

SECTION 2
LOCOMOTIVE OPERATIONS

WITHDRAWN

REFER ARTC ROUTE ACCESS STANDARD (RAS) GENERAL
INFORMATION AND APPENDIX E

📖 Marshalling of locomotives

Powering locomotives may be marshalled anywhere within a train. Powering locomotives within the train consist or at the rear of a train are called distributed power locomotives.

Up to five (5) locomotives may be marshalled together at the front of a train. The number of distributed power locomotives marshalled together within a train consist and/or at the rear of a train must not exceed the maximum horsepower limits specified for assisting (Banking) Locomotives.

Unless otherwise approved by the **Track Access Provider**, the maximum number of locomotives, which can be marshalled, together and powering at any given time is specified under **Multiple Locos** in the **Maximum Speed of Locomotives and Rolling Stock** table located in the respective Track Section Pages.

📖 Assisting (Banking) locomotives

Additional locomotives may be used to assist a train where there is insufficient train locomotive tractive effort to haul a train over the grade. Assisting locomotives may be attached to the front or rear of a train.

If the locomotives are attached at the front, the maximum number of powering locomotives specified under **Multiple Locos** in the **Maximum Speed of Locomotives and Rolling Stock** table located in the respective Track Section Pages, must not be exceeded, unless otherwise approved by the **Track Access Provider**.

If the assisting locomotives are attached to the rear of the train, the minimum allowable vehicle mass for vehicles in the trailing 1/3 of the train mass is given in the following diagram.

a.

MAXIMUM HORSEPOWER OF BANK LOCOMOTIVES = 4000	Minimum allowable vehicle mass 16 tonnes	LEADING TONNAGE	TRAIN LOCOS
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b.

MAXIMUM HORSEPOWER OF BANK LOCOMOTIVES = 8000	Minimum allowable vehicle mass 40 tonnes	LEADING TONNAGE	TRAIN LOCOS
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c.

MAXIMUM HORSEPOWER OF BANK LOCOMOTIVES = 12000	Minimum allowable vehicle mass 60 tonnes	LEADING TONNAGE	TRAIN LOCOS
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Notes:

1. In the case of multi-pack vehicles the minimum allowable vehicle mass shall be the gross mass divided by the number of platforms (decks).
2. Trains conveying road/rail vehicles (i.e. Rail compatible Road Trailers) must not be assisted in the rear without the specific authority of the **Track Access Provider**.
3. Low mass vehicles should be marshalled, where possible, towards the centre of the train consist.
4. After a bank locomotive has been detached from the rear of a train, an end of train marker, (EOTM) must be fitted to the end of the rear vehicle on the train.

📖 Distributed power

It is permissible to distribute locomotive power in the train consist. In addition to the locomotives at the front of a train, additional powering locomotives may be marshalled within a train consist or at the rear of a train. These additional locomotives may be crewed or be controlled from the leading locomotive through hard wiring as in the case of the XPT, or by remote radio control.

In the case of remote radio control, the operation must be sanctioned and approved by the **Track Access Provider**.

The train driver in the front locomotive must have full control of the automatic air brake throughout the train including the rear locomotive(s) and shall direct the driver of the distributed power locomotives, if crewed, when to apply and reduce power.

If the distributed power locomotives(s) are marshalled at the rear of the train, refer to **Assisting (Banking) locomotives** section for the minimum allowable vehicle mass for vehicles in the trailing 1/3 of the train mass.

4 wheel vehicle and vehicles with non-automatic couplers **must not** be included in a distributed power train consist forward of the distributed power locomotives.

The two red lights on the rear locomotive must be exhibited as tail lights to indicate the rear of the train. A flashing tail light (end-of-train marker) is not required.

Excessive Sanding

Locomotives that are applying excessive sand or sanding continuously must be stopped and the fault rectified or the sanding magnet valve isolating cock closed. The signaller/train controller must be advised.

If adhesion conditions require the use of sand, the sand equipment may be cut in and the train worked under block working conditions until the sand is again isolated. The signaller/train controller must be advised and be in agreement with this working.

De-sanding equipment

It is a requirement that all locomotives with sanding equipment and operating under power, be fitted with de-sanding equipment.

Locomotives not fitted with de-sanding equipment (identified in the Section 10 Locomotive and Rolling Stock Data pages by note m) or locomotives with inoperative de-sanding equipment, operating in track circuited areas, when operating as single units or as trailing units in a multiple unit consist must have their sanding equipment isolated.

Locomotive wheel spin

Rails can be severely damaged by uncontrolled wheel spin. All cases of uncontrolled wheel spin and/or rail burns must be reported to the signaller/train controller so that arrangements can be made to have the rails inspected to determine the extent of the damage.

When uncontrolled wheel spin is occurring on any locomotive in the consist, no more than three attempts may be made to move the train. If by the third attempt, the train still can not be moved and/or wheel spin continues to occur, the train must be assisted from the section.

Locomotive (s) dead attached or off line

Dead / off line attached locomotives may be marshalled anywhere within a train consist. Locomotives that are dead attached or off line must be included in the train load and for the purpose of train load calculations the live weight of the locomotive/s is multiplied by 1.1 (covers an increase in rolling resistance).

If the dead attached locomotives are coupled to the train locomotives, numbers 3 & 4 control air hoses must be coupled.

If the dead attached locomotives are marshalled in the train consist or at the rear of the consist, these locomotive(s) must be certified as having passed the brake system sensitivity part of the single car air test before being considered fit to be marshalled in that position.

Locomotive(s) which do not pass the sensitivity test cannot operate dead attached within the train consist or on the rear of the consist unless a crew person is available, to ensure the brakes release.

Marshalling of locomotives due to brake valve type

Unless otherwise approved, the following marshalling restrictions apply to locomotives due to the brake valve type on the lead locomotive.

Brake valve type	Marshalling requirement
A7-EL	Not to lead in more than a two locomotive consist. This restriction is due to the independent release on A7-EL brake valves not being relied upon to release the independent brake on the third or more locomotives.
B7 – EL, 26L, 30CDW or Epic	Must lead on multiple locomotive consists.

Mixing locomotives types

As each type of locomotive, when operating on the ruling grade and conveying its Full Sectional Load, can have different traction performance capabilities at the balancing speed, the mixing of locomotive types may result in one locomotive working excessively harder than the other/s.

To allow for this, where the loads for multiple unit mixed locomotives are not published in the **LOADS & CONDITIONS** table. The following method, unless approved otherwise below, shall be used for determining the Full Sectional Load of the locomotive consist. Add together each of the individual **FULL SECTIONAL LOADS** for the required section and reduce the total by 10%.

e.g. Lithgow to Mudgee:

81 + 44 class = 1131t + 615t = 1746t – 175t (10%) = 1571 tonnes

This rule will not apply when mixing the following classes of locomotives:

- a. 90, 81, 82, 80 and 48.
- b. 31, L and 830.
- c. 81, BL, DL, NR class locomotives (Refer to **Illawarra Section 2 Pt Kembla – Moss Vale** for exceptions)
- d. 42, 421 and GM.
- e. 43, 44, 44s and 45.
- f. 47, 48, 48s, 49, 830, KL, MM, PL and T.
- g. 44, 442, 422, 18 and 31, L
- h. 421 and 422
- i. CLP and CLF.
- j. G, X and T

Alternate methods of determining locomotive loads may be considered but must be sanctioned and approved by the **Track Access Provider** before use.

Multiple unit working of locomotives

The column associated with locomotives headed '**Multiple Loco Working**' shows the maximum number of locomotives that may run coupled on each relevant section of track.

Up to a maximum of **5** locomotives total can be marshalled at the front of a train. However, the number of locomotives that can be **powering** at any given time is indicated in the multiple working section on the respective **MAXIMUM SPEED OF LOCOMOTIVES AND ROLLING STOCK** page.

Dynamic / Regenerative braking restrictions

Dynamic / Regenerative braking is **not to be used** for the control of the train speed (that is dynamic brake must be used in conjunction with automatic train brake) in the following instances:

- (a) When more than three locomotives are marshalled on the front of the train and are powering.
- (b) Irrespective of the number of locomotives marshalled on the front of the train, if any empty vehicle or empty platform (in the case of multi pack vehicles) is marshalled with more than 2000 tonnes trailing that empty vehicle.

Locomotive categories

The following table lists approved locomotives in categories which indicate the locomotives load and speed.

NUMERICAL LISTING			
Loco type	Speed Category	Load Category	Horse-power
18	S7	L10	2400
22	S9	L10	2000
31	S2	L5	3000
42	S6	L12	1750
421	S9	L12	1800
422	S9	L10	2000
423	S11	L12	1500
43	S10	L12	1600
44	S9	L12	1800
44s	S10	L12	1600
442	S8	L11	2000
442s	S8	L11	2000
45	S9	L12	1800
45s	S9	L12	1800
47	S13	L13	1000
48	S13	L13	900
48s	S13	L13	900
49	S13	L13	875
73	S14	L14	650
80	S6	L9	2000
80s	S6	L9	2000
81	S5	L4	3000
82	S5	L3	3000
90	S1	L1	4000
600	S13	L13	900
830	S13	L13	900
900	S13	L13	900

LOAD CATEGORY		
Load Category	Locomotive type	Horse-power
L1	90	4000
L2	NR	4000
L3	82	3000
L4	81, AN, BL, G, GL	3000
L5	31,DL	3000
L6	ALF, CLF, CLP, L,	3000
L7	EL	2450
L8	C, Cs	3000
L9	80, 80s, X	2000
L10	18, 22, 422, HL, FL	2000
L11	442, 442s, JL	2000
L12	42, 421, *423, 43, 44, *44s, 45, 45s, 600, B, GM(12), S	1800
L13	47, 48, 48s, 49, 830, 900, GM(1), KL, MM, PL, #T	900
L14	73	650

SPEED CATEGORY		
Speed Category	Locomotive type	
S1	90	
S2	L, 31	
S3	C, Cs	
S4	NR	
S5	81, 82, ALF, ALN, BL, CLF, CLP, G, GL	
S6	42, 80, 80s, B, DL	
S7	18	
S8	442, 442s, 700, GM(1), GM(12), JL, S, X	
S9	22, 421, 422, 44, 45, 45s, 600, EL, FL, HL	
S10	43, 44s, 930	
S11	423	
S12	T	
S13	47, 48, 48s, 49, 830, 900, KL, MM, PL,	
S14	73	

ALPHABETICAL			
Loco type	Speed Category	Load Category	Horse-power
ALF	S5	L6	3000
AN	S5	L4	4000
B	S6	L12	1500
BL	S5	L4	3000
C	S3	L8	3000
Cs	S3	L8	3000
CLF	S5	L6	3000
CLP	S5	L6	3000
DL	S6	L5	3000
EL	S9	L7	2450
FL	S9	L10	2000
G	S5	L4	3000
GL	S5	L4	3000
GM(1)	S8	L13	1500
GM(12)	S8	L12	1750
HL	S9	L10	2000
JL	S8	L11	2000
KL	S13	L13	875
L	S2	L6	3000
MM	S13	L13	875
NR	S4	L2	4000
PL	S13	L13	900
S	S8	L12	1800
T	S12	L13	875
X	S8	L9	1800

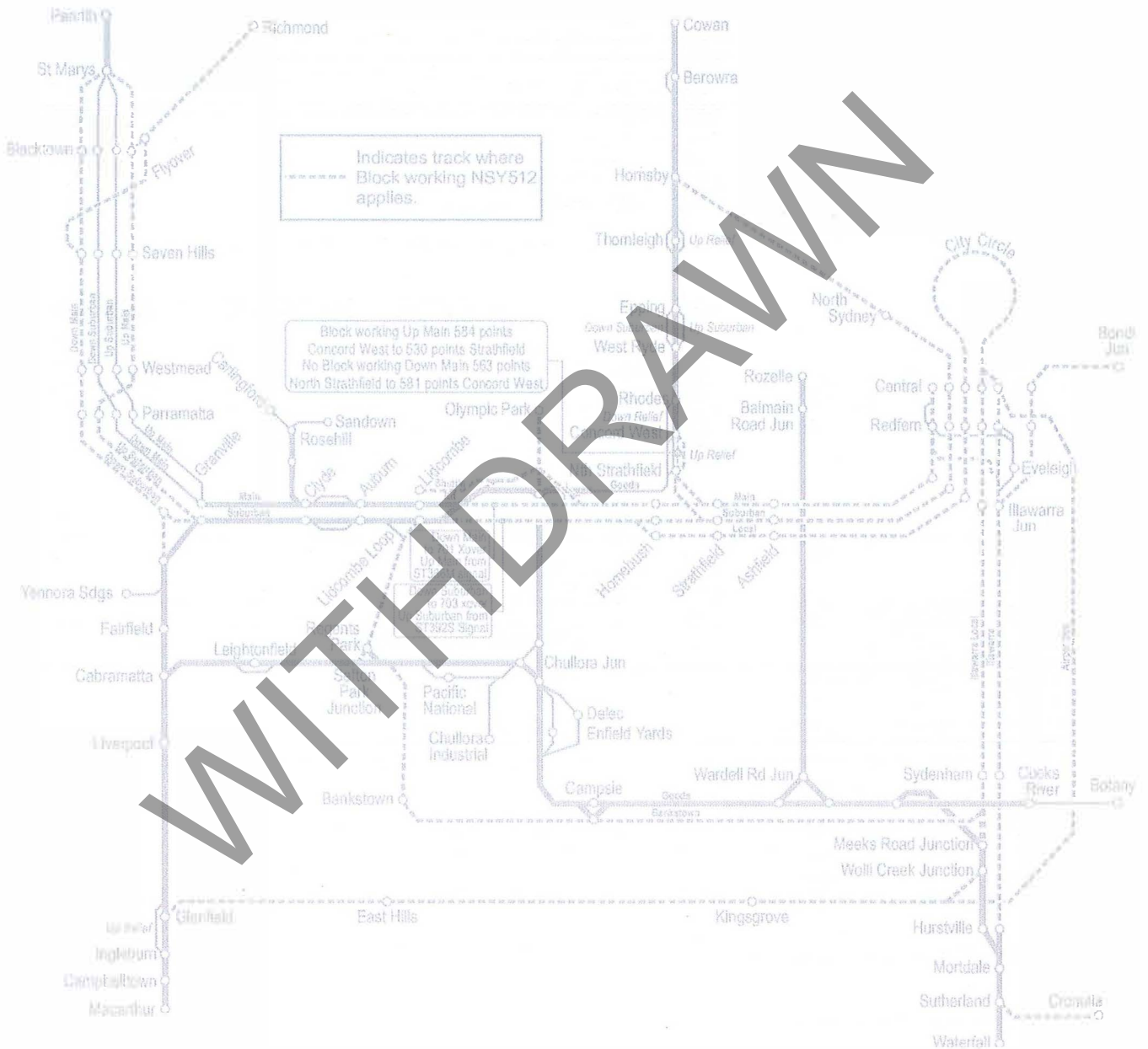
When a locomotive shown in the **LOADS AND CONDITIONS** section with an associated load, is unavailable, a superior or equivalent locomotive may be utilised for that load.

Locomotives that appear on the same line are deemed to be equivalent locomotives and can operate to the same loads.

When a superior locomotive has been selected, reference must be made to the **Maximum Speed of Locomotives And Rolling Stock Table** for the track section covering the intended area of operation, to check that the locomotive is approved to operate.

Block working of all classes of light locomotives

ALL classes of light locomotives (with the exception of electric locomotives and XPT power cars), when travelling as a single unit or as a double consist and operating over the track circuited lines as indicated below must be worked under block working conditions as shown in NSY512.



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