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Project	Extended Tay Estuary Rail Study

Project No.   22093501

Subject   **Engineering & Operations Report – Appendix A**

Railsys Timetabling Conflicts

The tables below list the timetable conflicts identified from railsys for the Package 1 and 2 timetables.

Table 1

Package 1- Phase 2 (Northbound) Glasgow to Perth with two hourly extension to Arbroath;

Table 2

Package 1 - Phase 2 (Southbound) Glasgow to Perth with two hourly extension to Arbroath;

Table 3

Package 2,3&4 - Phase 2 (Northbound) Glasgow to Perth and Perth to Arbroath shuttles; and

Table 4

Packages 2,3&4 – Phase 2(Southbound) Glasgow to Perth and Perth to Arbroath shuttles.

The vast majority of conflicts identified are minor. The three major conflicts identified are highlighted in yellow. Proposed solutions have been developed to resolve all conflicts and further consultation will take place with Network Rail and First ScotRail to seek agreement on the assumptions underpinning these.

TABLE 1   PACKAGE 1 - PHASE 2 NORTHBOUND SERVICES (GLASGOW TO PERTH WITH TWO HOURLY EXTENSION TO ARBROATH)

Service (departure)	Conflict	Comment
Glasgow 07:06 extended from Perth to Arbroath	SRT problems from Perth to Arbroath. Timetable conflict on single track with 1T08. 1T08 timetable to pass Barnhill 08:08:30 extended service passes at 08:08:00. Small <30 sec conflict with ECS service at Cowlairs West Jn	
Glasgow 08:11	Conflicts with following passenger service 1R60 between Croy and Greenhill Upper Jn this could be resolved by populating passing times in this area. Large timetable conflicts with freight service 6A65 between Larbert and Blackford.	
Glasgow 09:11	Conflicts with following passenger service 1R64 between Croy and Greenhill Upper Jn this could be resolved by populating passing times in this area. Conflicts with 5N42 turnback ECS at Dunblane. Moving arriving train 2N45 to form 5N42 into Platform 1 resolves. Conflicts in the south end throat at Perth with 1T12, however 1T12 can be re-routed via Signal 46 at Perth South Jn to resolve. Runs down train 6A65 between Dundee and Carnoustie. Enough white space behind to retime the train without conflicting with the next train (1A57). Turnround at Arbroath appears to be approx 35 mins so no issue there.	
Glasgow 11:11	Conflicts with following passenger service 1R42 between Croy and Greenhill Upper Jn this could be resolved by populating passing times in this area. Conflicts with 5N44 turnback ECS at Dunblane. Moving arriving train 2N49 to form 5N44 into Platform 1 resolves. Conflicts in the south end throat at Perth with 1T18, however 1T18 can be re-routed via Signal 46	

Service (departure)	Conflict	Comment
	at Perth South Jn to resolve.	
Glasgow 12:11	The suggested platforming at Queen Street isn't valid, however a brief look sees what looks like an easy solution. Conflicts with following passenger service 1R48 between Croy and Greenhill Upper Jn this could be resolved by populating passing times in this area. Conflicts with 5N46 turnback ECS at Dunblane. Moving arriving train 2N21 to form 5N46 into Platform 1 resolves.	
Glasgow 13:11	Conflicts with following passenger service 1R68 between Croy and Greenhill Upper Jn this could be resolved by populating passing times in this area. Conflicts with 5N38 turnback ECS at Dunblane. Moving arriving train 2N51 to form 5N38 into Platform 1 resolves. Conflicts in the south end throat at Perth with 1T22, however 1T22 can be re-routed via Signal 46 at Perth South Jn to resolve.	
Glasgow 14:11	Conflicts with following passenger service 1R40 between Croy and Greenhill Upper Jn this could be resolved by populating passing times in this area. Conflicts with 5N48 turnback ECS at Dunblane. Moving arriving train 2N43 to form 5N48 into Platform 1 resolves.	
Glasgow 15:11	The suggested platforming at Queen Street isn't valid, however a brief look sees what looks like an easy solution. Conflicts with following passenger service 1R14 between Croy and Greenhill Upper Jn this could be resolved by populating passing times in this area. Conflicts with 5N42 turnback ECS at Dunblane. Moving arriving train 2N45 to form 5N42 into	

Service (departure)	Conflict	Comment
	Platform 1 resolves. Conflicts (runs down) 4S43 between Greenhill Lower and Carmuirs West Jn. 4S43 is given considerably more than required running time, however 4S43 is a intermodal operated by DRS and consists of Loco + approx 90 SLU. The maximum that can be held at Carmuirs East without fouling West is Loco + approx 75 SLU, so this is not an option. It is possible to hold 4S43 at Greenhill Lower until after the 15:11 has passed and still fit into its path at Carmuirs.	
Glasgow 17:12	Conflicts with *NEW* 1740 Arbroath – Glasgow in the south end throat at Perth, however *NEW* 1740 Arbroath – Glasgow can be re-routed via Signal 46 at Perth South Jn to resolve. There is an issue with platforming at Dundee. At present the Edinburgh – Carnoustie that will be in the equivalent path north of Dundee stopping all stations is held in Platform 1N for 1A81 to overtake, however this train actually arrives considerably in advance of this (1834). This earliest this train can get to Dundee Central Jn is 1844, which leaves it too tight to get infront of 1A81 (1846H). It could in theory follow 1A81 in at 1849H into Platform 1 North however there is an arrival (1T40) at 1852H in Platform 1 South which would scupper that! Therefore it will have to reoccupy Platform 4 post departure of 1A81 giving a 1852 arrival, 1 ½ min dwell so 1854 departure is still achievable. With 7 mins pathing time approaching Dundee Central Jn as a result of all this, a stop at Invergowrie can be accommodated with no journey time implication.	
Glasgow 19:11	Can depart from platform 7 at Queen Street. Conflicts with 5N44 turnback ECS at Dunblane. Moving arriving train 2N53 (arr 1946) to form 5N44 (dep 2002) into Platform 1 resolves. Conflicts with 5P90 performing RM at Dunblane Signalbox on the ML (stops 1943H-1957H, whilst new service is timetabled to depart Dunblane at 1951). Reduce ECS turnaround time to resolve. Conflicts (runs too close behind) 1A88 between Dundee and Monifieth. * Conflicts (runs too close behind) 5R19 at Cowlairs Passenger Loop (ECS dwells 1912-1912H) -	* This arises because 1A88 calls at both Cupar and Leuchars and is therefore later than the standard pattern on arrival at Dundee. A possible option would be to omit the Cupar call. It looks possible to follow 1A88 and clear the main line before being run down by 1A89. This

Service (departure)	Conflict	Comment
	resolved by populating a passing time of 1915 for the new service. Conflicts with following passenger service 1R14 between Croy and Greenhill Upper Jn - this could be resolved by populating passing times in this area.	will require retiming our train to run 2:30 later from Dundee (dep 20:47) Worst case, our train will probably have to dwell at Dundee for quite some time to follow 1A89 at approx 21:08.
Glasgow 20:11	The suggested platforming at Queen Street isn't valid, however a brief look sees what looks like an easy solution. Conflicts with 5N46 turnback ECS at Dunblane. 2N43 arrives at 2043, forming 5N46 departing 2102. Cannot move to Platform 1 as in previous cases since this is occupied by the 2P65 (arr 2036)/5P92 (dep 2051) connection. Conflicts with 5P92 performing RM at Dunblane Signalbox on the ML (stops 2052H-2055 whilst new service is timetabled to depart Dunblane at 2051). Could resolve by departing 5P92 much earlier (e.g. 2036), allowing it to complete its RM before new service departs Dunblane and allowing the 2N43/5N46 to move across to platform 1. Conflicts with 2J54 at Greenhill Lower Jn (emerges at 2029H) – resolved by speeding up new service to run sufficiently ahead by populating passing times in this area	
Glasgow 21:11	Can depart from platform 1 at Queen Street. Small conflicts (runs too close behind) 5T40 at Cowlairs Passenger Loop – resolved by populating a suitable passing time. Conflicts with 5P94 performing RM at Dunblane Signalbox on the ML (stops 2147H-2150H, whilst new service is timetabled to depart Dunblane at 2151). Could resolve by departing 5P94 earlier from Dunblane, allowing it to complete its RM before new service departs Dunblane. Conflicts in the south end throat at Perth (dwell 2219-20) with southbound 1T54 (dwell 2214-16). Could be resolved by routing 1T54 via Up Dundee Loop.	* Could be resolved by holding new service at Dundee to follow 1A97 towards Arbroath (hold new service in P4 and divert 1A97 through P1 on bi-di line? It looks possible to follow 1A97 and clear the main line before being run down by

Service (departure)	Conflict	Comment
	Conflicts (gets run down) with 1A97 between Brought Ferry and Carnoustie. *	1A95. This would require retiming into a path 10mins later from Dundee (dep 2259) Worst case this service will need to dwell until approx 23:10 and follow 1A95. Similar situation to the 19:11 ex Glasgow, above.

TABLE 2   PACKAGE 1 - PHASE 2 SOUTHBOUND SERVICES (GLASGOW - PERTH WITH TWO HOURLY EXTENSION TO ARBROATH)

Service (departure)	Conflict	Comment
Arbroath 07:45 extended from Dundee to Glasgow	SRT problems between Perth and Croy. Conflicts in the south end throat at Perth (dwell 0840-41) with 1A51 travelling in the opposite direction (dwell 0841H-43H) Can arrive into platform 6 at Queen Street and connect to 1011 departure	
Perth 09:37	Conflict at Cowlairs Passenger Loop with 5R05 (dwell 1040-40H). Could be resolved by running ECS earlier and omitting 30s dwell. Conflicts with 5N42 turnback service performing RM at Dunblane signalbox. Could be resolved by running ECS out later. Conflicts in the south end throat at Perth (dep 0937) with 1A53 (dwell 0938H-40). Could resolve by departing new service 2mins earlier or 2mins later (is possible due to SRT slack between Gleneagles and Blackford). Can use platform 6 at Queen Street and connect to 1111 departure.	
Arbroath 09:44	Minor (6 sec) conflict in the south end throat at Perth with 1A57. Could resolve by routing 1A57 via Up Dundee Loop. SRT issue between Arbroath and Carnoustie (MRTech 364s, SchedRT 300s) * Can move to platform 2 at Queen Street and connect to 1211 departure	* Suggest retime 1 minute earlier from Arbroath. (alternative of one minute later to Perth is less appropriate)
Arbroath 11:44	Conflict at Carmuirs West Jn with 6S36 (passes 1323). Could resolve by retiming freight to pass earlier at 1321H using slack in SRTs and adding a passing time of 1323H for the new service. SRT issue between Arbroath and Carnoustie (MRTech 364s, SchedRT 300s) *	* Suggest retime 1 minute earlier from Arbroath. (alternative of one minute later to Perth is less appropriate)

Service (departure)	Conflict	Comment
	Can use platform 7 at Queens Street and connect to 1211 departure.	
Perth 13:37 (from Inverness)	Conflicts with 5N38 turnback service performing RM at Dunblane signalbox. Could be resolved by running ECS out later. Can move to platform 1 at Queen Street and connect to 1511 departure	
Arbroath 13:44	Severe conflicts with 2W62 (ANSL-GLGQHL) – both on the same path from Cowlairs South Jn into Queens Street. * Conflict at Greenhill Lower Jn with 6D18 (passes at 1626) – would be best resolved by adding a passing time to allow new service to run sufficiently ahead of freight (if ran behind freight would conflict with 1R55 afterwards). SRT issue between Arbroath and Carnoustie (MRTech 364s, SchedRT 300s). # No available platform and no obvious connection at Queen Street. *#	Occurs because 2W62 is off normal pattern of Anniesland arrivals at xx:41. Presumably to enable running of 5R28 from Eastfield. Opportunity exists to retime so as to accommodate each service. The new service has enough SRT slack to enable a 1543 arrival. 2W62 could then be pathed 1min later into GLGC (1546 arrival)? 3min headway is ROTP compliant. In any case there will need to be a re-jigging of diagrams which could alter ecs workings . # Suggest retime 1 minute earlier from Arbroath. (alternative of one minute later to Perth is less appropriate) *# Connection is to 16:11

Service (departure)	Conflict	Comment
		departure, currently formed ecs from Eastfield. (5A73, arr GLGQHL 15:09). Can connect to 1611 departure in platform 6
Perth 15:37 (from Inverness)	Re-platforming required at Queens Street * Conflicts with 5N38 turnback service performing RM at Dunblane signalbox - arrives Dunblane P3 at 1606, new service dwells at P3 between 1605-06. Could be resolved by running ECS out later. Severe conflicts (is in the same path) with 5N75 (FALKRKG-GLGQHL) from Carmuirs West Jn to Cowlairs West Jn (appears to be sufficient white space for 2 paths if appropriately timed). Subsequently, the new service runs into the same path as 2W66 from Cowlairs West Jn into Queen Street #	* Needs to form 17:12 existing service currently operated by unit arriving 15:58 from Cumbernauld. Can connect to 1712 departure in platform 4. # Similar to 13.44 issue, although less obvious in this instance why 2W66 cannot arrive at 16:41 as it does on SO. Could then run 5N75 to arrive 1644 (dep GRNGMTJ 1615H, then populate 1618H, 1620, 1623, 1624H, 1628H, 1631H, 1634, 1639, 1640, 1644), and new service to arrive 1647 (populate 1627H at GNHLUJN and 1639H at BSHB), ahead of 1R57 arriving 1651.

Service (departure)	Conflict	Comment
Arbroath 15:54 extended from Perth to Glasgow	Opposing conflict between Barnhill and Perth with 1A73 (dep Perth 1638). To resolve would have to run new service into Perth to arrive later. SRT issue between Arbroath and Carnoustie (MRTech 364s, SchedRT 300s).*	* Suggest retime 1 minute earlier from Arbroath. (alternative of one minute later to Perth is less appropriate)
Perth 17:37 (from Inverness)	Conflicts in the south end throat at Perth (dep 1737) with 1A77 (dwells 1737H-39). Could resolve by departing new service 1min later (would involve stopping slightly later at Gleneagles but could use SRT slack between Gleneagles and Blackford to pass Blackford on original time). Conflict at Carmuirs West Jn with 6D68 (passes ~1823). Could resolve by retiming freight to pass earlier/later. Can arrive into platform 7 at Queen Street and connect to 1911 departure.	
Arbroath 17:40	Conflict at Cowlairs Passenger Loop with 5R79 * Small (5sec) conflict at Barnhill due to 1min junction margin with *NEW* 1712 Glasgow – Arbroath. SRT issue between Arbroath and Carnoustie (MRTech 364s, SchedRT 300s). The suggested platforming at Queen Street isn't valid, however a brief look sees what looks like an easy solution.	* ECS passes at 1940H crossing into Eastfields Depot, whilst new service passes at ~1941. Resolved by running ECS earlier out of Queen St.
Perth 19:37 (from Inverness)	Conflicts at Dunblane P3 with 2P90 due to 3min platform re-occupation. Conflicts (runs too close behind) 2P90 between Stirling and Larbert Jn. Could resolve by populating passing times to achieve sufficient headway behind 2P90 or utilise white space ahead of 2P90 in this section. Can arrive into platform 1 at Queen Street and connect to 2111 departure.	

Service (departure)	Conflict	Comment
Arbroath 19:40	Severe conflicts (in the same path) with 5N79 between Longforgan LC and Perth. Could resolve by removing slack and allowing new service to run sufficiently ahead of 5N79. Conflicts with 5L11 between Arbroath and Dundee - new service runs too close behind (1min headway at Carnoustie). Retime in a later path? * Conflict at Cowlairs South Jn with 5Y48 crossing onto Chord. SRT issue between Arbroath and Carnoustie (MRTech 364s, SchedRT 300s) # Can arrive into platform 3 at Queen Street.	* 5L11 would not run as it is the ecs off 1L11 Edinburgh – Carnoustie which we have replaced between Dundee and Carnoustie, and which will therefore terminate at Dundee. #Suggest retime 1 minute earlier from Arbroath. (alternative of one minute later to Perth is less appropriate)
Perth 21:37 (from Inverness)	Conflicts with 5N48 turnback service performing RM at Dunblane signalbox - arrives Dunblane P3 at 2207, new service dwells at P3 between 2205-06. Could be resolved by running ECS out later. Can arrive into platform 2 at Queen Street	
Arbroath 21:40	Conflicts in Perth platform 1 (dwells 2233-37) with 5L79 which stops in P1 from 2227 to 2310H. Also runs too close behind 5L79 on approach between Dundee and Perth * Conflicts with 1L10 departing Perth at 2238 until 1L10 diverges off at Hilton Jn # Conflicts (runs too close behind) 1T56 between Gleneagles and Blackford *# Conflicts with 5R06 (from Eastfield Depot) at Cowlairs South Jn. Could resolve by populating a passing time of 2340H at CWLRSSJ. Severe conflicts (on an identical path) with 2P96 (Dunblane-Haymarket) between Dunblane and Larbert. **	* Suggest 5L79 (described as 5P29 in diagrams) could run earlier or later between Dundee and Perth. It shunts at Perth to attach another unit, and is unlikely to dwell in the platform for the time described. Overall, I am sure there would be a fairly easy resolution to this – in extremis the unit could even be attached to our train between

Service (departure)	Conflict	Comment
		Dundee and Perth (or even Glasgow) if necessary.

1L10 is shown as a through service from Inverness, and would probably depart Perth earlier than 22:38.

*# 1T56 is shown diverted to Edinburgh, and does not run south of Hilton Jnc

** This train is already off pattern, and designed to connect out of 1T56. Our train is replacing 1T56 south of Perth (and is no longer through from Inverness). If a connection is still required, then this service will need retiming later. If not, it could run earlier in standard path leaving Dunblane 22:58. |

TABLE 3   **PACKAGE 2,3&4 - PHASE 2 NORTHBOUND SERVICES (GLASGOW – PERTH & PERTH - ARBROATH SHUTTLES)**

Service (departure)	Conflict	Comment
0645 Perth to Arbroath	No conflicts.	
0740 Perth to Arbroath	No conflicts.	
0845 Perth to Arbroath	The approximate headway between Perth and Dundee is 10 mins as it is Absolute Block (limiting section Barnhill to Errol 170 SRT is 8 mins). 1A51 departs Perth at 0843H, therefore earliest realistic departure from Perth is 0854 and arrival into Dundee at 0913, and arrival into Arbroath at 0936.	Check this is OK with 4A64.
Glasgow 08:11	As per Package 1	
0945 Perth to Arbroath & 1038 Arbroath - Perth	The approximate headway between Perth and Dundee is 10 mins as it is Absolute Block (limiting section Barnhill to Errol 170 SRT is 8 mins). 1A53 departs Perth at 0940, therefore earliest realistic departure from Perth is 0950 and arrival into Dundee at 1014, and arrival into Arbroath at 1035. This presents an issue with the return working which is currently scheduled to depart at 1038, with a shunt included for which 8 mins appears to be the minimum. This would give an earliest possible departure of 1043, giving a Dundee arrival time of 1104. Unfortunately there is a Aberdeen to King's Cross NXEC service utilising an HST booked to arrive at 1106. It would appear there has been an assumption made that the Arbroath to Perth train can use Platform 1N at Dundee with the NXEC service 'looping' around it to use Platform 1S. Platform 1S is not long enough to accommodate a 2+9 HST set as used by NXEC. Platform 4 can not be used to get out of this situation due to 1A57 calling 1100-1102. The solution therefore is that the Arbroath to Perth train has a standard 1 ½ minute dwell and continues to Perth out of pattern. However, in order for this to be valid the Arbroath to Perth train has to use Platform 1 from 1101 to 1102 $^1/_2$, requiring a departure of 1040 from Arbroath. In order to form this, the 0945 Perth to	Removal of Broughty Ferry stop

Service (departure)	Conflict	Comment
	Arbroath needs to arrive at Arbroath by 1032. The only obvious way to do that is for the Broughty Ferry stop to be omitted on the way to Arbroath in order to attain an earlier arrival time. Starting later from Arbroath and omitting the Broughty Ferry stop on the 1038 Arbroath – Perth does not solve the problem, as this train needs to be clear of Carnoustie before the NXEC service can depart Arbroath.	
Re-pathed 6A65 freight	Works pretty well, a bit tight with 5P32 ECS shunt at Dunblane but otherwise OK	
Glasgow 09:11	As per Package 1 but terminating at Perth	
1045 Perth to Arbroath	The approximate headway between Perth and Dundee is 10 mins as it is Absolute Block (limiting section Barnhill to Errol 170 SRT is 8 mins). 1A57 departs Perth at 1039, therefore earliest realistic departure from Perth is 1049 and arrival into Dundee at 1113, and arrival into Arbroath at 1136.	
1145 Perth to Arbroath	The approximate headway between Perth and Dundee is 10 mins as it is Absolute Block (limiting section Barnhill to Errol 170 SRT is 8 mins). 1A59 departs Perth at 1138, therefore earliest realistic departure from Perth is 1148 and arrival into Dundee at 1212, and arrival into Arbroath at 1235.	
Glasgow 11:11	As per Package 1 but terminating at Perth	
1245 Perth to Arbroath	The approximate headway between Perth and Dundee is 10 mins as it is Absolute Block (limiting section Barnhill to Errol 170 SRT is 8 mins). 1A61 departs Perth at 1237H, therefore earliest realistic departure from Perth is 1248 and arrival into Dundee at 1312, and arrival into Arbroath at 1435.	
Glasgow 12:11	As per Package 1	

Service (departure)	Conflict	Comment
1345 Perth to Arbroath	The approximate headway between Perth and Dundee is 10 mins as it is Absolute Block (limiting section Barnhill to Errol 170 SRT is 8 mins). 1A63 departs Perth at 1438H, therefore earliest realistic departure from Perth is 1449 and arrival into Dundee at 1513, and arrival into Arbroath at 1536.	
Glasgow 13:11	As per Package 1 but terminating at Perth	
14:45 Perth to Arbroath	The approximate headway between Perth and Dundee is 10 mins as it is Absolute Block (limiting section Barnhill to Errol 170 SRT is 8 mins). 1A63 departs Perth at 1538, therefore earliest realistic departure from Perth is 1548 and arrival into Dundee at 1612, and arrival into Arbroath at 1635.	
Glasgow 14:11	As per Package 1	
1525 Perth to Arbroath	I am assuming the unit for this train is being resourced by stepping up a unit from a Glasgow or Edinburgh to Perth local service, as the incoming unit from Arbroath does not arrive until 1533. I'm sure the plan was not to run the 1411 ex Glasgow as two units and split at Perth, one to Arbroath and one to Inverness isn't the plan; but just on the off chance this isn't possible due to platforming constraints at Perth.	Correct – assumed to use unit off Edinburgh – Perth, and arrival from Arbroath to return to Edinburgh
Glasgow 15:11	As per Package 1. 4S43 retimed 5 mins later. There are no issues caused by this retiming.	
1745 Perth to Arbroath	The approximate headway between Perth and Dundee is 10 mins as it is Absolute Block (limiting section Barnhill to Errol 170 SRT is 8 mins). 1A77 departs Perth at 1739, therefore earliest realistic departure from Perth is 1749 and arrival into Dundee at 1813, and arrival into Arbroath at 1836.	
Glasgow 17:11	As per Package 1	
Glasgow 19:11	As per Package 1. Conflicts (runs too close behind) 1A88 between Dundee and Monifieth. *	This arises because 1A88 calls at both Cupar and Leuchars and is therefore later than the standard

Service (departure)	Conflict	Comment
		pattern on arrival at Dundee. A possible option would be to omit the Cupar call. It looks possible to follow 1A88 and clear the main line before being run down by 1A89. This will require retiming our train to run 2:30 later from Dundee (dep 20:47) Worst case, our train will probably have to dwell at Dundee for quite some time to follow 1A89 at approx 21:08.
Glasgow 20:11	As per Package 1	
Glasgow 21:11	As per Package 1. Conflicts (gets run down) with 1A97 between Brought Ferry and Carnoustie. *	* Could be resolved by holding new service at Dundee to follow 1A97 towards Arbroath (hold new service in P4 and divert 1A97 through P1 on bi-di line? It looks possible to follow 1A97 and clear the main line before being run down by 1A95. This would require retiming into a path 10mins later from Dundee (dep 2259) Worst case this service will need to dwell until approx 23:10 and follow 1A95. Similar situation to the 19:11 ex Glasgow, above.

TABLE 4   PACKAGE 2,3&4 PHASE 2 PHASE 2 SOUTHBOUND SERVICES (GLASGOW – PERTH & PERTH - ARBROATH SHUTTLES)

Service (departure)	Conflict	Comment
Arbroath 07:45 extended from Dundee to Glasgow	Same as package 1. Connection at Arbroath requires shunting move of incoming service.	
Arbroath 08:40 (forms Perth 09:37)	Conflicts (runs too close behind) 1T10. Retiming to stop Carnoustie at 0847-48 would resolve. Conflicts at Dundee platform 1 (dwell 0900-08) with 1E10 (dwell 0905-07H). Insufficient platform length to bring 1E10 HST into platform 1S via Up Through loop whilst new service waits in platform 1N. Cannot move either to platform 4 due to 1A51 (dwell 0902H-04H). Suggested solution involves 1 min dwell at Dundee (0900-01), then run ahead of HST, arriving earlier at Perth at 0926.	
Perth 09:37	Same as package 1.	
Arbroath 09:44	Same as package 1.	
Arbroath 10:38	Conflicts at Dundee platform 1 (dwell 1059-1108) with 1E14 (dwell 1105-07H). Insufficient platform length to bring 1E14 HST into platform 1S via Up Through loop whilst new service waits in platform 1N. Cannot move either to platform 4 due to 1A57 (dwell 1100-02). Suggested solution involves 1040 departure from Arbroath (see above), 1 min dwell at Dundee (1101-02), then run ahead of HST, arriving earlier at Perth at 1127. Connection to 1145 Perth departure requires shunting move from P1 to P2 via Up Dundee Loop.	
Arbroath 11:44	Same as package 1.	

Service (departure)	Conflict	Comment
Arbroath 12:46	No conflicts. Should be able to depart on time despite the possible later arrival of the incoming service. Connection to 1345 Perth departure requires shunting move from P1 to P2 via Up Dundee Loop.	
Perth 13:37 (from Inverness)	Same as package 1.	
Arbroath 13:44	Same as package 1.	
Arbroath 14:46	Minor (3 sec) conflict at Barnhill due to 1min junction margin with *NEW* 15:25 Perth – Arbroath (1528 vs 1529). Should be able to depart on time despite the possible later arrival of the incoming service. No obvious connection at Perth (1533 arrival).	
Perth 15:37 (from Inverness)	Same as package 1.	
Arbroath 15:54 extended from Perth to Glasgow	Same as package 1.	
Arbroath 16:34	No conflicts. Connection to 1745 Perth departure requires shunting move from P1 to P2 via Up Dundee Loop.	
Perth 17:37 (from Inverness)	Same as package 1.	
Arbroath 17:40	Same as package 1.	

Service (departure)	Conflict	Comment
Arbroath 18:44	No conflicts.	
Perth 19:37 (from Inverness)	Same as package 1.	
Arbroath 19:40	Same as package 1.	
Perth 21:37 (from Inverness)	Same as package 1.	
Arbroath 21:40	Same as package 1.	