# East West Rail Initial Constructability Study

Constructability Outputs – 21st February 2022 EWR\_CS3-COS-CL-XX-PP-Y-000005

Overview

### 21st February 2022

Baseline overview complete

- Final baseline sequences
- Baseline programme
  - Detailed Blockade Analysis
- Logistics sketch
- Red line boundary commentary
- Possessions strategic overview

### Deliverables

Long Road Bridge Construction Sequence

• EWR\_CS3-COS-CL-XX-ST-Y-000002

Cambridge Throat Construction Sequence

• EWR\_CS3-COS-CL-XX-ST-Y-000003

Approach to Cambridge Construction Sequence

• EWR\_CS3-COS-CL-XX-ST-Y-000004

**Construction Programme** 

• EWR\_CS3-COS-CL-XX-PR-Y-000001

### Break?

**Programme Strategy Overview** 



# Approach to Cambridge – Key Blockades

Initial study baseline sequences

### Approach to Cambridge Shepreth Branch Junction Blockade Duration

**OLE Testing & Signal** Installation (Midweek) Signal Testing & EIS - ALB



# Approach to Cambridge Shepreth Branch Junction Blockade Build Up – Example

Activity	Installation	Quantity	Possession type	Duration	Total Duration	Comments
CAM-SBJRS-1040	Track and OLE removal	3150m (track) + 5000m (OLE)	ALL LINES Blockade	5d + <mark>3</mark> d = 8d		These works would be completed
						progressively with the installation works:
						Track removal = 630m / day &
						OLE removal = 1670m / day
CAM-SBJRS-1050	Track and OLE	260m + 400m = 660m (track) +	ALL LINES Blockade	2d + 1d = 3d		Concurent with Main Works
		400m + 600m = 1000m (OLE)				Interim alignments north of Cambridge
						South Station
CAM-SBJRS-1060	Track	450m + 690m = 1140m + 4no S&C units on Up SBR =	ALL LINES Blockade	5.5d + 4.5d = 10d		Track & S&C Install = 4 days
		120 * 4 = 480m = 1620m				Tamping and Welding 1.5 days
						Includes 3no temporary point ends.
CAM-SBJRS-1060	OLE	1500m + 1800m = 3300m				Down WAML OLE - 1800m = 2.5 days
CAM-SBJRS-1060	Point ends	6no (OOU)				Up WAML OLE - 1500m = 2 days
CAM-SBJRS-1060	OLE Testing & Signal Installation	-	ALL LINES Blockade	1d		Panning all New OLE Wire runs
CAM-SBJRS-1080	EIS WAML	-	ALL LINES Blockade	2d		Wheels Free
CAM-SBJRS-1080	Risk / Contingency	-	ALL LINES Blockade	2d	23 Days (3 weeks)	4no weekends
CAM-SBJRS-1040	Track removal	400m + 1360m = 1760m				These works would be completed
						progressively with the installation works:
						Assumes ALO planning requirements
						reduce the productivity.
CAM-SBJRS-1070	Track	1760m + 2110m = 3870m - (120 * 4 = 480m) = 3390m	SBR Blockade	49d		Assumes ALO planning requirements
CAM-SBJRS-1070	OLE	2300m + 1500m (6xXOs) + 2300m = 6100m				reduce the productivity.
CAM-SBJRS-1070	Point ends	2no				5poss for up SBR track, Dn SBR midweek
						assuming ALO, extra 4poss for OLE, Dn
						midweek. Includes 1no temporary point
CAM-SBJRS-1090	Temp buffers	2no	SBR Blockade	5d		
CAM-SBJRS-1100	OLE Testing & Signal Installation	-	SBR Blockade	5d		
CAM-SBJRS-1100	EIS SBR & WAML Lines	-	ALL LINES Blockade wkd	2d	70 Days (10 weeks)	
CAM-SBJRS-1100	Risk / Contingency	-	ALL LINES Blockade wkd	14d	14 Days (2 weeks)	
	Total Duration:	-	-	-	107 Days (15 weeks)	

Key Programme & Blockade Duration drivers

#### **Overall Strategy**

Why do we need to segregate SBJ & Cambridge Works into two blockades:

- 1. Rail based logistics cannot reasonably feed multiple worksites
  - Critical resource
  - 2-track railway blocked
- 2. Signalling Data Design Periods
  - Assumption of 9-12 months conservative
  - Supplier and technology dependant
- 3. Overall risk profile
  - Number of preparatory workstreams
  - Quantum of work required

### **Cambridge Station Blockade Duration Drivers**

- A. Hills Road Bridge physical ALO constraint
- B. Cambridge is fundamentally a 2-track railway
  - Others examples have more approach tracks therefore easier to keep something open
- C. Sheer volume of work

**Cambridge Station Blockade Duration Inputs** 

#### **Core Quantities**

5.2km track and OLE removal

24no. Point Ends Installed

7.4km Plain Line

11.6km OLE wiring + some structures

Signalling & OLE commissioning of whole layout

Plus other systems All in a complex environment

#### Assumptions

The following sensitivities have been applied to the testing, commissioning and risk allowances:

- OLE Testing 1-week / 1-week, 0-weeks Diesel
- Signalling Installation Concurrent / 1-week
- Signal Testing 1-week / 1-week
- Risk allowance 2-weeks / 3-weeks

**Cambridge Station Blockade Duration Sensitivity** 

#### **Detailed Programme Scenarios**

6no. Durations examined in detail:

- 1. ALB Best Case
- 2. ALB Worst Case
- 3. WAML Partial Diesel Only Platform 9&10 Open Early Best Case
- 4. WAML Partial Diesel Only Platform 9&10 Open Early Worst Case
- 5. WAML Partial Electric *Platform 9&10 Open Early* Best Case
- 6. WAML Partial Electric *Platform 9&10 Open Early* Worst Case

These have been driven by the level of concurrency of working.

### Cambridge Station Blockade Duration Justification – Example Detail

	Remove Up WAML	2000m track and OLE	5	2d to remove OLE (w/through rd), 4d track (with through road							
	Install new Up WAML	1780m (track) + 1PE	6	400m/d = 5d + 1d for PE = 6d							
	Remove southern 350m of Dn WAML	350m	1			Example of					
	Complete Dn SBR 350m	350m (track)	1			dotailed build up					
	Remove remaining Dn WAML	1650m track and OLE	4	1d to remove OLE, 3d track = 4d overall		detalled bulld-up					
6	Install new Dn WAML	2000m , 5 PEs	10	1d per Point End = 5days + 400m/d = 2000 / 400 = 5 days, so 1	Od total						
CB	Install new Up SBR	1800m track, 5 PEs	10	1d per Point End = 5days + 400m/d = 1800 / 400 = 4.5 rounder	Colouring split by						
to			ł	Note: Assumed that due to Rail Haulage availability and site Lo	ogistics requirements,						
bad			I	these works cannot be commpleted concurently.	WAML / ALB and						
s Rc	Top ballast, tamping, welding - WAML	3850m track	7	4d of tamping with 1 tamper, 11550t top ballast, 6 trains, 2tra	ins per day = 3d	SRR elements					
Ē	Top ballast, tamping, welding - SBR	2150m track	4	2d of tamping with 1 tamper, 6450t top ballast, 4 trains, 2trair	is per day = 2d	OBICCICITICITIES					
	Install new Up WAML	2100m (OLE)	2	1000m/day							
	Complete Dn SBR 350m	500m (OLE)	1	less than 1000 but still 2no anchors	Full details in A2C						
	Install new Dn WAML	2100m (OLE)	2	1000m/day	soquence						
	Install new Up SBR	1900m (OLE)	2	1000m/day	Sequence						
	OLE Cross Overs - WAML	ers - WAML 2no = 500m 1 More difficult work - 250m per run									
	OLE Cross Overs - SBR	6no = 1500m	3	More difficult work - 250m per run							
	Platform 7 Track and OLE removal	640m	2	2d (concurrent with 1)							
	Through Rd London Track and OLE removal	l 215m	2	2d (concurrent with 1)							
	Platform 7 Track	300m + 350m = 650m + 5PEs	3	3d for short length inc PE's							
	Through Rd Country Track and OLE remova	l 160m	1		89 days with no	o concurrency on these activities					
at	Through Rd Country Track	160m + 2PEs	1		13 weeks with	vith no concurrency on these activities					
hro	Platform 1/4 Track and OLE removal	365m	2	1d London, 1d country	1 wook OLE to	testing					
еT	Through Rd London Track	180m + 2PEs	1		I WEEK OLE LE	esting					
gbr	Platform 1/4 Track	240m +150m = 390m + 4PEs	2	1d London, 1d country	1 week signal	ling installation					
bru	Top ballast, tamping, welding - WAML	725m track	4	a fifth of Hills to Bussway but a lot of S&C	1 week signal	ling testing and FIS					
am	Top ballast, tamping, welding - SBR	655m track	2								
0	Platform 7 OLE	650m + 315m = 965m	2	1d London, 1d country	ngency/risk						
	Through Rd OLE 540m			1d London, 1d country							
	Platform 1/4 OLE	590m	2	1d London, 1d country		4					
	OLE Cross Overs - WAML	5no. = 750m	3	More difficult work - 150m per run	1						
	OLE Cross Overs - SBR	1no = 150m	1	More difficult work - 150m per run							

EWR Constructability Initial Review

### Blockade Duration Options – Baseline Design

Week	Dec	Ja	an	Feb					M	ar			Α	pr			M	Jun			
Option	Wk Wk 1 2	Wk Wk 3 4	Wk Wk 5 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14	Wk 15	Wk 16	Wk 17	Wk 18	Wk 19	Wk 20	Wk 21	Wk 22	Wk 23	Wk 24
Full Block	Best C	ase									A	В									
(P5&6 Open)	Worst	Case													A	В					
WAML Partial	Best C	ase				AL	в								No	Ele	ctric	s			
Diesel Only	Worst	Case						A	В								N	o El	ectr	ics	
WAML Partial	Best C	ase						A	B				TL	K @	) Ca	am S	Sout	h			
Electric	Worst	Case								A	LB						TLK	& C	am	So	uth
Shenfield (OLE)				Deliver	ed Dui	ation – p	ost c	lesign (	leveloj	oment											
Derby		Delivered Du	iration – post	design	develo	pment															
Bristol East	Delivered	Dutation – p	ost design de	velopm	ent																

Design development and challenge is the key next step to likely successful delivery

### Blockade Duration Options – Baseline Design

Week	Dec Jan					Fe	Mar					Α	pr			M		Jun				
Option	Wk Wk 1 2	Wk W	k Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14	Wk 15	Wk 16	Wk 17	Wk 18	Wk 19	Wk 20	Wk 21	Wk 22	Wk 23	Wk 24
Full Block	Best C	ase					lide	D				A										
(P5&6 Open)	Worst	Case				3	mae	: Pe	ICA:			_				A	. 6					
WAML Partial	Best C	ase					Al	В								No	Ele	otric	s			
Diesel Only	Worst	Case							А	В								N	o El	ectr	ics	
WAML Partial	Best C	288				Dee	-		A	B				TL	KQ	) Ca	imi S	out	h			
Electric	Worst	Case				Rec	omi	nei	iua	uon	Α	LB.						ίĸ	80	am	SQ	uth
Shenfield (OLE)			11.0		Deliver	ed Dúra	ation – I	post o	esign	laveloj	oment							<i>1</i> 9.			19	
Derby		Delivered	Duration	– post o	lesign	develop	oment															
Bristol East	Delivered	Duration -	post des	sign dev	elopm	ent																

Design development and challenge is the key next step to likely successful delivery

Blockade Duration Assumptions and Rates – All Options

#### **Assumptions / Rates**

- 1. Assume that no sub formation treatments other than Geotextile installation required.
- 2. No Drainage works allowed for within the Blockade
- 3. 300mm track ballast to be installed
- 4. Logistics by rail some road as an opportunity.
- 5. Assumes NRD based logistics
- 6. Assumed that all new OLE Foundations, Masts and Booms can be installed prior to the blockade commencing

#### **Uncertainties / Risks**

The following are key areas where there are unknowns in the work to date:

- A. Permanent Works Scope not defined in detail particularly OLE
- B. New OLE Locations could clash with existing assets, therefore cant be installed prior to the blockade.
- C. Existing System conditions particularly OLE
- D. Rail haulage requirements / availability
- E. Critical resource requirements / availability (Particularly – Kirow Crane / Tilting Wagons OLE Linesmen & Signal Testers)
- F. Coordination with other major works nationally.
- G. Fatigue management Long duration / is this sustainable (*Productivity / Outputs likely to be effected*)

.





### **Approach to Cambridge** Blockade Duration Opportunities – All Options

#### **Opportunities**

The following are detailed options to help reduce duration:

- 1. Lineside equipment positioning Resignalling Project & Cambridge South – high likelihood
- 2. Improved Cambridge South Design Integration
  - Alignments & Platform 2
  - Needs review with NR / funders
- 3. More North End Layout complete pre-blockade
  - More possessions would be required
- 4. Use of Offline Rail Systems Package Logistics in critical stages?
  - Interface with offline works delivery

### Key Influencers – Part 1 Inputs

However, at this stage the biggest influencers are:

- A. Stakeholder operational requirements
- B. Reduce physical scope
  - Understand physical consequence chains
- C. Reduce systemic change
  - Challenge Operational requirements

### Approach to Cambridge Consequence chains – Cost & Programme

#### Key drivers of Cost / Programme

Elements to mitigate in Strategic Review Part 1:

- Platform 2&3 buffers Platform 2&3 geometry 1060 / 1058 / 1052 / 1051 / 1050 points + OLE + speed – Hills Road Bridge pinch point
- 1059 points Platform 1&4 / Scissors move north Platform 5&6 realignment OLE, systems & sidings impacts
- 3. Platform 9&10 Thameslink Sidings temporary sidings / Royal Mail / MSCP
- 4. SBJ split widening impact on services / access requirement disruption / programme impacts



### Approach to Cambridge Blockade Train Service Impacts

# Service Assumptions for discussion with TOC's / FOC's

The following key service assumptions have been made, but are not validated:

 Cambridge - Platform 5&6 Open Weekdays,

Cambridge North terminating only feasible on through running lines in Platform 2.

- Cambridge South SBR Always Open (Except for Temporary Buffer removal and final commissioning weekend)
- Cambridge South WAML Service reversing at Whittlesford Parkway or Cambridge South

(Train pathing and stacking arrangements to be better understood)

