**SHIRE OF DENMARK REVEGETATION SITES**
**INFORMATION SHEET**

## SHIRE REVEGETATION ACTIVITIES

Since 1993, all revegetation is undertaken in-house by the Shire of Denmark using local provenance plant material propagated through our Revegetation Nursery. Seed collection needs to occur a minimum of a year prior to the revegetation planting. Planting ideally occurs over the winter months between June and September to optimise root growth prior to the arrival of drier months.

Shire revegetation activities have involved community engagement of local volunteers, TAFE and school students in all phases including seed collection, plant propagation, direct seeding and planting of revegetation sites, as well as follow-up monitoring to assess success rates and priority actions for further works.

Over Mark's 30 year tenure with the Shire, he has revegetated more than 40 sites throughout the Shire ranging in size from several 100 square metres up to 15 hectares. Mark has collected seed from more than 200 species, and used these to propagate and establish more than 700 000 plants. Mark has established many more through direct seeding - all with the help of community to make it happen. Mark's dedication and tireless efforts have lead to the establishment of rehabilitated areas of healthy bushland which provides a habitat for local flora and fauna, while increasing biodiversity.

The Shire Nursery was originally sited on the Kwoorabup park site, but was relocated in 1997 to the Shire Depot in Zimmermann Street. This involved a shift from a publicly accessible site to an operational construction site which unfortunately limits public accessibility and places constraints on community engagement with volunteers and school students. It also excludes members of the public who have limited mobility and disabilities due to the potential safety concerns at the current site. The opportunity exists for inclusivity of all community members if consideration could be given to relocation of the Revegetation Nursery to a more accessible non-industrial site.

***Shire of Denmark Revegetation Hot House***

***Propagation with Green Skills Noongar trainees***

Prepared by Y.Caruso and M.Parre 30/11/21. Last updated 22/12/21.

**LIME QUARRY**

**History of Site**

The lime quarry site has been an active lime pit extractive industry site since the 1950's. The Shire utilises contractors to extract the resource and the Shire receives royalties from this resource.

In 2013 the lime quarry was planned to be extended to the next staged area however there were known P3 threatened flora species (*Thomasia quercifolia*) that existed within the new lime quarry extraction site. This was investigated by Shire staff in collaboration with DBCA and the species priority status was changed to P4 due to further populations being located, which then enabled the mining extraction area extension to occur.

**When site was first revegetated (and ongoing efforts)**

Compliance with the Department of Mines, Industry Regulation and Safety requires annual plantings. The lime quarry has had revegetation works undertaken by the Shire since 2000 with annual plantings undertaken. It is still a working quarry, with new areas revegetated as mining is completed in that area as a condition of the mining lease. When a new area has not been prepared by the Shire with topsoil, then infill planting to extend biodiversity is carried out in previously revegetated areas.

Volunteers have been involved, as well as TAFE and school students, in all aspects of the revegetation works of the lime quarry including seed collection activities, plant propagation, planting on-site and monitoring. Monitoring of the revegetated sites involves collecting data from four quadrat sites with annual updates to the regulatory authority DWER.

**Area of site revegetated**

A total of seven sites have been revegetation in stages in the old lime quarry pit from 2000-2021, with two staged revegetation sites in the new lime quarry pit site from 2016-current. The old quarry pit site revegetated area totals 18,192 square metres, with the number of plants installed at the old quarry pit site totalling 20,814. The new quarry pit site revegetated area comprises 2300 sq metres with the total number of plants revegetated at the new quarry site totalling 1846. The total amount of seeds direct-sown at the lime quarry pit sites (old and new) totals 11.025kg.

**Species for revegetation**

All revegetation plantings since 2000 have been derived from local provenance seed collected from within Wilson Head and propagated at the Revegetation Nursery. Species for revegetation are in excess of 30 different types of species and include (but are not limited to):

- *Agonis flexuosa*
- *Banksia grandis*
- *Acacia cyclops*
- *Acacia littorea*
- *Hakea oleifolia*
- *Olearia axillaris*
- *Leucopogon parviflorus*
- *Scaevola crassifolia*
- *Spyridium globulosum*
- *Ficinia nodosa*

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The lime pit plantings and plantation areas from 1999 to 2016 are shown in Table 3 below and Figure 6 in the Appendix.

| Period | Quantity | Areas of Stage 1 |
|---|---|---|
| 1999 | 1.3 kg of seed | East-south east rim |
| 2000 | 1071 seedlings | South west rim |
| 2001 | 252 advanced plants | North rim |
| 2002 | 2.2 kg of seed and 97 plants | South top |
| 2004 | 2111 plants | North top slope |
| 2005 | 1.5kg of seed and 2085 plants | North and west slope |
| 2006 | 0.3kg of seed and 2460 plants | North area below road |
| 2007 | 0.24kg of seed and 690 plants | North area below road |
| 2010 | 1010 plants | North and west |
| 2011 | 916 plants | South west corner |
| 2012 | 150 plants | Infill all sites |
| 2013 | 800 plants | Infill all sites |
| 2014 | 653 plants | East and south east rim |
| 2016 | 3000 plants | Subject to site preparation. Lower north and west slopes. |

Table 3: Lime Pit Plantings for the Ocean Beach Lime Quarry

*Derived from Rehabilitation Performance Review Report – Ocean Beach Lime Quarry (Dec 2010-June 2016)*

**Successes/ Challenges**

The geographic location and subsequent high visibility of the site is a major consideration in regards aesthetics for revegetation works due to scars on the landscape from extraction activities.

Major issues for the success of revegetation at the lime quarry site have been lack of ideal site preparation, a dumping of weed-bearing soil material, and the presence of rabbits. Additionally, any slope that has been created through extractive activity that is greater than 45 degrees poses a problem for revegetation as it will erode over time.

The major impediment for revegetation works from 2000-2015 was that the environmental plan for restoration did not allow any topsoil to be imported into the lime pit. This meant that the site preparation involved ripping of the lime to create a loose surface, however this was only shallow over limestone rock. Once the new area of the quarry was cleared, an onsite resource of topsoil was made available.

Recommendations for improved site preparation include deeper ripping of the limestone sub-strata prior to top-soil replacement. Unfortunately, the Shire no longer has machinery that can perform these works and limited funds to outsource this activity.

**Photos of Lime Quarry site – before and after revegetation works**

Ocean Beach Limepit upper slope planted 2001, mid slope 2005

Good survival of seedlings


***Lime Pit Quarry site showing old pit site - aerial 2014.***


***Lime Pit Quarry site showing new and old revegetated areas – aerial 2020.***

Prepared by Y.Caruso and M.Parre 30/11/21. Last updated 22/12/21.

**EAST RIVER ROAD RE-ALIGNMENT**

**History of site**

The realignment of East River Rd occurred in 2019 to increase the trafficability to the new industrial area which subsequently required the old section of road to be revegetated.

**When site was first revegetated (and ongoing efforts)**

The East River Rd re-alignment revegetation was commenced in 2019. It was further revegetated in June 2020 and then again in June 2021. Monitoring of the revegetation site along with ongoing weed control will continue until canopy closure of the site has occurred and resilience has developed. Establishment of an understorey with upper storey canopy is usually achieved in the first 3-10 years post planting.

**Hectares of site revegetated**

The total area to be revegetated totals 5600 square metres over four sections. 2.683kg of seed were sown by direct seeding in the first year with a total of 6877 seedlings planted over 2020-2021. WA College of Agriculture, Denmark, students were involved in the direct seeding in 2019 and planting in 2020.

**Species for revegetation**

Species were all local provenance seed collected from Shire tenure on the adjacent Airport Reserve R41390 and McIntosh Rd road reserve. Both direct seeding and planting were used. Species included (but not limited to):

- *Acacia myrtifolia*
- *Acacia pentadenia*
- *Acacia browniana*
- *Agonis theiformis*
- *Allocasuarina fraseriana*
- *Beaufortia sparsa*
- *Eucalyptus marginata*
- *Eucalyptus staeri*
- *Kunzea ericifolia*
- *Taxandria parviceps*

**Successes/ Challenges**

The main issues at this site include poor sub-soil site preparation due to compaction by machinery, burial of rocks and sub-standard top-soil being spread. This was due to the stock-pile of top-soil being mixed with the McIntosh Rd top-soil which had a higher incidence of weed seeds. This was in part due to a contractor working on the site and the Shire had limited access and control of how the work was conducted and progressed.


***East River Rd re-alignment revegetation site – aerial 2021.***

Prepared by Y.Caruso and M.Parre 30/11/21. Last updated 22/12/21.

Some of Mark Parre's revegetation sites are listed below:

| SITE | REASON FOR REVEGETATION |
|---|---|
| Airport Reserve R41390 | ex-sand pit for airstrip |
| Airport Reserve R41390 forest site | ex-gravel pit and spoil dump |
| Back Beach Coastal Reserve 24913 | plantings denuded areas – stairs infrastructure |
| Berridge Park | gardens |
| Denmark Cemetery | garden beds & screening vegetation |
| Denmark River fringing vegetation | plantings |
| Denmark Rivermouth foreshore | plantings illegally cleared areas |
| Denmark-Nornalup Heritage Rail Trail (Men's Shed site) | plantings illegally cleared areas |
| Denmark-Nornalup Heritage Rail Trail (Little River crossing site) | Plantings – trail realignment due to bridge infrastructure |
| Denmark Visitor Centre | gardens |
| Denmark Waste Management Facility | tip site plantings |
| Golf Course dam embankment | plantings |
| Happy Valley Rd Reserve 36028 | plantings rubbish dump site |
| Hazelvale Road | ex-gravel pit |
| Kearsley Drive Water Tank | water tank installation |
| Kwoorabup Community Park nature playground | plantings |
| Kwoorabup Park wetland ponds vegetation | plantings |
| Lights Beach carpark | carpark and infrastructure revegetation |
| Limbourne Road rail trail | ex-sand pit and tip site |
| Millers Creek Reserve (Waterfall Park) | plantings |
| Mount Hallowell Reserve | ex-sand pit and spoil dump |
| Mt Shadforth Road | ex-gravel pit |
| Parker Road | ex-spoil dump |
| Parry Beach | ex-tip site |
| Parry Beach | ex-lime pit |
| Paterson Street Reserve | plantings |
| Peaceful Bay Caravan Park | revegetating demarcated camping areas |
| Pistol Club Rifle Range Reserve | plantings |
| Prawn Rock Island | plantings |
| Rose Road (Loc. 1675) | ex-gravel pit |
| Silvers pit | ex-gravel pit and current spoil dump |
| Station Rd, Nornalup | ex-spoil dump |
| Thornton Park | gardens |
| Turner Road | ex-gravel pit |
| Valley of the Giants Road | ex-spoil dump |
| Walnut Grove settlement basin | plantings |
| Wentworth Road Reserve | planting denuded areas |
| Wilson Inlet Foreshore fringing vegetation (from Ocean Beach to Hay River) | plantings |
| Wilson Inlet foreshore Reserve 12232 (near golf course) | plantings |
| Yacht Club Reserve | plantings denuded site |
| Zimmerman Street Reserve 13777 (UCL) | plantings denuded site |