Our Ref: D2009/57964

26 February, 2010

Mr Grant McBride
Chair
Public Accounts Committee
Legislative Assembly
NSW Parliament
Macquarie Street
**SYDNEY  NSW  2000**

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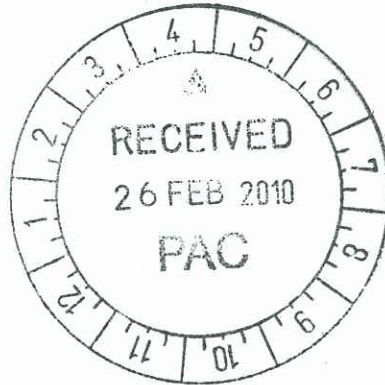
Dear Mr McBride

**Re  Signalling Strategy**

I refer to your letter of 3 September 2009 in relation to the RailCorp Signalling Strategy and my subsequent letter of 28 October 2009.

In this correspondence, clarity was requested on whether the signalling system and the associated planned works will support the State Plan growth targets.

As previously advised RailCorp's Signalling Strategy has been designed to support timetable changes up to 2016, consistent with achieving the 2016 State Plan targets.

RailCorp has updated it's strategy and produced the attached "Signalling System Future Capacity Plan" to demonstrate how this is being achieved.  I am sure you will find that this document highlights that RailCorp has an extensive plan for Signalling upgrades to support the growth of the rail system.

The NSW Government announced the Metropolitan Transport Plan 2010 on 21 February, 2010.  Whilst the Metropolitan Transport Plan projects have not specifically been identified within this document, this increase in signalling capacity supports the projects and optimizes the capacity of the system.

Yours sincerely

**Rob Mason**
Chief Executive Officer

D2010/8197

# Summary Report

## Signalling System Future Capacity Plan and Asset Condition Programs



Version 1.3
26-02-2010

CountryLink  CityRail  **RailCorp**

Summary Report – Signalling System

Future Capacity Plan & Asset Condition Programs

D2010/8197

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## Document Control and Custodianship

| Publication of Version 1.3 | Date | Signature |
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| Prepared and Endorsed by – refer to Sign off Sheet document reference D2010/ 9401 | 22/2/2010 | Refer to Sign Off Sheet |
| Approved by : Gavin Campbell<br>GGM Asset Operations Group | 26/2/2010 | *[signature]* |
| Approved by : Ian McCullough<br>GGM Engineering & Projects | 26/02/2010 | *[signature]* |
| Approved by: Vivienne King<br>GGM Strategy & Service Development | 26/2/10 | *[signature]* |

**Document Custodian –**

Asset Planning Manager, Asset Planning

Asset Planning & Performance, Asset Operations Group

RailCorp

## Version Control

F2010/3412    D2010/8197

| Version | Change From Previous | Date | Comment |
|---|---|---|---|
| 1.0 | | 19/2/2010 | |
| 1.2 | Review of CE Signals & Control | 22/2/2010 | |
| 1.3 | Review of GGM E&P | 26/2/2010 | |

## Due Date for Review

| Due Date Interval | Next Version | Nature of Review | Date Review Completed | Version Published |
|---|---|---|---|---|
| 12 months | 2.0 | Annual scheduled review | | |
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D2010/8197

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# Table of Contents

## Introduction

The NSW State Government announced the Metropolitan Transport Plan 2010 on 21 February 2010. Whilst the Metropolitan Transport Plan Projects have not specifically been identified within this document the asset plans support the Projects, and optimise the capacity of the existing RailCorp network.

RailCorp's current signalling upgrade program consists of both Capital and Major Periodic Maintenance (MPM) projects. These projects are designed to enhance system capacity by enabling up to 20 trains per hour to operate in peak periods on designated parts of the network, as well as supporting the operation of freight and CountryLink trains on mixed traffic corridors.

Future timetables have been developed to identify future capacity pinch-points which would constrain the availability of peak hour capacity. The signalling upgrade program considers these capacity pinch-points and ensures signalling design specifications meet future operating requirements.

RailCorp's immediate asset plans have been designed to support timetable changes up to 2016, consistent with achieving the 2016 State Plan targets.

RailCorp has adopted a systems engineering approach to system capability growth where future timetables have been analysed to identify asset requirements. The rail Capital and Major Periodic Maintenance Programs are focused on optimising network capability and asset condition to meet projected demand. Assets are upgraded to support a total corridor completion strategy matched to timetable change events. This means:-

- Infrastructure growth program increases route capability (the number of trains per hour).

- Signalling program provides for the increased route capability in terms of both capacity and control flexibility and resilience.

- Rollingstock program provides additional trains to increase service levels.

- Electrical program provides power to support additional trains.

- Stabling program provides storage for trains to be stabled overnight and between peak periods.

- Maintenance facility program provides modern fleet support facilities.


Traffic levels beyond 20 trains per hour in the core CBD area are constrained by track capacity, and by dwell times at stations such as Town Hall. These type of stations have the challenges of constrained platform space and limited vertical passenger movement (lifts and escalators).

Traffic levels beyond the 20 trains per hour into the CBD will require added track, platforms and passenger circulation areas at stations.

# 1. Signal Asset Summary

Signal Functional Specifications for future projects and/or upgrades are reviewed and approved on a multifunctional basis to ensure that safety, functionality and capacity are specified in the schemes development phase. RailCorp has a Signalling and Control Systems Asset Strategy which highlights the major issues that are for consideration and outlines the various strategies, projects and programs that are currently in place with respect to maintenance and upgrades whilst taking into account emerging technologies. This document provides a summary of the signal asset programs addressing both future capacity and asset condition-led renewals. A summary of both the Capital and Condition Based Projects is included in Appendix 1, and the nature of the projects by type is outlined below.

## 1.1 Timetable (Growth)

This program comprises signalling upgrades to support future capacity requirements. It also provides improvements in signal asset condition.

Where RailCorp plans an increase in services to provide for growth, signal system capacity is reviewed. If required upgrades, are specified to ensure that the system allows for future growth whilst maintaining or improving reliability.

## 1.2 Resignalling (condition based)

This program comprises signalling upgrades to improve asset condition and network reliability.

This program supports the Chief Engineer's Asset Integrity Report. Investments are primarily targeted at addressing integrity and performance issues. While upgrades are carried out for asset condition purposes the Signalling system capacity is reviewed and enhanced to allow for planned future growth if required.

## 1.3 Stabling (With Resignalling and Remodelling)

This program provides upgraded and improved stabling arrangements to allow for specified fleet size and train length.

Remodelling of part of the railway network is the process of redesign of the track layout to support current fleet requirements and operational practices. This can particularly impact junction areas and arrangements for efficient access into and out of stabling and maintenance areas. Generally remodelling necessitates resignalling to provide for efficient train movements over the revised track layout. As an example, the Emu Plains stabling projects comprises provision of new stabling facilities at Emu Plains, remodelling of track facilities at Penrith (where trains are currently stabled) and Emu Plains, and resignalling of this complete area.

## 1.4 Maintenance Centres

This program supports growth in services by accommodating maintenance of the increased Rollingstock fleet.

The principal example of this is the new Auburn Maintenance facility built to service the new Waratah fleet (626 cars). The Waratah fleet replaces current non air conditioned stock and provides additional trains for growth. RailCorp is investing in the Lidcombe to Granville Corridor upgrade which includes remodelled entrances to the Auburn Maintenance facility and provides new signalling throughout the corridor. (The Auburn facility includes new signalling to control movements within the facility itself and to interface efficiently to operations on the network)

## 1.5 Control Automation Program

This program provides incremental centralisation of signalling control and responds to Recommendation 38 of the Glenbrook Special Commission Inquiry.

Migration from distributed control centres to centralised control provides for more efficient operation of trains overall. Benefits include provision of Automatic Route Setting. This can act to increase an operators 'span of control' (efficiency) and to reduce risk of human error in routing trains on their correct path (improved on–time running).

## 1.6 Automatic Train Protection – Level 1 ETCS

This program provides for implementation of the European Train Control System (ETCS) at level 1 to provide Automatic Train Protection (ATP) functions and responds to Recommendation 32 of the Waterfall Special Commission Inquiry.

ETCS provides for continuous supervision of train movement against a permitted speed envelope and thus provides protection (ATP) against driver error or incapacitation. In event of absent or unsatisfactory response from the driver, system intervention results in train brake application to achieve a 'safe state'. Operational procedures govern subsequent actions to continue the train movement. At 'level 1' the train receives signalling information on a discontinuous basis from active track equipment (typically near to signals).

At 'level 2' the train receives signalling information on a continuous basis via GSM-R data radios. Level 2 was recommended by the Waterfall Special Commission as it potentially supports more efficient operation than level 1 due to the continuous data exchange with the signal control system. (Refer to specialist literature for a deeper insight as this subject is complex both technically and operationally)

Currently planning for ATP has been based on level 1 implementation only. It is expected that work will also progress in parallel to assess the efficiency benefits potentially available from continuous data exchange between train and track.

In certain corridors (i.e. Kiama to Bomaderry which is electric train staff) implementation of ETCS will require resignalling.

Efficient implementation of ETCS is also expected to trigger progressive re-locking (upgrade from relay to electronic interlocking) of the major Sydney signal box control area. This activity would be necessitated to a similar timescale to facilitate track change associated with Metropolitan Transport Plan (2010).

When all passenger trains operating on an ETCS–equipped route have been ETCS fitted, it will be feasible to remove trainstop installations on that route. These are a major source of vulnerability to vandalism such that benefits will be realised in terms of on time running and maintenance staff safety.

## 1.7 Freight Projects

This program supports selective separation of freight operations from passenger services through grade separated junctions and additional track.

Projects include SSFL and NSFL. These projects necessitate upgrade to Signalling systems. Such upgrades are designed to meet planned operational needs for both passenger and freight traffic.

## 2.    Future Capacity

The Rail Clearways Program and the Rollingstock PPP (new Waratah trains) program are enhancing rail capacity through the network and deliverability of services to the mission critical CBD area. The Rail Clearways Program enables signalled movement of up to 20 trains per hour on each of the six tracks through Town Hall. Note that there may be other constraints to the timetabling of such operations (such as dwell time variance). The Rollingstock Waratah (PPP) program will provide additional trains as well as enabling suburban sets to normally operate at their maximum length of 8 carriages. Further rollingstock and associated facilities would be required to fully utilise the train capacity unlocked by the Rail Clearways Program.

The Signalling program of works is designed as an integrated part of the investment.

The table below highlights central area infrastructure capacity increases per corridor provided by our investment programs. Actual rail traffic may operate less than the capacity available due to demand and rollingstock availability.

| Corridor | 2005 ♠ | 2006 ♣ | 2009 ♥ | 2010 ♦ | Future A (Approximately (circa 2012) | Future B (Approximately (circa 2014) | Future C (Approximately (circa 2017) |
|---|---|---|---|---|---|---|---|
| ESR / Illawarra | 13 | 16 | 16 | 18 | 18 | 18 | 20 |
| City Inner | 16 | 16 | 16 | 16 | 16 | 18 | 20 |
| City Outer | 16 | 16 | 16 | 16 | 18 | 18 | 20 |
| Up Shore | 15 | 15 | 20 | 20 | 20 | 20 | 20 |
| Down Shore | 20 | 20 | 20 | 20 | 20 | 20 | 20 |

♠ – Base infrastructure before commencement of the Rail Clearways projects

♣ –Macdonaldtown turnback and stabling; Bondi Junction turnback; ESR ATRICS

♥ – ECRL; Revesby turnback; Hornsby fifth platform; Berowra additional platform; Sefton Park Area Resignalling (SPAR); Liverpool & East Hills ATRICS; North Shore headways; Homebush Control Centre

♦ – Cronulla line duplication; Sutherland – Oatley – Loftus Area Resignalling (SOLAR)

Future A – Homebush & Lidcombe turnbacks, Richmond Line duplication to Schofields

Future B – Kingsgrove to Revesby Quadruplication; Glenfield Junction Remodelling; Emu Plains stabling; Auburn stabling; Lidcombe – Granville Corridor Upgrade Project (LGCUP)

Future C – Liverpool turnback; South West Rail Link (SWRL); Wollongong stabling

## 3.   Appendices

## Appendix 1 – RailCorp's Signalling Strategy

**RailCorp Signalling Strategy: February 2010**

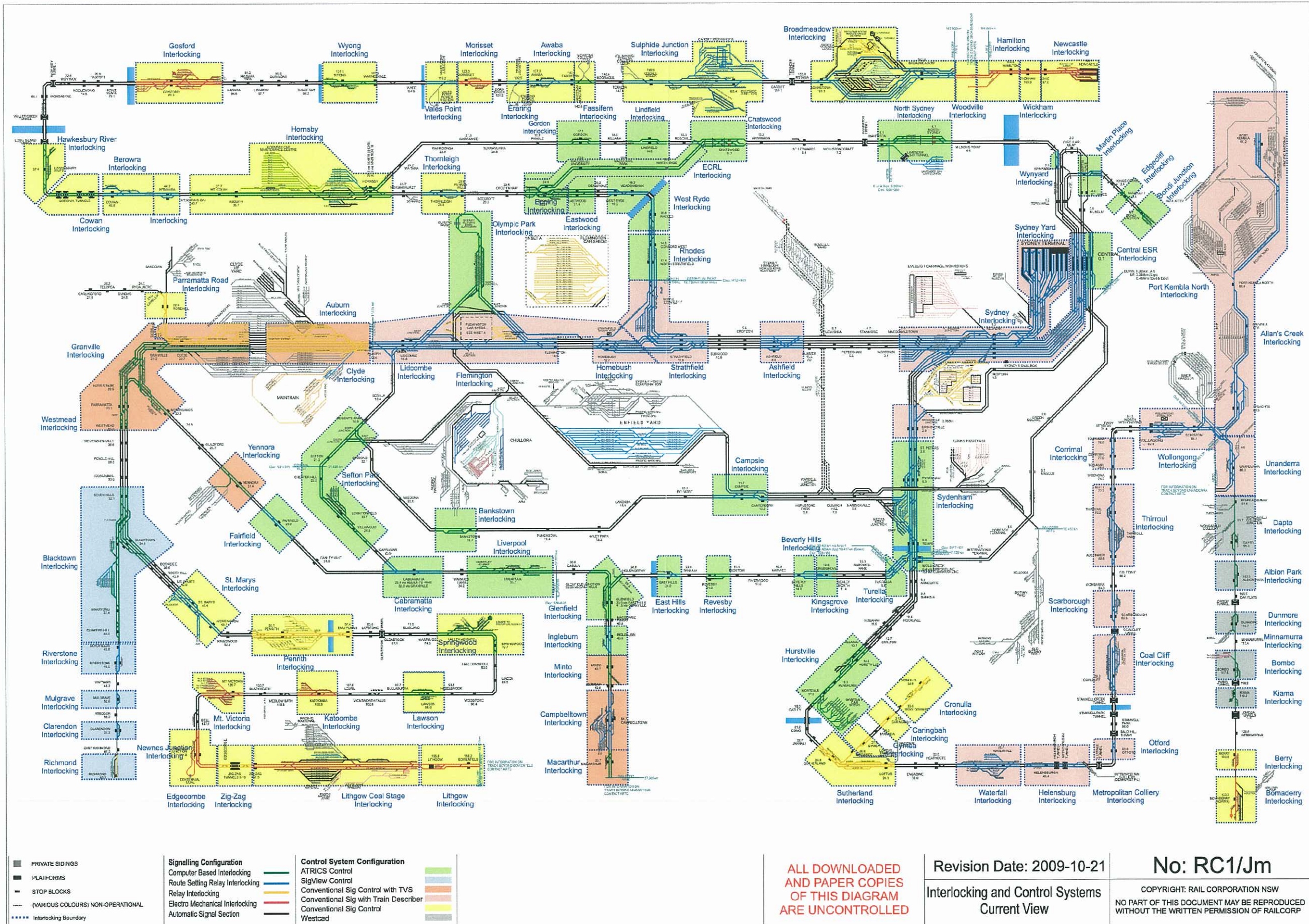| | Funding Source | Is it in the TAMP? | Commissioning Year | Asset Condition Requirement | Proposed Signalling/Control System Upgrades | Reliability Benefit | Growth (Capacity) Benefit |
|---|---|---|---|---|---|---|---|
| **(A) Timetable Projects (Growth)** | | | | | | | |
| **Timetable: 2005/6** | | | | | | | |
| Bondi Turn back: New Signalling and Control System | Cap | N/A | 2006 | No | Existing relay based interlocking was replaced with new computer based interlocking | Increased functionality to accommodate new capacity project | These projects contributed to the record 96.7% OTR figure year to date 2009-2010. Bondi Turnback has allowed an additional 3 trains per hour to service the Eastern Suburbs and Illawarra lines. Additional stabling capacity of 8 trains has been realised at Macdonaldtown. |
| McDonaldtown Turn back: New Signalling and Control System | Cap | N/A | 2005 | No | Existing relay based interlocking | Increased functionality to accommodate new capacity project | |
| **Timetable: 2009** | | | | | | | |
| Epping to Chatswood Rail Line: Chatswood Jct: New Signal and Control System | Cap | N/A | 2009 | No | Existing relay based interlocking was replaced with new computer based interlocking | Increased functionality to accommodate new capacity project | |
| Epping to Chatswood Rail Line: Epping Jct: New Interlocking and Control System | Cap | N/A | 2009 | No | Existing relay based interlocking was replaced with \new computer based interlocking | Increased functionality to accommodate new capacity project | These projects have delivered 100 extra weekday services including integrating the Macquarie Park area into the CityRail network, and increasing the peak western line services into the CBD. |
| Hornsby 5th Platform and Stabling: No change to Signal and Control System | Cap | N/A | 2009 | No | Computer based interlocking upgraded to include Platform 5 and new stabling | Increased functionality to accommodate new capacity project | |
| Revesby Turnback: New Signalling and Control System | Cap | N/A | 2009 | No | New computer based interlocking | Increased functionality to accommodate new capacity project | |
| **Timetable: 2010** | | | | | | | |
| Cronulla Line Duplication: New Signal and Control System | Cap | Yes | 2010 | Yes | Existing relay based interlocking will be replaced with new computer based interlocking. | Sutherland Signal interlocking built in the 1930s. Will be replaced by brand new Computer Signalling System. | Allows for an increase of Cronulla line services up to 8 per hour in the peak periods. |
| Sutherland/Oatley/Loftus Area Resignalling: New Signal and Control System | Cap | Yes | 2010 | Yes | Existing relay based interlocking will be replaced with new computer based interlocking. New control system with control back to the new Sydenham Control Centre | Sutherland Signal interlocking built in the 1930s. Will be replaced by brand new Computer Signalling System. | Signalling system designed to cater for future growth  New control system with control back to the new Sydenham Control Centre this provides automatic route setting |
| **Timetable (A): 2011/2012** | | | | | | | |
| Quakers Hill - Schofield Duplication: Schofields Jct: New Signalling and Control System | Cap | Yes | 2011 | No | Upgrading of existing Solid state interlocking (SSI) and new computer based interlocking | Increased functionality to accommodate new capacity project | Quakers Hill starting trains extended to Schofields. This creates additional capacity at Schofields |
| Homebush Turnback: | Cap | Yes | 2011 | No | Alter existing | Benefits through asset rationalisation | 2 additional peak trains on each of the South and Bankstown lines. |
| Lidcombe Turnback: | Cap | Yes | 2011 | No | Alter existing | Benefits through asset rationalisation | |
| **Timetable B: 2013/2014** | | | | | | | |
| Kingsgrove - Revesby Quadruplication: New Signal System | Cap | Yes | 2013 | No | Existing relay based interlocking will be replaced expanded computer based interlocking | Increased functionality to accommodate new capacity project | 2 additional peak trains per hour. Reduced journey times for Campbelltown. Greater customer amenity for interchange. Increased reliability leading to fewer short terminated trains. |
| Liverpool Turnback: New Signal and Control System | Cap | Yes | 2014 | Yes | The Liverpool Interlocking was brought into use on the 21 December 1992, as an SSI signalling system. Interlocking upgrade to computer based interlocking. Power Supply Upgrade 415V, LED signal upgrade all part of project. | Increased functionality to accommodate new capacity project and operational flexibility | Increased reliability, removing timetabling constraint of Bankstown line trains through removing nodal linkages with South line trains |
| **Timetable C: 2016/2017** | | | | | | | |
| SouthWest Rail Link/Glenfield Junction: New Signal and Control System | Cap | Yes | 2016 | No | Upgrade from SSI Interlocking to computer based interlocking. New Air Supply system. New Power Supply Upgrade to 415V. Upgrade of all points to EP, Inbearer. All Signals LED. | Increased functionality and Operational flexibility. Improvements to Power Supply reliability. | Greater reliability and increased sectorisation. Allowing for increased service levels to be achieved at a later stage when demand requires. |
| Macarthur Turnback - New Signal and Control System | Cap | Yes | 2016 | No | Upgrade version of interlocking configuration | Increased functionality and Operational flexibility. | |
| Cabramatta Turnback - New Signal and Control System | Cap | Yes | 2016 | No | Existing relay based interlocking will be replaced with new computer based interlocking | Increased functionality and Operational flexibility. Interlocking redundancy. | |

*Note: Work during the 2010 to 2016 period, necessary for subsequent timetable deliverables, is not highlighted here.*

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# RailCorp
## Signalling Strategy: February 2010

| | Funding Source | Is it in the TAMP? | Commissioning Year | Asset Condition Requirement | Proposed Signalling/Control System Upgrades | Reliability Benefit | Growth (Capacity) Benefit |
|---|---|---|---|---|---|---|---|
| **(B) Resignalling (Condition Based)** | | | | | | | |
| Auburn Resignalling and Remodelling | Cap | Yes | 2014 | Yes | Existing relay based interlocking will be replaced with by new computer based interlocking with EP points and trainstops New control system with control back to new Homebush Control Centre | Remove poor integrity and condition of signals, track and points. Improve reliability from new signal equipment. Interlocking redundancy. Ability to remote control and centralise. | Reduced journey times, allowance for increased services on West and South lines at a later stage when demand requires. |
| Clyde/Carlingford Resignalling and Remodelling | Cap | Yes | 2016/17 | Yes | Existing relay based interlocking will be replaced with by new computer based interlocking with EP points and trainstops New control system with control back to new Homebush Control Centre | Remove poor integrity and condition of signals, track and points. Improve reliability from new signal equipment. Interlocking redundancy. Ability to remote control and centralise. | Increased service frequency from 1 train per hour to 2 trains per hour |
| Kiama to Bomaderry Resignalling | MPM | MPM Program part of Opex Bid | Future Program | Yes | Remove mechanical signals and interlocking. | Remove poor integrity and condition of Staff Instruments and their transmission lines- Improve reliability from new signal equipment . | |
| Mt Victoria to Lithgow Resignalling and Remodelling | MPM | Maintenance Program | Future Program | Yes | Existing mechanical interlocking will be replaced with new computer based interlocking -Replace mechanical points | Remove poor integrity and condition of signals, track and points. Improve reliability from new signal equipment. Interlocking redundancy. Ability to remote control and centralise. | |
| Katoomba Resignalling and Remodelling | MPM | MPM Program part of Opex Bid | Future Program | Yes | Existing relay based and mechanical interlocking will be replaced with new computer based interlocking | Remove poor integrity and condition of signals, track and points. Improve reliability from new signal equipment. Interlocking redundancy. Ability to remote control and centralise. | |
| Broadmeadow to Wickham Resignalling | MPM | MPM Program part of Opex Bid | Future Program | Yes | Existing relay based and mechanical interlocking will be replaced with new computer based interlocking | Remove poor integrity and condition of signals- Improve reliability from new signal equipment . | |
| Wickham to Newcastle Resignalling and Junction Remodelling (Subject to review of Newcastle Line finishing at Wickham or Newcastle) | MPM | MPM Program part of Opex Bid | Pending outcome of Newcastle strategy | Yes | Existing power operated mechanical and relay interlocking will be replaced with new computer based interlocking | Remove poor integrity and condition of signals, track and points. Improve reliability from new signal equipment. Interlocking redundancy. Ability to remote control and centralise. | |
| Morisset to Vales Point Resignalling | MPM | MPM Program part of Opex Bid | Future Program | Yes | Existing mechanical interlocking will be replaced with new computer based interlocking | Remove poor integrity and condition of signals, track and points. Improve reliability from new signal equipment. Interlocking redundancy. Ability to remote control and centralise. | Reduction in operating headways for Coal trains and other freight traffic |
| **(C) Stabling (With Resignalling and Remodelling)** | | | | | | | |
| Emu Plains Stabling (New Signal and Control System) | Cap | Yes | 2014 | No | Existing relay based interlocking will be replaced with new computer based interlocking. Remote Control. | | New stabling allowing for growth in Western line services |
| Penrith Stabling (Decommission Existing Stabling and Resignalling) | Cap | Yes | 2016 | Yes | Existing relay based interlocking will be replaced with by new computer based interlocking. Remote Control. | Remove poor integrity and condition of signals- Improve reliability from new signal equipment . | |
| Auburn Stabling (Requires new Auburn and Clyde Resignalling and Control Systems) | Cap | Yes | 2014 | Yes | Scope to be defined. | | New stabling allowing for growth (20 trains) in South line services |
| Warnervale Stabling (New Signal and Control System) | Cap | No | Yet to be Programmed | No | New computer based interlocking installed | None | New stabling allowing for growth in Central Coast services. Together with station design allows Newcastle local services to connect with Sydney Bound Warnervale starting services. |
| Berowra Stabling (New Signal and Control System) | Cap | No | Yet to be Programmed | No | New computer based interlocking installed | None | |
| Mt Victoria Stabling (Requires new Mt Victoria Resignalling and Control Systems) | Cap | No | Yet to be Programmed | Yes | Existing relay based interlocking will be replaced with by new computer based interlocking. Remote Control. | Remove poor integrity and condition of signals- Improve reliability from new signal equipment . | |
| Wollongong Stabling | Cap | No | Yet to be Programmed | No | Currently route setting relay interlocking. Scope to be defined. | | New stabling allowing for growth in Illawarra line services |

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## Signalling Strategy: February 2010

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|---|---|---|---|---|---|---|---|
| **(D) Maintenance Centres (with new Signal and Control Systems)** | | | | | | | |
| Auburn Maintenance Centre (Requires new Auburn and Clyde Resignalling and Control Systems and Clyburn Jct) | Cap | Yes | 2010 | Yes | New computer based interlocking installed | None | New maintenance facility for 626 Waratah trains (132 for growth) |
| Cardiff: Sulphide Junction: New Layout and Signal System | Cap | Yes | 2011 | No | Existing relay based interlocking will be replaced with new computer based interlocking | Remove poor integrity and condition of signals- Improve reliability from new signal equipment . | Allows committed Waratah fleet to be delivered. |
| **(E) Control Automation Program** | | | | | | | |
| Waterfall: New Control System | Cap | Yes | Yet to be Programmed | No | No scope defined, possibly new interlocking/resignalling | To be developed | |
| Erskineville Junction: New Control System | Cap | Yes | Yet to be Programmed | No | No scope defined, possibly new interlocking/resignalling | To be developed | |
| City Circle: New Control System | Cap | Yes | Yet to be Programmed | No | No scope defined, possibly new interlocking/resignalling | To be developed | |
| Strathfield to McDonaldtown | Cap | Yes | Yet to be Programmed | No | No scope defined, possibly new interlocking/resignalling | To be developed | |
| Sydney Signal Box Area: New Control System | Cap | Yes | Yet to be Programmed | Yes | No scope defined, possibly new interlocking/resignalling | To be developed | |
| Strathfield Jct: New Control System | CAP | Yes | Yet to be Programmed | Yes | No scope defined, possibly new interlocking/resignalling | To be developed | |
| **(F) Automatic Train Protection** | | | | | | | |
| Automatic Train Protection - Level 1 | Cap | Yes | Progressive Delivery to 2020 | No | Introduction of European Train Control System Level 1. | Long term removal of trainstops when fleet is ATP enabled. | This is primarily a safety system. |
| **(G) Freight Projects with Major Signalling and Control System Changes** | | | | | | | |
| Southern Sydney Freight Line | Joint Federal/ State Capital | Yes | 2011 | No | Interface at Sefton no change to existing signalling system (CBI upgrade completed in 2006) | NA | Facilities freight trains (4/ per hour). Removes majority of South freight from RailCorp network, increasing South line capacity |
| Northern Sydney Freight Project - Stage 1 | Federal Funding | No | Yet to be Scheduled | No | Under Development | NA | Facilitates 4 Freight trains per hour for 20 hours per day. Increases North line capacity |

*Note: Investment in ATP will have an associated requirement to upgrade mechanical signalling areas to be ATP equipped.*

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## Appendix 2 – RailCorp's current Signalling and Control System Configuration

**Signalling Configuration**
- Computer Based Interlocking
- Route Setting Relay Interlocking
- Relay Interlocking
- Electro Mechanical Interlocking
- Automatic Signal Section

**Control System Configuration**
- ATRICS Control
- SigView Control
- Conventional Sig Control with TVS
- Conventional Sig with Train Describer
- Conventional Sig Control
- Westcad

- PRIVATE SIDINGS
- PLATFORMS
- STOP BLOCKS
- (VARIOUS COLOURS) NON-OPERATIONAL
- Interlocking Boundary

Revision Date: 2009-10-21

Interlocking and Control Systems
Current View

No: RC1/Jm

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**Appendix 3 – Automatic Train Protection Level 1 and Level 2**

# ATP Level 1 - European Train Control System 1 (ETCS 1)

Uses trackside and on-train equipment to identify some potentially unsafe conditions, and if necessary the on-train equipment will warn the Driver, and slow or stop the train before the conditions can become dangerous. Four specific functions of the system are to:

- enforce track speed limits
- give Drivers advance notice about the track ahead, including signals at STOP
- prevent trains from approaching a signal at STOP at too great a speed
- prevent trains from passing the overlaps beyond signals at STOP.

- Overlay to existing signalling system
- Uses active balises to provide signalling data to the train
- Passive balises provide invariant route data to the train
- Lineside signals are usually retained

Conceptually introduction of ETCS represents a change from signal permissions based on route to signalling permission base on permitted speed and 'movement authority' – the distance limited to which the train is permitted to proceed
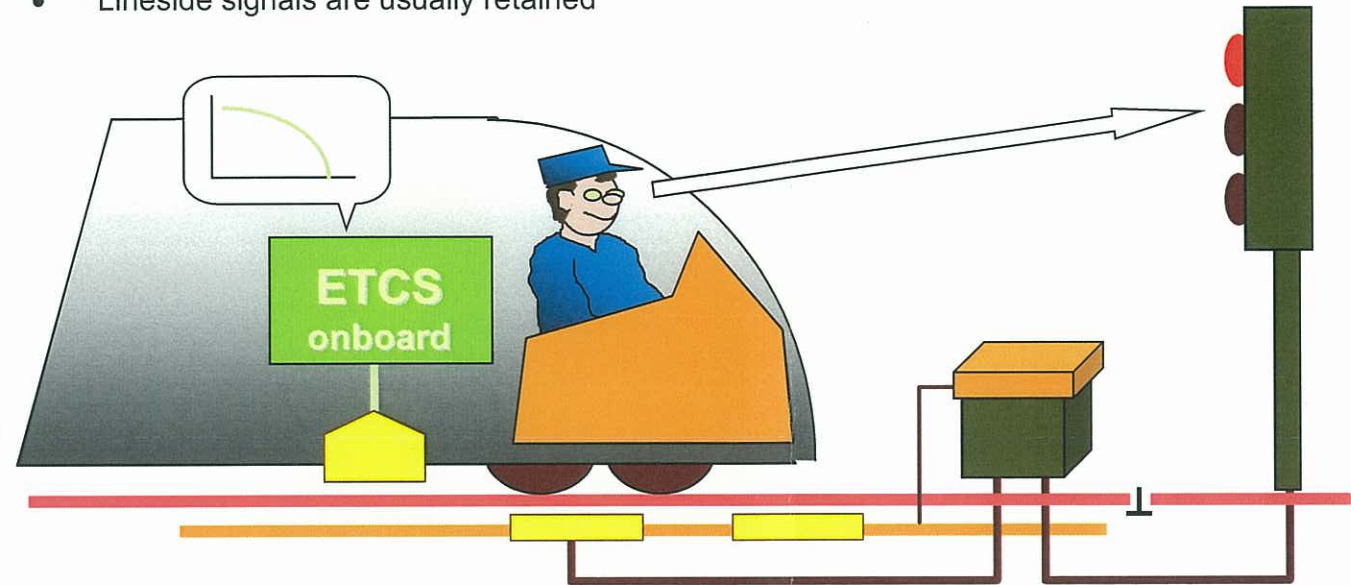
# ATP Level 2 - European Train Control System 2 (ETCS 2)

ETCS 2 provides the same safety benefits as ETCS 1. Access to continuous signalling data from the wayside enables train systems to respond more efficiently to changes in permitted speed and 'movement authority'. The effect is to permit greater capacity then level 1 systems under some conditions and subject to optimisation of track circuit arrangements to permit this.

Migration to ETCS 2 is a more significant step than that to ETCS 1 in terms of technical infrastructure and operational arrangements. There are added benefits and added risks to be managed.

- Overlay to existing signalling system
- Uses radio (GSM-R) to provide signalling data to the train
- Passive balises provide invariant route data to the train
- Lineside signals can be suppressed