



MAIN ROADS Western Australia COALFIELDS HIGHWAY PROJECTS REVEGETATION PRESENTATION

*South West Region - Alan Grist, Project Manager,
Environment (September 2018)*

Environmental Policy STATEMENT

MAIN ROADS WESTERN AUSTRALIA manages the State's road network to provide safe and efficient road access that will enhance community lifestyles and support economic prosperity. We seek to achieve balanced and sustainable outcomes for the community. Responsible environmental stewardship in developing and maintaining the road network is critical to our success.

Principles

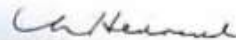
Main Roads is committed to:

- Protecting and enhancing the environmental values of road reserves;
- Minimising the impact on the natural environment of roads and road use; and
- Conserving natural resources and minimising energy consumption and waste.

Objectives

In applying these principles, Main Roads aims to:

- Fully satisfy all environmental legislation, Government Policy and, where specific legislation is lacking, uphold the spirit of the law;
- Implement, maintain and continually improve an effective environmental management system across Main Roads planning, business, project and management processes;
- Apply an approach of "avoid, minimise and mitigate", in order of preference, to the management of environmental impacts associated with road construction projects;
- Develop awareness of environmental management processes, standards and responsibilities among Main Roads' employees and contractor partners;
- Listen and be responsive to community and stakeholder views on environmental issues; and
- Set specific environmental objectives and targets relating to the key environmental aspects of Main Roads' activities, and measure and report progress in achieving these targets.



Menno Henneveld
Commissioner of Main Roads
June 2004

Protecting and enhancing
the environmental values
of road reserves

Minimising the impact on
the natural environment
of roads and road use; &

Conserving natural
resources and minimising
energy consumption and
waste.



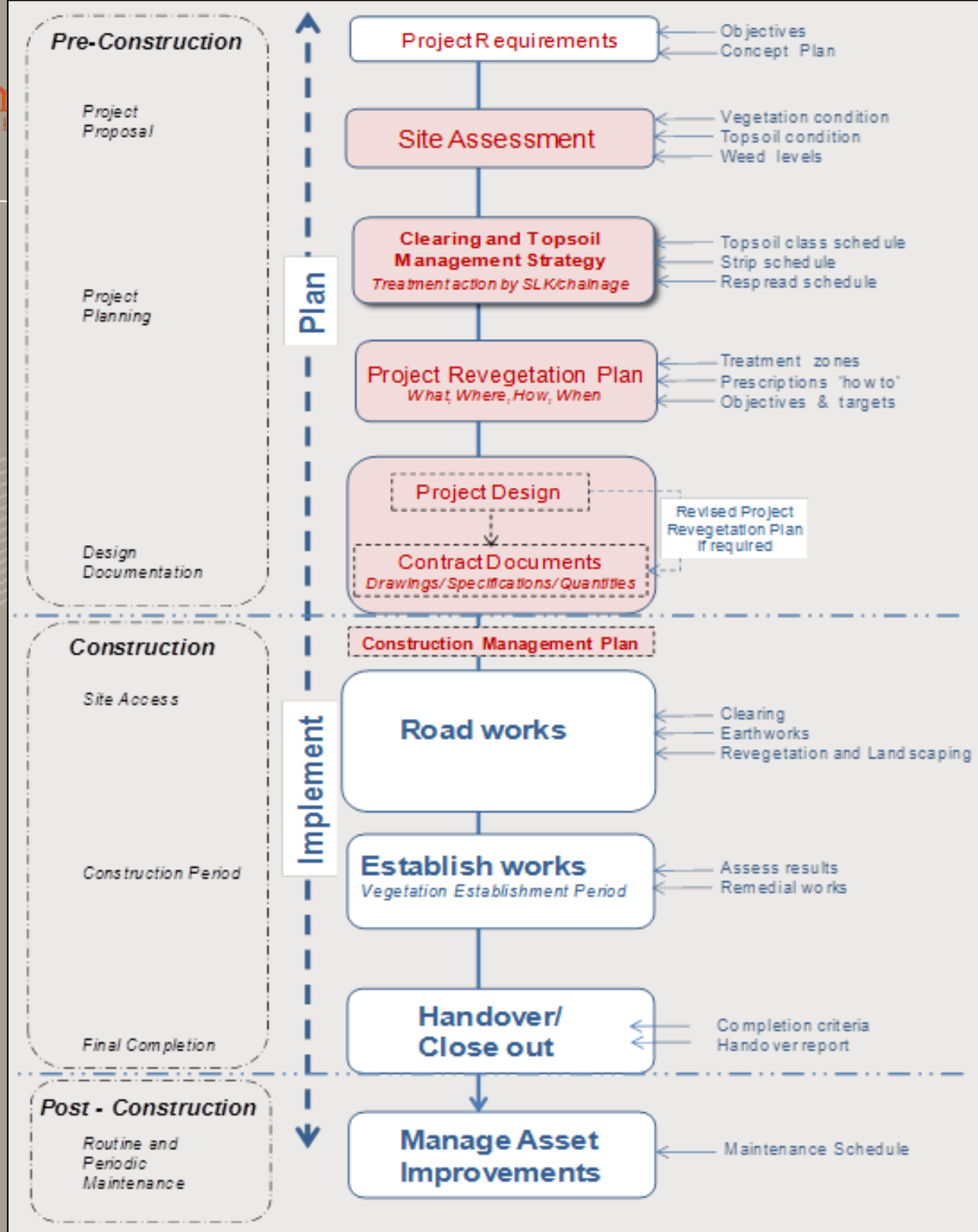
Aims for MRWA Revegetation

CONSERVATION OF INDIGENOUS VEGETATION

- Development of construction and maintenance techniques to support the conservation of existing natural vegetation.
- Implement work in compliance with Main Roads Dieback Policy.
- Management of rare and endangered flora (DRF) and fauna along road reserves in consultation with DBCA.

IMPLEMENT ROADSIDE REHABILITATION

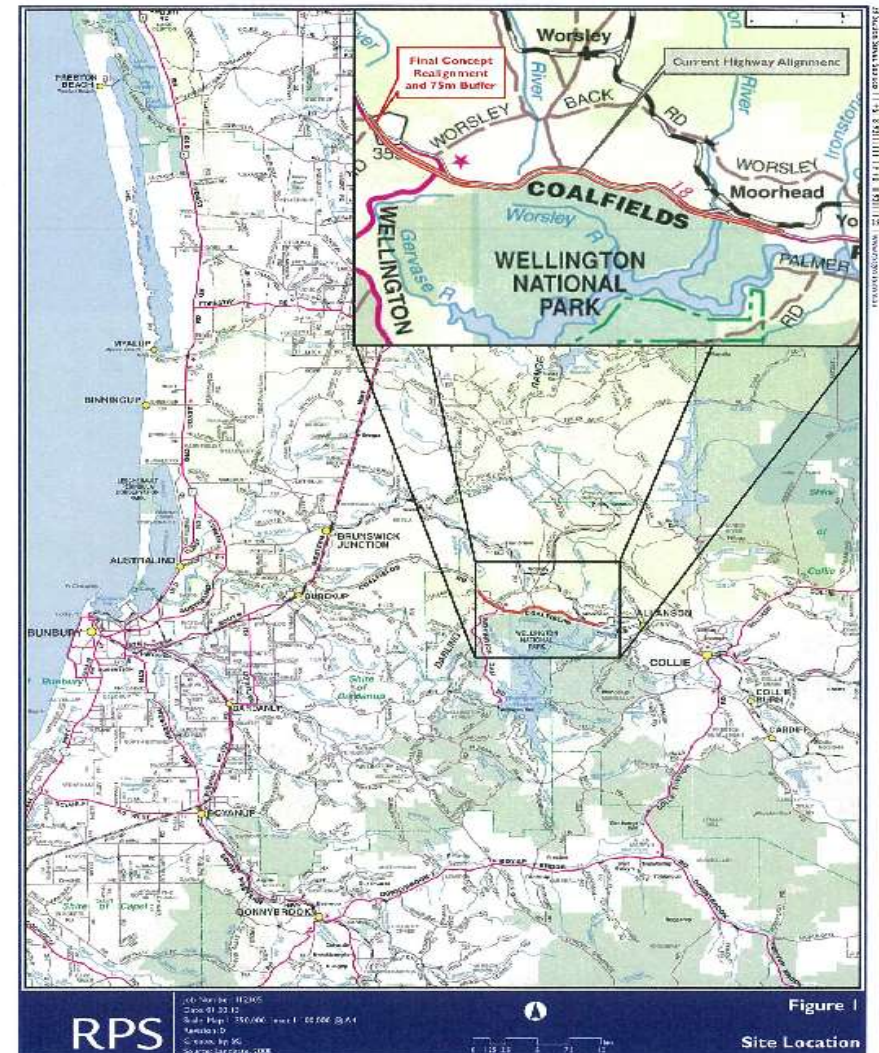
- Vegetation programmes to enhance roadside verges and borrow areas during and following construction.
- Ensure all rehabilitation and conservation aspects are carried out in accordance with Main Roads policy and accepted standards.
- Document treatment methods and report on results. (Flowchart)





Coalfields Highway

- Project Location
- Coalfields Hwy
- 2014 – 2017
 - 15.9 to 26.30 SLK
- 2017- 2018
 - 0.3 - 10 SLK 2018





Coalfields Summary 16 – 24 SLK

- **Clearing of 15.02 Ha** for road construction.
- Rehabilitated – 5 legacy gravel pits – 4.15 Ha in State Forest
- Roadside Direct Seeded Area – 13.24 Ha
- Old road rehabilitated - 22.68 Ha

OFFSETS

Included planting of 4800 Marri (2000 required)

Financial contribution made to Offset Funding

– Total area rehabilitated = 40.07 Ha



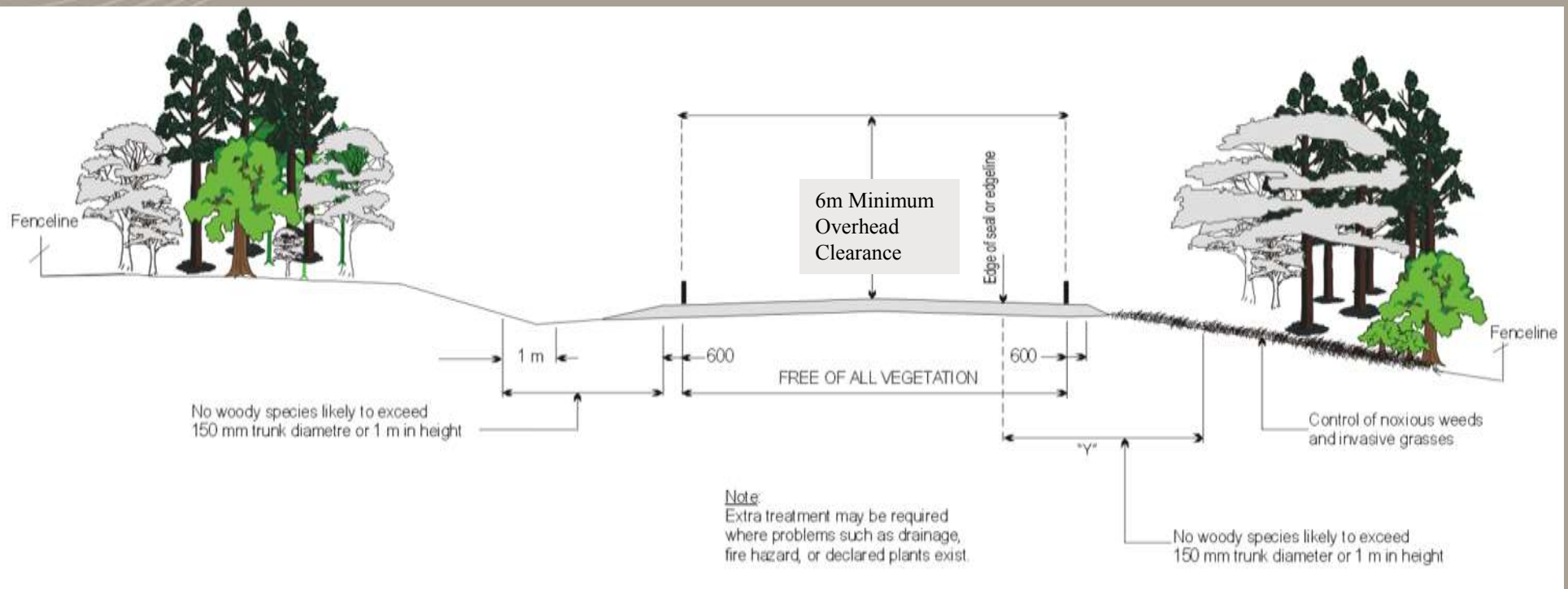
PROJECT PLANNING

- MRWA Landscape Manager during planning is required to achieve New safety requirements make conservation of existing roadside vegetation more challenging. Provision of acceptable roadside clearance is required.
- MRWA have developed software from “Archibus and CAD SIS” to document landscape works and implementation requirements in the field with GIS being available for set out.
- Topsoil Management Planning completed early and included in project plans prior to commencement of works.
- Seed collection and plant propagation requirements identified early (2014) to obtain resources required
- Implementation of Top Soil Management Plans
- Delivery of Landscape and Rehabilitation Works over numerous seasons



Design considerations for Vegetation Placement and Clear Zones

Clear Zone is 14 m from travel path or edge line for Coalfields Hwy

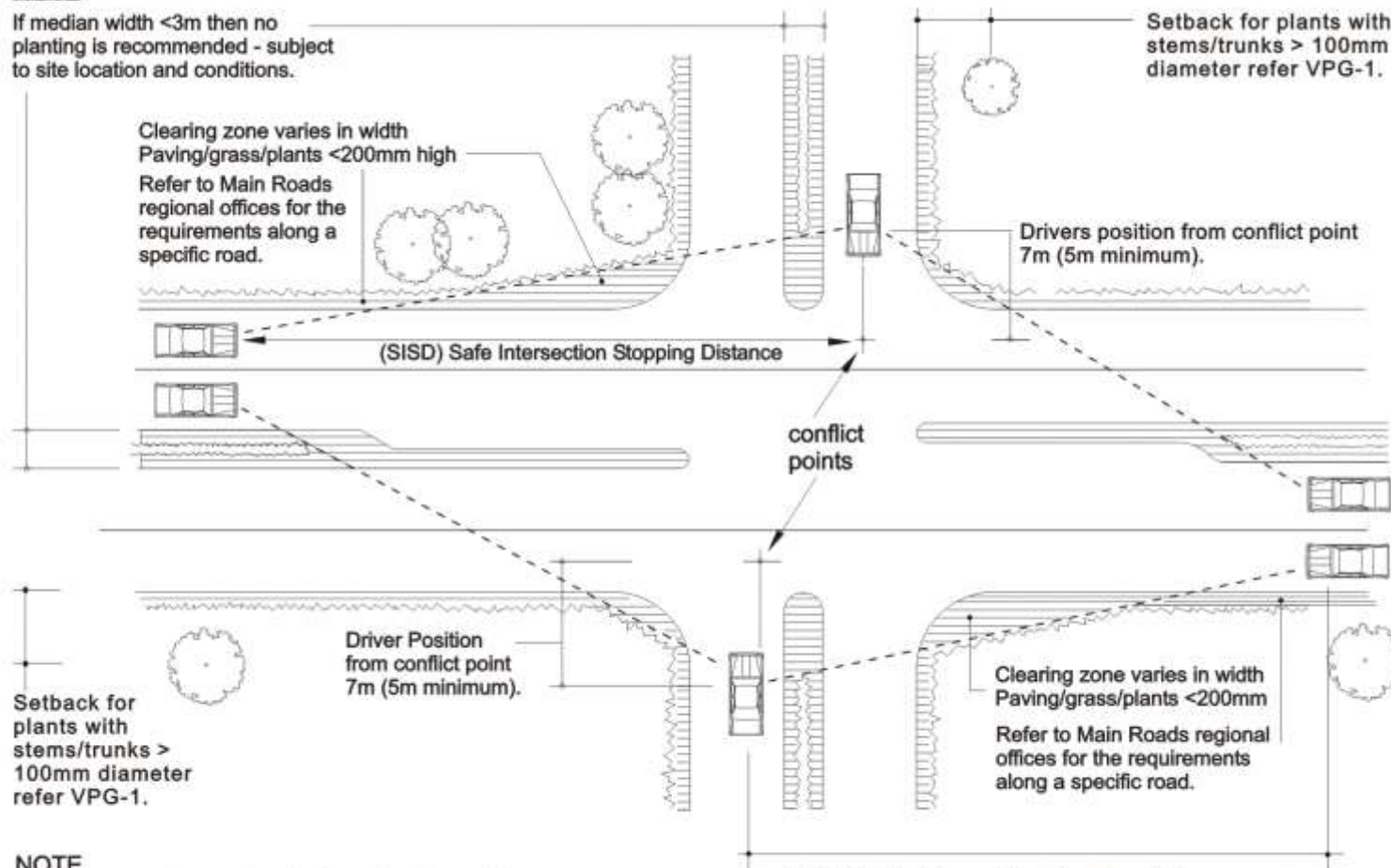




Vegetation Placement - AUSTRROADS

NOTE

If median width <3m then no planting is recommended - subject to site location and conditions.



NOTE

Clearing zone at intersections is determined by applying SISD and the vegetation lateral clearance requirements for the specific road. Refer to Main Roads regional offices for the vegetation lateral clearance requirements along a specific road.

(SISD) Safe Intersection Stopping Distance is dependent on speed and grade of road. Refer AUSTRROADS (1991) Part 5, Intersections at Grade, Tables 5.1, 5.2, 5.3 and Figure 5.2.



Topsoil Condition and Management Planning (Reference MRWA Doc 6707-053)

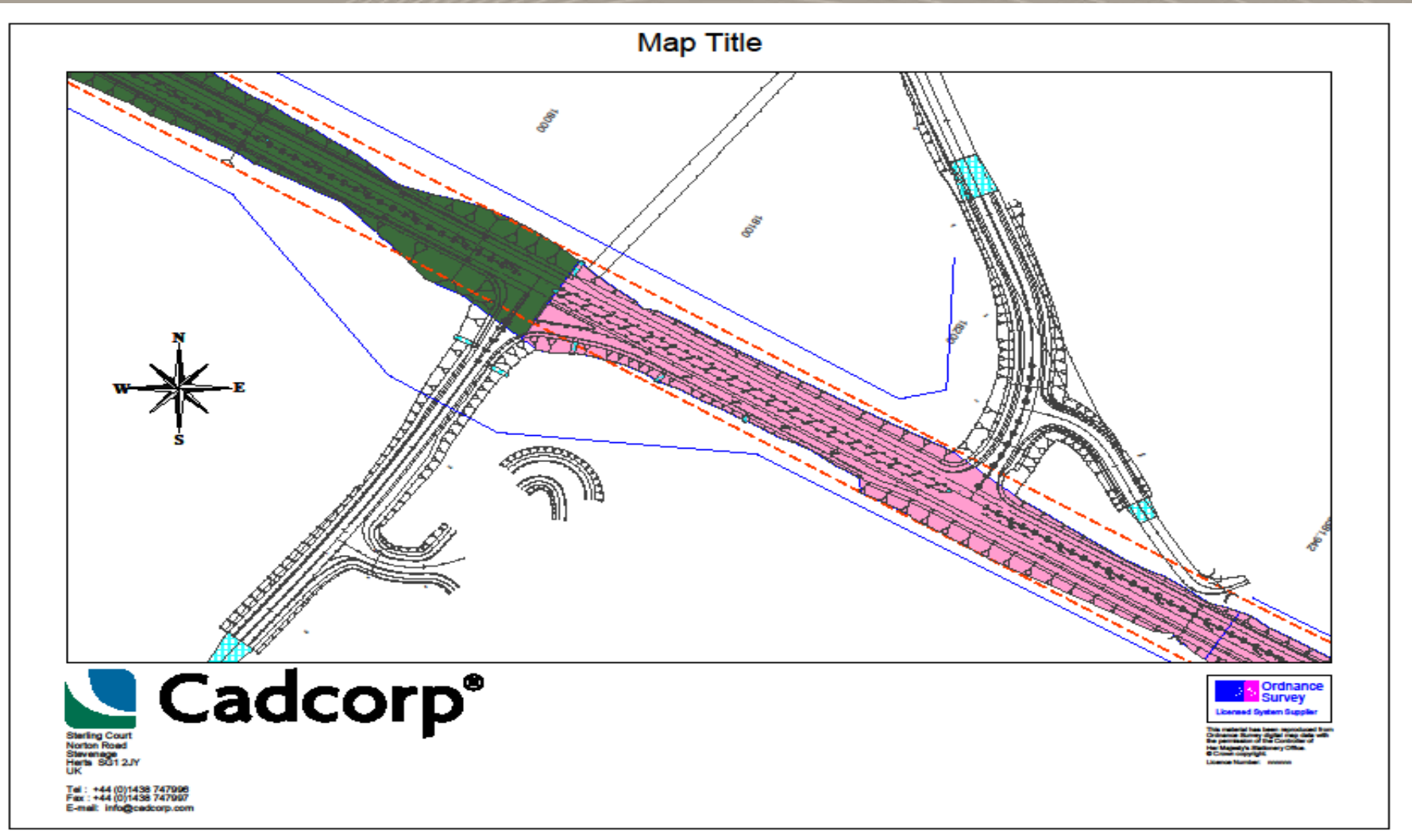
- Topsoil Classification Actions require
 - Assessment of topsoil condition and value, prior to stripping, mixing or placement
 - Clear identification of conserved high value topsoil
 - Consideration of Dieback status to avoid spreading
- Topsoil Respread
 - Conserve and protect valuable topsoil
 - Utilisation of existing natural resources – Mulch and Manufactured soil mixes
 - Minimise the need to move soils off site



Existing Vegetation		Topsoil management			
1* Vegetation Condition Scale		2* Topsoil Condition (Main Roads)		Topsoil Management (Main Roads).	
		(use in topsoil assessment)		(use in project revegetation planning)	
Condition	Description	Condition	Description	Strategy	Description
Pristine (6)	Pristine or nearly so, no obvious signs of disturbance	Well conserved (5)	Sections of native vegetation that have no weed invasion and a broad representation of native vegetation	Conserve and reuse	Selective clearing and stockpiling of vegetation/topsoil. May be mixed in single operation. Respread on site over finished surfaces.
Excellent (5)	Vegetation structure intact, disturbance affecting individual species and weeds are non aggressive				
Very Good (4)	Vegetation structure altered obvious signs of disturbance.		Usually fringe vegetation related to well conserved sites that have minor grass infestations		
Good (3)	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate	Partially Conserved (3)	Upper storey vegetation intact with some natural understorey but with grass species invading the sites	Treat and reuse	Selective clearing and stockpiling of chipped (or slashed) vegetation and topsoil. May be mixed in single operation Weed control as needed. Respread on site over finished surfaces.
Degraded (2)	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management	Degraded (2)	Pasture land or farmland that will require herbicide control to manage weed infestations	Treat and reuse or dispose	Selective clearing and stockpiling of chipped (or slashed) vegetation and topsoil. May be mixed in single operation. Weed control program. May be respread in selected areas. May be buried on site
Completely Degraded (1)	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.	Unsuitable (1)	Weed-dominated sections that include declared plants and other undesirable species	Dispose	Selective clearing and stockpiling of vegetation/topsoil and disposal off site.

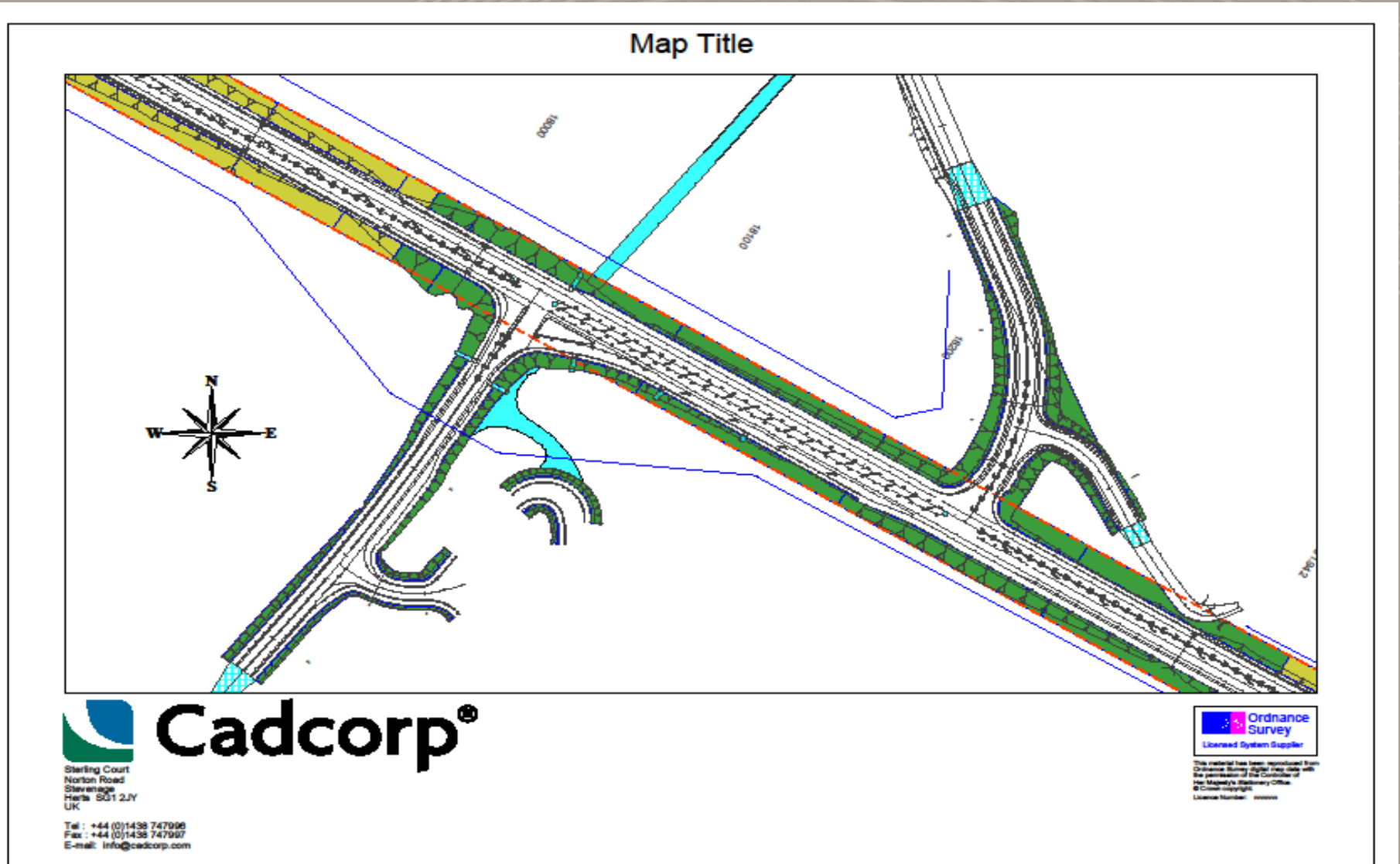


Development of Topsoil Plan – Management of Weeds and Topsoil





Topsoil Respread Plan – Replace conserved topsoil onto site





Windrowed Topsoil and Mulch mixed and stripped in one operation.





Topsoil Respread – Free Rehabilitation



Mulch/Topsoil respread over batters – “Sticky Mulch”. Native seed allowed to regenerate.

- Very cost effective
- Slower rehabilitation initially
- Often a better long-term result
- Excellent scour protection
- Follow up direct seeding if required



Manufacturing Topsoil

- Blend Topsoil, mulch and compost to improve soil quality
- Weed free Clay/ Loam / Sand – depending on where the material can be used AND what is available (Unsuitable !)
- Manage mixing process to achieve consistency
- Moisture and Oxygen levels are critical for biological activity
- Monitor temperatures and moisture content regularly
- Protect from weed infestation
- Avoid temps above 65.
- Imported compost MUST comply with AS 4454-2012



Manufacturing Topsoil On Site.

Manufactured Topsoil

- Mulch – Weed Free
- Compost
- Gravel/loam
- Bactivate ®
- Slow release fertiliser

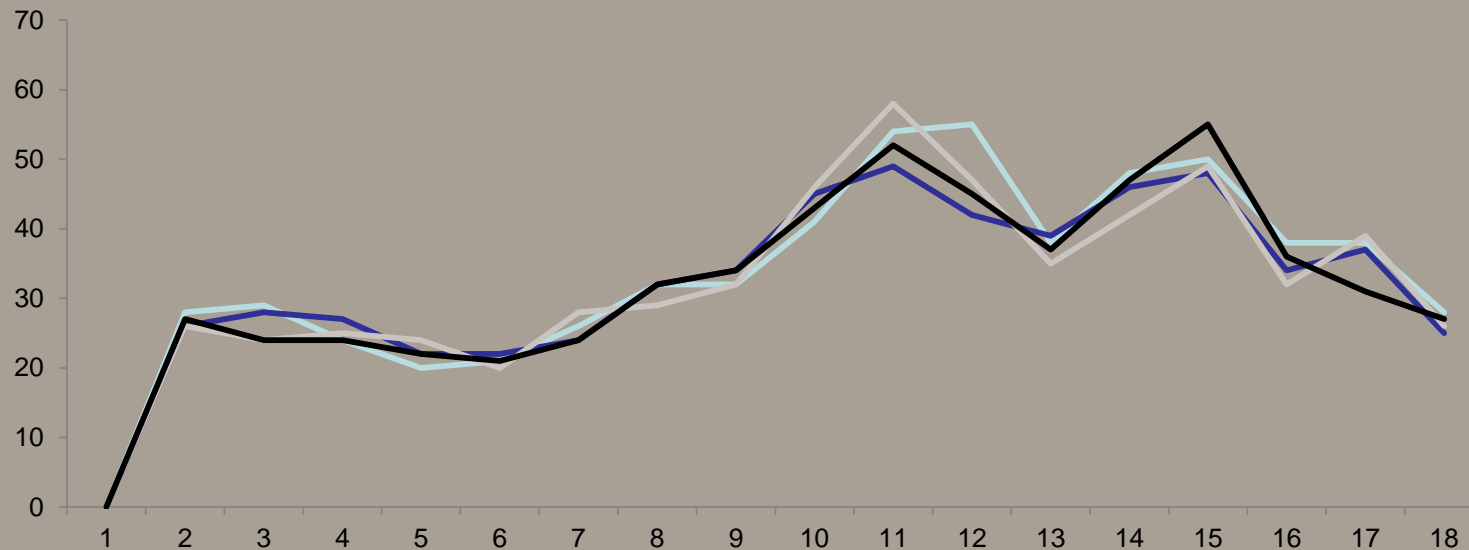




Coalfields Manufacturing Topsoil



- Mixing (aerating) and adding moisture activates the soil biology and encourages decomposition (max 55 degrees)...
- Temps will stabilise but the stockpile will continue to mature 3 - 6 months.
- End product contains valuable soil microbes and fungi suitable for plant growth





Manufacturing Topsoil On Site.

Temperature monitoring is critical to ensure the biological activity is maintained at an optimum level.

Water cart used to apply liquid nutrients prior to and during mixing.





Manufactured Topsoil – Controlled Site



Manufacturing Topsoil Ingredients
Fresh Mulch – Weed Free
Matured Compost
Soil Microbes, Fungal Promoter
“Other” Soil Nutrients
4-6 month process
Lower temperature (max 40)



Earthworks - Stepped Batters 2013 Shine

Batters are stepped to allow topsoil to be retained on batter.

Benefits - Provides improved stabilisation

- Improves vegetation establishment
- Minimize scour





Hamilton Batter Preparation for Direct Seeding

- Batter Preparation and placement of manufactured topsoil





Premixed Topsoil / Mulch Respread from stockpiles





Mulch & Topsoil Spreading

- Modified “muck” spreaders for evenly distributing mulch
- Moxi Tippers
- Swamp Dozers
- Posi-Tracks
- Power (Harley) Rakes





Topsoil Mulch Preparation for Seeding



Heavy chain is used on large steep batters to break any surface compaction.





Site Preparation – Flatter Batters



Drum roller is used to disturb the surface and create notches prior to direct seeding.

The roller is also used to “bed in” the seed.



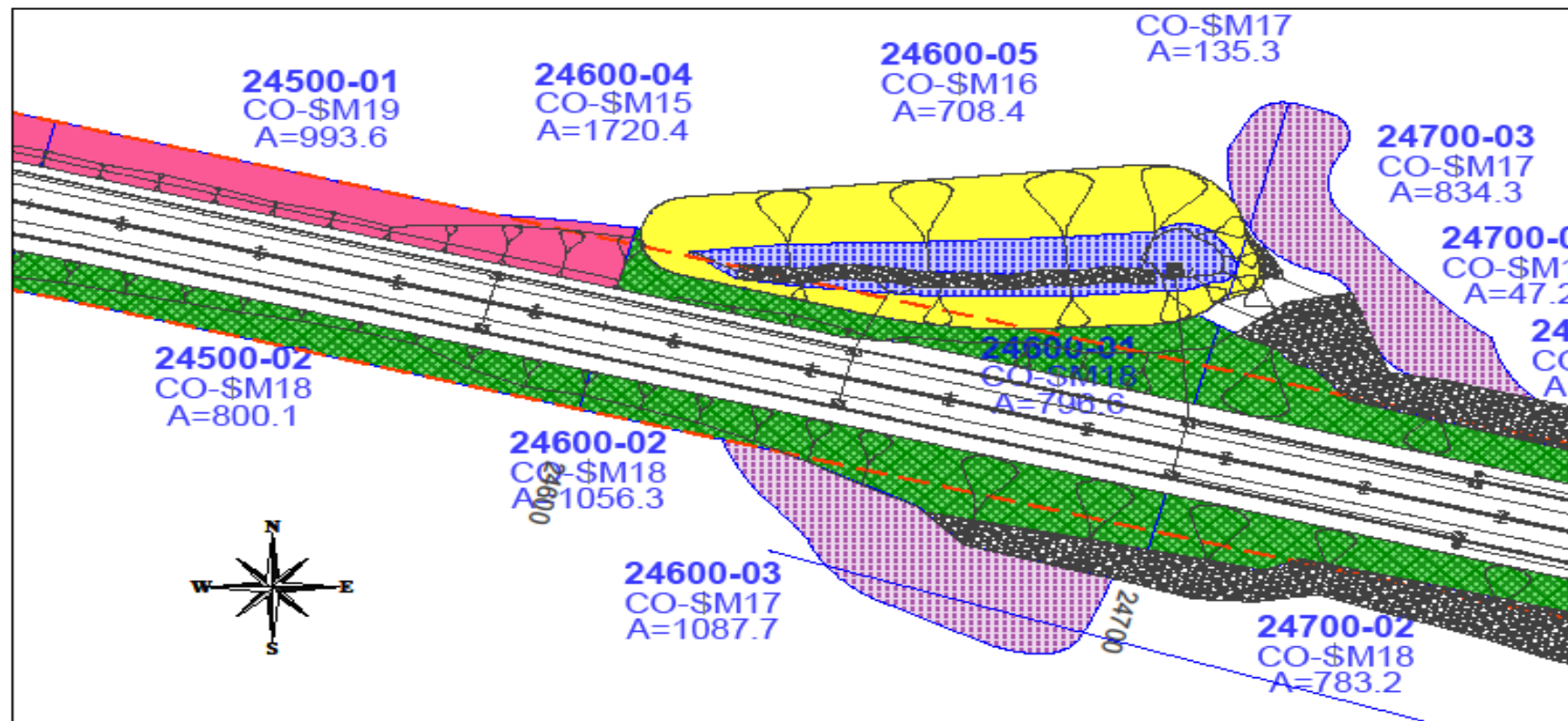
Planning and Delivery Guideline

- Propagation native seedlings – Order well in advance
- Collection of providence native seed – Define requirements and availability
- Soil preparation – Site specific, scalping, rip-mound, or rip-furrow
- Application of pre mixed seed mixes – Direct seeding
- Planting – Hand or machine planting, auger plant.
- Maintenance and infill planting continued in following years
- Follow up Weed Control – Pest Control



SIS Landscape Treatment Plan – Hamilton Section

Map Title



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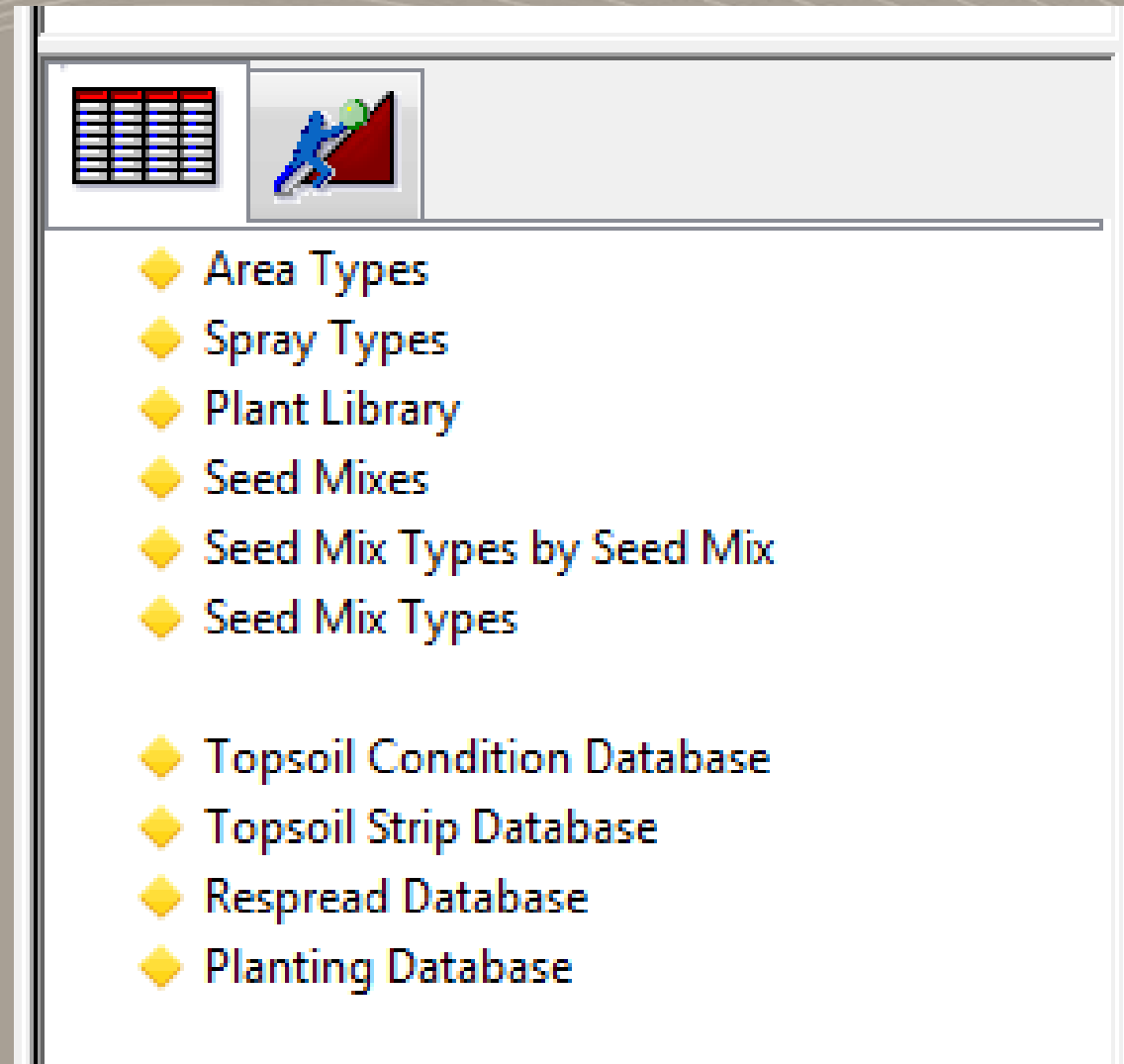


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Archibus Planting Reports

- Reports from Project Seed Library
- Individual Seed Mixes
- Seed mixes by lot
- Multiple reports available





Planting Reports – Costs and Seed Mixes

- Produces a various cost reports
- Provides Seed Mixes per lot
- Provides Total seed requirements
- Provides tube stock reports for ordering



- ◆ Update Plant type costs
- ◆ Calculate Costs
- ◆ Calculate Plant Type Quantities by Seed Mix
- ◆ Calculate Plant Type Quantities
- ◆ Seed Mix Quanties Report
- ◆ Tube Stock Quantities Report
- ◆ Feature Tree Type Quantities
- ◆ Plant Types by Planting

- ◆ Drawing List
- ◆ Calculate Drawing Mixes



DIRECT SEEDING – Premixed Topsoil and Mulched sites

- Evenly spread seed at the specified application rate (Normally 4 Kg/Ha) across entire site directly after topsoil / mulch resspreading.
- Apply slow release fertilizer and Bactivate ® if required.
- Lightly harrow or chain the site to incorporate seed into the top soil horizons.
- Sites with no prior topsoil/mulch respread, additional soil preparation is required prior to application of seed.
- On compacted sites, rip to a minimum depth of 500mm with minimum 1m spacing's across the entire site.
- For non mulched sites, if possible apply natural mulch material evenly over the site to achieve 50 mm cover.
- Rotary hoe the area to incorporate mulch into soil and direct seed. Fertilise
- Monitor sites for weed control



CO-SM011 Prepared Seed Mix – Added Mycorrhizal – MycoApply Maxx

Seed Mix	Area (ha)	SM Kg	TS Units
CO-SM11	0.935	3.74	0

Seed Mix	Plant Type	SM Kg	TS Units
CO-SM11	Acacia extensa	0.19	0
CO-SM11	Acacia pulchella	0.07	0
CO-SM11	Allocasuarina humilis	0.37	0
CO-SM11	Anigozanthos manglesii	0.19	0
CO-SM11	Billardiera fusiformis	0.37	0
CO-SM11	Bossiaa eriocarpa	0.00	0
CO-SM11	Bossiaea linophylla	0.19	0
CO-SM11	Conostylis aculeata	0.19	0
CO-SM11	Daviesia cordata	0.19	0
CO-SM11	Hakea lissocarpa	0.19	0
CO-SM11	Hakea prostrata	0.00	0
CO-SM11	Hardenbergia comptoni	0.19	0
CO-SM11	Hovea triperma	0.00	0
CO-SM11	Hypocalymma angustifolium	0.37	0
CO-SM11	Kennedia coccinea	0.37	0
CO-SM11	Melaleuca thymoides	0.30	0
CO-SM11	Mitrella dilatata	0.19	0
CO-SM11	Patersonia occidentalis	0.37	0

ARCHIBUS





DIRECT SEEDING

Hamilton Section - Direct Seeding in progress.

Seeding works applied by hand or by using mechanical spreaders for optimum distribution and consistency.

Calibration of the operator required





Seeded Batter after 5 Months Growth 2015





Shine Section – Batter Preparation circa 2013





Shine Section – 3 years Growth





Tree Replacement Project - 2000 Marri





2017 – Deep Ripping across contours followed by hand planting and direct seeding



3200 seedlings planted year 1
1600 seedlings planted year 2
Plus direct seeding
Natural recruitment

85% survival rate @ Sept 2018



Monitoring 2018 – Implemented weed control





Rip and Mound Planting with Covers to protect against Kangaroo grazing





Old Road Rehabilitation 2017- 2018





Old road rehabilitation – Maintaining habitat values



- Gravel reclaimed from road
- Road contoured
- Mulch spread 30-50mm
- Deep ripped to 500mm
- Direct seeded





Gravel Pit Rehabilitation in State Forest





Gravel pit # 2 Preparation and Results 2 Years





Ecoblanket® – Spray on Compost / Mulch 2016



Quality Control – 30mm cover



Sterile Grass and native seed used -2017



Grass Seeding rates are critical to allow native seed to develop through the turf.





Batter Stabilisation



Ecoblanket® with native seed mix and turf seed –
2013 – 2015 - 2017





Topsoil respread 1996 / Ecoblanket ® 2016





Monitoring – Site Identification & Weed Control





DuraVeg® Stabilisation

- Steep 1:1 “pinned” batter
- Excavator used to key into clay batter





DuraVeg® Batter Stabilisation





QUESTIONS

