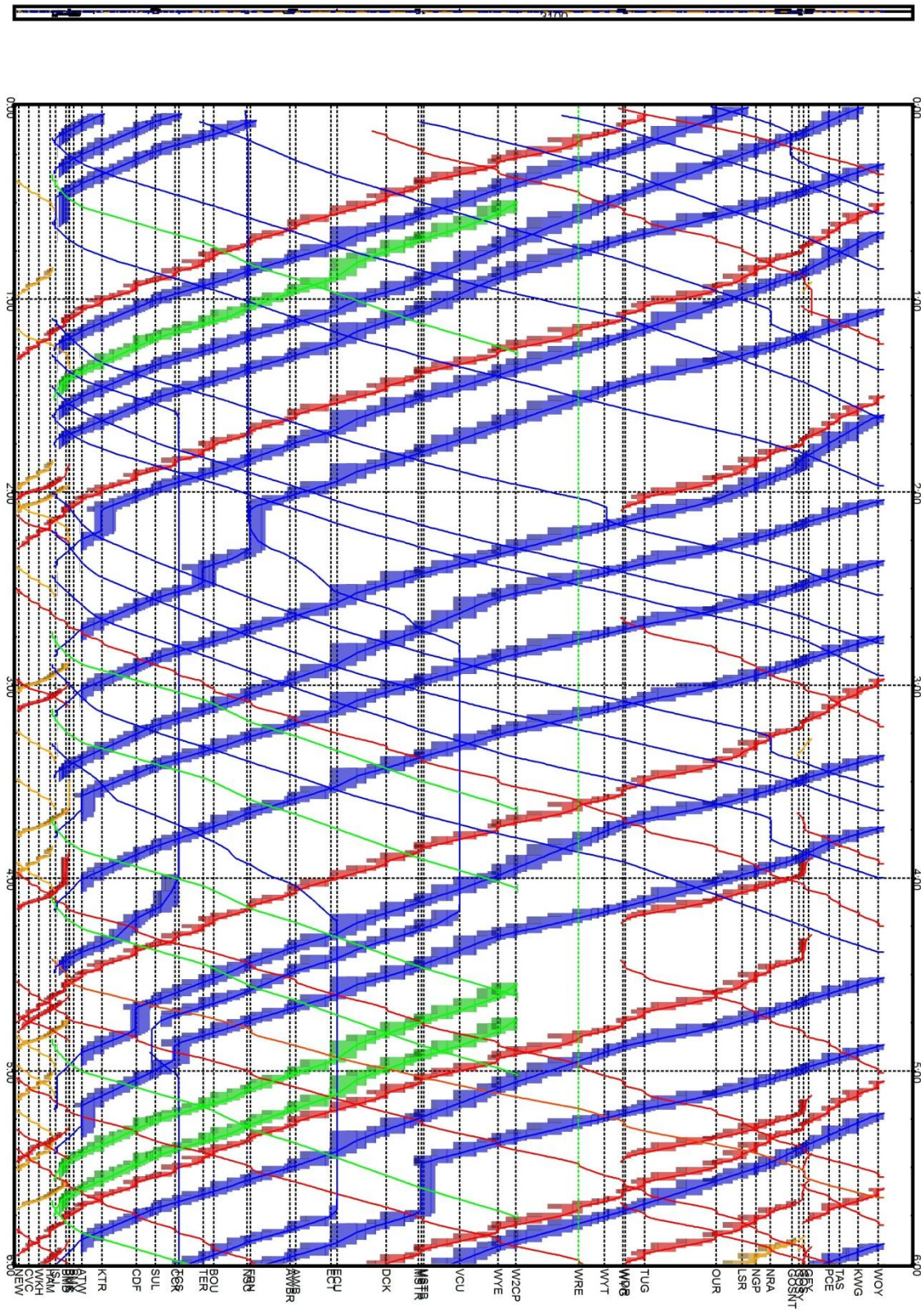
Graphical timetable for all available potential paths without any conflict

Down direction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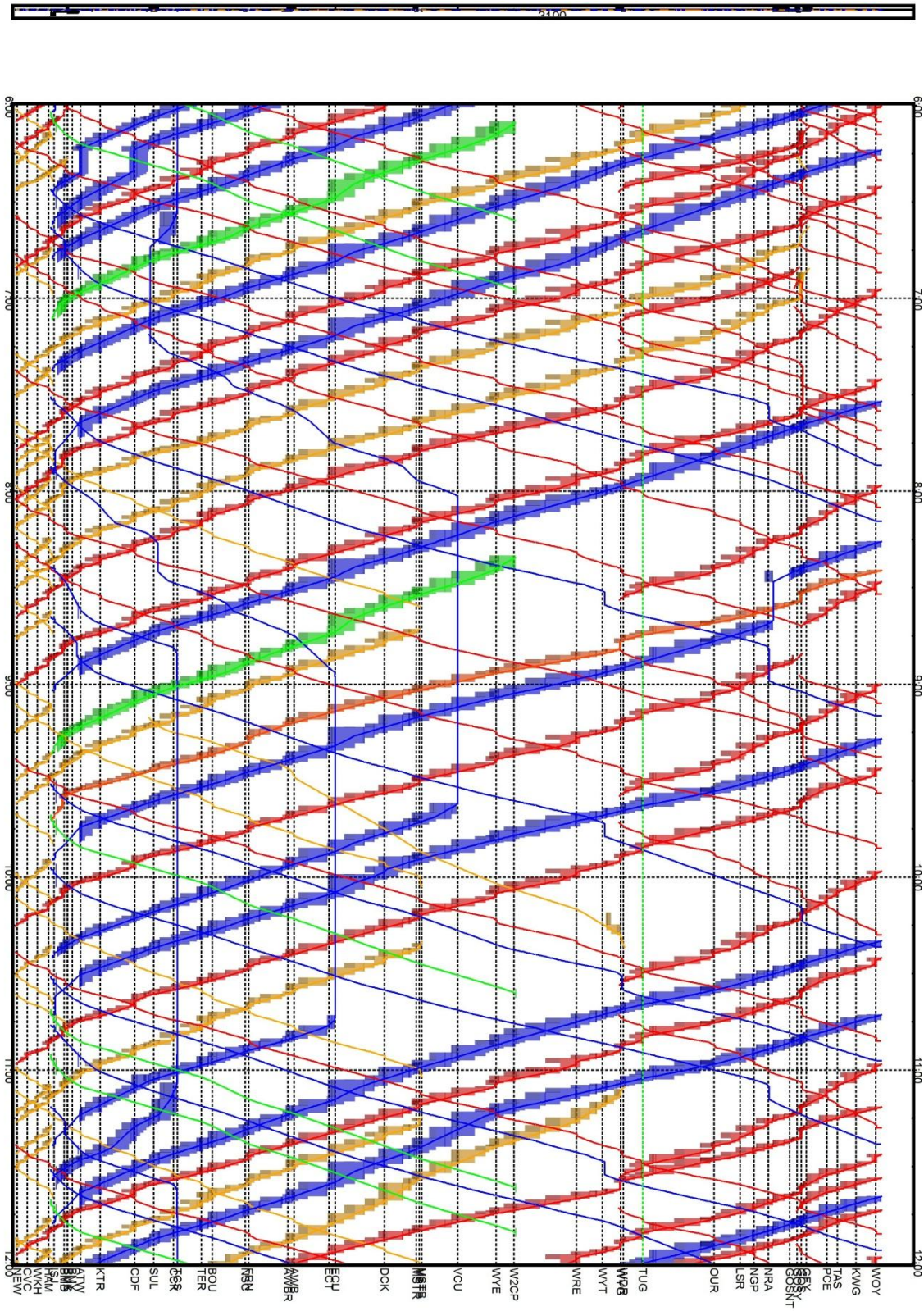
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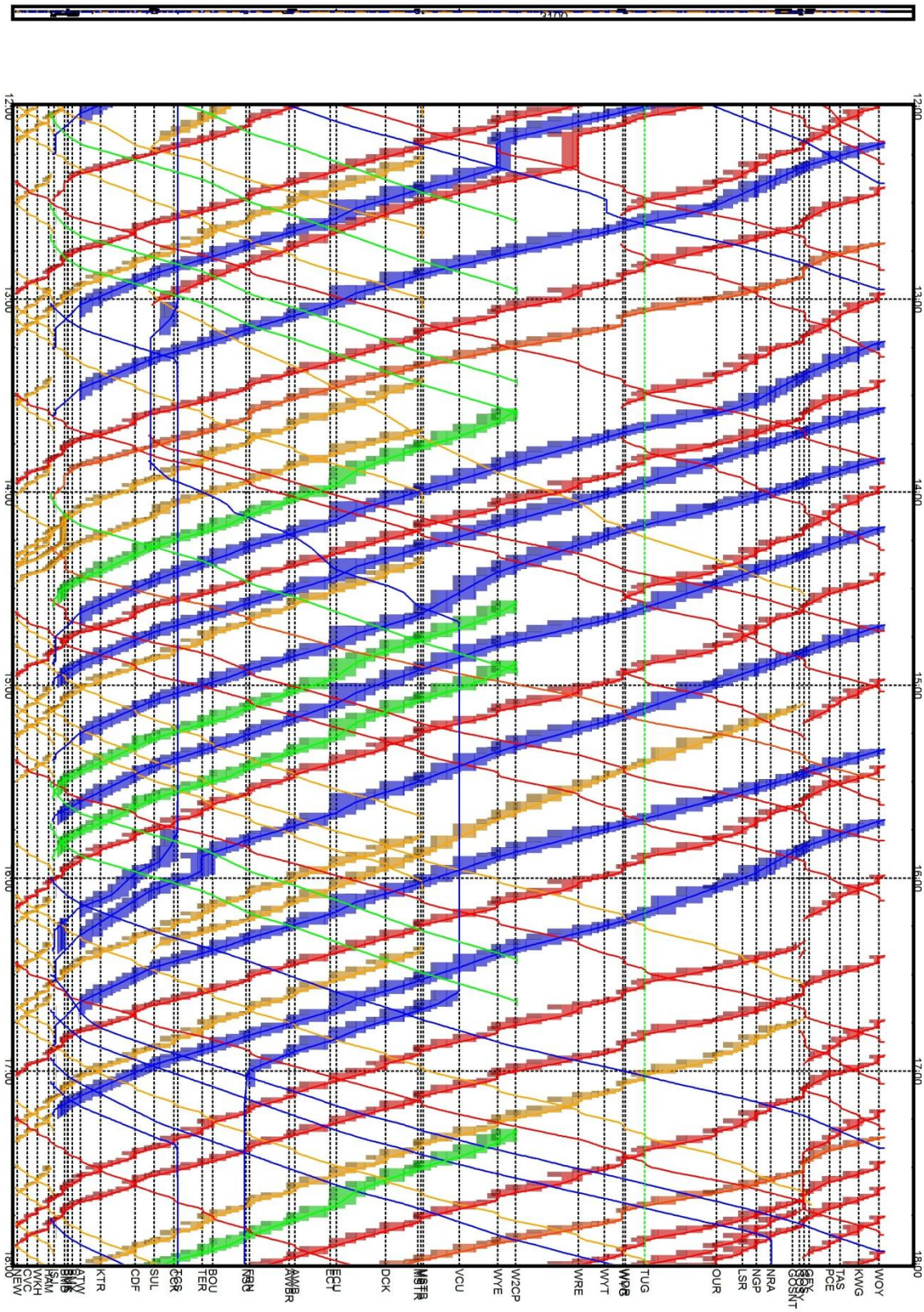
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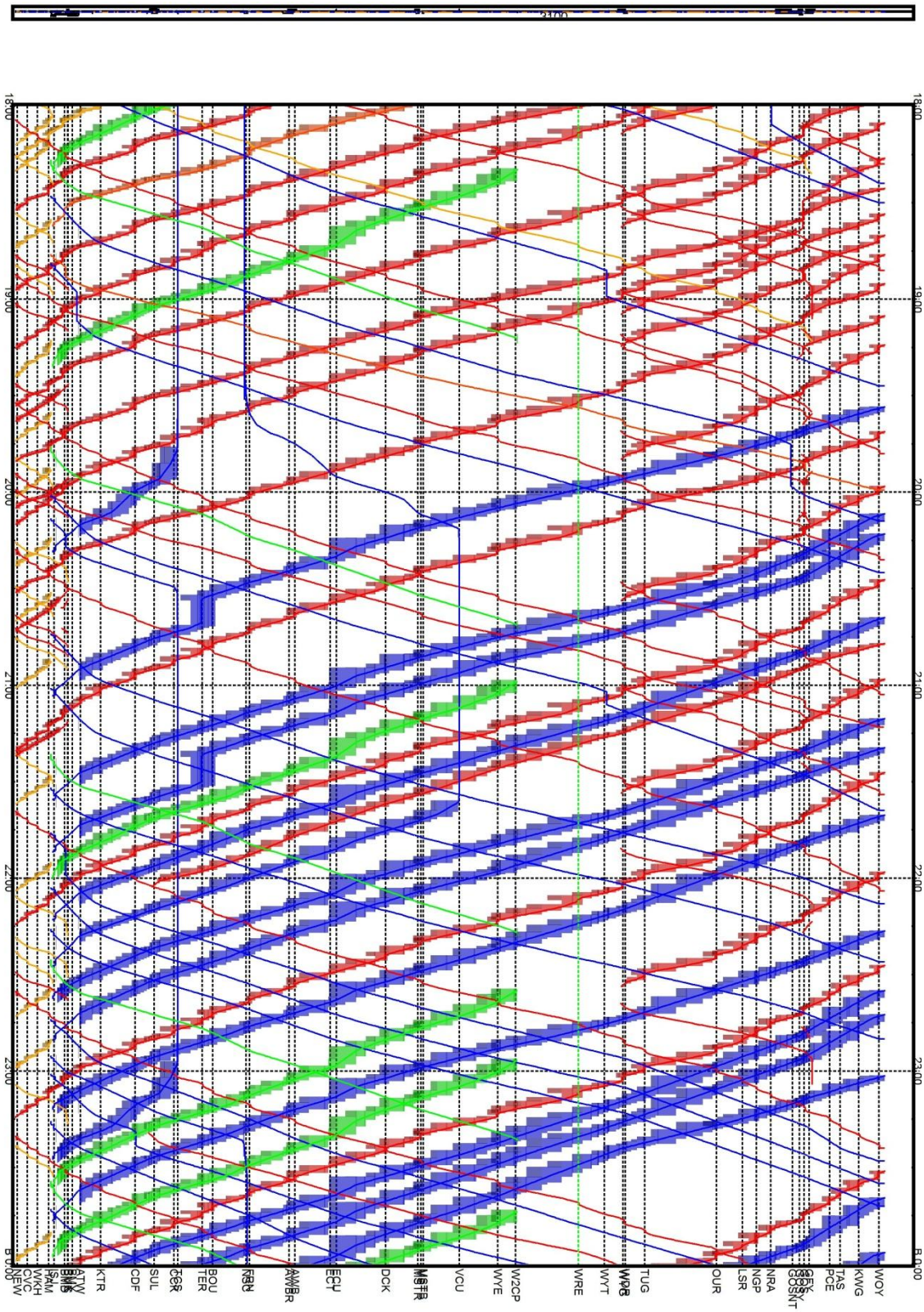
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