Project Name:	**EXTRACTIVE INDUSTRIES LICENSE APPLICATION.** **LOT 503 FLYNN DRIVE NEERABUP (PHASE 1 AREA)**
Project №:	PC18027
Client:	LANDCORP
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Date:	11/11/2019

REVISION STATUS

Revision No.	Description of Revision	Date	Approved
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2	Issued for Approval	11/11/2019	EBF

Recipients are responsible for eliminating all superseded documents in their possession.

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RELIANCE, USES and LIMITATIONS

This study, report and analyses have been based on the information available to Peritas Group at the time of preparation. Peritas Group accepts responsibility for the report and its conclusions to the extent that the information was sufficient and accurate at the time of preparation. Peritas Group does not take responsibility for errors and omissions due to incorrect information or information not available to Peritas Group at the time of preparation of the study, report or analyses.

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1.0 INTRODUCTION

This application seeks approval for an **Extractive Industries Licence** in accordance with the City of Wanneroo's Extractive Industries Law (1998) (EIL Law) for portion of Lot 503 Flynn Drive in Neerabup, WA (formerly Lot 701, now Lot 503 on DP409677).

The West Australian Land Authority (LandCorp), owners of Lot 503 Flynn Drive, seek approval for an Extractive Industries Licence to extract limestone and sand resources from the Lot 503 Phase 1 area. Planning consent for Phase 1 clearing and quarrying works was granted by the City of Wanneroo on 5 March 2019 (DA2017/509).

A Native Vegetation Clearing Permit approval for the Phase 1 area was granted by the Department of Water and Environmental (DWER) on 11 April 2019 (NVCP 7405/1).

Figure 1. Subject Site Location Plan (Lot 503 /No 398 Wattle Avenue, Neerabup)

LandCorp purchased the subject land, which forms part of the Neerabup Industrial Area, in late 2010. The land is strategically located within the North-West Corridor and has good road linkages with planned future improvements to the network. The land is zoned for industrial purposes within the Neerabup Industrial Area Structure Plan No.17 (NIASP17). Quarrying and industrial development operations currently being undertaken on Lot 22, LandCorp's adjoining land to the

east, include limestone extraction over the past 25 years, with the past 16 years under a contract agreement with an experienced quarrying group.

The subject land has been identified as a Priority Resource Location for sand and limestone and therefore Basic Raw Material Policy (SPP2.4) dictates that raw materials resources within the area should be extracted prior to the development of the land for other land uses.

This application seeks approval for an Extractive Industries Licence for the Phase 1 development area (portion of Lot 503) as identified in Figures 2 & 3 which comprises some 93.4 hectares with an estimated resource of 15,000,000 cubic meters of sand and limestone resource.

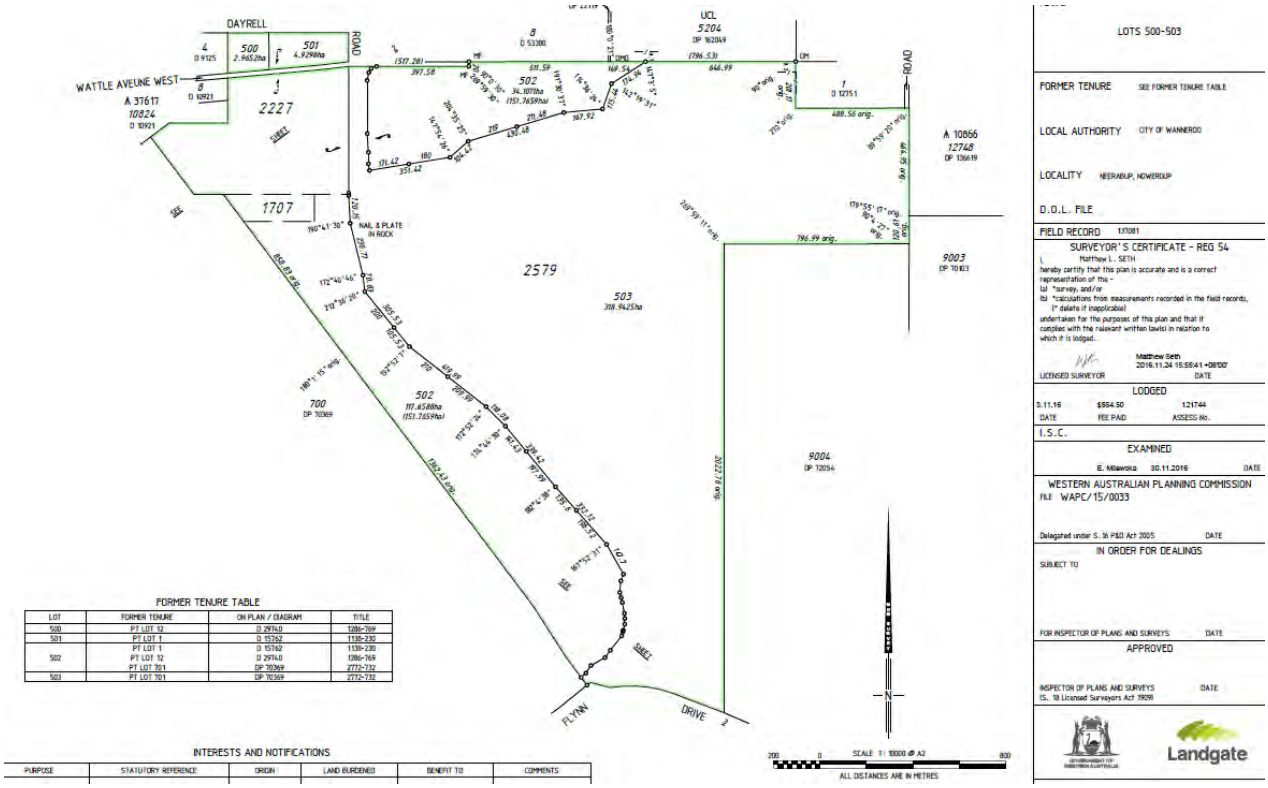

Figure 2. Subject Lot location Plan – Lot 503

Native Vegetation Clearing Permit approval for the Phase 1 area was granted by the Department of Water and Environmental (DWER) on 11 April 2019 (NVCP 7405/1). (Refer APPENDIX B).

Development Approval for the Lot 503 Phase 1 area clearing and quarrying works was granted by the City of Wanneroo on 5 March 2019 (DA2017/509).

The rate of extraction of the resource is anticipated to be some 600,000 to 800,000 tonnes per year and in the Phase 1 area is expected to be extracted over a 25 to 30 year period.

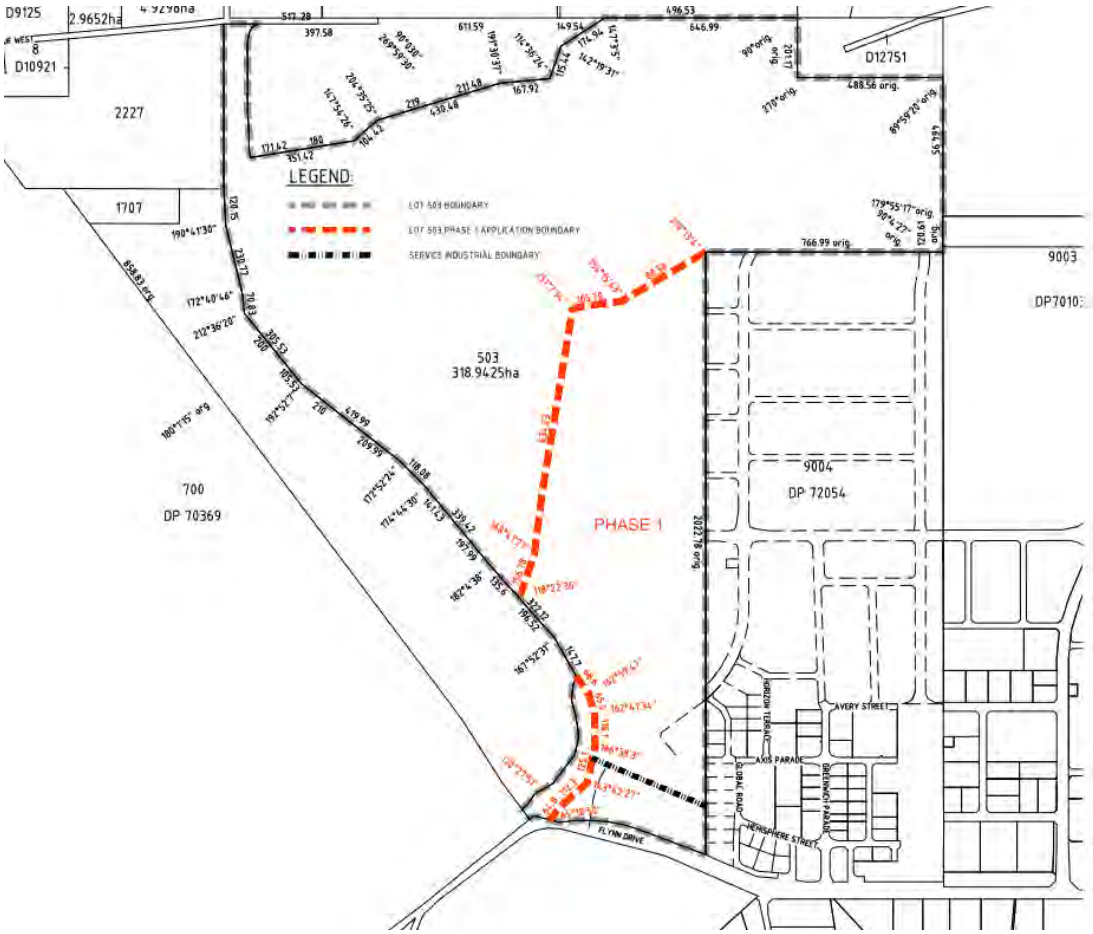

Figure 3 – Lot 503 Phase 1 Application Area

It should be noted that all activities specific to 'extractive industries' will be excluded from the area zoned as 'service industrial' and only bulk earthworks activities will be carried out in the 'service industrial' zone. This is further detailed in ***Section 5.2 Land Zonings***.

The resource to be extracted will supply strategic sand and limestone resources for construction use within the Perth Metropolitan Area.

The extraction of limestone and sand products from Phase 1 Lot 503 will be part of the sequential development process which prepares the land for industrial use, compliant with the Neerabup Industrial Area Structure Plan No.17 ("**NIASP17**").

The proposal includes land rehabilitation works to progressively follow excavation, as has been undertaken on the adjacent land (formerly Lot 22), where to date, the most southern 46 ha portion of the land has already been extracted, developed and released for industrial purposes.

The site lies within an important area of limestone resources that is strategic to the development of the Perth Metropolitan Area. The site is identified in Statement of Planning Policy 2.4 (SPP2.4), Basic Raw Materials, as a Priority Limestone Resource.

The Phase 1 quarry operations areas, at their closest point, are over 300 metres from the nearest dwellings located south of Flynn Drive. The operations are planned and designed to minimise

visual, noise and dust impacts on adjoining properties, and will progressively move north, away from dwellings to the south and to the west of the site.

Proposed hours of operation will be from 6.30am to 6.00pm Monday to Friday and 7.00am to 5.00pm Saturday, excluding public holidays. This is similar to the operations of nearby quarries in the area.

Perimeter bunds, strategic fences, and locked gates, will be maintained to manage potential illegal entry. Warning signs will be maintained as required by the Department of Mines Industry Regulation and Safety (DMIRS) and the City of Wanneroo EIL Law.

No major complaints have been received in recent years for LandCorp's adjacent quarry operations. Regular monitoring of operations for compliance will be undertaken by the quarry operator, with oversight by the relevant regulatory authorities.

APPROVAL SOUGHT

Approval is sought to remove the usable sand and limestone resource from the Lot 503 Phase 1 area for a period of 25-30 years to enable staged extraction, to comply with SP2.4 and the proposed development of industrial land in line with the **NIASP17**.

1.1 Application Summary

This application contains the following documents in support of the EIL application:

1. Application report
2. DWER NVCP approval letter (refer APPENDIX B)
3. Ecological Native Vegetation Clearing Permit Application (6/12/2016) (refer APPENDIX C)
4. Drawings and Sketches as listed below:

Drawing No	Rev	Drawing description
PC18027-1300	C	Resource Plan & Sections
PC18027-1301	C	Limestone Surface Plan
PC18027-1302	D	Deposited Plan
PC18027-1303	C	Concept Subdivision Plan – Phase 1
PC18027-1304	B	Surface Detail Plan – Sheet 1 of 3
PC18027-1305	C	Surface Detail Plan – Sheet 2 of 3
PC18027-1306	C	Surface Detail Plan – Sheet 3 of 3
PC18027-1307	B	Excavation Staging Plan Phase 1 Area
PC18027-SK4	C	Site Facilities Plan Layout and Elevations

PC18027-SK5	C	Bush Forever & Lot 503 Interface Cross Sections

5. Copy of Lot 503 Certificate of Title (Plan 409677)
6. Copy of Deposited Plan – Lot 503 - DP 409677 certifying the pegged location of reference pegs and site boundary extents.

In accordance with the requirements of the Extractive Industry Licence application requirements under the City of Wanneroo "Extractive Industries Law 1998 (Amendment 2008 GG 058)" we provide the following tabulation detailing how this application has addressed the items required and detailed in the City of Wanneroo document:

SECTION 8 – EIL 1998 - REQUIREMENT	**APPLICATION DOCUMENT RESPONSE and WHERE REQUESTED DETAILS ARE LOCATED IN THIS APPLICATION REPORT**
Section 8(1)(a) EXCAVATION Plan – Scale 1:2000	
8(1)(a) - Plan of the excavation site to a scale of between 1:500 and 1:2000	Refer to Drawings 1300 and 1304, 1305 & 1306 and SK2 (Excavation Staging Plan Phase 1 Area) in **APPENDIX C**
8(1)(a)(i) the existing and proposed land contours based on the Australian Height Datum and plotted at 1 metre contour intervals	Drawings 1300 and 1304, 1305 & 1306 in **APPENDIX C**
8(1)(a)(ii) the land on which the excavation site is to be located	Refer to Drawings 1300, 1301 and 1302 in **APPENDIX C** and section **Error! Not a valid result for table.** and **2.1 Site Location** of this application report.
8 (1) a)(iii) the external surface dimensions of the land	Refer to Drawings 1302 (Deposited Plan) in **APPENDIX C** and Section **5.0 SOCIAL ENVIRONMENT** of this report.
8 (1)(a)(iv) the location and depth of the existing and proposed excavation of the land	Refer to Drawings 1300, 1301, 1304, 1305 & 1306 in **APPENDIX C** and **6.0 MINING OPERATIONS AND MANAGEMENT** of this report.
8(1)(a)(v) the location of existing and proposed thoroughfares or other means of vehicle access to and egress from the land and to public thoroughfares in the vicinity of the land	Refer to section **6.0 MINING OPERATIONS AND MANAGEMENT** of this report.
8(1)(a)(vi) the location of buildings, treatment plant, tanks and other improvements and developments existing on, approved for or proposed in respect of the land	Refer to section **6.0 MINING OPERATIONS AND MANAGEMENT** of this application report.
8(1)(a)(vii) the location of existing power lines, telephone cables and any associated poles or pylons, sewers, pipelines, reserves, bridges, railway lines and registered grants of easement or other encumbrances over, on, under or adjacent to or in	Powerlines: Powerline to become redundant and removed when Waste Water Pump Station is constructed (3 year estimated timeline). Telephone Cables: Telstra Communications

the vicinity of the land	Tower also located on Lot 503 is subject to a lease granted to Telstra by LandCorp, which includes a break clause subject to a Notice Period of one month. Refer to **APPENDIX D** for Wester Power Assets Location within Lot 9004 Flynn Drive Neerabup
8(1)(a)(viii) the location of all existing dams, swamps, lakes, watercourses, drains or sumps on or adjacent to the land	There are no existing dams, swamps, lakes or watercourses on the subject land. Refer to following Sections for relevant details. **3.0 EXISTING PHYSICAL ENVIRONMENT** **5.3 Surrounding Land Uses and Buffers** **7.0 ENVIRONMENTAL IMPACTS**
8(1)(a)(ix) the location and description of existing and proposed fences, gates and warning signs around the land	Refer to **6.0 MINING OPERATIONS AND MANAGEMENT** of this application report.
8(1)(a)(x) the location of the areas proposed to be used for stockpiling excavated material, treated material, overburden and soil storage on the land and elsewhere	Saleable product stockpiles will be located adjacent to the crusher and be relocated progressively or as sales orders are fulfilled but will generally remain within the sequential extraction zones in accordance with PC18027-CI-1307-REV C in **APPENDIX C.** As most resource produced is immediately loaded onto trucks for delivery to customers it is therefore unusual for resource to be stockpiled for long periods. Refer to **6.2.1 Excavation Method** Topsoil is generally either blended for re-use as part of the post extraction backfill or for stabilisation of batters. Topsoil stockpiles are therefore not located in permanent areas or for long periods as the material is re-used in the progressive backfill operations. Refer to **6.2.1 Excavation Method**
8(1)(a)(xi) brief description of uses of adjoining and nearby land	Refer to **3.0 EXISTING PHYSICAL ENVIRONMENT** and **5.3 Surrounding Land Uses and Buffers** of this application report.
8(1)(a)(xii) other details as the local government	Refer to **5.0 SOCIAL ENVIRONMENT** of this

may require	application report for further relevant details.
Section 8(b) WORKS & EXCAVATION PROGRAM	
8(b)(i) the nature and estimated duration of the proposed excavation for which the licence is applied	See Project Section **1.2 Project Summary** and **6.0 Mining Operations and Management**
8(1)(b)(ii) the stages and the timing of the stages in which it is proposed to carry out the excavation	Refer to **6.2.2 Pit Design & Staging** for mine staging plan
8(1)(b)(iii) details of the methods to be employed in the proposed excavation and a description of any on-site processing works	Refer to **6.2.4 Processing of the Resources** and **Figure 7** to **Figure 11** for detailed descriptions of mining Flow diagrams, equipment and processes for the resource extraction & processing.
8(1)(b)(iv) details of the depth and extent of the existing and proposed excavation of the site	Refer to Drawings 1300, 1301 and 1304, 1305 & 1306 in **APPENDIX C** and **Figure 5** and **Figure 6**
8(1)(b)(v) an estimate of the depth of and description of the nature and quantity of the overburden to be removed	Overburden varies across the site. Refer to Drawing 1300 and 1301. 1304, 1305 & 1306 in **APPENDIX C** for depths from Natural surface to the top of the limestone resource. The estimated volume of overburden to be removed is in the order of 4 million BCM.
8(1)(b)(vi) a description of the methods by which existing vegetation is to be cleared and topsoil and overburden removed or stockpiled	Refer to the following sections and figures for detailed descriptions **6.0 MINING OPERATIONS AND MANAGEMENT** **6.2.1 Excavation Method** **6.2.5 Stockpiles** **Figure 7, Figure 8, Figure 9, Figure 10, Figure 11** and **Figure 12**
8(1)(b)(vii) a description of the means of access to the excavation site and the types of thoroughfares to be constructed	Generally, all internal road accesses will be a minimum of 8m wide limestone formation tracks. Refer to **6.0 MINING OPERATIONS AND MANAGEMENT** and **6.5 Access & Transport** for further details.

8(1)(b)(viii) details of the proposed number and size of trucks entering and leaving the site each day and the route or routes to be taken by those vehicles	Refer to the following Sections for further details **1.2 Project Summary** **6.4 Machinery & Equipment** **6.5 Access & Transport**
8(1)(b)(ix) a description of any proposed buildings, water supply, treatment plant, tanks and other improvements	Refer to **6.7 Water Use** for detailed descriptions
8(1)(b)(x) details of drainage conditions applicable to the land and methods by which the excavation site is to be kept drained	The site will not require dewatering and the base formation will be free draining. **7.2 Water Management** for detailed descriptions
8(1)(b)(xi) a description of the measures to be taken to minimise sand drift, dust nuisance, erosion, watercourse siltation and dangers to the general public	Refer to the following sections for relevant management plans and measures to be undertaken. **6.0 MINING OPERATIONS AND MANAGEMENT** **7.1 Biodiversity Management** **7.2 Water Management** **7.3 Atmospheric Pollution and Noise**
8(1)(b)(xii) a report of an acoustic consultant verifying that the various plant, machinery and operational noise levels will comply with the requirements of the Environmental Protection (Noise) Regulations 1997	Refer to acoustic report in **APPENDIX I**
8(1)(b)(xiii) a description of the existing site environment and a report on the anticipated effect that the proposed excavation will have on the environment in the vicinity of the land	Refer to **7.0 ENVIRONMENTAL IMPACTS** for detailed descriptions of relevant measures to be undertaken.
8(1)(b)(xiv) details of the nature of existing vegetation, shrubs and trees and a description of measures to be taken to minimise the destruction of existing vegetation	Refer to **7.0 ENVIRONMENTAL IMPACTS** for detailed descriptions of relevant measures to be undertaken. Refer also to **Figure 7 - Vegetation Class**
8(1)(b)(xv) a description of the measures to be taken in screening the excavation site, or otherwise minimising adverse visual impacts, from nearby thoroughfares or other areas	Refer to **7.0 ENVIRONMENTAL IMPACTS** particularly Section **7.3.1 Visual Management** for detailed descriptions of relevant measures to be undertaken.
Section 8(c) – REHABILITATION & DECOMMISSIONING PROGRAM	
8(1)(c)(i) the objectives of the program, having due	Refer to the following sections for detailed

regard to the nature of the surrounding area and the proposed end-use of the excavation site	descriptions of relevant measures to be undertaken **1.3 Project Management Summary** **8.0 ONGOING REHABILITATION & MINE CLOSURE PLAN**
8(1)(c)(ii) whether restoration and reinstatement of the excavation site is to be undertaken progressively or upon completion of excavation operations	Refer to the following sections for detailed descriptions of relevant measures to be undertaken **1.3 Project Management Summary** **8.0 ONGOING REHABILITATION & MINE CLOSURE PLAN**
8(1)(c)(iii) how each face is to be made safe and batters sloped	Refer to the following sections for detailed descriptions of relevant measures to be undertaken **6.0 MINING OPERATIONS AND MANAGEMENT** **6.2.2 Pit Design & Staging** **8.0 ONGOING REHABILITATION & MINE CLOSURE PLAN**
8(c)(iv) the method by which topsoil is to be replaced and revegetated	Land will be developed, in response to market demand as industrial land and not topsoiled and revegetated. The completed lots are to be stabilised with "Glue On" or seeded hydromulched treatment to reduce risk of dust and erosion until required to be developed for industrial use. Refer to **8.0 ONGOING REHABILITATION & MINE CLOSURE PLAN** for detailed descriptions of relevant measures to be undertaken
8(1)(c)(v) the numbers and types of trees and shrubs to be planted and other landscaping features to be developed	Refer to **8.0 ONGOING REHABILITATION & MINE CLOSURE PLAN** for detailed descriptions of relevant measures to be undertaken
8(1)(c)(vi) how rehabilitated areas are to be maintained	Refer to **8.0 ONGOING REHABILITATION & MINE CLOSURE PLAN** for detailed descriptions of relevant measures to be undertaken
8(1)(c)(vii) the program for the removal of buildings, plant, waste and final site clean up	Refer to **8.0 ONGOING REHABILITATION & MINE CLOSURE PLAN** and **8.4 Rehabilitation Objectives** for detailed descriptions of relevant measures to be undertaken
Section 8(d) – ESTABLISHMENT OF A DATUM PEG	

8(d)(i) evidence that a datum peg has been established on the land related to a point approved by the local government on the surface of a constructed public thoroughfares or such other land in the vicinity	Refer to the following sections for details: **APPENDIX F - Copy of Deposited Plan, APPENDIX G - Control Summary** and **APPENDIX H - Lot 503 Certificate of Title (Plan 409677)**
Section 8(e) – CERTIFICATION OF CORRECTNESS FROM A LICENSED SURVEYOR	
8(e)(i) a certificate from a licensed surveyor certifying the correctness of the plan referred to in paragraph (a)	Refer to **APPENDIX F** for signed and certified DP for the site showing pegged boundaries and **APPENDIX G** for Control Summary certified by the licensed surveyor (MNG – McMullen Noland Group).
8(e)(ii) a certificate from a licensed surveyor certifying the correctness of the datum peg and related point referred to in paragraph (d)	Refer to **APPENDIX F** for signed and certified DP for the site showing pegged boundaries and **APPENDIX G** for Control Summary certified by the licensed surveyor (MNG – McMullen Noland Group).
Section 8(f) – EVIDENCE THAT THE REQUIREMENTS OF CLAUSE 9(1)(a) AND CLAUSE 9(1)(b) HAVE BEEN CARRIED OUT.	
8(f) evidence that the requirements of clause 9(1)(a) and clause 9(1)(b) have been carried out	Refer to **APPENDIX F** for signed and certified DP for the site showing pegged boundaries and **APPENDIX G** for Control Summary certified by the licensed surveyor (MNG – McMullen Noland Group).
Section 8(g) – COPIES OF ALL LAND USE PLANNING APPROVALS REQUIRED UNDER ANY PLANNING LEGISLATION	
8(g) copies of all land use planning approvals required under any planning legislation	As noted above the Development Approval application for the subject land has been lodged and is being considered by City of Wanneroo and WAPC. The subject land is recognised as a priority resource area and is approved use under the City of Wanneroo Local Structure Plan - Neerabup Industrial Area Structure Plan No.17 ("**NIASP17**").
Section 8(h) – THE CONSENT IN WRITING TO THE APPLICATION FROM THE OWNER OF THE EXCAVATION SITE.	
8(h) the consent in writing to the application from the owner of the excavation site	This Extractive Industry License application has been prepared by the proponents and landowners as noted in Section **2.2**

	Ownership & Proponent
Section 8(i) – OVERALL STAGING & MANAGEMENT PLAN.	
8(i) an overall staging and management plan and report which by a matrix indicates the progressive stages of construction, excavation, rehabilitation, landscaping and the like together with obvious milestones of progress upon which the staging and management of the extractive industry can be measured and reviewed prior to renewal or at other nominated times	Refer to **6.0 MINING OPERATIONS AND MANAGEMENT** and **6.2.2 Pit Design & Staging** **APPENDIX C** - PC18027-CI-1307 for Staging in particular for mine staging plan.
Section 8(J) – EVIDENCE THAT A NOTICE OF CLEARING HAS BEEN GIVEN TO THE COMMISSIONER OF SOIL AND LAND CONSERVATION IF THAT IS REQUIRED UNDER REGULATION 4 OF THE SOIL AND LAND CONSERVATION REGULATIONS 1992.	
8(J) evidence that a notice of clearing has been given to the Commissioner of Soil and Land Conservation if that is required under regulation 4 of the Soil and Land Conservation Regulations 1992	Refer to **APPENDIX E** for details of the Native Vegetation Clearing Permit application and **APPENDIX B** for DWER response and requirements.
Section 8(K) – copies of any environmental approval required under any environmental legislation**.**	
8(k) copies of any environmental approval required under any environmental legislation	Refer to environmental reporting and details contained in the environmental report associated with the Native Vegetation Clearing Permit application in **APPENDIX E**
Section 8(l) – EVIDENCE THAT THE REQUIREMENTS OF CLAUSE 9(1)(a) AND CLAUSE 9(1)(b) HAVE BEEN CARRIED OUT.	
8(l) - copies of any geotechnical information relating to the excavation sit	Refer to details provided in sections and Figures **3.0 EXISTING PHYSICAL ENVIRONMENT** **7.1.7** Karst **Figure 12 - Karst Hazard Zones in Rural Wanneroo (Mapped by Lex Bastian)**
Section 8(2) – ALL SURVEY DATA MUST COMPLY TO AHD & AUSTRALIAN MAP GRID STANDARDS	
8(2) – Data to comply with AHD and Australian Map Grid	Plans and data supplied by the licensed surveyors MNG are provided in the required formats and to AHD and relevant Australian Map Grid Standards

1.2 Project Summary

The main aspects of the project that the Extractive Industries Licence application relates to is summarised in the following table.

ASPECT	PROPOSAL CHARACTERISTIC
EXCAVATION	
Total Resource Area (Phase 1)	93.4 hectares
Total disturbance area	93.4 hectares (Phase 1)
Total Area of Mining Footprint	93.4 hectares (Phase 1)
Sand-Limestone extraction	Up to 700,000 tonnes per year
Total estimated Resource	15 million BCM
Life of Project	>30 years
Area cleared per year	Average 3 – 5 hectares
Area mined per year	Average 2 – 3 hectares
Area open at any one time	20 plus hectares required including backfill to design
Dewatering requirements	None
Depth of excavations	Up t0 10+ metres
Native vegetation to be cleared	See attached DWER letter – Appendix B
PROCESSING	
Sand and Limestone	See excavation rate above
Water requirements	Supplied by existing Groundwater Extraction License estimated usage 12,000 kL per year
Water supply source	Supplied by a new bore to be constructed with approval from DWER
INFRASTRUCTURE	
Total area of plant and stockpiles	Located within existing excavated area
Area of settling ponds	Not required as site is too porous
Fuel storage	Proposed to be mobile refuelling with an onsite bunded and lined fuel storage tank of 10,000 L.

TRANSPORT	
Truck movements	Variable but an average of approximately 10 per hour
Access	Limestone internal haul road to Flynn Drive
WORKFORCE	
Construction	5 persons
Operation	10-12 persons
Hours of operation	Approved hours of operation will be 6.30am to 6.00pm Monday to Friday and 7.00am to 5.00pm Saturday, excluding public holidays

1.3 Project Management Summary

The below tabulation addresses the major components of the proposed operations on the subject land and the measures to be undertaken as part of the resource extraction licence.

Factor	Summary	Reference
Mining Operations	• Open Cut excavation methods will be the same in operation and scale to those currently operating.	6.0 MINING OPERATIONS AND MANAGEMENT See also Project Summary above
Biodiversity Management Flora	• See attached DWER letter.	Attached as APPENDIX B 4.1 Vegetation & Flora 7.1 Biodiversity Management
Biodiversity Management Fauna	• Refer to References	4.2 Fauna 7.1 Biodiversity Management
Plant Pathogens	• There is unlikely to be any impact and low risk of introducing plant diseases. • A plant Pathogen Management Plan will be implemented.	7.1.5 Dieback Management Plan
Weeds	• There is unlikely to be any impact and low risk of introducing new weed species. • A weed Management Plan will be implemented.	7.1.6 Weed Management Plan
Water Management	• The main risk to groundwater is from fuel leakage. • A management plan to be implemented by the quarrying contractor will meet will and comply with all Government policies and guidelines.	7.2 Water Management
Fuel and maintenance	• Fuel is to be brought to the site by mobile tanker. In addition, a 10,000 L tank is retained on site in a bunded lined facility. • Refuelling and maintenance will be the same as that used in the past. • A Refuelling and Maintenance Management Plan will be prepared and put in place by the quarrying	7.2.8 Refuelling & Maintenance

	contractor.	
Visual Management	• The site is over 300 m distant from the closest dwelling, across already prepared industrial land and protected by vegetation and bunding.	7.3.1 Visual Management
Noise	• The closest dwelling is over 300 m distant from the proposed site. • Noise management procedures will be maintained for all parts of the operations.	7.3.2 Noise Management
Dust	• Dust is managed for Health and Safety under the Mines Safety and Inspection Act 1994 and administered by the Department of Minerals and Petroleum. • Dust management procedures will be used for all aspects of the operations to protect both the staff and environment. • There will be no changes to the previous operational procedures utilised by the proponent in their adjacent quarry operations. • The extraction of limestone will move further away from dwellings in the South. • A licensed bore and 13,000 L water tanker will be retained on site for dust suppression. • A Dust Management Plan will be maintained.	7.3.3 Dust Management
Fire	• Fire is seen as a low risk in quarries such as this, but could include fire in the surrounding vegetation or plant and equipment. • Fire management procedures are addressed. The selected contractors will be required to prepare full Safety Management Plans for all sites and will be implemented under the quarrying contract for the site. These plans include emergency procedures, muster stress, graining and contingencies.	7.3.4 Fire Management
Mine Closure	• Closure of land is to be progressive with the land being reformed to the **NIASP17** and to the requirements of	8.0 ONGOING REHABILITATION & MINE CLOSURE PLAN

	LandCorp. • The development of industrial land follows excavation. • All equipment will be removed from site at the completion of activities and the disturbed land formed into a shape compatible with the surrounding areas.	
Rehabilitation	• A Rehabilitation Plan will be prepared and relates primarily to interim stabilisation of the soils as necessary, pending redevelopment. • In most cases rehabilitation to native vegetation is not supported apart from an interim cover, as the land surface has to be reformed to create the industrial developments.	8.0 ONGOING REHABILITATION & MINE CLOSURE PLAN

2.0 BACKGROUND INFORMATION

2.1 Site Location

This site comprises part of lot 503 on DP 409677 (Phase 1 area) is bounded by Flynn Drive to the South, Lot 22 (under development) to the east, the balance of lot 503 to the north and Bush Forever site 384 to the west.

The site is located some 32 km north of Perth and 10Km north of the Wanneroo townsite. Refer to **Figure 1** to **Figure 3** above**.** A Structure Plan has been adopted by council and WAPC for the Neerabup Industrial Area (Neerabup Industrial Area Structure Plan No.17) and a concept plan for future development of the land based on the structure plan has been developed to guide development levels for the early phases of the resource extraction and quarry operations. (Refer to Figure 4 below)

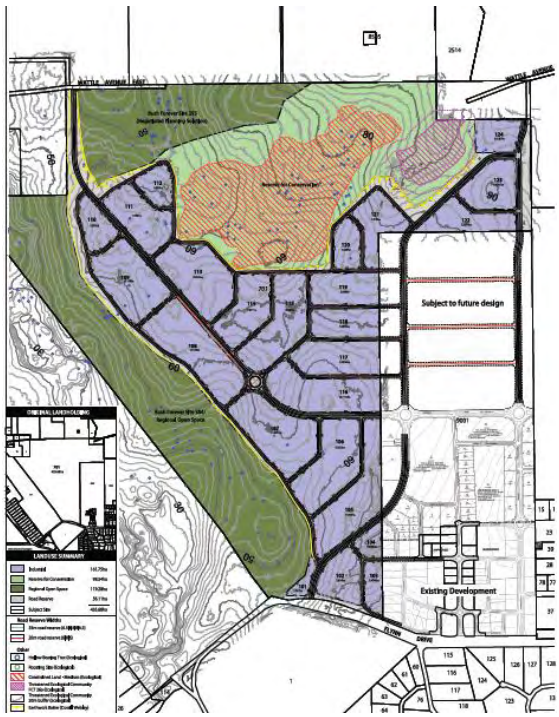

Figure 4 - Development Concept Plan

2.2 Ownership & Proponent

The West Australian Land Authority (LandCorp), owners of the subject site (Phase 1 area portion of lot 503 on DP 409677) Flynn Drive Neerabup seek approval for an Extractive Industries Licence to enable the extraction of limestone and sand resources from Phase 1 Lot 503 Flynn Drive, Neerabup.

LandCorp purchased the subject land in late 2010 with the intention of extending their existing industrial development operations currently located to the east of the site (lot 22 Flynn Drive). The land forms part of the **NIASP17** which is strategically located within the North-West Corridor

currently services by good road linkages and proposed future improvements to the regional road network.

The subject land has been identified as a Priority Resource Location for sand and limestone and therefore Basic Raw Material Policy dictates that extraction of the available resource should occur prior to the development of the land for other land uses.

LOT	OWNERS	VOLUME	FOLIO	PLAN
503	Western Australian Land Authority Level 3, 40 The Esplanade Perth WA 6000			**409677**

The contact person responsible for all operations at the site is Mr Steve Bennett, LandCorp. Mr Bennett can be contacted at LandCorp's Head Office on 9482 7833.

2.3 Project Objectives

Phase 1 Lot 503 forms part of the **NIASP17** and contains strategic natural resources that are an extension of the resources being extracted from adjacent landholdings. This proposal achieves the purposes of extracting a valuable resource in line with Statement of Planning Policy No 2.4 Basic Raw Materials.

Importance and Rationale

In general, sand is used for the construction industry as both concrete sand and fill sand. The majority of the Swan Coastal Plain has now been sterilised for urban sprawl, rural living subdivisions and the Conservation Estate.

This has led to a situation where there are limited limestone resources available within the northern Perth Metropolitan Area. In the northern Perth metropolitan area, all good quality limestone deposits are predominantly in the Neerabup Nowergup area, located in State Forest or the potential extension of the Yanchep National Park.

The whole site is underlain by high grade limestone. The limestone has always been earmarked for extraction and has formed a key part of the resources held by LandCorp for many years in the Neerabup -Nowergup Area.

Limestone is also used for dimension stone, road bases, the construction industry, reconstituted stone, armour rock, and lime manufacture.

It is important to note that limestone and sand are only extracted for the community. Almost all sand and limestone is used on public works projects and for structural works, such as footings, dwellings, structural walls in subdivisions and for building materials.

Whilst these resources might seem common, most of the resources closer to Perth have been

sterilised by development, conservation of vegetation, and public intolerance.

The limestone on site and the surrounding area is a particularly valuable community resource.

The limestone has very high community value, as the Perth Metropolitan area spreads north, which is why the site has been listed by the Western Australian Planning Commission for many years as a Priority Resource.

The staged taking of the sand and limestone and the later use of the site for industrial land forms part of good co-ordinated land planning.

Limestone on this site is identified in Planning Policies such as Statement of Planning Policy 2.4, Basic Raw Materials as a Priority Limestone Resource.

- Abeysinghe P B, 1998, *Limestone and Limesand Resources of Western Australia,* Geological Survey of Western Australia, Mineral Resources Bulletin 18.
- Abeysinghe P B, 2003, *Silica resources of Western Australia,* Department of Mines and Petroleum, Mineral Resources Bulletin 21.
- Gozzard J R, 1987, *Limesand and Limestone Resources between Lance/in and Bunbury,* Geol Surv WA, Record 1987 /5
- Western Australia, Western Australian Planning Commission, *Statement of Planning Policy 2.4, Basic Raw Materials.*
- Chamber of Commerce and Industry, 1995 and 1996, *Managing the Basic Raw Materials of Perth and the Outer Metropolitan Region,* Parts 1 and 2.
- Chamber of Commerce and Industry, 2008, *Basic Raw Materials Access and Availability.*

An extended Licence period of 10 years is required to protect the resource and ensure that excavation is not hindered by the periodic need to reapply for approval, which can now take some years to achieve because of the number of approvals required, the workload of Government authorities, the number of authorities and agencies that now have to review a proposal and the lack of a co-ordinated and expedited planning and environmental approval process.

2.4 Aims of the proposal

This application report describes the environmental characteristics of the site, the methods and staged approach to excavation and rehabilitation/development, and proposes environmental management strategies as required.

The aims of the proposal are to;

- Obtain an Extractive Industries Licence with an approval period of 10 years in conjunction with a Development Approval of 30 years (subject of a separate application to be lodged concurrently).
- Excavate sand and limestone.
- Provide reserves of strategically located sand and limestone suited to a variety of end products.
- Prepare the site for LandCorp to conform to the **NIASP17**.
- Maximise the use of sand and limestone to the north of Perth, to enable greenhouse gases, transport, and other environmental issues associated with alternative resources, to

be minimised.

- Help to keep the prices of local limestone products at the lowest possible levels, by reducing transport distances and competition. This benefits the whole community.
- Comply with Statement of Planning Policy No 2.4 Basic Raw Materials, for the Metropolitan Area which state that basic raw materials should be taken prior to sterilisation of the area by development.

The following factors are considered in detail:

- The existing environment including soils, surface and ground hydrology, vegetation, flora and fauna;
- The application of guidelines and policies relevant to the proposal;
- Future mining operations including a staged excavation plan, infrastructure, access, and management of noise, dust, fuel and wastes; and
- A staged rehabilitation plan in conjunction with development of the site for the intended industrial development as identified in the approved structure plan for the Neerabup Industrial area.

2.5 Site Plans

Site Plans supporting the application are appended in **APPENDIX C.**

3.0 EXISTING PHYSICAL ENVIRONMENT

3.1 Regional Geology

The resource lies on a ridge of Tamala Limestone that extends north south, inland from the west coast. Elevation of the limestone ridge averages 75 metres, rising to 80 metres in the north east.
Tamala Limestone, which outcrops along the south western coast of Western Australia, is an aeolian calcarenite (formed from wind blown calcareous sands) derived from beach sands. It consists of foraminifer, shell fragments and quartz grains, and therefore variation in the quality of the stone is normal both laterally and vertically.

The upper portion of the limestone is frequently recalcified to form hard capstone. In this area the capstone is restricted to small parts of the ridge. Pillars of limestone are common, separated by deep yellow sand, and are the main landform of the ridge. Away from the ridge the pinnacles drop out of the soil profile and the proportion of sand increases.

There is no evidence of karst features in the limestone exposed on the faces of the existing quarry. The geomorphology, geology and relationship to the water table make it unlikely that karst features will be found. They are more related to the edges of the wetlands to the west.

The existing excavations to the east of the site provide a good opportunity to assess the presence of caves and karst. None has been observed in either the existing adjoining quarry east of Lot 503 or south of Flynn Drive.

The resource area lies outside the Karst Risk Area identified by Csaky D, 2003.

The proposed base of the quarry at a concept minimum of RL 50-52 metres AHD rising to be compatible with the adjoining land and excavated areas is still over 20 metres above the regional and local water tables. The risk of surface cavities and discontinuities is also reduced by the sand which forms infill, grading to a deep layer, over the limestone

Therefore, the risk of the presence of caves or karst is considered low.
In this area the grade of the limestone can be up to 87% CaC03 (Gozzard, 1987, Limesand and Limestone resources between Lancelin and Sunbury, Western Australia, Geological Survey of Western Australia, Record 1987/5).

The Muchea Sheet of the 1:50,000 Geology Series indicates that the site is in an area underlain by sand derived from Tamala Limestone.

The underlying Tamala Limestone is recognised as a particularly variable material both in terms of its extent and degree of cementing. The limestone comprises a weakly to well cemented matrix with uncemented inclusions. Features such as pinnacles and cavities are known to exist in this type of material. Significant variations in rockhead elevation and cementation can occur over very short distances.

Subsurface conditions across the site can be generalised as:

- SAND -fine to medium grained, brown orange, with silt in parts, loose to medium dense, overlying
- LIMESTONE -fine to medium grained sand in a calcareous matrix, pale brown/ off white, weakly to well cemented.

3.2 Surface Hydrology

The site consists of highly permeable sandy soils overlying limestone formations, and infiltration of rainfall is the dominant hydrological process. Consequently, no surface drainage lines or seasonally inundated areas occur.

The final contours proposed by the **NIASP17** will rise from 52 metres AHD along the eastern boundary to 78 metres AHD on the north-eastern boundary. Therefore, the final land surface will be 20 metres above the highest known water table. Refer to Section 3.4 for discussion on proposed structure plan levels.

3.3 Groundwater

The Perth Groundwater Atlas indicates that the maximum expected groundwater levels at the site vary between about RL 30m on the eastern boundary to RL 24m along the western boundary. (Department of Environment, Perth Groundwater Atlas). Flow is to the south west.

Therefore, the groundwater level is well below the existing and proposed surface levels and will not be a constraint to the development of the site. Flow of ground water is to the west towards Lake Neerabup.

3.4 Topography & Structure Plan Levels

The existing topography of the site rises from a height of RL 50m AHD along the western boundary to 95 mAHD in the northeast of the site and up to RL 78m AHD adjacent to the common boundary with Lot 22.

The finished surface levels of the adopted Structure Plan provide for a site which generally grades from east at RL78 to west at RL53 in the north of the site and then from the northern and southern extremities at about 62m AHD to a central low area at RL50 AHD. The grading of the site is generally at 2% but there are some steeper areas with grades to 5%. Figure 5 details the final design levels which must be achieved to meet the requirements of the Structure Plan. Refer to Figure 5 and Figure 6 below.

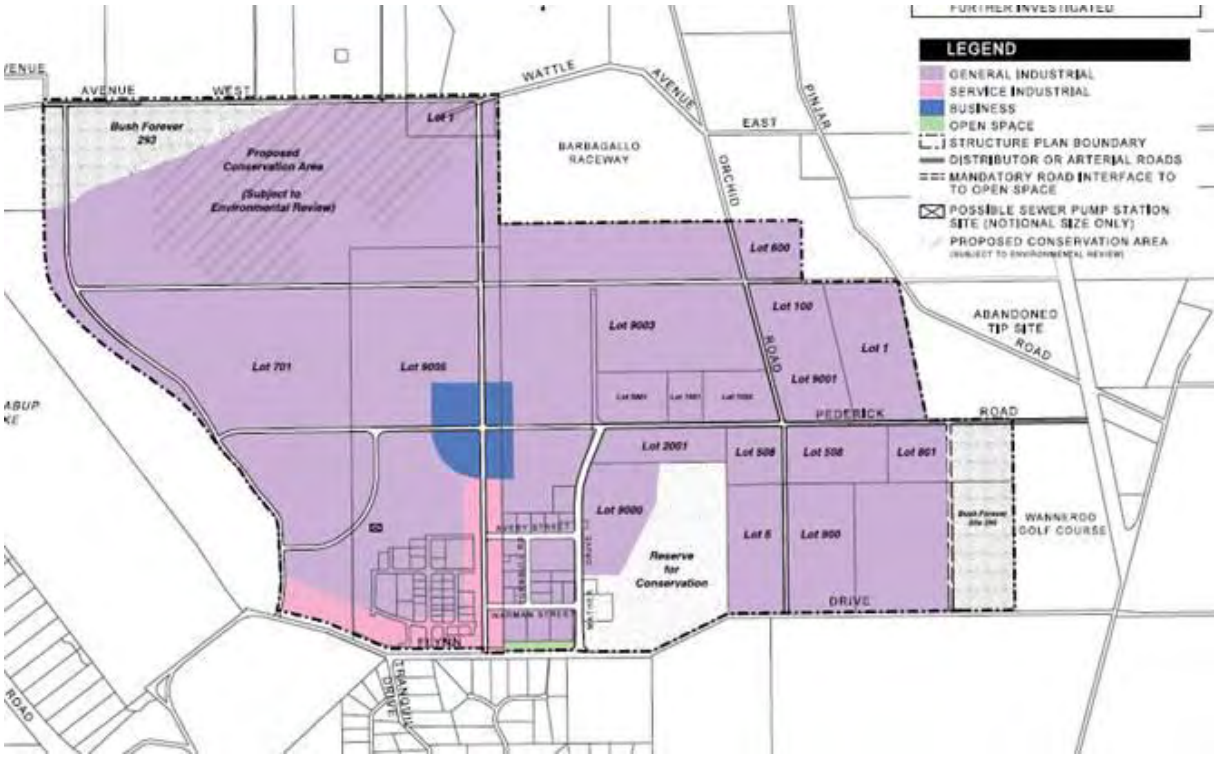

Figure 5 - Structure Plan 2017)

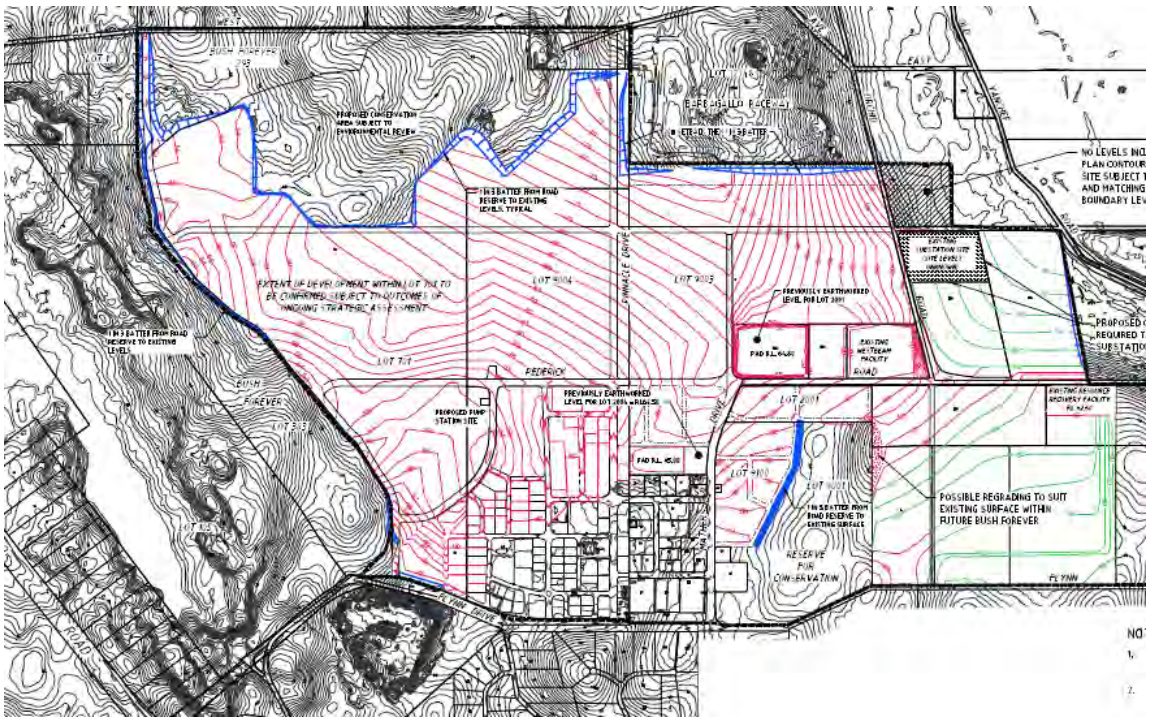

Figure 6 - Structure Plan Levels (2015)

Therefore, following the completion of limestone and sand extraction further earthworks would generally be required at subdivision stage to present lots which meet current market expectations.

3.5 Surrounding Land Uses

LandCorp's existing Limestone and sand quarry is located along the common eastern boundary of the subject site and Barbagallo Raceway is located to the NE of the site. Bush Forever Site No. 393 is located to the north of the proposed excavation area, Flynn Drive to the south and Bush Forever site 384 to the west.

The nearest residence is located approximately 300m south-east of the site to the south of Flynn Drive. This residence is part of a rural living estate. Other residences to the north of the site are rural properties in some cases already undertaking small scale extractive activities.

Consequently, the site can be considered relatively isolated in terms of sensitive adjacent land uses.

3.6 Description of the Resource

The area to be excavated consists of a low limestone ridge average height RL 75 metres and rising to 95 metres in the north east. The limestone is covered by a variable superficial deposit of yellow sand. The depth of the resource is limited by the final contours required by the **NIASP17** which rise from RL53 metres AHD in the central west to 78 metres AHD in the north-eastern corner and RL 63 metres in the south east. This provides for 20 metres depth of resource being available from the un-opened ground.

The degree of lithification of the limestone changes both horizontally and vertically from well cemented calcrete cap rock on the ridge, formed by additional cementation of the limestone, to softer less well cemented limestone at depth.

Sand covers much of the deposit away from the ridges and represents a resource of up to four metres deep which is used for fill and concrete sand as well as in rehabilitation.

Some material remains to be taken from the open ground, as the floor of the pit is brought into conformity with the required final contours.

There are several resources on the site; a ridge of limestone suited to rubble, road base and armour rock, and possibly limestone for block manufacture, together with a large resource of sand which is suitable for fill and may also be suitable for concrete manufacture. There is also high quality (metallurgical grade) limestone resources towards the northern boundary (under Bush Forever site 293).

Sand and roadbase prices are sensitive to transport distances so access to these resources can benefit local and future residents of the area by containing delivered prices.

Depending on the rate of excavation some 30 plus years of limestone and sand resources are available for extraction within the entire site area.

4.0 BIOLOGICAL ENVIRONMENT

4.1 Vegetation & Flora

Bush Forever (Government of Western Australia, 2000) effectively supersedes System 6 recommendations for conservation in the Perth Metropolitan Region, focusing on the retention and protection of selected areas of native vegetation through a number of implementation methods.

Part of the site have been included in the Bush Forever process as part of Site No.293 & 384, Neerabup. The outcome is the definition of a conservation boundary through a Negotiated Planning Solution as depicted in Figure 2 , which protects the areas identified within Bush Forever as having "Regionally Significant Bushland". Extractive industries as proposed also acknowledges and adopts this boundary.

The site is generally covered with native vegetation and extensive clearing will be required to facilitate resource extraction and earthworks to accommodate future industrial development.

(Excerpt from Neerabup Industrial Area - Structure Plan No.17 Report September 2017)

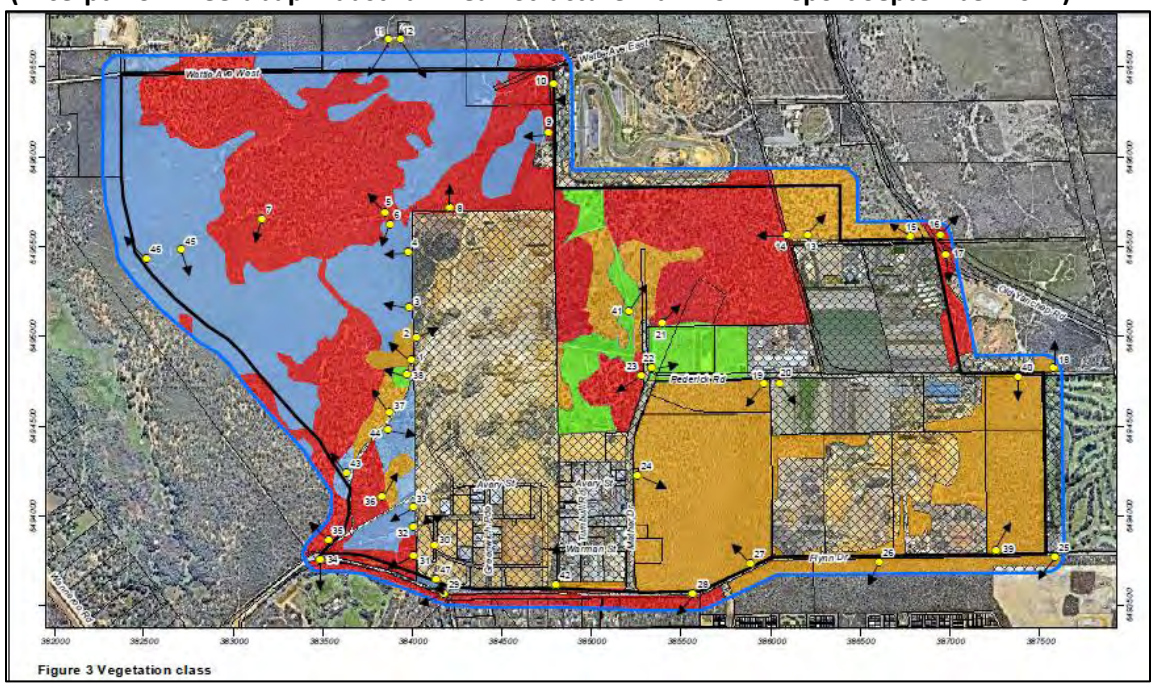

Figure 7 - Vegetation Class

A detailed description of the Flora and Fauna of the site in provide in the Environmental report by Ecological Australia (Refer to **APPENDIX E**).

4.2 Fauna

The site (Lot 503) is zoned for industrial purposes and is partly covered by native vegetation, which is the habitat for a range of native species. Refer to **APPENDIX E - Ecological Environmental Report**

The survival of native fauna depends on the management of the rate of clearing and development of the site. Site development requires that the site be excavated and progressively cleared and developed for industrial use by LandCorp.
Progressive clearing will permit time for native fauna to migrate ahead of the loss of habitat caused during development of site.

4.3 Wetlands

There are no wetlands on site. Lake Neerabup occurs 0.5 km to the west. Lake Neerabup is maintained by westwards groundwater flow and is an expression of the superficial aquifer.

5.0 SOCIAL ENVIRONMENT

5.1 Alternative Resources

The limestone resources of the northern Perth Metropolitan area are seen as strategic resources for the community, which is why they are identified in SPP 2.4.

Most of the resources closer to Perth have been sterilised by development, conservation of vegetation considerations, and public intolerance.

In the northern Perth Metropolitan area high grade limestone that is available for community use is located on the land held by LandCorp or is located in State Forest or potential extension of the Yanchep National Park.

The Chamber of Commerce and Industry 1996, has investigated the limestone resources and found them to be restricted in the northern Perth Metropolitan Area.

See Chamber of Commerce and Industry, 1995 and 1996, *Managing the* Basic *Raw Materials of Perth and the Outer Metropolitan Region,* Parts 1 and 2 and Chamber of Commerce and Industry, 2008, Basic *Raw Materials* Access *and Availability.*

Sand and limestone are widely used community resources and the deposits that are not already sterilised are finite and should be used in a staged manner.

Should they not be available resources will have to be sourced from another location, at a significant greenhouse penalty from an area that is also likely to involve clearing.

5.2 Land Zonings

Under the City of Wanneroo Town Planning Scheme No.2 and Neerabup Industrial Area Agreed Structure Plan No 17 (ASP 17), majority of Lot 503 is currently zoned as 'General Industrial' with a small portion of the land along the southern boundary of the lot zoned as 'Service Industrial'. The area zoned as 'General Industrial', with Council approval, permits the Extractive Industry as a discretionary "D" use.

The development approval issued by Council on 5 March 2019 (DA2017/509) only permits extractive industry to occur within the 'General Industrial' zone on ASP17. Condition (g) of the DA prescribes that only bulk earthworks can occur on the southernmost portion of the site (zoned 'Service Industrial'; under ASP17), and that no extractive industry activities are to take place within this area.

It should be noted that all activities specific to 'extractive industries' will be excluded from the area zoned as 'service industrial' and only bulk earthworks activities will be carried out in this zone.

Section 3.17.1b of the City of Wanneroo District Planning Scheme has the objective; "protect from incompatible uses or subdivision, basic raw materials priority areas and basic raw materials key extraction areas".

Section 3.17 .3f commences "There is a presumption in favour of applications for the extraction for basic raw materials in the basic raw materials resource areas ..... "

Statement of Planning Policy 2.4 recognises the site as Priority Limestone Resource, Number

30/13. This is also recognised in the Metropolitan Rural Plan and the North West Structure Plan. Furthermore SPP 2.4 requires that resources be staged and taken prior to sterilisation by other land uses.

End Use

The extraction of limestone and sand is seen as the interim use to achieve an industrial end use as shown in the **NIASP17**. This progression of development is already occurring in the south of adjoining Lot 9005 (formerly Lot 22).

5.3 Surrounding Land Uses and Buffers

Refer to Section 3.0 EXISTING PHYSICAL ENVIRONMENT above.

5.4 Progressive Planning

Excavation of the sand and limestone resources from Phase 1 Lot 503 is consistent with orderly planning of the site to achieve an industrial end use.

5.5 Community Consultation

The Proposed Extractive Industry Licence Application will be subject to public advertising to provide the community the opportunity to comment on the proposal. The application will also be referred to all relevant regulatory authorities by the City of Wanneroo.

5.6 Heritage

A search of the of the Department of Indigenous Affairs database was undertaken with no heritage sites identified within the project area. An Indigenous Heritage site survey of the Neerabup Industrial area including the subject site area was completed by LandCorp. Several sites are listed adjacent to Lake Neerabup including Orchestra Shell Cave. Lake Neerabup is 1 km distant to the West of the subject site.

HERITAGE			
Potential Impact	**Management**	**Outcome Commitments**	**Action Required**
Aboriginal sites	*Aboriginal Heritage Act 1972-1980* - Should any evidence of early aboriginal occupation be uncovered, development will be stopped pending an assessment by a recognised consultant. - If the site is confirmed as a site under the provisions of Section 15 of the Aboriginal Heritage Act 1972-1980 and Amendments, operations will cease pending relevant negotiations.	The proponents will comply with the *Aboriginal Heritage Act 1972-1980*	None required at this time.
European	There are no known European Heritage sites within the subject		

Heritage	site

5.7 Responsible Authorities

A number of Local and State authorities are involved as referral agencies for approval of extractive industry applications of this type or have an interest in the quarrying operations.

- **City of Wanneroo**
  - Has responsibility for local roads in this area.
  - Issues Recommendations and Development Approval under the current Town Planning Scheme.
  - Issues and oversees the Extractive Industries Licence.

- **Department of Mines Industry Regulation and Safety**
  - Controls the safety and methods of extraction.
  - Oversees the health and safety of workers.
  - Provides input into the need and protection of basic raw materials.

- **Department of Conservation Biodiversity and Attractions**
  - Oversees all significant environmental impacts.
  - Licenses any screening plant used in the processing of limestone.
  - Responsible for flora and fauna.

- **Department of Indigenous Affairs**
  - Oversees the Native Title Amendment Act and the *Aboriginal Heritage Act 1972 – 1980.*

- **Department of Water and Environmental Regulation**
  - Issues guidelines for water quality management for extractive industries.
  - Oversees protection of groundwater and water courses.

- **Environmental Protection Agency (EPA)**
  - Oversees control of dust, noise, vibration, and nuisance emissions from the site.

- **Main Roads WA**
  - Responsible for construction and maintenance of main roads and the use of these roads by truck traffic.

- **Western Australian Planning Commission**
  - Responsible for Statement of Planning Policy No 2.4, Basic Raw Materials Policy.
  - Responsible for regional planning including the Metropolitan Region Scheme.
  - Issues Planning Consent under the Metropolitan Region Scheme.

6.0 MINING OPERATIONS AND MANAGEMENT

Environmental issues including dust, noise and traffic can be managed in such a way to minimise or eliminate any potential impact on the local community. Dust and noise can be contained by the methods of extraction to be used and the control measures which will be put into place. Measures to protect the site and minimise the influence of dieback are addressed under Environmental Management.

The following sections describe the future mining and management at the site.

6.1 Project Summary

ASPECT	PROPOSAL CHARACTERISTIC
EXCAVATION	
Total Resource Area (Phase 1)	93.4 hectares
Total disturbance area	93.4 hectares (Phase 1)
Total Area of Mining Footprint	93.4 hectares (Phase 1)
Sand-Limestone extraction	Up to 700,000 tonnes per year
Total estimated Resource	15 million BCM
Life of Project	>30 years
Area cleared per year	Average 3 – 5 hectares
Area mined per year	Average 2 – 3 hectares
Area open at any one time	20 plus hectares required including backfill to design
Dewatering requirements	None
Depth of excavations	Up to 10+ metres
Native vegetation to be cleared	Refer DWER NVCP Approval 7405/1
PROCESSING	
Sand and Limestone	See excavation rate above
Water requirements	Supplied by existing Groundwater Extraction License estimated

	usage 12,000 kL per year
Water supply source	Supplied by a new bore to be constructed with DWER approval
INFRASTRUCTURE	
Total area of plant and stockpiles	Located within existing excavated area
Area of settling ponds	Not required as site is too porous
Fuel storage	Proposed to be mobile refuelling with an onsite bunded and lined fuel storage tank of 10,000 L.
TRANSPORT	
Truck movements	Variable but an average of approximately 10 per hour
Access	Limestone internal haul road to Flynn Drive
WORKFORCE	
Construction	5 persons
Operation	10-12 persons
Hours of operation	Approved hours of operation will be 6.30am to 6.00pm Monday to Friday and 7.00am to 5.00pm Saturday, excluding public holidays

6.2 Extraction and Processing of the Resource

6.2.1 Excavation Method

The area where resource extraction works are to be undertaken, is to be cleared and stripped of overburden/topsoil, prior to any extraction. Topsoil is generally either blended for re-use as part of the post extraction backfill or for stabilisation of batters. Permanent topsoil stockpiles will not be created as the topsoil material is to be re-used in the progressive backfill operations.

The excavation of limestone will cut a graded quarry floor by sequentially opening new ground as excavated ground is closed and rehabilitated to achieve approved structure plan levels.

The objective of excavation is to maximise the extraction of resource to meet government requirements, so selected parts of the quarry floor will be excavated below proposed design levels. Therefore, progressive backfill is required to rehabilitate excavated areas to achieve approved structure plan levels.

Limestone Excavation

Limestone can be taken for production of several types of products. It is possible that dimension stone blocks could be cut. Other limestone can be taken from site as rubble for use in clinker manufacture, roadbase for road construction or reconstituted block construction of retaining

walls and decorative paving blocks.

A production rate of approximately 700,000 tonnes per year is anticipated, depending on market demand for quarry products. It is possible that a larger tonnage may be required in any particular year.

Roadbase

Excavation will be carried out in sequence.

1. The excavation is similar to past excavation on Lot 9005 (formerly Lot 22) adjacent to Lot 503.
2. A bulldozer will be used to remove any vegetation cover by pushing it into windrows, for mulching and use on the batters to minimise soil erosion and spreading on the final land surface as part of the final rehabilitation.
3. Where practicable vegetation is directly transferred to an area being rehabilitated. Smaller indigenous shrub material will be used in the rehabilitation process when available and suitable; for example, on batter slopes of completed areas.
4. If direct transfer is not possible the vegetation is stored in dumps, mulched or swapped with a nearby operator or developer to try and ensure that the material is not wasted.
5. Any excess vegetation which can not be utilised by the methods stated above will be disposed of at a landfill site that is acceptable to the City of Wanneroo.
6. The use of weed affected topsoil is managed to minimise the spread of weeds It is buried or sprayed to reduce the future weed loading on the site. See 7.1.6 Weed Management Plan.
7. Overburden, as yellow and brown sand and low grade limestone, is removed by pushing to the perimeter of the proposed pit to form perimeter bunding to the pit. Excess overburden is either directly transferred to a rehabilitation area or stored in low dumps for later rehabilitation use.
8. Limestone is to be excavated to a floor of the pit, from behind perimeter bunding and edge face at elevations 10 -20 below natural ground level.
9. The limestone will be deep ripped with a bull dozer which is pushed down a sloping face below the elevation of the perimeter bunding.
10. In the process the limestone is track rolled as the bulldozer pushes and this crushes the limestone.
11. The rubble produced is pushed into a stockpile from which it is loaded directly into road trucks for taking offsite for use as roadbase, raw feed for reconstituted block making, or for clinker manufacture.

12. To produce various sizes products for road bases the rubble may need to be crushed and screened. A loader will take material from the rubble stockpile created by the bulldozer and will then load it into a mobile crusher for reduction to the required size.
13. From the crusher the product may be screened and a series of stockpiles formed by a classifier, which is essentially a series of conveyor belts that form stockpiles of various grades of material.
14. It is possible that a small amount of bitumen stabilised road base products is produced. In this case limestone road base is mixed with a small volume of bitumen emulsion (about 2%) for use in road base and construction materials in a small portable screening plant.
15. All static and mobile equipment such as the loader, transport, crushers and screens will be located on the floor of the quarry to provide visual and acoustic screening. Stockpiles of products will be retained on the floor of the pit to reduce visual impact.

16. Water is used for dust suppression, to reduce the potential for dust generation from the movement of machinery and the effect of wind.
17. Blasting is not part of the normal operations to produce road base.
18. Subgrade material and overburden is normally stored in the bunds around the perimeter of the pit and then used to recontour the completed pit as the first stage of rehabilitation.
19. At the end of excavation the floor of the quarry is deep ripped, covered by a layer of overburden and top soil and rehabilitated with pasture and local indigenous tree/shrub species as an interim to future rural living land use.
20. 700,000 tonnes annually (average) is anticipated to be produced in any particular year in order to keep pace with anticipated demand for the extracted resource and product, but this may vary depending on market demand for quarry products.

Dimension Stone

Dimension stone cutting is not always used and currently there is no such production. However, if dimension stone is taken the operational sequence will be as follows.

1. The cutting floor is created behind the face and perimeter bund, a minimum of some 5 metres below natural ground level.
2. A bull dozer is used to remove the cap rock and surface limestone, to produce a relatively flat cutting floor of soft limestone.
3. A grader is used to smooth and level the floor, as flat as possible, to allow the installation of rails and cutting machines.
4. As dimension stone is to be cut, sections of the floor are lowered by the depth of one block until the whole floor is lowered. The next set of blocks are cut by the reinstallation of the rails and cutting machines on the lowered floor and the process repeated. This method of excavation means that the cutting floor is gradually lowered over time. The cutting saws are electric, using air cooling for the blades.
5. Water is used for dust suppression, to reduce the potential for dust generation from the movement of machinery and the effect of wind.
6. Blasting is not a normal part of the quarrying operations.
7. At the end of excavation, the cutting floor is used for limestone road base.

Armour Stone

1. Armour stone is the production of large boulders of several sizes for use in coastal construction. Normally only the harder recalcified surface rock is used. Occasionally larger blocks may be "popped" by explosives or broken with a rock breaker.
2. The market for armour stone is very intermittent and limited and it may be that this material is never produced from the pit. Blasting can be used to break larger pieces but in recent years a rock breaker has been preferred.

Details of the Rehabilitation are listed under Section 8.0 ONGOING REHABILITATION & MINE CLOSURE PLAN

Sand Excavation

If sand is excavated, the active area is prepared in the same manner as described under Limestone Extraction above.

1. Sand is loaded directly to a road truck for fill sand.
2. Sand is cut down to the basal limestone which is then extracted.
3. Mixed sand and limestone may be screened to maximise the resources.

6.2.2 Pit Design & Staging

The proposed quarry excavations will proceed generally from west to east and most likely from the S to N. Refer to Figure 8 - Staged Quarry Operations (Lot 503 – Phase 1 Area)

It is estimated that about 700,000 tonnes of limestone and sand products may be excavated from the site annually depending on sales contracts. It is possible that **if** large contracts are obtained a larger amount of material may be sold in a particular year.

The active area needs to be large enough to enable a range of limestone and sand products to be available at all times, and to provide sufficient area for processing/screening and for stockpiles. At least 5 -10 hectares of floor open at any time, in addition to internal roads, with two operators on site and to maintain site safety.

Excavation **will** be staged and cut downwards, taking the surface sand first and moving from the centre outwards in areas selected for excavation so as to minimise visual impact as well as gaining the maximum noise screening.

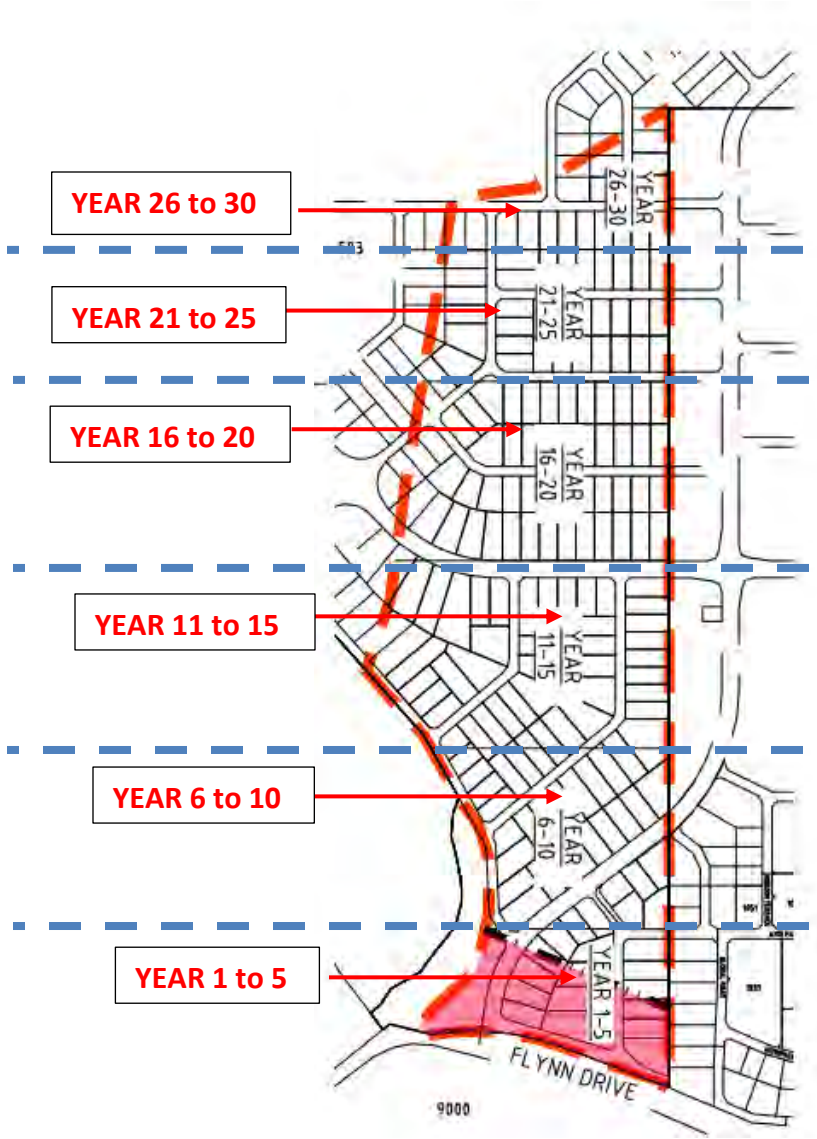

Figure 8 - Staged Quarry Operations (Lot 503 – Phase 1 Area)

It should be noted that all activities specific to 'extractive industries' will be excluded from the area zoned as 'service industrial' and only bulk earthworks activities will be carried out in this zone.

The site will be cut below the planned final level where high-grade limestone occurs and will then backfilled to the planned final level with low grade limestone and sand. Engineering advice and compaction testing to the requirements of the contract with the landowner will be used to recontour, compact and stabilise the land.

Wherever possible rehabilitation will be commenced as areas are completed to ensure that the amount of ground that is open at any one time is minimised. Final contouring of the quarry area will follow the proposed levels for the future roads and industrial lots.

It is anticipated that the life of the quarry will be at least 20 years depending on market demands.

1. The existing access road servicing Lot 9005 (formerly Lot 22) will be used from Flynn Drive. This access currently crossed through Lot 503 and may require diverting to a new alignment to suit quarry operations on lot 503.
2. The existing bitumen apron and entrance to Flynn Drive will be maintained.
3. The proposed excavation will be set back in excess of the normal 40 metre road buffer zones.
4. Normally a 20 metre setback from adjoining lots is used but this will not be the case with the adjoining Lot 9005 to the east because that land is currently being excavated and a consistent final land surface will be required between the properties in line with the approved structure plan levels (Refer to Figure 5).
5. The excavation to depth is proposed to be completed without the use of benches with the sand and limestone being separate operations and the sand taken from above the limestone.

Surface Restoration

1. A bulldozer is used to reform the proposed final land surface, infilling and back filling as required. Any fill is completed in small lifts, compacted and tested to comply with an industrial substrate. The floor is then subject to deep ripping the basal limestone followed by pushing and spreading of overburden and finally topsoil.
2. Rehabilitation is completed progressively as the pit moves across the resource. Land restoration is completed to the agreed final land surface in a manner similar to that used in the southern portion of Lot 9005 (formerly Lot 22) where early sections of the limestone pit have already been developed for industrial estate, with roads and new lots already formed.
3. As a last phase the perimeter bunds are pushed down and the batter land surface reformed.

6.2.3 Final Contours

Following mining, the finished levels will be gently sloping with a minimum elevation of 53 mAHD (Figure 5) approx. mid way along the western boundary with the Bush Forever site 383 to a peak of RL 79m AHD approx. in the north-east corner of the site in accordance with the approved Structure Plan levels. A vertical separation distance in accordance with the groundwater protection policy objectives. Furthermore, this final elevation will provide continuity with the final floor elevation of Lot 9005 which immediately adjoins the site's eastern boundary.

Finished batters will be used to integrate the mined surface with the natural remaining topography of the site, with the steepest batter being 1 in 3 on the northern and western boundaries (Figure 5). Working batters on the mine face will be left in a slumped condition at the end of each day and over weekends for safety reasons.

6.2.4 Processing of the Resources

The processing of resource will incorporate modern methods of equipment based screening and crushing to produce naturally graded or blended products suitable for industry use. Methods of excavation or processing, the permanent structures required or the equipment used, may require some change to suit modern equipment availability and development to ensure extraction and processing is undertaken with the latest and most efficient processes available to the quarrying industry.

A site office in conjunction with an approved toilet system is to be located in the south west adjacent to the existing access road. The site office is to be located within a locked compound which will also enclose a weighbridge. A seatainer may be required for servicing and storage of minor equipment within the pit area. It should be noted that the site office and associated infrastructure, including but not limited to ablution blocks, lunchroom facilities, seatainers etc, will not be located on land that ASP 17 designates as 'service industrial'.

Mobile telephone is available for emergencies and all mobile plant is able to communicate with the site office via two-way radio.

All static and operational equipment will continue to work on the quarry floor to provide maximum sound and visual screening wherever possible.

Refer to Figure 9 and Figure 10 for typical site operations facilities, resource product and resource recovery methods at each stage of operation (some photos taken of existing operations on LandCorp operated Quarry of Lot 9005 (formerly Lot 22).

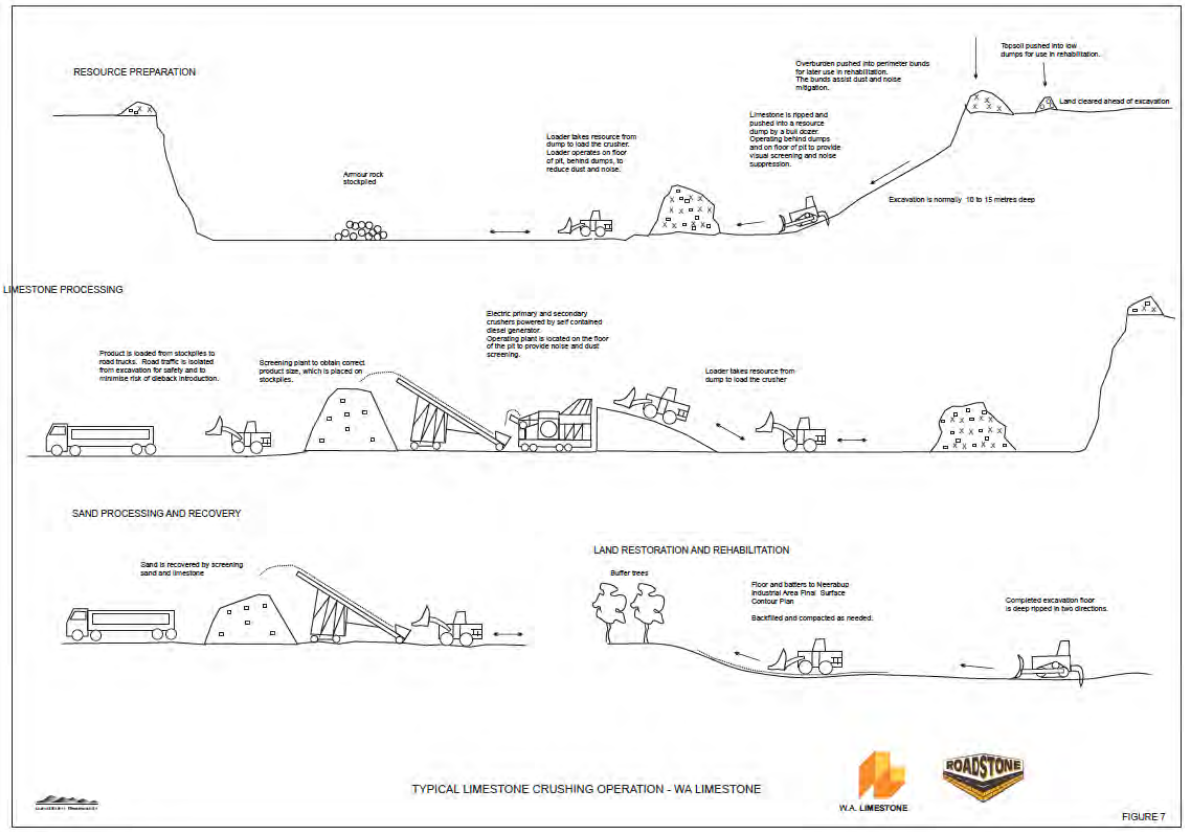

Figure 9 - Typical Mine Operations Flow Chart and Sequencing Diagram

Limestone

There are no proposed changes to the processing of limestone.

1. A mobile crushing plant and screens are used to prepare construction materials.
2. Crushing plants and screens are licensed or registered through DBCA as required for the site or as a mobile pit.
3. Annual throughput is anticipated to continue at 700,000 tonnes although more could be taken in any particular year in response to market demand for particular quarry product.
4. Mobile crushing plants are used.
5. From the crusher the product is screened and a series of stockpiles formed by a classifier, which is essentially a series of conveyor belts that form stockpiles of various grades of material.
6. It is possible that a small amount of bitumen stabilised road base products are produced. In this case limestone road base is mixed with a small volume of bitumen emulsion (about 2%) for use in road base and construction materials in a small portable screening plant.
7. A site office and service shed is to be located adjacent to the access road in the south-western corner of the site.

Sand

A screening plant may be used for the separation of limestone from sand. This plant, if used will be a small mobile plant that will be moved from time to time, as the face moves.

Any screening will be licensed through the DBCA as required for the site or plant depending on the annual throughput.

Taking limestone from pushed up resource, November 2009

Loader feeding a working crusher

Loading a working crusher, November 2009

Limestone crushing plant

Crushing limestone, November 2009

The stabilised limestone plant with products in the background

Various grades of limestone product stockpiles

Various grades of limestone product stockpiles

Figure 9- Typical Views of Operations and Resource Extraction and Product Produced

Weighbridge and site office

Fuel tank located in a bunded and lined facility

Truck wet down facility near the weighbridge

Operating water truck

Developed industrial land on the southern end of Lot 22

Figure 10 - Typical Photos showing Facilities required for quarrying operations

6.2.5 Stockpiles

Stockpiles of all products are retained on the floor of the pit to reduce visual impact. Relatively small stockpiles of 20 -40 000 tonnes are proposed to continue to be used. There may also be some small stockpiles of cut dimension stone placed on pallets if produced. Stockpiles will not be located within the 'Service Industry' zone.

Saleable product stockpiles will be located adjacent to the crusher and be relocated progressively or as sales orders are fulfilled but will generally remain within the sequential extraction zones in accordance with Attachment B of DA2018 509. As most resource produced is immediately loaded onto trucks for delivery to customers it is therefore unusual for resource to be stockpiled for long periods.

6.3 Hours of Operation

The approved hours of operation are between 6:30am and 6.00pm Monday to Friday and 7.00am and 5.00pm Saturday, excluding public holidays, for bulldozing and processing.

Transporting material on Saturday is normal today because of the short distance of the quarry from major arterial roads, and the change of Saturday to a day of normal commercial trading in recent years.

HOURS OF OPERATION			
Potential Impact	**Management**	**Outcome Commitments**	**Action Required**
Operating times	Approved hours of operation will be 6.30am to 6.00pm Monday to Friday and 7.00am to 5.00pm Saturday, excluding public holidays.	The proponent will comply with the approved hours of operations.	Compliance with the Excavation Management Plan, Compliance with Licence and operating conditions.

6.4 Machinery & Equipment

The following equipment is proposed to continue to be used during the excavation and processing of limestone.

- Electricity from Western Power is available to the site.
- A Telstra landline phone is available to the site.
- Licensed groundwater bore for the supply of construction water

Site office/lunchroom	A site office/lunchroom is to be maintained on site for the management and security of small items.
Toilet system	A serviced portable toilet system is to be installed at the site office when the site is manned.
Storage sheds	A storage shed is to be located on site for the storage of maintenance items.
Bore	One bore is to be located on site, licensed from DWER; with an allocation of 12,000 kL per year for dust suppression.
Fenced compound	Fenced security compound at the weighbridge for the storage of machinery is to be used for security.
Bulldozer	1. Bulldozer equivalent to D111 is to be retained on site for

	production of the limestone and land clearing. 2. Pushing, track rolling, land clearing and reinstatement and movement of limestone and for use in land restoration.
Water tanker	A 13,000 L water truck is to be used for dust suppression on the access road and working floors as required.
Loader	Rubber tyred loaders (Cat 980) and excavator for the movement of limestone and sand.
Bobcat	A bobcat may be used to lift reconstituted blocks or dimension stone if these are produced on site.
Blasting	Not normally used.
Weighbridge	A weighbridge is to be located at the site office in the Southwest.
Mobile crushing and screening plant	• Mobile crushing plant (licensed by DBCA). • Mobile screening plants are used for the preparation of various grades of limestone sand potentially to separate sand from limestone. • Screening plant are electric and combined with a Genset generator. • At any one time up to two or more mobile crushers and screens will be operating on site.
Fuel storage	• Vehicles are to be refuelled from mobile tankers. • A fuel storage tank of 10,000 litres is to be located within the fenced compound, bunded and lined with an impermeable membrane, to Department of Mines and Petroleum and Department of Environment and Conservation standards.

6.5 Access & Transport

The quarry will be accessed from Flynn Drive. The existing quarry haul road which services the existing quarry on Lot 9005 which traverses the west side Lot 503, will be used to access the Lot 502 Phase 1 quarrying operations. **See Figure 11**.

Unwanted access is restricted by small perimeter bunds and trenches, strategic placement of barriers of logs and boulders, and gates that will be locked when the site is unmanned and equipment retained on site. Fences are maintained and upgraded as required.

Warning signs are maintained as required by the Department of Mines Industry Regulation and Safety and the Extractive Industries Law.

Based on average rates of excavation and annual sales, approximately 10 laden trucks will leave the site every hour.

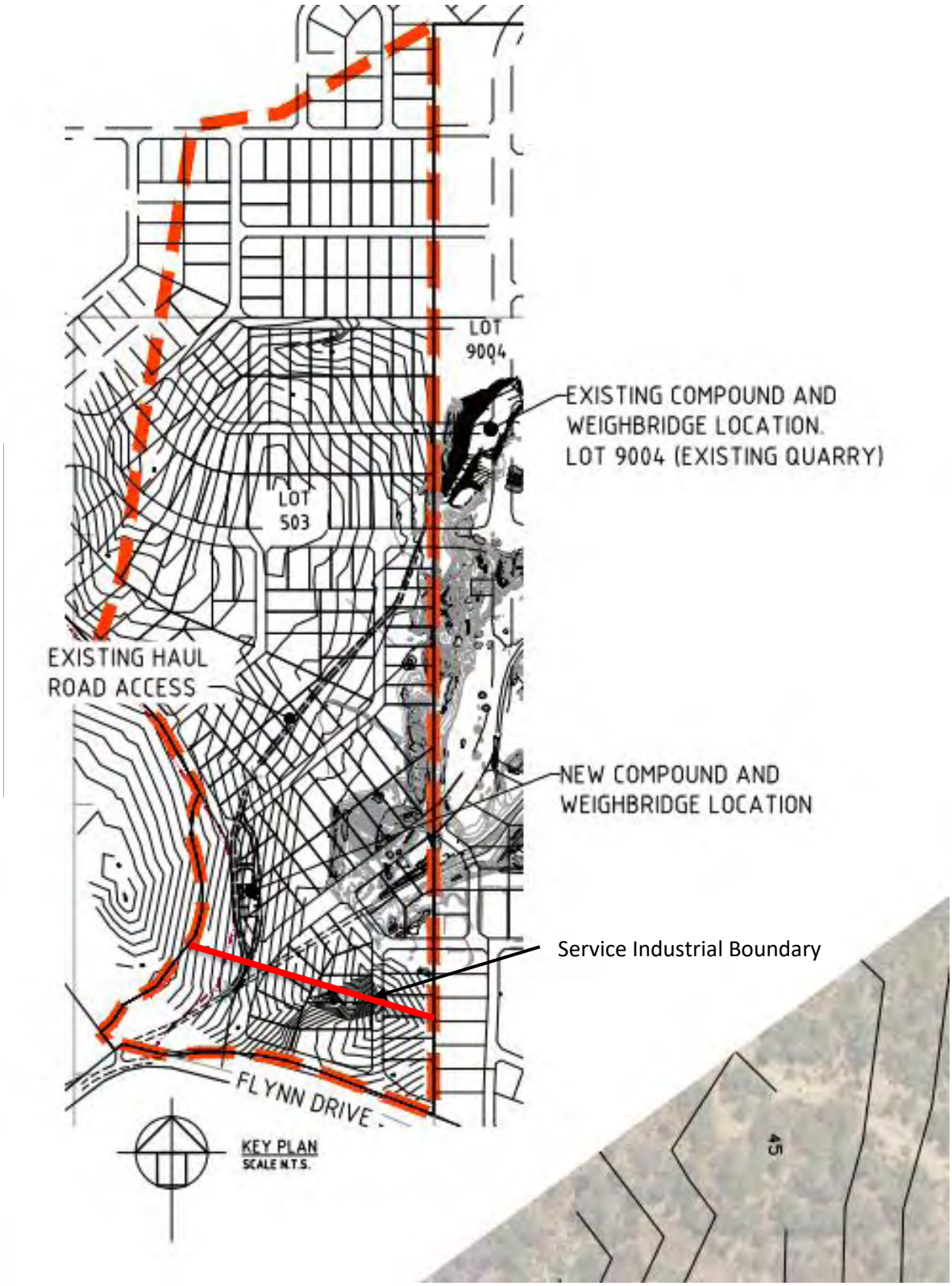

Figure 11 - Quarry Site Access & Site Compound Location

6.6 Workforce

The workforce will vary, depending on the level of operation, number and type of pits being excavated at any time and market demands, but usually a minimum of 10 -12 persons when busy.

6.7 Water Use

Water is to be mainly used for dust suppression.

A bore is to be provided on site licensed through the DWER. The landowner has an annual licence of 12 000 kl per year. A water truck will be retained on site full time and will have a capacity of 13,000 L. Daily, when conditions warrant the use of water, the water truck is anticipated to make 5 -6 rounds of the pit in dry conditions, which has been found to be sufficient to effectively minimise dust based on operations undertaken on the adjacent landholdings by the proponent. The amount of watering varies and may only be required for 1 -2 rounds on dry days in winter or not required on rainy days. Refer to Figure 9 for typical facility details.

Water will continue to be drawn from the licensed bore that is to be located within the fenced compound. From the bore, water is fed to tanks on site from which it can be quickly drawn for use.

Potable water is brought to the site as needed.

6.8 Safety

The site will operate to the *Mines Safety and Inspection Act 1994 and Regulations 1995,* which are administered by the Department of Mines Industry Regulation and Safety.

LandCorp propose to tender the quarrying operations to experienced quarrying contractors and operators and will require strong commitments to maintaining a safe working environment and to having demonstrated safe operations at their other facilities.

Companies to be selected will be required to develop and maintain a Safety Management Plan for the site, and a site specific Emergency Response Plan, to cover all operational procedures, which include workforce induction and training to ensure that all employees involved in sand and limestone excavation are made aware of the environmental and safety implications associated with all stages of the mining activities.

Where applicable Safe Operating Procedure Sheets will be required and prepared for all identified risks and hazards. Workers and staff are to be trained in the use of the procedures and all employees will be required to undertake site inductions and training as necessary prior to commencing work on the site.

Radio contact is to be available for all vehicles and the site is within mobile phone range.

See 6.5 Access & Transport for site security and 7.3.4 Fire Management

A key aspect of site safety is to prevent unauthorised access and the provision of signage.

Safety will also be addressed within the lease and operation agreement between the quarry operators and LandCorp. This lease will require the Quarry Operators to comply with the *Occupational Safety and Health Act 1984.* The operation agreement will also require the

preparation of a Safety Plan. As a Quarry the site must however operate to the *Mines Safety and Inspection Act 1984 and Regulations 1985.*

The Safety Plan is in place to assess the hazards at the site and provide a sequence of steps to reduce or deal with any hazard which is identified. The Safety Plan addresses the following Safety and Health Standards and will be adjusted to apply to extraction activities;

- Management Commitment
- Occupational Safety and Health Planning
- Consultation
- Hazard Management
- Training
- Sub-contractor Controls
- First Aid/Medical
- Rehabilitation
- Fire Prevention
- Occupational Hygiene
- Housekeeping
- Safety and Health Promotion
- Tenderer Safety Management Questionnaire
- Risk Assessment
- Safety and Health Performance Reporting
- Incident Notification

It is anticipated that the deepest excavation will continue to be a maximum of up to 10 plus metres below natural ground level. Faces are left in compliance with the Mines Safety and Inspection Act at times when the site is unattended. This can include fencing, bunding, signage, stable slopes and other appropriate measures.

Signs required by the Department of Mines Industry Regulation and Safety and the Extractive Industries Law are to be installed and maintained.

7.0 ENVIRONMENTAL IMPACTS

The likely environmental impacts are minimal on a well managed site. The issues are well known from existing limestone quarries in the local area and past operations.

In order to make each section more self contained the Environmental Management of each Section is included at the end of each section below.

7.1 Biodiversity Management

The site is to be cleared in accordance with the requirements of the approval to be issued by the Department of Water and Environmental regulation ("DWER"). Trees and shrubs will be removed from the quarry areas, with the topsoil remaining in place as required until such time as the quarrying operations require the stripping of the surficial overburden to expose the resource to be mined and processed as part of the extractive industries licence.

7.1.1 Land Clearing

Clearing is controlled under the **Environmental Protection (Clearing of Native Vegetation) Regulations 2004.** These regulations provide for a number of principles against which **clearing is assessed. Refer to DWER NVCP approval conditions.**

7.1.2 Vegetation & Flora

The final amount of flora and fauna habitat to be retained or provided will be decided through the planning processes, such as the **NIASP17**. This could include habitat areas, public open space or linkages.

The area of native vegetation, after development of the subject land for industrial purposes, will depend on the area of land allocated to, or rehabilitated with, native vegetation by LandCorp.

Local native species will be used in the revegetation of buffers, road reserves and other selected areas within the industrial development.

FLORA			
Potential Impact	**Management**	**Outcome Commitments**	**Action Required**
Flora	• The final landform and surface treatment is to be decided during the life of the project in consultation with LandCorp and to the requirements of LandCorp, in compliance with the approved Structure Plan.	The proponent will comply with the requirements of the approved structure plan.	Undertake the rehabilitation actions.

	• The amount of ground open at any one time is minimised, where possible, but sufficient ground is needed to provide the required resource and to enable continued processing of limestone. • Progressive clearing and interim rehabilitation is to be undertaken where appropriate.		

7.1.3 Fauna

The final land use is industrial land, under the control and guidelines of the approved Structure Plan to be implemented by LandCorp. The amount of fauna habitat retained will depend on the area of land allocated to, or rehabilitated with, native vegetation

FAUNA			
Potential Impact	**Management**	**Outcome Commitments**	**Action Required**
Fauna	• Topsoil removal will be progressive and followed by revegetation to similar vegetation to that currently present. • The final landform and surface treatment is to be decided during the life of the project in consultation with LandCorp and to the requirements of LandCorp, in compliance of the approved Structure Plan. • Fauna will be removed from areas prior to clearing of vegetation. • Fencing will be erected around work zones to prevent Fauna from entering work sites.	The proponent will comply with the requirements of the approved structure plan.	Undertake the rehabilitation actions.

7.1.4 Wetlands

There are no wetlands on site. Lake Neerabup lies 0.5km to the west of the proposed quarry site.

WETLANDS			
Potential	**Management**	**Outcome**	**Action Required**

Impact		Commitments	
Wetlands	• There are no proposed changes to the water recharge on site.	None required	None necessary

7.1.5 Dieback Management Plan

Dieback of vegetation is often attributed to Phytophthora cinamomi even though there are other Phytophthora species and other diseases such as Armillaria that can cause dieback like symptoms. Microscopic soil-borne fungi of the genus Phytophthora kill a wide range of native plants and can cause severe damage to many vegetation types, particularly those from the families Proteaceae, Epacridaceae, Xanthorrhoeaceae and Myrtaceae.

In most cases dieback is caused by a pathogen which infests the plant and causes it to lose vigour, with leaves dying, and overtime may kill the plant. As such the management of Dieback is essentially related to plant hygiene when coming onto a site and within a site.

There are several guides to the management of Dieback.

- *Department of Environment and Conservation CALM Dieback Hygiene Manual 1992* is *a practical guide to Dieback management.*
- *Department of Environment and Conservation CALM* Best *Practice Guidelines for the Management of Phytophthora cinamomi, draft 2004.*
- *Dieback Working Group 2005, Management of Phytophthora Dieback in Extractive Industries.*
- *Dieback Working Group, 2000, Managing Phytophthora Dieback, Guidelines for Local Government.*

The Department of Environment and Conservation generally recognises that Dieback is less likely to impact on vegetation on limestone and Spearwood/Cottesloe Land Systems, Podger F D and K R Vear, 1998, Management of Phytophthora and disease caused by it, IN Phytophthora cinnamomi and the disease caused by it -protocol for identifying protectable areas and their priority for management, EPA 2000. However recently Murdoch University has identified a species of Phytophthora as having impacts on Tuart in calcareous soils.

Dieback is only likely to be an issue when equipment is brought to the site from a dieback affected area either through vehicles or plant and soil materials, therefore the following general principles are applied to Dieback management.

The aim of dieback management during excavation is to minimise the risk of entry of dieback into the site. The calcareous soils of the remnant vegetation may reduce the spread of some Phytophthora species. but there may be other pathogens such as Armillaria.

In many ways the management of the site for dieback is similar to that for the management of weeds, and the two management practices are considered together.

Even so, as the final end use will be industrial land, and the land to the east of the site being Lot 9005 (Lot 22) has already been cleared in the past, the risks from dieback are minimised on a site such as this. There is very little risk of the operations spreading dieback onto vegetation on adjoining properties as there is no access to those properties.

On the other hand, good management practices are used as part of the ongoing normal quarry operations.

The following management procedures are used on other LandCorp managed operating quarry sites and it should be noted that not all potential impacts apply to all parts of the proposed quarry operations.

- DBCA and Dieback Working Group 2005, Guidelines will continue to be followed.
- Dieback principles are followed even though there is a reduced risk of spread on calcareous soils such as this. (Podger F D and K R Vear, 1998, Management of Phytophthora and disease caused by it, IN Phytophthora cinnamomi and the disease caused by it -protocol for identifying protectable areas and their priority for management, EPA 2000).
- The access road is to continue to be limestone.
- Vehicles are prohibited from entering vegetation ahead of excavation, apart from normal travel along made firebreaks and roads for normal security and maintenance activities.
- Dieback diseases are more likely to be transported under moist soil conditions.
- All vehicles and equipment are used during land clearing or land reinstatement, are clean and free from soil or plant material when arriving at site.
- When removing topsoil, the vehicles should run around the perimeter and then push inwards and not towards the pit.
- Remnant vegetation ahead of the stage to be excavated is quarantined by preventing land clearing vehicles from entering.
- No soil and vegetation is to be brought to the site apart from that to be used in rehabilitation and that which is dieback free.
- Plants to be used in rehabilitation are to be certified as dieback free sources.
- Unwanted access to vegetated areas is discouraged through a lack of tracks, signage, site marking and or fencing as appropriate
- Excavation vehicles are restricted to the excavation area apart from clearing land.
- Rehabilitated surfaces are free draining and do not contain wet or waterlogged conditions.
- Illegally dumped rubbish is removed promptly.
- When clearing land or firebreaks vehicles are to work from disturbed areas towards the pit; or in situations where dieback interpretation is not possible, from areas of higher quality vegetation to areas of lower quality vegetation.
- Roads are maintained as free draining and hard surfaced.
- A split operation will be undertaken where practicable, where the road transport vehicles only access one side of the stockpile or processing area and excavation vehicles operate on the other side of the stockpiles and processing, reducing the risk of contamination from road transport.

- DBCA has determined that material such as sand and limestone, taken from deeper in the regolith profile where there is no organic and other plant matter, carries low risk of spreading dieback. (DEC 2004).
- The Weed Management Policy will continue to be complied with.
- Topsoil will be cleared according to 8.0 Ongoing rehabilitation and Mine Closure Plan.

DIEBACK DISEASE			
Potential Impact	**Management**	**Outcome Commitments**	**Action Required**
Dieback Disease	*CALM Dieback Hygiene Manual 1992. CALM Best Practice Guidelines for the Management of Phytophthora cinamomi, draft 2004.* Dieback Working Group 2005, Management of *Phytophthora* Dieback in Extractive Industries. • The management procedures listed above will be followed, even though there is a minimal to no risk of dieback because access to surrounding land	The JV partners maintain their Dieback Management Policy to reduce the spread of *Phytophthora spp*.	Compliance with the Dieback Management Plan.

7.1.6 Weed Management Plan

The management of weeds is essentially similar to that for plant diseases. The impact of weeds is really the impact within the local area and the more they are controlled the better. It is desirable that the site does not become a haven for environmental weeds and therefore a management and control program is warranted at all sites.

Weeds can be declared under the Agriculture and Related Resources Protection Act 1976 which requires that Declared Weeds are eradicated. Other weeds are not Declared but may be classified as Environmental Weeds because they are well known for impacting on vegetation.

Generally, if the actions taken for Dieback are applied they will also control weeds. Not all potential impacts will apply to this quarry and the main impacts affecting this site are also listed.

Weed management will be used to minimise impact on site and on adjoining properties. Good management practices are used as part of the ongoing normal quarry operations.

A typical plan utilises the most appropriate on ground measures to minimise the risk of spread of

Declared and Environmental weeds. The information provided here summarises the key points of the on ground management to be used as part of the management practices to be implemented at the proposed quarry operations on Lot 503.

- Areas being rehabilitated are subjected to detailed weed management.
- The Dieback Management Actions are used to assist weed management.
- Inspections are conducted to monitor the presence and introduction of Environmental and Declared Weeds on an annual or more frequent basis. On identification, Declared and significant environmental weeds are either be removed, buried, or sprayed with a herbicide.
- Large plants such as Castor Oil plants and Declared Weeds are periodically grubbed out or spot sprayed with a herbicide. Smaller weeds are treated.
- Areas of grass can be sprayed with Fusilade or similar grass selective herbicide. This can occur over the top of rehabilitated areas without significantly setting back the broad leafed species.
- All vehicles and equipment to be used during land clearing or land reinstatement, are clean and free from soil or plant material when arriving at site.
- No soil and vegetation is brought to the site apart from that to be used in rehabilitation.
- Plants to be used in rehabilitation are to be free from weeds.
- Vegetated areas ahead of excavation are quarantined to excavation vehicles until required.
- Unwanted access to vegetated areas is discouraged through signage, marking, a lack of tracks or external fencing.
- Weed affected top soils may need to be taken offsite, used in weed affected areas, buried by 500 mm soil/overburden or taken offsite.
- Illegally dumped rubbish is the major source of weeds and is removed promptly.
- No weed contaminated or suspect soil or plant material is to be brought onto the site.
- When clearing land or firebreaks vehicles work in conjunction with dieback principles and push from areas of better vegetation towards areas of lower quality vegetation.
- Weeds are sprayed with broad spectrum spray prior to planting or seeding in weed affected soils as required.
- Weed management works from the least affected areas to most affected.
- Ongoing monitoring of weeds should be undertaken at least annually in autumn, prior to winter rains.

WEED MANAGEMENT			
Potential Impact	**Management**	**Outcome Commitments**	**Action Required**
Dieback Disease	*Agriculture and Related Resources Protection Act 1976.* • The weed management actions listed above are used as applicable to manage weeds on the site.	The proponents will implement and maintain a weed policy to try and prevent the introduction of Declared, Environmental or other weeds to the site, in particular in rehabilitation.	Compliance with the Management Plan.

7.1.7 Karst

No caves or sinkhole karst are known to occur locally on the resource area of Lot 503. Caves are known to occur along the western side of Neerabup Lake over 0.5- km to the west where organic rich water has formed cavities as it laterally exited from Lake Neerabup.

There are no known caves, based on local knowledge and an examination of the open quarry floor and previously excavated areas along the eastern boundary of lot 503. The site lies outside the known Karst belt, (Geoscience Australia 2005). See Figure 12 below

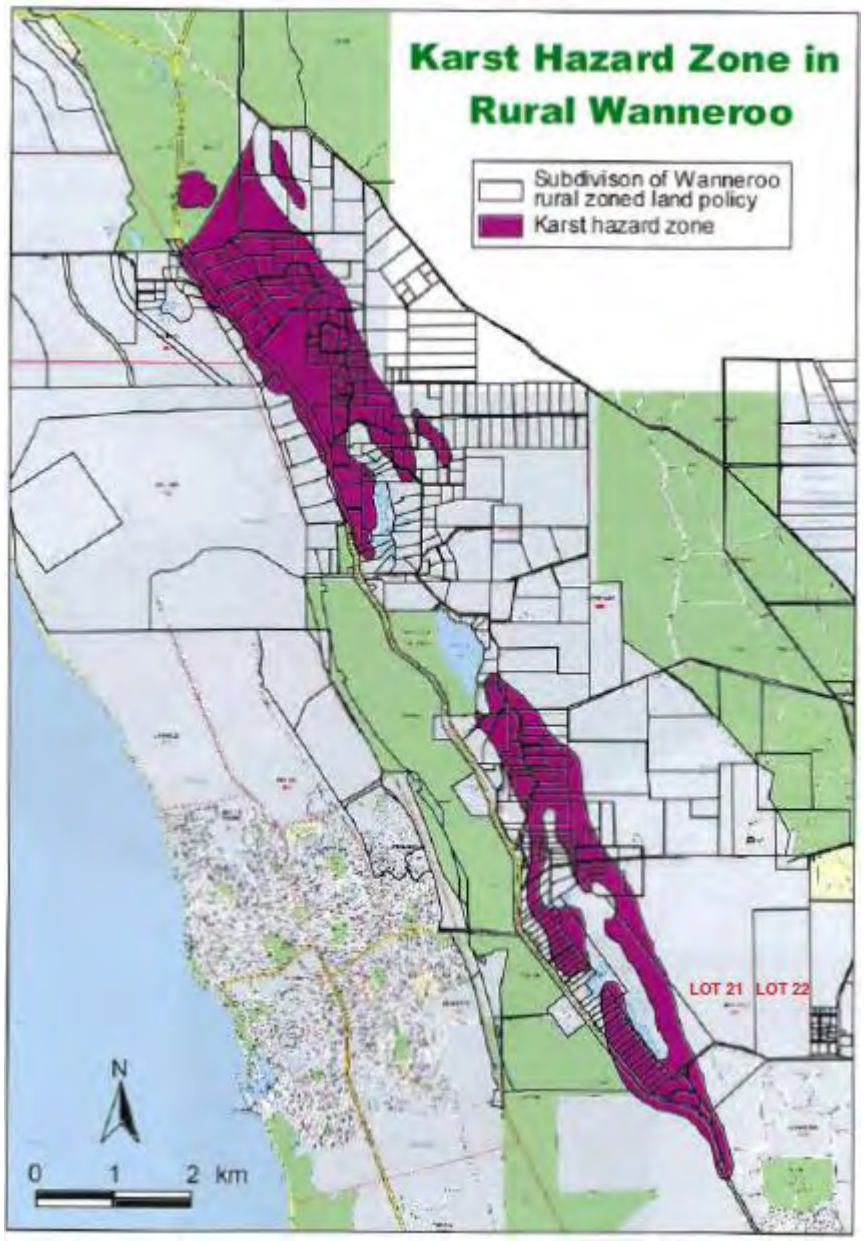

Figure 12 - Karst Hazard Zones in Rural Wanneroo (Mapped by Lex Bastian)

EPA Guidance 54, concentrates on Stygofauna, which occur in caves and "are aquatic subterranean animals, found in a variety of groundwater systems".

Troglofauna, if they exist which is unlikely will be protected by leaving some 15 plus metres of limestone above the water table.

None of the risk factors listed in Guidance 54 are likely to occur. As Guidance 54 states that Stygofauna are aquatic they are unlikely to occur, and even if they did they will not be impacted on.

See also 3.1 Regional Geology.

KARST MANAGEMENT			
Potential Impact	**Management**	**Outcome Commitments**	**Action Required**
Karst Protection Stygofauna and Troglofauna	• There is no evidence of karst within the excavations. • There is a low risk of karst development and their dependant biota being present. • No caves of the water table have been intersected in this or adjoining quarries.	If caves are encountered, work will cease in that area, pending an assessment by a qualified person. Future actions will depend on the findings.	Ongoing

7.2 Water Management

7.2.1 Local Hydrology

Refer to 3.2 Surface Hydrology

IDEAL OPERATIONAL PROCEDURES	COMMITMENTS ON ACTIVITIES CONDUCTED ON SITE
Contain all stormwater on site and only release clean, treated water.	° The pit will be internally draining. ° All stormwater collects on the porous floor of the pit and infiltrates into the ground as happens on the pit to the East for example.
Maintain all plant in good condition.	° All plants will be maintained in an efficient operational condition.
Maintain haul road and hardstand surfaces in good condition (free of potholes, rills and product spillages) and with suitable grades, and direct runoff to trapping and filtrating device.	° The hail road is limestone based, formed, graded, wetted down and maintained. ° The crossover from Flynn Drive will be sealed.
Recycle water through sediment settling ponds if possible.	° The pit will be internally draining. ° As the pit floor is so porous it is difficult to achieve recycling, and there is normally not a wash cycle to recover water. Therefore, sediment settlement dams are not appropriate in this instance.
Provide an approved serviced portable or septic toilet	° An approved septic toilet system will be installed to meet health requirements.

system.	
Separate extraction, washdown and storm water if water is used.	° As stormwater is contained all water is treated as pit stormwater. ° Stormwater from roads is shed to the adjoining soils and table drains.
Implement a site code outlining requirements for operators and drivers.	° This forms part of the normal operational procedures employed by the proponents or their contractors.
Avoid spillages on roads and clean up promptly.	° This forms part of the normal quarry operational procedures. The proponents propose to implement procedures consistent with the regulations and as are being employed at the adjacent quarry to deal with spillages of any type.
Conduct training programs on pollution minimisation practices.	° Site induction and training contains programs dealing with pollution prevention.
In the event of a spill or adverse incident, activities will be stopped in that area until the incident is resolved.	° This is included as part of the normal operational procedures and is proposed.
All significant adverse incidents are to be recorded, investigated and remediated. A record is to be kept of incidents and the Local Authority and Department of Environment and Conservation notified within 24 hours.	° A site office will be maintained. ° A site record book will be retained. ° Any incidents will be reported annually within 24 hours to the DBCA and City of Wanneroo.
Provide an environmental monitoring and audit program.	° The proponents will adopt internal monitoring and recording of operations.
Monitor water quality	° As there is no surface water, sampling of that waterbody is not appropriate. ° Groundwater pollution risk is recognised as low by the DBCA and EPA who permit excavation of sand with a 3 metre separation to the water table in Priority 1 groundwater area.
Provide a complaint and remediation program in the event of non-conformities.	° A site record book will be maintained. ° All complaints are to be investigated, remediated and recorded in the record book.
Comply with all operational conditions.	° This is normal operational procedures.

7.2.2 Protection of Water Quality

The protection of water whether groundwater or surface water is an important part of the management of quarries. Different types of quarries have different potential impacts which are listed below in general terms. Not all potential impacts will apply to this quarry and the main impacts affecting this site are also listed.

A number of documents provide guidance on the management and disposal of surface water that can lead to waterways, wetlands and underground water systems. These mainly apply to urban development but the methods are also applicable to the quarrying industry.

- Engineers Australia 2003, Australian Runoff Quality, National Committee on Water Engineering.
- Stormwater Management Manual for Western Australia, Department of Environment WA, 2004.
- Guidelines for Groundwater Protection in Australia, ARMCANZ, ANZECC, September 1995.
- Environmental Protection Authority Victoria/Melbourne Water, undated, Urban Stormwater, Best Practice Environmental Management Guidelines
- Water and Rivers Commission, 1998, Manual for Managing Urban Stormwater Quality in Western Australia.

Documents specific to the mining and quarrying operations are the DBCA DMIRS Water Quality Protection Guidelines for Mining and Mineral Processing.

- Overview
- Minesite water quality monitoring
- Minesite stormwater
- Mechanical servicing and workshop facilities
- Above-ground fuel and chemical storage
- Mine dewatering

The extraction of limestone is a chemically free operation with the only liquids used being lubricants for machinery. Extractive Industries are one of the few industries permitted to operate in Groundwater Source Protection Areas provided a 2 metre vertical buffer is in place.

The proposed complies with Department of Environment and Conservation Guidelines.

The proposed procedures listed below summarise the water management to be used on site.

IDEAL OPERATIONAL PROCEDURES	COMMITMENTS ON ACTIVITIES CONDUCTED ON SITE
Contain all stormwater on site and only release clean, treated water.	◦ The pit will be internally draining. ◦ All stormwater collects on the porous floor of the pit and infiltrates into the ground as happens on the pit to the East for example.

Maintain all plant in good condition.	° All plants will be maintained in an efficient operational condition.
Maintain haul road and hardstand surfaces in good condition (free of potholes, rills and product spillages) and with suitable grades, and direct runoff to trapping and filtrating device.	° The hail road will be formed using limestone base, formed, graded, wetted down and maintained. ° The crossover from Flynn Drive will be sealed.
Recycle water through sediment settling ponds if possible.	° The pit will be internally draining. ° As the pit floor is so porous it is difficult to achieve recycling, and there is normally not a wash cycle to recover water. Therefore, sediment settlement dams are not appropriate in this instance.
Provide an approved serviced portable or septic toilet system.	° An approved septic toilet system will be installed to meet health requirements.
Separate extraction, washdown and storm water if water is used.	° As stormwater will be contained all water is treated as pit stormwater. ° Stormwater from roads will be shed to the adjoining soils and table drains.
Implement a site code outlining requirements for operators and drivers.	° This forms part of the normal operational procedures employed by the proponents or their contractors.
Avoid spillages on roads and clean up promptly.	° This forms part of the normal quarry operational procedures. The proponents propose to implement procedures consistent with the regulations and as are being employed at the adjacent quarry to deal with spillages of any type.
Conduct training programs on pollution minimisation practices.	° Site induction and training contains programs dealing with pollution prevention.
In the event of a spill or adverse incident, activities will be stopped in that area until the incident is resolved.	° This is included as part of the normal operational procedures and is proposed.
All significant adverse incidents are to be recorded, investigated and remediated. A record is to be kept of incidents and the Local Authority and Department of Environment and Conservation notified within 24 hours.	° A site office will be maintained. ° A site record book will be retained. ° Any incidents will be reported annually within 24 hours to the DBCA and City of Wanneroo.
Provide an environmental monitoring and audit program.	° The proponents will adopt internal monitoring and recording of operations.
Monitor water quality	° As there is no surface water, sampling of that waterbody

	is not appropriate. ° Groundwater pollution risk is recognised as low by the DBCA and EPA who permit excavation of sand with a 3 metre separation to the water table in Priority 1 groundwater area.
Provide a complaint and remediation program in the event of non-conformities.	° A site record book will be maintained. ° All complaints are to be investigated, remediated and recorded in the record book.
Comply with all operational conditions.	° This is normal operational procedures.

7.2.3 Groundwater Protection & Water Use

A licenced bore from Department of Water is to be maintained for 12 000 kl per year usage. This has been found to be sufficient for good dust suppression on the adjacent site (Lot 9005 (formerly Lot 22), which is large by comparison to most other limestone pits on the Swan Coastal Plain, and with two operators on site as the joint venture arrangement.

A licensed bore is to be located within the fenced compound, with water being fed to an impermeable lined sump to allow rapid filling of the water trucks as required.

The Perth Groundwater Atlas indicates that the maximum expected groundwater levels at the site vary between about RL 30m on the eastern boundary to RL 24m along the western boundary. (Department of Environment, Perth Groundwater Atlas). Flow is to the south west.

The final contours proposed by the **NIASP17** will rise from 53 metres AHD in the centre of Lot 503 (western boundary) to 63 metres AHD on the southern boundary and 79 metres AHD on the northern boundary. Therefore, the final land surface will be over 20 metres above the highest known water table.

- **Salinity**

There is no known salinity in the locality. Bore water is fresh.

- **Recharge and Water use**

Water is to be used for dust suppression.

7.2.4 Surface Water, Dewatering & Drainage

Clearing will locally increase the recharge, through removal of the vegetation. (Environmental Protection Authority Bulletins 512, 788, 821 and 818). This will have locally result in an increase in recharge of 289 mm based on annual rainfall of 722 mm.

For example clearing will potentially increase the recharge by 2 889 kl per hectare per year.

With development to industrial land, increased proportions of hard surfaces that provide greater runoff will further increase the recharge.

The increase from clearing will be equivalent to an additional 145 mm rainfall annually (based on 20% increase for an annual rainfall of 722 mm), but will be balanced by the extraction of groundwater. Nine hectares of additional recharge as a result of land clearing will compensate for the 12 000 kl water taken from the groundwater system annually. With industrial development and say 50% hard surface formed, an additional 20 -30% recharge will occur, being equivalent to an additional 215 mm per year.

The additional recharge will assist the maintenance of local water tables in a drying climate.

The proposed operation complies with all Government Policies and Guidelines.

Water for dust suppression will be obtained from the licensed bore on site.

Potable water is brought to the site as needed.

7.2.5 Acid Sulphate Risk

There has been an increased interest in acid sulfate soils since the release of WAPC Planning Bulletin 64.

However, the interest has been over-reactive with assessments sought and risk applied in many areas where there is no geological risk or evidence of acid sulfate potential or actual conditions.

The most definitive survey procedure was produced by the Acid Sulfate Soil Management Advisory Committee NSW, 1998, in their *Acid Sulfate Manual.* This Manual forms the basis for much of the assessment procedures in Australia, including those adopted by the Western Australian Planning Commission and the Department of Environment and Conservation. The *Acid Sulfate Manual* adopts the procedure of reviewing the published data followed up by field assessment, which has been completed for this site. If a geological risk is determined, then a Preliminary Acid Sulfate Assessment is conducted.

The site is shown as Low to No Risk of acid sulfate conditions at depths of > 3 metres in WAPC Planning Bulletin 64.

A geological examination of the site showed that the site has no risk of containing acid sulfate conditions in the proposed depths of excavation. No evidence of acidic or reducing conditions have been encountered in any of the nearby quarries and none would be expected.

For example, the resource of limestone is high in the landscape, highly oxidised and alkaline. The same limestone is in fact used for neutralisation of acid soil conditions.

7.2.6 Waste Rock & Tailings Management

There will be no washing of limestone or products. Subgrade materials are incorporated into the fill to raise the final floor elevations.

7.2.7 Waste Materials

- **Unauthorised Access and Illegal Dumping**

The potential for rubbish to be dumped relates mainly to poorly managed sites. Access to Lot 503 will be restricted by small perimeter trenches, strategic placement of logs and boulders and gates locked when the site is unmanned and equipment is retained on site. Fences will be

maintained and upgraded as required.
Wastes generated will be recycled wherever possible and periodically disposed of at an approved landfill site. Any illegally dumped materials will be removed promptly to an approved landfill or other suitable site, depending on the nature of the material.

- **Solid Domestic and Light Industrial Wastes**

All solid domestic and light industrial wastes will be stored in commercial waste storage containers and/or removed to an approved landfill facility.
There will be no waste disposal onsite. Normal practice is for waste storage containers to be sealed so that rainfall cannot enter, therefore preventing the formation of leachates.

- **Vehicle Maintenance Wastes**

No major servicing will occur on site. The only servicing will most likely be minor lubrication as part of normal running operations.
Any waste chemicals derived during routine maintenance activities will be stored in appropriately sealed containers within a designated storage area or taken from site and disposed of at an approved facility. There is not proposed to be any wash down of mechanical equipment.

- **Domestic Wastewater Disposal**

A septic toilet system is installed on site.

7.2.8 Refuelling & Maintenance

'The protection of water from fuels and other chemicals is an important part of the management of quarries. Different types of quarries have different potential impacts which are listed below in general terms. Not all potential impacts will apply to this quarry and the main impacts affecting this site are also listed'

Extraction of limestone is a clean operation similar to sand excavation in the nature of the risk to groundwater. No chemicals are used apart from normal lubricants, which is similar to sand excavation, and sand excavation is one of the few industries that are permitted to operate in a Priority 1 Public Drinking Water Source Area, indicating the clean nature of the activity. See Department of Water *Land Use Compatibility in Public Drinking Water Source Areas.*

All spills are cleaned up in accordance with the summarised procedures above and the Management Plans which are summarised below.

Documents specific to the fuel and maintenance are the DBCA -DMIRS Water Quality Protection Guidelines for Mining and Mineral Processing

- *Mechanical servicing and workshop facilities*
- *Above-ground fuel and chemical storage*

A list of the management actions for maintenance is provided above under 7.2.2. The actions will be used where applicable and as the opportunity presents to maintain water quality on this site.

The site will operate under and have in place safety and pollution management procedures for all

operations. Regular independent audits are undertaken by LandCorp on all their development and operational sites.

Dangerous Goods and Hazardous Substances
There will be no transport, storage or handling of hazardous materials involved in limestone extraction.

Servicing and Maintenance

- All major servicing of vehicles will be conducted off site. Wastes generated from excavation and processing activities will be collected and removed off site weekly to an approved landfill site.
- Vehicle washdown will not be undertaken on site.
- Waste oil and other fluids derived from the routine maintenance of mobile machinery, will be transported off site and disposed of at an approved landfill site. Grease canisters, fuel filters, oil filters and top-up oils will be stored in appropriate containers and brought to the site as required.
- Accidental spill containment and clean-up protocol will be implemented as necessary.
- Rubbish generated will be recycled wherever possible and periodically disposed of at an approved landfill site.
- The site will continue to be maintained in a tidy manner by removing all rubbish regularly offsite

Maintenance and Fuel Spill Management Plan
Fuel and maintenance will be carried out in accordance with the DBCA -DMIRS Water Quality Protection Guidelines for Mining and Mineral Processing, *Mechanical servicing and workshop facilities* and *Above-ground fuel and chemical storage.*
Mobile tankers will be used to refuel mobile and fixed plant when the site is manned.

In addition, a fuel storage tank of 10,000 litres is to be located within the fenced compound, bunded and lined with an impermeable membrane, to Department of Mines Industry Regulation and Safety and Department of Water and Environmental Regulation standards.

- Minor spills (e.g. 5 litres) will be recovered but will not affect the ground water because of the absorbent nature of the limestone and bacterial breakdown.
- Larger spills will be picked up and removed to an approved waste disposal site. The Department of Environment and Conservation and City of Wanneroo will be notified if a spill in excess of 5 litres occurs.
- Soil and resource will quickly be placed around the spill to contain it in as small an area as possible. When contained, the contaminated limestone will be scooped up and removed to an approved landfill or other approved site.
- Refuelling will be conducted in designated areas, where any spill can be contained. In addition, any spill will be immediately bunded and all contaminated soil removed to an appropriate location for remediation.

- Soils and hardstand such as those on this site are adsorptive. The main risk of contamination is the minor drips that occur during the removal of hoses etc. Minor spills are quickly degraded by soil microbial matter.
- Major servicing of large machinery is to be normally undertaken offsite or in specially designed facilities approved for the location of the quarry.
- Regular inspections and maintenance of fuel, oil and hydraulic fluids in storages and lines will be carried out for wear or faults.
- Servicing plant and equipment will be in accordance with a maintenance schedule.
- Refuelling and lubricating activities are to occur in designated areas, and equipment for the containment and cleanup of spills will be provided.
- Spillages are to be contained in plant and working areas by shutting down plant or equipment if the plant or equipment is the source of the spill (provided it is safe to do so).
- Waste substances and chemicals will be stored in accordance with the Site Waste Guidelines.
- Transport chemicals in accordance with the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code).
- All significant adverse incidents (such as a fuel spill of >5 litres) in one dump, are to be recorded, investigated and remediated. A record is to be kept of incidents, and City of Wanneroo, DMIRS and DWER will be notified within 48 hours of an incident.

WATER QUALITY			
Potential Impact	**Management**	**Outcome Commitments**	**Action Required**
General Management	*DBCA – DMIRS Water Quality Protection Guidelines for Mining and Mineral Processing* • *Overview* • *Minesite water quality monitoring* • *Minesite stormwater* • *Mechanical servicing and workshop facilities* • *Above-ground fuel and chemical storage* • *Mine dewatering* • Management procedures outlined above will protect water quality. • All spills are to be cleaned	The proponent will maintain the relevant water protection policies to minimise the potential for alteration to surface or ground water.	Compliance with the Management Plan.

	up as described in the Management Plan above.		
Surface water	There is no surface water runoff and no dewatering. All water is contained within the pit and allowed to infiltrate into the limestone.	None necessary.	Compliance with the Management Plan.
Ground water	*DBCA – DMIRS Water Quality Protection Guidelines for Mining and Mineral Processing* • Interpretation of the geology and hydrology, shows that there will be no significant alteration to the groundwater regime. • Complies with all Government Policies. • The management actions listed above are complied with. • The current operational procedures will be continued.	The proponent will maintain the relevant water protection policies to minimise the potential for alteration to surface or ground water.	Compliance with the Management Plan.
Salinity	No evidence of surface water or salinity.	None necessary.	None necessary at this time.
Waste Materials	*DBCA – DMIRS Water Quality Protection Guidelines for Mining and Mineral Processing* • A septic toilet system is maintained on this site. • No liquid or solid wastes will be disposed of on site. • All waste will be collected and either recycled or disposed of at an approved waste disposal site.	The proponent will maintain the relevant water protection policies to minimise the potential for alteration to surface or ground water.	Compliance with the Management Plan.

Table 1. Water Quality

7.3 Atmospheric Pollution and Noise

7.3.1 Visual Management

Visual Impact can occur in a number of circumstances, by the operation being set too high in the landscape, by being too close to neighbours and by insufficient visual protection.

There are a number of management actions that can be taken in quarries to minimise visual impact and these will be used wherever possible. The general management actions are summarised below together with the visual impact issues that relate to this site. The actions will be used where applicable and as the opportunity presents to minimise visual impact.

The only potential visual issue is from Flynn Drive. In other directions the pit is set back more than 500 metres from any dwelling, behind existing vegetation and the developed industrial land. Even so perimeter bunds will be formed during the resource preparation.

The following procedures will be undertaken wherever possible to minimise visual impact from on site activities.

The excavation will operate from the floor of the pit behind the existing faces, which assists visual screening. Excavation will push towards the perimeters behind the existing faces, with the floor being progressively lowered.

IDEAL OPERATIONAL PROCEDURES	COMMITMENTS ON ACTIVITIES CONDUCTED ON SITE
Locate exposed features behind natural barriers and landform.	• The quarry and processing facilities will be set well back from Flynn Drive located behind perimeter bunding and on the floor of the pit.
Operate from the floor of the pit below natural ground level	• The pit is worked from the inside via an internal haul road.
Avoid breaks in the skyline due to workings and haul roads.	• The access road will be maintained but as the industrial development extends from the south the access road will have to be reformed and moved to the North.
Push overburden and overburden dumps into positions where they will not be seen or can form screening barriers.	• Perimeter bunds will be formed from overburden.
Construct screening bunds and plant tree and shrub screens to reduce visual impact.	• Perimeter bunds will be formed from overburden. • The ability to do this is restricted in the south by the already developed industrial land which has been formed at a higher elevation than the current pit floor. • The quarry and industrial development moves northwards as excavation progresses.
Stage workings and progressive rehabilitation to provide visual protection of later activities.	• A stayed procedure is to be implemented and maintained. • The quarry and individual development moves

	northwards as excavation progresses.
Cover barriers and landscaping with forms, colours and textures compatible with the natural environment.	• Plant is to be located on the floor of the pit so this is less applicable.
Adopt good house keeping practices such as orderly storage and removal of disused equipment or waste.	• The proponents will maintain a tidy work environment on all sites. • Waste will be regularly removed off site to an approved waste facility.
Provide progressive rehabilitation of all completed or disturbed areas.	• The quarry and industrial development moves northwards as excavation progresses.
Minimise the amount of ground used at any one time.	• Only ground required for excavation will be prepared and the industrial land development follows excavation.
Install fences and gates which are compatible with the style of the area.	• Gates and fences are to be installed at the entrance and as appropriate.
Minimise offsite impacts of night lighting.	• Night operations are not proposed. • Some security lighting is to be used, which is directed away from sensitive views, roads and premises.
Paint and maintain buildings exposed, plant and equipment with low impact colours.	• Plant will not normally be visible from Flynn Drive. • Proposed plant is small and consists of small portable and mobile items. • Plant is to be located on the floor of the pit, so this is less applicable.
Locate roads and access to prevent direct views into the site.	• The access road will be located behind maximum natural screening but as the industrial development extends from the south the access road will have to be relocated.
Locate buildings, plant and stockpiles in areas of low visual impact and maintain appropriate size.	• Plant and stockpiles are to be located on the floor of the pit.
Provide temporary revegetation of road embankments and disturbed areas as soon as practicable.	• As the land is being progressively development to industrial land this is not generally possible or required. • Some interim native vegetation has been used.
Control weeds and maintain amenity planting.	• A weed control program will be implemented. • Revegetation is to be incorporated into the industrial land development.
Ensure transport vehicles do not spill material on public roads and ensure prompt clean-up if it occurs.	• Company practices and drive/operator training addresses the need to minimise spill by ensuring the trucks are not overloaded or material is not left on the outside of the trays. • Collection of spills is to be carries out when

	reported. • Drivers will be instructed to be responsible for their load. • All loads will be required to be covered by company policy. • All loads leaving the site are to be covered.

Table 2. Atmospheric Pollution and Noise – Visual Management

Light Overspill

The site will not operate at night. The only lighting that might be required at night could be security lighting. Security lighting is to be located to minimise light visibility from roads and neighbours. The pit is to be stabilised by the use of top soil as discussed in 8.0 Mine Closure Plan. Excavated areas will be progressively rehabilitated as they are completed.

Potential Impact	Management	Outcome Commitments	Action Required
Neighbours or road users	• The active working areas of the quarry are screened by the landform, large buffers and existing vegetation. • Excavation takes place from the floor of the pit, working outwards.	The proponents are committed to continued management of visual impact and will implement the measured outlined.	Compliance with the Excavation Management Plan. Ongoing.

Table 3. Atmospheric Pollution and Noise – Light Overspill

7.3.2 Noise Management

Day-to-day noise produced by mining equipment will be limited to the loader and cartage trucks, and to a lesser extent the small mobile screen. Noise levels at the mine will need to conform to limits specified under Assigned Outdoor Neighbourhood Noise Levels for adjacent land.

As noted, the closest noise sensitive premise is residential development located approximately 300m south-east from the closest area proposed for mining on Phase 1 Lot 503 and some 500m from the initial quarrying operations and separated from the site by Flynn Drive.

Noise levels associated with the operation of the mine will be minimised by the following factors and management techniques:

- The activity level at the mine will be relatively low given that a restricted number of equipment types will be in operation and that no processing or blasting occurs;

- The location of the mine within the nominated buffers will reduce the potential for the lateral propagation of operational noise;

- Machinery at the site will only operate within the designated hours;
- The access road will be kept in good condition at all times to minimise the potential for noise generation from empty trucks entering the site;
- Any complaints received regarding noise disturbance will be recorded and follow-up action instigated immediately to minimise the cause, to the greatest practical extent.

Based on the previous analysis, and given that Flynn Drive is a busy distributor road carrying a large volume of both passenger and heavy haulage vehicles, the potential for impact on the residential area to the south-east is considered low.

However, in the event that justifiable noise complaints are received, the Quarry Operator will be required under his license agreement to engage the services of an acoustic consultant to identify the noise source and provide a solution.

7.3.3 Dust Management

The potential for dust generation may occur when topsoil is stripped, respread during rehabilitation, and from truck movements. However, the site is relatively well screened (as discussed previously in this report) and will be actively managed.

The Department of Environmental Protection has prepared a Site Classification Assessment Chart for dust and wind-borne material (DEP, 1996). This document is somewhat superseded by the DEP's Guidance for the Assessment of Environmental Factors – Prevention of Air Quality Impacts from Land Development Sites (DEP, 2000), however the latter does not include an Assessment Chart approach, which is considered useful in determining dust generation risk.

Applying the DEP (1996) Assessment Chart to the proposal based on a series of assumptions results in a **score of 119 (APPENDIX A)** , or **Classification 1**, which is subsequently considered "**low risk**".

In the case of Classification 1 proposals, the DEP considers that the proponent shall supply a contingency plan to the local government, which shall detail the activities to be undertaken should dust impacts occur. Contingency arrangements include allowance for water-cart operation, wind fencing and surface stabilisation, and minimising the area disturbed at any one time.

Consequently, the following management strategies will be implemented to prevent or minimise dust generation from the quarrying operations:

- Vegetation will be cleared and topsoil stripped in months and conditions less conducive to dust generation;
- All reasonable and practicable measures will be taken to minimise dust emissions from the mine and associated plant;

- Where possible, vegetation clearing and topsoil handling will be conducted on days when winds are from direction other than north or north-easterly, so that any dust produced will not be carried in the direction of Flynn Drive;
- The area disturbed or open at any one time will be minimised;
- All traffic areas will be maintained in a manner which minimises dust generation;
- A water cart, which is stationed on-site, will be used to water roads to prevent the generation of dust;
- All vehicles leaving the site are required to have loads covered.

In the unlikely event that justifiable dust complaints are received, Rocla will identify the dust source and provide an immediate solution.

7.3.4 Fire Management

The excavation area will form a natural firebreak; the access road will also assist. Water available on site can be used for fire fighting.

> *The safety of workers is managed through* a *Safety Management Plan developed through the Mines Safety and Inspection Act 1994 and Regulations 1995.*
>
> *There are a number of management actions that can be taken in quarries to minimise fire risk and these will be used wherever possible. The general management actions are summarised below together with the potential issues that relate to this site. The actions will be used where applicable and as the opportunity presents to minimise fire risk.*

- *Restrict vehicles to operational area, particularly on high fire risk days*
- *Use diesel rather than petrol powered vehicles*
- *Maintain perimeter fire breaks as required*
- *Ensure fire risk is addressed and maintained through the site Safety Management Procedures*
- *Provide an emergency muster area, communications and worker induction and training*
- *Establish on site water supplies for potential use in extinguishing fire*
- *Secure the site from unauthorised access*

There is less potential fire risk from quarries than other land uses because quarries operate on cleared land, and vehicles are restricted to cleared access roads, the pit floor, processing and stockpile areas.
These cleared areas form a natural firebreak. The main risk comes from an external fire in the surrounding vegetation, impacting on the quarry. As such the fire risk is less than the risk from a rural property.

Fire risk is normally controlled through the *Bush Fires Act 1954* and local authority bylaws.

FIRE PROTECTION			
Potential Impact	**Management**	**Outcome Commitments**	**Action Required**

Fire Protection	*Bush Fires Act 1954* • The excavated area provides a natural fire break. • Perimeter firebreaks are to be maintained. • Public access to the site is prohibited and fences maintained. • Water for dust minimisation is available for firefighting. • The excavation equipment is available to cut emergency firebreaks and has been used in the past. • The site is serviced by telephone.	The proponents will ensure the quarry operates to the standards in the *Mines Safety and Inspection Act 1994 and Regulations 1995.* The proponents will ensure the quarry complies with the City of Wanneroo fire safety requirements.	Maintenance of Fire Preparedness Plan. Ongoing.

Table 4 – Fire Protection

8.0 ONGOING REHABILITATION & MINE CLOSURE PLAN

8.1 Land Use Policies

Lot 503 is zoned General Industry.

The site is covered by SPP 2.4 Basic Raw Materials Policy as a Priority Resource.

The site is owned by the Western Australian Land Authority, managed by LandCorp.

8.2 End Use

The extraction of limestone is seen as an interim use of the land prior to returning the site to an industrial land use.

Lot 503 is to be progressively converted to industrial land generally from the south to the north in compliance with the **NIASP17**.

8.3 Mine Closure Considerations

The potential for rehabilitation to native vegetation is therefore limited by the Structure Plan.

The use of interim revegetation remains an option but is normally constrained by the need not to impede future development.

The achievement of a cover of indigenous shrubs over the whole site is limited by the use of top soil which will contain a significant proportion of pasture seeds. Appropriate topsoil management does however remain an important element.

Conditions for plant growth on rehabilitated surfaces can be harsh, with low nutrient levels, low levels of water availability in summer, excessive heat, high pH, strong winds and high evapo-transpiration. The steps outlined below will reduce these impacts and increase the success of the rehabilitation program. Rehabilitation already undertaken on site shows that rehabilitation can be very successful, to the point of providing interim ground cover, if carried out at the correct time using suitable techniques.

The other difficulty is that the level of exotic species and pasture already within the topsoil on Lot 503 means that rehabilitation to indigenous vegetation will be more difficult. Topsoil that will be available will have high seed loads of pasture species which will severely restrict the establishment of native species.

8.4 Rehabilitation Objectives

Rehabilitation will be directed towards the final end use as Industrial Landuse in compliance with the **NIASP17**.
As such land restoration and rehabilitation could have three Options;

1. Land surface prepared in readiness for imminent development
2. Land stabilised and left for development at a future time
3. Land stabilised with an interim low vegetation cover of native plants pending decisions on final development.

The rehabilitation methodology which follows is the fall back Option 3 above in the event that

other land uses are not readily identifiable. Even though relatively full rehabilitation is described, it is unlikely to be used. Where an interim cover is required, species from an approved list (City of Wanneroo) will be used.

The species will therefore need to be selected to match the local plant communities or a restricted number of fast growing species may be used. The species to be used in rehabilitation may be different to that which originally occurred on site, because the land surface might be much lower and have higher levels of soil moisture, or the soil conditions may be different, as noted above the substrate will be limestone.

Rehabilitation may contain Dieback and Weed Management in addition to monitoring and replanting failed areas. There should also be a completion criteria against which the revegetation should be compared.

The interim rehabilitation will therefore continue to be used in strategic locations as a light seeding of local indigenous species to provide an interim cover of local native shrubs with scattered trees.

The same techniques have proved very successful in the past when rehabilitating Alcoa Australia land for future use as red mud lakes at Hope Valley and for rehabilitation of a block cutting quarry at Nowergup. This type of rehabilitation has been particularly successful where little topsoil has been available.

Rehabilitation Objectives

Rehabilitation Program to Native Vegetation if required by Option 3 if used.

Note that if any of Options 1 -3 are used this full revegetation program will not be required, but the key elements may still be used.

Whichever option is applicable to Weed and Dieback Management.

The aim of the rehabilitation program is revegetation to parkland pasture and local native species suitable for a range of land uses.

The final land surface will be smoothed to be compatible with the existing natural landform of the area.

1. Quarry faces will be checked for stability and any substandard faces will be made safe to Department of Mines Industry Regulation and Safety standards.
2. As the limestone is porous there will be no need for upslope contour or diversion banks to prevent water entering the void. Similarly, there will be no need for drainage works on the floor of the void.

Revegetation activities will be integrated into the excavation and land clearing process. The process of collecting local seed and the direct return of topsoils for use in rehabilitation will be pursued wherever possible in order to maintain vegetation provenance. Because of the nature of the timing of the operation there may be a need to liaise with nearby operators to swap topsoil if there are no on site areas on which to directly place the topsoil.

Appropriate topsoil management is seen to be an important element in achieving successful rehabilitation and plant re-establishment on the restored surface.

The land to be stabilised with Glue On or seeded treatment to promote stabilisation of the land, until required to be developed for industrial use

Completion criteria

- A stable post-mining landscape, and the minimisation of wind erosion in conformity with planning and land use requirements applicable at the time of closure of each piece of land.
- A land surface that is compatible with the surrounding area and in accordance with the NIASP17.
- A self sustaining low density cover of native shrubs that will stabilise the land surface and be capable of regenerating following fire (not to be used for imminent development of the completed land lots).
- Rehabilitation should be free of weeds likely to impact on the effectiveness of the vegetation.

Depending on the success of rehabilitation, land use requirements, evolving community standards, and new research, the completion criteria may be adjusted to reflect emerging trends and also adjusted in terms of cover and species richness depending on the results achieved and emerging technologies or techniques.

Vegetation Clearing

Vegetation is proposed to be cleared once DWER approvals are achieved. **Refer to Appendix B for details of DWER requirements.**

1. Topsoil clearing will be progressive and minimised to that required for each stage of excavation.
2. Consideration also needs to be given to the possibility that large fragments of vegetation may inhibit future use of the site. Alternatively, chipping of removed vegetation may be used.
3. Where practicable vegetation will be directly transferred to a batter slope or other area being rehabilitated. Smaller indigenous shrub material will be used in the rehabilitation process when available and suitable, for example on the batter slopes of worked out areas. It will be laid on re-formed slopes to reduce wind and water erosion as well as provide a source of seeds for revegetation.
4. If direct transfer is not possible the vegetation will be stored in low dumps to 1 metre high or swapped with a nearby operator to try and ensure that the material is not wasted.

Topsoil and Overburden Removal

1. Where possible topsoil and overburden will be directly transferred from an area being cleared to an area to be rehabilitated.
   Stabilisations of batters arising from cut operations, by means of possible re-spreading of stripped topsoil, and subsequent planting, will be considered.

2. Overburden, as yellow and brown sand and low grade limestone, will be pushed to the perimeters of the excavation, particularly the eastern edges, to assist with visual and noise screening. From there it can be used for the rehabilitation process and for raising the land to the final proposed elevation.
3. Excavation will be worked progressively in the stages as shown on the attached plan.
4. Where possible topsoil clearing will be undertaken in wetter months.

Landform Reconstruction and Contouring

1. All buildings, equipment and machinery will be removed from site.
2. The land surface will be formed to the requirements of the Mines Safety and Inspection Act 1994 and Regulations 1995 as a final land surface.
3. The final landform will be formed to the proposed land use defined at the time of each closure and in compliance with the final concept plan and the NIASP17.
4. The land surface will be a level floor with interim sloping batters at I : 3 to 1 : 4 vertical to horizontal to the flat floor and final elevations of 1 : 10.
5. The limestone floor and batter slopes will be deep ripped in two directions. The width between rip lines will be 1 metre intervals.
6. A minimum of 300 mm of overburden will be spread over the surface where available to provide a substrate for revegetation. On limestone, rehabilitation can be very successful with minimum overburden when the floor is adequately deep ripped.
7. Research on limestone rehabilitation on mining leases demonstrates that good revegetation can be achieved by seeding into soft overburden and deep ripped limestone floor, if suitable local species are used.

Vegetation Establishment

Pre-Planting/Seeding Weed Control

Pre-seeding weed control is only likely to be required where topsoils are used that contain weed species.

If required, this is normally only conducted after overburden and topsoil have been spread and any seeds have been allowed to germinate. Broadscale weed treatment can be detrimental to the germination and growth of native species but may be required if the weed load is to be reduced.

In May, after the first autumn rains, check for grass germination. Where grass has the potential to inhibit rehabilitation, such as areas to be returned to native vegetation, use a licensed contractor to spray with Fusillade or other suitable herbicide. In areas of parkland pasture, grass cover is desirable.

Any weeds likely to significantly impact on the rehabilitation will be sprayed with Roundup or similar herbicide or grubbed out, depending on the species involved. Weed affected topsoil and overburden will be buried. The Weed Management Plan will form the basis of weed treatment. Depending on the nature of the planting substrate, a broad spectrum spraying program may be used. In areas where grass only is a potential problem, grass specific sprays will be used. In some areas where topsoil from cleared native vegetation is available no spraying may be required.

Revegetation

1. Topsoil will be re-distributed as stabilisation of batters arising from cut operations, if required, to a depth of 50 mm, where available.

    a. Topsoil provides a useful source of seed for rehabilitation when the correct handling of the topsoil is used, stripped and replaced dry (autumn direct return). Maximum depth of 50 mm can be used to optimise revegetation of species-rich plant communities. However, weed affected topsoil can create additional issues and may not be used.

    b. Studies have shown that topsoil stripping and placement is best undertaken in summer for maximum germination, but this raises the potential for additional dust generation from the fine humus particles.

    c. Topsoil will be spread directly from an area being cleared where possible, otherwise reclaimed from a topsoil dump.

2. Sufficient revegetation of land, aiming to suppress dust and sand rift from vacant land, post extractive industry uses and prior to development for industrial purposes, is proposed.

    a. Rehabilitation will take place during the first winter months following the restoration earth works of each particular section of quarry. Leaving the completed earth works for one season will reduce the success of rehabilitation by at least 50%, due to compaction effects.

    b. Local provenance seed will be used wherever possible, selected for its ability to not impede the proposed final end use. A species list is attached.

    c. Seeds of indigenous species will be scattered during late summer at the rate of approximately 1 -2 kg seeds per hectare if required.

    d. Seeding conducted in summer will use scarified leguminous seeds that have been "dry smoked". Seeding conducted in July to August will have the leguminous seeds heat treated and all seeds will be smoke treated by soaking in "smoke water" for 24 hours prior to seeding.

    e. Seed spreading will be achieved either using mechanical seed dispersal equipment

or using manual methods. Bulking with a spreading agent such as sawdust, vermiculite or sand is desirable.

f. Rehabilitation will progressively follow mining with completed areas of the excavation being revegetated as soon as practicable.

Fertiliser

Fertiliser is not always required and will add nutrients to the ground water. If used a fertiliser containing low nitrogen, phosphorous and potassium, and trace elements, is recommended to be spread at rates of up to 50 kg/hectare, applied to rehabilitation areas in the year of planting. Nitrogen is provided by using leguminous seed in the seed mix.

Irrigation

1. Experience in quarries in Tamala Sand and limestone, has shown that when completed well there is no need for irrigation of the rehabilitation.
2. Irrigation was not used previously in the adjacent quarry operations (Lot 9005) and rehabilitation works.

Erosion Control

1. Soil erosion occurs when soil is exposed and disturbed by wind or water. Erosion involves soil particles being detached from areas not adequately protected by vegetation, and moved down-slope. This is not normally a significant problem in limestone which crusts after the first winter.
2. The soils are very permeable and runoff is normally minimal unless surface materials become non-wetting. Even so experience shows that there is minimal non wetting and surface particle movement under such conditions.
3. Water erosion on the batter slopes can be avoided by the permeability of the materials and by leaving the surface soft, rough and undulating, with the undulations running along contour. The final machinery run should be along contour and not down slope.
4. Limestone, when subjected to rainfall, forms a crust that is impervious to further erosion unless disturbed.
5. Wind erosion will be controlled by rehabilitating the disturbed ground as soon as practicable.
6. If wind erosion and soil stability become an issue measures will be taken to stabilise the soils. These could include but not be limited to fence wind breaks, spray mulching, cover crops, interim native vegetation or spreading mulch and vegetation.
7. For rehabilitation areas, interim revegetation will take place as soon as possible following landform and soil reconstruction.
8. Control of wind erosion potential will be assisted by spreading brush and vegetation across the topsoil on the batter slopes and reconstructed soils where local native vegetation is to be established.

Monitoring

1. During late summer an assessment of the success of the rehabilitation will be made to determine the rehabilitation requirements for the following winter.
2. Monitoring includes visual assessments and, where necessary, counts to determine the success of the rehabilitation and restoration, as follows;
   - plant density
   - plant growth
   - plant deaths
   - regeneration
   - weed infestation
3. As necessary, steps will be taken to correct any deficiencies in the vegetation.
4. Rehabilitation of each stage will be monitored for a period to ensure that the revegetation meets the completion criteria of providing self-sustaining indigenous shrub vegetation.
5. If rabbit damage is detected either place guards around the tube stock or bait using commercial baits laid under low concrete slabs. Kangaroos are difficult to control other than by culling but this is not desired. Normally impact from kangaroos is regarded as acceptable damage.
6. Provide ongoing weed management to identify and treat significant environmental weeds or weeds likely to impact on the rehabilitation.
7. Plants that have not survived are to be assessed to determine the number of replacement plants required. To this is to be added the number of additional plants required to be installed in the following winter to bring any deficiencies up to the completion criteria.
8. In areas of rehabilitation that do not meet the completion criteria measures are to be taken to increase the stem density to achieve the completion criteria. This could include but not be limited to;
   - additional seeding,
   - planting additional tube plants,

   additional use of fresh topsoil.

REHABILITATION			
Potential Impact	**Management**	**Outcome Commitments**	**Action Required**
Rehabilitation	• See the Rehabilitation, Weed Management and Dieback Plans outlines above. • Rehabilitation will aim to achieve compliance with the proposed end use at the time of each closure. • The rehabilitation aims to stabilise the excavated	The proponents will implement and maintain the Rehabilitation Plan to rehabilitate the excavated surface as outlined above.	Implement and maintain the rehabilitation program. Rehabilitate each completed section as soon as practicable.

	soils and batter slopes pending decisions being made on the future use of the excavated area. • All buildings, structures and equipment will be removed at the conclusion of excavation. • The final contours will be in accordance with the contours proposed by the **NIASP17**. • Monitoring of the rehabilitation will be undertaken.	

Table 5 – Rehabilitation

9.0 REFERENCES

- Department of Environmental Protection (2000). Assessment of Environmental Factors – Prevention of Air Quality Impacts from Land Development Sites. Final Guidance No.18.

- Department of Environmental Protection (1996). Land Development Sites and Impacts on Air Quality – A guideline for the prevention of dust and smoke pollution from land development sites in Western Australia.

- Environmental Protection Authority (1997). Guidelines for Environment and Planning. Draft. Environmental Protection Authority.

- Government of Western Australia (2000). Bush Forever.

- Heddle, E.M., Loneragan, O.W. and Havel, J.J. (1980). Vegetation Complexes of the Darling System, Western Australia. IN: Atlas of Natural Resources, Darling System, Western Australia. Maps and Explanatory Text. Department of Conservation and Land Management.

- Ministry for Planning (MfP) (1995). Urban Bushland Strategy. Ministry for Planning, Western Australia.

- Rokich, D.P., Dixon, K.W., Sivasithamparam, K. and Meney, K.A. (2000). Topsoil Handling and Storage Effects on Woodland Restoration in Western Australia. Restoration Ecology Vol.8, No.2, pp. 196-208.

- Water and Rivers Commission (1997). Perth Groundwater Atlas.

APPENDIX A – Dust Managament

1. DUST MANAGEMENT

The Contractor will at all times be fully aware of the requirements of this Dust, Noise and Vibration management requirements of the site and will co-operate to the fullest extent to assist in implementing and auditing it during the entire excavation staging plan **(Refer to drawing PC18027-CI-SK2 in Appendix C**)

The Contractor will report to the Superintendent in such a manner and at all times as directed by the Superintendent on its activities in complying with the Dust Management Plan.

Nothing in the Dust Management Plan will derogate from the responsibility of the Contractor to take all steps necessary including stabilisation to prevent dust and windblown material from escaping the site both during and outside working hours.

1.1 Dust Control

1.1.1 DER Site Classification

The site has been evaluated in accordance with the Department of Environmental Regulation guidelines, "A Guideline for Managing the impacts of Dust and associated contaminants from land development sites, contaminated sites remediation and other related activities" dated March 2011. **(Refer to Table below)**.

According to Appendix 1 the DER Guidelines and Procedures, an assessment made by Peritas Consulting Pty Ltd and appended to this document has resulted in an aggregate score of 119, which categorises the site as a "**Classification 1**" site from an air quality and dust prevention perspective.

The Contractor will have a copy of the DER guidelines on site for the duration of the contract.

The DER guidelines, site assessments and contingency arrangements for dust and wind borne pollution control will be the basis for control of dust and wind borne material on the site.

1.1.2 Duration and Responsibility

The Relevant Contractor will be responsible for effectively controlling dust and wind borne material nuisance throughout the period of the work, including after hours, weekends and public holidays during each estimate phase of excavation plan (Refer to Appendix C of the PC18027-Flynn Drive _EIL Application – PC18027-CI-1307).

1.1.3 Dust Control Measures during extraction and operation phases

The steps undertaken to date as part of the Dust Management procedures during extraction of material phase and operation have included:

I. Site Classification - An assessment of the dust potential for the site.

II. A site inspection (jointly or separately) with the Owner's engineering consultant and the Local Government Engineer or Environmental Health Officer and determined:

- Soil type and sensitivity
- Site exposure - Site depressed in a hollow and proximity/sensitivity and adjacent land uses and immediately surrounded by land currently used for residential or industrial purposes.
- Prevailing winds likely to affect local community are predominantly the sea breeze and winter storm fronts from the South-West.

III. Notification of Local Authority and nearby residents prior to any works commencing on site.

IV. Contractual arrangements with relevant contractor to ensure dust management measures are understood and procedures followed.

Provisional and contingency item inclusions in contracts for the works relating to dust control measures and procedures.

The Contractor will implement all measures necessary to eliminate dust and windblown material from the site, being blown over or onto property outside the site. These measures will meet or exceed the requirements of the “Guidelines for the Prevention of Dust and Smoke Pollution” March 2011, for a Category 1 Site and will include, but not be limited to:

Extraction and Operational Phase:

1. Establish a line of communication with any adjacent residents or key landowners (measure already established by the owners of the site).
2. The Superintendent is to monitor the works that have potential to cause dust and control the works to ensure the extent of disturbed land at any one time is kept to a minimum.
3. Installation of a wheel wash system in order to eliminate the pollution of public roads.

1.1.4 Notification Arrangements

The Land Owner will prepare an advisory note to be distributed to all adjoining residents by the Relevant Contractor giving work and contact details for any concerns. These notices will outline the project timing, working hours, dust noise and vibration management measures and contact details of the site supervisors (names and telephone numbers).

The Relevant Contractor to undertake to implement and maintain a notification, complaints handling. It is intended that the following procedure be adopted in the event of a dust complaint.

i. Through the provision of an advisory notice to be issued to residents surrounding the site, all complaints will be referred to the Contractor.

ii. At the time of receiving the complaint, the Superintendent will take details of the complaint including time of occurrence, location of occurrence. If it is clear to the Contractor that the works are creating a dust problem, the Superintendent will implement a solution to eliminate the problem. If any explanation cannot be made, the Contractor will advise the resident that the matter will be investigated and the resident will be notified of the outcome within 48 hours.

iii. The Contractor and Superintendent will also keep copies of any correspondence or documentation for their records.

2. TREATMENT AND MEASURES

The importance of sand and dust control during the extraction of material has been recognized and solution to this problem will be put in place for each sequential extraction zone (refer to Appendix C - PC18027-CI-1307 for staging plan).

Impact	Treatment & Measures
Sand Drift	Proposed control methods to be implemented include: - Sand fences: Fences to be installed perpendicular to the wind direction, including on the southern lot boundary. - Barriers: As the quarry and individual development moves northwards as excavation progresses, perimeter bunds will be formed from overburden assisting the dust mitigation. - Perimeter bunds made from overburden will be hydro-mulched and seeded as soon as practical. - A temporary bund to be located - industrial development extends from the south the access road will have to be reformed and moved to the North. - In windy conditions, spray water on the stockpiles to minimise the dust hazard
Dust Nuisance Erosion	- Control dust generation using water trucks to reduce dust nuisance and poor visibility hazards. One bore is to be located on site, licensed from DWER; with an allocation of 12,000 kL per year for dust suppression using a water truck, which will be retained on site full time and will have a capacity of 13,000 L. Dust levels operation will be visually monitored by the relevant Contractor and the water cart will

be employed if high levels of dust are observed. High pressure fast-flow overhead tanks are utilised to ensure the immediate availability of the water cart.

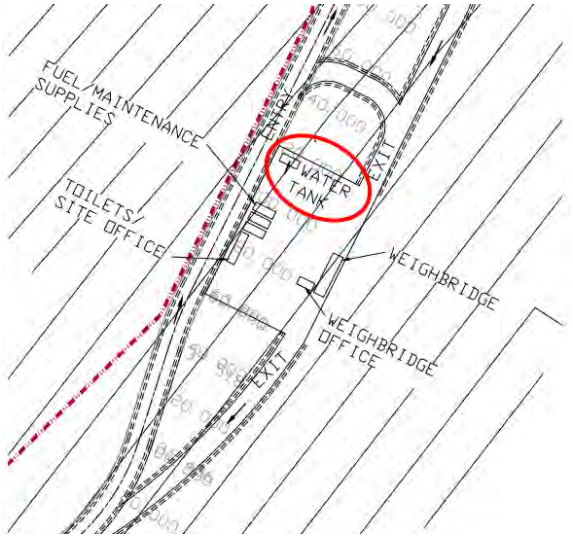

Figure i - Proposed location Water Tank

- Installation of a heavy duty wheel wash system prior to the commencement of development, in order to eliminate the pollution of public roads.

Figure ii. Example of Wheel Wash

- Surrounding roads adjacent to the site, will be swept clean at the end of each day wherever sand is visible.
- The extend of disturbed area will be minimised where possible to dissipate wind velocity at ground level.
- Any trucks transporting material such as sand, limestone, crushed rock will not excessive loaded and will be covered it deemed necessary by the Site Supervisor of the relevant contractor
- Speed limit will be maintained on site and all eamples from relevant Contractor as well as visitors will be required to adhere to these limits to reduce the level of dust generated from vehicle movement.

Siltation	Siltation or the deposit of silt in waterways could be caused by dust erosion from water and the quarry extraction activities. To prevent this type of pollution in water is proposed to prevent the dust erosion in the first place implementing systems and techniques as noted above which include: - Designated truck wheel washing areas and collect contaminated water in a sump. - Cleaning site roads regularly and keep them free from dust and mud. - Minimise the amount stockpiles on site where possible.
Danger to the general Public	- Activities such as crushing and screening are noisy and dusty and it will be positioned in a location away from site boundaries to lessen the potential nuisance value of the activities. - Control measures to eliminate and minimise the exposure of general public to dust, and reduction of visibility include: wheel wash, water spraying and barriers.

3. CONCLUSION

The site classification assessment undertaken by Peritas Consulting concludes that the site can be characterised as a Classification 1 site in accordance with the DER Guidelines and Procedures.

Based on this Site Classification there are no measures required to be implemented (Refer to below conclusion from the DER Guidelines and recommendations.

- **Classification 1 (score under 199, considered negligible risk)**

Provisions:
• None required.
Contingency arrangements:
• None required.

Notwithstanding the above the owners intend to implement contingency arrangement as noted in Clause 4.1.3 above that well exceed the minimum requirements and hence Peritas conclude that the Dust Management Plan and procedures presented in this report are satisfactory and meet all statutory requirements under the relevant act.

Appendix 1: Site risk assessment/classification for activities generating uncontaminated dust

Sheet 1: Site classification assessment chart

Part A. Nature of site

PART A. Nature of Site									
Item	Score Options								Allocated Score
1. Nuisance potential of soil when disturbed:	1	very low	2	Low	4	medium	6	high	4
2. Topography and protection provided by undisturbed vegetation.	1	Sheltered & screened	6	Medium screening	12	little screening	18	exposed & wind	1
3. Area of site disturbed by the works.	1	Less than 1ha	3	Between 1ha and 5ha	6	Between 5ha and 10ha	9	More than 10ha	3
4. Type of work being done.	1	roads or shallow trenches	3	road, drains & med depth sewers	6	roads, drains & partial earthworks	9	bulk earthworks deep trenches	9
								Total score for Part A	**17**
PART B. Proximity of Site to Improvements									
1. Distance of improvements from site.	1	More than 1Km	6	Between 1km and 500m	12	Between 100m and 500m	18	Less than 100m	1
2. Effect of prevailing winds (at time of construction) on improvements.	1	not affected	6	isolated improvements affected by one wind direction	9	Dense improvements affected by one wind direction	12	dense/sensitive improvements highly affected by prevailing winds.	6
								Total score for Part B	**7**

SITE CLASSIFICATION SORE (A x B) = 17 x 7 = 119

A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities.

Sheet 2: Site assessment details

Engineer for the owner	PERITAS CIVIL PTY LTD
Site Detail	LOT 503 FLYNN DRIVE, NEERABUP
Local government	CITY OF WANNEROO
Location of Works (use AMG Grid Reference from MS Director and nearest Main St.	NORTH OF FLYNN DRIVE NEAREST CROSS-STREET is WANNEROO ROAD & FLYNN DRIVE
Project Name/Stage	LOT 503 FLYNN DRIVE, NEERABUP – PHASE 1 AREA
Description of Works	EARTHWORKS, QUARRYING/RESOURCE EXTRACTION
Contract Dates (Starting/Completion/Period in weeks)	TBA
Score from Assessment Chart	**119**
Special Considerations	(refer to Appendix 1, Note 4)

Comments at Completion

(to include detail of dust-related problems and Provisions and Contingency Arrangements which were actually carried out)

(Copy of this completed sheet to be returned to the Department of Environmental Regulation)

Sheet 3: Notes relating to 'site assessment classification chart'

1. The site assessment chart is used to differentiate between Classifications 1, 2, 3 and 4, as defined within these guidelines. Classifications 2 and 3 are subject to Note 4, below.

2. Sites may be divided into two or more classifications depending mainly on the proximity of existing land uses.

3. In assessing the relevant score level, the 'effect of prevailing winds' must be carefully considered. While houses, commercial areas, market gardens, schools and factories have high sensitivity ratings, roads, parks and recreational areas have lower sensitivity ratings.

4. Construction during dry period (1 October – 31 March).

   (a) Where other land uses are within 100 metres of the site:

      (i) sites assessed as Class 3 will automatically become Class 4, and

      (ii) sites assessed as Class 2 will automatically become Class 3.

   (b) Where other land uses are situated between 100 metres and 500 metres from the site, an on-site re-evaluation of Class 3 sites shall be conducted by the engineer for the developer, the local government or the DEC to determine the extent of additional Class 4 requirements considered necessary (if any).

Sheet 4: Dust management and monitoring requirements for each site classification score

Based on the total score obtained from the 'SITE CLASSIFICATION ASSESSMENT CHART' and notwithstanding any allowance for special site conditions during the dry period, (refer to Note 4, Appendix 1) the following site classification will apply:

Site classification 1 — under 199;

Site classification 2 — 200 to 399;

Site classification 3 — 400 to 799, and

Site classification 4 — over 800.

Note: • Unique sites may need special assessment.
• It is essential that any contracts for construction work on site include the relevant contingency arrangements appropriate for the site classification.

- **Classification 1 (score under 199, considered negligible risk)**

Provisions:
• None required.
Contingency arrangements:
• None required.

- **Classification 2 (score between 200 and 399, considered low risk)**

Provisions:
• The developer shall supply a contingency plan to the local government, which shall detail the activities to be undertaken should dust impacts occur.

Contingency arrangements:
• Include an allowance for water-cart operation, wind fencing and surface stabilisation during the construction period for the purposes of dust suppression.
• All areas of disturbed land should be stabilised to ensure that the disturbed area exposed at any time is kept to a practical minimum.

Monitoring requirements:
• Complaints management system in place (complaints recorded and acted on promptly).
• Notice to be erected at the site, providing contact details of the person to be contacted and works.

- **Classification 3 (score between 400 and 799, considered medium risk)**

Provisions:
- Appropriate wind fencing of a length specified in the air quality management programme needs to be stored on site or available within one hour of being required by the engineer for the developer/local government/DEC.
- All areas of disturbed land should be stabilised to ensure that the disturbed area exposed at any time is kept to a practical minimum to prevent exceedence of dust standards (see Section 4.4.2).
- The engineer for the developer shall maintain close control of works with dust creating potential (for example, allowable length of open trenching).
- After all siteworks are completed, and before the contractor has vacated the site, the developer should ensure that the entire site is stable. The developer then retains responsibility for site stability until change of ownership/control takes place. After the change of ownership/control has taken place, the new owner or controlling party will inherit responsibility for site stabilisation.

Contingency arrangements:
- Suitable water-carts in good working condition and of not less than 10,000 litres capacity per 7.5 hectares of disturbed site, or other suitable alternatives, shall be available to commence watering on the site within 18 hours of being required to do so by the engineer for the developer/local government/DEC.
- Surface stabilisation equipment shall be available to commence operation on site within 48 hours of being required to do so by the engineer for the developer/local government/DEC and with sufficient capacity to cover the disturbed site area within a further 48 hours.
- Wind fencing shall be erected within 18 hours of the contractor being required to do so by the engineer for the developer/local government/DEC. Dust generating works on the site shall cease in the interim.
- If dust-related complaints are generated due to activities on the site, the developer may be required by the local government or an authorised DEC officer to distribute advisory notices to adjoining land occupiers within 48 hours. A notice form is provided in Sheet 5 of Appendix 1.
- If dust-related complaints are generated due to material which has been excavated for trenching, the developer shall ensure this material is stabilised within 48 hours of being requested to do so by the engineer for the developer, local government or an authorised DEC officer.
- Include an allowance for water-cart operation, wind fencing and surface stabilisation during the construction period for the purposes of dust and wind-borne material suppression.
- Include an allowance for surface stabilisation for the purposes of dust and wind-borne material suppression to be maintained after the construction period and until change of ownership/control takes place.

Monitoring requirements
- Site dust management system in place.
- On-site dust monitoring against short term criteria.
- Off-site (compliance) dust monitoring at site boundary (if close to sensitive receptors) or at sensitive receptors. See Section 4 and Appendix 4.
- Complaints management system in place (complaints recorded and acted on promptly).
- Exceedences to be reported to the relevant authority – DEC, Local Government or DOH.
- Notice to be erected at the site, providing contact details of the person to be contacted regarding the works.

Classification 4 (score over 800, considered high risk)

Provisions:

- Advisory notices shall be issued to adjoining land occupiers, the local government and the DEC at least 48 hours before site works commence. The notices shall include the name of the developer, engineer for the developer, contractor/s, contract period, contact telephone numbers of the site engineer and local government environmental health officer as detailed in Sheet 5 of Appendix 1.
- Fencing to the extent and in locations agreed to by the developer and local government shall be erected before any part of the site surface is disturbed.

Note: This provision does not necessarily mean that the total site boundary is to be fenced. The fence is to be installed to an extent which will protect adjacent land uses and in most cases should be erected on the edge of the area which will be disturbed rather than on the site boundary.

- An amount of wind fencing of a length specified in the air quality management programme needs to be stored on site or available within one hour of being required by the engineer for the developer/local government/DEC.
- The nominated wind fencing is to remain in position until the disturbed surface is stable.
- Surface stabilisation is to be applied to the disturbed area of each section of the site upon completion of the works in that section.
- The engineer for the developer shall maintain strict control of works with dust-creating potential. Material which has been excavated for trenching shall be stabilised if the trench is to be left exposed for longer than 72 hours.
- After all siteworks are completed, and before the contractor has vacated the site, the developer should ensure that the entire site is stable. The developer then retains responsibility for site stability until change of ownership/control takes place. After the change of ownership/control has taken place, the new owner or controlling party will inherit responsibility for site stabilisation.

Contingency arrangements:

- Suitable water-carts in good working condition and of not less than 10,000 litres capacity per 5 hectares of disturbed site, or an appropriate alternative, shall be available to commence immediate watering on the site.
- Surface stabilisation equipment shall be available to commence operation on site within 48 hours of being required to do so by the engineer for the developer/local government/DEC and with sufficient capacity to cover the disturbed site area within a further 48 hours.
- Additional wind fencing shall be erected within 18 hours of the contractor being required to do so by the engineer for the developer/local government/DEC. Dust generating works on the site shall cease in the interim.
- Include an allowance for water-cart operation, wind fencing and surface stabilisation during the construction period for the purposes of dust and wind-borne material suppression.
- Include an allowance for surface stabilisation for the purposes of dust and wind-borne material suppression to be maintained after the construction period and until change of ownership/control takes place.

Monitoring requirements

As for Classification 3.

APPENDIX B - DWER Clearing Approval

GOVERNMENT OF
WESTERN AUSTRALIA

CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

ADVICE NOTE

In regards to condition 5, it is noted that the Permit Holder has allocated 481 hectares of its banked offset site at Lot 1 on Plan 12354, Mindarra, to this project. The nominated 481 hectare area contains similar environmental values to the application area, being; habitat for Carnaby's cockatoo (*Calyptorhynchus latirostris*) and vegetation commensurate with the *Banksia* Woodlands of the Swan Coastal Plain threatened ecological community.

PERMIT DETAILS

Area Permit Number: 7405/1
File Number: DER2016/002484
Duration of Permit: From 8 May 2019 to 8 May 2024

PERMIT HOLDER

Western Australian Land Authority T/A Landcorp

LAND ON WHICH CLEARING IS TO BE DONE

Lot 503 on Deposited Plan 409677, Neerabup

AUTHORISED ACTIVITY

The Permit Holder must not clear more than 93.4 hectares of native vegetation within the area hatched yellow on attached Plan 7405/1(a).

CONDITIONS

1. **Avoid, minimise and reduce the impacts and extent of clearing**
   In determining the amount of native vegetation to be cleared authorised under this Permit, the Permit Holder must have regard to the following principles, set out in order of preference:
   (a) avoid the clearing of native vegetation;
   (b) minimise the amount of native vegetation to be cleared; and
   (c) reduce the impact of clearing on any environmental value.

2. **Dieback and weed control**
   When undertaking any clearing or other activity authorised under this Permit, the Permit Holder must take the following steps to minimise the risk of the introduction and spread of *weeds* and *dieback*:
   (a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
   (b) ensure that no *dieback* or *weed*-affected soil, *mulch*, *fill* or other material is brought into the area to be cleared; and
   (c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

3. **Wind erosion management**
   The Permit Holder shall not clear native vegetation unless the works approved under condition 1 of this Permit commence within three months of the authorised clearing being undertaken.

4. **Fauna Management**
   Clearing shall be conducted in a slow, progressive manner towards areas of remnant vegetation to the north and west of the area approved to be cleared.

5. Offset – Land Transfer

(a) The Permit Holder must fund the purchase of the area cross hatched red on attached Plan 7405/1(b) to be ceded to the Department of Biodiversity Conservation and Attractions for conservation.

(b) The Permit Holder shall provide documentary evidence to the CEO that the area cross hatched red on attached Plan 7405/1(b) has been ceded to the Department of Biodiversity Conservation and Attractions within three months of executing the land transfer.

6. Flora management

(a) Prior to undertaking any clearing within vegetation community BsOH, as shown on Appendix 1, the Permit Holder shall engage a *botanist* to conduct a *targeted flora survey* for the presence of *Melaleuca* sp. Wanneroo (G.J. Keighery 16705).

(b) Where *Melaleuca* sp. Wanneroo (G.J. Keighery 16705) is identified under Condition 6(a) of this Permit, the Permit Holder shall ensure that:

(i) no clearing of *Melaleuca* sp. Wanneroo (G.J. Keighery 16705) occurs; and

(ii) no clearing within 50 metres of *Melaleuca* sp. Wanneroo (G.J. Keighery 16705) occurs, unless first approved by the CEO.

7. Records must be kept

The Permit Holder must maintain the following records for activities done in pursuant to this Permit:

(a) In relation to the clearing of native vegetation authorised under this Permit:

(i) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings;

(ii) the date that the area was cleared; and

(iii) the size of the area cleared (in hectares).

(b) Actions taken to avoid, minimise and reduce the impacts and extent of clearing in accordance with condition 1 of the Permit.

(c) Actions taken to minimise the risk of the introduction and spread of *weeds* and *dieback* in accordance with condition 2 of the Permit;

(d) The date works commenced in accordance with condition 3 of the Permit;

(e) In relation to flora management pursuant to condition 6 of this Permit:

(i) the location of each *Melaleuca* sp. Wanneroo (G.J. Keighery 16705) recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees; and

(ii) a copy of the botanists flora survey report.

8. Reporting

(a) The Permit Holder must provide to the *CEO* on or before 30 June of each year, a written report:

(i) of records required under condition 7 of this Permit; and

(ii) concerning activities done by the Permit Holder under this Permit between 1 January to 31 December of the preceding calendar year.

(b) If no clearing authorised under this Permit was undertaken between 1 January to 31 December of the preceding calendar, a written report confirming that no clearing under this permit has been carried out, must be provided to the *CEO* on or before 30 June of each year.

(c) Prior to 8 February 2024, the Permit Holder must provide to the *CEO* a written report of records required under condition 7 of this Permit where these records have not already been provided under condition 8(a) of this Permit.

DEFINITIONS

The following meanings are given to terms used in this Permit:

botanist: means a person who holds a tertiary qualification in environmental science or equivalent, and has a minimum of 2 years work experience in identification and surveys of flora native to the bioregion being inspected or surveyed, or who is approved by the CEO as a suitable botanist for the bioregion;

CEO means the Chief Executive Officer of the Department responsible for the administration of the clearing provisions under the *Environmental Protection Act 1986*;

dieback means the effect of *Phytophthora* species on native vegetation;

fill means material used to increase the ground level, or fill a hollow;

mulch means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation; and

targeted flora survey: means a field-based investigation, including a review of established literature, of the biodiversity of flora and vegetation of the Permit Area, focusing on habitat suitable for flora species that are being targeted and carried out during the optimal time to identify those species. Where target flora are identified in the Permit Area, the survey should also include sufficient surrounding areas to place the Permit Area into local context;

weed/s means any plant -

(a) that is a declared pest under section 22 of the *Biosecurity and Agriculture Management Act 2007*; or
(b) published in a Department of Biodiversity, Conservation and Attractions Regional Weed Rankings Summary, regardless of ranking; or
(c) not indigenous to the area concerned.

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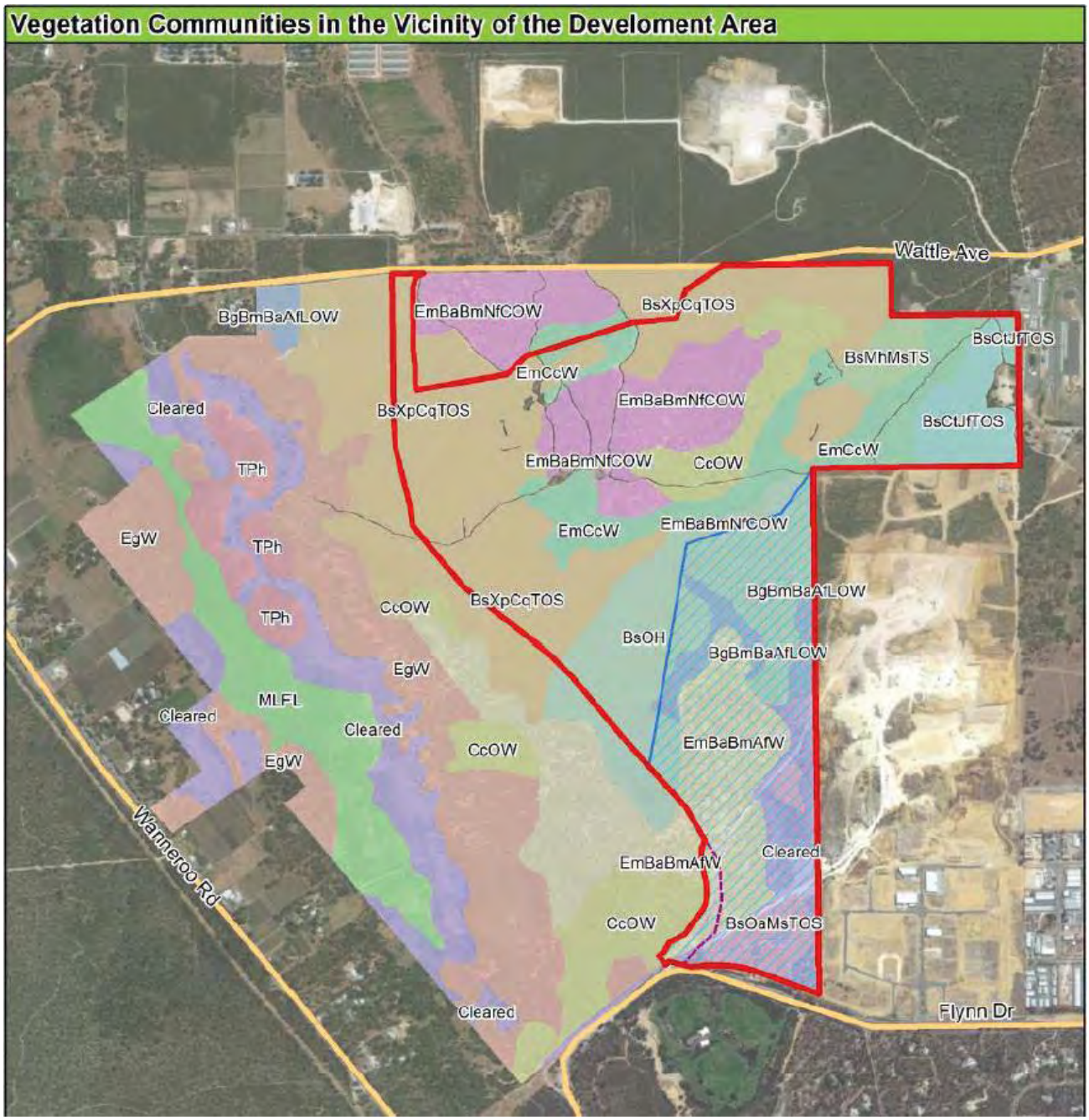
Ryan Mincham
MANAGER
NATIVE VEGETATION REGULATION

Officer delegated under Section 20
of the Environmental Protection Act 1986

11 April 2019

APPENDIX 1


Vegetation Communities in the Vicinity of the Develoment Area
Wattle Ave
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EmCcW
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BsCtJfTOS
TPh
EmBaBmNfCOW
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EmBaBmNfCOW
BgBmBaAfLOW
CcOW
BsXpCqTOS
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BsOH
BgBmBaAfLOW
EgW
MLFL
Cleared
Cleared
EmBaBmAfW
CcOW
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Wanneroo Rd
EmBaBmAfW
Cleared
CcOW
BsOaMsTOS
Cleared
Flynn Dr

Plan 7405/1(a)

Legend

- CPS areas approved to clear
- base layers
- Road Centrelines
- Cadastre
- Image

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Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

GOVERNMENT OF WESTERN AUSTRALIA

Plan 7405/1(b)

Legend

CPS subject to conditions

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Road Centrelines

Cadastre

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Officer with delegated authority under Section 20
of the Environmental Protection Act 1986

GOVERNMENT OF
WESTERN AUSTRALIA

Government of Western Australia
Department of Water and Environmental Regulation

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 7405/1
Permit type: Area Permit

1.2. Applicant details

Applicant's name: Western Australian Land Authority T/A Landcorp

Application received date: 14 December 2016

1.3. Property details

Property: LOT 503 ON DEPOSITED PLAN 409677
Local Government Authority: WANNEROO, CITY OF
Localities: NEERABUP

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	Purpose category:
93.4		Mechanical Removal	Industrial

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 11 April 2019
Reasons for Decision:

The clearing permit application has been assessed against the clearing principles, planning instruments and other matters in accordance with section 51O of the *Environmental Protection Act 1986* (EP Act). It has been concluded that the proposed clearing is at variance to principles (a), (b) and (d), may be at variance to principles (c), (g) and (h) and is not likely to be at variance to the remaining principles.

Through assessment it was determined that the application area contains 69.2 hectares of foraging habitat for Carnaby's cockatoo (*Calyptorhynchus latirostris*) and vegetation synonymous with the *Banksia* Woodlands of the Swan Coastal Plain threatened ecological community.

To mitigate the significant residual environment impacts identified above, and in accordance with the WA Environmental Offset Policy and Environmental Offsets Guidelines the applicant has allocated 481 hectares of its banked offset site at Lot 1 on Plan 12354, Mindarra to this project.

Through assessment it was determined that the application area may support ground dwelling fauna, such as, the western brush wallaby (*Macropus irma*) and quenda (*Isoodon obesculus fusciventer*). A condition has been added to the permit requiring slow progressive clearing towards areas of retained native vegetation to minimise impacts to ground dwelling fauna.

Through assessment it was also identified that threatened flora species, *Melaleuca* sp. Wanneroo (G.J. Keighery 16705), has the potential to occur within vegetation community type BsOH. A condition has been added to the permit requiring this vegetation type to be surveyed prior to clearing and to not clear within 50 metres of the species if identified, unless first approved by the CEO.

The Delegated Officer determined that the proposed clearing may increase the spread of weeds and dieback into adjacent vegetation. To minimise this impact, a condition has been placed on the permit requiring the implementation of weed and dieback management measures.

It was also determined that the proposed clearing may cause appreciable land degradation in the form of wind erosion. To minimise the impacts of wind erosion a condition has been placed on the permit requiring works to commence within three months of clearing.

Given the above, the Delegated Officer decided to grant a clearing permit subject to weed amd dieback management, fauna management, wind erosion and offset conditions.

2. Site Information

Clearing Description

The application is to clear 93.4 hectares of native vegetation within Lot 503 on Deposited Plan 409677, Neerabup, for the purposes of extractive industry and industrial development (Figure 1).

Vegetation Description

The application area has been mapped as Heddle vegetation complex Cottesloe – Central and South: Mosaic of woodland of *Eucalyptus gomphocephala* (tuart) and open forest of tuart - *Eucalyptus marginata* (jarrah) - *Corymbia calophylla* (marri); closed heath on the limestone outcrops (Heddle *et al*., 1980).

In Spring 2008, a flora and vegetation survey of the former Lot 21 Flynn Drive, Neerabup was conducted. Lot 21 comprised approximately 437 hectares and included the application area.

Vegetation mapping associated with the 2008 survey identified six vegetation types within the application area being (Ecoscape, 2016a);

BsOH (26.5 hectares): *Banksia sessilis* Open Heath with scattered *Xanthorrhoea preissi* over Low Open Heath dominated by *Calothamnus quadrifidus* and *Hibbertia hypericoides.* This area has been mapped as being in a very good to excellent (Keighery, 1994) condition.

EmBaBmAfW (31.7 hectares): *Eucalyptus marginata, Banksia attenuata, B. menziesii* and *Allocasuarina fraseriana* Woodland. This area has been mapped as being in good (Keighery, 1994) condition.

BsOaMsTOS (9 hectares): *Banksia sessilis, Olearia axillaris* and *Melaleuca systena* Tall Open Scrub. This area has been mapped as being in a very good (Keighery, 1994) condition.

BgBmBaAfLOW (9.1 hectares): *Banksia grandis, B. menzeisii, B. attenuata* and *Allocasuarina fraseriana* Low Open Woodland. This area has been mapped as being in a very good (Keighery, 1994) condition.

CcOW (0.2 hectares): *Corymbia calophylla* Open Woodland over *Allocasuarina fraseriana, Banksia attenuata.* Low Open Woodland. This area has been mapped as being in good (Keighery, 1994) condition.

EmCcW (0.2 hectares): *Eucalyptus marginata* and *Corymbia calophylla* Woodland. This area has been mapped as being in a very good (Keighery, 1994) condition.

The remaining area has been mapped as being in a completely degraded (Keighery, 1994) condition.

The above vegetation descriptions and conditions were consistent with observations from a site inspection conducted by former Department of Environment Regulation staff on 27 February 2017.

Vegetation Condition

Excellent; Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery, 1994).

To

Completely Degraded; No longer intact, completely/almost completely without native species (Keighery, 1994).

Soil type

The application area has been mapped as the following soil types (Schoknecht et al., 2004):

- Karrakatta Shallow Soils Phase (approximately 60 per cent of application area): Bare limestone or shallow siliceous or calcareous sand over limestone.
- Karrakatta Sand Yellow Phase (approximately 40 per cent of application area): Yellow sand over limestone at 1-2 metres.

Comment

The local area considered in the assessment of this application is defined as a 10 kilometre radius measured from the centre of the application area.

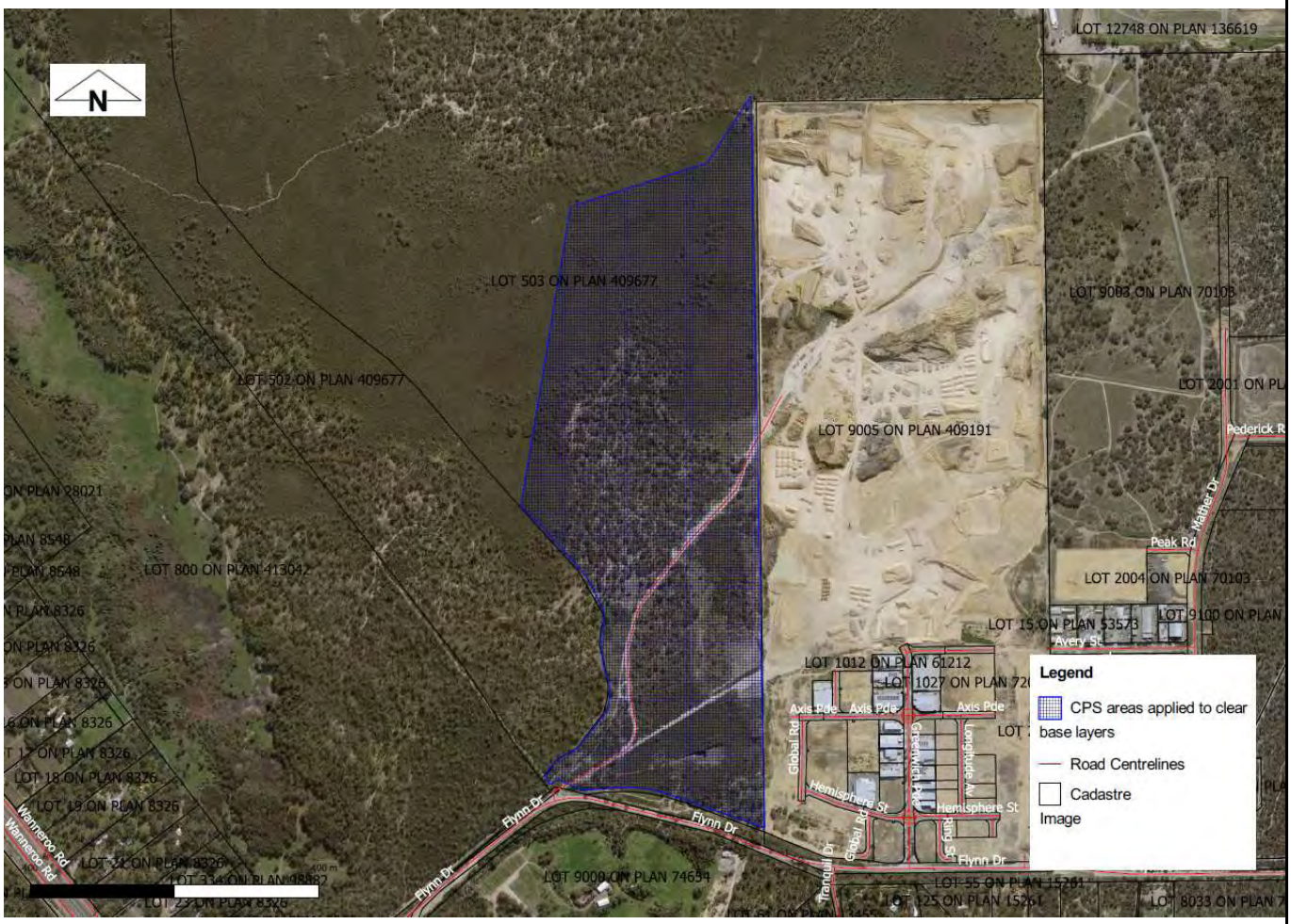

Figure 1: Application Area

3. Minimisation and mitigation measures

The project was initially for a larger area involving the clearing of 218 hectares and has since been reduced to 93.4 hectares to avoid and minimise potential environmental impacts.

The clearing is proposed to take place progressively over five years. Clearing will be subject to a Construction Environmental Management Plan (CEMP) to reduce the impact on retained vegetation until it is scheduled for clearing (Eco Logical, 2016b).

A quarry and earthworks contract will also address management of potential environmental impacts associated with other requirements during construction and operation of the quarry (e.g. fauna relocation, erosion management, storage and handling of chemicals and hydrocarbons, groundwater and surface water quality management).

4. Assessment of application against clearing principles

(a) Native vegetation should not be cleared if it comprises a high level of biodiversity.

Proposed clearing is at variance to this Principle

The applicant proposes to clear 93.4 hectares of native vegetation within Lot 503 on Deposited Plan 409677, Neerabup, for the purposes of extractive industry and industrial development.

In Spring 2008, a flora and vegetation survey of the former Lot 21 Flynn Drive, Neerabup was conducted. Lot 21 comprised approximately 437 hectares and included the application area. The survey of the 437 hectare area identified 153 flora species which was compiled from sampling 21 floristic quadrats, six of which were located within the application area (Ecoscape, 2009).

Two main vegetation types were observed within the application area, being;

1. BsOH (26.5 hectares): *Banksia sessilis* Open Heath with scattered *Xanthorrhoea preissi* over Low Open Heath dominated by *Calothamnus quadrifidus* and *Hibbertia hypericoides.*
2. EmBaBmAfW (31.7 hectares): *Eucalyptus marginata, Banksia attenuata, B. menziesii* and *Allocasuarina fraseriana* Woodland.

(Ecoscape, 2009)

Two floristic community types (FCT) were recorded within the application area being; FCT 24 – Northern Spearwood shrublands and woodlands and FCT 28 – Spearwood *Banksia attenuata* or *B. attenuata* – *Eucalyptus* sp. woodlands.

Four of the six quadrats sampled within the application area were identified as FCT 24. This FCT is recognised as a Priority 3 ecological community.

On 16 September 2016, the Commonwealth Department of the Environment and Energy (DotEE) listed Banksia Woodlands of the Swan Coastal Plain ecological community as endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The broad scale mapping of this threatened ecological community (TEC) indicates that it is likely to occur within the application area. The approved conservation advice for this TEC indicates that FCT 24 has a relationship with this TEC (Parks and Wildlife, 2017a). The conservation advice also states that certain vegetation components of the TEC are recognised as threatened and are priorities for protection and this includes FCT 24 (Parks and Wildlife, 2017a).

Twenty five priority and two threatened flora species have been recorded within the local area (10 kilometre radius). The spring flora survey conducted by Ecoscape in 2008 did not identify any threatened or priority flora within the application area. Since this time several species recorded within the local area have been added to the Priority Flora List (Parks and Wildlife, 2017b). These species are not likely to have been targeted in the 2008 flora survey. Of these species, it is considered that four have the potential to occur within the application area (Parks and Wildlife, 2017b).

The first of these species is *Baeckea* sp. Limestone (N. Gibson & M.N. Lyons 1425). This species was listed as Priority 1 in December 2012. There is suitable habitat present within the application area for *B.* sp. Limestone (N. Gibson & M.N. Lyons 1425) which has been recorded as occurring on sand over limestone and has been recorded in Banksia, jarrah and tuart woodland. *B.* sp. Limestone (N. Gibson & M.N. Lyons 1425) (P1) is known from a restricted range on coastal limestone between Seabird and North Beach on the Swan Coastal Plain over approximately 75 kilometres. Of the five locations, one is most likely extinct. From WA Herbarium data there are approximately 12 populations, five of which appear to have been cleared already with another two most likely cleared, leaving only five that may be extant (Parks and Wildlife, 2017b).

The second species is *Leucopogon* sp. Murdoch (M. Hislop 1037) (P3). This species was listed as Priority 3 in December 2016. There is potentially suitable habitat present within the application area for *L.* sp. Murdoch (M. Hislop 1037) (P3) which has been recorded on yellow/brown/grey sand on sandplains and winter wet swamps within Banksia and jarrah woodland. *L.* sp. Murdoch (M. Hislop 1037) (P3) is known from approximately 12 locations from 36 WA Herbarium collections between Eneabba south to Harvey on the Swan Coastal Plain and Lesueur Sandplain (Parks and Wildlife, 2017b).

Most populations are very small, consisting of few, scattered plants (Parks and Wildlife, 2017b). If present within the application area there is potential for significant impacts on a local scale, however the proposed clearing is unlikely to have a significant impact to the overall conservation status of the species (Parks and Wildlife, 2017b).

The third species is *Fabronia hampeana* (P2), a moss which has been recorded as growing on trunks of *Macrozamia* species. The 2008 flora report states that there was no information on Florabase for *Fabronia hampeana* and so this species "was effectively excluded from the search". *Fabronia hampeana* has been recorded as a "highly distinctive moss, endemic to Western Australia, and easily recognized by its silvery green, imbricate, linear-lanceolate leaves that have numerous, long, single-celled cilia along the margins" (Nuytsia 18: 1–30 (2008)). *Macrozamia riedlei* was recorded within the application area (Quadrat 5 and 13) and thus the species has the potential to occur within the application area. *Fabronia hampeana* is known from four widespread locations in WA; Eneabba, Mindarie/Tamala Park, Floreat, and Dalyup near Esperance. Locally this species is known from two populations both on private property with one subpopulation within a Bush Forever site. One of these populations has already been partially cleared (one of four subpopulations) for housing and another may have been cleared for the Mitchell Freeway extension (Ministerial Statement 629) (Parks and Wildlife, 2017b). Whilst this species is present in the local area, those populations are also under threat from clearing and so if present within the application area, the proposed clearing has the potential to have a significant impact on a local scale. The proposed clearing, however, is unlikely to have a significant impact on the overall conservation status of this species. Given the widespread distribution of *Fabronia hampeana*, and the widespread distribution of its known host, *Macrozamia,* and being a moss species it is likely to be under collected (Parks and Wildlife, 2017b).

The forth species is *Poranthera moorokatta* (P2). A new population of *Poranthera moorokatta* was located in 2012 approximately 2.5 kilometres from the application area. This species was not previously recorded within the local area and, therefore is not likely to have been targeted in the 2008 survey. There is suitable habitat for this species within the application area. The population nearby is located within similar habitat (*Banksia attenuata*, *Banksia menziesii*, *Allocasuarina fraseriana* low woodland over *Xanthorrhoea preissii* open shrubland over *Hibbertia hypericoides*, *Calothamnus sanguineus*, *Calytrix flavescens* low shrubland over *Mesomelaena pseudostygia* scattered sedges). *Poranthera moorokatta* is a small (16-47 millimetres tall) annual herb, recorded flowering in late September to early November. Whilst the 2008 survey by Ecoscape was undertaken within the flowering period of this species it may not have been specifically targeted and could have been easily overlooked given its small size. *Poranthera moorokatta* is known from three locations and one unconfirmed location (Parks and Wildlife, 2017b).

A site inspection undertaken by former Department of Environment Regulation (DER) staff on 27 February 2017 identified what is most likely to be Priority 4 species *Jacksonia sericea* within the application area (DER, 2017). A record of this species from 2001 is mapped within 500 metres of the application area within Bush Forever site 384. According to the location description of the record, the species was recorded from Lot 21 Flynn Drive, Neerabup. The potential population identified within the application area may represent the 2001 record.

Priority 4 species are defined as species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. This species has been recorded within nearby Bush Forever Site 293 and approximately 6020 individuals were recorded within a flora survey undertaken for a project located within four kilometres of the application area. Given its Priority 4 status and nearby records, the proposed clearing is not likely to impact upon the conservation status of this species.

As discussed in Principle (c) one threatened flora species, *Melaleuca* sp. Wanneroo (G.J. Keighery 16705), has the potential to occur within one of the vegetation types mapped within the application area.

As discussed in Principle (b) nine terrestrial fauna species listed as specially protected under the *Biodiversity Conservation Act 2016* (BC Act) within the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* have been recorded within the local area. The application area contains 69.2 hectares of significant foraging habitat for Carnaby's cockatoo.

The application area contains vegetation in very good to excellent (Keighery, 1994) condition and significant habitat for Carnaby's cockatoo. The application area may also contain priority and threatened flora, and vegetation representative of a TEC. Therefore, the application area contains a high level of biodiversity and the proposed clearing is at variance to this principle.

To offset the residual impacts outlined above, the proponent has allocated 481 hectares of its banked offset site at Lot 1 on Plan 12354, Mindarra to this project.

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna.

Proposed clearing is at variance to this Principle

Nine terrestrial fauna species, listed as specially protected under the BC Act within the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* have been recorded within the local area, including; Baudin's cockatoo (*Calyptorhynchus baudinii*), Carnaby's cockatoo (*Calyptorhynchus latirostris),* woylie *(Bettongia penicillata* subsp. *ogilbyi),* curlew sandpiper *(Calidris ferruginea),* chuditch *(Dasyurus geoffroii),* western barred bandicoot *(Perameles bougainville* subsp. *bougainville),* black-flanked rock-wallaby *(Petrogale lateralis* subsp. *lateralis),* Rottnest dugite *(Pseudonaja affinis* subsp. *exilis) and* fairy tern *(Sterna nereis* subsp. *nereis*) (Parks and Wildlife, 2007-).

Two main vegetation types were recorded within the application area, being;

1. BsOH: *Banksia sessilis* Open Heath with scattered *Xanthorrhoea preissi* over Low Open Heath dominated by *Calothamnus quadrifidus* and *Hibbertia hypericoides.*
2. EmBaBmAfW: *Eucalyptus marginata, Banksia attenuata, B. menziesii* and *Allocasuarina fraseriana* Woodland.

(Ecoscape, 2009)

In Autumn (late March – early April) 2012, Eco Logical Australia conducted a vertebrate fauna survey of former Lot 701 Flynn Drive, Neerabup. The former Lot 701 covered an area of 435.5 hectares and included the application area. This fauna survey identified that the survey area supported a diverse range of vertebrate fauna species. A total of 69 vertebrate species were recorded in the field (Eco Logical, 2012).

The fauna survey identified that four mammals, twelve birds and three reptile species of conservation significance could potentially occur in the survey area. Of these, two mammals, two birds and two reptiles were either recorded or are likely to occur within the survey area. These species are:

Recorded

Carnaby's cockatoo (*Calyptorhynchus latirostris*) Endangered (State & Federal)
Rainbow bee-eater (*Merops ornatus*) Migratory (State & Federal)
South-west carpet python (*Morelia spilota imbricata*) Other Specially Protected Fauna (State)

Likely to Occur

Black-striped snake (*Neelaps calonotus*) Priority 3 (State)
Western brush wallaby (*Macropus irma*) Priority 4 (State)
Quenda (*Isoodon obesculus fusciventer*) Priority 5 (State)

Carnaby's cockatoo is listed as endangered under the EPBC Act. Carnaby's cockatoo breed in large hollow-bearing trees, generally within woodlands or forests or in isolated trees (Commonwealth of Australia, 2012). This species nests in hollows in live or dead trees of karri, marri, wandoo, tuart, salmon gum, jarrah, flooded gum, York gum, powder bark, bullich and blackbutt (Commonwealth of Australia, 2012).

Within former Lot 701, 143 trees with hollows greater than 10 centimetres were recorded, three of which were observed within the application area (Eco Logical, 2015), none of which showed evidence of use. The majority of potential breeding trees are tuart, but also includes some jarrah and marri (Eco Logical, 2015).

Twenty two Carnaby's cockatoo roost sites have been recorded within the local area, the closest of which is located approximately 350 metres north of the application area.

Black cockatoos have a preference for foraging habitat that includes jarrah and marri woodlands and forest heathland and woodland dominated by proteaceous plant species such as *Banksia* sp., *Hakea* sp. and *Grevillea* sp. (Commonwealth of Australia, 2012).

Approximately 69.2 hectares of Carnaby's cockatoo foraging habitat has been recorded within the application area. This includes 44.6 hectares of high value foraging habitat (vegetation in very good (Keighery, 1994) or better condition) and 24.6 hectares of medium value foraging habitat (vegetation in good (Keighery, 1994) condition) (Eco Logical, 2015).

The rainbow bee-eater is a migratory species that arrives in the south west of Western Australia in late September-early October nesting in burrows dug in the ground. No breeding hollows were observed on site during the fauna survey, however,

the sandy substrate available provides potentially suitable nesting areas (Eco Logical, 2012). Although this species was present within the application area, given its large distribution and large population size (DotEE, 2017), it is not likely to be significantly impacted by the proposed clearing.

The south west carpet python occurs in semi-arid coastal and inland habitats consisting of Banksia woodland, eucalypt woodlands, and grasslands with known populations in close proximity to the application area (DEC, 2012a). The fauna report states that a sloughed skin was identified within Lot 701, and a specimen has also been recorded in private property on Flynn Drive which is in close proximity to Lot 701 (Eco Logical, 2012).

The black-striped snake occurs on the coastal plain and coastal dune formations supporting low shrublands, heaths, and *Banksia* woodlands between Mandurah and Cataby (Bush et al., 2010; Eco Logical, 2012). Although not observed on site, the application area contains suitable habitat for this species.

The application area is not likely to contain significant habitat for the two snake species discussed above. It is the applicant's intention to have a fauna handler present at all times during vegetation clearing to facilitate the capture and relocation of fauna (Eco Logical, 2016a).

The western brush wallaby is found in the south-west coastal region of Western Australia where populations are particularly centralised near the Swan River and the dry sclerophyll Jarrah forests to the east of Perth (Groves, 2005; Eco Logical, 2012). Scats identified as most likely to be of this species were recorded during the survey and suitable habitat for grazing and breeding occurs throughout much of the survey area (Eco Logical, 2012). It has been advised that the proposed clearing will be undertaken in stages to facilitate the movement of fauna species into the surrounding vegetation (Eco Logical, 2016a).

Quenda prefers low dense vegetation such as heath and swampy habitat that provide shelter, often associated with forests, woodland and shrublands and foraging often extends into adjacent more open grasslands, pastures, or including areas subject to regular burning, also often associated with riparian areas (DEC, 2012b). Quenda was not recorded during the fauna survey, however suitable habitat does occur within the survey area and the species is likely to occur on at least a seasonal basis (Eco Logical, 2012). A site inspection conducted by the former Department of Environment Regulation staff on 27 February 2017 identified diggings that could potentially be that of the quenda (DER, 2017).

Quenda are listed as priority 5 by the Department of Biodiversity Conservation and Attractions. Priority 5 is defined as species that are managed under a specific conservation program, the cessation of which would result in the species becoming threatened. Given this, although it may be present within the application area, the proposed clearing is unlikely to alter the conservation status of the taxon.

Ecological linkages, defined by the Gnangara Sustainability Strategy (Brown *et al*, 2009) run through contiguous vegetation to the south, west and north of the application area, connecting it to nature reserves in all directions. Ecological linkages have been defined as 'a series of (both contiguous and non-contiguous) patches of native vegetation which, by virtue of their proximity to each other, act as stepping stones of habitat which facilitate the maintenance of ecological processes and the movement of organisms within, and across, a landscape' (Molloy *et al*, 2009). The application area is significant in the movement of fauna within the landscape as it supports these linkages.

The application area contains significant foraging habitat for Carnaby's cockatoo and supports a significant ecological linkage. Therefore, the proposed clearing is at variance to this principle.

To offset the residual impacts outlined above, the proponent has allocated 481 hectares of its banked offset site at Lot 1 on Plan 12354, Mindarra to this project.

In regards to the proposed clearing which supports the ecological linkage the applicant's consultant has advised that "The ecological linkage present, as per the Gnangara Sustainability Strategy (Brown et al. 2009) will be maintained despite the clearing of vegetation in the Development Area, as vegetation will remain immediately to the west and north of the Development Area (land that LandCorp is intending to be managed for conservation into the future)" (Eco Logical, 2017).

The applicant proposes to manage potential impacts to fauna through management actions which will be outlined in a Construction Environmental Management Plan (CEMP). A CEMP will be prepared prior to clearing. Prior to the development of the CEMP the applicant's consultant has committed to management actions, including:

- A fauna relocation program will be undertaken prior to commencement of each stage;
- Vegetation clearing will occur from a disturbed edge, where possible, to encourage any remaining fauna to naturally relocate to retained vegetated areas; and
- A fauna handler will be available during on-site clearing activities.

(Eco Logical, 2017)

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.

Proposed clearing may be at variance to this Principle

Three threatened flora species have been recorded within the local area (10 kilometre radius); *Marianthus paralius*, *Melaleuca* sp. Wanneroo (G.J. Keighery 16705) and *Eucalyptus argutifolia*.

Eucalyptus argutifolia is a small, multi-stemmed mallee tree growing to four metres in height. It occurs on slopes or gullies near the coast and, to a lesser extent, close to the summits of limestone ridges. This species was targeted in the 2008 survey,

however no mallee eucalypts were observed within the survey area and therefore the application area is not likely to support this species.

Marianthus paralius is a woody, almost prostrate shrub, approximately 50 cm wide, with red-orange flowers and white stamens. *Marianthus paralius* is know from three populations and grows amongst coastal heath in areas of white sand and brown loam, on coastal limestone cliffs (DEC, 2009). All three of the know populations have been identified on the coast and therefore the application area is not likely to support this species.

In 2018, *Melaleuca* sp. Wanneroo (G.J. Keighery 16705) was added to the list of extant threatened flora. This species was previously listed as a Priority 1 species. The 2008 flora survey stated that there was no information available on the flowering time of this species. *M.* sp. Wanneroo is known to co-occur often as a dominant, in dense patches with other *Melaleuca* species, predominantly *M. systena*, when growing on very shallow soils over limestone 'caprock' on ridges. Advice from Parks and Wildlife's Swan Coastal District is that the north-eastern section of the application area, mapped as the vegetation community type BsOH which is on upper slopes of limestone ridges is potential habitat for *M*. sp. Wanneroo (G.J. Keighery 16705), and that the vegetation at Quadrat 12 appears to have similar associated vegetation to the known habitats of *M*. sp. Wanneroo (G.J. Keighery 16705). *M*. sp. Wanneroo (G.J. Keighery 16705) flowers in late November to late December, and so the 2008 flora survey (mid October to early November) would have been too early to be able to detect and identify this species whilst flowering (Parks and Wildlife, 2017b).

M. sp. Wanneroo (G.J. Keighery 16705) is restricted to limestone ridges within the locality of Nowergup, 35 kilometres north of Perth, Western Australia. It is currently known from an extensively cleared region, and subpopulations are scattered across a 3.3 kilometres (east to west) by 3.0 kilometres (north to south) area. There is a population of *M*. sp. Wanneroo (G.J. Keighery 16705) located approximately 1.5 kilometres north-east of the application area (Parks and Wildlife, 2017b).

Given that *M*. sp. Wanneroo (G.J. Keighery 16705) is now listed as threatened and that the application area contains suitable habitat, pre-clearance surveys are required within vegetation community type BsOH. If this species is identified then no clearing within 50 metres of the identified species is permitted without CEO approval and a licence issued under the Biodiversity Conservation Regulations 2018.

Given the above, the proposed clearing may be at variance to this principle.

(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

Proposed clearing is at variance to this Principle

As discussed in Principle (a), the Banksia Woodlands of the Swan Coastal Plain TEC is listed as endangered under the EPBC Act.

The Banksia Woodlands TEC is restricted to areas in and immediately adjacent to the Swan Coastal Plain Interim Biogeographic Regionalisation of Australia (IBRA) bioregion, including the Dandaragan plateau. This coastal plain stretches from around Jurien Bay in the north, to Dunsborough in the south (DotEE, 2016).

This ecological community has undergone a decline of about 60 per cent in its original extent and almost all of the ecological community that remains, occurs as highly fragmented patches less than 10 hectares in size (DotEE, 2016).

This ecological community has a dominant *Banksia* component, which includes at least one of four key species—*Banksia attenuata* (candlestick banksia), *B. menziesii* (firewood banksia), *B. prionotes* (acorn banksia) and/or *B. ilicifolia* (holly-leaved banksia) (DotEE, 2016).

The ecological community provides habitat for many native plants and animals that rely on *Banksia* woodlands for their homes and food. Remaining patches of the ecological community provide important wildlife corridors and refuges in a mostly fragmented landscape (DotEE, 2016).

The broad scale DotEE mapping of this ecological community includes the application area.

The raw quadrat data in Appendix D of the 2008 flora report includes descriptions that indicate affinities for the Banksia Woodlands TEC (Parks and Wildlife, 2017a).

The approved conservation advice for the Banksia Woodlands TEC indicates FCT24 has a relationship with this TEC. The approved conservation advice also states that certain vegetation components of the TEC are recognised as threatened and are priorities for protection, and this includes FCT24 (Parks and Wildlife, 2017a).

The information pertaining to vegetation types provided in the 2008 survey and 2016 additional data (Eco Logical Australia, 2016b) indicates that the Banksia Woodland community is present, but does not provide quantification of the extent of its occurrence, relative composition, nor likely impact from the proposed clearing on this community and its component parts (Parks and Wildlife, 2017a).

Further survey work is required to assess the application area against the key diagnostic characteristics, condition and size thresholds held in the approved conservation advice for the Banksia Woodlands TEC (Parks and Wildlife, 2017a). The FCTs present in any vegetation that aligns with the Banksia Woodlands TEC should be identified and mapped. Mapping of component FCTs in each condition category should also be provided, and the area of each FCT in each condition category tabulated (Parks and Wildlife, 2017a).

Given the above, the proposed clearing is at variance to this principle.

To offset the residual impacts outlined above, the proponent has allocated 481 hectares of its banked offset site at Lot 1 on Plan 12354, Mindarra to this project.

(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Proposed clearing is not likely to be at variance to this Principle

The area under application is located within the Swan Coastal Plain IBRA bioregion. This bioregion has approximately 38.5 per cent of its pre-European vegetation extent remaining (Government of Western Australia, 2018a).

The application area is mapped as Heddle vegetation complex Cottesloe Central and/South which retains approximately 32 per cent pre-European extent (Government of Western Australia, 2018b).

The area under application is located within the City of Wanneroo, within which there is approximately 44 per cent pre-European extent remaining ((Government of Western Australia, 2018b).

The local area retains approximately 26 per cent native vegetation.

The national objectives and targets for biodiversity conservation in Australia have a target to prevent clearance of ecological communities with an extent below 30 per cent of that present pre-1750, below which species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia, 2001).

The Environmental Protection Authority (EPA) recognises the Perth Metropolitan Region to be a constrained area, within which a modified objective to retain at least 10 per cent of the pre-clearing extent of vegetation complexes for constrained areas (intensely developed) applies (EPA 2015; EPA 2008). The application area is zoned 'Public purposes – special uses' under the Metropolitan Region Scheme. The application area is considered to occur within a constrained area and the 10 per cent threshold applies in this instance.

Although the application area is a significant remnant due to its fauna and biodiversity values, it is located within a constrained area and the mapped vegetation complex retains above 10 per cent native vegetation. The proposed clearing is not likely to be at variance to this principle.

	Pre-European (ha)	Current Extent (ha)	Remaining (%)	Extent in DBCA lands (%)
IBRA Bioregion*				
Swan Coastal Plain	1,501,222	578,432	38.5	38
Shire*				
City of Wanneroo	67,517	29,805	44	54
Heddle Vegetation Complex **				
Cottesloe Complex-Central And\South	45,300	14,571	32	14.5

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Proposed clearing is not likely to be at variance to this Principle

No wetlands or watercourses have been recorded within the application area.

The closest watercourse or wetland is Neerabup Lake which is located approximately 870 metres west of the application area. Neerabup Lake is mapped as a resource enhancement category wetland. Resource enhancement wetlands are defined as wetlands which may have been partially modified but still support substantial ecological attributes and functions (Water and Rivers Commission, 2001). The 870 metre vegetated buffer between the application area and Neerabup Lake should be sufficient to ensure that the environmental values of this wetland are not compromised by the proposed clearing.

The flora survey of the application area did not record vegetation growing in association with a wetland (Ecoscape, 2009).

Given the above, the proposed clearing is not likely to be at variance to this principle.

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Proposed clearing may be at variance to this Principle

The application area has been mapped as the following soil types (Schoknecht et al., 2004):

- Karrakatta Shallow Soils Phase (approximately 60 per cent of application area): Bare limestone or shallow siliceous or calcareous sand over limestone.
- Karrakatta Sand Yellow Phase (approximately 40 per cent of application area): Yellow sand over limestone at 1-2 metres.

Land Degradation Risk Category	Karrakatta Shallow Soils Phase	Karrakatta Sand Yellow Phase
Water Erosion	3-10% of map unit has a high to extreme water erosion risk	3-10% of map unit has a high to extreme water erosion risk
Wind Erosion	30-50% of map unit has a high to extreme wind erosion risk	>70% of the map unit has a high to extreme wind erosion risk
Waterlogging	<3% of map unit has a moderate to very high waterlogging risk	<3% of map unit has a moderate to very high waterlogging risk
Flooding	<3% of the map unit has a moderate to high flood risk	<3% of the map unit has a moderate to high flood risk

Based on the mapped land degradation risk outlined above, the application area has a relatively low likelihood of water erosion, waterlogging and flooding (Schoknecht *et al*., 2004).

Wind erosion is mapped between 30-50 per cent and greater than 70 per cent of the map unit having a high to extreme risk of wind erosion (Schoknecht *et al*., 2004).

Given the sandy nature of the soils and mapped land degradation risk, the proposed clearing may lead to appreciable land degradation through wind erosion.

The proposed clearing may be at variance to this principle.

The applicant proposes to manage potential impacts associated with clearing and construction, such as land degradation from erosion, sedimentation and spread of weeds, through a Construction Environmental Management Plan (CEMP) (Eco Logical, 2016a). A CEMP will be prepared prior to clearing. Prior to the development of the CEMP the applicant's consultant has committed to management actions, including:

- Installation of wind fencing around the perimeter of the site;
- Stockpiled soil to be stabilised with hydro mulch or similar material; and
- Earthworks slopes to be stabilised with hydro-mulch.

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Proposed clearing may be at variance to this Principle

Approximately 3.6 hectares of Bush Forever Site 384 (Neerabup Lake and Adjacent Bushland, Neerabup) overlaps the application area. This 3.6 hectare area has been termed the Boundary Rationalisation Area by Eco Logical (2016a), in which clearing may be necessary in the future as part of road widening. The applicant intends on requesting an amendment to the Metropolitan Regional Scheme to alter the zoning of this area of Bush Forever from 'Parks and Recreation' to 'Industrial'.

The Bush Forever mapping indicates that the majority of the Boundary Rationalisation Area is not mapped as native vegetation (Map Sheet no. 20; WAPC 2000). The vegetation and general fauna habitat that is shown on this map is described as good to poor condition (Eco Logical, 2017).

The 3.6 hectare area of Bush Forever Site 384 within the application area has been subjected to degrading processes, including an access road (Eco Logical, 2016a). The proposed clearing of this area will have a direct impact on Bush Forever Site 384 through the removal of vegetation. The proposed clearing may lead to further degradation of this conservation area through impacts such as the spread of weeds and dieback, alteration of the hydrology, increased wind speed resulting in drying of vegetation and excess dust, spread of rubbish, increased human activity and an increased frequency of fires. Weed and dieback management practices will assist in mitigating these risks.

Neerabup National Park is located approximately 1.4 kilometres west of the application area and Lake Joondalup Nature Reserve is located approximately 3.7 kilometres south.

Ecological linkages, defined by the Gnangara Sustainability Strategy (Brown *et al*, 2009) run through contiguous vegetation to the south, west and north of the application area, connecting it to nature reserves in all directions. Ecological linkages have been defined as 'a series of (both contiguous and non-contiguous) patches of native vegetation which, by virtue of their proximity to each other, act as stepping stones of habitat which facilitate the maintenance of ecological processes and the movement of organisms within, and across, a landscape' (Molloy et al., 2009). The application area supports this linkage in facilitating the movement of fauna within the landscape. Although the application area supports this linkage, the proposed clearing will not sever the linkage as vegetation will remain immediately to the west and north of the application area (land that LandCorp is intending to be managed for conservation into the future) (Eco Logical, 2017).

Given the above, the proposed clearing may be at variance to this principle.

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

Proposed clearing is not likely to be at variance to this Principle
No watercourses or wetlands are mapped within the application area, therefore, the proposed clearing is not likely to impact on the quality of surface water.

Groundwater salinity within the application area is mapped as less than 500 total dissolved solids, milligrams per litre. This level of groundwater salinity is classified as 'fresh' and therefore, noting the scale of this clearing and the vegetation cover in the local area, the proposed clearing is not likely to increase the salinity of groundwater or surface water.

Given the above the proposed clearing is not likely to cause deterioration in the quality of surface or groundwater and is therefore, not likely to be at variance to this principle.

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Proposed clearing is not likely to be at variance to this Principle
Given the porous nature of the mapped soils and the low mapped (<3 per cent) flood risk, the proposed clearing is not likely to increase the incidence or intensity of flooding.

The proposed clearing is not likely to be at variance to this principle.

Planning instruments and other relevant matters.

The State Planning Policy 2.4 Basic Raw Materials identifies the application area as being within a priority area for basic raw material extraction such as limestone.

In 1994, the Environmental Protection Authority (EPA) considered Metropolitan Region Scheme (MRS) amendment 948/33 in which the application area (with the exception of the Boundary Rationalisation Area) was zoned Industrial. The EPA recommended more detailed planning for the proposed industrial area be referred to the EPA to ensure the detailed plans accommodate site constraints and provide for adequate services.

The proposal to develop Lot 503 (under its previous lot numbers) was referred to the EPA and, on 7 September 2012, the EPA decided to not assess the proposal, with public advice given.

The proposed clearing was deemed a controlled action under the EPBC Act in 2012 (EPBC Reference: 2012/6424). The proposed action was approved by DotEE on 20 September 2018.

The Neerabup Industrial Area Agreed Structure Plan (as amended) was adopted in January 2005, under the provisions of Part 9 of City of Wanneroo District Planning Scheme (DPS) No. 2 (Eco Logical, 2016a). The City of Wanneroo advises that under the City's District Planning Scheme No. 2, a Development Application is required to be submitted and approved prior to undertaking extractive industry or industrial development on the subject lot (City of Wanneroo, 2017).

On 8 March 2019, the City of Wanneroo issued Planning Approval for the proposed extractive industry.

The application was advertised in *The West Australian* newspaper on 2 January 2017 by the former DER inviting submissions from the public within a 21 day period. No submissions were received in relation to this application.

An Aboriginal Site of Significance has been mapped over the majority of the application area, being Lake Neerabup. The applicant is to contact the Department of Planning, Lands and Heritage regarding its obligations under the *Aboriginal Heritage Act 1972*.

Previous clearing permits covering the current application area

CPS 2142/1, CPS 2515/1 and CPS 4949/1
Clearing permit application CPS 2142/1 (Rocla Quarry Products) was received on 10 October 2007 and was for the proposed clearing of 159.4 hectares of native vegetation within Lot 21 on Plan 13583 for the purpose of sand excavation. This application covered the majority of the current application area and approximately 70 hectares north of the current application area.

In early May 2008, the application was amended to 100.72 hectares. The application was reduced to take out areas which required surveying (the area which overlaps the current application area) and on 12 May 2008, a separate clearing permit application (CPS 2515/1) was received for the areas removed from CPS 2142/1.

On 22 May 2008, a letter was sent to the applicant identifying that the application (CPS 2142/1) area may contain an area of TEC and that the area is adjacent to Bush Forever Site 384. Additional information was requested addressing these issues.

On 12 July 2008, the applicant committed to retaining a 50 metre buffer to Bush Forever Site 384 and advised that a vegetation survey was almost complete.

On 31 October 2008, a letter was sent to the applicant advising that the assessment of CPS 2142/1 was complete, however, an Extractive Industry Licence (EIL) was outstanding. The applicant was requested to provide a copy of the EIL within six months.

On 15 October 2009, a letter was sent to the applicant regarding CPS 2142/1 and CPS 2515/1 stating that the applications had been reassessed and that it was identified that the application areas contained significant habitat for Carnaby's cockatoo and it is unlikely that clearing permits would be granted.

Both applications were refused on 19 November 2009.

An appeal against the decisions to refuse was lodged on 23 December 2009.

In October 2010, the Appeals Convenor determined that the decision to refuse the permits was justified. However, the Minister was of the view that a permit to clear the southern portion of CPS 2515/1, approximately 32 hectares, could be granted subject to the following:

1. habitat trees at the site being identified by Rocla and excluded form the proposal, where practicable, having regard to the location of the sand resource;
2. requirement to restore degraded areas onsite which are not proposed to be cleared; and
3. securing remnant native vegetation off site in the event restoration is unsuccessful. The vegetation was to be of a positive ratio, with the actual ratio to be determined by the former Department of Environment and Conservation through conditions, taking into account the quality of the restoration (that is, a higher ratio where restoration fails).

On 15 March 2012, Rocla Quarry Products reapplied (CPS 4949/1) for a 67.1 hectare area which was similar to the area refused under CPS 2142/1.

At the request of the applicant, on 18 May 2012, the applications CPS 4949/1 and CPS 2515/2 were withdrawn. The application was withdrawn as the applicant decided that they would like to use their offset site for a different clearing permit application (CPS 4935/1).

5. Suitability of Proposed Offset

The applicant initially proposed three offsets for this project, being;

1. The change in tenure and zoning of part of Bush Forever Site 293 for conservation.
2. The rehabilitation and management of part of Bush Forever Sites 293 and 384.
3. The acquisition of offsite land that contains Carnaby's cockatoo habitat for management by the former Department of Parks and Wildlife (now Department of Biodiversity, Conservation and Attractions).

On 30 November 2017, a letter was received from the applicant's consultant formally requesting to revise the proposed offset to now consist soley of land acquisition.

To mitigate the significant environment impacts identified in the above assessment, and in accordance with the WA Environmental Offset Policy and Environmental Offsets Guidelines, the Permit Holder has allocated 481 hectares of its banked offset site at Lot 1 on Plan 12354, Mindarra.

In assessing whether the proposed offset is adequately proportionate to the significance of the habitat being impacted, DWER undertook a calculation using the Commonwealth Offsets Assessment Guide. The calculations determined that the allocation of 481 hectares of the banked offset is adequate to counterbalance the significant residual impacts asssicatioed with this project.

DWER officers inspected the proposed offset site on 27 September 2017 and confirmed that it contained appropriate attributes to be considered an offset for this project.

Given the above, the proposed offset is considered adequate to counterbalance the significant residual impacts to black cockatoo foraging habitat and the *Banksia* woodland TEC consistent with the *Environment Protection and Biodiversity Conservation Act 1999,* Environmental Offsets Policy October 2012 and *WA Environmental Offsets Policy September 2011*.

6. References

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APPENDIX C - Plans Associated with Extractive Industries License

Drawing Number	Rev	Drawing description
PC18027-1301	C	Limestone Surface Plan
PC18027-1302	D	Deposited Plan
PC18027-1303	C	Concept Subdivision Plan – Phase 1
PC18027-1304	B	Surface Detail Plan – Sheet 1 of 3
PC18027-1305	C	Surface Detail Plan – Sheet 2 of 3
PC18027-1306	C	Surface Detail Plan – Sheet 3 of 3
PC18027-CI-1307	B	Excavation Staging Plan Phase 1 Area
PC18027-CI-SK1	A	Existing Access Haul Road, New Compound and Weighbridge Location Plan
PC18027-CI-SK4	C	Site Facilities Plan Layout and Elevations
PC18027-CI-SK5	D	Bush Forever & Lot 503 Interface Cross Sections

NORTHERN CONSTRAINTS BOUNDARY
(FINAL BOUNDARY OF QUARRYING AREA
SUBJECT TO ENVIRONMENTAL APPROVALS)

PART LOT 503
PHASE 1
93.2ha

LAN 01 ⊕ 66.3
LAN 02 ⊕ 49.9
LAN 03 ⊕ 50.5
LAN 04 ⊕ 67.6
LAN 05 ⊕ 45.8
LAN 06 ⊕ 41.3
LAN 07 ⊕ 39.5
LAN 08 ⊕ 35.0
LAN 09 ⊕ 60.4
LAN 10 ⊕ 62.0
LAN 11 ⊕ 51.6
LAN 12 ⊕ 67.8
LAN 13 ⊕ 55.2
LAN 14 ⊕ 75.5
LAN 15 ⊕ 63.2
LAN 16 ⊕ 59.5
LAN 17 ⊕ 86.7
LAN 18 ⊕ 80.3
LAN 19 ⊕ 82.7

FUTURE PEDERICK ROAD EXTENSION
AVERY STREET
HORIZON TERRACE
AXIS PARADE
GLOBAL ROAD
GREENWICH PARADE
HEMISPHERE STREET
FLYNN DRIVE

LEGEND

- LIDAR SURVEY CONTOURS (2m) — 58
- LIMESTONE SURFACE CONTOURS (2.0m) — 40
- LOT 503 PHASE 1 APPLICATION BOUNDARY
- NORTHERN CONSTRAINTS BOUNDARY
- LAN 07 ⊕ 0.7 / 70.6 — BORE HOLE LIMESTONE SURFACE DEPTH/ELEVATION (AHD)
- + 0.5 / 66.3 — INTERPOLATED LIMESTONE SURFACE DEPTH/ELEVATION (AHD)

METRES
100 0 100 200 300m
SCALE 1:5000

LIMESTONE SURFACE PLAN
SCALE: 1:5000

E:\Project Delivery (PD)\3.0 Projects\3.4 Civil\2018\PC18027 - Lot 503 DA & EIL Applications Neerabup\2.0 Design\6. Drawings\2.34.1 - ACAD\PC18027-CI-1301.dwg

No.	REVISION	BY	DATE
C	DRAWING UPDATED	DA	11.10.19
B	APPLICATION BOUNDARY UPDATED	DA	29.01.19
A	ISSUED FOR INFORMATION	MD	26.02.18

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CLIENT: LANDCORP

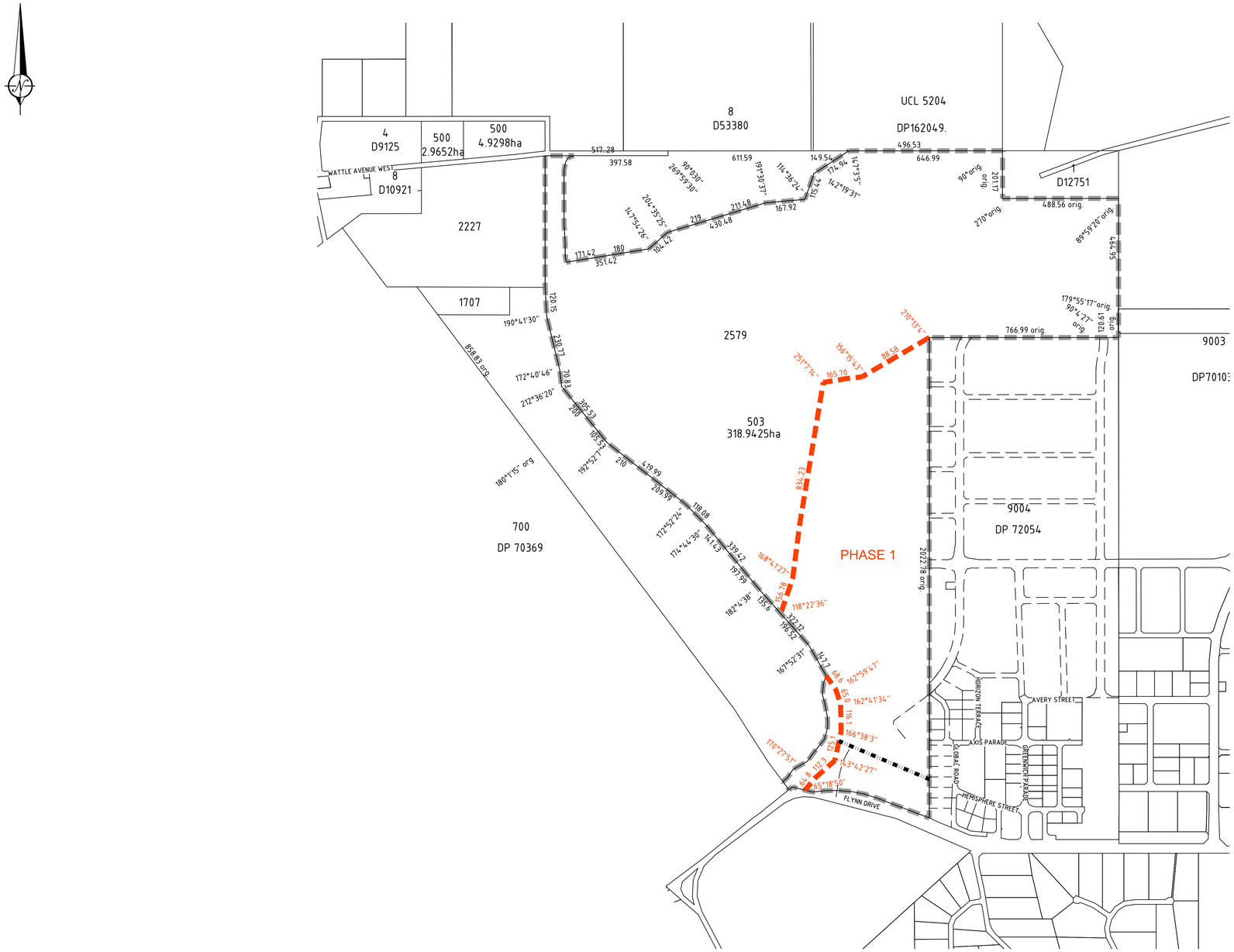
PROJECT:
NEERABUP INDUSTRIAL AREA
LOT 503 FLYNN DRIVE NEERABUP

DRAWING TITLE:
LIMESTONE SURFACE PLAN

SCALE	AS SHOWN	FILE	
HORIZONTAL	–	DESIGN	MD
VERTICAL	–	DRAWN	MD
SURVEY DATUM	AHD	CHECKED	EBF
WAPC No		DATE	FEB 2018
CADFILE NAME		DRAWING No.	REV C
		REV.	C

THIS PLAN IS NOT TO BE USED FOR CONSTRUCTION UNLESS SIGNED BELOW

APPROVED



LEGEND:

- LOT 503 BOUNDARY
- LOT 503 PHASE 1 APPLICATION BOUNDARY
- SERVICE INDUSTRIAL BOUNDARY

DEPOSITED PLAN

SCALE: 1:10000

METRES

200 0 200 400 600m

SCALE 1:10000

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No.	REVISION	BY	DATE
D	SERVICE INDUSTRIAL BOUNDARY ADDED	DA	05.02.19
C	APPLICATION BOUNDARY UPDATED	DA	29.01.19
B	ISSUED FOR INFORMATION	MD	10.04.18
A	ISSUED FOR INFORMATION	MD	26.02.18

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P.O. BOX 134
BURSWOOD WA 6100

CLIENT: LANDCORP

PROJECT:
NEERABUP INDUSTRIAL AREA
LOT 503 FLYNN DRIVE NEERABUP

DRAWING TITLE:
DEPOSITED PLAN

SCALE	AS SHOWN	FILE	
HORIZONTAL	–	DESIGN	MD
VERTICAL	–	DRAWN	MD
SURVEY DATUM	AHD	CHECKED	EBF
WAPC No		DATE	FEB 2018
CADFILE NAME		DRAWING No.	1302
		REV.	D

THIS PLAN IS NOT TO BE USED FOR CONSTRUCTION UNLESS SIGNED BELOW

APPROVED .....

OVERALL LOT SUMMARY

SIZE	No. LOTS	% TOTAL LOTS	
2001m² – 3000m²	16	8.51%	MINIMUM LOT SIZE 2531m²
3001m² – 4000m²	126	67.02%	MAXIMUM LOT SIZE 8911m²
4001m² – 5000m²	27	14.36%	AVERAGE LOT SIZE 3733m²
5001m² – 6000m²	13	6.91%	TOTAL LOT AREA 70.1820ha
6001m² – 7000m²	3	1.60%	
7001m² – 10000m²	3	1.60%	
TOTAL LOTS	188		
FUTURE LOTS	1		

LEGEND:

- LOT 503 BOUNDARY
- LOT 503 PHASE 1 APPLICATION BOUNDARY

CONCEPT SUBDIVISION PLAN – PHASE 1

SCALE: 1:5000

METRES
100 0 100 200 300m
SCALE 1:5000

E:\Project Delivery (PD)\3.0 Projects\3.4 Civil\2018\PC18027 - Lot 503 DA & EIL Applications Neerabup\2.0 Design\6. Drawings\2.34.1 - ACAD\PC18027-CI-1303.dwg

No.	REVISION	BY	DATE
C	DRAWING UPDATED	DA	11.10.19
B	APPLICATION BOUNDARY UPDATED	DA	29.01.19
A	ISSUED FOR INFORMATION	MD	26.02.18

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CLIENT: LANDCORP

PROJECT: NEERABUP INDUSTRIAL AREA
LOT 503 FLYNN DRIVE NEERABUP

DRAWING TITLE: CONCEPT SUBDIVISION PLAN
PHASE 1

SCALE	AS SHOWN	FILE	
HORIZONTAL	–	DESIGN	MD
VERTICAL	–	DRAWN	MD
SURVEY DATUM	AHD	CHECKED	EBF
WAPC No		DATE	FEB 2018
CADFILE NAME		DRAWING No.	REV C

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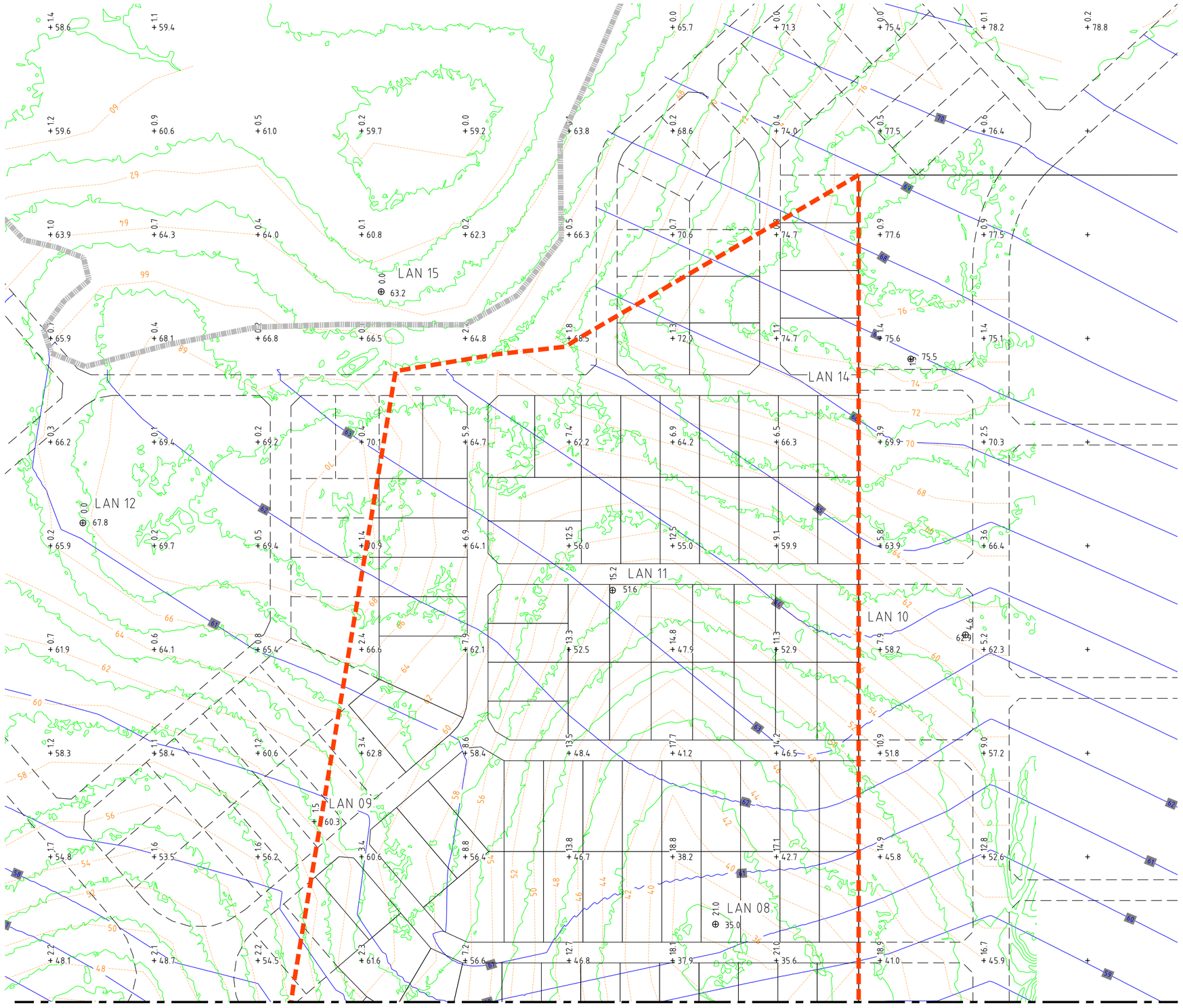
APPROVED .....

REV. C



NOTES:

1. FOR TYPICAL SECTIONS AT BOUNDARY OF THE PHASE 1 AREA REFER TO DRAWING SK5.

LEGEND

- 58 — DESIGN CONTOURS (2015)
- 58 — LIDAR SURVEY CONTOURS (2m)
- 40 — LIMESTONE SURFACE CONTOURS (2.0m)
- LOT 503 PHASE 1 APPLICATION BOUNDARY
- NORTHERN CONSTRAINTS BOUNDARY
- LAN 07 ⊕ 0.7 / 70.6 — BORE HOLE LIMESTONE SURFACE DEPTH/ELEVATION (AHD)
- + 0.5 / 66.3 — INTERPOLATED LIMESTONE SURFACE DEPTH/ELEVATION (AHD)

JOINS TO DWG PC18027-CI-1305

SURFACE DETAIL PLAN

SCALE: 1:2000

METRES 40 0 40 80 120m

SCALE 1:2000

E:\Project Delivery (PD)\3.0 Projects\3.4 Civil\2018\PC18027 - Lot 503 DA & EIL Applications Neerabup\2.0 Design\6. Drawings\2.34.1 - ACAD\PC18027-CI-1304-1306.dwg

No.	REVISION	BY	DATE
B	DRAWING UPDATED	DA	11.10.19
A	ISSUED FOR INFORMATION	MD	10.04.18

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CLIENT: LANDCORP

PROJECT: NEERABUP INDUSTRIAL AREA
LOT 503 FLYNN DRIVE NEERABUP

DRAWING TITLE: SURFACE DETAIL PLAN
SHEET 1 OF 3

SCALE	AS SHOWN	FILE	
HORIZONTAL	–	DESIGN	MD
VERTICAL	–	DRAWN	MD
SURVEY DATUM	AHD	CHECKED	EBF
WAPC No		DATE	FEB 2018
CADFILE NAME		DRAWING No.	1304
		REV.	B

THIS PLAN IS NOT TO BE USED FOR CONSTRUCTION UNLESS SIGNED BELOW

APPROVED .....

JOINS TO DWG PC18027-CI-1304

LAN 07

LAN 06

LAN 05

LAN 03

LAN 04

HORIZON TERRACE

JOINS TO DWG PC18027-CI-1306

NOTES:

1. FOR TYPICAL SECTIONS AT BOUNDARY OF THE PHASE 1 AREA REFER TO DRAWING SK5.

LEGEND

- 58 — DESIGN CONTOURS (2015)
- 58 — LIDAR SURVEY CONTOURS (2m)
- 40 — LIMESTONE SURFACE CONTOURS (2.0m)
- LOT 503 PHASE 1 APPLICATION BOUNDARY
- NORTHERN CONSTRAINTS BOUNDARY
- LAN 07 ⊕ 0.7 / 70.6 / + 0.5 / 69.3 — BORE HOLE LIMESTONE SURFACE DEPTH/ELEVATION (AHD); INTERPOLATED LIMESTONE SURFACE DEPTH/ELEVATION (AHD)

METRES
40 0 40 80 120m
SCALE 1:2000

SURFACE DETAIL PLAN

SCALE: 1:2000

E:\Project Delivery (PD)\3.0 Projects\3.4 Civil\2018\PC18027 - Lot 503 DA & EIL Applications Neerabup\2.0 Design\6. Drawings\2.34.1 - ACAD\PC18027-CI-1304-1306.dwg

No.	REVISION	BY	DATE
C	DRAWING UPDATED	DA	11.10.19
B	APPLICATION BOUNDARY UPDATED	DA	29.01.19
A	ISSUED FOR INFORMATION	MD	10.04.18

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CLIENT: LANDCORP

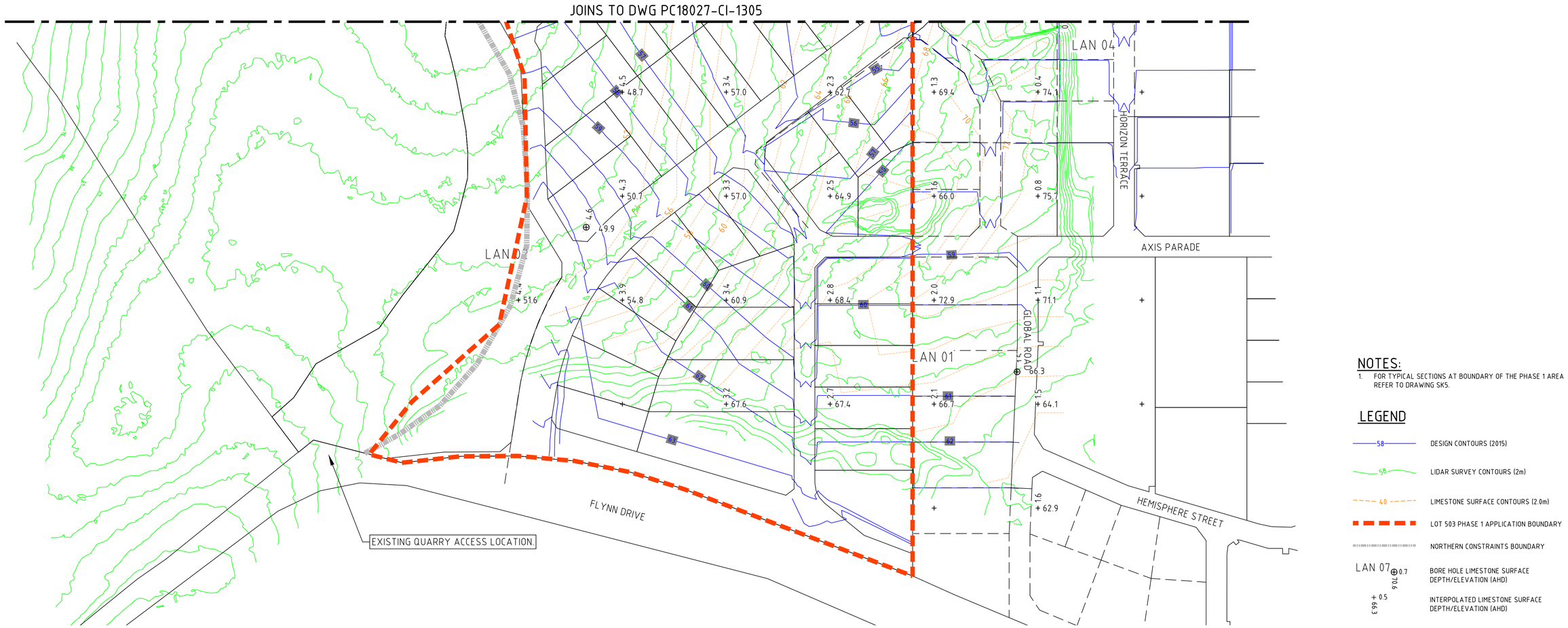
PROJECT: NEERABUP INDUSTRIAL AREA
LOT 503 FLYNN DRIVE NEERABUP

DRAWING TITLE: SURFACE DETAIL PLAN
SHEET 2 OF 3

SCALE	AS SHOWN	FILE	
HORIZONTAL	–	DESIGN	MD
VERTICAL	–	DRAWN	MD
SURVEY DATUM	AHD	CHECKED	EBF
WAPC No		DATE	FEB 2018
CADFILE NAME		DRAWING No.	1305
		REV.	C

THIS PLAN IS NOT TO BE USED FOR CONSTRUCTION UNLESS SIGNED BELOW

APPROVED



SURFACE DETAIL PLAN

SCALE: 1:2000

NOTES:

1. FOR TYPICAL SECTIONS AT BOUNDARY OF THE PHASE 1 AREA REFER TO DRAWING SK5.

LEGEND

- DESIGN CONTOURS (2015)
- LIDAR SURVEY CONTOURS (2m)
- LIMESTONE SURFACE CONTOURS (2.0m)
- LOT 503 PHASE 1 APPLICATION BOUNDARY
- NORTHERN CONSTRAINTS BOUNDARY
- BORE HOLE LIMESTONE SURFACE DEPTH/ELEVATION (AHD) — e.g. LAN 07 ⊕ 0.7 / + 70.6
- INTERPOLATED LIMESTONE SURFACE DEPTH/ELEVATION (AHD) — e.g. + 0.5 / + 66.3

METRES
40 0 40 80 120m
SCALE 1:2000

E:\Project Delivery (PD)\3.0 Projects\3.4 Civil\2018\PC18027 - Lot 503 DA & EIL Applications Neerabup\2.0 Design\6. Drawings\2.34.1 - ACAD\PC18027-CI-1304-1306.dwg

No.	REVISION	BY	DATE
C	DRAWING UPDATED	DA	11.10.19
B	APPLICATION BOUNDARY UPDATED	DA	29.01.19
A	ISSUED FOR INFORMATION	MD	10.04.18

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CLIENT: LANDCORP

PROJECT:
NEERABUP INDUSTRIAL AREA
LOT 503 FLYNN DRIVE NEERABUP

DRAWING TITLE:
SURFACE DETAIL PLAN
SHEET 3 OF 3

SCALE	AS SHOWN	FILE	
HORIZONTAL	–	DESIGN	MD
VERTICAL	–	DRAWN	MD
SURVEY DATUM	AHD	CHECKED	EBF
WAPC No		DATE	FEB 2018
CADFILE NAME		DRAWING No.	1306
		REV.	C

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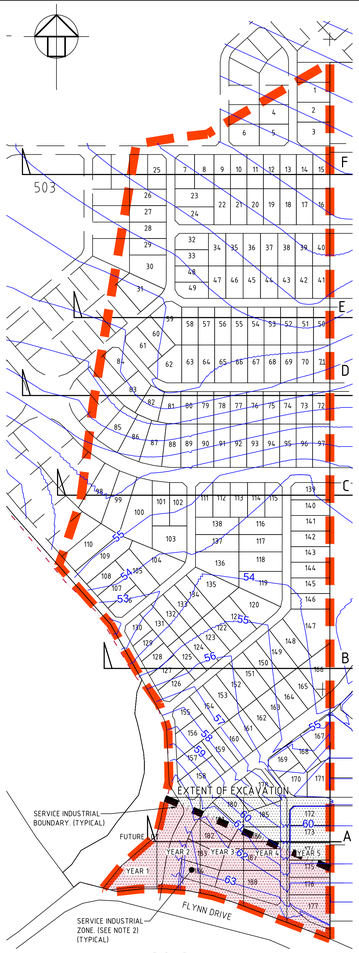
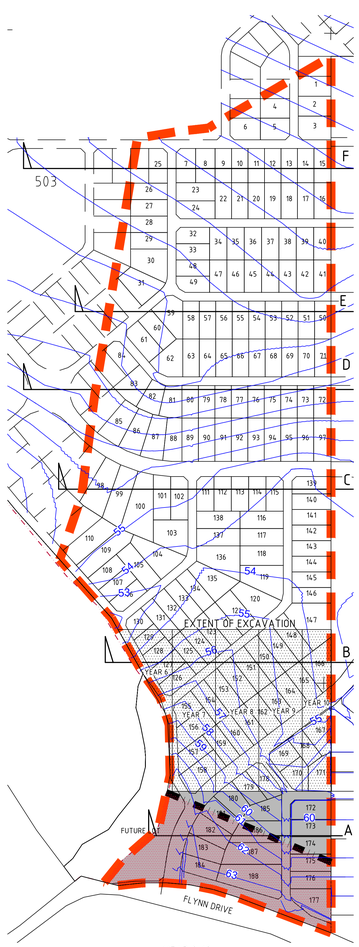
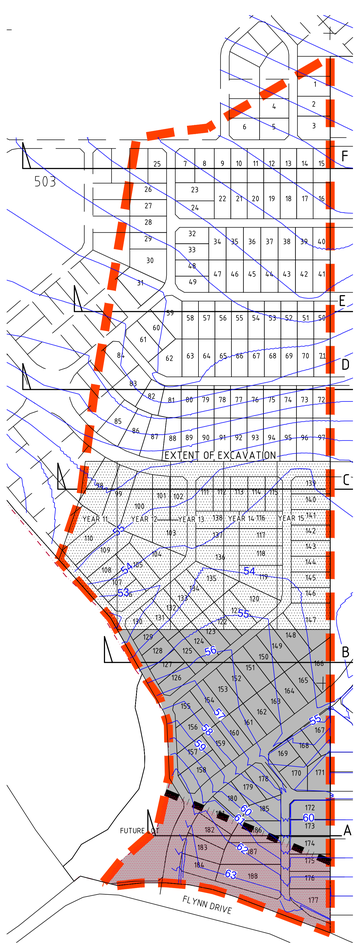
APPROVED .....



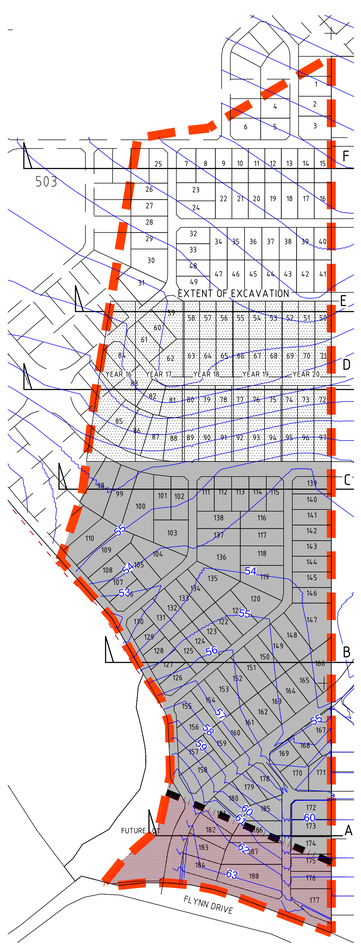
YEAR 1-5
SCALE 1:5000



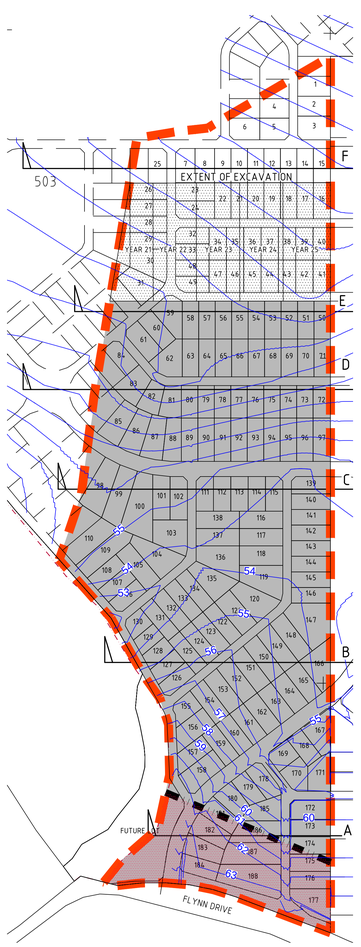
YEAR 6-10
SCALE 1:5000



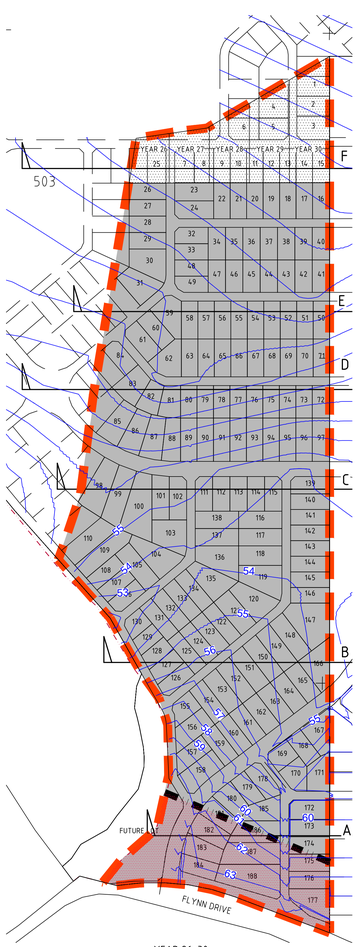
YEAR 11-15
SCALE 1:5000



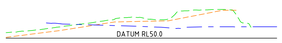
YEAR 16-20
SCALE 1:5000



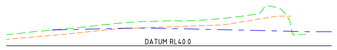
YEAR 21-25
SCALE 1:5000



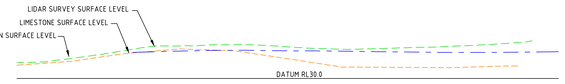
YEAR 26-30
SCALE 1:5000



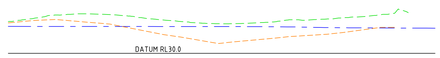
SECTION A
H.1:4000 V.1:2000



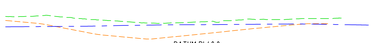
SECTION B
H.1:4000 V.1:2000



SECTION C
H.1:4000 V.1:2000



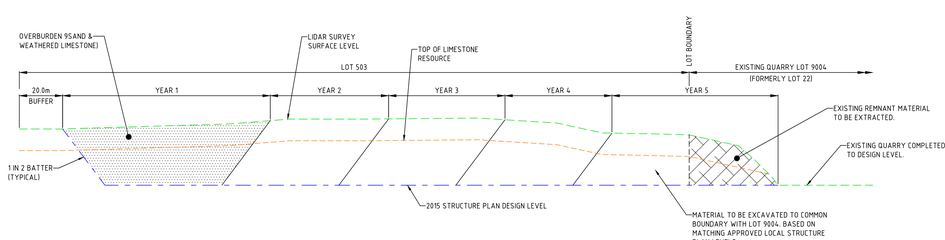
SECTION D
H.1:4000 V.1:2000



SECTION E
H.1:4000 V.1:2000

SECTION F
H.1:4000 V.1:2000

KEY PLAN
SCALE 1:10000



TYPICAL EXCAVATION SECTION PER 5 YEAR PERIOD

(REFER TO SECTIONS 'A' TO 'F' FOR DETAILS)
SCALE N.T.S.

NOTES:
1. EXCAVATION AREAS TO BE PROGRESSIVELY CLEARED. CLEARING TO BE X Ha AS PER APPROVED EXTRACTIVE No. LICENSE.
2. EXTRACTIVE INDUSTRIES ACTIVITIES ARE EXCLUDED FROM THE SERVICE INDUSTRIAL ZONE.

LEGEND

- DESIGN CONTOURS (2015)
- LIMESTONE CONTOURS
- NATURAL SURFACE (LIDAR CONTOURS)
- BALANCE AREAS TO BE EXCAVATED.
- CURRENT EXCAVATION (BASED ON YEAR OF ACTIVITY).
- AREAS WHERE PROGRESSIVE EXCAVATION WORKS ARE COMPLETED.
- SERVICE INDUSTRIAL BOUNDARY
- 'SERVICE INDUSTRIAL' ZONE UNDER ASP 17.

FOR INFORMATION

1:5000 AT A0
0 50m 100m 200m 300m

No	REVISION	BY	DATE
B	SERVICE INDUSTRIAL ZONE ADDED	DA	11.10.19
A	ISSUED FOR INFORMATION	DA	06.08.19

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CLIENT: LANDCORP

PROJECT:
NEERAUP INDUSTRIAL AREA
LOT 503 PHASE 1 AREA
FLYNN DRIVE, NEERABUP

DRAWING TITLE:
EXCAVATION STAGING PLAN
PHASE 1 AREA

SCALE	AS SHOWN	FILE	PC18027
HORIZONTAL		DESIGN	EBF
VERTICAL		DRAWN	DA
SURVEY DATUM	AHD	CHECKED	
WAPC No		DATE	AUG 19
CADFILE NAME	PC18027-CI-1307	DRAWING No.	PC18027-CI-1307
REV.	B		

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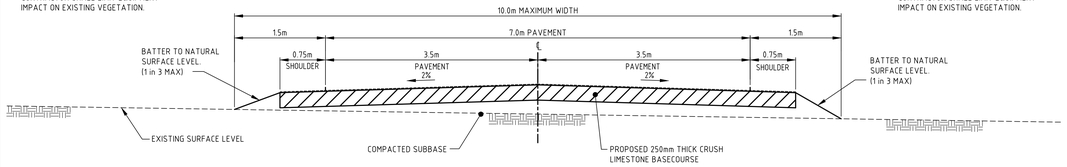
APPROVED

EXISTING VEGETATION SHALL BE RETAINED WHERE POSSIBLE. THE CONTRACTOR SHALL LIMIT EQUIPMENT IMPACT ON EXISTING VEGETATION.

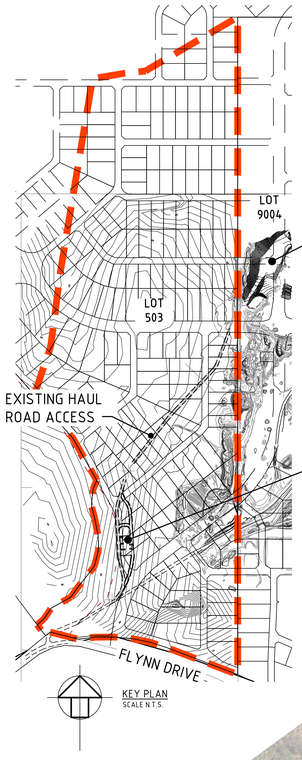


EXISTING VEGETATION SHALL BE RETAINED WHERE POSSIBLE. THE CONTRACTOR SHALL LIMIT EQUIPMENT IMPACT ON EXISTING VEGETATION.

TYPICAL EXISTING ACCESS ROAD CROSS SECTION

SECTION A

SCALE : DIAGRAMMATIC



KEY PLAN
SCALE N.T.S.

EXISTING COMPOUND AND WEIGHBRIDGE LOCATION. LOT 9004 (EXISTING QUARRY)

NEW COMPOUND AND WEIGHBRIDGE LOCATION

EXISTING HAUL ROAD ACCESS

BUSH FOREVER BOUNDARY

NEW COMPOUND AND WEIGHBRIDGE LOCATION

NEW BITUMEN SEALED ROAD FROM WEIGHBRIDGE.

EXISTING FLYNN DRIVE INTERSECTION

EXISTING HAUL ROAD ACCESS

(ORIGINAL HAUL ROAD CLOSED 18/11/2011)

EXISTING BOULDERS.

ORIGINAL QUARRY'S WEIGHBRIDGE AND OFFICES (REMOVED)

LOT 9004

LOT 503

BOUNDARY LOT 503
BOUNDARY LOT 9004

FENCE LINE

STORAGE/ AMENITIES

FUEL

WATER TANK

OFFICE, CRIB, & WEIGHBRIDGE

WC

ENTRY

EXIT

NOTES:
NEW SITE COMPOUND SHALL BE SETOUT ONSITE WITH ECO LOGICAL AUSTRALIA REPRESENTATIVE.

UNDER NO CIRCUMSTANCES IS VEGETATION, TREES AND FLORA TO BE CUT UNTIL APPROVED BY ECO LOGICAL AUSTRALIA.

LEGEND

- 50 — EXISTING SURFACE CONTOURS
- PROPOSED ACCESS ROAD
- ORIGINAL/EXISTING ACCESS ROAD
- BUSH FOREVER BOUNDARY (DEVELOPMENT PLANNING STRATEGIES (WA) 28/11/2011)

FOR DISCUSSION

1:1250 AT A0

0 12.5m 25m 50m 75m

No.	REVISION	BY	DATE
A	ISSUED FOR DISCUSSION	DA	13.08.18

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CLIENT: LANDCORP

PROJECT: NEERAUP INDUSTRIAL AREA
LOT 503 PHASE 1 AREA
FLYNN DRIVE, NEERABUP

DRAWING TITLE: EXISTING ACCESS HAUL ROAD, NEW COMPOUND AND WEIGHBRIDGE LOCATION PLAN

SCALE	AS SHOWN	FILE	PC18027
HORIZONTAL		DESIGN	EBF
VERTICAL		DRAWN	DA
SURVEY DATUM	AHD	CHECKED	
WAPC No		DATE	JULY 18
CADFILE NAME	PC18027-CI-SK1	DRAWING No.	PC18027-CI-SK1
REV.	A	APPROVED	

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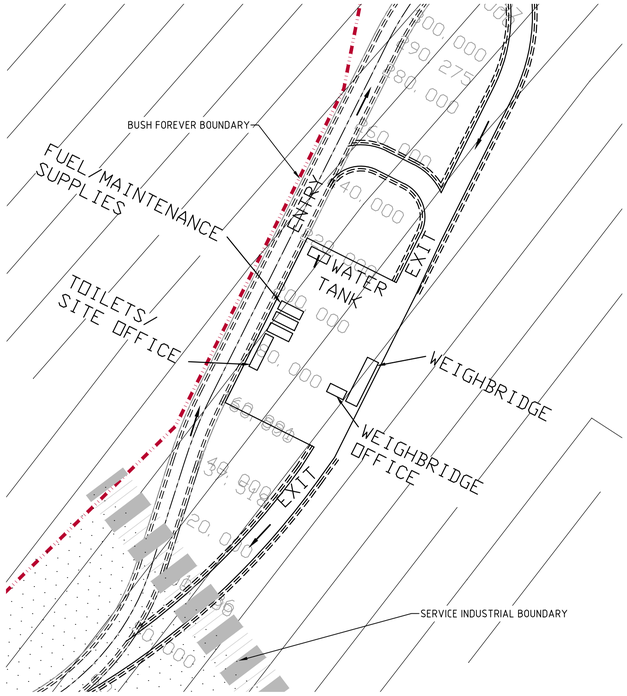
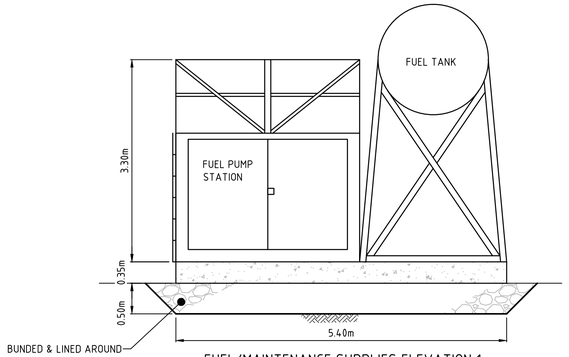
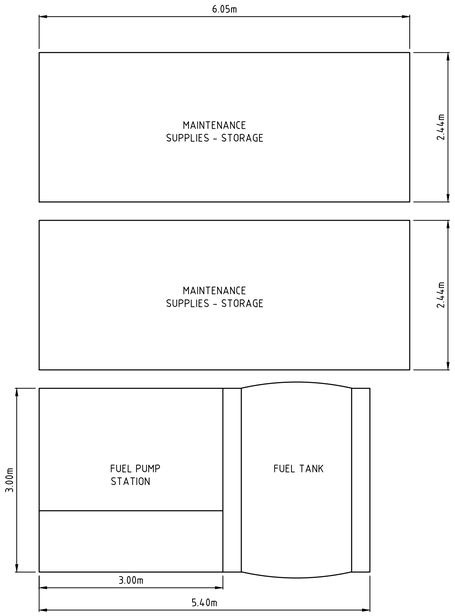


PLAN
SCALE 1:1000

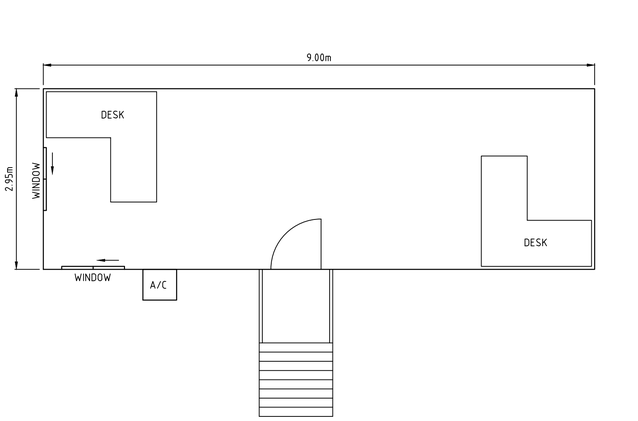
PHOTO - FUEL/MAINTENANCE SUPPLIES



FUEL/MAINTENANCE SUPPLIES ELEVATION 1
SCALE 1:50



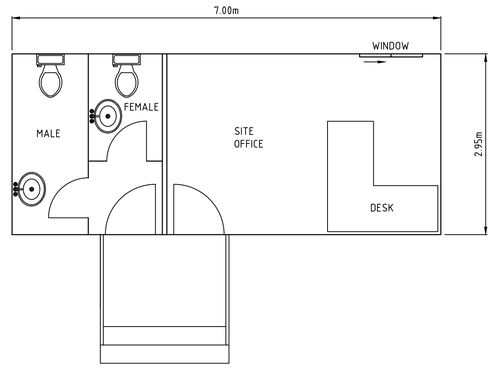
FUEL/MAINTENANCE SUPPLIES PLAN
SCALE 1:50



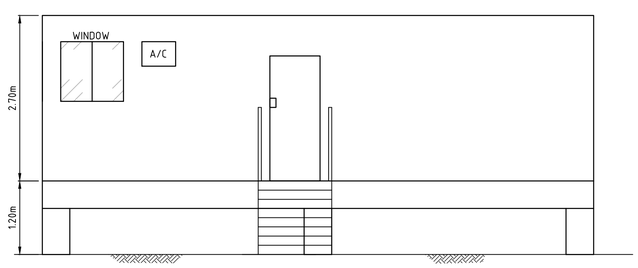
WEIGH BRIDGE OFFICE PLAN
SCALE 1:50

PHOTO - WEIGH BRIDGE OFFICE

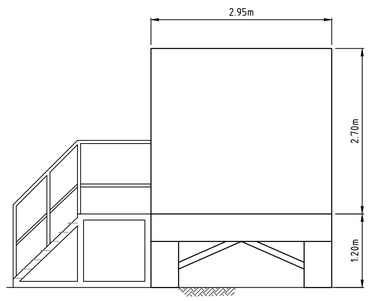
PHOTO - TOILETS/SITE OFFICE



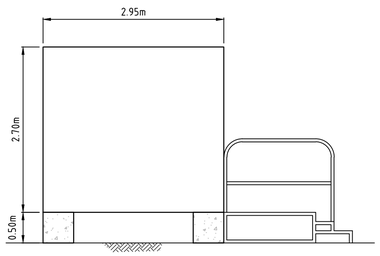
TOILETS/SITE OFFICE PLAN
SCALE 1:50



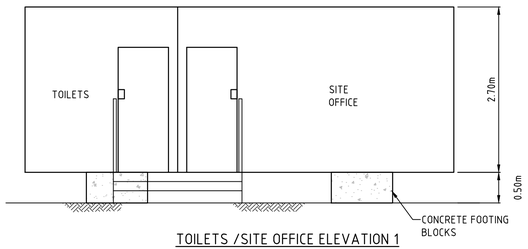
WEIGH BRIDGE OFFICE ELEVATION 1
SCALE 1:50



WEIGH BRIDGE OFFICE ELEVATION 2
SCALE 1:50



TOILETS/SITE OFFICE ELEVATION 2
SCALE 1:50



TOILETS /SITE OFFICE ELEVATION 1
SCALE 1:50

1:50 AT A1 0 0.5m 1m 2m 3m

1:1000 AT A1 0 10m 20m 40m 60m

E:\Project Delivery (PD)\3.0 Projects\3.4 Civil\2018\PC18027 - Lot 503 DA & EIL Applications Neerabup\2.0 Design\6 Drawings\2.34.1 - ACAD\PC18027-CI-SK4.dwg

No.	REVISION	BY	DATE
C	SERVICE INDUSTRIAL BOUNDARY ADDED	DA	11.10.19
B	DRAWING UPDATED	DA	02.10.18
A	ISSUED FOR INFORMATION	DA	01.10.18

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F: +61 8 6336 9288
E: enquire@peritasgroup.com.au
74 GOODWOOD PARADE
BURSWOOD WA 6100
P.O. BOX 134
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CLIENT: LANDCORP

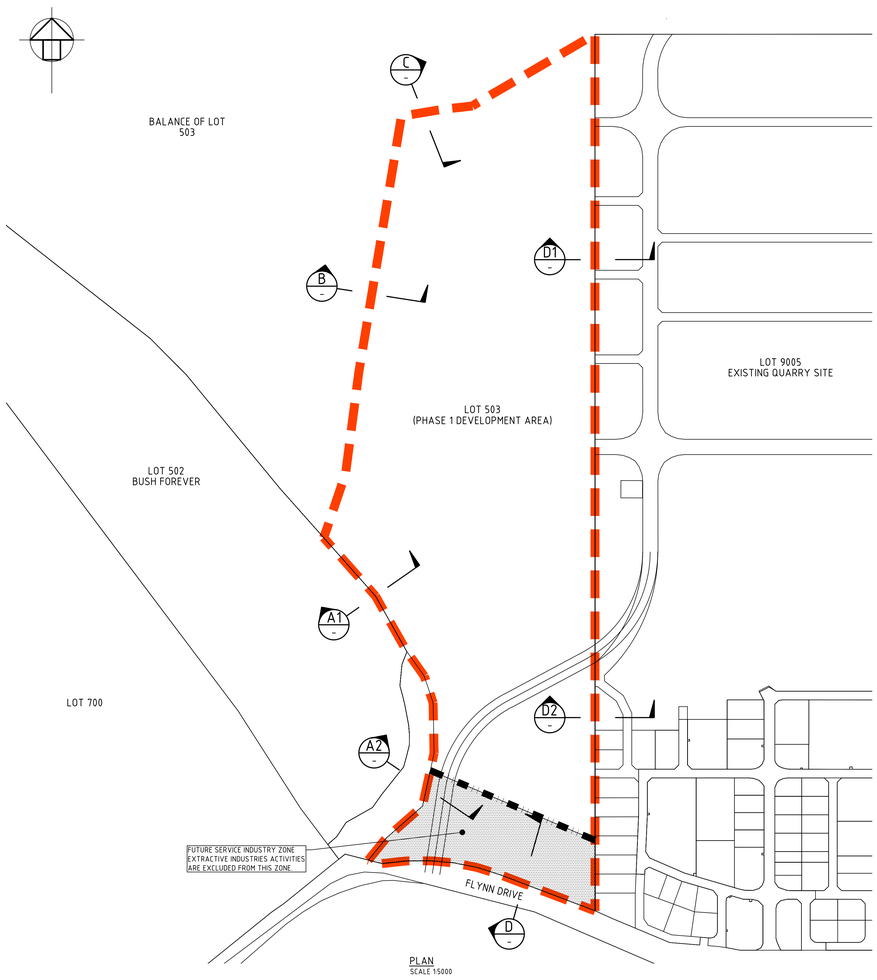
PROJECT:
NEERABUP INDUSTRIAL AREA
LOT 503 FLYNN DRIVE NEERABUP

DRAWING TITLE:
SITE FACILITIES PLAN
LAYOUT & ELEVATIONS

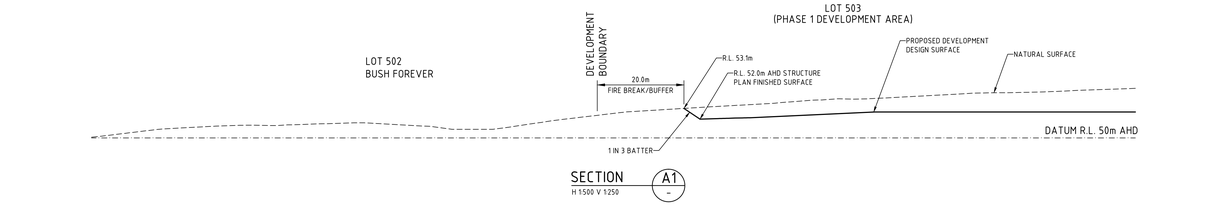
SCALE	AS SHOWN	FILE	
HORIZONTAL		DESIGN	EBF
VERTICAL		DRAWN	DA
SURVEY DATUM	AHD	CHECKED	
WAPC No		DATE	SEPT 18
CADFILE NAME	PC18027-CI-SK4	DRAWING No.	PC18027-CI-SK4
		REV.	C

THIS PLAN IS NOT TO BE USED FOR CONSTRUCTION UNLESS SIGNED BELOW

APPROVED .....



PLAN
SCALE 1:5000



SECTION A1
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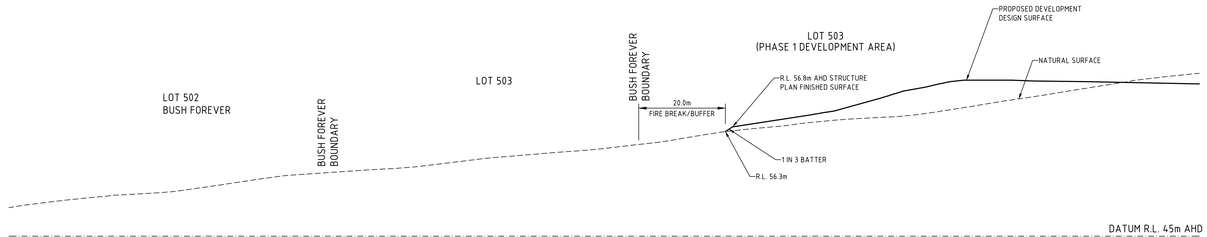

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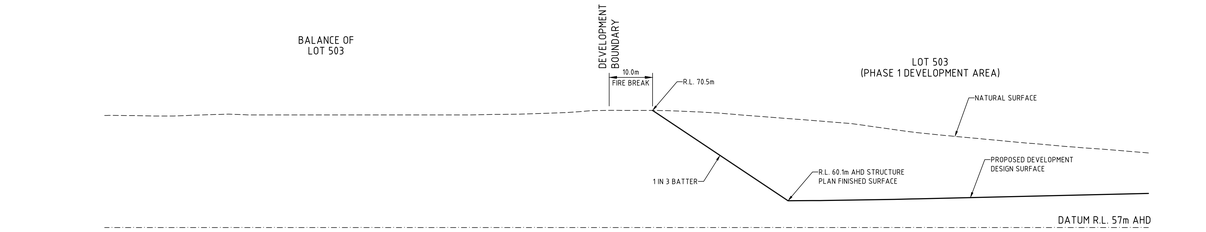

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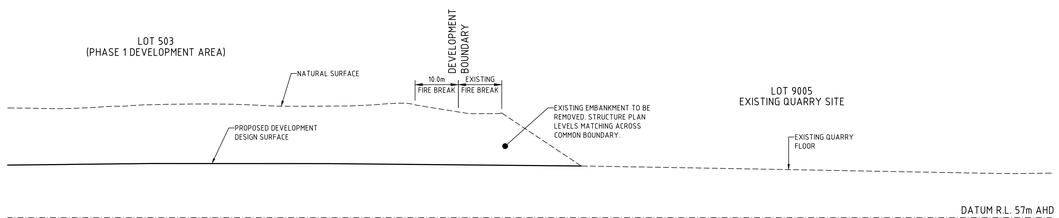

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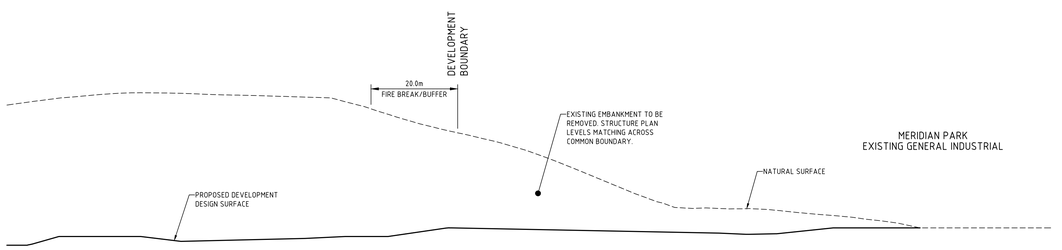

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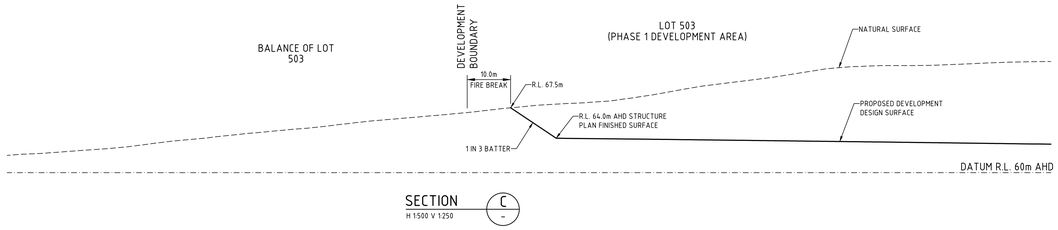

SECTION C
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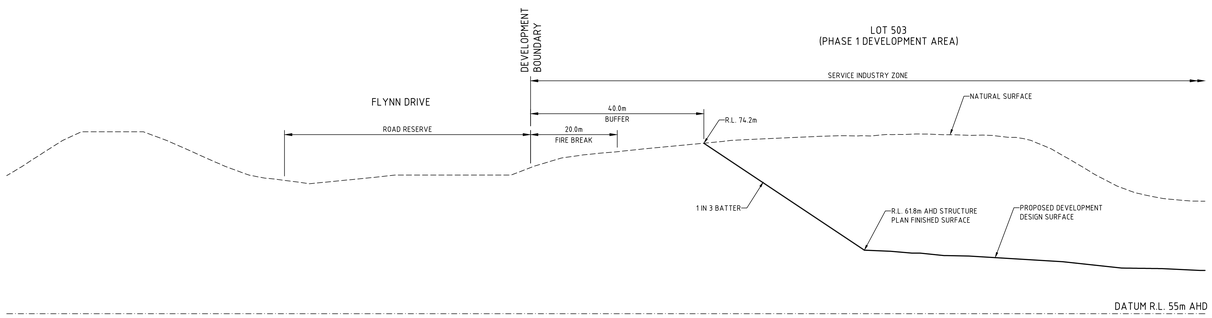

SECTION D
H 1:500 V 1:250

FOR DISCUSSION

1:250 AT A1 (0 2.5m 5m 10m 15m)
1:500 AT A1 (0 5m 10m 20m 30m)
1:5000 AT A1 (0 50m 100m 200m 300m)

No.	REVISION	BY	DATE
D	SERVICE INDUSTRY ZONE ADDED, SECTIONS AMENDED	DA	11.10.19
C	DRAWING UPDATED	DA	30.01.19
B	APPLICATION BOUNDARY UPDATED	DA	29.01.19
A	ISSUED FOR DISCUSSION	DA	23.01.19

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BURSWOOD WA 6100

CLIENT: LANDCORP

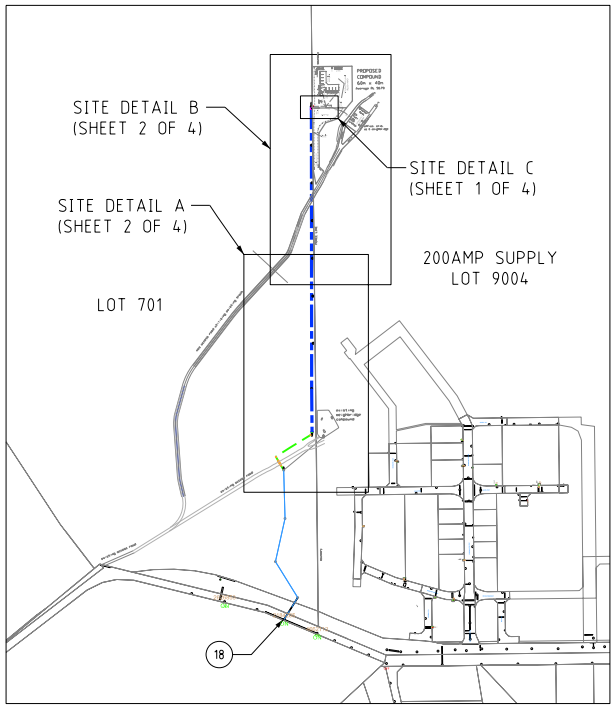
PROJECT: NEERAUP INDUSTRIAL AREA
LOT 503 PHASE 1 AREA
FLYNN DRIVE, NEERABUP

DRAWING TITLE: BUSH FOREVER & LOT 503 INTERFACE CROSS SECTIONS

SCALE	AS SHOWN	FILE	PC18027
HORIZONTAL		DESIGN	EBF
VERTICAL		DRAWN	DA
SURVEY DATUM	AHD	CHECKED	
WAPC No		DATE	JULY 18
CADFILE NAME	PC18027-CI-SK5	DRAWING No.	PC18027-CI-SK5

THIS PLAN IS NOT TO BE USED FOR CONSTRUCTION UNLESS SIGNED BELOW
APPROVED .....
REV. D

APPENDIX D - Western Power Assets Location within Lot 9004 Flynn Drive Neerabup



SITE LOCATION

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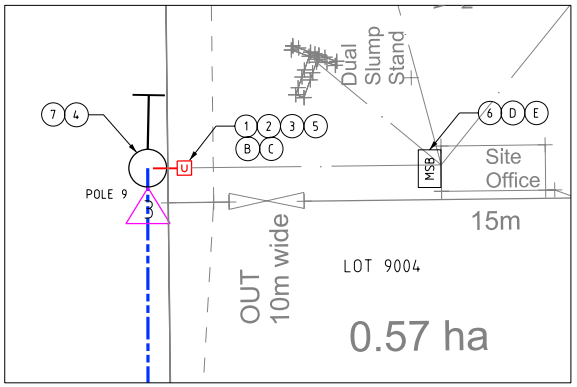
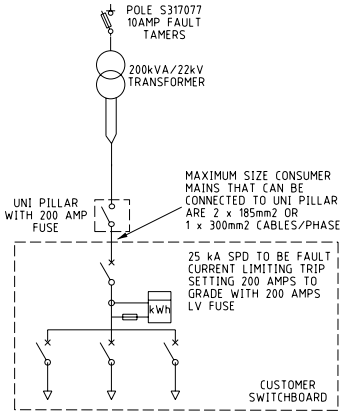


SITE DETAIL C

1:500 — 10 5 0 10 20 30 40



CUSTOMER'S INFORMATION / SCOPE OF WORK

(A) THIS DRAWING TO BE READ IN CONJUNCTION WITH WESTERN AUSTRALIAN DISTRIBUTION CONNECTIONS MANUAL.

(B) PILLAR EXCLUSION ZONE TO BE PREPARED AS PER THE WESTERN AUSTRALIAN DISTRIBUTION CONNECTIONS MANUAL CLAUSE 12.5.3. THIS INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:

1. PEGGING THE PILLAR LOCATION PRIOR TO CONSTRUCTION.

2. ONLY EASILY REMOVABLE SURFACE TREATMENT IS TO BE INSTALLED IN THIS AREA, SUCH AS BRICK PAVING.

3. CLEAR OF ALL SERVICES.

4. LOCATED 300mm ABOVE 100 YEAR FLOOD LEVEL AND NOT IN A PRECARIOUS POSITION.

(C) CUSTOMER ELECTRICAL CONTRACTOR IS TO SUPPLY SUITABLE LUGS AND CRIMPING TOOLS FOR TERMINATION OF CUSTOMERS CABLE.

(D) CUSTOMER TO SUPPLY AND INSTALL 'S' TYPE METERING CT's.

(E) CUSTOMER'S ELECTRICIAN TO ENSURE CUSTOMER'S SPD GRADES WITH WESTERN POWER'S UPSTREAM PROTECTION AS NOTED ON THE SIMPLIFIED LINE DIAGRAM.

(F) CUSTOMER MUST COMPLY WITH POWER QUALITY LIMITS AS PER AS61000.3.6 AND WESTERN POWER TECHNICAL REQUIREMENTS.

WESTERN POWER SCOPE OF WORK

1. INSTALL NEW UNI PILLAR AS PER ZONE EXCLUSION DETAIL. INSTALL 200AMPS FUSE
   CU: LU11 x 1, LU36 x 1
2. TRENCH AND INSTALL 185LV CABLE FROM NEW UNI PILLAR TO NEW POLE 9 AS PER SITE DETAIL C.
   CU: CN44 x 10m, CN54 x 1
3. TERMINATE 185LV CABLE TO NEW UNI PILLAR.
   CU: LU7 x 1
   DCSH: U9
4. TERMINATE 185LV CABLE TO NEW TX POLE 9.
   CU: LU61 x 1
5. TERMINATE CUSTOMER'S CABLE IN CONJUNCTION WITH CUSTOMER'S ELECTRICAL CONTRACTOR.
6. INSTALL CT METER IN CUSTOMERS SWITCHBOARD.
   CU: LM1 x 1
7. INSTALL NEW 12.5m/6KN POLE AS PER SITE DETAIL B AND C. INSTALL HV TERMINATION XARM INSTALL 200kVA/22kV TRANSFORMER INSTALL GROUND STAY.
   CU: P08 x 1, HV5 x 1, TX4_200/22 x 1, ST1 x 1, CN1 x 3
   DCSH: H4, R12/2, R9, R13, R14/1
8. DRILL/TRENCH AND INSTALL 35HV CABLE FROM POLE 317080 TO NEW POLE 1 AS PER SITE DETAIL A.
   CU: CN46 x 180m
9. INSTALL NEW 12.5m/4KN POLE AS PER SITE DETAIL A. INSTALL HV TERMINATION XARM. INSTALL GROUND STAY.
   CU: P07 x 1, HV5 x 1, ST1 x 1, CN1 x 3,
   DCSH: H4, R13, R14/1
10. INSTALL NEW 11m/5kN POLES AS PER SITE DETAIL A. INSTALL HV INTERMEDIATE XARMS.
    CU: P05 x 2, HV1 x 2, CN18 x 6, CN74 x 12
    DCSH: H1, R3/2, R13
11. INSTALL NEW 12.5m/6KN POLE AS PER SITE DETAIL A. INSTALL HV INTERMEDIATE XARM.
    CU: P08 x 1, HV1 x 1, CN18 x 3, CN74 x 6
    DCSH: H1, R3/2, R13
12. INSTALL NEW 12.5m/6KN POLE AS PER SITE DETAIL A AND B. INSTALL HV IN LINE STRAIN.
    CU: P08 x 1, HV9 x 1, CN1 x 6, CN26 x 3
    DCSH: H5, R8/2, R5/2, R3/2, R13
13. INSTALL NEW 11m/4kN POLES AS PER SITE DETAIL B. INSTALL HV INTERMEDIATE XARMS.
    CU: P04 x 3, HV1 x 3, CN18 x 9, CN74 x 18
    DCSH: H1, R3/2, R13
14. INSTALL NEW 3 x 3/2.75SCAC CONDUCTOR FROM NEW POLE 1 TO NEW TX POLE 9.
    CU: CN37 x 2700m
15. REMOVE HV VERTICAL STRAIN ANGLE ON POLE 317080. INSTALL HV TERMINATION XARM AND REATTACH 3/2.75GZ CONDUCTORS FROM POLE 317079. REINSTALL GROUND STAY.
    CU: HV5 x 1, ST1 x 1, CN4 x 3, CN39 x 3m
    NON CU: CF0471 x 3
    DCSH: H4, R13, R14/1
16. TERMINATE 35HV CABLE TO POLE S317080 AND NEW POLE 1.
    CU: HU19 x 2, CN9 x 6, CN70 x 6
    DCSH: H9-1
17. REMOVE 1 BAY OF 3/2.75GZ CONDUCTOR FROM POLE 317080 TO POLE 317081. REMOVE EXISTING CUSTOMER AERIAL SERVICE FROM POLE 317081. REMOVE EXISTING POLE 317081 AND TRANSFORMER READYMIX.
18. REPLACE DOFs WITH 10AMPS FAULT TAMERS ON POLE S317077.
    CU: HV52 x 3
19. ⚠ IDENTIFIES POSITION WHERE CABLE MARKERS ARE TO BE INSTALLED. EACH MARKER IS TO BE VISIBLE FROM THE NEXT WITH A MAXIMUM SPACING BETWEEN MARKERS OF 150m.
    CU: CN64 x 3
20. ENVIRONMENTAL FILTER CHECKED BY CHARLES CHANG.

    NO ENVIRONMENTAL ISSUES IDENTIFIED IN IMMEDIATE WORKING AREAS. NEARBY POTENTIAL ENVIRONMENTAL RISK AREAS ARE INDICATED ON ENVIRONMENTAL DRAWING. (DO NOT ENTER OR IMPACT WITHOUT WESTERN POWER APPROVAL.)

NOTE TO CM:

CM TO ADVISE SITE MANAGER JOE CONCEI IF THERE WILL BE ANY ISSUES WITH EQUIPMENT AND VEHICLE ACCESS TO POLE LOCATIONS. CUSTOMER AGREED TO PREPARE THE ACCESS ROADS SHOULD THERE BE ANY ISSUES.

WARNING

BEWARE OF EXISTING SERVICES

DIAL 1100 BEFORE YOU DIG

THE LOCATION OF EXISTING SERVICES IS APPROXIMATE ONLY. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN. ALWAYS REFER TO CURRENT DBYD DRAWINGS. CONFIRM ASSET LOCATIONS ON SITE BEFORE COMMENCEMENT OF WORK.

REFER TO 'WORKSAFE' REGULATION 3.21

WARNING

IF WORKING IN THE VICINITY OF EXISTING OVERHEAD DISTRIBUTION OR TRANSMISSION LINES CONTRACTOR TO COMPLY WITH

"WORKSAFE" CLEARANCES DURING CONSTRUCTION

INSTRUCTION TO CONSTRUCTION CREWS

IT IS A REQUIREMENT OF WESTERN POWER THAT ALL EXISTING CONDUCTOR / CABLES SIZES ARE CONFIRMED ONSITE TO ENSURE THAT ALL FITTINGS ARE OF THE APPROPRIATE SIZE AND ARE INSTALLED CORRECTLY IN ACCORDANCE TO

Distribution Construction Standards Handbook

RESTORATION & REINSTATEMENT REQUIREMENTS

RESTORATION & REINSTATEMENT REQUIRED FOR THIS PROJECT TO BE COMPLETED AS PER THE RESTORATION AND REINSTATEMENT SPECIFICATION FOR LOCAL GOV'TS IN WA. THE CONSTRUCTION MANAGER IS RESPONSIBLE FOR ALL RESTORATION AND REINSTATEMENT UNTIL FORMALLY ACCEPTED BY WESTERN POWER OR LOCAL GOV'T AUTHORITY AS APPROPRIATE. SEE FIELD INSTRUCTION 2.21.

LEGEND

HV CABLES
- CN53 - 400mm2 (3X1c)
- CN49 - 240mm2 (3X1c)
- CN48 - 185mm2 (3X1c)
- CN50 - 95mm2 (3X1c)
- CN51 - 50mm2 (3X1c)
- CN51 - 50mm2 (1c)
- CN46 - 35mm2 (3X1c)
- CN47 - 35mm2 (1c)
- EXISTING HV CABLES (SIZE AND TYPE INDICATED)

LV-SL CABLES
- CN45 - 240mm2 (1x3c)
- CN44 - 185mm2 (1x3c)
- CN43 - 120mm2 (1x3c)
- CN42 - 25mm2 (1x3c)
- CN41 - 16mm2 SL (1c)
- 4.0 C PILOT
- EXISTING LV CABLES (SIZE AND TYPE INDICATED)

PILLARS / PITS / ETC
- MINI (WORKING END)
- UMS PIT
- UNIVERSAL
- UTILITIES PIT
- MINI
- 100/200AMP CUTOUT
- LINK
- CONDUIT / POLY PIPE
- CABLE MARKER U/G

OH EQUIPMENT
- INTERMEDIATE
- OUTRIGGER STAY
- DOF
- GROUND STAY
- PTT
- LV ABC KRONE

HV - AERIAL CONDUCTORS
- 19/3.25 AAC/AAAC
- 7/4.75 AAC/AAAC
- 7/2.5 AAC/AAAC
- 3/2.75 SCAC
- 150 HENDRIX
- EXISTING HV CONDUCTORS (SIZE AND TYPE INDICATED)

AERIAL CONDUCTORS AND POLES
- NEW POLE (ANY TYPE AS INDICATED)
- EXISTING POLE (ANY TYPE AS INDICATED)
- HV LV EXISTING AERIAL CONDUCTORS (SIZE AND TYPE INDICATED)

CUSTOMER CONTACT DETAILS

COMPANY NAME: WA LIMESTONE

CONTACT: JOE CONCEI TEL: 0405 365 643

APPROVED FOR CONSTRUCTION

SAFETY - MAKE IT YOUR PRIMARY VALUE

DM#	FN:	Rev.	REVISIONS	DRN	DATE
		A	APPROVED FOR CONSTRUCTION	E.D.	04/14
		1	ISSUED FOR ENGINEERING REVIEW	C.C	01/14

FILE REFERENCE DETAILS

JRA DM#: 11821652
DBYD DM#: 11821656
PnW DM#: 11823979
SITE PHOTOS DM#: 11821662
SAFETY IN DESIGN DM#: 11821637

200AMP MAXIMUM DEMAND

INSTALL NEW 200kVA/22kV TRANSFORMER

LOT 9004 FLYNN DRIVE

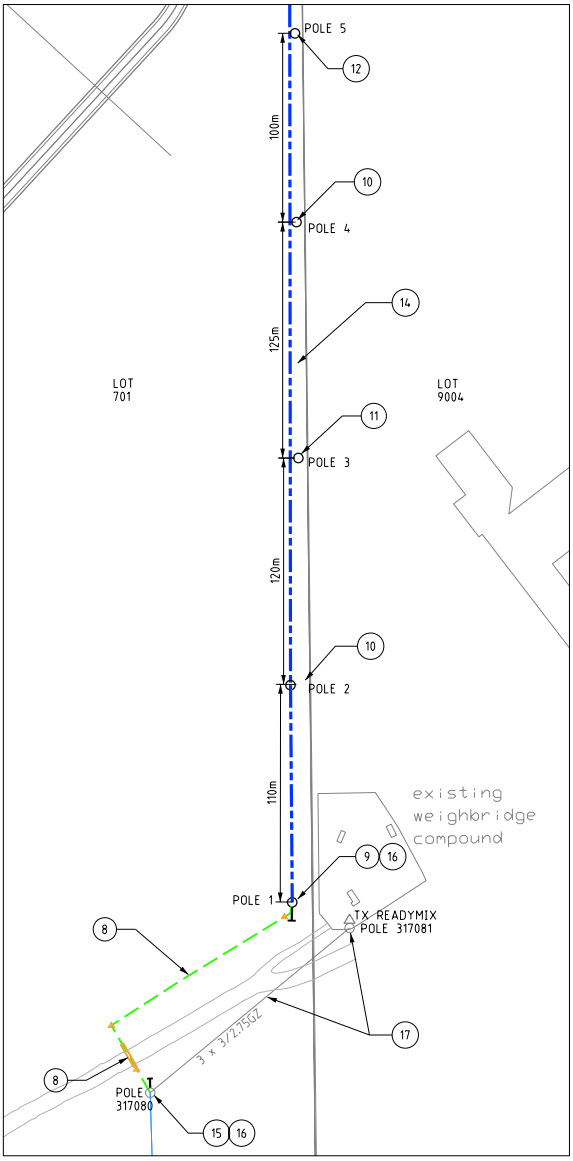
NEERABUP

western power

DESIGNER: CHARLES CHANG
TEL: 93267184
DATE: 01/14 | SCALE: AS NOTED @ A2
GEO REF: Lat. - 31°40'56" S Long. - 115°46'36" E
MAP REF:

DRAWING NUMBER
MP140013
SHEET 1 OF 4
REV: A | ORIGINAL SIZE - A2

SAFETY FIRST ALWAYS



SITE DETAIL A

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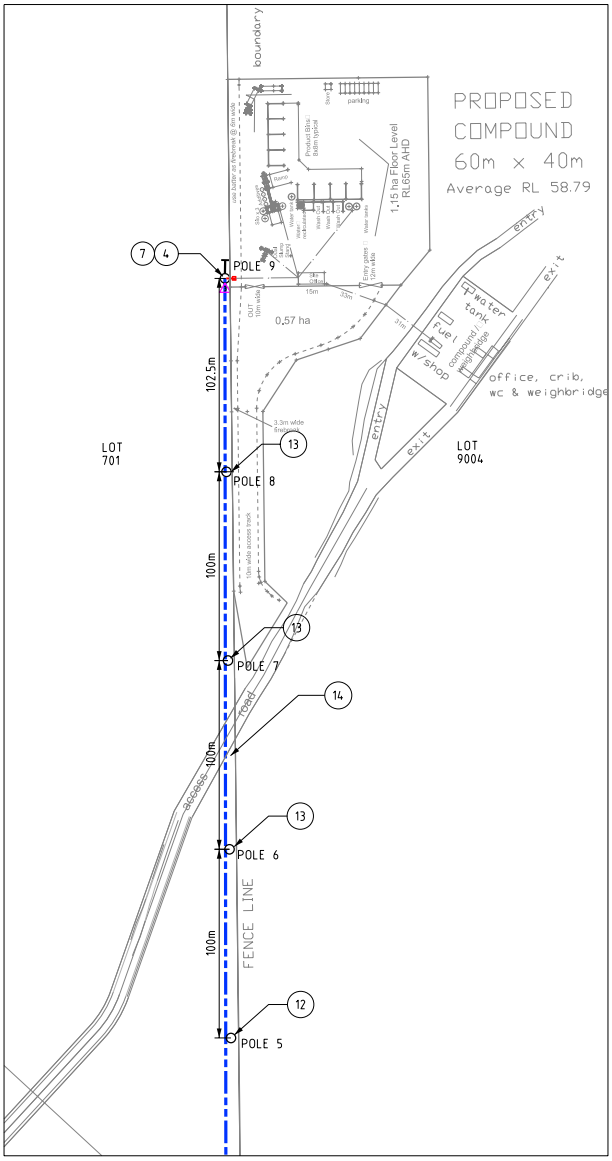

SITE DETAIL B

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LEGEND

HV CABLES

- CN53 - 400mm2 (3X1c)
- CN49 - 240mm2 (3X1c)
- CN48 - 185mm2 (3X1c)
- CN50 - 95mm2 (3X1c)
- CN51 - 50mm2 (3c)
- CN51 - 50mm2 (1c)
- CN46 - 35mm2 (3X1c)
- CN47 - 35mm2 (1c)
- EXISTING HV CABLES (SIZE AND TYPE INDICATED)

LV-SL CABLES

- CN45 - 240mm2 (1x3c)
- CN44 - 185mm2 (1x3c)
- CN43 - 120mm2 (1x3c)
- CN42 - 25mm2 (1x3c)
- CN41 - 16mm2 SL (1c)
- 40 C PILOT
- EXISTING LV CABLES (SIZE AND TYPE INDICATED)

PILLARS / PITS / ETC

- MINI (WORKING END)
- UMS PIT
- UNIVERSAL
- UTILITIES PIT
- MINI
- 100/200AMP CUTOUT
- LINK
- CONDUIT / POLY PIPE
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- INTERMEDIATE
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- DOF
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- PTT
- LV ABC KRONE

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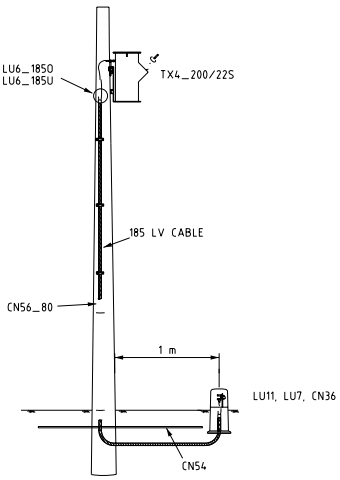
- 7/4.75 AAC/AAAC
- 7/2.5 AAC/AAAC
- 3/2.75 SCAC
- 150 HENDRIX
- EXISTING HV CONDUCTORS (SIZE AND TYPE INDICATED)

AERIAL CONDUCTORS AND POLES

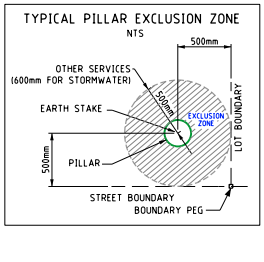
- NEW POLE (ANY TYPE AS INDICATED)
- EXISTING POLE (ANY TYPE AS INDICATED)
- HV LV EXISTING AERIAL CONDUCTORS (SIZE AND TYPE INDICATED)



NEIH REFERENCE - U19/3

TYPICAL PILLAR EXCLUSION ZONE

NTS



APPROVED FOR CONSTRUCTION

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200AMP MAXIMUM DEMAND

INSTALL NEW 200kVA/22kV TRANSFORMER

LOT 9004 FLYNN DRIVE

NEERABUP

westernpower

DESIGNER: CHARLES CHANG

TEL: 9326 7184

DATE: 01/14

SCALE: AS NOTED @ A2

GEO REF: Lat. - 31°40'56" S Long. - 115°46'36" E

MAP REF:

DRAWING NUMBER MP140013

SHEET 2 OF 4

REV: A

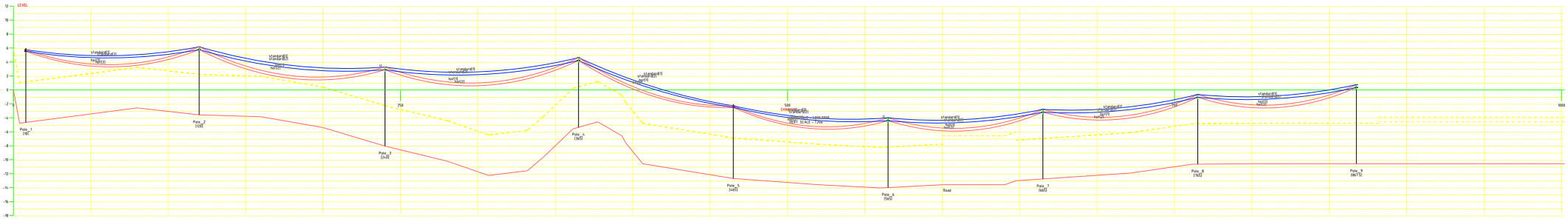
ORIGINAL SIZE - A2

Rev.	REVISIONS	DRN	DATE
A	APPROVED FOR CONSTRUCTION	E.D.	04/14
1	ISSUED FOR ENGINEERING REVIEW	C.C.	01/14

SAFETY IN DESIGN DM#: 11821637

FILE REFERENCE DETAILS

DESIGN SAFE - WORK SAFE - HOME SAFE



POLE SCHEDULE

POLE ID	INSTRUCTION	STRUCTURE	POLE DETAILS	SINKAGE (m)	BAY LENGTH	LOCATION EASTING	LOCATION NORTHING	COND WEIGHT Kg	TIP LOADING (Kg) @ 15° NO WIND	TIP LOADING (Kg) @ 15° WIND @900Pa	CU	DCSH	AS CON CHECK
POLE 1	NEW	3PH CABLE POLE TERMINATION	12.5m/4kN	1.85	56	0384009	6494146	18.984	0	6.6	P07 x 1, HV5 x 1, ST1 x 1, CN1 x 3, HU19 x 1, CN9 x 3, CN70 x 3	H4, R13, R14/1, H9-1	
POLE 2	NEW	3PH INTERMEDIATE	11m/5kN	1.7	116	0384005	6494264	39.324	0	10.03	P05 x 1, HV1 x 1, CN18 x 3, CN74 x 6	H1, R3/2, R13	
POLE 3	NEW	3PH INTERMEDIATE	12.5m/6kN	1.85	122.5	0384017	6494384	41.5275	0	10.77	P08 x 1, HV1 x 1, CN18 x 3, CN74 x 6	H1, R3/2, R13	
POLE 4	NEW	3PH INTERMEDIATE	11m/5kN	1.7	112.5	0384016	6494509	38.1375	0	9.85	P05 x 1, HV1 x 1, CN18 x 3, CN74 x 6	H1, R3/2, R13	
POLE 5	NEW	3PH INLINE STRAIN	12.5m/6kN	1.85	100	0384016	6494609	33.9	0	9.25	P08 x 1, HV9 x 1, CN1 x 6, CN26 x 3, CN74 x 6	H5, R8/2, R5/2, R3/2, R13	
POLE 6	NEW	3PH INTERMEDIATE	11m/4kN	1.7	100	0384015	6494709	33.9	0	7.5	P04 x 1, HV1 x 1, CN18 x 3, CN74 x 6	H1, R3/2, R13	
POLE 7	NEW	3PH INTERMEDIATE	11m/4kN	1.7	100	0384014	6494809	33.9	0	7.5	P04 x 1, HV1 x 1, CN18 x 3, CN74 x 6	H1, R3/2, R13	
POLE 8	NEW	3PH INTERMEDIATE	11m/4kN	1.7	100	0384012	6494909	33.9	0	7.57	P04 x 1, HV1 x 1, CN18 x 3, CN74 x 6	H1, R3/2, R13	
POLE 9	NEW	3PH TERMINATION WITH TX	12.5m/6kN	1.85	50	0384008	6495012	16.95	0	6.94	P08 x 1, HV5 x 1, TX4_200/22 x 1, ST1 x 1, CN1 x 3	H4, R12/2, R9, R13, R14/1	

CONDUCTOR SCHEDULE - REFER TO DM# 9692320 FOR FULL LIST OF STRINGING TABLES

SECTION	TYPE	LOCATION FROM	LOCATION TO	NO COND	CONDUCTOR TYPE	NO SPANS	MES (m)	DIST (m)	%CBL @ 15°C	MATERIAL LENGTH	CU	AS CON CHECK
1	HV	New pole 1	New pole 2	3	3/2.75 SCAC	1	115	110	25	336	CN37	
2	HV	New pole 2	New pole 3	3	3/2.75 SCAC	1	115	120	25	360	CN37	
3	HV	New pole 3	New pole 4	3	3/2.75 SCAC	1	115	125	25	375	CN37	
4	HV	New pole 4	New pole 5	3	3/2.75 SCAC	1	100	100	25	300	CN37	
5	HV	New pole 5	New pole 6	3	3/2.75 SCAC	1	100	100	25	300	CN37	
6	HV	New pole 6	New pole 7	3	3/2.75 SCAC	1	100	100	25	300	CN37	
7	HV	New pole 7	New pole 8	3	3/2.75 SCAC	1	100	100	25	300	CN37	
8	HV	New pole 8	New pole 9	3	3/2.75 SCAC	1	100	100	25	300	CN37	

WARNING
BEWARE OF EXISTING SERVICES

DIAL1100 BEFORE YOU DIG

THE LOCATION OF EXISTING SERVICES IS APPROXIMATE ONLY. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN. ALWAYS REFER TO CURRENT DBYD DRAWINGS. CONFIRM ASSET LOCATIONS ON SITE BEFORE COMMENCEMENT OF WORK.
REFER TO 'WORKSAFE' REGULATION 3.21

WARNING
IF WORKING IN THE VICINITY OF EXISTING OVERHEAD DISTRIBUTION OR TRANSMISSION LINES CONTRACTOR TO COMPLY WITH
"WORKSAFE" CLEARANCES DURING CONSTRUCTION

INSTRUCTION TO CONSTRUCTION CREWS
IT IS A REQUIREMENT OF WESTERN POWER THAT ALL EXISTING CONDUCTOR / CABLES SIZES ARE CONFIRMED ONSITE TO ENSURE THAT ALL FITTINGS ARE OF THE APPROPRIATE SIZE AND ARE INSTALLED CORRECTLY IN ACCORDANCE TO
Distribution Construction Standards Handbook

RESTORATION & REINSTATEMENT REQUIREMENTS
RESTORATION & REINSTATEMENT REQUIRED FOR THIS PROJECT TO BE COMPLETED AS PER THE RESTORATION AND REINSTATEMENT SPECIFICATION FOR LOCAL GOV'TS IN WA. THE CONSTRUCTION MANAGER IS RESPONSIBLE FOR ALL RESTORATION AND REINSTATEMENT UNTIL FORMALLY ACCEPTED BY WESTERN POWER OR LOCAL GOV'T AUTHORITY AS APPROPRIATE. SEE FIELD INSTRUCTION 2.21.

APPROVED FOR CONSTRUCTION

CUSTOMER CONTACT DETAILS
COMPANY NAME: WA LIMESTONE
CONTACT: JOE CONCEI TEL: 0405 365 643

Rev.	REVISIONS	DRN	DATE	FILE REFERENCE DETAILS
A	APPROVED FOR CONSTRUCTION	E.D.	04/14	PnW DM#: 11823979
1	ISSUED FOR ENGINEERING REVIEW	C.C	01/14	SAFETY IN DESIGN DM#: 11821637

200AMP MAXIMUM DEMAND

INSTALL NEW 200kVA/22kV TRANSFORMER

LOT 9004 FLYNN DRIVE

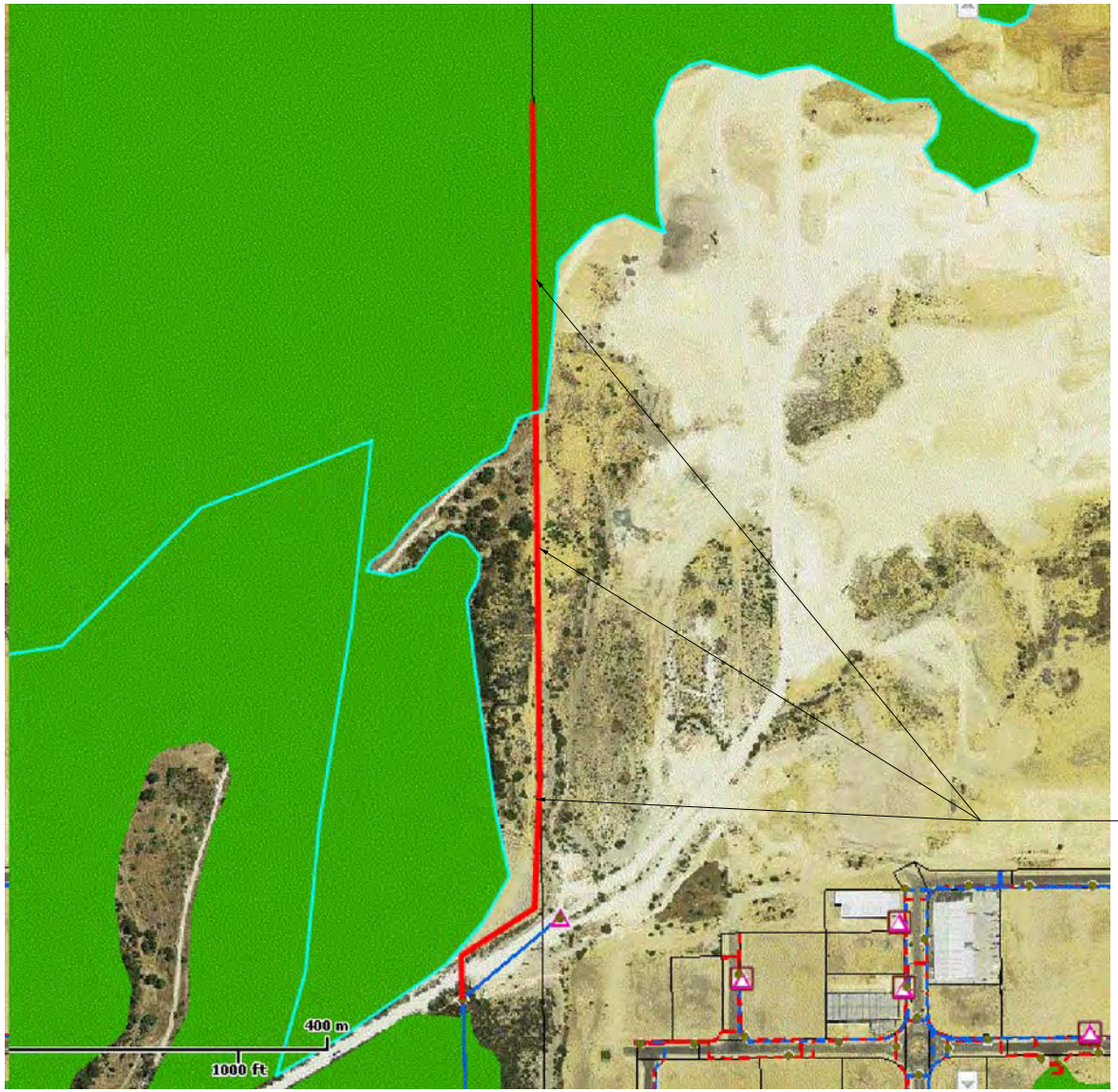
NEERABUP

westernpower

DESIGNER: CHARLES CHANG
TEL: 93267184
DATE: 01/14 SCALE: AS NOTED @ A2
GEO REF: Lat. - 31°40'56" S Long. - 115°46'36" E
MAP REF:

DRAWING NUMBER
MP140013
SHEET 3 OF 4
REV: A ORIGINAL SIZE - A2

YOUR SAFETY STARTS HERE



LOCATION OF WORKS:
SEE SHEET 1 AND 2 FOR SCOPE OF WORKS

1) NATIVE VEGETATION REMAINING

INTERPRETATION
ANY CLEARING OF NATIVE VEGETATION REQUIRES A PERMIT. IN AREAS WITH LESS THAN 30% REMAINING OF THE ORIGINAL VEGETATION TYPE THERE MAY BE REQUIREMENTS TO PROVIDE DEC WITH OFFSETS TO ENABLE THE CLEARING. HOWEVER, IF IT IS A VERY SMALL AMOUNT OF CLEARING ELMB MAY STILL BE ABLE TO ISSUE A PERMIT OFFSETS ARE SIMILAR VEGETATION TYPES BOUGHT OR CAPTURED AND HELD IN PERPETUITY IN CONSERVATION ESTATE AND GENERALLY AMOUNT TO MORE THAN WHAT IS BEING CLEARED. EG FOR 1 HA CLEARED DEC MAY REQUIRE 1.5 OR 2 HA OFFSET

APPLICATION
THIS CAN DELAY PROJECTS CONSIDERABLY IF THE CLEARING IS SIGNIFICANT. SEND TO THE ENVIRONMENT IN-BOX FOR ADVICE.

APPROVED FOR CONSTRUCTION

THIS DRAWING IS TO BE READ IN CONJUCTION WITH SHEET 1 AND 2

NO NATIVE VEGETATION MAY BE DISTURBED WITHOUT A PERMIT. IF IN DOUBT PLEASE CONTACT THE RELEVANT MANAGER WHO WILL CONTACT WESTERN POWER ENVIRONMENTAL OPERATIONS TO ARRANGE A PERMIT.

PLEASE NOTE: HEAVY PENALTIES MAY APPLY TO INDIVIDUALS AND BUSINESSES FOR DAMAGE TO NATIVE VEGETATION WITHOUT A PERMIT.

DM#
FN:

Rev.	REVISIONS	DRN	DATE
A	APPROVED FOR CONSTRUCTION	E.D.	04/14
1	ISSUED FOR ENGINEERING REVIEW	C.C	01/14

FILE REFFERENCE DETAILS

200AMP MAXIMUM DEMAND

INSTALL NEW 200kVA/22kV TRANSFORMER

LOT 9004 FLYNN DRIVE, NEERABUP

ENVIRONMENTAL DRAWING

westernpower

DESIGNER: CHARLES CHANG	DRAWING NUMBER
TEL: 93267184	MP140013
DATE: 01/14	SCALE: AS NOTED @ A2
GEO REF: Lat. - 31°40'56" S Long. - 115°46'36" E	SHEET 4 OF 4
MAP REF:	REV: A ORIGINAL SIZE - A2

APPENDIX E - Ecological Environmental Report

Lot 503 Native Vegetation Clearing Permit Application

Neerabup Industrial Area

Prepared for
Western Australian Land Authority (LandCorp)

6 December 2016

DOCUMENT TRACKING

Item	Detail
Project Name	Lot 503 Native Vegetation Clearing Permit Application
Project Number	16PER-5279
Project Manager	Rebecca McCracken (08) 9227 1070 Suite 1&2, 49 Ord St, West Perth, 6005
Prepared by	Rebecca McCracken
Reviewed by	Ben Casillas-Smith
Approved by	Ben Casillas-Smith
Status	Final
Version Number	2
Last saved on	6 December 2016
Photos	*Eucalyptus* and *Banksia* woodlands in Lot 503 and adjacent bushland

This report should be cited as 'Eco Logical Australia 2016. *Lot 503 Native Vegetation Clearing Permit Application, Neerabup Industrial Area*. Western Australian Land Authority (LandCorp).'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from LandCorp.

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Abbreviations

Abbreviation	Description
BAM Act	*Biosecurity and Agriculture Management Act 2007* (WA)
CEMP	Construction Environmental Management Plan
DEC	Department of Environment and Conservation
DoEE	Department of the Environment and Energy
DPS	District Planning Scheme
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
ELA	Eco Logical Australia
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwth)
GPS	Global Positioning System
ha	Hectare
IBRA	Interim Biogeographic Regionalisation for Australia
MNES	Matter of National Environmental Significance
MRS	Metropolitan Region Scheme
NVCP	Native Vegetation Clearing Permit
NIA	Neerabup Industrial Area
Parks and Wildlife	Department of Parks and Wildlife
PaWST	Parks and Wildlife Service Tasmania
PEC	Priority Ecological Community
TEC	Threatened Ecological Community
WA	Western Australia
WC Act	*Wildlife Conservation Act 1950* (WA)

1 Introduction

1.1 Development overview and background

The Western Australian Land Authority (LandCorp) proposes to develop an industrial estate on a portion of land within Lot 503 (DP 409677) Flynn Drive in Neerabup, Western Australia (WA) (**Figure 1**). Vegetation clearing will be undertaken within a 93.4 hectare (ha) area, which includes a 3.6 ha area termed the 'Boundary Rationalisation Area', in which clearing may be necessary in the future as part of road widening. Lot 503 lies within the superseded Lot 701 and is located within the larger Neerabup Industrial Area (NIA). The proposed development ('the Development') involves the staged clearing of vegetation and topsoil followed by basic raw material (limestone and sand) extraction and earthworks to bring the site to required contour levels. This would be followed by the creation of industrial lots, construction of roads and drainage infrastructure, and installation of services.

Eco Logical Australia (ELA) was commissioned by LandCorp to assist in preparing a Native Vegetation Clearing Permit (NVCP) application for the disturbance associated with the Development. This document is provided to support the NVCP application and has been prepared for assessment and approval under Part V of the WA *Environmental Protection Act 1986* (EP Act). The 'Development Area' refers to the area within which clearing of native vegetation will occur for construction of the Development components (**Figure 1**).

Note that the lot number of the Development Area was recently changed from Lot 701 to Lot 503, following the exclusion of the portion of Bush Forever Sites that were originally contained within Lot 701. Lot 701 had previously been called Lot 21, with the name change resulting from a minor change to the lot boundary to alter the configuration of the road reserve for Flynn Drive. Consequently, a number of studies completed for the Development refer to Lot 701 or Lot 21. Some of the information contained within this report refers to the old Lot numbers, where it was not possible to delineate the data for only Lot 503 or the Development Area.

1.2 Project approvals history

The Development Area (with the exception of the Boundary Rationalisation Area) was zoned 'Industrial' in the Metropolitan Region Scheme (MRS) following advice from the Environmental Protection Authority (EPA) to the State Planning Commission (now Western Australian Planning Commission) in 1994 on MRS Major Amendment no 948/33 for the North West Corridor (East Wanneroo). The EPA recommended more detailed planning for the proposed industrial area be referred to the EPA to ensure the detailed plans accommodate site constraints and provide for adequate services.

The Neerabup Industrial Area Agreed Structure Plan (As Amended) was adopted in January 2005, under the provisions of Part 9 of City of Wanneroo District Planning Scheme (DPS) No. 2. The Structure Plan has not been assessed formally by the EPA; therefore, a separate referral of this proposed development was required. The proposal to develop Lot 503 (under its previous lot numbers) was referred to the EPA and, on 7 September 2012, the EPA decided to not assess the proposal, with public advice given.

A proposal to extract basic raw materials and develop the land for industrial use was referred to the then Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC; now the Department of Environment and Energy; DoEE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in 2012 (EPBC Reference: 2012/6424). The proposal was for a larger area of development (218 ha) than is currently proposed and was deemed a controlled action requiring

assessment under the controlling provision 'listed Threatened species and communities (Sections 18 and 18A)'. DSEWPaC set the level of assessment at Preliminary Documentation and requested additional information on the proposed development in October 2012.

In December 2013, a variation to the original proposal, involving a reduced area of disturbance, was sought and accepted under section 156A of the EPBC Act. As part of the variation, all provisions under the EPBC Act ceased to apply to the original proposal and applied instead to the revised proposal, including the October 2012 request for additional information.

In December 2015, the Preliminary Documentation - Additional Information Request (ELA 2016; Appendix C) was submitted to the then Department of the Environment (DoE; now DoEE). The document was released for public review in April 2016. No comments were received during the review period. An Offset Proposal (ELA 2015a; Appendix F), elaborating on the offsets outlined in ELA (2016) was submitted to the then DoE in May 2016, and the contents are currently under negotiation. Approval of the Offset Proposal by DoEE is anticipated to occur by the end of 2016.

1.3 Purpose of this document

While the proposal was not assessed by the EPA, the Development will require the clearing of native vegetation and therefore an assessment of the potential environmental impacts of the Development in accordance with the requirements of the EP Act Part V is required. This NVCP application has been prepared to address this requirement.

Note that the 3.6 ha Boundary Rationalisation Area located within the Development Area is currently considered part of Bush Forever Site 384; however, LandCorp will request an amendment to the MRS to alter the zoning of this area from 'Parks and Recreation' to 'Industrial'. The vegetation present within this area has already been subjected to clearing and other degrading processes, including for an access road. The potential impacts to the Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) habitat contained within this area were addressed in the EPBC Act referral.

Figure 1: Location of Development Area

2 Description of the Development

2.1 Development overview

The proposal involves clearing of native vegetation within a Development Area of 93.4 ha for basic raw material extraction and subsequent industrial development. This includes the 3.6 ha Boundary Rationalisation Area in which clearing may be necessary in the future as part of access road widening activities. The remaining 225.4 ha of vegetation within Lot 503 will be retained.

The Development consists of sequential extraction of an on-site limestone resource prior to industrial development of the land. The works and associated land clearing will be undertaken in stages. As clearing and limestone extraction progress, land will be made ready for earthworks and conversion to industrial lots and roads (with installation of required services) for the NIA.

The Development comprises industrial lots and road reserves. Part Bush Forever Site 293 and part Bush Forever Site 384 (located within Lot 502 on DP 409677; were previously contained within Lot 701) located adjacent to Lot 503 will be rehabilitated and managed for conservation.

2.2 Schedule

Initial vegetation clearing works are proposed to commence in early to mid-2017, and will be staged over a period of approximately five years along with the limestone extraction operation. Resource extraction will be carried out by a pre-qualified earthworks and quarrying contractor following a request for tender process. Operations will be governed by an extraction licence issued by the WA Department of Mines and Petroleum.

2.3 Proposed works

The proposed works involve:

- Clearing of native vegetation;
- Earthworks for creation of appropriate levels and lot areas;
- Installation of services (water, power, electricity, gas, sewer, and communications);
- Road construction for establishment of transport networks;
- Landscaping of streetscapes;
- Implementation of conservation management measures for retained vegetation; and
- Selling of lots and subsequent development of commercial buildings.

The quarry operator has not yet been determined; however, the quarrying process is likely to be similar in nature to other quarries in the surrounding area (there is a quarry operating immediately adjacent to Lot 503 on LandCorp land) and will require vehicle and machinery access, storage facilities (which could include fuels and chemicals), offices and wash-down areas on site. Quarry activities will be contained wholly within the Development Area.

2.3.1 Pre-clearing

Prior to clearing, the boundaries of the Development Area and retained vegetation will be surveyed and clearly marked by a fence, with a 6 m fire break located alongside the boundary in the Development Area (as required by the Department of Fire and Emergency Services). This demarcation will ensure over-clearing does not occur. As the development of the site is staged, each stage will be surveyed and clearly marked to identify clearing limits. An induction will be provided to all personnel who will be on-site, which

will outline the environmental values of the site and re-iterate the importance of remaining within defined clearing areas.

An inspection of the site for suitable rehabilitation material will occur prior to clearing. Seed collection and storage for future rehabilitation and/or landscaping is likely to be undertaken in the first summer seed collection period (generally from October to February). The seed collection program (including volume of seed) will be influenced by the staging of raw materials extraction. Other material suitable for rehabilitation includes habitat logs, hollow-bearing trees (hollows could potentially be relocated to other areas), mulched vegetation and topsoil. The suitability of the site for rehabilitation material (including consideration of the weed store that may occur in more disturbed areas) will be determined prior to clearing. Rehabilitation areas within the Bush Forever Sites 293 and 384 are identified in the Rehabilitation Strategy (attached as part of ELA (2016) in Appendix C) and are mapped in **Figure 7**.

Prior to clearing each stage, the site will be inspected for suitable habitat trees or hollow-bearing trees. Any such trees recorded will be flagged for retention and relocation to rehabilitation areas.

2.3.2 Clearing and topsoil stripping

Clearing of vegetation and stripping of topsoil within the site will be staged, dependent on the raw materials extraction likely to occur over the next five years. A fauna relocation program will be undertaken prior to commencement of each stage. In addition, the staged development will assist the natural relocation of native fauna to other suitable habitats in the area. Clearing of vegetation and stripping of topsoil will be undertaken as follows:

- Clearing boundaries will be clearly demarcated by a fence to prevent clearing outside the Development Area;
- Where available, GPS equipment in machinery will be loaded with the GPS coordinates of the areas to be cleared to further provide a demarcation of vegetation to be cleared and retained;
- Vegetation clearing will occur from a disturbed edge, where possible, to encourage any remaining fauna to naturally relocate to retained vegetated areas;
- A fauna handler will be available during on-site clearing activities;
- Topsoil will be stripped and, where possible, directly relocated to appropriate rehabilitation areas. Where this is not possible, stripped topsoil will be stored on-site until a rehabilitation use is identified (topsoil storage time will be minimised as far as practicable);
- Vegetation (excluding relocated habitat trees/hollow-bearing trees) will be mulched for use on-site (rehabilitation or landscaping) or in off-site rehabilitation; and
- Mulch and topsoil not used for rehabilitation will be used for on-site landscaping where possible. Where this is not possible, mulch and topsoil will be disposed of to an appropriate facility.

Clearing activities will be in line with the Ten Clearing Principles (Section 6).

2.3.3 Raw materials extraction

The site is designated as a Priority Resource Location for limestone/limesand under the Basic Raw Materials Statement of Planning Policy 2.4 (Western Australian Planning Commission 2000). The intent of this policy is to ensure consideration of the availability of raw materials in the Perth metropolitan area for construction purposes, to keep down the costs of land development and contribute to the availability of affordable housing.

2.3.4 Earthworks / levelling

Following raw material extraction in each stage, earthworks will be required to meet the final surface contours as determined in the final contour plan. This is expected to involve reconfiguration of the residual soil to create the desired landform. In the future, roads are likely to be constructed adjacent to the retained

vegetation in Bush Forever Site 384, which will require batters. The batter from the edge of the 6 m fire break to the development level (and the proposed road reserve in the area adjacent to the Bush Forever Site) will form a separation of approximately 50-60 m from the retained vegetation outside the Development Area (see cross-sections in **Figure 2**). Further minor earthworks will also be required to allow installation of infrastructure and services.

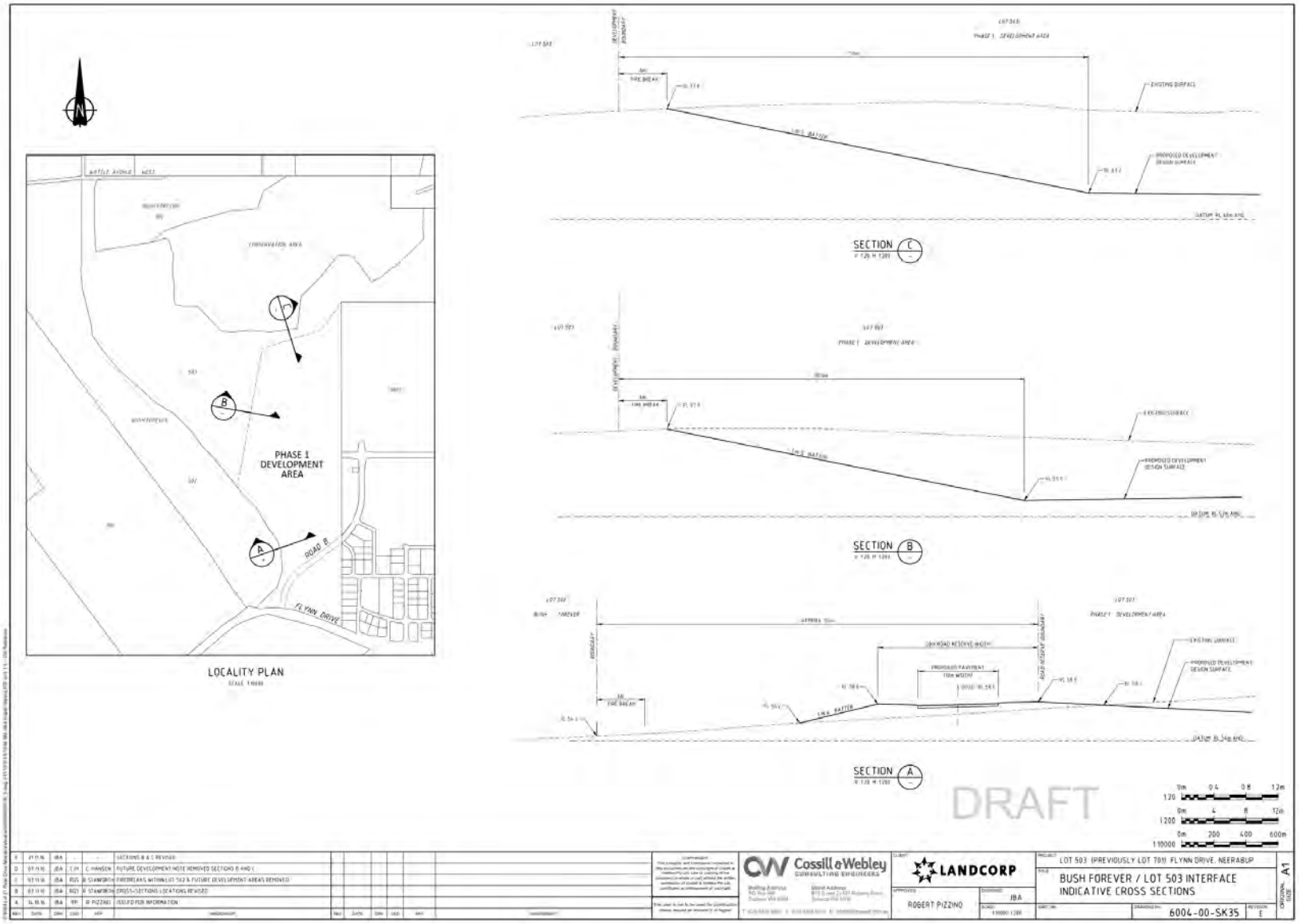

Figure 2: Indicative cross-sections along the length of the Development Area boundary.

3 Physical Environment

3.1 Biogeographic and regional setting

The Interim Biogeographic Regionalisation for Australia (IBRA) recognises 89 bioregions (DoEE 2016a). The Development Area is located in the Swan Coastal Plain bioregion as defined by the IBRA. The Swan Coastal Plain bioregion has been further subdivided into two sub-regions: Dandaragan Plateau (SWA1); and Swan Coastal Plain (SWA2). The Development Area is located in the Swan Coastal Plain sub-region, which is described by Mitchell et al. (2002) as:

- A low lying coastal plain, mainly covered with woodlands. It is dominated by *Banksia* or Tuart on sandy soils. *Casuarina obesa* on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah woodland. The climate is Warm Mediterranean. It is composed of colluvial and Aeolian sands, alluvial river flats and coastal limestone.

3.2 Geology, geomorphology and land systems

The geology of the site comprises Tamala Limestone (units LS1 and LS2) and Sand Derived from Tamala Limestone (Gozzard 1982), and is situated on the Spearwood Dune System. The system originally formed in the Aeolian period, and consists of a core of Tamala Limestone with a hard capping of calcite (cap-rock) overlain by a variable depth of yellow to brown sands (Ecoscape 2009).

The following phases of the Spearwood soil system occur within the site (DAFWA 2007):

- Spearwood Sand Phase (Sp) – undulating dunes with rocky crests on aeolian sand over limestone in the Swan Coastal Plain between Wanneroo and Moore River;
- Karrakatta Shallow Soils Phase (Kls) – rocky low hills and ridges on limestone in the Swan Coastal Plain between Wanneroo and Lancelin. Bare rock, yellow/brown shallow sands and stony soils; and
- Karrakatta Sand Yellow Phase (Ky) – undulating dunes on aeolian sand over limestone in the Swan Coastal Plain between Wanneroo and Lancelin. Yellow deep sands and brown deep sands.

3.3 Hydrological processes and inland waters

Lot 503 is gently undulating, and generally slopes downward toward the south-west, with groundwater flow in that direction. Groundwater depth ranges between 27 m AHD on the north-eastern boundary to 20 m AHD on the western boundary. Using the 'depth to groundwater' tool from the Perth Groundwater Atlas (Department of Water 2016), depth to groundwater within the Development Area varies from 32 m in south-west to 52 m in the north-east. Soils are porous and are derived from Tamala Limestone, hence it is likely that surface water rapidly infiltrates the soil, although large rainfall events are likely to result in surface run off that flows towards Neerabup Lake (Coffey Environments 2009).

There are no minor or major drainage lines within the Development Area. The closest water feature is the ephemeral Neerabup Lake (Resource Enhancement Category Wetland; Hill et al. 1996), located 370 m to the east of Lot 503 at its closest point.

4 Biological environment

4.1 Flora and vegetation

A single season Level 2 flora and vegetation survey of the Development Area and the larger Lot 21 (427 ha) was undertaken by Ecoscape in October/November 2008 (Ecoscape 2009). The Ecoscape (2009) report is provided in Appendix D with the key findings summarised below.

4.1.1 Flora

A total of 153 taxa of terrestrial vascular flora representing 102 genera and 46 families were recorded during the survey, including 36 introduced species. The most common families were Proteaceae (17 native species), Fabaceae (11 native species, three introduced) and Myrtaceae (12 native species).

4.1.2 Threatened and Priority flora

No Threatened flora species pursuant to subsection (2) of section 23F of the *Wildlife Conservation Act* 1950 (WC Act) were recorded within the Development Area (Ecoscape 2009). One Priority 3 flora species, *Stylidium maritimum,* was recorded in the north-east of Lot 503, outside the Development Area. This species has been recorded from Lancelin to south of Mandurah, and grows on sandy soils over limestone (Department of Parks and Wildlife (Parks and Wildlife) 2016). This record of *Stylidium maritimum* will not be affected by the Development.

The Parks and Wildlife and WA Museum (WAM) NatureMap database (Parks and Wildlife 2007-2016) and the EPBC Act Protected Matters Search Tool (PMST) were searched for flora that have the potential to occur within the Development Area. A 5 km buffer of the coordinates -31.67758° S 115.77292° E was used for both searches.

A list of 17 conservation listed flora species (species listed under the WC Act or as Priority species) was generated (Appendix B). A likelihood of occurrence assessment was undertaken (**Table 1**, criteria attached in Appendix A), and it was determined that two species had potential to occur within the Development Area; *Conostylis bracteata* (Priority 3) and *Pimelea calcicola* (Priority 3). If these species are present in the Development Area, they are unlikely to occur in high numbers, as they were not observed during the Ecoscape (2009) survey. Thus, the clearing of vegetation within the Development Area is unlikely to have a significant impact on these species.

Table 1: Likelihood of occurrence assessment for conservation significant terrestrial flora species

Species	Conservation status*		Likelihood of occurrence
	WC Act / Parks and Wildlife	EPBC Act	
Acacia benthamii	Priority 2	-	Unlikely
Andersonia gracilis (Slender Andersonia)	Vulnerable	Endangered	Unlikely
Anigozanthos viridis subsp. *terraspectans* (Dwarf Green Kangaroo Paw)	Vulnerable	Vulnerable	Unlikely
Caladenia huegelii (King Spider-orchid)	Critically Endangered	Endangered	Unlikely
Conostylis bracteata	Priority 3		Potential
Diuris micrantha (Dwarf Bee-orchid)	Endangered	Vulnerable	Unlikely

Species	Conservation status*		Likelihood of occurrence
	WC Act / Parks and Wildlife	EPBC Act	
Diuris purdiei (Purdie's Donkey-orchid)	Endangered	Endangered	Unlikely
Drakaea elastica (Glossy-leafed Hammer-orchid)	Critically Endangered	Endangered	Unlikely
Drakaea micrantha (Dwarf Hammer-orchid)	Vulnerable	Vulnerable	Unlikely
Drosera x *sidjamesii*	Priority 1	-	Unlikely
Eucalyptus argutifolia (Wabling Hill Mallee)	Vulnerable	Vulnerable	Unlikely
Hibbertia spicata subsp. *leptotheca*	Priority 3	-	Unlikely
Jacksonia sericea (Waldjumi)	Priority 4	-	Unlikely
Lepidosperma rostratum (Beaked Lepidosperma)	Endangered	Endangered	Unlikely
Melaleuca sp. Wanneroo (G.J. Keighery 16705)	Priority 1	-	Unlikely
Pimelea calcicola	Priority 3	-	Potential
Stylidium maritimum	Priority 3	-	Recorded
Stylidium striatum (Fan-leaved Triggerplant)	Priority 4	-	Unlikely

* Parks and Wildlife 2015a, DoEE 2016b

EN = listed as Endangered under the EPBC Act, WC Act.

VU = listed as Vulnerable under the EPBC Act, WC Act.

S = listed as Specially Protected under the WC Act.

P = listed as Priority by Parks and Wildlife 2015a.

4.1.3 Introduced species

A total of 36 introduced (weed) species were recorded in Lot 701 during the Ecoscape (2009) survey. Individual quadrats recorded one to 11 species. The most common weed species were **Lysimachia arvensis* (Pimpernel; 17 quadrats), **Hypochaeris glabra* (Smooth Cats-ear; 11 quadrats) and **Gladiolus caryophyllaceus* (Wild Gladiolus; 10 quadrats). Two species recorded in Lot 701 are classified as Declared Pests under s22(2) of the *Biosecurity and Agriculture Management Act 2007* (BAM Act); **Asparagus asparagoides* (Bridal Creeper) and **Echium plantagineum* (Patterson's Curse). These species are in the Control Category C3 (Management; DAFWA 2016). **Asparagus asparagoides* is also a Weed of National Significance (WoNS).

4.2 **Beard's Vegetation and Pre**-European Vegetation Extent

Vegetation type and extent in WA has been mapped at a regional scale by Beard (1981), who categorised vegetation into broad vegetation associations. Based on this mapping at a scale of 1:1,000,000, the Department of Agriculture and Food WA (DAFWA) has compiled a list of vegetation extent and types across WA (Shepherd et al. 2002). The Development Area intersects two vegetation associations:

- Spearwood 6 (e2,4Mi): Medium woodland; Tuart and Jarrah (19% of the Development Area); and
- Spearwood 949 (bLi): Low woodland; *Banksia* (81% of the Development Area).

The pre-European and current extent of native vegetation associations in WA has been interpreted by Shepherd et al. (2002) using data from Beard's (1981) regional vegetation mapping, along with other vegetation mapping and satellite imagery and orthophoto interpretation. The Development Area contains 0.13% of the current extent of Spearwood 6 (e2,4Mi), and 1.11% of the current extent of Spearwood 949 (bLi); see **Table 2** (Government of WA 2016).

Table 2: Beard's mapping unit occurring within the Development Area, its current and Pre-European extent within the Spearwood system and its extent across the Development Area.

Beard's Mapping Unit (Shepherd vegetation association)	Pre-European extent (ha) (Government of WA 2016)	Current extent (ha) (Government of WA 2016)	Extent within the Development Area (ha) (% of current extent)
e2,4Mi (Spearwood 6)	54,427.13	13,335.50	17.73 (0.13)
bLi (Spearwood 949)	13,221.96	6,797.69	75.64 (1.11)

4.2.1 Vegetation communities

The vegetation of the Development Area is associated with the Cottesloe – Central and South Complex, described as a mosaic woodland of *Eucalyptus gomphocephala* and open forest of *Eucalyptus gomphocephala*, *Eucalyptus marginata, Corymbia calophylla*; closed heath on limestone outcrops (Heddle et al. 1980). The flora and vegetation assessment of Lot 701 by Ecoscape (2009) resulted in delineation of a total of 11 vegetation communities comprised of *Eucalyptus* woodlands and *Banksia* dominated heathlands (**Figure 3**). Six of these vegetation communities are present with the Development Area; BgBmBaAfLOW, BsOH, BsOaMsTOS, EmBaBmAfW, EmCcW and CcOW (**Table 3**). EmBaBmAfW and BsOH are the most widespread, comprising 31.7% and 26.5% of the Development Area respectively.

Table 3: Vegetation communities in the Development Area

Code	Habitat	Area to be cleared (ha)
BgBmBaAfLOW	*Banksia grandis, B. menzeisii, B. attenuata* and *Allocasuarina fraseriana* Low Open Woodland	9.1
BsOH	*Banksia sessilis* Open Heath with scattered *Xanthorrhoea preissi* over Low Open Heath, dominated by *Calothamnus quadrifidus* and *Hibbertia hypericoides*	26.5
BsOaMsTOS	*Banksia sessilis, Olearia axillaris* and *Melaleuca systena* Tall Open Scrub	9.0
EmBaBmAfW	*Eucalyptus marginata, Banksia attenuata, B. menziesii* and *Allocasuarina fraseriana* Woodland	31.7
EmCcW	*Eucalyptus marginata* and *Corymbia calophylla* Open Forest	0.2
CcOW	*Corymbia calophylla* Open Woodland over *Allocasuarina fraseriana, Banksia attenuata* Low Open Woodland	0.2

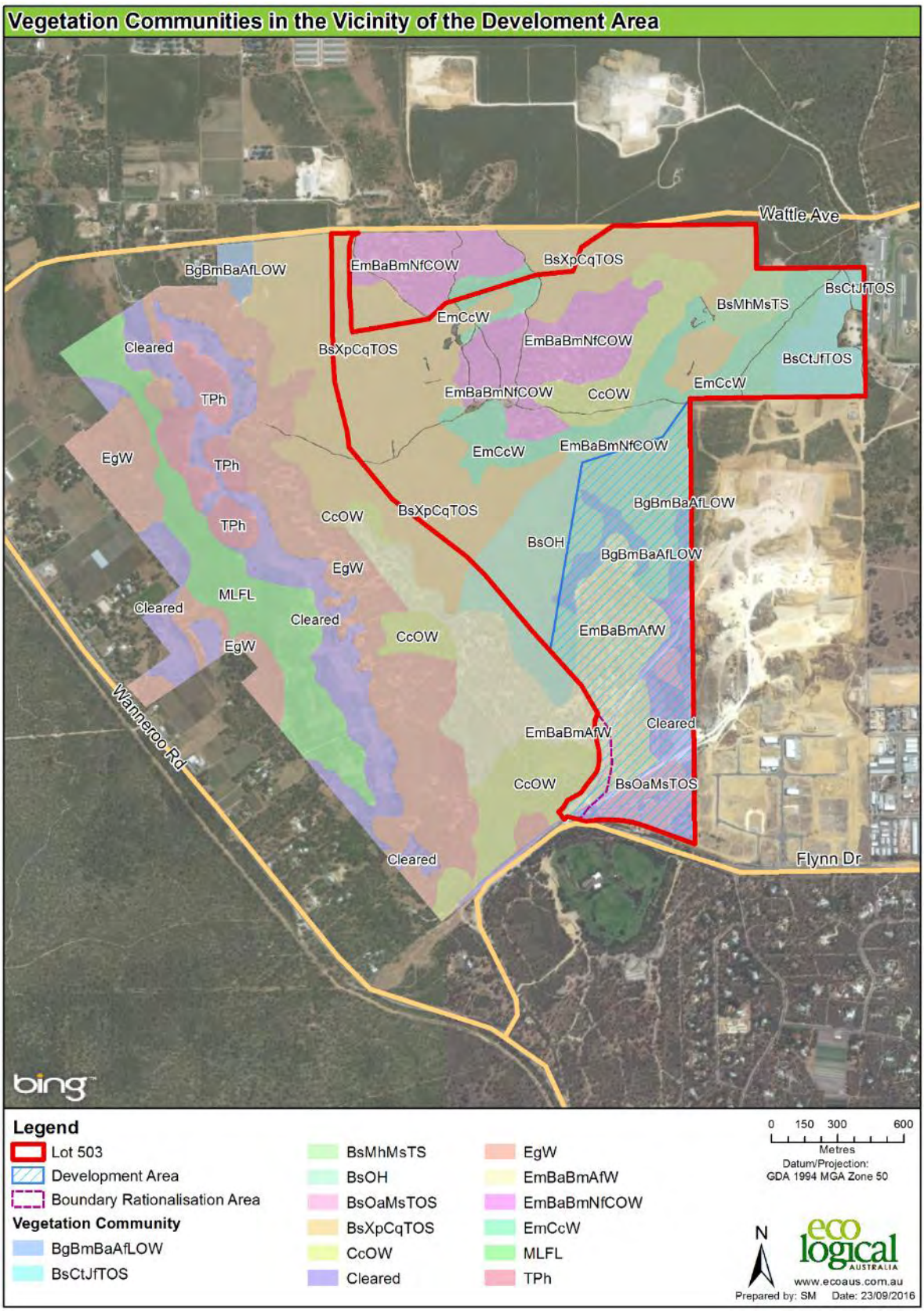

Figure 3: Vegetation communities in the vicinity of the Development Area

4.2.2 Vegetation condition

Vegetation condition ranges from Very Good to Excellent in the north of the Development Area, and decreases towards the south where vegetation is in Good to Completely Degraded condition (**Figure 4**). The vegetation adjacent to the south-eastern boundary (near Lot 9004 on DP 72054, Eclipse Resources' 19 Mile Quarry) is in the poorest condition, containing little to no habitat value for flora and fauna species. A total of 73.6% of the Development Area is in Good to Excellent condition, with the remaining 26.4% in Degraded or Completely Degraded condition (**Table 4**).

Table 4: Vegetation condition in the Development Area

Condition	Area (ha)	Proportion of Development Area (%)
Very Good-Excellent	26.5	28.4
Very Good	18.4	19.7
Good	23.9	25.6
Degraded	8.0	8.6
Completely Degraded	16.6	17.8

4.2.3 Bush Forever Sites

Bush Forever is a WA policy framework that identifies regionally significant bushland that should be retained (Government of Western Australia 2000). Bush Forever Sites 384 (Neerabup Lake and Adjacent Bushland Neerabup) and 293 (Shire View Hill and Adjacent Bushland, Nowergup / Neerabup) are located adjacent to the western and northern boundaries of Lot 503. Bush Forever Site 383 (Neerabup National Park) is located to the west of Bush Forever Site 284; the two sites are separated by Wanneroo Road (**Figure 5**).

4.2.4 Threatened and Priority Ecological Communities

An Endangered State-listed Threatened Ecological Community (TEC), Limestone ridges (SCP 26a), is present within north-eastern portion of Lot 503 in close proximity to Barbagallo Raceway, but outside the Development Area. This TEC is described as *'Melaleuca huegelii - Melaleuca acerosa*[1] shrublands on limestone ridges (Gibson et al. 1994 type 26a)' (Parks and Wildlife 2015b). This 7.63 ha TEC, along with a 50 m surrounding buffer, will be retained, with no vegetation clearing proposed within this area. This area, along with a larger portion of high quality vegetation, will be protected within a proposed 'conservation area' within Lot 503 (**Figure 5**).

Vegetation sampled by Ecoscape (2009) throughout Lot 503 and the adjacent Bush Forever Sites, including the Development Area (14 of 21 quadrats), was determined to be representative of the State-listed Priority Ecological Community (PEC) Northern Spearwood shrublands and woodlands (community type 24'). This PEC is described as 'heaths with scattered *Eucalyptus gomphocephala* occurring on deeper soils north from Woodman Point. Most sites occur on the Cottesloe unit of the Spearwood system. The heathlands in this group typically include *Dryandra sessilis*[2]*, Calothamnus quadrifidus*, and *Schoenus grandiflorus*' (Parks and Wildlife 2015c). This PEC has not been defined by mapping in this area. While

[1] Currently *Melaleuca systena*
[2] Currently *Banksia sessilis*

some clearing of the Priority 3 PEC will occur within the Development Area, the PEC will remain represented within the retained vegetation with Lot 503 and the adjacent Bush Forever Sites.

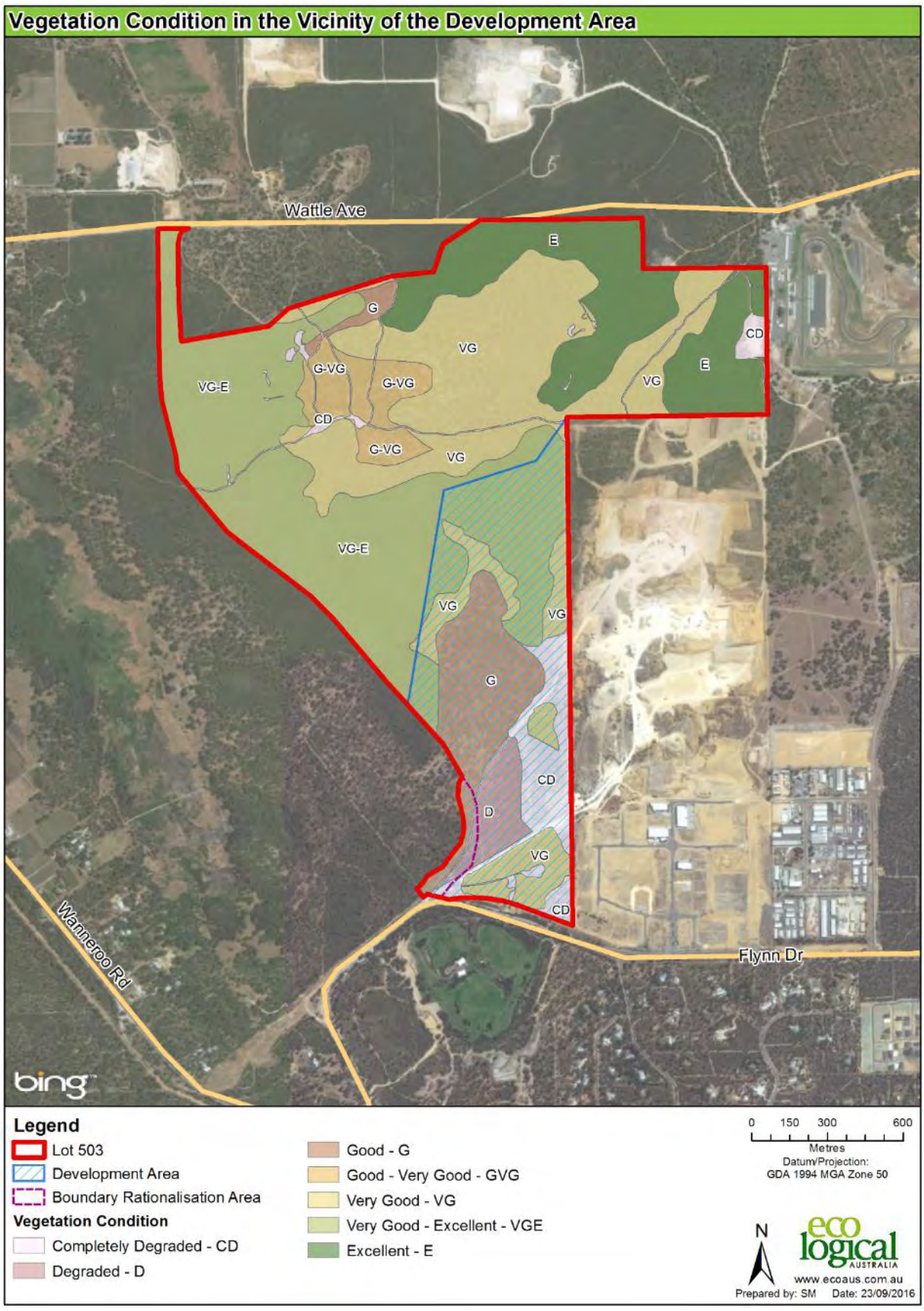

Figure 4: Vegetation condition in the vicinity of the Development Area

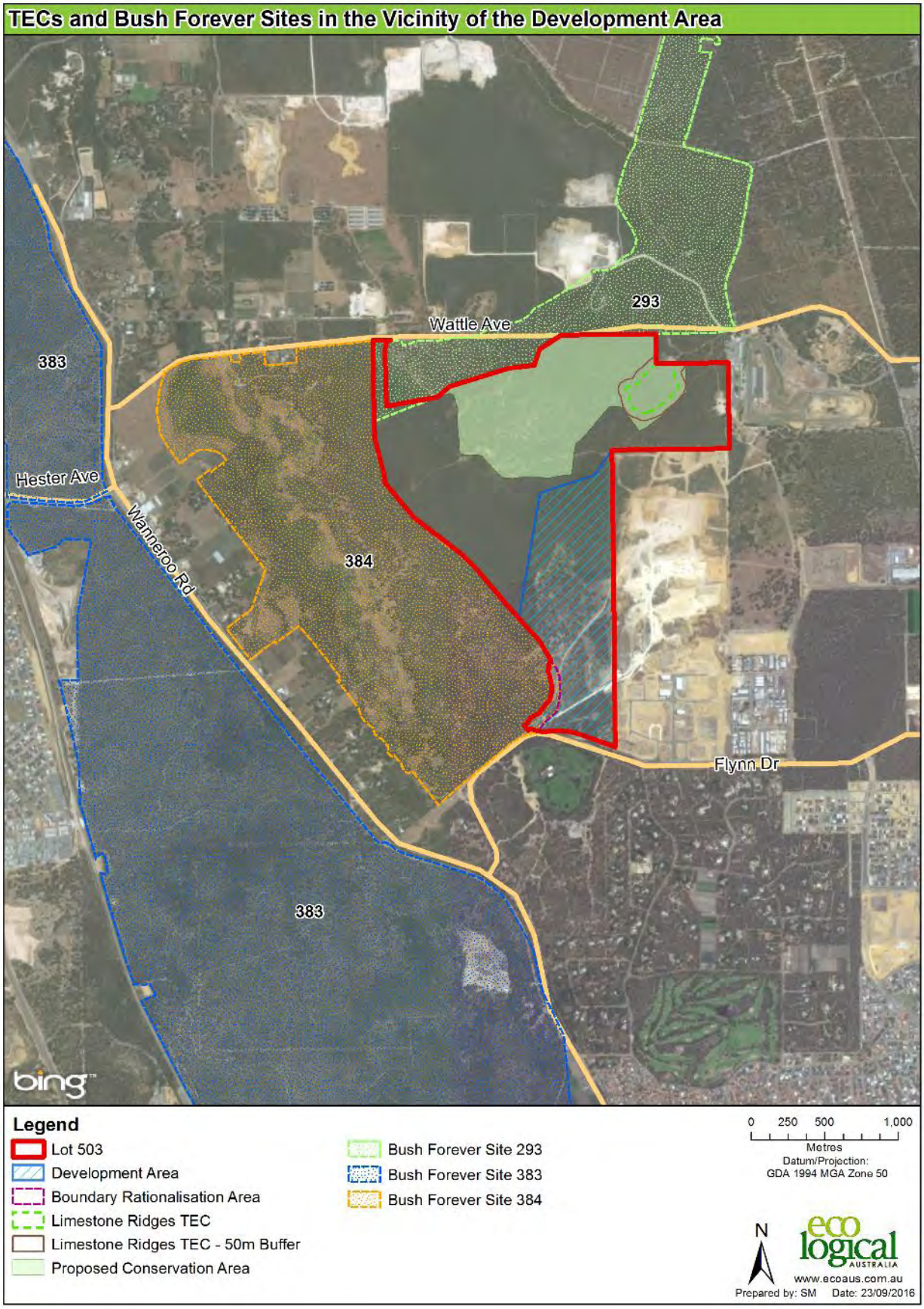

Figure 5: State-listed TECs and Bush Forever Sites in the vicinity of the Development Area

4.3 Terrestrial fauna

A level 2 vertebrate fauna survey was undertaken by ELA in March/April 2012 to assess the vertebrate fauna assemblages and any conservation significant species present within Lot 701 and the remaining portion of Bush Forever Site 384 located to the west of Lot 701 (ELA 2012; Appendix E).

Relevant survey limitations relate mainly to survey timing, which was outside the optimal surveying period of spring-early summer for the Swan Coastal Plain. Due to very dry, cool conditions some species of reptile, amphibian and birds may not have been recorded due to lower activity or seasonal absence. However, analysis of capture data and species observed indicates that the survey methodology recorded the majority of species detectable at the time of the survey.

4.3.1 Terrestrial fauna habitats

Two main fauna habitat types were defined by ELA (2012) in Lot 701; 'Mixed woodlands' (*Eucalyptus/Corymbia/Banksia*) and 'Fringing vegetation associated with Neerabup Lake'. Mixed woodlands is the only habitat type that occurs within the Development Area. This fauna habitat type is common throughout Lot 503 and the vicinity.

Carnaby's Black Cockatoo moderate to high value habitat has been mapped for the Development Area (**Figure 6**), and is described in detail in Section 4.3.4.

4.3.2 Terrestrial fauna species

The level 2 vertebrate fauna survey undertaken by ELA (2012) recorded a total of 61 native vertebrate fauna species within Lot 701, including one amphibian, 18 reptile, 37 bird and four mammal species. Introduced fauna observed included the European Mouse (*Mus musculus*), Cat (*Felis catus*), Rabbit (*Oryctolagus cuniculus*), Red Fox (*Vulpes vulpes*), Laughing Turtle-Dove (*Streptopelia senegalensis*), Laughing Kookaburra (*Dacelo novaeguineae*) and Rainbow Lorikeet (*Trichoglossus haematodus*).

4.3.3 Threatened and Priority fauna

One Threatened species listed under the WC Act, Carnaby's Black Cockatoo, has been recorded in Lot 701. This bird species was observed in groups of up to approximately 100 individuals (ELA 2009). Carnaby's Black Cockatoo is listed as Endangered under both the WC Act and EPBC Act. One Priority 4 species was recorded within the Development Area, the Western Brush Wallaby (*Macropus irma*). The Rainbow Bee-eater (*Merops ornatus*; listed as a Migratory bird protected under an international agreement under the WC Act), was recorded within Lot 503, although outside the Development Area. However, it is very likely this species would also utilise the Development Area for foraging and potentially breeding, as suitable sandy habitat is available.

The Parks and Wildlife and WAM NatureMap database (Parks and Wildlife 2007-2016) and the EPBC Act PMST were searched for fauna that have the potential to utilise the habitats present within the Development Area (Appendix B). A 5 km buffer of the coordinates -31.67758° S 115.77292° E was used for both searches. A list of 23 conservation listed fauna species (species listed under the WC Act or as Priority species) was generated (**Table 5**); with an additional species, the Black-striped Snake (*Neelaps calonotos*), included as it was identified in a previous survey report as likely to occur in Lot 701 (ELA 2012). This list includes species that are now considered to be locally extinct (e.g. Chuditch (*Dasyurus geoffroii*) and Malleefowl (*Leipoa ocellata*)). A likelihood of occurrence assessment was undertaken (**Table 5**, criteria in Appendix A), and it was determined that two species were likely to occur within the Development Area; the Priority 3 Black-striped Snake and the Priority 4 Quenda (*Isoodon obesulus* subsp. *fusciventer*).

An additional four species were considered to have the potential to occur, given the available habitat and proximity of nearby records:

- *Hylaeus globuliferus* (bee) (Priority 3);
- *Austrosaga spinifer* (cricket) (Priority 3);
- *Falco peregrinus* (Peregrine Falcon) (Specially Protected under the WC Act); and
- *Apus pacificus* (Fork-tailed Swift) (Migratory under the WC Act and EPBC Act).

It should be noted that the Indian Ocean and associated near-coastal habitats are approximately 5 km to the west of Lot 503. Migratory birds that frequent the ocean and beach may occasionally fly over the Development Area but would not utilise the habitats in this area.

Table 5: Likelihood of occurrence assessment for conservation listed terrestrial fauna species

Species	Conservation status*		Likelihood of occurrence
	WC Act / Parks and Wildlife	EPBC Act	
Apus pacificus (Fork-tailed Swift)	IA	IA	Potential
Ardea modesta (Eastern Great Egret)	IA	IA	Unlikely
Austrosaga spinifer (cricket)	P3	-	Potential
Calidris acuminata (Sharp-tailed Sandpiper)	IA	IA	Unlikely
Calidris ferruginea (Curlew Sandpiper)	VU/IA	CR/IA	Unlikely
Calidris ruficollis (Red-necked Stint)	IA	IA	Unlikely
Calyptorhynchus baudinii (Baudin's Cockatoo)	EN	EN	Unlikely
Calyptorhynchus latirostris (Carnaby's Black Cockatoo)	EN	EN	Recorded
Dasyurus geoffroii (Chuditch)	VU	VU	Unlikely
Falco peregrinus (Peregrine Falcon)	OS	-	Potential
Hylaeus globuliferus (bee)	P3	-	Potential
Isoodon obesulus subsp. *fusciventer* (Quenda)	P4	-	Likely
Leipoa ocellata (Malleefowl)	VU	VU	Unlikely
Macropus irma (Western Brush Wallaby)	P4	-	Recorded
Merops ornatus (Rainbow Bee-eater)	IA	-	Recorded
Motacilla cinerea (Grey Wagtail)	IA	IA	Unlikely
Neelaps calonotos (*Black-striped Snake)*	P3	-	Likely
Numenius madagascariensis (Eastern Curlew)	VU/IA	CR/IA	Unlikely
Oxyura australis (Blue-billed Duck)	P4	-	Unlikely
Pandion haliaetus (Osprey)	IA	IA	Unlikely
Plegadis falcinellus (Glossy Ibis)	IA	IA	Unlikely
Synemon gratiosa (Graceful Sunmoth)	P4	-	Unlikely

Species	Conservation status*		Likelihood of occurrence
	WC Act / Parks and Wildlife	EPBC Act	
Tringa hypoleucos (Common Sandpiper)	IA	IA	Unlikely
Tringa nebularia (Common Greenshank)	IA	IA	Unlikely

*Parks and Wildlife 2015a, DoEE 2016b

CR = listed as Critically Endangered under the EPBC Act or WC Act.

EN = listed as Endangered under the EPBC Act or WC Act.

VU = listed as Vulnerable under the EPBC Act or WC Act.

IA = listed as Migratory (protected under an international agreement) under the EPBC Act or WC Act.

OS = listed as Specially Protected under the WC Act.

P = listed as Priority by Parks and Wildlife 2015a.

4.3.4 Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*)

Carnaby's Black Cockatoo is endemic to south-west WA with populations extending from the Murchison River to Esperance, and inland to Coorow, Kellerberrin and Lake Cronin. The species feeds on seeds, nuts and flowers of a variety of native species including *Banksia, Hakea, Grevillea, Allocasuarina, Eucalyptus* and *Corymbia*. Carnaby's Black-Cockatoos have also been recorded feeding extensively on seeds from the cones of exotic pines (*Pinus* spp.; Shah 2006). Pine plantations in the coastal zone are now considered important feeding areas in the non-breeding season (Cale 2003).

The species is a post-breeding nomad, tending to move west to coastal areas with its young after breeding (late spring to mid-winter), particularly to the Swan Coastal Plain. A small number of birds remain resident on the Swan Coastal Plain all year and have been recorded breeding in a number of areas including Gingin, Yanchep, Mandurah, and Bunbury. Like most cockatoo species, Carnaby's Black Cockatoo is gregarious and is usually seen in small groups and will occasionally congregate in large flocks comprised of hundreds or, exceptionally, thousands of birds. During the breeding season, adults nest as solitary pairs.

Carnaby's Black Cockatoo nest in hollows of smooth-barked eucalypts, especially Salmon Gum (*Eucalyptus salmonophloia*) and Wandoo (*Eucalyptus wandoo*), but nests have also been found in other eucalypts, including York Gum (*Eucalyptus loxophleba*), Flooded Gum (*Eucalyptus rudis*), Tuart (*Eucalyptus gomphocephala*) and the rough-barked Marri (*Corymbia calophylla*). On the Swan Coastal Plain, most nests are in Tuart trees (Johnstone & Storr 1998). Breeding birds forage no more than approximately 20 km from their nesting hollows during the breeding season, and therefore having sufficient foraging and water resources close to breeding areas is critical to their breeding success (Saunders 1980).

Approximately 17,000 ha of Carnaby's Black Cockatoo habitat has been recorded within the City of Wanneroo, of which 0.5% is located within the Development Area. Yanchep National Park, approximately 17 km to the north of the Development Area, contains some of the northern Swan Coastal Plain's highest quality foraging habitat for Carnaby's Black Cockatoo and breeding has been recorded in the park (Department of Planning 2011).

ELA undertook a Carnaby's Black Cockatoo breeding habitat assessment in 2014; the assessment report (ELA 2014) is attached in Appendix C (Appendix D in ELA 2016). Carnaby's Black Cockatoo moderate and high value habitat was mapped in the Development Area and vicinity (**Figure 6**). The Development Area contains 69.2 ha of foraging habitat (44.6 ha of high value foraging habitat and 24.6 ha of moderate value foraging habitat, including 0.03 ha within the Boundary Rationalisation Area). A total of 31.9 ha of

potential breeding habitat (ELA 2014, ELA 2016) is located within the Development Area (including 3.1 ha within the Boundary Rationalisation Area). All but 10.2 ha of the 31.9 ha of potential breeding habitat overlaps with foraging habitat. Only 0.15 ha (0.5%) of the 31.9 ha of potential breeding habitat is considered to be of high value (13.6 potential breeding trees per hectare, or a total loss of approximately two trees); the remaining 99.5% is low value potential breeding habitat (8.4 potential breeding trees per hectare). Based on the density of potential breeding trees, the estimated total number of potential breeding trees to be lost due to the clearing of the Development Area will be approximately 269.

The Development Area's primary attribute for Carnaby's Black Cockatoo is its foraging value; the potential breeding habitat is mostly low value, with no actual breeding having been recorded on site. The closest breeding records are located at Yanchep National Park and in remnant vegetation approximately 16 km to the north-east (Department of Planning 2011).

4.3.5 Western Brush Wallaby (*Macropus irma*)

The Western Brush Wallaby is found in the south-west coastal region of WA where populations are particularly centralised near the Swan River and the dry sclerophyll Jarrah forests to the east of Perth (Groves 2005). The species is found in some areas of mallee and heathland but is generally uncommon in wet sclerophyll forest further south. It prefers tall open forests that supply adequate grazing and open, seasonally damp flat areas with low grasses and open scrubby brushes that allow it to move freely and speedily.

The Western Brush Wallaby is a crepuscular animal, unlike many macropod species, and is active mainly at dusk and dawn (Menkhorst and Knight 2009). It is herbivorous and feeds on many plant species, in particular on *Carpobrotus edulis, *Cynodon dactylon*, and *Nuytsia floribunda*. Western Brush Wallabies are commonly recorded around the Swan Coastal Plain in suitable habitat. Scats identified as most likely to be from this species were recorded during the fauna survey (ELA 2012) and suitable habitat for grazing and breeding occurs throughout much of Lot 503. The Development will result in the loss of Western Brush Wallaby habitat. During clearing, it is likely that individuals will move away into similar habitat adjacent to the Development Area. Vegetation clearing will be undertaken in stages to facilitate the movement of fauna species into the surrounding vegetation.

4.3.6 Rainbow Bee-eater (*Merops ornatus*)

Rainbow Bee-eaters are commonly found during the summer throughout most of southern Australia excluding Tasmania (Barrett et al. 2003). They migrate north at the onset of cooler weather in Autumn, spending the winter in northern Australia, New Guinea, and some of the southern islands of Indonesia. They occur in a wide range of habitats including open woodlands, shrublands, beaches, dunes, cliffs, mangroves, woodlands and parks and private gardens (Boland 2004).

Rainbow Bee-eaters eat insects, mainly bees and wasps, as well as dragonflies, beetles, butterflies and moths. They gather in small flocks before returning to summer breeding areas after over-wintering in the north (aside from resident northern populations). Both males and females select a suitable nesting site in a sandy bank and dig a long tunnel leading to a nesting chamber, which is often lined with grasses. Both parents incubate the eggs and both feed the young, sometimes with the assistance of auxiliaries (Boland 2004). Nest holes are often located in disturbed areas such as bare sand batches and road sidings.

Rainbow Bee-eaters have been previously recorded within Lot 503, and it is likely they are present within the Development Area. While no breeding burrows have been identified, the sandy substrate available provides potentially suitable nesting areas. Vegetation clearing will result in a loss of habitat, and potential loss of young in nests, depending on the time of year the clearing is undertaken. As this species is aerial

and migratory, it will be able to move away from disturbances and is likely to find alternative foraging and breeding sites in the nearby remaining vegetation.

4.3.7 Black-striped Snake (*Neelaps calonotos*)

The Black-striped Snake occurs on the coastal plain and coastal dune formations supporting low shrublands, heaths, and *Banksia* woodlands between Mandurah and Cataby (Bush et al. 2010). It feeds primarily on burrowing skinks (genus *Lerista*). It is a seasonal breeder, like most reptiles in the south-west of WA. Little information has been documented on its ecology; however, it is known to be abundant in many bushland reserves in Perth such as Bold Park (Bush et al. 2010).

Extensive areas of *Banksia* woodland with mixed shrubs and low heath within Lot 503 are considered suitable habitat for this species. There are a number of records of the species on Bassendean sand formations on the northern Swan Coastal Plain (Bush et al. 2010). The closest record on NatureMap (Parks and Wildlife 2007-2016) is 5.8 km east of the Development Area.

Clearing within the Development Area will result in a loss of Black-striped Snake habitat, and potentially mortality and forced relocation away from the Development Area, if the species is present. Vegetation clearing will be undertaken in stages to facilitate the movement of fauna species into the surrounding vegetation. A fauna handler will be present at all times during vegetation clearing to facilitate the capture and relocation of fauna.

4.3.8 Quenda (*Isoodon obesulus* subsp*. fusciventer*)

The Quenda is widely but patchily distributed through south-western WA, from around Guilderton to east of Esperance and inland to Hyden. This species prefers low, dense vegetation such as heath and swampy habitat and is often associated with forests, woodland, shrubland and riparian areas (Department of Environment and Conservation (DEC) 2012). Its foraging often extends into adjacent, more open grasslands, pastures, or areas subject to regular burning (DEC 2012). The species is nocturnal and sleeps during the day in a nest of heaped vegetation with a hollow centre. The nest is usually concealed in a depression or amongst dense vegetation or ground litter. Food is located by digging conical holes with the forefeet and probing with the snout, and includes insects and larvae, worms, bulbs, berries and small vertebrates (Menkhorst and Knight 2009).

This species is commonly recorded around the Swan Coastal Plain, and is considered likely to occur in the Development Area, as suitable habitat is present. Vegetation clearing will result in a loss of habitat for the species, and potentially mortality and forced relocation away from the Development Area, if the species is present. Vegetation clearing will be undertaken in stages to facilitate the movement of fauna species into the surrounding vegetation. A fauna handler will be present at all times during vegetation clearing to facilitate the capture and relocation of fauna.

4.3.9 Bee sp. (*Hylaeus globuliferus*)

The native bee *Hylaeus globuliferus* has a distribution that extends from the south coast near Fitzgerald River National Park, to the Mid West near Dongara (Parks and Wildlife 2007-2016). It has been recorded near the Development Area; the closest record on NatureMap is less than 2 km from the Development Area (Parks and Wildlife 2007-2016). This species of native bee is known to feed on the flowers of *Adenanthos cygnorum*, but has also been collected from the flowers of *Grevillea cagiana, Grevillea* sp. aff. *hookeriana*, *Banksia grossa* and *Banksia attenuata* (Western Wildife 2008, Parks and Wildlife 2007-2016). Due to the the proximity of nearby records and as *Banksia attenuata* is present in the Development Area, this species may be present. Vegetation clearing will result in loss of habitat and potential mortality of individuals of the species, if present within the Development Area. Suitable habitat for the species is also present within the retained vegetation within Lot 503, and within the adjacent Bush Forever Sites.

4.3.10 Cricket sp. (*Austrosaga spinifer*)

The cricket *Austrosaga spinifer* is known from heath habitats from Perth to Cervantes (Western Wildlife 2008). There are only four records of this species on NatureMap; two of the records are from Neerabup National Park, less than 2 km west of the Development Area (Parks and Wildlife 2007-2016). Given its habitat preference, and the proximity of nearby records, this species may potentially occur in the Development Area. Vegetation clearing will result in loss of habitat and potential mortality of individuals of the species, if present within the Development Area. Suitable habitat for the species is also present within the retained vegetation within Lot 503, and within the adjacent Bush Forever Sites.

4.3.11 Peregrine Falcon (*Falco peregrinus*)

The Peregrine Falcon is a large bird of prey. NatureMap (Parks and Wildlife 2007-2016) identifies the Peregrine Falcon as occurring throughout WA, from the south near Albany to the north near Kununurra. Whilst considered uncommon, it is widespread across Australia, and occurs across all continents (Parks and Wildlife Service Tasmania (PaWST) 2011). The Peregrine Falcon occupies a variety of habitats including inland cliffs, rocky outcrops and gorges, coastal cliffs and islands, open woodlands near water, and can also be found nesting on ledges of high city buildings (PaWST 2011).

The Peregrine Falcon has been recorded in close proximity to the Development Area, and is considered to potentially occur in the Development Area. However, it is likely to be an infrequent visitor and is not considered to be dependent on the habitat in the Development Area.

4.3.12 Fork-tailed Swift (*Apus pacificus*)

Fork-tailed Swifts are nomadic and typically respond to broad-scale weather pattern changes. They are attracted to thunderstorms and cyclonic disturbances where they can be seen in flocks hawking insects from the storm fronts with numbers ranging from a few individuals to flocks of up to 2,000 birds. In WA, the Fork-tailed Swift is considered uncommon to moderately common near the north-west, west and south-east coasts, common in the Kimberley and rare or scarce elsewhere (Johnstone *et al.* 1998). They live almost exclusively in the air and rarely land (Simpson et al. 2004). This species may hunt for insects over the site on a seasonal basis, but is unlikely to utilise it for roosting as breeding occurs outside Australia.

Figure 6: Moderate and high value Carnaby's Black Cockatoo habitat in the vicinity of the Development Area

5 Social environment

5.1 Tenure

The Development Area is located within freehold land owned by LandCorp. The site is predominantly intended for industrial use, in line with the current MRS zoning of 'Industrial', and the 'Industrial Development' zoning under the Wanneroo District Planning Scheme No 2 (DPS 2). The Development Area is within the boundaries of the larger NIA, which is approximately 1000 ha of general industrial land in the north-west corridor of the Perth metropolitan area.

The 3.6 ha Boundary Rationalisation Area within the Development Area is currently considered part of Bush Forever Site 384 and is zoned as 'Parks and Recreation'; however, LandCorp will request an amendment to the MRS to alter the zoning to 'Industrial'.

5.2 Population demographics

The Development Area is located in Neerabup, in the City of Wanneroo, approximately 32 km north of the Perth Central Business District and 9 km north-east of Joondalup. The City of Wanneroo covers an area of 68,561 ha and has a population of approximately 198,689 people (August 2016 forecast; City of Wanneroo 2016). A total of 38.5% of residents in 2011 were aged between 25-49 years, with the remaining 29.0% and 32.5% aged between 0-24 years and 50+ years respectively.

In the City of Wanneroo, construction is the largest employer, generating 11,126 local jobs in 2014/15 (21.7% of all workers). Other major industries (City of Wanneroo 2016) include retail trade (6,657 people or 13.0%), education and training (6,518 people or 12.7%) and manufacturing (5,890 people or 11.5%).

5.3 Heritage

An Aboriginal heritage analysis of Lot 701 Flynn Drive was undertaken by R. & E. O'Connor Pty Ltd (2012). The objective of the analysis was to establish whether there are any known Aboriginal heritage constraints which would be required to be taken into consideration in advance of development of the site.

There are no registered Aboriginal sites within the Development Area, however there are two sites located in the vicinity of the Development Area. These are Registered Aboriginal Heritage Site Number 4404 ('Orchestra Shell Cave') and Other Heritage Place Number 3693 ('Neerabup Lake'). These Registered Aboriginal Heritage Sites are contained within Bush Forever Site 384 and found on land designated as 'Parks and Recreation', and therefore will not be affected by the Development.

6 Assessment against the Ten Clearing Principles

An assessment of the proposed vegetation clearing against the ten native vegetation Clearing Principles contained in Schedule 5 of the EP Act is provided in Section 6.1-6.10. Based on the assessment of the environmental values of the Development Area, it is deemed that the Development is unlikely to be at variance with eight of the ten Clearing Principles. However, the Development could be considered to potentially be at variance to Principles (a) and (b).

6.1 Comprises high level of biological diversity

Principle (a): Native vegetation should not be cleared if it comprises a high level of biological diversity.

The vegetation in the Development Area is a mixture of *Eucalyptus* woodlands and *Banksia* dominated heathlands, with six vegetation communities present with the Development Area. The most widespread vegetation communities were EmBaBmAfW (*Eucalyptus marginata*, *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Woodland) and BsOH (*Banksia sessilis* Open Heath), comprising 31.7% and 26.5% of the Development Area respectively.

A total of 153 taxa of terrestrial vascular flora representing 102 genera and 46 families have been recorded within what was Lot 21 (437 ha), including 36 weed species. As a comparison, Bennett Environmental Consulting (2000) conducted a previous flora survey in Lot 21, and recorded 121 vascular flora species from the same area. A 325 ha survey conducted in other areas of the NIA (ATA Environmental 2007) recorded 136 taxa, including 19 weed species.

One Priority 3 flora species was recorded in Lot 503 outside the Development Area. A further two Priority 3 species were considered to potentially occur in the Development Area, but if present, they are unlikely to occur in high numbers, as they were not observed during the Ecoscape (2009) survey.

A total of 73.6% of the Development Area is in Good to Excellent condition, with the remaining 26.4% in Degraded or Completely Degraded condition (**Table 4**). Of the 36 weed species recorded in Lot 701, two are classified as Declared Pests under s22(2) of the BAM Act; **Asparagus asparagoides* (Bridal Creeper) and **Echium plantagineum* (Patterson's Curse). **Asparagus asparagoides* is also a Weed of National Significance (WoNS).

The fauna habitat that occurs within the Development Area ('Mixed woodlands' habitat type) is common on the Swan Coastal Plain, and is well represented outside the Development Area in the locality. A level 2 vertebrate fauna survey (ELA 2012) covering approximately 715 ha (but primarily focusing on the 437 ha Lot 701) recorded a total of 61 native vertebrate fauna species, including one amphibian, 18 reptiles, 37 birds and four mammals. Eight species of introduced fauna were recorded during the ELA (2012) survey. The number of species recorded during the ELA (2012) survey is comparable to a similar scale of survey (325 ha) conducted nearby (ATA Environmental 2007), which found a total of 63 native vertebrate fauna species, including two amphibians, 17 reptiles, 42 birds and two mammals.

Three conservation listed fauna species have been recorded in the Development Area or in very close proximity; Carnaby's Black Cockatoo, Western Brush Wallaby and Rainbow Bee-eater. A further two species are considered likely to occur (Black-striped Snake and Quenda), and four species are considered to have the potential to occur (Peregrine Falcon, Fork-tailed Swift, *Hylaeus globuliferus* and *Austrosaga spinifer*).

The fauna, flora and vegetation of the Development Area could be considered to potentially have a high level of biodiversity, although it is consistent with surveys undertaken in nearby vegetation. However, none of the mapped vegetation communities or fauna habitats found within the Development Area are restricted and all extend well beyond the boundaries of the Development Area. There are no known Rare or Priority flora records located in the Development Area and the number of conservation listed fauna species occurring or likely to occur in the Development Area is not considered high. Therefore, while the Development could potentially be considered to be at variance with this Principle, the Development Area is not considered to contain an unusually high level of biological diversity or significant species for this region.

6.2 Potential impact to any significant habitat for fauna indigenous to Western Australia

Principle (b): Native vegetation should not be cleared if it comprises the whole, or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

A total of 61 native vertebrate fauna species have been recorded within Lot 701 and the vicinity, including one amphibian, 18 reptiles, 37 birds and four mammals (ELA 2012). Of these terrestrial fauna species, three are conservation listed; Carnaby's Black Cockatoo, Western Brush Wallaby and Rainbow Bee-eater. A further two species are considered likely to occur (Black-striped Snake and Quenda), and four species are considered to have the potential to occur (Peregrine Falcon, Fork-tailed Swift, *Hylaeus globuliferus* and *Austrosaga spinifer*).

The Development will cause the destruction of actual or potential habitat for these conservation listed species. Clearing will potential cause mortality or forced relocation away from the Development Area of individuals, if present. Vegetation clearing will be undertaken in stages to facilitate the movement of fauna species into the surrounding vegetation, and a fauna relocation program will be undertaken prior to commencement of each stage. A fauna handler will also be present at all times during vegetation clearing to facilitate the capture and relocation of fauna.

The Development Area contains 69.2 ha of Carnaby's Black Cockatoo foraging habitat (44.6 ha of high value and 24.6 ha of moderate value) and 31.8 ha of potential breeding habitat (0.2 ha of moderate value and 31.6 ha of low value). LandCorp has proposed several avoidance and mitigation measures to reduce the impact to the Carnaby's Black Cockatoo and to maximise the potential for the undeveloped portions of the Lot 503 and the adjacent Bush Forever Sites to continue to be utilised by Carnaby's Black Cockatoo during and following development (see Section 7).

The residual impact to Carnaby's Cockatoo having applied avoidance and mitigation measures is loss of 69.2 ha of known foraging habitat of moderate to high value. As there is still a significant residual impact to Carnaby's Black-Cockatoo, LandCorp is currently negotiating with DoEE regarding offsets for the loss of the foraging habitat within the Development Area; details of the proposed offset strategy are outlined in Section 7 and elaborated further in ELA 2015a (Appendix F) and ELA 2016 (Appendix C). Consequently, as there is significant residual impact to Carnaby's Black Cockatoo foraging habitat, the Development could be considered to be at variance to this Principle.

6.3 Potential impact to any rare flora

Principle (c): Native vegetation should not be cleared if it includes, or is necessary for the continued existence of Rare flora.

No Rare flora species have been recorded in the Development Area (Ecoscape 2009) and the Development is therefore considered to not be at variance with this Principle.

6.4 Presence of any threatened ecological communities

Principle (d): Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of a threatened ecological community (TEC).

An Endangered state-listed TEC, Limestone ridges (SCP 26a), is present within north-eastern portion of Lot 503 outside the Development Area. This 7.63 ha TEC, along with a buffer and a larger portion of high quality vegetation, will be protected within a 'conservation area' proposed within Lot 503.

As there are no state-listed TECs present in the Development Area, the Development is therefore not at variance with this Principle.

6.5 Significance as a remnant of native vegetation in the area that has been extensively cleared

Principle (e): Native vegetation should not be cleared if it is significant as remnant vegetation in an area that has been extensively cleared.

The Development Area intersects two vegetation associations defined by Shepherd et al. (2002):

- Spearwood 6 (e2,4Mi): Medium woodland; Tuart and Jarrah (19%); and
- Spearwood 949 (bLi): Low woodland; *Banksia* (81%).

The Development Area contains 0.13% of the current extent of Spearwood 6 (e2,4Mi), and 1.11% of the current extent of Spearwood 949 (bLi) within the Swan Coastal Plain sub-region (Government of WA 2016). A total of 13,335.50 ha (24.88%) of Spearwood 6 and 6,797.69 ha of Spearwood 949 (57.73%) remain respectively within this sub-region.

The State Government is committed to the National Objectives and Targets for Biodiversity Conservation (Commonwealth of Australia 2001) that includes a target that prevents a clearance of ecological communities with an extent below 30% of that present prior to European settlement. The vegetation association Spearwood 6 is below this 30% target level. However, the EPA (2006) recognises the Perth Metropolitan Region as a constrained area, providing for the reduction of the vegetation associations to a minimum of 10% of the pre-European extent. The Development Area is located within the Perth Metropolitan Region, and intersects vegetation communities that have over 10% of the pre-European extent. As the Development will not reduce the extent of these vegetation communities below 10% of their pre-European extent, the Development is therefore considered to not be at variance with this Principle.

6.6 Impact on any watercourses and/or wetlands

Principle (f): Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

There are no watercourses or wetlands located within the Development Area. The closest water feature is the ephemeral Neerabup Lake, located 370 m to the east of Lot 503 at its closest point. As the Development will not have an impact to any watercourses or wetlands, it is not at variance with this Principle.

6.7 Potential to cause appreciable land degradation

Principle (g): Native vegetation should not be cleared if the clearing of vegetation is likely to cause appreciable land degradation.

The Development Area will be cleared progressively over approximately five years in accordance with the requirements for extraction of the limestone resource. Clearing within the Development Area will occur as access to the resource is required. LandCorp proposes to manage potential impacts associated with clearing and construction, such as land degradation from erosion, sedimentation and spread of weeds, through a Construction Environmental Management Plan (CEMP). A 6 m fire break will run the length of the entire western and northern Development Area boundaries. A 20 m road reserve will also be located next to the batter adjacent to the Bush Forever Site; where the road reserve is not present, the batter width will be greater (>45 m). The Development will therefore be separated from the remaining vegetation outside the Development Area by a distance of 50-60 m. This distance, along with the height of the batter, will reduce the risk of indirect impacts to vegetation outside the Development Area. Furthermore, the Development Area boundary will be fenced. Specific outcomes-based conditions will be included as part of the CEMP, with related management actions, monitoring and corrective actions.

The Extractive Industry Licence for the Development Area is conditional on various environmental and rehabilitation conditions as required by the Department of Mines and Petroleum; these conditions will also be reflected within the CEMP. The requirements of the CEMP will be included in the contract with the limestone extraction contractor. The contract will also address management of potential environmental impacts associated with other requirements during construction and operation of the quarry (e.g. erosion management, fauna relocation, storage and handling of chemicals and hydrocarbons, and groundwater and surface water quality management).

The occurrence of 36 weed species within Lot 701 has implications for the spread of these weeds. This risk will be managed by implementing weed management and hygiene measures during vegetation clearing and construction to minimise the spread of weeds within or outside the Development Area. The CEMP will also include measures to prevent the introduction of weeds to the Development Area. Annual weed monitoring (including mapping) in the Development Area within 50 m of the cleared area at the time of survey (up to the point where the clearing meets the batter or road reserve with the Development Area) is proposed. Where the clearing boundary is adjacent to Bush Forever Site 384, monitoring will be undertaken as part of on-going monitoring activities associated with the rehabilitation of this area (see ELA 2015c). Additional monitoring and/or corrective actions will be implemented in the event of a reported incident (for example, the observed presence of a new weed species adjacent to the cleared area boundary or in the cleared area of the Development Area).

As the Development is not anticipated to cause appreciable land degradation, the Development is therefore considered to not be at variance with this Principle.

6.8 Potential to impact on the environmental values of adjacent or nearby conservation areas

Principle (h): Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Bush Forever Sites 384 (Neerabup Lake and Adjacent Bushland Neerabup) and 293 (Shire View Hill and Adjacent Bushland, Nowergup / Neerabup) are located adjacent to the western and northern boundaries of Lot 503. Bush Forever Site 383 (Neerabup National Park) is located to the west of Bush Forever Site 284, separated by Wanneroo Road (**Figure 5**).

The Development is not anticipated to have a significant impact on the adjacent Bush Forever Sites. Due to ground level differences between the Development Area and the remaining vegetation (including the Bush Forever Sites), the batters between these two areas will act as a physical buffer. The Development Area boundary will also be fenced and separated from the industrial estate by a 20 m road reserve that

together with the batter and fire break, will form a buffer greater than 50 metres in width when constructed. The potential direct and indirect impacts to the Bush Forever Sites (weeds, land degradation, inadvertent clearing of vegetation, access by members of the public) associated with clearing and construction will be managed through a CEMP.

The Development is not at variance with this Principle as the Development is not anticipated to have a significant impact to the environmental values of adjacent or nearby conservation areas.

In addition, LandCorp is committed to a comprehensive offsets strategy focussed on addressing significant residual impacts to Carnaby's Black Cockatoo; two of these offsets will directly benefit the Bush Forever Sites, resulting in greater protection and enhanced vegetation condition within Bush Forever Sites 293 and 384. Direct Offset 2 (see Section 7.2) will result in the rehabilitation and management of portions of the two Bush Forever Sites within what was Lot 701 (now located within Lot 502 on DP 409677). The aim of the rehabilitation works is to improve the overall condition and environmental function of the Bush Forever Sites. Direct Offset 1 (see Section 7.1) will alter the of tenure and zoning of the portion of Bush Forever Site 293 within Lot 502, from 'Industrial' to 'Parks and Recreation', giving this area of bushland protection in perpetuity from future clearing. It is intended that in the future, Bush Forever Sites 293 and 384 within Lot 502 will be managed as a single unit, in conjunction with the remainder of Bush Forever Site 384, to create a large consolidated conservation area under a single management regime, managed by Parks and Wildlife.

6.9 Potential deterioration in the quality of surface or underground water

Principle (i): Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

There are no watercourses or wetlands located within the Development Area. The closest water feature is the ephemeral Neerabup Lake (Resource Enhancement Category Wetland), located 370 m to the east of Lot 503 at its closest point. A wetland buffer of 50 m is recommended to protect wetland values and functions of Resource Enhancement Category wetlands (Western Australian Planning Commission 2005). Given the distance to the closest surface water body, the Development is not considered likely to cause deterioration to the quality of the surface water in the vicinity of the Development Area.

The depth to groundwater within the Development Area varies from 32 m in south-west to 52 m in the north-east (Department of Water 2016). The soils of the Development Area are porous and are derived from Tamala Limestone, hence it is likely that surface water rapidly infiltrates the soil although large rainfall events are likely to result in surface run off that flows towards Neerabup Lake (Coffey Environments 2009). Implementation of the CEMP will ensure protection of groundwater and surface water quality during vegetation clearing and construction. The Development is considered unlikely to be at variance with this Principle.

6.10 Potential of clearing to cause, or exacerbate, the incidence of flooding

Principle (j): Native vegetation should not be cleared if the clearing of vegetation is likely to cause, or exacerbate, the incidence of flooding.

The Development is considered unlikely to cause or exacerbate the incidence of flooding. Lot 503 is gently undulating, and generally slopes downward toward the south-west, reducing the chance of water pooling. There are no watercourses or wetlands located within the Development Area. The soils of the Development Area are porous and are derived from Tamala Limestone, hence it is likely that surface water would rapidly infiltrate the soil rather than form sheet flow, with the exception of during large rainfall

events (Coffey Environments 2009). The Development is not anticipated to significantly alter drainage flows or overland sheet flow and is therefore considered to not be at variance with this Principle.

7 Proposed EPBC Act Offsets for Carnaby's Black Cockatoo

LandCorp has proposed several avoidance and mitigation measures to minimise impacts to Carnaby's Black Cockatoo during and following development. Implementation of mitigation measures will span the life of the Development (including construction) and include the retention of habitat within Lot 503 outside the Development Area and progressive clearing of vegetation over a period of five years in accordance with the requirements for extraction of the limestone resource. A CEMP will be developed to manage potential impacts associated with clearing and construction. A management target of zero off-site direct or indirect impacts is proposed. The CEMP will specify management measures (controls) within the Development Area to avoid off-site impacts, and will outline monitoring both within the site to ensure management actions are implemented properly and off-site to ensure the management target of zero off-site impacts is being achieved during construction activities and quarry operations. Trigger levels for incidents and corrective actions will be included in the CEMP. An emphasis will be placed on effective and proactive adaptive management.

The extent of impact to Carnaby's Black Cockatoo foraging habitat from the Development is the loss of 69.2 ha of foraging habitat (44.6 ha of high value foraging habitat and 24.6 ha of moderate value foraging habitat). A total of 31.9 ha of potential breeding habitat is also located within the Development Area (with over 68% of this habitat overlapping with foraging habitat). The majority (99.5%) of this potential breeding habitat is considered to be low value potential breeding habitat, with no significant impact to the species from the clearing of this vegetation. The residual impact to Carnaby's Black Cockatoo that LandCorp proposes to offset, having applied avoidance and mitigation measures, is loss of 69.2 ha of known foraging habitat.

LandCorp is committed to a comprehensive offsets program. There are three direct offsets proposed:

- Direct Offset 1: The change in tenure of part Bush Forever Site 293 from 'Industrial' zoned land to conservation tenure;
- Direct Offset 2: The rehabilitation and management of part Bush Forever Site 293 and 384; and
- Direct Offset 3: The acquisition of offsite land that contains Carnaby's Black Cockatoo habitat for management by Parks and Wildlife.

The information provided in Sections 7.1-7.3 is a summary from the proposed offsets strategy provided in the Additional Information Request (ELA 2016) and further elaborated in the Offset Proposal (ELA 2015a), and is currently subject to further negotiation with DoEE. The EPBC Act Offsets Calculator was used to determine the value of the proposed offsets (see ELA 2015a); these values are currently under discussion with DoEE and are subject to change.

7.1 Direct Offset 1: Transfer of Industrial zoned land to conservation tenure

The first component of the Offsets Proposal (ELA 2015a) is the retention of approximately 34.1 ha of Bush Forever Site 293 within Lot 502 (previously Lot 701). This area is currently zoned as 'Industrial' and provides foraging and potential breeding habitat for Carnaby's Black-Cockatoo. This portion of Lot 701 was designated as a Strategic Negotiated Planning Solution (NPS) implementation category within the Bush Forever program. This category of NPS intends for a site outcome that balances the needs of conservation and development and pre-supposes an outcome where portions of the Bush Forever Site will be developed.

7.2 Direct Offset 2: Rehabilitation Strategy

A Rehabilitation Strategy (ELA 2015b; see Appendix C) is proposed to be implemented to increase the long-term value and viability of retained habitat in the portion of Bush Forever Sites 293 and 394 that were within Lot 701 (now within Lot 502). The Rehabilitation Strategy aims to improve the overall condition and environmental function of these areas, and to create, rehabilitate or enhance Carnaby's Black Cockatoo habitat. The Strategy has been endorsed by Parks and Wildlife, and includes:

- Details of the location and areas to be revegetated;
- Objectives and completion criteria, including:
    - The rehabilitation of vegetation to Very Good or better condition, if currently in Completely Degraded to Good condition (46.8 ha); or
    - The maintenance of the condition of vegetation considered to be in Very Good or better condition (69.9 ha); see **Figure 7**.
- Revegetation and creation of habitat in cleared areas;
- Supplementary planting and weed control in degraded habitat;
- Implementation of a conservation management regime controlling access, weeds, pests, and addressing other threatening processes; and
- A monitoring program and contingency actions/response triggers.

It is expected that the Rehabilitation Strategy will be supplemented by more detailed rehabilitation specifications to further describe activities required, though all activities will be consistent with the requirements of this document. The CEMP will include additional detail on the Rehabilitation Strategy and other management requirements within the Development Area. In addition to rehabilitation, the CEMP will address issues including installation of artificial hollows, monitoring, access control and fire management, and will be implemented in consultation with Parks and Wildlife. The Rehabilitation Strategy will be implemented during the life of the Development and continue until handover of the site to Parks and Wildlife to undertake its long-term maintenance; the timing of this will be detailed in the CEMP.

7.3 Direct Offset 3: Land Acquisition

Direct Offset 3 is funding the acquisition of a 140 ha area[3] of Carnaby's Black Cockatoo foraging habitat (potentially also supporting breeding habitat) located at Lot 1, Wannamal Road West, Mindarra (as a portion of the entire 950 ha lot) in the Gingin / Boonanarring area (the 'offset site'; **Figure 8**). Having been purchased by LandCorp as part of the advanced offset package (the purchasing of parcels of land with suitable Carnaby's Black Cockatoo habitat by LandCorp to offset potential impacts associated with current and future projects referred to the DoEE under the EPBC Act), the offset site is currently zoned as freehold land and is managed by Parks and Wildlife as a 'Nature Reserve for the purposes of conservation of flora and fauna'.

The offset site acquired by LandCorp contains vegetation with equivalent Carnaby's Black Cockatoo habitat value to that on the Swan Coastal Plain. The offset site is understood to contain Very Good to Excellent condition *Banksia* woodland/shrubland (e.g. *B. attenuata, B. menziesii*) typical of key Carnaby's Black Cockatoo foraging habitat in the Dandaragan Plateau sub-region. The offset site has been inspected by Parks and Wildlife staff, who considered it suitable for acquisition as an offset for impacts to Carnaby's Black Cockatoo habitat.

[3] Area of the offset site is subject to change based on negotiation with DoEE on the EPBC Act Offset Calculator values.

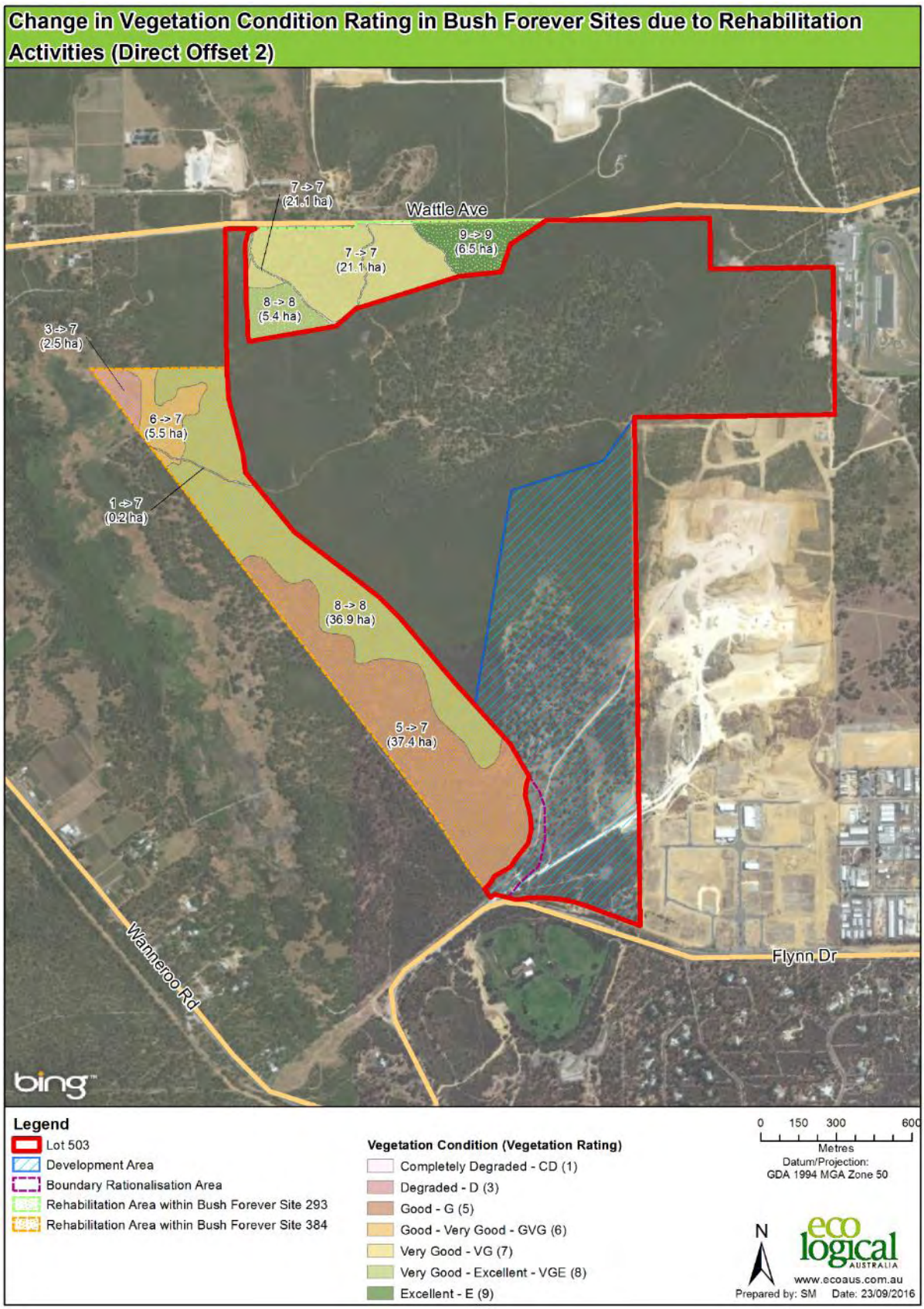

Figure 7: Change in vegetation condition rating in Bush Forever Sites due to rehabilitation activities (Direct Offset 2).

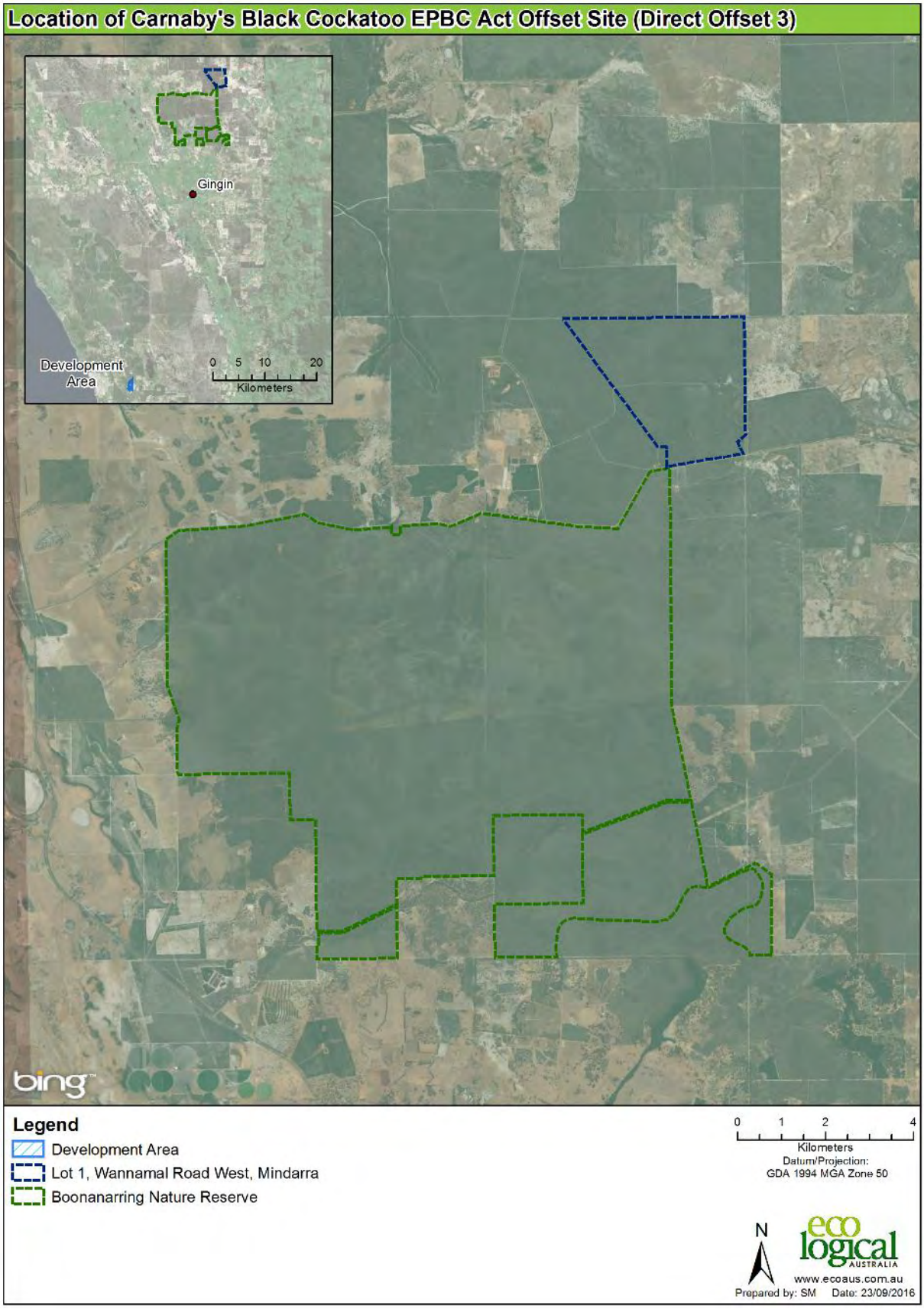

Figure 8: Location of Direct Offset Site 3

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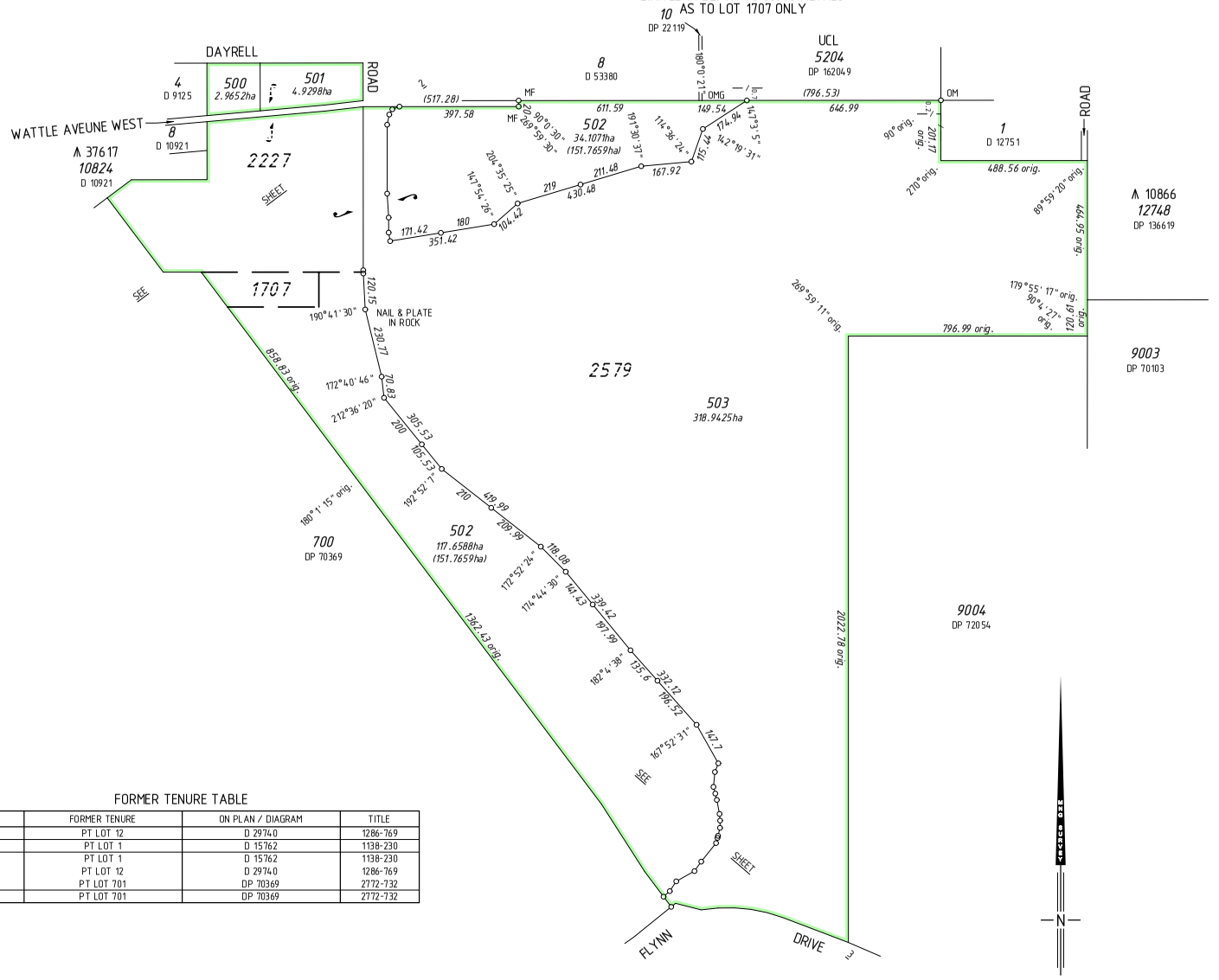
APPENDIX F - Copy of Deposited Plan

Lot 503 - DP 409677 certifying the pegged location of reference pegs and site boundary extents

VERSION	AMENDMENT	AUTHORISED BY	DATE
2	AUDIT REQUIREMENTS	Matthew L. SETH	24/11/2016

HELD BY LANDGATE IN DIGITAL FORMAT ONLY
LIMITED IN DEPTH TO 60.96 METRES
AS TO LOT 2227 AND 2579
LIMITED IN DEPTH TO 609.6 METRES
AS TO LOT 1707 ONLY



FORMER TENURE TABLE

LOT	FORMER TENURE	ON PLAN / DIAGRAM	TITLE
500	PT LOT 12	D 29740	1286-769
501	PT LOT 1	D 15762	1138-230
502	PT LOT 1	D 15762	1138-230
	PT LOT 12	D 29740	1286-769
	PT LOT 701	DP 70369	2772-732
503	PT LOT 701	DP 70369	2772-732

INTERESTS AND NOTIFICATIONS

SUBJECT	PURPOSE	STATUTORY REFERENCE	ORIGIN	LAND BURDENED	BENEFIT TO	COMMENTS

MNG
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Fax: (08) 6436 1500
Email: info@mngsurvey.com.au
MNG Ref : 96767dp-024d - DP409677#00.CSD

TYPE FREEHOLD S.S.A. NO

PURPOSE SUBDIVISION

PLAN OF
LOTS 500-503

FORMER TENURE SEE FORMER TENURE TABLE

LOCAL AUTHORITY CITY OF WANNEROO

LOCALITY NEERABUP, NOWERGUP

D.O.L. FILE

FIELD RECORD 137081

SURVEYOR'S CERTIFICATE - REG 54

I, Matthew L. SETH
hereby certify that this plan is accurate and is a correct representation of the -
(a) *survey, and/or
(b) *calculations from measurements recorded in the field records,
[* delete if inapplicable]
undertaken for the purposes of this plan and that it complies with the relevant written law(s) in relation to which it is lodged.

Matthew Seth
2016.11.24 15:55:41 +08'00'
LICENSED SURVEYOR DATE

LODGED

3.11.16	$554.50	121744
DATE	FEE PAID	ASSESS No.

I.S.C.

EXAMINED

E. Milewska 30.11.2016 DATE

WESTERN AUSTRALIAN PLANNING COMMISSION
FILE WAPC/15/0033

Delegated under S.16 P&D Act 2005 DATE

IN ORDER FOR DEALINGS

SUBJECT TO

FOR INSPECTOR OF PLANS AND SURVEYS DATE

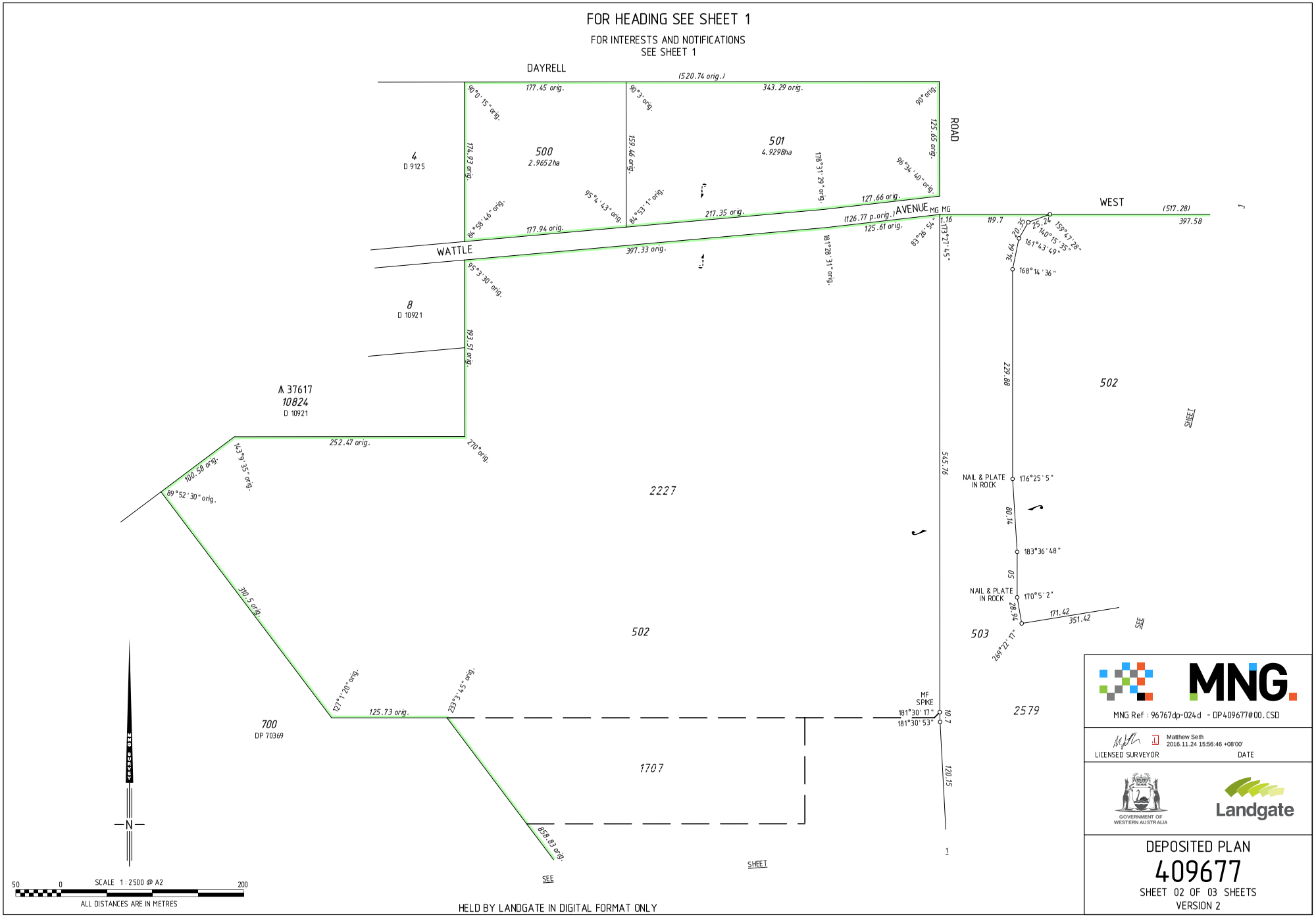
APPROVED

INSPECTOR OF PLANS AND SURVEYS DATE
(S. 18 Licensed Surveyors Act 1909)

GOVERNMENT OF WESTERN AUSTRALIA

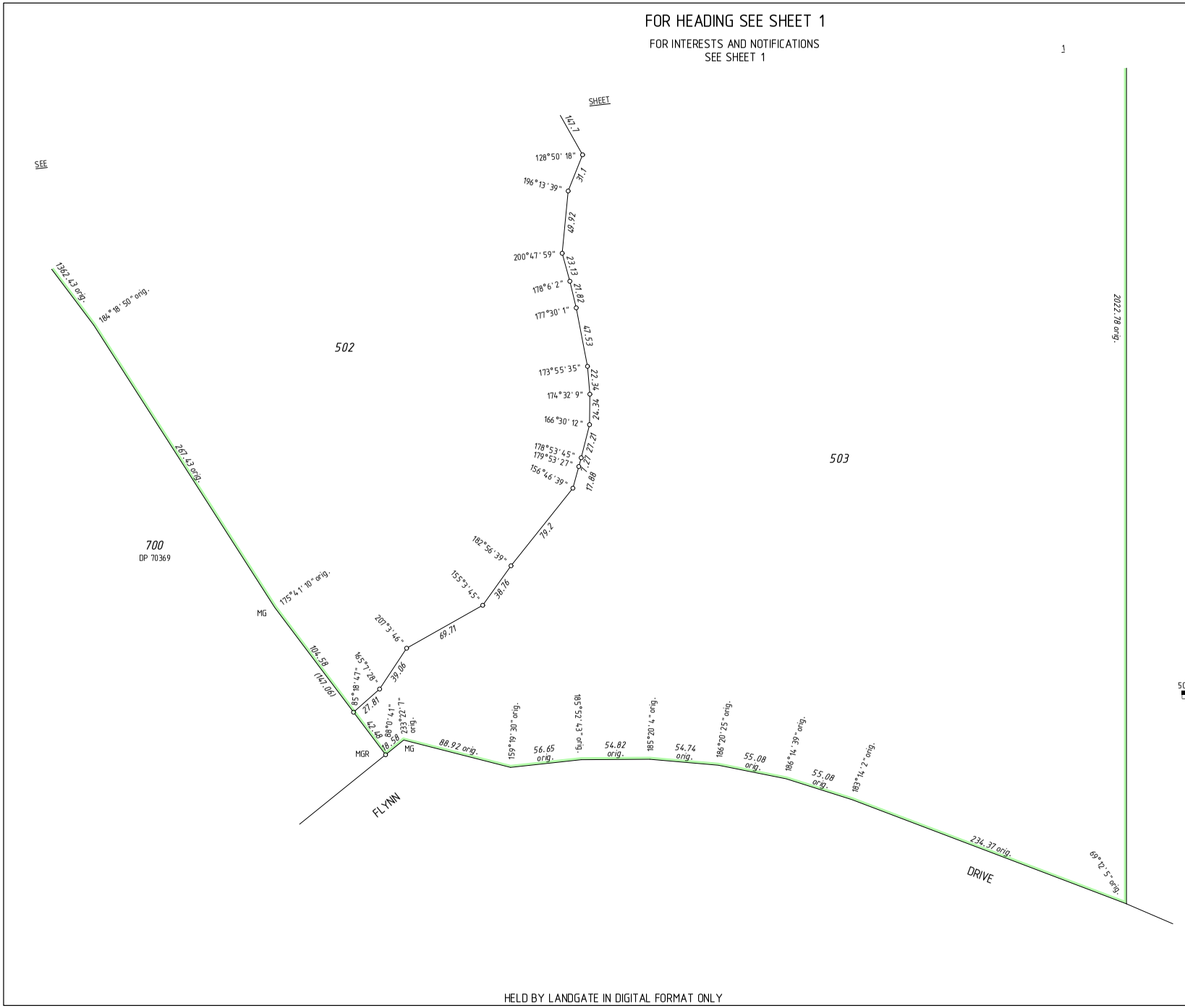
Landgate

DEPOSITED PLAN
409677
SHEET 01 OF 03 SHEETS
VERSION 2



FOR HEADING SEE SHEET 1

FOR INTERESTS AND NOTIFICATIONS
SEE SHEET 1



MNG Ref : 96767dp-024d - DP409677#00.CSD

LICENSED SURVEYOR

Matthew Seth
2016.11.24 15:57:23 +08'00'
DATE

GOVERNMENT OF WESTERN AUSTRALIA

Landgate

DEPOSITED PLAN

409677

SHEET 03 OF 03 SHEETS

VERSION 2

HELD BY LANDGATE IN DIGITAL FORMAT ONLY

APPENDIX G - Control Summary

4962420

STANDARD SURVEY MARKS ACT, 1924

DB Number 4962420

S.S.M. No. NEERABUP 10A

Department of
LAND ADMINISTRATION W.A.

DESCRIPTION OF MARK

☒ Standard Survey Mark set in concrete with ~~steel~~ concrete hatch cover.

☐ Other .....

Stamped NEE 10A

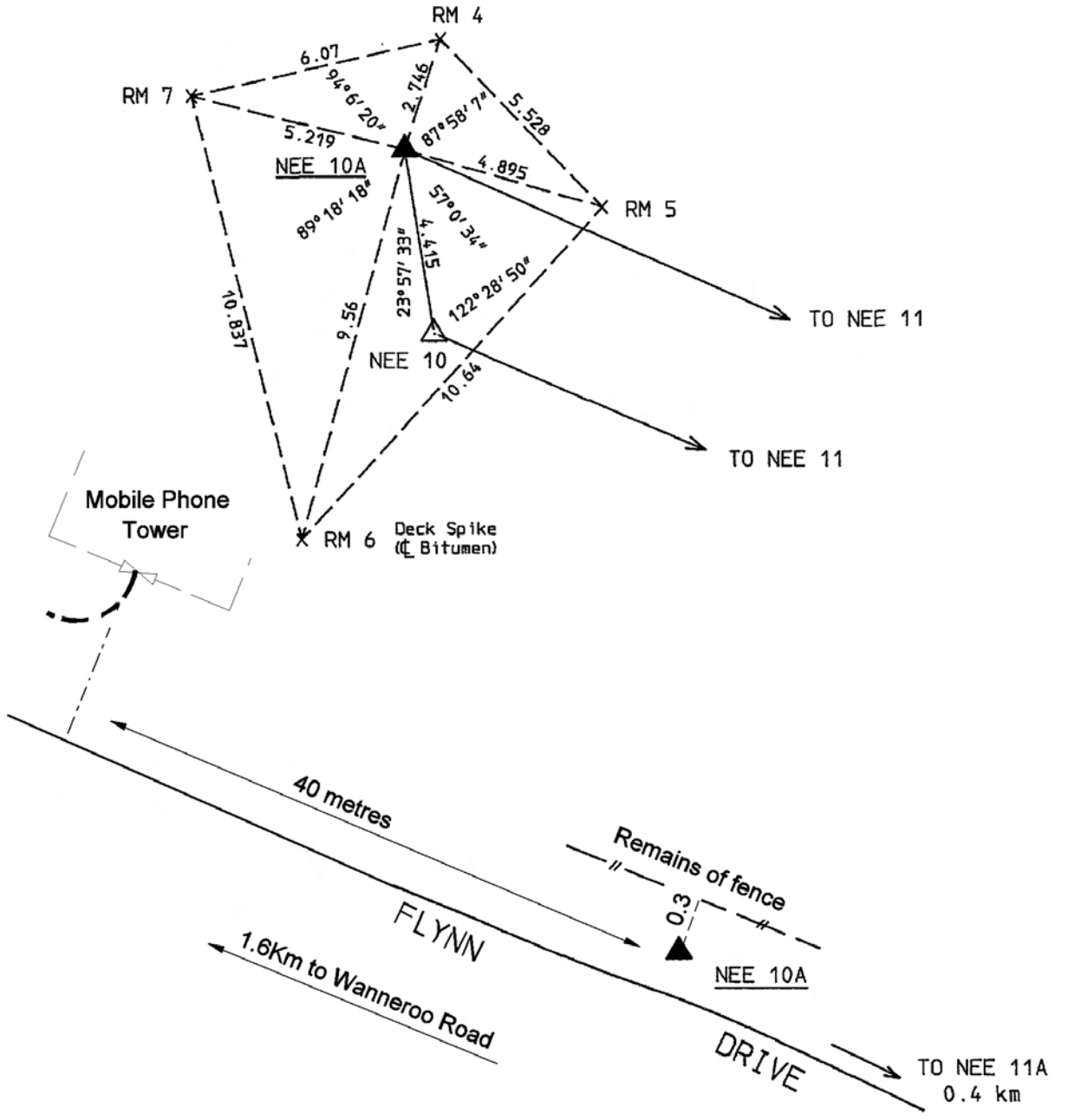
Spike set in concrete R.M. 4.5.7

S.I.P. set in concrete R.M. .....

Deck Spike in bitumen R.M. 6

W.P. SIP on Fence Line

FOR CURRENT VALUES REFER TO GESMAR COMPUTER PRINTOUT.



Provision of this access Summary by DOLA does not imply automatic right of entry onto Lands.
The onus remains with the user to confirm entry requirements prior to use.

Map Sheet: NEERABUP BG35 2.3 Scale 1: 10 000

T.M.C.N

QR 97/1

Geodetic On-Line Access *(GOLA)*

To enter the monthly prize draw for a $100 voucher to major retailers, use the SLIP Geodetic Portal button ...

Send status update

Mark Details

(GOLA last updated on 16-Apr-2018)

Download Details — Download details of all points

Frequently Asked Questions

Download Summaries — Download graphic summaries of all points

View the graphic summary

SSM NEERABUP 10A

Alternate names :

Stamp name: NEE10A

Map ref.: NEERABUP BG35 2.3
Physical Status : **located (McMullen Nolan & Partners)**
Phys. Status Date : 13/06/2012

Geographical Coordinates
Horizontal datum : **GDA94**
Latitude : **S 31 41 09.70213**
Longitude : **E 115 46 26.61563**

MGA Coordinates
Zone : 50
Easting (m) : 383806.546
Northing (m) : 6493711.826
Convergence : -0 38 38.45
Point scale factor : 0.999766510

Positional Uncertainty (m): 0.029
(95% Confidence Level)
Horizontal method : geodetic-terrestrial
Horizontal accuracy : 20ppm
Coordinate date : 09/10/2000

Cadastral connection : Exists

Project Grid - PCG94
Perth Coastal Grid 1994
Easting (m) : 45960.297
Northing (m) : 292964.525
Convergence : -0 1 20.57
Point scale factor : 0.999999260

Height Information
Vertical datum : **AHD71**
Height (m) : **69.581**
Vertical method : Spirit Levelling
Derived GDA94 Ellipsoidal **h**eight (m) : 36.843

*** Derived GDA94 Ellipsoidal height*: **h = H + N**

Height date : 04/05/2000

Vertical accuracy : 12rootK
N-Value (m) : -32.738
Geoid Model : AUSGeoid09 V1.01
Interpolation : Bi-Cubic

RM Information (Height Difference and Azimuth relative to main mark)

RM4	Physical Status: located (McMullen Nolan & Partners)	Date: 26/07/2007
	Height Diff (m): -0.353	Ht Diff. Type: Spirit Levelling
	Azimuth: 18 14 22	Az Type: True azimuth
RM5	Physical Status: established	Date: 17/02/1998
	Height Diff (m): -0.294	Ht Diff. Type: Spirit Levelling
	Azimuth: 106 12 29	Az Type: True azimuth
RM6	Physical Status: established	Date: 17/02/1998
	Height Diff (m): -0.245	Ht Diff. Type: Spirit Levelling
	Azimuth: 194 49 44	Az Type: True azimuth

RM7

Physical Status: located (McMullen Nolan & Partners)
Height Diff (m): -0.426
Azimuth: 284 8 2

Date: 26/07/2007
Ht Diff. Type: Spirit Levelling
Az Type: True azimuth

RM Position Information (RM coordinates should be verified prior to use.)

RM4

Geographical Coordinates
Horizontal datum : **GDA94**
Latitude : **S 31 41 09.61745**
Longitude : **E 115 46 26.64826**

MGA Coordinates
Zone : 50
Easting (m) : 383807.376
Northing (m) : 6493714.443

Project Grid - PCG94
Perth Coastal Grid 1994
Easting (m) : 45961.156
Northing (m) : 292967.133

Height Information
Vertical datum : **AHD71**
Height (m) : **69.228**

RM5

Geographical Coordinates
Horizontal datum : **GDA94**
Latitude : **S 31 41 09.74649**
Longitude : **E 115 46 26.79410**

MGA Coordinates
Zone : 50
Easting (m) : 383811.261
Northing (m) : 6493710.513

Project Grid - PCG94
Perth Coastal Grid 1994
Easting (m) : 45964.998
Northing (m) : 292963.160

Height Information
Vertical datum : **AHD71**
Height (m) : **69.287**

RM6

Geographical Coordinates
Horizontal datum : **GDA94**
Latitude : **S 31 41 10.00218**
Longitude : **E 115 46 26.52273**

MGA Coordinates
Zone : 50
Easting (m) : 383804.204
Northing (m) : 6493702.560

Project Grid - PCG94
Perth Coastal Grid 1994
Easting (m) : 45957.854
Northing (m) : 292955.282

Height Information
Vertical datum : **AHD71**
Height (m) : **69.336**

RM7

Geographical Coordinates
Horizontal datum : **GDA94**
Latitude : **S 31 41 09.66075**
Longitude : **E 115 46 26.42347**

MGA Coordinates
Zone : 50
Easting (m) : 383801.472
Northing (m) : 6493713.044

Project Grid - PCG94
Perth Coastal Grid 1994
Easting (m) : 45955.236
Northing (m) : 292965.797

Height Information
Vertical datum : **AHD71**
Height (m) : **69.155**

Cadastral Connection Fieldbooks

LG 104280
LG 116777
LG 120382
R.J.BAKER 117

Special Notes

No Notes for this mark.

APPENDIX H - Lot 503 Certificate of Title (Plan 409677)

WESTERN AUSTRALIA

REGISTER NUMBER	
503/DP409677	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
N/A	**N/A**

RECORD OF CERTIFICATE OF TITLE

VOLUME **2915** FOLIO **803**

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 503 ON DEPOSITED PLAN 409677

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

WESTERN AUSTRALIAN LAND AUTHORITY OF LEVEL 6, 40 THE ESPLANADE, PERTH
(AF N475323) REGISTERED 6 DECEMBER 2016

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. *G665221 CAVEAT BY TELSTRA CORPORATION LTD AS TO PORTION ONLY. LODGED 16.12.1997.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: DP409677.
PREVIOUS TITLE: 2772-732.
PROPERTY STREET ADDRESS: 398 FLYNN DR, NEERABUP.
LOCAL GOVERNMENT AREA: CITY OF WANNEROO.
RESPONSIBLE AGENCY: WESTERN AUSTRALIAN LAND AUTHORITY.

NOTE 1: DUPLICATE CERTIFICATE OF TITLE NOT ISSUED AS REQUESTED BY DEALING N475323

APPENDIX I - Noise Impact Assessment

Noise Impact Assessment

Extractive Industries Licence Application

Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Peritas Civil Pty Ltd

Project No.: ATP190527

Project Name: Limestone Crushing Operations – Flynn Drive Quarry

Document No.: ATP190527-R-NIA-01

July 2019

Document Control Record

Prepared by:	Alex Gent
Position:	Engineer - Acoustics
Signed:	
Date:	19 July 2019

Approved by:	Sasho Temelkoski RPEQ 13551
Position:	Manager - Acoustics
Signed:	
Date:	19 July 2019

REVISION STATUS

Revision No.	Description of Revision	Date	Approved
0	Issue 1	19 July 2019	S. Temelkoski

Recipients are responsible for eliminating all superseded documents in their possession.

atf ATP Engineering Trust
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Executive Summary

ATP Consulting Engineers (ATP) was engaged to carry out noise impact assessment in support of an Extractive Industries Licence application for the proposed quarrying operations (Phase 1) at Lot 503 Flynn Drive in Neerabup.

Detailed noise propagation modelling was carried out to assess the potential noise impacts from the proposed quarrying operations on the surrounding land uses.

Noise emissions have been calculated considering all plant and equipment to be engaged in clearing and quarrying operations including:

- Mobile crushing and screening plant;
- Diesel genset;
- Conveyor;
- Bulldozer;
- Loader;
- Excavator;
- Bobcat;
- Mobile fuel tankers;
- Product trucks;
- Water truck; and
- Stone cutting saw.

The following noise mitigation measures will be implemented to minimise noise impacts on the surrounding land uses during long-term quarrying operations:

- The quarry will be established by strategically pushing the unusable topsoil into a temporary earth mound along the southern boundary of Lot 503. This earth mound will be approximately 3m high and effectively acoustically screen the nearest noise sensitive places to the south from the quarry operations during stage 1 (Year 1-5). Upon completion of stage 1 and as the operations move north throughout Lot 503, the temporary earth mound will be removed and potentially used for rehabilitation of the site.
- Quarrying and processing plant and equipment will be located on the floor of the extraction pit. Excavated material will be pushed towards the perimeters behind the faces of the extraction pit, with the floor being progressively lowered. The earth mounds and faces of the extraction pit will provide effective visual and noise screening of the plant and equipment.

- Extraction will be staged, beginning at the southern portion of the Phase 1 area and progressing north over time. As such, the separation distance to the nearest noise sensitive places will increase over time.
- Operating hours will be limited to 6:30am to 5:00pm Monday to Saturday. There will be no operations on Sundays or public holidays.

The results of the noise propagation modelling indicate compliance with the Assigned Noise Levels as per the *Environmental Protection (Noise) Regulations 1997*.

Noise monitoring should be undertaken on receipt of a noise complaint. The noise monitoring should be carried out in accordance with the requirements of Australian Standard AS1055-1997 (*Description and measurement of environmental noise*) or any other noise monitoring methodology agreed with the regulatory authorities.

If the results of noise monitoring indicate exceedance of the noise limits, appropriate noise mitigation measures should be implemented to reduce the noise levels.

Table of Contents

Tables

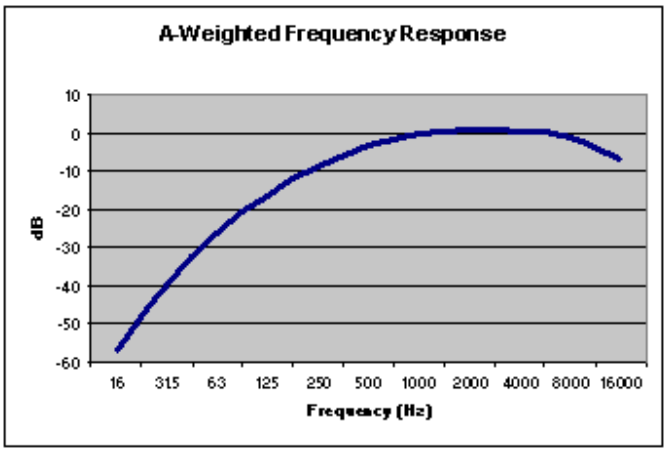
Figures

Appendices

Acoustics Glossary

A-weighting

The A-weighting filter suppresses low frequency sounds and some of the higher frequency sounds to which the human ear is less sensitive. It is a correction to sound pressure levels to mimic the response of the human ear at low sound pressure levels. The A-weighted sound pressure level correlates well with the perceived loudness at low sound levels. The A-weighted sound pressure level is used extensively for general purpose noise measurements.



Broadband sound

Sound distributed across the whole audible frequency range.

dB(A)

The A-weighted sound pressure level.

Fast time-weighting

The Fast ("F") time weighting is defined in AS 1259.1-1990. Instruments set to "F" time weighting use a time constant of 125 milliseconds in their exponential averaging circuit.

Hz (Hertz)

Hertz is the standard measure of the frequency of oscillations in a wave motion. The frequency is most often measured in cycles per second (cps) or Hertz (Hz). Frequency of 1 Hz is one cycle per second.

Impulsive noise and impulsiveness adjustment

Noise having a high peak of short duration or a sequence of such peaks. According to the *Environmental Protection (Noise) Regulations 1997*, impulsive noise is present where the difference between $L_{A\ peak}$ and $L_{A\ Slow\ max}$ is more than 15dB when determined for a single representative event.

$L_{Amax,T\ (Slow)}$

Maximum sound pressure level with A frequency weighting and Slow time weighting over the measurement time T.

$L_{Aeq,T\ (Slow)}$

"Average-energy" sound pressure level with A frequency weighting and Slow time weighting over the measurement time T. Used in situations where sound varies over time. The $L_{Aeq,T}$ sound level has the same energy as the fluctuating sound over the time period T sec.

$L_{A1,T\ (Slow)}$

Measure of the maximum sound level. $L_{A01,T\ (Slow)}$ is a statistical parameter that is sound pressure level with A frequency weighting and Slow time weighting that is exceeded for 1% of the measurement time T.

$L_{A10,T\ (Slow)}$

$L_{A10,T\ (Slow)}$ is a statistical parameter that is the sound pressure level with A frequency weighting and Slow time weighting that is exceeded for 10% of the measurement time T.

$L_{A90,T\ (Slow)}$

Background sound level. $L_{A90,T}$ is a statistical parameter that is the sound pressure level with A frequency weighting and Slow time weighting that is exceeded for 90% of the measurement time T.

Noise	Unwanted sound.
Octave bands and 1/3 octave bands	A range of frequencies whose upper frequency limit is twice that of its lower frequency limit. In acoustics, the audible spectrum (20Hz to 20kHz) is divided into 10 parts (octaves) with centre frequencies of 31.5Hz, 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz, 4kHz, 8kHz and 16kHz. For more detailed frequency analysis, octave bands are further divided into more discrete bands. For examples, 1/3 octaves bands are is where each octave band is divided into three parts. IEC 61260:1995, *Electroacoustics — Octave-band and fractional-octave band filters*
Slow time-weighting	The Slow ("S") time weighting is defined in AS 1259.1-1990. Instruments set to "S" time weighting use a time constant of 1000 milliseconds in their exponential averaging circuit. Sound levels must be measured with Slow time weighting as per the *Environmental Protection (Noise) Regulations 1997*.
Sound power	The sound energy radiated per unit time by a sound source in all directions, measured in Watts (W).
Sound Power Level, L_w (SWL)	The sound power level in decibels (dB) is 10 times the base 10 logarithm of the ratio of the sound power in W to the reference sound power of 1×10^{-12} W (hearing threshold).
Sound pressure	The difference between the pressure caused by a sound wave and the ambient pressure of the medium the sound wave is passing through. Measured in Pascals (Pa).
Sound Pressure Level, L_p (SPL)	The sound power level in decibels (dB) is 20 times the base 10 logarithm of the ratio of the sound pressure in Pa to the reference sound pressure of 2×10^{-5} Pa (hearing threshold).
Tonal noise, tonality and tonality adjustment	Tonal noise is characterised by one or more distinct frequency components ("tones") that emerge audibly from the total sound. Tonal noise is generally far more annoying than non-tonal noise. Presence of tonal sound ("tonality") can be identified by analysing the sound levels in adjacent 1/3 octave bands. According to the *Environmental Protection (Noise) Regulations 1997*, tonality is present if the A-weighted sound pressure level in any 1/3 octave band exceeds the arithmetic average of the A-weighted sound pressure levels in the two adjacent 1/3 octave bands by greater than 3dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.
Weighted Sound Reduction Index (R_w)	A single-number quantity which characterises the airborne sound insulation of a material or building element over a range of frequencies.

1. Introduction

ATP Consulting Engineers (ATP) was engaged to carry out noise impact assessment in support of an Extractive Industries Licence application for the proposed quarrying operations (Phase 1) at Lot 503 Flynn Drive in Neerabup.

This report presents the results of the operational noise impact assessment considering the potential noise impact from the proposed quarrying operations on the surrounding land uses in accordance with *Environmental Protection (Noise) Regulations 1997*.

1.1 Study objectives

Study objectives are as follows:

- Site-specific noise measurements using an automated noise logger to obtain data on the existing background noise levels.
- Noise propagation modelling, considering typical noise emissions associated with operation of the proposed limestone crushing operations, to determine the potential noise impact on the nearest noise sensitive places.
- Assessment of the noise levels against the relevant noise criteria from the *WA Environmental Protection (Noise) Regulations 1997*.
- Recommendation of noise mitigation measures to prevent noise impacts on the nearest noise sensitive places.

1.2 Subject site

The subject site is located at Flynn Drive in Neerabup on the land described as Lot 503 on DP409677 within the City of Wanneroo local government area.

The proposed works under Phase 1 include clearing and quarrying works at a portion of Lot 503 comprising 93.4 hectares of land. The proposed works include sand and limestone extraction over a 20 to 30 year period. This activity will commence around the southern section of the lot, moving north over time. As works progress, each section of the site will be prepared to the final surface levels to comply with the Neerabup Industrial Area Structure Plan No. 17. The land will be progressively developed into an industrial subdivision. This progression of development is already occurring at the adjoining Lot 9005.

The proposed hours of operation are 6:30am to 5:00pm Monday to Saturday. There are no proposed operations on Sundays or public holidays.

The location of the site is presented in Figure 1.1.

The plans of the Phase 1 development area are presented in Appendix A.

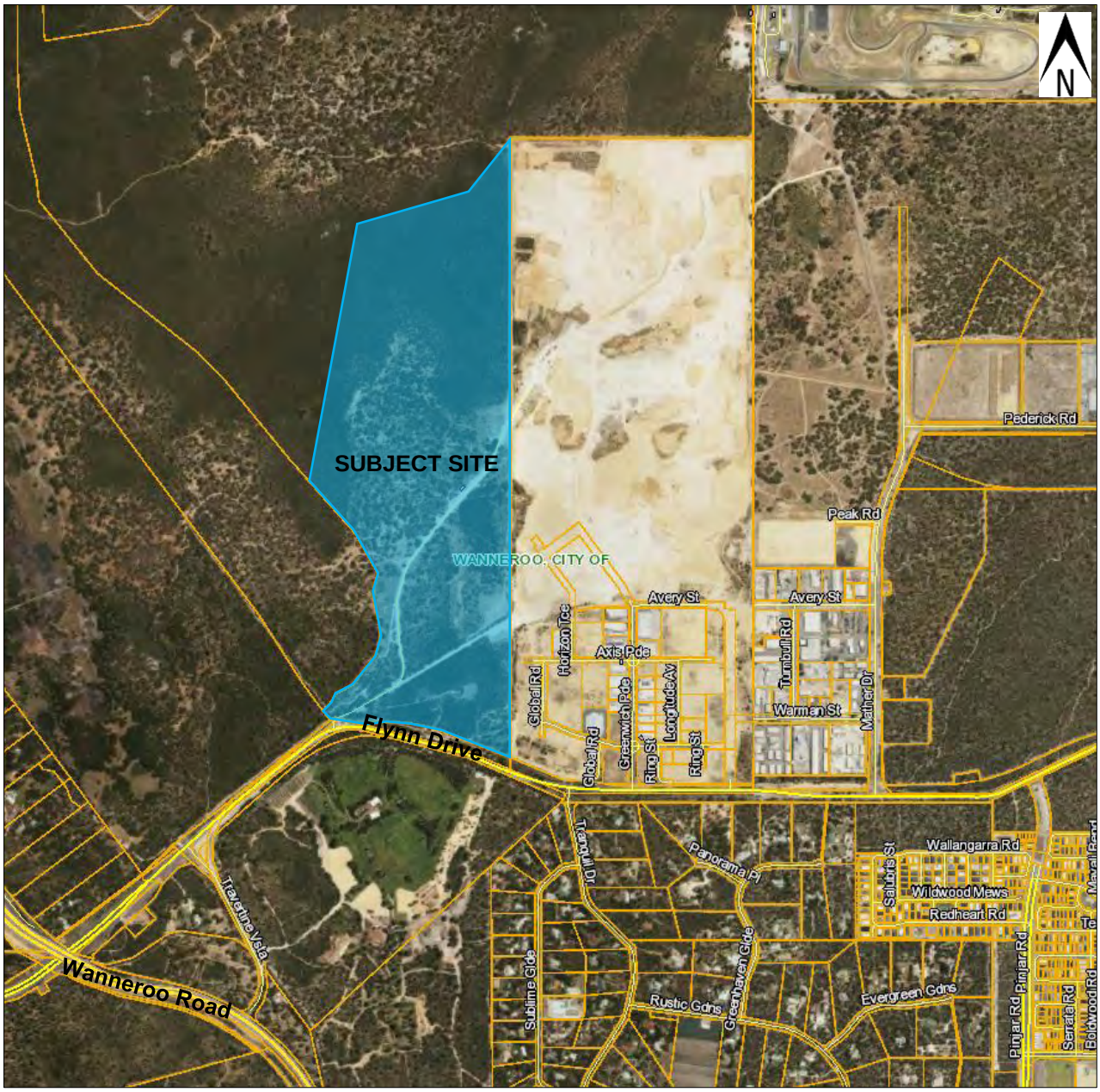


Figure 1.1 Site location

1.3 Proposed works

The processes to be carried out at the Phase 1 area of Lot 503 Flynn Drive are summarised below:

Resource preparation

- Clearing and grubbing.
- Topsoil is pushed to the side and saved for later use in rehabilitation. Material unsuitable for processing (overburden) is pushed into perimeter bunds. The bunds assist in dust and noise mitigation.
- Limestone is ripped and pushed into stockpiles / dumps with a bulldozer.

Limestone processing

The site contains limestone suited to rubble, road base and armour rock.

- Front loader takes resource from dump to crusher.
- Limestone is crushed and then screened to obtain correct product size.
- Material is stockpiled via a conveyor belt.
- Front loader moves stockpile to another stockpile.
- Product is loaded from stockpiles to road trucks.

The site may contain high quality limestone deposits suitable for natural limestone blocks, or limestone suitable for reconstituted limestone blocks.

- Natural limestone blocks are cut using a stone cutting saw.
- Reconstituted blocks are made by mixing crushed limestone with cement and water and moulding the mixture into blocks.

Sand processing and recovery

- Sand is recovered by screening sand and limestone.

Land restoration and rehabilitation

- Completed excavation floor is deep ripped in two directions.
- Floor and batters to Neerabup Industrial Area Final Surface Contour Plan. Backfilled and compacted as needed.

2. Existing Noise Amenity

2.1 Noise measurements

The following noise measurements have been carried out:

- Background noise monitoring at the subject site over 7 days using an automated noise logger, to obtain information about the existing background noise levels during day, evening and night time.
- Attended noise measurements at an existing limestone quarry in Nowergup operated by WA Limestone, to obtain information about the noise emissions of typical limestone quarrying operations.

The noise measurement methodology is summarised in Table 2.1.

Table 2.1 Noise measurements

Relevant legislation, standards and guidelines	The noise measurements were carried out in accordance with: • Australian Standard AS 1055-1997 (*Acoustics – Description and measurement of environmental noise*).
Measurement locations	**Background noise monitoring** The noise monitoring location at the subject site is presented in Figure 2.1 and in Appendix B. **Attended noise measurements** Noise measurements were carried out at various locations at an existing quarry at Lot 501 on DP71509, No. 311 Wattle Avenue in Nowergup, as presented in Figure 2.2 and in Appendix B.
Measurement period	**Background noise monitoring** The background noise monitoring was carried out 24 hours a day from 19 to 30 June 2019. **Attended noise measurements** The attended noise measurements were carried out on 18 June 2019.
Measurement equipment	The following noise measurement equipment was used during the unattended measurements: • Noise logger – ARL Ngara Environmental Noise Logger (serial no. 8780D4); • Sound level meter – SVANTEK 977 (serial no. 45785); and • Calibration – SVANTEK SV-33A Sound Level Calibrator (serial no. 73360). The noise measurement instruments conform to Australian Standard ASIEC61672.1-2004. Calibration was performed during set up and download of the data from the instruments. The calibration drift was <0.1 dB(A).
Meteorological conditions	Some rainfall has occurred during the background noise monitoring period. Noise data affected by rainfall has been excluded from the results. The meteorological data for the noise measurement period is presented in Appendix C. Daily weather observation data was sourced from the Bureau of Meteorology for Pearce RAAF and Perth Airport weather stations (station IDs 009053 and 009021).

Analysis of data	**Background noise monitoring** The background noise monitoring data was analysed to determine the following noise descriptor: • $L_{A90,T}$: Background noise level during day time, evening and night time. **Attended noise measurements** The attended noise measurements of existing quarrying operations were analysed to determine the following noise descriptors: • $L_{Aeq,T}$, $L_{A10,T}$, $L_{A1,T}$, $L_{Amax,T\ (Slow)}$.

Figure 2.1 Background noise monitoring location

Figure 2.2 Attended noise measurements at quarry in Nowergup

2.2 Noise measurement results

2.2.1 Background noise monitoring

The results of the background noise monitoring, expressed in terms of the L_{A90} background noise descriptor, are presented in Table 2.2 and in Appendix D.

Table 2.2 Background noise monitoring results

Date	Background noise levels, dB(A)		
	$L_{A90,T}$ Day	$L_{A90,T}$ Evening	$L_{A90,T}$ Night
19 June 2019 (Wed)	—	35	35
20 June 2019 (Thu)	48	38	37
21 June 2019 (Fri)	46	32	31
22 June 2019 (Sat)	46	45	36
23 June 2019 (Sun)*	43	43	36
24 June 2019 (Mon)	45	30	29
25 June 2019 (Tue)	45	33	32
26 June 2019 (Wed)	48	40	43
27 June 2019 (Thu)*	51	41	37
28 June 2019 (Fri)*	46	35	31
29 June 2019 (Sat)	42	34	31
30 June 2019 (Sun)	41	34	34
Average	**45**	**36**	**34**

**Rainfall recorded on this day.*

2.2.2 Attended noise measurements

The results of the attended noise measurements are presented in Table 2.3.

Table 2.3 Attended noise measurements

Description	Distance from noise source, m	Sound pressure level dB(A), Slow weighting			
		$L_{ASmax,T}$	$L_{Aeq,T}$	$L_{A1,T}$	$L_{A10,T}$
Crusher	3	90.7	87.1	93.4	89.1
	5	86.4	84.2	88.3	85.8
	10	82.7	80.5	83.9	81.8
Generator	3	85.0	84.6	85.9	85.1
Conveyor	5	85.4	83.7	86.3	85.0
Front loader loading truck	30	78.6	75.9	79.2	77.6
Bulldozer ripping	10	85.7	79.9	87.2	83.4
Top of quarry	Approx. 90m from crusher	74.5	71.9	77.8	74.2

3. Operational Noise Impact Assessment

3.1 Noise receptors

The *Environmental Protection (Noise) Regulations 1997* specifies Assigned Noise Levels which must be met at different types of receptors. The Assigned Noise Levels at “noise sensitive premises” are the lowest, with higher levels permitted at commercial and industrial premises.

“Noise sensitive premises” is defined in Schedule 1 Part C of the Noise Regulations and includes premises used for residential or accommodation purposes, rural premises, education facilities, child care centres and other uses.

3.1.1 Current receptors

During initial operations, the nearest noise sensitive places will be the existing house at No. 569 Flynn Drive which is located approximately 100m south of the subject site, as well as the rural residential properties along Sublime Glade and Tranquil Drive which are located approximately 300m to the south-east. The nearest residences to the south-west, along Wanneroo Road, are located approximately 1250m from the subject site.

The nearest non- noise sensitive premises are the industrial premises located within the Meridian park industrial estate to the east of the subject site. There are also currently two sheds located at the centre of No. 569 Flynn Drive, a redeveloped former quarry site.

The nearest current receptors are identified in Figure 3.1, overlaid on the zoning map from the City of Wanneroo District Planning Scheme 2.

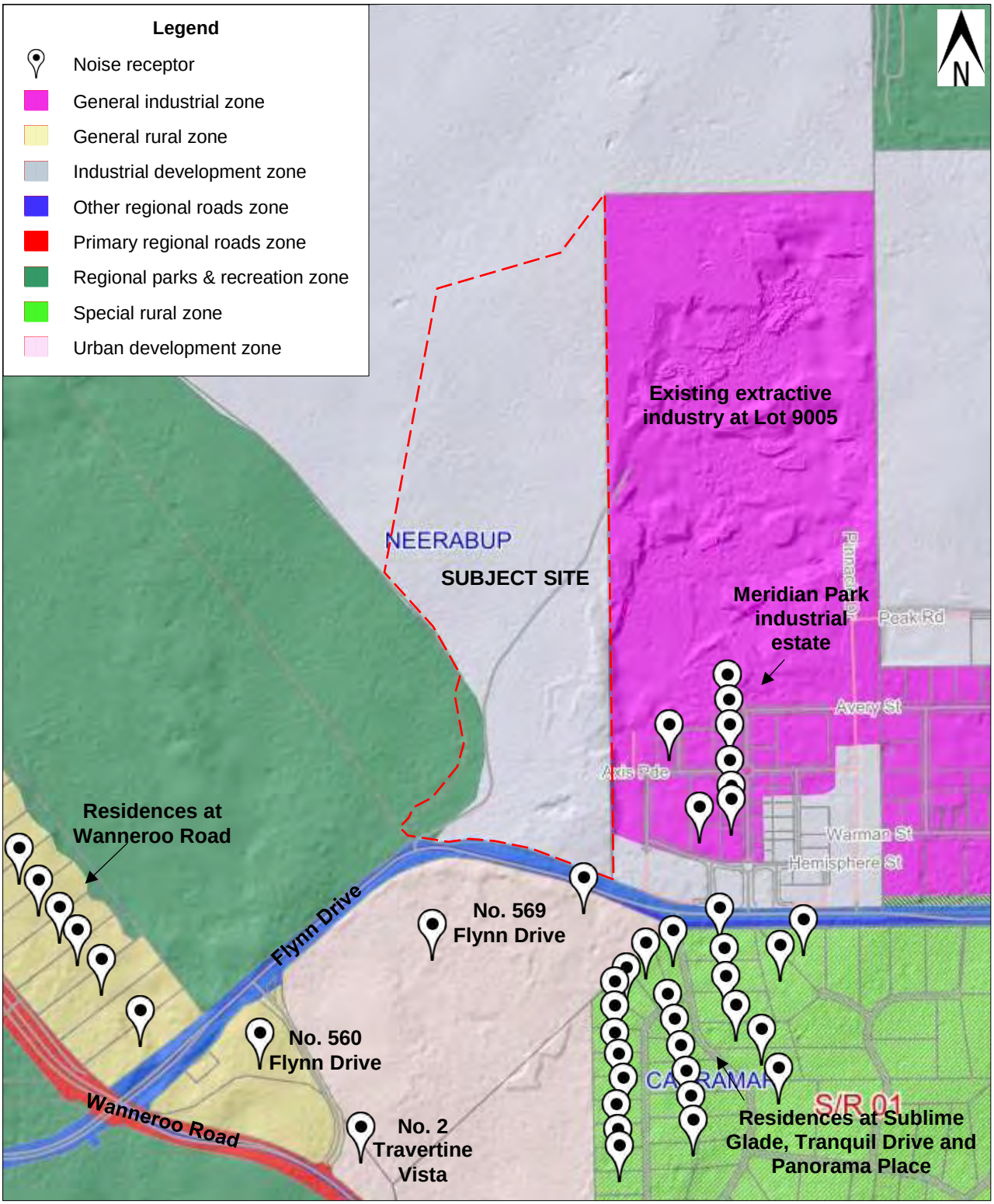


Figure 3.1 Current receptors

3.1.2 Future receptors

Industrial premises will continue to be established within the Meridian Park industrial estate to the east. However, the extractive industry at the northern part of Lot 9005 is expected to continue for several years.

The land to the south of the subject site is subject of future residential development in accordance with Amendment No. 2 to Lots 1 & 2 Flynn Drive, Carramar - Agreed Structure Plan No. 61 (WAPC reference: WANN/2015/61-02). The proposed subdivision concept is presented in Figure 3.2.

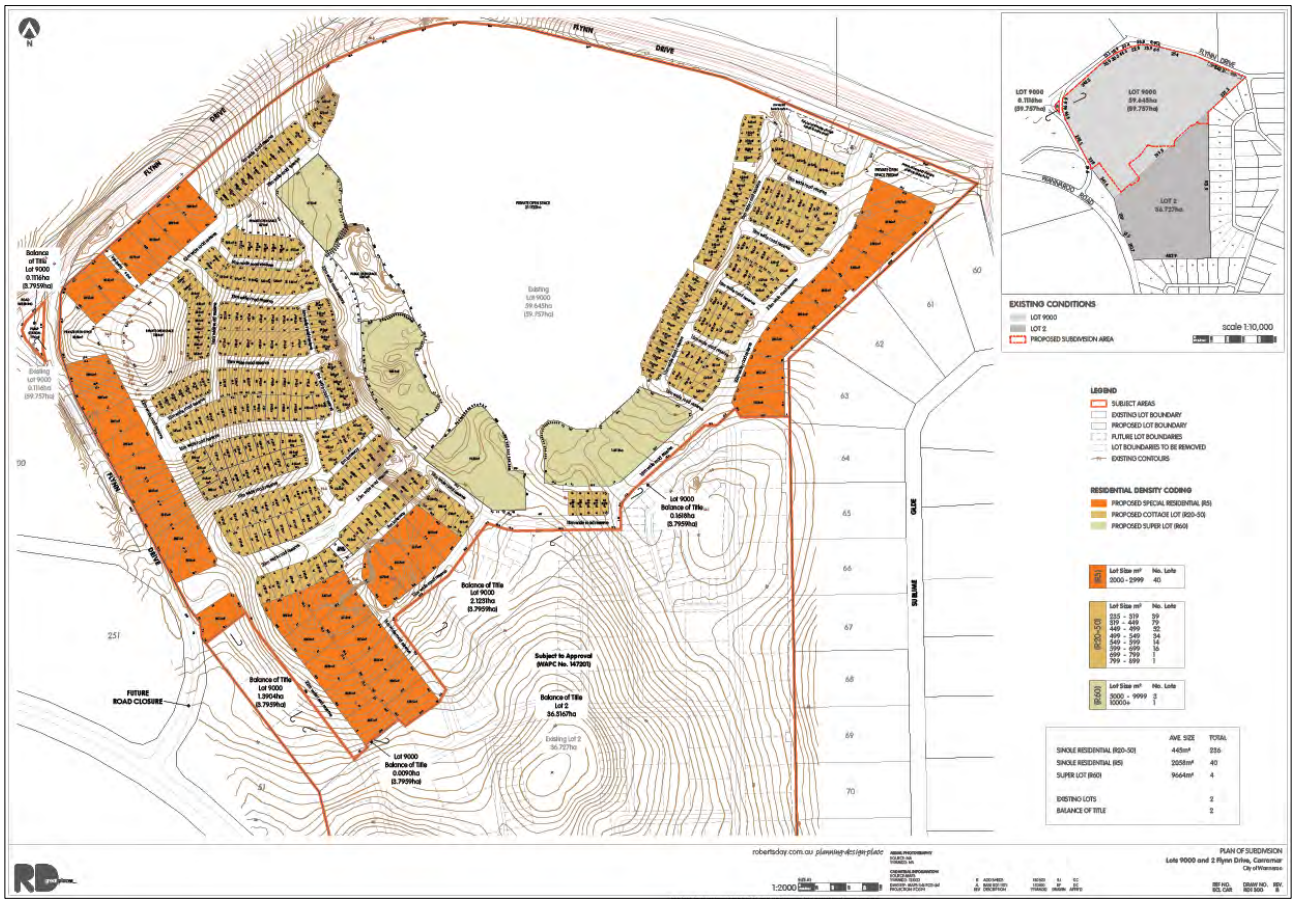


Figure 3.2 Proposed subdivision concept – Lots 1 & 2 Flynn Drive

The proposed quarrying operations at Lot 503 Flynn Drive will commence at the southern part of the site and then progress north. As such, the distance to the noise sensitive places will increase as works progress north.

List of current and future noise receptors considered in this assessment, along with the influencing factors (refer to Section 3.2.2 of this report), are listed in Table 3.1.

Table 3.1 List of noise receptors

Noise receptor	Type of premises	Influencing factor
2 Travertine Vista	Noise sensitive	2
7 Panorama Place	Noise sensitive	0
18 Panorama Place	Noise sensitive	2
19 Panorama Place	Noise sensitive	1
20 Greenwich Parade	Industrial other than Kwinana	n/a
22 Greenwich Parade	Industrial other than Kwinana	n/a
24 Greenwich Parade	Industrial other than Kwinana	n/a
26 Greenwich Parade	Industrial other than Kwinana	n/a
29 Greenwich Parade	Industrial other than Kwinana	n/a
30 Greenwich Parade	Industrial other than Kwinana	n/a
33 Greenwich Parade	Industrial other than Kwinana	n/a
34 Greenwich Parade	Industrial other than Kwinana	n/a
36 Hemisphere Street	Industrial other than Kwinana	n/a
37 Greenwich Parade	Industrial other than Kwinana	n/a
39 Greenwich Parade	Industrial other than Kwinana	n/a
42 Axis Parade	Industrial other than Kwinana	n/a
44 Greenwich Parade	Industrial other than Kwinana	n/a
47 Greenwich Parade	Industrial other than Kwinana	n/a
48 Greenwich Parade	Industrial other than Kwinana	n/a
51 Greenwich Parade	Industrial other than Kwinana	n/a
53 Sublime Glade	Noise sensitive	0
54 Sublime Glade	Noise sensitive	0
55 Greenwich Parade	Industrial other than Kwinana	n/a
59 Sublime Glade	Noise sensitive	0
62 Sublime Glade	Noise sensitive	0
65 Sublime Glade	Noise sensitive	0
73 Sublime Glade	Noise sensitive	0
79 Sublime Glade	Noise sensitive	0
83 Sublime Glade	Noise sensitive	1
89 Sublime Glade	Noise sensitive	2
95 Sublime Glade	Noise sensitive	2
151 Tranquil Drive	Noise sensitive	0
154 Tranquil Drive	Noise sensitive	0
161 Tranquil Drive	Noise sensitive	0
162 Tranquil Drive	Noise sensitive	0
171 Tranquil Drive	Noise sensitive	0
174 Tranquil Drive	Noise sensitive	0
181 Tranquil Drive	Noise sensitive	0
182 Tranquil Drive	Noise sensitive	0
194 Tranquil Drive	Noise sensitive	2

Noise receptor	Type of premises	Influencing factor
204 Tranquil Drive	Noise sensitive	3
560 Flynn Drive	Noise sensitive	2
569 Flynn Drive	Noise sensitive	4
569 Flynn Drive_Shed 1	Commercial	n/a
569 Flynn Drive_Shed 2	Commercial	n/a
1768 Wanneroo Drive	Noise sensitive	2
1792 Wanneroo Drive	Noise sensitive	2
1800 Wanneroo Drive	Noise sensitive	2
1814 Wanneroo Drive	Noise sensitive	2
1820 Wanneroo Drive	Noise sensitive	2
1830 Wanneroo Drive	Noise sensitive	2
1834 Wanneroo Drive	Noise sensitive	2
1864 Wanneroo Drive	Noise sensitive	2
1868 Wanneroo Drive	Noise sensitive	2
1880 Wanneroo Drive	Noise sensitive	2
1900 Wanneroo Drive	Noise sensitive	2
1910 Wanneroo Drive	Noise sensitive	2
1920 Wanneroo Drive	Noise sensitive	2
1954 Wanneroo Drive	Noise sensitive	2
1964 Wanneroo Drive	Noise sensitive	2
1974 Wanneroo Drive	Noise sensitive	2
Future residential_Lots 1 and 2 Flynn Dr	Noise sensitive	4
Future industrial_Meridian Park	Industrial other than Kwinana	n/a

3.2 Noise criteria

3.2.1 Environmental Protection (Noise) Regulations 1997

The environmental noise criteria was determined with consideration of the Table 1 (Assigned Noise Levels) from the *Environmental Protection (Noise) Regulations 1997.* The assigned noise levels takes into consideration the level of development at the investigated site and the existing environmental noise sources.

The assigned noise levels are presented in Table 3.2.

Table 3.2 Assigned noise levels

Type of premises receiving noise	Time of day	Assigned level, dB		
		L_{A10}	L_{A01}	L_{Amax}
Noise sensitive premises: highly sensitive area	Day 0700 hours to 1900 hours Monday to Saturday	45 + influencing factor	55 + influencing factor	65 + influencing factor
	Day 0900 hours to 1900 hours Sunday and public holidays	40 + influencing factor	50 + influencing factor	65 + influencing factor
	Evening 1900 hours to 2200 hours All days	40 + influencing factor	50 + influencing factor	55 + influencing factor
	Night 2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public holidays	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises other than those in the Kwinana Industrial Area	All hours	65	80	90

3.2.2 Influencing factor

The Influencing factor for the nearest noise sensitive premises was calculated in accordance with Schedule 3 of the *Environmental Protection (Noise) Regulations 1997*.

The various factors considered in determination of the influencing factor are presented in Table 3.3.

Table 3.3 Determination of influencing factor

Noise sensitive premises	Inner Circle – 100m		Outer Circle – 450m		Transport factor, dB	Influencing factor, dB
	% Area Type A	% Area Type B	% Area Type A	% Area Type B		
Noise sensitive premises along Flynn Drive	1	0	38	0	0	4
Noise sensitive premises set back >450m from industrial area	0	0	0	0	0	0
Noise sensitive premises along Wanneroo Drive	0	0	0	0	2	2

3.3 Noise propagation modelling

3.3.1 Modelling methodology

A 3D model of the site and surroundings was developed using SoundPLAN noise propagation software considering the proposed quarrying operations and progression of works over the planned 20 to 30 year period.

The calculations were carried out as per the procedures specified in the International Standard ISO9613 (*Acoustics – Attenuation of sound during propagation outdoors*).

The calculation method for a single frequency is as follows:

$$L_S = [\ L_W + K_0\ ] - [\ A_{dI} + A_{div} + A_{gr} + A_{bar} + A_{atm} + d_{Lrefl} + d_{Lw}\ ]$$

Where:

L_S	Sound pressure for a single frequency
L_W	Sound power of source
K_0	Correction for propagation in limited spacial angle
A_{DI}	Mean directivity correction
A_{div}	Mean attenuation due to geometrical spreading
A_{gr}	Mean attenuation due to ground effect
A_{bar}	Mean attenuation due to screening
A_{atm}	Mean attenuation due to air absorption
d_{Lrefl}	Level increase due to reflections
d_{Lw}	Correction due to source operation time

The noise propagation losses are calculated as a combination of distance attenuation (geometrical spreading), screening, ground attenuation and other factors.

The results of noise modelling as per ISO9613 are in terms of L_{Aeq}. A conversion factor was applied to L_{eq} to obtain results in terms of the assessment criteria L_{A10}, L_{A01} and L_{ASmax} used in the *Environmental Protection (Noise) Regulations 1997*. The conversion factors were derived from the noise measurements of existing quarry operations at Nowergup as presented in Table 2.3 of this report, with some upwards adjustment as a factor of safety. The conversion factors are presented in Table 3.4.

Table 3.4 Noise descriptor conversion factors

Type of noise	Conversion factors		
	L_{Aeq} to L_{A10}	**L_{Aeq} to L_{A01}**	**L_{Aeq} to L_{ASmax}**
Limestone extraction and crushing	$L_{10} = L_{eq} + 3$ dB	$L_{01} = L_{eq} + 10$ dB	$L_{max} = L_{eq} + 15$ dB

The parameters and assumptions considered in the 3D noise propagation model are described in Table 3.5.

Table 3.5 Data and assumptions – Operational noise model

Modelling scenarios	• The layout of the proposed works is presented in Appendix A. • Short term clearing: One modelling scenario was considered to account for initial clearing with bulldozer at the surface of Stage 1 (Year 1-5 work area). • Long term quarrying / extraction activities: Six modelling scenarios were considered to account for the different locations of the proposed works over the planned 25-30 year timeline. The extraction areas were modelled at the locations indicated in Appendix A, moving from south to north as indicated. These modelling scenarios consider combined noise from all activities. The six modelling scenarios are as follows: o Year 1-5 o Year 6-10 o Year 11-15 o Year 16-20 o Year 21-25 o Year 26-30
Terrain	• Natural surface levels were sourced from Geoscience Australia – Digital Elevation Model (DEM) of Australia derived from LiDAR 5 Metre Grid. **Subject site** • 3m high mound of overburden material is considered along the southern boundary of Lot 503 during Year 1-5 quarrying operations. • It is anticipated that the deepest excavation will be a maximum of 10-20 metres below natural ground level. Three modelling scenarios were considered to account for different excavation depths: o 3m below natural ground level; o 10m below natural ground level; and o 20m below natural ground level.
Noise sources	• The plant and equipment will be similar to that used at the existing quarries operated by WA Limestone at No. 311 Wattle Avenue in Nowergup and Lot 9005 Flynn Drive in Neerabup. • Refer to Section 3.3.2 of this report for the sound power levels considered in the SoundPLAN model. • Noise sources are located at 1.5m above ground level.

<table>
<tr><td>Receivers</td><td>

Receivers were attached to the facades of the nearest buildings at a height of 1.5m above each floor level.
SoundPLAN adds +2.5dB(A) to the calculated noise levels when the receivers are attached to the buildings, thus the tabulated traffic noise levels are façade adjusted.
50-100m grid spacing was used for calculation of noise contour maps.

</td></tr>
<tr><td>Noise mitigation measures</td><td>

The following noise mitigation measures have been considered:

3m high earth mound is considered along the southern boundary of Lot 503 during Year 1-5 quarrying operations; and
Plant and equipment located within the extraction pits, with depth varying from 3m to 20m below natural ground level.

The recommended noise control measures are discussed in Section 4 of this report.

</td></tr>
<tr><td>Distance attenuation</td><td>

3D model of the subject site and surroundings was developed using cadastral and survey data using SoundPLAN software. The source-receiver distances and geometrical spreading are automatically calculated in SoundPLAN to a high level of accuracy in accordance with the ISO9613 procedure.

</td></tr>
<tr><td>Barrier attenuation / screening</td><td>

Screening by topography and buildings has been considered in the model. The screening has been calculated in SoundPLAN in accordance with the ISO9613 procedure.

</td></tr>
<tr><td>Ground attenuation</td><td>

Sound reflecting surfaces such as pavement are modelled with ground absorption coefficient of 0 (no absorption). Grassed and vegetated areas are modelled with ground absorption coefficient of 1 (100% absorption) in accordance with ISO9613.

</td></tr>
<tr><td>Volume attenuation (Vegetation)</td><td>

Sound attenuation by areas of bushland has been considered in this assessment. The attenuation by vegetation has been calculated in SoundPLAN in accordance with the ISO9613 procedure. The sound attenuation for propagation distance d_f through foliage is presented below:
<table>
<tr><th>Propagation distance d_f, m</th><th>63 Hz</th><th>125 Hz</th><th>250 Hz</th><th>500 Hz</th><th>1000 Hz</th><th>2000 Hz</th><th>4000 Hz</th><th>8000 Hz</th></tr>
<tr><td>Attenuation, dB where $10 \le d_f \le 20$</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Attenuation, dB/m where $20 \le d_f \le 200$</td><td>0.02</td><td>0.03</td><td>0.04</td><td>0.05</td><td>0.06</td><td>0.08</td><td>0.09</td><td>0.12</td></tr>
</table>

</td></tr>
</table>

3.3.2 Noise sources

The sound power levels, tonality/impulsiveness adjustment factors, and the operational scenarios for all noise sources considered in the model are presented in Table 3.6.

Table 3.6 Details of operational noise levels

Operational noise source	Sound power level dB(A) (re 10^{-12}W)	Operational scenario[1]	Tonality/ impulsiveness
Mobile crushing and screening plant	108.5	6:30am to 5:00pm, continuous operation At any time up to two or more mobile crushers and screeners will be operating on site	+ 5 dB
Diesel genset	97.2	6:30am to 5:00pm, continuous operation	+ 5 dB
Conveyor	100.7	6:30am to 5:00pm, continuous operation	+ 5 dB
Bulldozer (D11 or equivalent)	108.0	6:30am to 5:00pm, continuous operation	+ 5 dB
Loader (Caterpillar 980 rubber tyred loader or equivalent)	104.2	6:30am to 5:00pm, continuous operation	+ 5 dB
Excavator	106.5	6:30am to 5:00pm, continuous operation	+ 5 dB
Bobcat	94.8	6:30am to 5:00pm, continuous operation	+ 5 dB
Mobile fuel tankers	97.2	6:30am to 5:00pm, operating for 1 hour per day	n/a
Product trucks.	107.2 Access road – 60.7 per metre	6:30am to 5:00pm. Based on average rates of excavation and annual sales approximately 10 laden trucks will leave the site every hour.	+ 5 dB
Water truck	107.2	6:30am to 5:00pm Daily, when conditions warrant the use of water, the water truck is anticipated to make 5 -6 rounds of the pit in dry conditions.	n/a
Stone cutting saw	107.2	6:30am to 5:00pm, continuous operation	+ 5 dB

[1] Conservative estimates considered in model based on ATP Consulting's extensive experience with similar scenarios.

The sound power levels in octave bands are presented in Table 3.7.

Table 3.7 Sound power levels (dB) in octave bands

Operational noise source	Sound power level dB in octave bands								Total, dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
Mobile crushing and screening plant	114.8	109.9	109.5	105.0	103.3	100.5	94.9	87.9	108.5
Diesel genset	99.9	98.3	94.3	91.9	92.3	91.3	85.0	77.3	97.2
Conveyor	103.0	99.0	103.2	100.7	92.4	88.8	83.1	75.7	100.7
Bulldozer (D11 or equivalent)	109.9	103.8	106.1	104.2	102.9	101.5	95.4	90.5	108.0
Loader (Caterpillar 980 rubber tyred loader or equivalent)	114.0	110.0	105.0	102.0	98.0	94.0	90.0	83.0	104.2
Excavator	108.0	107.0	104.0	105.0	101.0	98.0	94.0	87.0	106.5
Bobcat	96.0	95.0	91.0	90.0	90.0	89.0	82.0	75.0	94.8
Mobile fuel tankers	106.0	102.0	93.0	91.0	93.0	90.0	86.0	78.0	97.2
Product trucks.	116.0	112.0	103.0	101.0	103.0	100.0	96.0	88.0	107.2
Water truck	110.0	106.0	97.0	95.0	97.0	94.0	90.0	82.0	101.2
Stone cutting saw	97.0	103.0	105.0	102.0	99.0	98.0	102.0	97.0	107.2

Extracts from the 3D noise propagation models developed in SoundPLAN are presented in Figures 3.3 to 3.9.

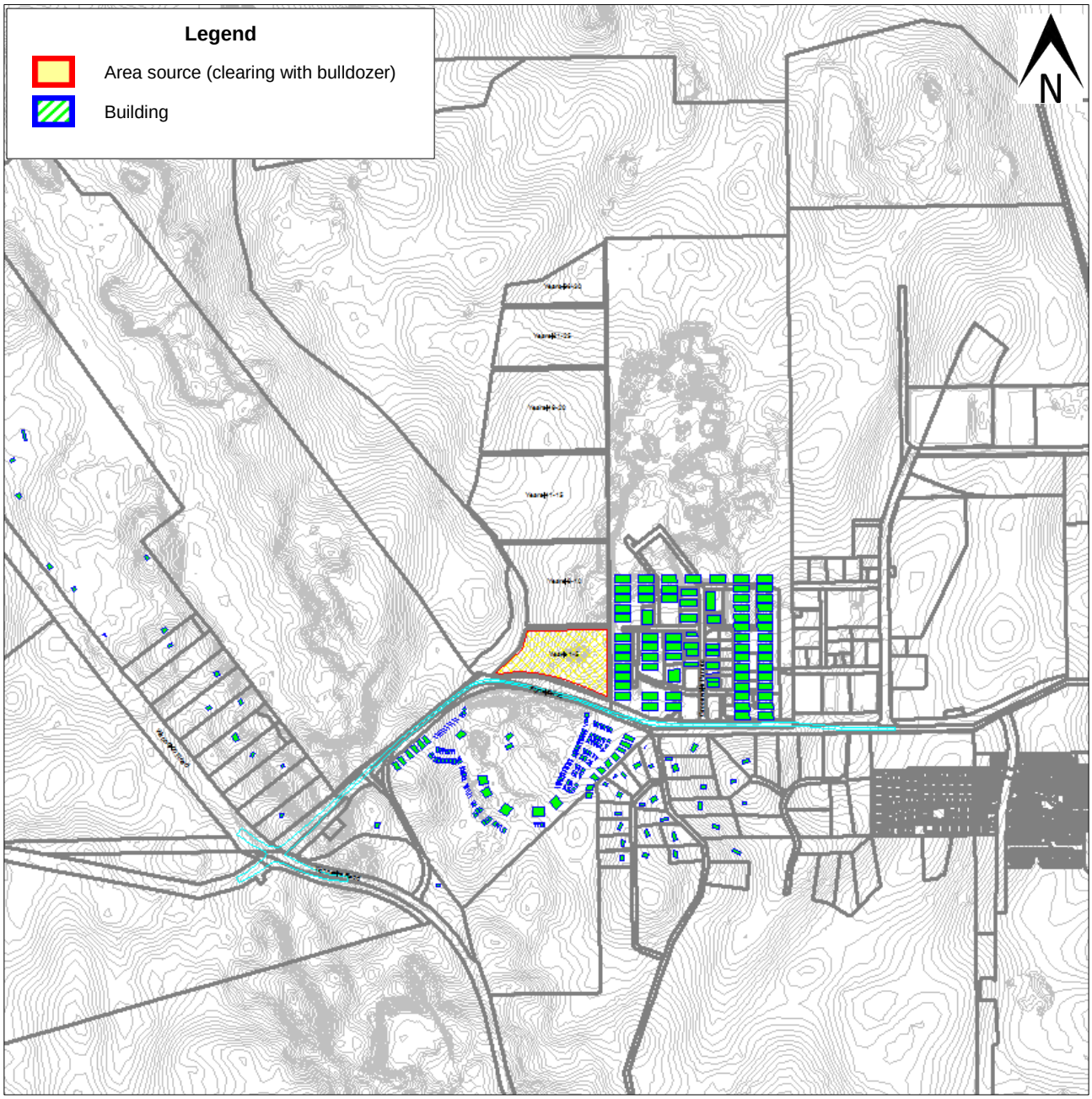


Figure 3.3 SoundPLAN operational noise model – Initial clearing at Stage 1

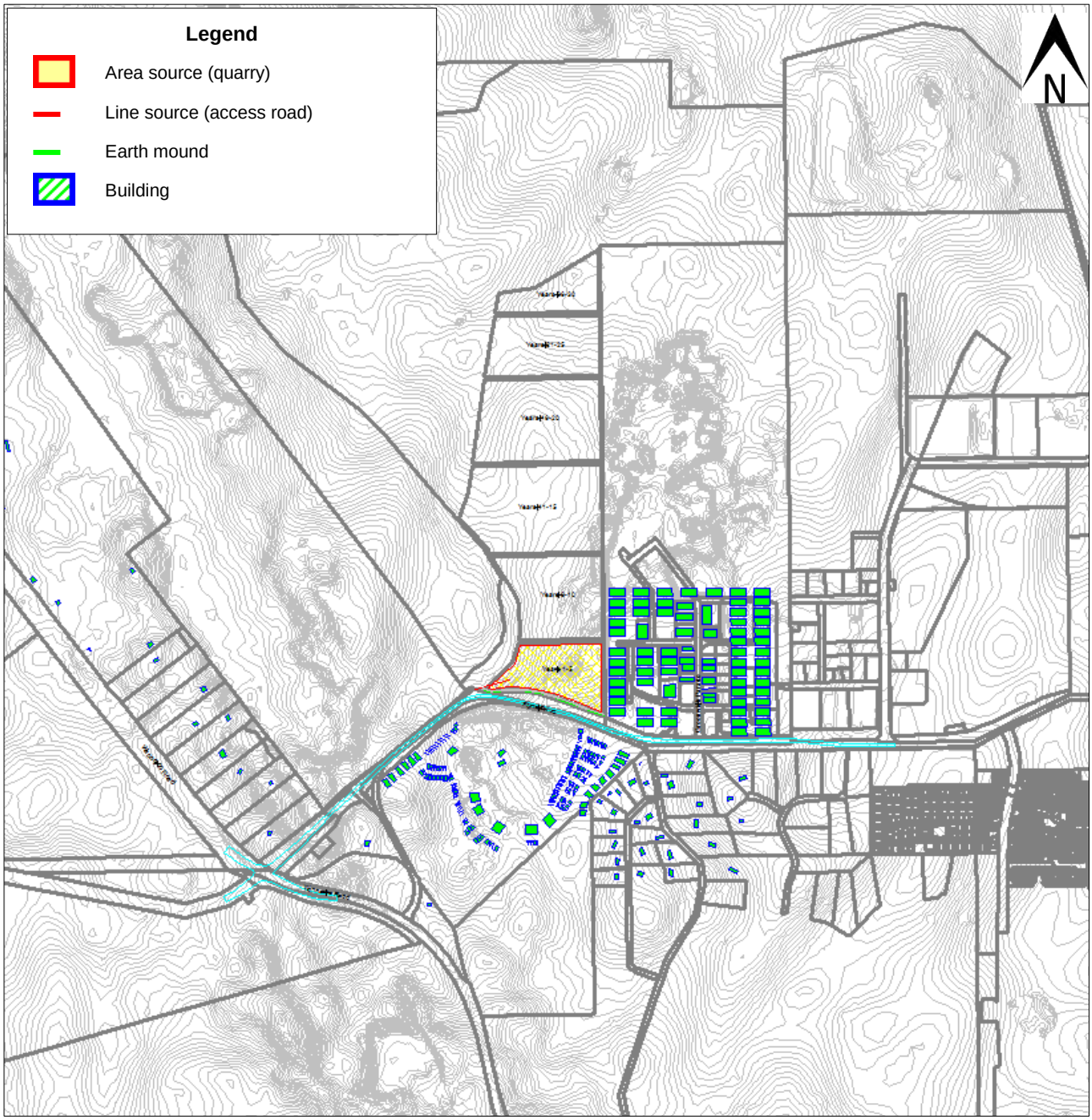


Figure 3.4 SoundPLAN operational noise model – Years 1-5

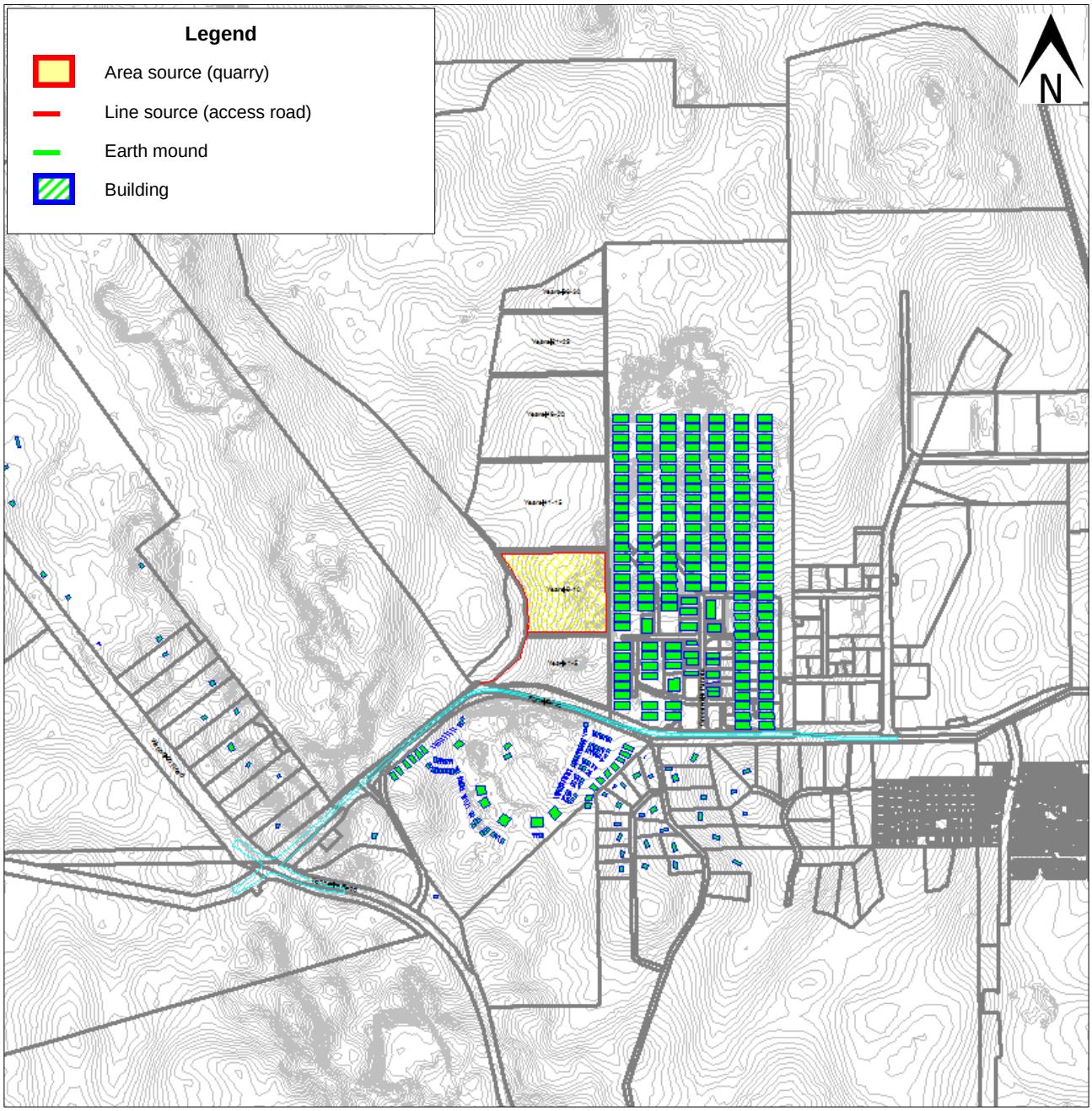


Figure 3.5 SoundPLAN operational noise model – Years 6-10

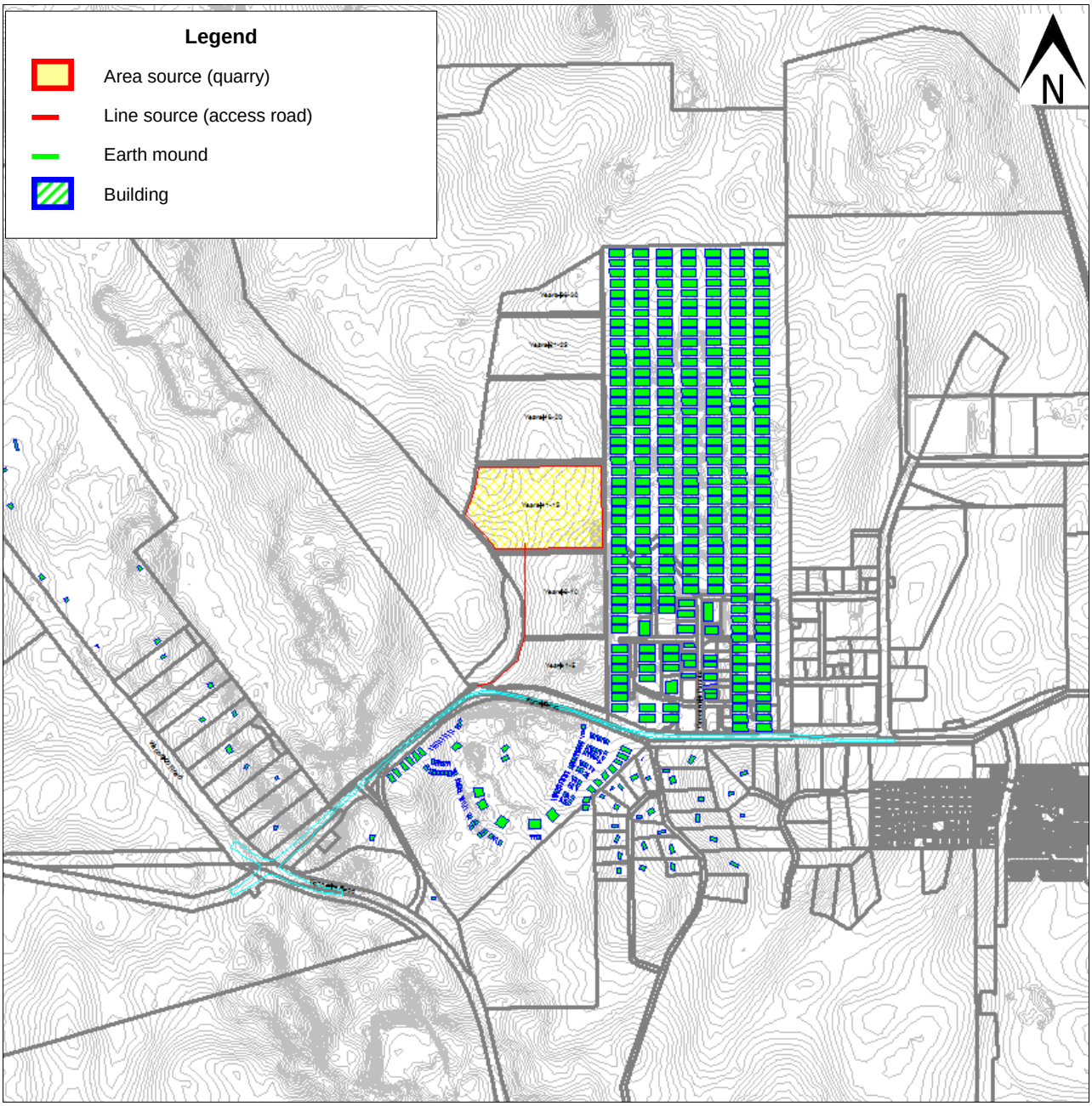


Figure 3.6 SoundPLAN operational noise model – Years 11-15

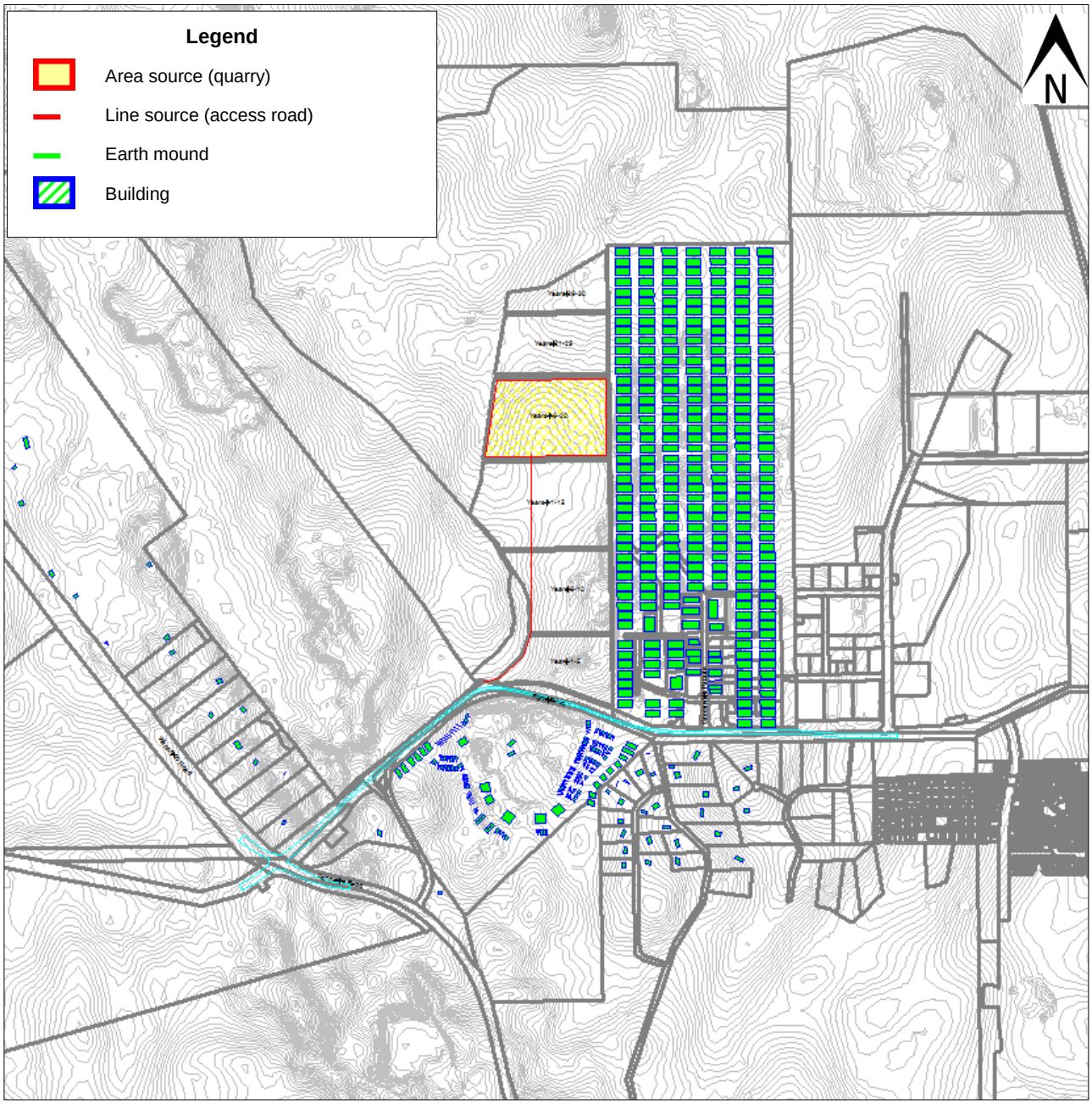


Figure 3.7 SoundPLAN operational noise model – Years 16-20

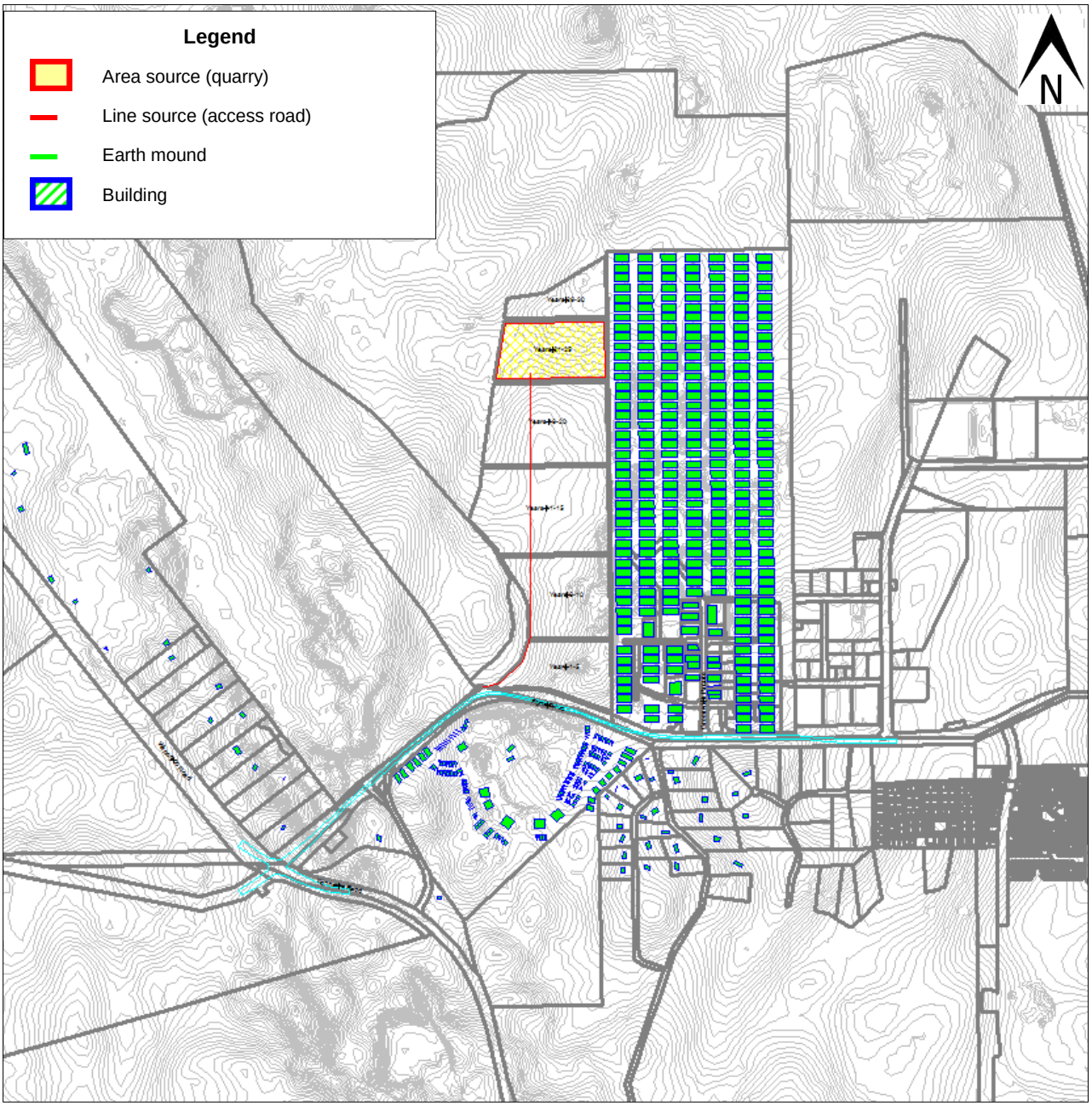


Figure 3.8 SoundPLAN operational noise model – Years 21-25

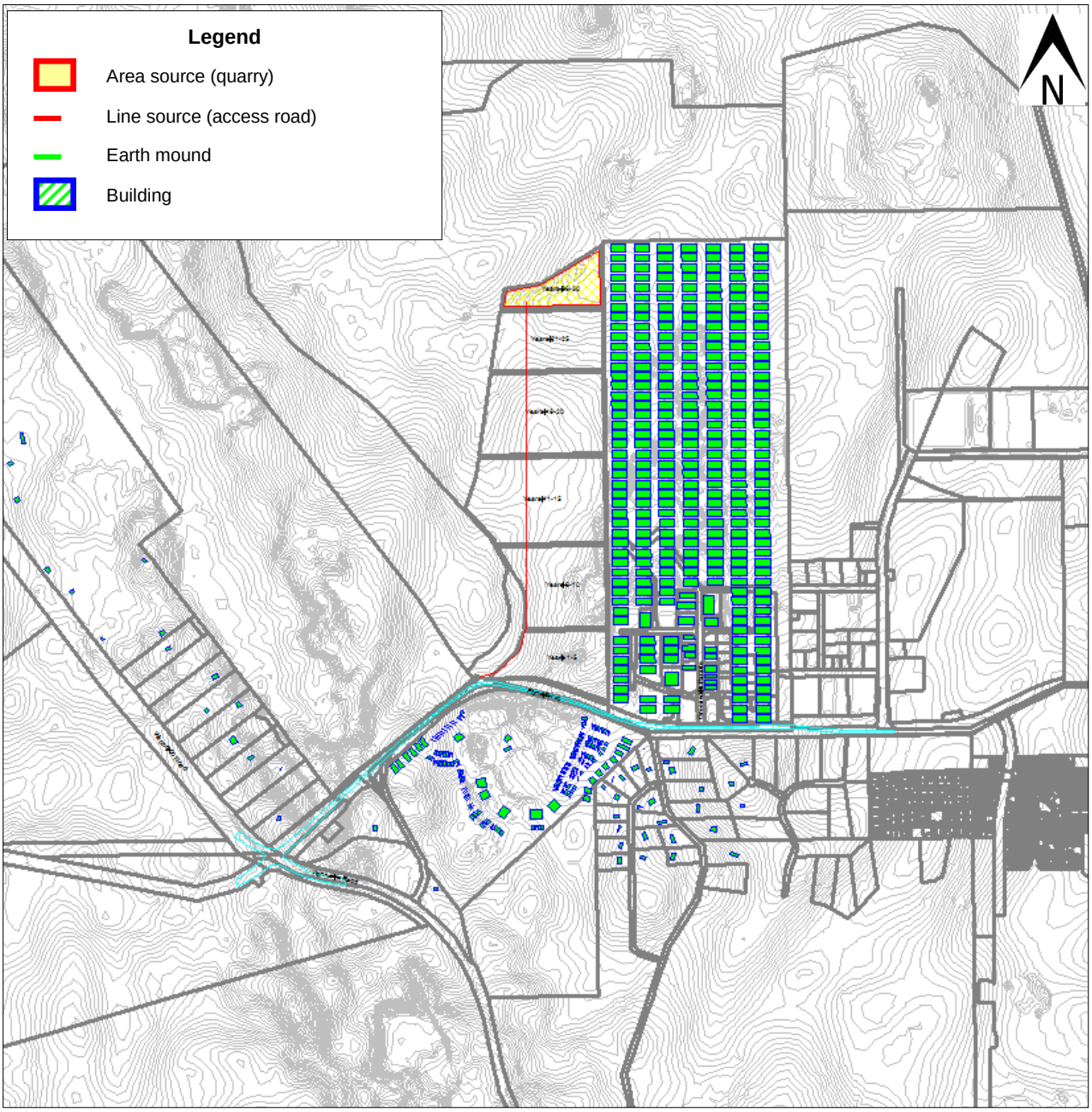


Figure 3.9 SoundPLAN operational noise model – Years 26-30

3.4 Operational Noise Calculation Results

The calculated noise levels at the nearest receptors for initial surface clearing with bulldozer at Stage 1 (Years 1-5 work area), sorted from highest to lowest noise levels, are presented in Table 3.8.

The calculated noise levels for long term quarrying activities with all noise sources operating, sorted from highest to lowest noise levels, are presented in Tables 3.9 to 3.14.

3.4.1 Initial clearing at Stage 1

Table 3.8 Operational noise levels – Initial clearing at Stage 1

Noise receptor	Type of premises	Influencing factor	Calculated noise levels, dB(A)			Compliance with noise criteria
			Clearing at surface			
			$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	
			D / E / N	D / E / N	D / E / N	
Future industrial_Meridian Park*	Industrial	n/a	54 / 0 / 42	61 / 0 / 49	66 / 0 / 54	Yes
Future residential_Lots 1 and 2 Flynn Dr**	Noise sensitive	4	45 / 0 / 33	52 / 0 / 40	57 / 0 / 45	Yes
569 Flynn Drive	Noise sensitive	4	44 / 0 / 32	51 / 0 / 39	56 / 0 / 44	Yes
36 Hemisphere Street	Industrial	n/a	40 / 0 / 28	47 / 0 / 35	52 / 0 / 40	Yes
29 Greenwich Parade	Industrial	n/a	39 / 0 / 28	46 / 0 / 35	51 / 0 / 40	Yes
42 Axis Parade	Industrial	n/a	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	Yes
47 Greenwich Parade	Industrial	n/a	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	Yes
51 Greenwich Parade	Industrial	n/a	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	Yes
55 Greenwich Parade	Industrial	n/a	37 / 0 / 26	44 / 0 / 33	49 / 0 / 38	Yes
33 Greenwich Parade	Industrial	n/a	37 / 0 / 26	44 / 0 / 33	49 / 0 / 38	Yes
39 Greenwich Parade	Industrial	n/a	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	Yes
24 Greenwich Parade	Industrial	n/a	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	Yes
44 Greenwich Parade	Industrial	n/a	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	Yes
204 Tranquil Drive	Noise sensitive	3	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	Yes
20 Greenwich Parade	Industrial	n/a	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	Yes
37 Greenwich Parade	Industrial	n/a	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	Yes
22 Greenwich Parade	Industrial	n/a	35 / 0 / 24	42 / 0 / 31	47 / 0 / 36	Yes
182 Tranquil Drive	Noise sensitive	0	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	Yes
30 Greenwich Parade	Industrial	n/a	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	Yes
194 Tranquil Drive	Noise sensitive	2	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	Yes
26 Greenwich Parade	Industrial	n/a	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	Yes
83 Sublime Glade	Noise sensitive	1	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	Yes
569 Flynn Drive_Shed 2	Commercial	n/a	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	Yes
18 Panorama Place	Noise sensitive	2	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
19 Panorama Place	Noise sensitive	1	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
89 Sublime Glade	Noise sensitive	2	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
174 Tranquil Drive	Noise sensitive	0	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
48 Greenwich Parade	Industrial	n/a	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
73 Sublime Glade	Noise sensitive	0	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
34 Greenwich Parade	Industrial	n/a	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
53 Sublime Glade	Noise sensitive	0	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes
59 Sublime Glade	Noise sensitive	0	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes
79 Sublime Glade	Noise sensitive	0	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes

Noise receptor	Type of premises	Influencing factor	Calculated noise levels, dB(A)			Compliance with noise criteria
			Clearing at surface			
			$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	
			D / E / N	D / E / N	D / E / N	
569 Flynn Drive_Shed 1	Commercial	n/a	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes
54 Sublime Glade	Noise sensitive	0	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
62 Sublime Glade	Noise sensitive	0	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
65 Sublime Glade	Noise sensitive	0	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	Yes
95 Sublime Glade	Noise sensitive	2	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	Yes
560 Flynn Drive	Noise sensitive	2	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	Yes
7 Panorama Place	Noise sensitive	0	30 / 0 / 19	37 / 0 / 26	42 / 0 / 31	Yes
151 Tranquil Drive	Noise sensitive	0	30 / 0 / 19	37 / 0 / 26	42 / 0 / 31	Yes
181 Tranquil Drive	Noise sensitive	0	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
162 Tranquil Drive	Noise sensitive	0	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	Yes
154 Tranquil Drive	Noise sensitive	0	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
171 Tranquil Drive	Noise sensitive	0	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
161 Tranquil Drive	Noise sensitive	0	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
1768 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1800 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1814 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1820 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1830 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1834 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
2 Travertine Vista	Noise sensitive	2	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	Yes
1864 Wanneroo Drive	Noise sensitive	2	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1868 Wanneroo Drive	Noise sensitive	2	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	Yes
1900 Wanneroo Drive	Noise sensitive	2	23 / 0 / 11	30 / 0 / 18	35 / 0 / 23	Yes
1910 Wanneroo Drive	Noise sensitive	2	22 / 0 / 10	29 / 0 / 17	34 / 0 / 22	Yes
1880 Wanneroo Drive	Noise sensitive	2	22 / 0 / 10	29 / 0 / 17	34 / 0 / 22	Yes
1920 Wanneroo Drive	Noise sensitive	2	22 / 0 / 10	29 / 0 / 17	34 / 0 / 22	Yes
1954 Wanneroo Drive	Noise sensitive	2	21 / 0 / 9	28 / 0 / 16	33 / 0 / 21	Yes
1964 Wanneroo Drive	Noise sensitive	2	20 / 0 / 9	27 / 0 / 16	32 / 0 / 21	Yes
1974 Wanneroo Drive	Noise sensitive	2	20 / 0 / 8	27 / 0 / 15	32 / 0 / 20	Yes
1792 Wanneroo Drive	Noise sensitive	2	19 / 0 / 7	26 / 0 / 14	31 / 0 / 19	Yes

Note: *D: Day (7:00am to 7:00pm), E: Evening (7:00pm to 10:00pm), N: Night (10:00pm to 7:00am)*
** Highest noise levels for buildings located in the westernmost part of the Meridian Park industrial estate.*
***Highest noise levels for dwellings located in the northernmost part of the future residential development at Lots 1 and 2 Flynn Drive.*

3.4.2 Years 1-5

Table 3.9 Operational noise levels – Years 1-5

Noise receptor	Type of premises	Influencing factor	Calculated noise levels, dB(A)									Compliance with noise criteria
			Pit 3m deep			Pit 10m deep			Pit 20m deep			
			$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	
			D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	
Future industrial_Meridian Park*	Industrial	n/a	62 / 0 / 50	69 / 0 / 57	74 / 0 / 62	58 / 0 / 46	65 / 0 / 53	70 / 0 / 58	55 / 0 / 43	62 / 0 / 50	67 / 0 / 55	Yes
569 Flynn Drive	Noise sensitive	4	49 / 0 / 38	56 / 0 / 45	61 / 0 / 50	45 / 0 / 33	52 / 0 / 40	57 / 0 / 45	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	Yes
Future residential_Lots 1 and 2 Flynn Dr**	Noise sensitive	4	49 / 0 / 38	56 / 0 / 45	61 / 0 / 50	46 / 0 / 34	53 / 0 / 41	58 / 0 / 46	42 / 0 / 31	49 / 0 / 38	54 / 0 / 43	Yes
36 Hemisphere Street	Industrial	n/a	48 / 0 / 36	55 / 0 / 43	60 / 0 / 48	43 / 0 / 31	50 / 0 / 38	55 / 0 / 43	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	Yes
29 Greenwich Parade	Industrial	n/a	47 / 0 / 35	54 / 0 / 42	59 / 0 / 47	43 / 0 / 31	50 / 0 / 38	55 / 0 / 43	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	Yes
42 Axis Parade	Industrial	n/a	47 / 0 / 36	54 / 0 / 43	59 / 0 / 48	43 / 0 / 31	50 / 0 / 38	55 / 0 / 43	40 / 0 / 28	47 / 0 / 35	52 / 0 / 40	Yes
47 Greenwich Parade	Industrial	n/a	46 / 0 / 34	53 / 0 / 41	58 / 0 / 46	43 / 0 / 31	50 / 0 / 38	55 / 0 / 43	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	Yes
51 Greenwich Parade	Industrial	n/a	46 / 0 / 34	53 / 0 / 41	58 / 0 / 46	42 / 0 / 31	49 / 0 / 38	54 / 0 / 43	38 / 0 / 27	45 / 0 / 34	50 / 0 / 39	Yes
55 Greenwich Parade	Industrial	n/a	45 / 0 / 34	52 / 0 / 41	57 / 0 / 46	42 / 0 / 30	49 / 0 / 37	54 / 0 / 42	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	Yes
33 Greenwich Parade	Industrial	n/a	45 / 0 / 33	52 / 0 / 40	57 / 0 / 45	40 / 0 / 29	47 / 0 / 36	52 / 0 / 41	36 / 0 / 25	43 / 0 / 32	48 / 0 / 37	Yes
39 Greenwich Parade	Industrial	n/a	44 / 0 / 33	51 / 0 / 40	56 / 0 / 45	41 / 0 / 29	48 / 0 / 36	53 / 0 / 41	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	Yes
24 Greenwich Parade	Industrial	n/a	44 / 0 / 32	51 / 0 / 39	56 / 0 / 44	40 / 0 / 28	47 / 0 / 35	52 / 0 / 40	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	Yes
44 Greenwich Parade	Industrial	n/a	44 / 0 / 32	51 / 0 / 39	56 / 0 / 44	41 / 0 / 29	48 / 0 / 36	53 / 0 / 41	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	Yes
204 Tranquil Drive	Noise sensitive	3	43 / 0 / 31	50 / 0 / 38	55 / 0 / 43	41 / 0 / 29	48 / 0 / 36	53 / 0 / 41	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	Yes
20 Greenwich Parade	Industrial	n/a	43 / 0 / 31	50 / 0 / 38	55 / 0 / 43	38 / 0 / 27	45 / 0 / 34	50 / 0 / 39	33 / 0 / 22	40 / 0 / 29	45 / 0 / 34	Yes
22 Greenwich Parade	Industrial	n/a	43 / 0 / 31	50 / 0 / 38	55 / 0 / 43	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	33 / 0 / 22	40 / 0 / 29	45 / 0 / 34	Yes
37 Greenwich Parade	Industrial	n/a	43 / 0 / 31	50 / 0 / 38	55 / 0 / 43	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
182 Tranquil Drive	Noise sensitive	0	42 / 0 / 30	49 / 0 / 37	54 / 0 / 42	40 / 0 / 28	47 / 0 / 35	52 / 0 / 40	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	Yes
30 Greenwich Parade	Industrial	n/a	42 / 0 / 30	49 / 0 / 37	54 / 0 / 42	40 / 0 / 28	47 / 0 / 35	52 / 0 / 40	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	Yes
194 Tranquil Drive	Noise sensitive	2	42 / 0 / 30	49 / 0 / 37	54 / 0 / 42	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	Yes
26 Greenwich Parade	Industrial	n/a	42 / 0 / 30	49 / 0 / 37	54 / 0 / 42	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	Yes
18 Panorama Place	Noise sensitive	2	41 / 0 / 29	48 / 0 / 36	53 / 0 / 41	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	Yes
19 Panorama Place	Noise sensitive	1	40 / 0 / 29	47 / 0 / 36	52 / 0 / 41	38 / 0 / 27	45 / 0 / 34	50 / 0 / 39	36 / 0 / 25	43 / 0 / 32	48 / 0 / 37	Yes
83 Sublime Glade	Noise sensitive	1	40 / 0 / 28	47 / 0 / 35	52 / 0 / 40	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
89 Sublime Glade	Noise sensitive	2	40 / 0 / 28	47 / 0 / 35	52 / 0 / 40	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	Yes
174 Tranquil Drive	Noise sensitive	0	40 / 0 / 28	47 / 0 / 35	52 / 0 / 40	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	Yes
48 Greenwich Parade	Industrial	n/a	40 / 0 / 29	47 / 0 / 36	52 / 0 / 41	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	30 / 0 / 19	37 / 0 / 26	42 / 0 / 31	Yes
53 Sublime Glade	Noise sensitive	0	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	Yes
59 Sublime Glade	Noise sensitive	0	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes
73 Sublime Glade	Noise sensitive	0	39 / 0 / 28	46 / 0 / 35	51 / 0 / 40	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes
79 Sublime Glade	Noise sensitive	0	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
34 Greenwich Parade	Industrial	n/a	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
54 Sublime Glade	Noise sensitive	0	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	Yes

Noise receptor	Type of premises	Influencing factor	Calculated noise levels, dB(A)									Compliance with noise criteria
			Pit 3m deep			Pit 10m deep			Pit 20m deep			
			$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	
			D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	
62 Sublime Glade	Noise sensitive	0	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	32 / 0 / 21	39 / 0 / 28	44 / 0 / 33	Yes
65 Sublime Glade	Noise sensitive	0	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
95 Sublime Glade	Noise sensitive	2	38 / 0 / 27	45 / 0 / 34	50 / 0 / 39	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
560 Flynn Drive	Noise sensitive	2	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
569 Flynn Drive_Shed 2	Commercial	n/a	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	Yes
7 Panorama Place	Noise sensitive	0	37 / 0 / 26	44 / 0 / 33	49 / 0 / 38	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	34 / 0 / 23	41 / 0 / 30	46 / 0 / 35	Yes
151 Tranquil Drive	Noise sensitive	0	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	32 / 0 / 21	39 / 0 / 28	44 / 0 / 33	Yes
181 Tranquil Drive	Noise sensitive	0	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
569 Flynn Drive_Shed 1	Commercial	n/a	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
162 Tranquil Drive	Noise sensitive	0	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	Yes
154 Tranquil Drive	Noise sensitive	0	36 / 0 / 25	43 / 0 / 32	48 / 0 / 37	34 / 0 / 23	41 / 0 / 30	46 / 0 / 35	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
171 Tranquil Drive	Noise sensitive	0	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
161 Tranquil Drive	Noise sensitive	0	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	Yes
1768 Wanneroo Drive	Noise sensitive	2	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	Yes
1800 Wanneroo Drive	Noise sensitive	2	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	Yes
1814 Wanneroo Drive	Noise sensitive	2	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	33 / 0 / 22	40 / 0 / 29	45 / 0 / 34	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes
1820 Wanneroo Drive	Noise sensitive	2	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes
1830 Wanneroo Drive	Noise sensitive	2	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes
1834 Wanneroo Drive	Noise sensitive	2	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes
2 Travertine Vista	Noise sensitive	2	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	23 / 0 / 11	30 / 0 / 18	35 / 0 / 23	Yes
1864 Wanneroo Drive	Noise sensitive	2	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
1868 Wanneroo Drive	Noise sensitive	2	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
1900 Wanneroo Drive	Noise sensitive	2	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
1910 Wanneroo Drive	Noise sensitive	2	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	Yes
1880 Wanneroo Drive	Noise sensitive	2	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	Yes
1920 Wanneroo Drive	Noise sensitive	2	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1954 Wanneroo Drive	Noise sensitive	2	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
1964 Wanneroo Drive	Noise sensitive	2	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
1974 Wanneroo Drive	Noise sensitive	2	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
1792 Wanneroo Drive	Noise sensitive	2	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	22 / 0 / 10	29 / 0 / 17	34 / 0 / 22	19 / 0 / 7	26 / 0 / 14	31 / 0 / 19	Yes

Note: *D: Day (7:00am to 7:00pm), E: Evening (7:00pm to 10:00pm), N: Night (10:00pm to 7:00am)*
** Highest noise levels for buildings located in the westernmost part of the Meridian Park industrial estate.*
***Highest noise levels for dwellings located in the northernmost part of the future residential development at Lots 1 and 2 Flynn Drive.*

3.4.3 Years 6-10

Table 3.10 Operational noise levels – Years 6-10

Noise receptor	Type of premises	Influencing factor	Calculated noise levels, dB(A)									Compliance with noise criteria
			Pit 3m deep			Pit 10m deep			Pit 20m deep			
			$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	
			D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	
Future industrial_Meridian Park*	Industrial	n/a	58 / 0 / 46	65 / 0 / 53	70 / 0 / 58	52 / 0 / 41	59 / 0 / 48	64 / 0 / 53	49 / 0 / 37	56 / 0 / 44	61 / 0 / 49	Yes
42 Axis Parade	Industrial	n/a	49 / 0 / 38	56 / 0 / 45	61 / 0 / 50	46 / 0 / 35	53 / 0 / 42	58 / 0 / 47	41 / 0 / 29	48 / 0 / 36	53 / 0 / 41	Yes
51 Greenwich Parade	Industrial	n/a	47 / 0 / 36	54 / 0 / 43	59 / 0 / 48	45 / 0 / 33	52 / 0 / 40	57 / 0 / 45	40 / 0 / 29	47 / 0 / 36	52 / 0 / 41	Yes
55 Greenwich Parade	Industrial	n/a	47 / 0 / 35	54 / 0 / 42	59 / 0 / 47	44 / 0 / 33	51 / 0 / 40	56 / 0 / 45	40 / 0 / 28	47 / 0 / 35	52 / 0 / 40	Yes
47 Greenwich Parade	Industrial	n/a	46 / 0 / 34	53 / 0 / 41	58 / 0 / 46	44 / 0 / 32	51 / 0 / 39	56 / 0 / 44	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	Yes
39 Greenwich Parade	Industrial	n/a	45 / 0 / 33	52 / 0 / 40	57 / 0 / 45	43 / 0 / 31	50 / 0 / 38	55 / 0 / 43	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	Yes
36 Hemisphere Street	Industrial	n/a	44 / 0 / 32	51 / 0 / 39	56 / 0 / 44	42 / 0 / 30	49 / 0 / 37	54 / 0 / 42	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	Yes
29 Greenwich Parade	Industrial	n/a	44 / 0 / 32	51 / 0 / 39	56 / 0 / 44	41 / 0 / 30	48 / 0 / 37	53 / 0 / 42	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	Yes
37 Greenwich Parade	Industrial	n/a	42 / 0 / 30	49 / 0 / 37	54 / 0 / 42	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	Yes
44 Greenwich Parade	Industrial	n/a	42 / 0 / 30	49 / 0 / 37	54 / 0 / 42	39 / 0 / 28	46 / 0 / 35	51 / 0 / 40	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	Yes
33 Greenwich Parade	Industrial	n/a	42 / 0 / 30	49 / 0 / 37	54 / 0 / 42	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
48 Greenwich Parade	Industrial	n/a	42 / 0 / 30	49 / 0 / 37	54 / 0 / 42	37 / 0 / 26	44 / 0 / 33	49 / 0 / 38	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
26 Greenwich Parade	Industrial	n/a	41 / 0 / 29	48 / 0 / 36	53 / 0 / 41	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	35 / 0 / 24	42 / 0 / 31	47 / 0 / 36	Yes
34 Greenwich Parade	Industrial	n/a	41 / 0 / 30	48 / 0 / 37	53 / 0 / 42	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	Yes
20 Greenwich Parade	Industrial	n/a	41 / 0 / 29	48 / 0 / 36	53 / 0 / 41	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	Yes
Future residential_Lots 1 and 2 Flynn Dr**	Noise sensitive	4	40 / 0 / 29	47 / 0 / 36	52 / 0 / 41	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	Yes
22 Greenwich Parade	Industrial	n/a	40 / 0 / 28	47 / 0 / 35	52 / 0 / 40	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
30 Greenwich Parade	Industrial	n/a	40 / 0 / 28	47 / 0 / 35	52 / 0 / 40	37 / 0 / 26	44 / 0 / 33	49 / 0 / 38	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
204 Tranquil Drive	Noise sensitive	3	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	33 / 0 / 22	40 / 0 / 29	45 / 0 / 34	Yes
24 Greenwich Parade	Industrial	n/a	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
182 Tranquil Drive	Noise sensitive	0	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	Yes
569 Flynn Drive	Noise sensitive	4	38 / 0 / 27	45 / 0 / 34	50 / 0 / 39	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
18 Panorama Place	Noise sensitive	2	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	Yes
19 Panorama Place	Noise sensitive	1	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	35 / 0 / 24	42 / 0 / 31	47 / 0 / 36	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
73 Sublime Glade	Noise sensitive	0	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	34 / 0 / 23	41 / 0 / 30	46 / 0 / 35	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
569 Flynn Drive_Shed 2	Commercial	n/a	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
569 Flynn Drive_Shed 1	Commercial	n/a	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
560 Flynn Drive	Noise sensitive	2	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	33 / 0 / 22	40 / 0 / 29	45 / 0 / 34	Yes
174 Tranquil Drive	Noise sensitive	0	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	Yes
59 Sublime Glade	Noise sensitive	0	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	34 / 0 / 23	41 / 0 / 30	46 / 0 / 35	32 / 0 / 21	39 / 0 / 28	44 / 0 / 33	Yes
53 Sublime Glade	Noise sensitive	0	35 / 0 / 24	42 / 0 / 31	47 / 0 / 36	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes
151 Tranquil Drive	Noise sensitive	0	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
54 Sublime Glade	Noise sensitive	0	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	33 / 0 / 22	40 / 0 / 29	45 / 0 / 34	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	Yes

Noise receptor	Type of premises	Influencing factor	Calculated noise levels, dB(A)									Compliance with noise criteria
			Pit 3m deep			Pit 10m deep			Pit 20m deep			
			$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	
			D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	
62 Sublime Glade	Noise sensitive	0	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
95 Sublime Glade	Noise sensitive	2	35 / 0 / 24	42 / 0 / 31	47 / 0 / 36	32 / 0 / 21	39 / 0 / 28	44 / 0 / 33	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	Yes
181 Tranquil Drive	Noise sensitive	0	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	32 / 0 / 21	39 / 0 / 28	44 / 0 / 33	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
79 Sublime Glade	Noise sensitive	0	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
7 Panorama Place	Noise sensitive	0	34 / 0 / 23	41 / 0 / 30	46 / 0 / 35	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
1834 Wanneroo Drive	Noise sensitive	2	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes
83 Sublime Glade	Noise sensitive	1	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
89 Sublime Glade	Noise sensitive	2	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1830 Wanneroo Drive	Noise sensitive	2	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
1864 Wanneroo Drive	Noise sensitive	2	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
194 Tranquil Drive	Noise sensitive	2	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
1768 Wanneroo Drive	Noise sensitive	2	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
1800 Wanneroo Drive	Noise sensitive	2	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
1814 Wanneroo Drive	Noise sensitive	2	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
1820 Wanneroo Drive	Noise sensitive	2	33 / 0 / 22	40 / 0 / 29	45 / 0 / 34	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	Yes
65 Sublime Glade	Noise sensitive	0	33 / 0 / 22	40 / 0 / 29	45 / 0 / 34	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
154 Tranquil Drive	Noise sensitive	0	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
2 Travertine Vista	Noise sensitive	2	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1868 Wanneroo Drive	Noise sensitive	2	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
162 Tranquil Drive	Noise sensitive	0	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	Yes
171 Tranquil Drive	Noise sensitive	0	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
161 Tranquil Drive	Noise sensitive	0	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1900 Wanneroo Drive	Noise sensitive	2	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	Yes
1910 Wanneroo Drive	Noise sensitive	2	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
1880 Wanneroo Drive	Noise sensitive	2	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1954 Wanneroo Drive	Noise sensitive	2	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1964 Wanneroo Drive	Noise sensitive	2	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1974 Wanneroo Drive	Noise sensitive	2	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1920 Wanneroo Drive	Noise sensitive	2	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	Yes
1792 Wanneroo Drive	Noise sensitive	2	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	23 / 0 / 11	30 / 0 / 18	35 / 0 / 23	19 / 0 / 7	26 / 0 / 14	31 / 0 / 19	Yes

Note: *D: Day (7:00am to 7:00pm), E: Evening (7:00pm to 10:00pm), N: Night (10:00pm to 7:00am)*

** Highest noise levels for buildings located in the westernmost part of the Meridian Park industrial estate.*

***Highest noise levels for dwellings located in the northernmost part of the future residential development at Lots 1 and 2 Flynn Drive.*

3.4.4 Years 11-15

Table 3.11 Operational noise levels – Years 11-15

Noise receptor	Type of premises	Influencing factor	Calculated noise levels, dB(A)									Compliance with noise criteria
			Pit 3m deep			Pit 10m deep			Pit 20m deep			
			$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	
			D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	
Future industrial_Meridian Park*	Industrial	n/a	61 / 0 / 49	68 / 0 / 56	73 / 0 / 61	58 / 0 / 46	65 / 0 / 53	70 / 0 / 58	55 / 0 / 43	62 / 0 / 50	67 / 0 / 55	Yes
55 Greenwich Parade	Industrial	n/a	43 / 0 / 31	50 / 0 / 38	55 / 0 / 43	41 / 0 / 29	48 / 0 / 36	53 / 0 / 41	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	Yes
51 Greenwich Parade	Industrial	n/a	42 / 0 / 31	49 / 0 / 38	54 / 0 / 43	40 / 0 / 29	47 / 0 / 36	52 / 0 / 41	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	Yes
47 Greenwich Parade	Industrial	n/a	41 / 0 / 30	48 / 0 / 37	53 / 0 / 42	40 / 0 / 28	47 / 0 / 35	52 / 0 / 40	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	Yes
39 Greenwich Parade	Industrial	n/a	41 / 0 / 29	48 / 0 / 36	53 / 0 / 41	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	Yes
42 Axis Parade	Industrial	n/a	40 / 0 / 28	47 / 0 / 35	52 / 0 / 40	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
Future residential_Lots 1 and 2 Flynn Dr**	Noise sensitive	4	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	Yes
29 Greenwich Parade	Industrial	n/a	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
36 Hemisphere Street	Industrial	n/a	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	Yes
37 Greenwich Parade	Industrial	n/a	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes
44 Greenwich Parade	Industrial	n/a	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
34 Greenwich Parade	Industrial	n/a	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	Yes
48 Greenwich Parade	Industrial	n/a	36 / 0 / 25	43 / 0 / 32	48 / 0 / 37	33 / 0 / 22	40 / 0 / 29	45 / 0 / 34	30 / 0 / 19	37 / 0 / 26	42 / 0 / 31	Yes
569 Flynn Drive_Shed 1	Commercial	n/a	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
33 Greenwich Parade	Industrial	n/a	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	Yes
26 Greenwich Parade	Industrial	n/a	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
20 Greenwich Parade	Industrial	n/a	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	Yes
30 Greenwich Parade	Industrial	n/a	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
204 Tranquil Drive	Noise sensitive	3	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
569 Flynn Drive	Noise sensitive	4	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	Yes
569 Flynn Drive_Shed 2	Commercial	n/a	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
22 Greenwich Parade	Industrial	n/a	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	Yes
24 Greenwich Parade	Industrial	n/a	34 / 0 / 23	41 / 0 / 30	46 / 0 / 35	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	Yes
182 Tranquil Drive	Noise sensitive	0	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes
560 Flynn Drive	Noise sensitive	2	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes
1834 Wanneroo Drive	Noise sensitive	2	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	Yes
18 Panorama Place	Noise sensitive	2	33 / 0 / 22	40 / 0 / 29	45 / 0 / 34	32 / 0 / 21	39 / 0 / 28	44 / 0 / 33	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
19 Panorama Place	Noise sensitive	1	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
73 Sublime Glade	Noise sensitive	0	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	Yes
174 Tranquil Drive	Noise sensitive	0	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
59 Sublime Glade	Noise sensitive	0	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
95 Sublime Glade	Noise sensitive	2	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	30 / 0 / 19	37 / 0 / 26	42 / 0 / 31	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
89 Sublime Glade	Noise sensitive	2	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes

Noise receptor	Type of premises	Influencing factor	Calculated noise levels, dB(A)									Compliance with noise criteria
			Pit 3m deep			Pit 10m deep			Pit 20m deep			
			$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	
			D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	
1820 Wanneroo Drive	Noise sensitive	2	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	Yes
53 Sublime Glade	Noise sensitive	0	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	Yes
151 Tranquil Drive	Noise sensitive	0	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
54 Sublime Glade	Noise sensitive	0	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
181 Tranquil Drive	Noise sensitive	0	32 / 0 / 21	39 / 0 / 28	44 / 0 / 33	30 / 0 / 19	37 / 0 / 26	42 / 0 / 31	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	Yes
83 Sublime Glade	Noise sensitive	1	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
79 Sublime Glade	Noise sensitive	0	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1800 Wanneroo Drive	Noise sensitive	2	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
1814 Wanneroo Drive	Noise sensitive	2	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
1830 Wanneroo Drive	Noise sensitive	2	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
1864 Wanneroo Drive	Noise sensitive	2	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
62 Sublime Glade	Noise sensitive	0	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
7 Panorama Place	Noise sensitive	0	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	Yes
1768 Wanneroo Drive	Noise sensitive	2	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	30 / 0 / 19	37 / 0 / 26	42 / 0 / 31	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	Yes
194 Tranquil Drive	Noise sensitive	2	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	Yes
65 Sublime Glade	Noise sensitive	0	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	24 / 0 / 13	31 / 0 / 20	36 / 0 / 25	Yes
154 Tranquil Drive	Noise sensitive	0	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
171 Tranquil Drive	Noise sensitive	0	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	24 / 0 / 13	31 / 0 / 20	36 / 0 / 25	Yes
161 Tranquil Drive	Noise sensitive	0	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1868 Wanneroo Drive	Noise sensitive	2	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	30 / 0 / 19	37 / 0 / 26	42 / 0 / 31	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
2 Travertine Vista	Noise sensitive	2	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
162 Tranquil Drive	Noise sensitive	0	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	23 / 0 / 12	30 / 0 / 19	35 / 0 / 24	Yes
1900 Wanneroo Drive	Noise sensitive	2	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
1880 Wanneroo Drive	Noise sensitive	2	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
1910 Wanneroo Drive	Noise sensitive	2	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1920 Wanneroo Drive	Noise sensitive	2	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1964 Wanneroo Drive	Noise sensitive	2	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1954 Wanneroo Drive	Noise sensitive	2	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1974 Wanneroo Drive	Noise sensitive	2	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1792 Wanneroo Drive	Noise sensitive	2	23 / 0 / 12	30 / 0 / 19	35 / 0 / 24	21 / 0 / 9	28 / 0 / 16	33 / 0 / 21	18 / 0 / 6	25 / 0 / 13	30 / 0 / 18	Yes

Note: *D: Day (7:00am to 7:00pm), E: Evening (7:00pm to 10:00pm), N: Night (10:00pm to 7:00am)*

** Highest noise levels for buildings located in the westernmost part of the Meridian Park industrial estate.*

***Highest noise levels for dwellings located in the northernmost part of the future residential development at Lots 1 and 2 Flynn Drive.*

3.4.5 Years 16-20

Table 3.12 Operational noise levels – Years 16-20

Noise receptor	Type of premises	Influencing factor	Calculated noise levels, dB(A)									Compliance with noise criteria
			Pit 3m deep			Pit 10m deep			Pit 20m deep			
			$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	
			D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	
Future industrial_Meridian Park*	Industrial	n/a	60 / 0 / 49	67 / 0 / 56	72 / 0 / 61	57 / 0 / 45	64 / 0 / 52	69 / 0 / 57	54 / 0 / 42	61 / 0 / 49	66 / 0 / 54	Yes
51 Greenwich Parade	Industrial	n/a	40 / 0 / 28	47 / 0 / 35	52 / 0 / 40	38 / 0 / 26	45 / 0 / 33	50 / 0 / 38	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	Yes
55 Greenwich Parade	Industrial	n/a	40 / 0 / 28	47 / 0 / 35	52 / 0 / 40	37 / 0 / 26	44 / 0 / 33	49 / 0 / 38	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	Yes
42 Axis Parade	Industrial	n/a	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	33 / 0 / 22	40 / 0 / 29	45 / 0 / 34	Yes
47 Greenwich Parade	Industrial	n/a	39 / 0 / 27	46 / 0 / 34	51 / 0 / 39	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	Yes
39 Greenwich Parade	Industrial	n/a	37 / 0 / 26	44 / 0 / 33	49 / 0 / 38	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	Yes
44 Greenwich Parade	Industrial	n/a	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
36 Hemisphere Street	Industrial	n/a	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
37 Greenwich Parade	Industrial	n/a	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
48 Greenwich Parade	Industrial	n/a	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
34 Greenwich Parade	Industrial	n/a	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
30 Greenwich Parade	Industrial	n/a	36 / 0 / 24	43 / 0 / 31	48 / 0 / 36	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
29 Greenwich Parade	Industrial	n/a	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
26 Greenwich Parade	Industrial	n/a	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	Yes
Future residential_Lots 1 and 2 Flynn Dr**	Noise sensitive	4	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
24 Greenwich Parade	Industrial	n/a	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
33 Greenwich Parade	Industrial	n/a	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
20 Greenwich Parade	Industrial	n/a	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
22 Greenwich Parade	Industrial	n/a	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
569 Flynn Drive_Shed 1	Commercial	n/a	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
569 Flynn Drive	Noise sensitive	4	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
569 Flynn Drive_Shed 2	Commercial	n/a	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
204 Tranquil Drive	Noise sensitive	3	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
1834 Wanneroo Drive	Noise sensitive	2	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	30 / 0 / 19	37 / 0 / 26	42 / 0 / 31	Yes
89 Sublime Glade	Noise sensitive	2	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
182 Tranquil Drive	Noise sensitive	0	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
18 Panorama Place	Noise sensitive	2	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
19 Panorama Place	Noise sensitive	1	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
1820 Wanneroo Drive	Noise sensitive	2	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	30 / 0 / 19	37 / 0 / 26	42 / 0 / 31	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
73 Sublime Glade	Noise sensitive	0	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	Yes
560 Flynn Drive	Noise sensitive	2	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
95 Sublime Glade	Noise sensitive	2	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
194 Tranquil Drive	Noise sensitive	2	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes

Noise receptor	Type of premises	Influencing factor	Calculated noise levels, dB(A)									Compliance with noise criteria
			Pit 3m deep			Pit 10m deep			Pit 20m deep			
			$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	
			D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	
83 Sublime Glade	Noise sensitive	1	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
79 Sublime Glade	Noise sensitive	0	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	Yes
174 Tranquil Drive	Noise sensitive	0	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
181 Tranquil Drive	Noise sensitive	0	30 / 0 / 19	37 / 0 / 26	42 / 0 / 31	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1814 Wanneroo Drive	Noise sensitive	2	30 / 0 / 19	37 / 0 / 26	42 / 0 / 31	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
1830 Wanneroo Drive	Noise sensitive	2	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	Yes
1864 Wanneroo Drive	Noise sensitive	2	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
59 Sublime Glade	Noise sensitive	0	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	Yes
171 Tranquil Drive	Noise sensitive	0	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	25 / 0 / 14	32 / 0 / 21	37 / 0 / 26	Yes
53 Sublime Glade	Noise sensitive	0	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
151 Tranquil Drive	Noise sensitive	0	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
54 Sublime Glade	Noise sensitive	0	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
62 Sublime Glade	Noise sensitive	0	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	25 / 0 / 14	32 / 0 / 21	37 / 0 / 26	Yes
7 Panorama Place	Noise sensitive	0	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1768 Wanneroo Drive	Noise sensitive	2	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
1800 Wanneroo Drive	Noise sensitive	2	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
161 Tranquil Drive	Noise sensitive	0	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1868 Wanneroo Drive	Noise sensitive	2	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
1900 Wanneroo Drive	Noise sensitive	2	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	Yes
65 Sublime Glade	Noise sensitive	0	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	22 / 0 / 11	29 / 0 / 18	34 / 0 / 23	Yes
154 Tranquil Drive	Noise sensitive	0	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
162 Tranquil Drive	Noise sensitive	0	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	24 / 0 / 13	31 / 0 / 20	36 / 0 / 25	Yes
1880 Wanneroo Drive	Noise sensitive	2	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1920 Wanneroo Drive	Noise sensitive	2	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	Yes
1910 Wanneroo Drive	Noise sensitive	2	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	Yes
2 Travertine Vista	Noise sensitive	2	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	Yes
1954 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1964 Wanneroo Drive	Noise sensitive	2	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1974 Wanneroo Drive	Noise sensitive	2	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1792 Wanneroo Drive	Noise sensitive	2	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	21 / 0 / 9	28 / 0 / 16	33 / 0 / 21	17 / 0 / 6	24 / 0 / 13	29 / 0 / 18	Yes

Note: *D: Day (7:00am to 7:00pm), E: Evening (7:00pm to 10:00pm), N: Night (10:00pm to 7:00am)*

** Highest noise levels for buildings located in the westernmost part of the Meridian Park industrial estate.*

***Highest noise levels for dwellings located in the northernmost part of the future residential development at Lots 1 and 2 Flynn Drive.*

3.4.6 Years 21-25

Table 3.13 Operational noise levels – Years 21-25

Noise receptor	Type of premises	Influencing factor	Calculated noise levels, dB(A)									Compliance with noise criteria
			Pit 3m deep			Pit 10m deep			Pit 20m deep			
			$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	
			D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	
Future industrial_Meridian Park*	Industrial	n/a	61 / 0 / 49	68 / 0 / 56	73 / 0 / 61	57 / 0 / 45	64 / 0 / 52	69 / 0 / 57	56 / 0 / 45	63 / 0 / 52	68 / 0 / 57	Yes
51 Greenwich Parade	Industrial	n/a	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	35 / 0 / 24	42 / 0 / 31	47 / 0 / 36	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
55 Greenwich Parade	Industrial	n/a	37 / 0 / 25	44 / 0 / 32	49 / 0 / 37	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	Yes
42 Axis Parade	Industrial	n/a	36 / 0 / 25	43 / 0 / 32	48 / 0 / 37	34 / 0 / 23	41 / 0 / 30	46 / 0 / 35	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	Yes
47 Greenwich Parade	Industrial	n/a	35 / 0 / 24	42 / 0 / 31	47 / 0 / 36	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	Yes
37 Greenwich Parade	Industrial	n/a	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
48 Greenwich Parade	Industrial	n/a	35 / 0 / 24	42 / 0 / 31	47 / 0 / 36	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	Yes
39 Greenwich Parade	Industrial	n/a	34 / 0 / 23	41 / 0 / 30	46 / 0 / 35	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
44 Greenwich Parade	Industrial	n/a	34 / 0 / 23	41 / 0 / 30	46 / 0 / 35	32 / 0 / 21	39 / 0 / 28	44 / 0 / 33	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
34 Greenwich Parade	Industrial	n/a	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
36 Hemisphere Street	Industrial	n/a	33 / 0 / 22	40 / 0 / 29	45 / 0 / 34	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	Yes
30 Greenwich Parade	Industrial	n/a	33 / 0 / 22	40 / 0 / 29	45 / 0 / 34	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
29 Greenwich Parade	Industrial	n/a	33 / 0 / 22	40 / 0 / 29	45 / 0 / 34	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
26 Greenwich Parade	Industrial	n/a	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
Future residential_Lots 1 and 2 Flynn Dr**	Noise sensitive	4	33 / 0 / 21	40 / 0 / 28	45 / 0 / 33	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
24 Greenwich Parade	Industrial	n/a	32 / 0 / 21	39 / 0 / 28	44 / 0 / 33	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
22 Greenwich Parade	Industrial	n/a	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	30 / 0 / 19	37 / 0 / 26	42 / 0 / 31	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
20 Greenwich Parade	Industrial	n/a	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	Yes
569 Flynn Drive_Shed 1	Commercial	n/a	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
33 Greenwich Parade	Industrial	n/a	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
569 Flynn Drive	Noise sensitive	4	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	23 / 0 / 11	30 / 0 / 18	35 / 0 / 23	Yes
1834 Wanneroo Drive	Noise sensitive	2	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
204 Tranquil Drive	Noise sensitive	3	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
18 Panorama Place	Noise sensitive	2	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
19 Panorama Place	Noise sensitive	1	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
569 Flynn Drive_Shed 2	Commercial	n/a	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	23 / 0 / 12	30 / 0 / 19	35 / 0 / 24	Yes
89 Sublime Glade	Noise sensitive	2	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
560 Flynn Drive	Noise sensitive	2	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
182 Tranquil Drive	Noise sensitive	0	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	Yes
1820 Wanneroo Drive	Noise sensitive	2	29 / 0 / 18	36 / 0 / 25	41 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	Yes
95 Sublime Glade	Noise sensitive	2	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
194 Tranquil Drive	Noise sensitive	2	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
83 Sublime Glade	Noise sensitive	1	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	23 / 0 / 11	30 / 0 / 18	35 / 0 / 23	Yes

Noise receptor	Type of premises	Influencing factor	Calculated noise levels, dB(A)									Compliance with noise criteria
			Pit 3m deep			Pit 10m deep			Pit 20m deep			
			$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	
			D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	
73 Sublime Glade	Noise sensitive	0	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
174 Tranquil Drive	Noise sensitive	0	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
181 Tranquil Drive	Noise sensitive	0	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
1814 Wanneroo Drive	Noise sensitive	2	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1830 Wanneroo Drive	Noise sensitive	2	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	Yes
1864 Wanneroo Drive	Noise sensitive	2	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	Yes
1868 Wanneroo Drive	Noise sensitive	2	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	Yes
1900 Wanneroo Drive	Noise sensitive	2	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	Yes
79 Sublime Glade	Noise sensitive	0	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	23 / 0 / 11	30 / 0 / 18	35 / 0 / 23	Yes
1768 Wanneroo Drive	Noise sensitive	2	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
59 Sublime Glade	Noise sensitive	0	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
151 Tranquil Drive	Noise sensitive	0	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
62 Sublime Glade	Noise sensitive	0	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	23 / 0 / 12	30 / 0 / 19	35 / 0 / 24	Yes
7 Panorama Place	Noise sensitive	0	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	23 / 0 / 11	30 / 0 / 18	35 / 0 / 23	Yes
1800 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
171 Tranquil Drive	Noise sensitive	0	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	24 / 0 / 13	31 / 0 / 20	36 / 0 / 25	Yes
161 Tranquil Drive	Noise sensitive	0	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	24 / 0 / 13	31 / 0 / 20	36 / 0 / 25	Yes
1880 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1920 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1964 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1974 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	25 / 0 / 14	32 / 0 / 21	37 / 0 / 26	Yes
53 Sublime Glade	Noise sensitive	0	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
65 Sublime Glade	Noise sensitive	0	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	20 / 0 / 8	27 / 0 / 15	32 / 0 / 20	Yes
154 Tranquil Drive	Noise sensitive	0	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	Yes
162 Tranquil Drive	Noise sensitive	0	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	23 / 0 / 11	30 / 0 / 18	35 / 0 / 23	Yes
1910 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	Yes
54 Sublime Glade	Noise sensitive	0	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
2 Travertine Vista	Noise sensitive	2	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	22 / 0 / 11	29 / 0 / 18	34 / 0 / 23	Yes
1954 Wanneroo Drive	Noise sensitive	2	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	25 / 0 / 14	32 / 0 / 21	37 / 0 / 26	Yes
1792 Wanneroo Drive	Noise sensitive	2	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	21 / 0 / 9	28 / 0 / 16	33 / 0 / 21	17 / 0 / 5	24 / 0 / 12	29 / 0 / 17	Yes

Note: *D: Day (7:00am to 7:00pm), E: Evening (7:00pm to 10:00pm), N: Night (10:00pm to 7:00am)*

** Highest noise levels for buildings located in the westernmost part of the Meridian Park industrial estate.*

***Highest noise levels for dwellings located in the northernmost part of the future residential development at Lots 1 and 2 Flynn Drive.*

3.4.7 Years 26-30

Table 3.14 Operational noise levels – Years 26-30

Noise receptor	Type of premises	Influencing factor	Calculated noise levels, dB(A)									Compliance with noise criteria
			Pit 3m deep			Pit 10m deep			Pit 20m deep			
			$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	
			D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	
Future industrial_Meridian Park*	Industrial	n/a	62 / 0 / 50	69 / 0 / 57	74 / 0 / 62	57 / 0 / 46	64 / 0 / 53	69 / 0 / 58	54 / 0 / 42	61 / 0 / 49	66 / 0 / 54	Yes
51 Greenwich Parade	Industrial	n/a	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	23 / 0 / 12	30 / 0 / 19	35 / 0 / 24	Yes
55 Greenwich Parade	Industrial	n/a	35 / 0 / 23	42 / 0 / 30	47 / 0 / 35	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	23 / 0 / 11	30 / 0 / 18	35 / 0 / 23	Yes
42 Axis Parade	Industrial	n/a	34 / 0 / 22	41 / 0 / 29	46 / 0 / 34	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	Yes
47 Greenwich Parade	Industrial	n/a	33 / 0 / 22	40 / 0 / 29	45 / 0 / 34	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	Yes
34 Greenwich Parade	Industrial	n/a	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	23 / 0 / 11	30 / 0 / 18	35 / 0 / 23	Yes
39 Greenwich Parade	Industrial	n/a	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	23 / 0 / 11	30 / 0 / 18	35 / 0 / 23	Yes
37 Greenwich Parade	Industrial	n/a	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
44 Greenwich Parade	Industrial	n/a	32 / 0 / 20	39 / 0 / 27	44 / 0 / 32	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	21 / 0 / 10	28 / 0 / 17	33 / 0 / 22	Yes
36 Hemisphere Street	Industrial	n/a	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	Yes
30 Greenwich Parade	Industrial	n/a	31 / 0 / 20	38 / 0 / 27	43 / 0 / 32	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	21 / 0 / 9	28 / 0 / 16	33 / 0 / 21	Yes
48 Greenwich Parade	Industrial	n/a	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	20 / 0 / 9	27 / 0 / 16	32 / 0 / 21	Yes
29 Greenwich Parade	Industrial	n/a	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	19 / 0 / 7	26 / 0 / 14	31 / 0 / 19	Yes
26 Greenwich Parade	Industrial	n/a	31 / 0 / 19	38 / 0 / 26	43 / 0 / 31	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	20 / 0 / 9	27 / 0 / 16	32 / 0 / 21	Yes
Future residential_Lots 1 and 2 Flynn Dr**	Noise sensitive	4	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	Yes
24 Greenwich Parade	Industrial	n/a	30 / 0 / 19	37 / 0 / 26	42 / 0 / 31	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	20 / 0 / 8	27 / 0 / 15	32 / 0 / 20	Yes
22 Greenwich Parade	Industrial	n/a	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	20 / 0 / 8	27 / 0 / 15	32 / 0 / 20	Yes
20 Greenwich Parade	Industrial	n/a	30 / 0 / 18	37 / 0 / 25	42 / 0 / 30	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	20 / 0 / 8	27 / 0 / 15	32 / 0 / 20	Yes
1834 Wanneroo Drive	Noise sensitive	2	29 / 0 / 17	36 / 0 / 24	41 / 0 / 29	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	Yes
1820 Wanneroo Drive	Noise sensitive	2	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	25 / 0 / 14	32 / 0 / 21	37 / 0 / 26	Yes
569 Flynn Drive_Shed 1	Commercial	n/a	28 / 0 / 17	35 / 0 / 24	40 / 0 / 29	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	19 / 0 / 7	26 / 0 / 14	31 / 0 / 19	Yes
204 Tranquil Drive	Noise sensitive	3	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	25 / 0 / 14	32 / 0 / 21	37 / 0 / 26	21 / 0 / 9	28 / 0 / 16	33 / 0 / 21	Yes
89 Sublime Glade	Noise sensitive	2	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	21 / 0 / 9	28 / 0 / 16	33 / 0 / 21	Yes
33 Greenwich Parade	Industrial	n/a	28 / 0 / 16	35 / 0 / 23	40 / 0 / 28	22 / 0 / 11	29 / 0 / 18	34 / 0 / 23	17 / 0 / 5	24 / 0 / 12	29 / 0 / 17	Yes
182 Tranquil Drive	Noise sensitive	0	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
18 Panorama Place	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
19 Panorama Place	Noise sensitive	1	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
1814 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
1830 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
1864 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	25 / 0 / 14	32 / 0 / 21	37 / 0 / 26	Yes
1868 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	25 / 0 / 14	32 / 0 / 21	37 / 0 / 26	Yes
1900 Wanneroo Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
73 Sublime Glade	Noise sensitive	0	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	18 / 0 / 6	25 / 0 / 13	30 / 0 / 18	Yes

Noise receptor	Type of premises	Influencing factor	Calculated noise levels, dB(A)									Compliance with noise criteria
			Pit 3m deep			Pit 10m deep			Pit 20m deep			
			$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	$L_{A10,adj,T}$	$L_{A1,adj,T}$	$L_{Amax,adj,T}$	
			D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	D / E / N	
95 Sublime Glade	Noise sensitive	2	27 / 0 / 16	34 / 0 / 23	39 / 0 / 28	24 / 0 / 13	31 / 0 / 20	36 / 0 / 25	19 / 0 / 7	26 / 0 / 14	31 / 0 / 19	Yes
194 Tranquil Drive	Noise sensitive	2	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	24 / 0 / 13	31 / 0 / 20	36 / 0 / 25	19 / 0 / 8	26 / 0 / 15	31 / 0 / 20	Yes
569 Flynn Drive	Noise sensitive	4	27 / 0 / 15	34 / 0 / 22	39 / 0 / 27	22 / 0 / 10	29 / 0 / 17	34 / 0 / 22	16 / 0 / 4	23 / 0 / 11	28 / 0 / 16	Yes
560 Flynn Drive	Noise sensitive	2	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
174 Tranquil Drive	Noise sensitive	0	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	20 / 0 / 9	27 / 0 / 16	32 / 0 / 21	Yes
181 Tranquil Drive	Noise sensitive	0	26 / 0 / 15	33 / 0 / 22	38 / 0 / 27	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	19 / 0 / 8	26 / 0 / 15	31 / 0 / 20	Yes
1880 Wanneroo Drive	Noise sensitive	2	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	25 / 0 / 14	32 / 0 / 21	37 / 0 / 26	24 / 0 / 13	31 / 0 / 20	36 / 0 / 25	Yes
1920 Wanneroo Drive	Noise sensitive	2	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	25 / 0 / 14	32 / 0 / 21	37 / 0 / 26	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
1964 Wanneroo Drive	Noise sensitive	2	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
1974 Wanneroo Drive	Noise sensitive	2	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	Yes
1910 Wanneroo Drive	Noise sensitive	2	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	23 / 0 / 12	30 / 0 / 19	35 / 0 / 24	Yes
569 Flynn Drive_Shed 2	Commercial	n/a	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	22 / 0 / 11	29 / 0 / 18	34 / 0 / 23	18 / 0 / 6	25 / 0 / 13	30 / 0 / 18	Yes
83 Sublime Glade	Noise sensitive	1	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	22 / 0 / 11	29 / 0 / 18	34 / 0 / 23	16 / 0 / 5	23 / 0 / 12	28 / 0 / 17	Yes
59 Sublime Glade	Noise sensitive	0	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	20 / 0 / 8	27 / 0 / 15	32 / 0 / 20	Yes
62 Sublime Glade	Noise sensitive	0	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	23 / 0 / 11	30 / 0 / 18	35 / 0 / 23	20 / 0 / 8	27 / 0 / 15	32 / 0 / 20	Yes
1800 Wanneroo Drive	Noise sensitive	2	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	23 / 0 / 11	30 / 0 / 18	35 / 0 / 23	Yes
171 Tranquil Drive	Noise sensitive	0	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	20 / 0 / 8	27 / 0 / 15	32 / 0 / 20	Yes
1954 Wanneroo Drive	Noise sensitive	2	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	25 / 0 / 14	32 / 0 / 21	37 / 0 / 26	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	Yes
79 Sublime Glade	Noise sensitive	0	26 / 0 / 14	33 / 0 / 21	38 / 0 / 26	22 / 0 / 11	29 / 0 / 18	34 / 0 / 23	17 / 0 / 5	24 / 0 / 12	29 / 0 / 17	Yes
151 Tranquil Drive	Noise sensitive	0	25 / 0 / 14	32 / 0 / 21	37 / 0 / 26	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	20 / 0 / 9	27 / 0 / 16	32 / 0 / 21	Yes
1768 Wanneroo Drive	Noise sensitive	2	25 / 0 / 14	32 / 0 / 21	37 / 0 / 26	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	Yes
161 Tranquil Drive	Noise sensitive	0	25 / 0 / 14	32 / 0 / 21	37 / 0 / 26	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	20 / 0 / 8	27 / 0 / 15	32 / 0 / 20	Yes
53 Sublime Glade	Noise sensitive	0	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	21 / 0 / 9	28 / 0 / 16	33 / 0 / 21	Yes
54 Sublime Glade	Noise sensitive	0	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	24 / 0 / 12	31 / 0 / 19	36 / 0 / 24	21 / 0 / 9	28 / 0 / 16	33 / 0 / 21	Yes
7 Panorama Place	Noise sensitive	0	25 / 0 / 14	32 / 0 / 21	37 / 0 / 26	22 / 0 / 10	29 / 0 / 17	34 / 0 / 22	15 / 0 / 4	22 / 0 / 11	27 / 0 / 16	Yes
154 Tranquil Drive	Noise sensitive	0	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	23 / 0 / 11	30 / 0 / 18	35 / 0 / 23	17 / 0 / 6	24 / 0 / 13	29 / 0 / 18	Yes
162 Tranquil Drive	Noise sensitive	0	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	22 / 0 / 10	29 / 0 / 17	34 / 0 / 22	16 / 0 / 4	23 / 0 / 11	28 / 0 / 16	Yes
65 Sublime Glade	Noise sensitive	0	25 / 0 / 13	32 / 0 / 20	37 / 0 / 25	20 / 0 / 9	27 / 0 / 16	32 / 0 / 21	14 / 0 / 3	21 / 0 / 10	26 / 0 / 15	Yes
2 Travertine Vista	Noise sensitive	2	24 / 0 / 13	31 / 0 / 20	36 / 0 / 25	22 / 0 / 10	29 / 0 / 17	34 / 0 / 22	17 / 0 / 5	24 / 0 / 12	29 / 0 / 17	Yes
1792 Wanneroo Drive	Noise sensitive	2	21 / 0 / 9	28 / 0 / 16	33 / 0 / 21	17 / 0 / 5	24 / 0 / 12	29 / 0 / 17	12 / 0 / 1	19 / 0 / 8	24 / 0 / 13	Yes

Note: *D: Day (7:00am to 7:00pm), E: Evening (7:00pm to 10:00pm), N: Night (10:00pm to 7:00am)*

** Highest noise levels for buildings located in the westernmost part of the Meridian Park industrial estate.*

***Highest noise levels for dwellings located in the northernmost part of the future residential development at Lots 1 and 2 Flynn Drive.*

Noise contour maps showing the propagation of noise from the proposed quarrying operations are presented in Appendix E.

4. Discussion and Recommendations

Detailed noise propagation modelling was carried out to assess the potential noise impacts from the proposed quarrying operations on the surrounding land uses.

Noise emissions have been calculated considering all plant and equipment to be engaged in clearing and quarrying operations including:

- Mobile crushing and screening plant;
- Diesel genset;
- Conveyor;
- Bulldozer;
- Loader;
- Excavator;
- Bobcat;
- Mobile fuel tankers;
- Product trucks;
- Water truck; and
- Stone cutting saw.

4.1 Noise mitigation measures

The following noise mitigation measures will be implemented to minimise noise impacts on the surrounding land uses during long-term quarrying operations:

- The quarry will be established by strategically pushing the unusable topsoil into a temporary earth mound along the southern boundary of Lot 503. This earth mound will be approximately 3m high and effectively acoustically screen the nearest noise sensitive places to the south from the quarry operations during stage 1 (Year 1-5). Upon completion of stage 1 and as the operations move north throughout Lot 503, the temporary earth mound will be removed and potentially used for rehabilitation of the site.
- Quarrying and processing plant and equipment will be located on the floor of the extraction pit. Excavated material will be pushed towards the perimeters behind the faces of the extraction pit, with the floor being progressively lowered. The earth mounds and faces of the extraction pit will provide effective visual and noise screening of the plant and equipment.
- Extraction will be staged, beginning at the southern portion of the Phase 1 area and progressing north over time. As such, the separation distance to the nearest noise sensitive places will increase over time.

- Operating hours will be limited to 6:30am to 5:00pm Monday to Saturday. There will be no operations on Sundays or public holidays.

The results of the noise propagation modelling indicate compliance with the Assigned Noise Levels as per the *Environmental Protection (Noise) Regulations 1997*.

Noise monitoring should be undertaken on receipt of a noise complaint. The noise monitoring should be carried out in accordance with the requirements of Australian Standard AS1055-1997 (*Description and measurement of environmental noise*) or any other noise monitoring methodology agreed with the regulatory authorities.

If the results of noise monitoring indicate exceedance of the noise limits, appropriate noise mitigation measures should be implemented to reduce the noise levels.

5. Conclusions

Based on the results of the proposed quarrying operations (Phase 1) at Lot 503 Flynn Drive in Neerabup, the following conclusions are made:

- The relevant noise criteria from the *Environmental Protection (Noise) Regulations 1997* were considered in this assessment.
- Background noise monitoring was carried out at the subject site over 7 days using an automated noise logger, to obtain information about the existing background noise levels during day, evening and night time.
- Attended noise measurements were carried out at an existing limestone quarry in Nowergup operated by WA Limestone, to obtain information about the noise emissions of typical limestone quarrying operations.
- A 3D model of the site and surroundings was developed using SoundPLAN noise propagation software considering the proposed quarrying operations and progression of works over the planned 20 to 30 year period.
- Noise mitigation measures must be implemented as per Section 4 of this report.

With the recommended noise mitigation measures in place, the results of noise propagation modelling indicate compliance with the compliance with the Assigned Noise Levels as per the *Environmental Protection (Noise) Regulations 1997* at the nearest noise receptors.

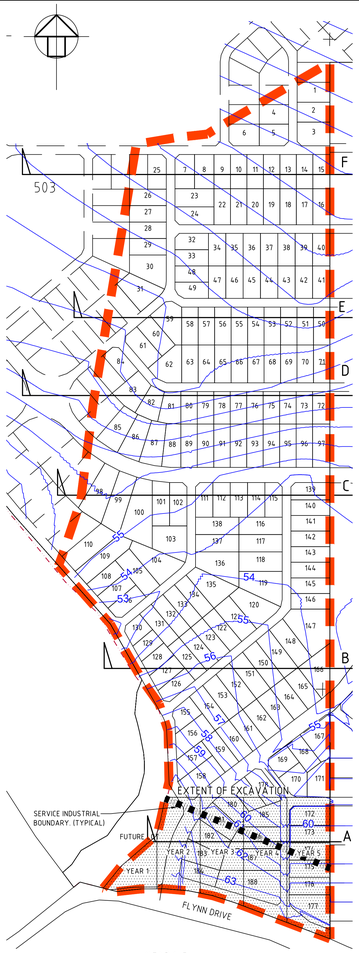
6. References

- Amendment No. 2 to Lots 1 & 2 Flynn Drive, Carramar - Agreed Structure Plan No. 61 (WAPC reference: WANN/2015/61-02)
- Australian Standard AS1055.1-1997 (*Acoustics - Description and Measurement of Environmental Noise Part 1: General Procedures*)
- Australian Standard AS1055.2-1997 (*Acoustics - Description and Measurement of Environmental Noise Part 2: Application to Specific Situations*)
- Australian Standard ASIEC61672.1-2004 (*Electroacoustics - Sound level meters – Specifications*)
- City of Wanneroo – *Extractive Industries Local Law 1998*
- *Environmental Protection (Noise) Regulations 1997*
- Neerabup Industrial Area Structure Plan No.17 ("NIASP17")

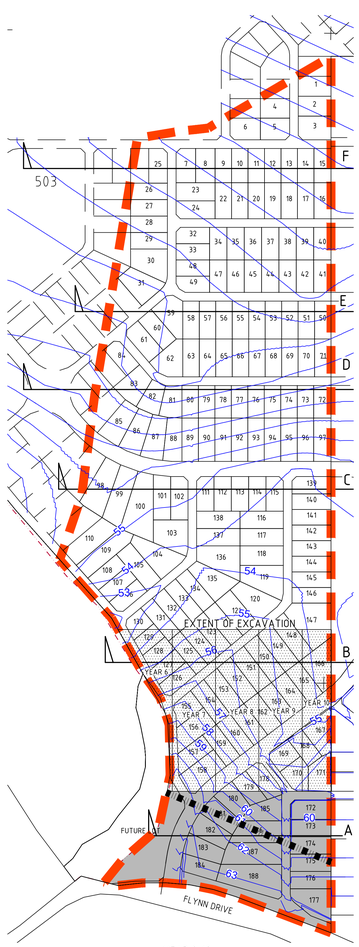
7. Appendices

- Appendix A – Lot 503 Flynn Drive, Neerabup
- Appendix B – Site Photos
- Appendix C – Meteorological Data
- Appendix D – Noise Measurement Results
- Appendix E – Operational Noise Contour Maps

Appendix A – Lot 503 Flynn Drive, Neerabup



YEAR 1-5
SCALE 1:5000



YEAR 6-10
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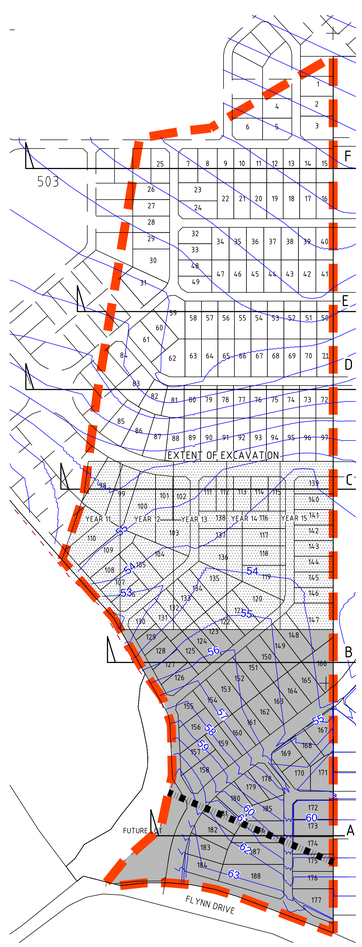

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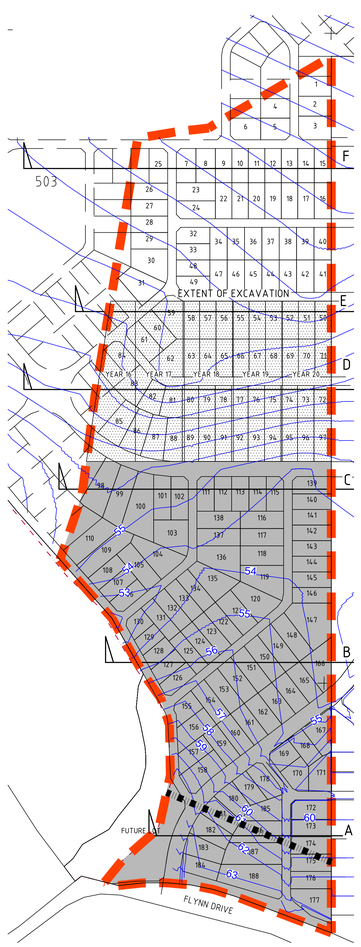

YEAR 16-20
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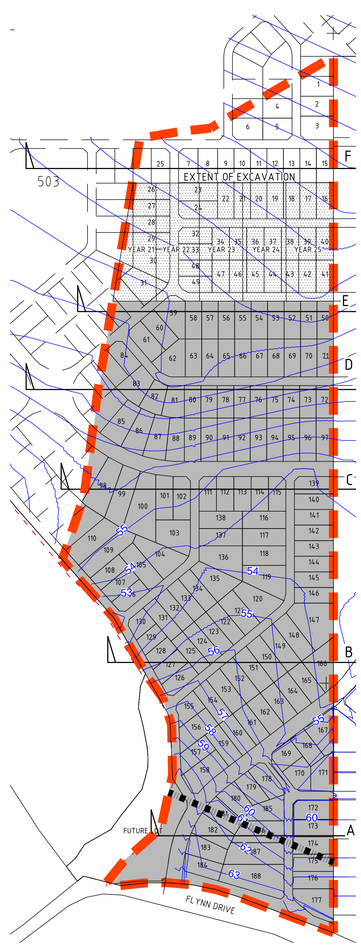
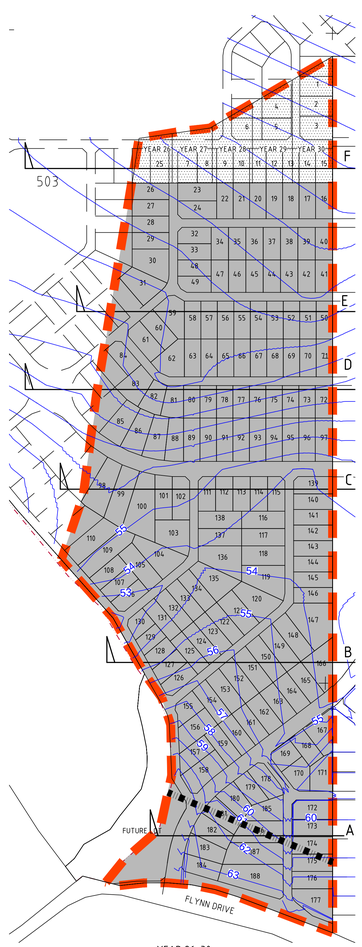
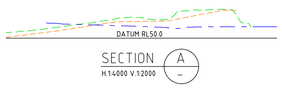


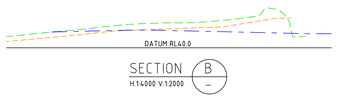
YEAR 21-25
SCALE 1:5000



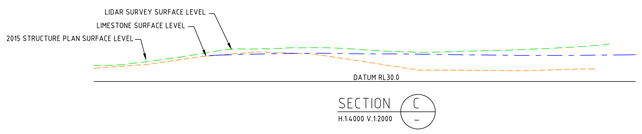
YEAR 26-30
SCALE 1:5000



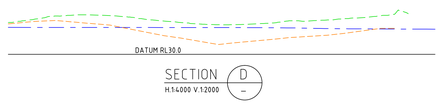
SECTION A
H.1:4000 V.1:2000



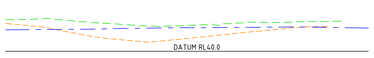
SECTION B
H.1:4000 V.1:2000



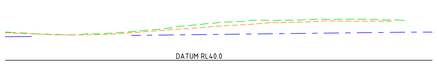
SECTION C
H.1:4000 V.1:2000



SECTION D
H.1:4000 V.1:2000

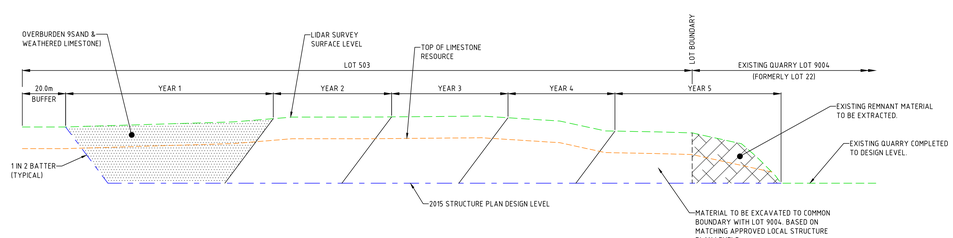


SECTION E
H.1:4000 V.1:2000



SECTION F
H.1:4000 V.1:2000

KEY PLAN
SCALE 1:10000



TYPICAL EXCAVATION SECTION PER 5 YEAR PERIOD

(REFER TO SECTIONS 'A' TO 'F' FOR DETAILS)
SCALE N.T.S.

NOTES:
1. EXCAVATION AREAS TO BE PROGRESSIVELY CLEARED. CLEARING TO BE X Ha AS PER APPROVED EXTRACTIVE No. LICENSE.

LEGEND

- DESIGN CONTOURS (2015)
- LIMESTONE CONTOURS
- NATURAL SURFACE (LIDAR CONTOURS)
- BALANCE AREAS TO BE EXCAVATED.
- CURRENT EXCAVATION (BASED ON YEAR OF ACTIVITY).
- AREAS WHERE PROGRESSIVE EXCAVATION WORKS ARE COMPLETED.

FOR DISCUSSION

1:5000 AT A0
0 50m 100m 200m 300m

No.	REVISION	BY	DATE
C	SERVICE INDUSTRIAL BOUNDARY ADDED	DA	05.02.19
B	APPLICATION BOUNDARY UPDATED	DA	29.01.19
A	ISSUED FOR DISCUSSION	DA	13.08.18

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BURSWOOD WA 6100
P.O. BOX 134
BURSWOOD WA 6100

CLIENT: LANDCORP

PROJECT:
NEERAUP INDUSTRIAL AREA
LOT 503 PHASE 1 AREA
FLYNN DRIVE, NEERABUP

DRAWING TITLE:
EXCAVATION STAGING PLAN
PHASE 1 AREA

SCALE	AS SHOWN	FILE	PC18027
HORIZONTAL		DESIGN	EBF
VERTICAL		DRAWN	DA
SURVEY DATUM	AHD	CHECKED	
WAPC No		DATE	JULY 18
CADFILE NAME	PC18027-CI-SK2	DRAWING No.	PC18027-CI-SK2
REV.	C		

THIS PLAN IS NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED BELOW.
APPROVED
.....

Appendix B – Site Photos

Photo 1: Background noise monitoring location at Lot 503 Flynn Drive, Neerabup

Photo 2: Background noise monitoring location at Lot 503 Flynn Drive, Neerabup

Photo 3: Crushing and screening plant – Existing quarry at Lot 501 Wattle Avenue, Nowergup

Photo 4: Generator – Existing quarry at Lot 501 Wattle Avenue, Nowergup

Photo 5: Crushing and screening plant – Existing quarry at Lot 501 Wattle Avenue, Nowergup

Photo 6: Conveyor – Existing quarry at Lot 501 Wattle Avenue, Nowergup

Photo 7: Generator – Existing quarry at Lot 501 Wattle Avenue, Nowergup

Photo 8: Conveyor – Existing quarry at Lot 501 Wattle Avenue, Nowergup

Photo 9: Crusher – Existing quarry at Lot 501 Wattle Avenue, Nowergup

Photo 10: Stockpile – Existing quarry at Lot 501 Wattle Avenue, Nowergup

Photo 11: Loader and product truck – Existing quarry at Lot 501 Wattle Avenue, Nowergup

Photo 12: View from top of existing quarry at Lot 501 Wattle Avenue, Nowergup

Photo 13: Bulldozer – Existing quarry at Lot 501 Wattle Avenue, Nowergup

Photo 14: View from Flynn Drive towards Lot 503 Flynn Drive, Neerabup

Photo 15: View from Flynn Drive towards 569 Flynn Drive, Carramar

Appendix C – Meteorological Data

Pearce RAAF Base, Western Australia
June 2019 Daily Weather Observations

Most observations from Pearce RAAF Base, but some from Perth Airport.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Sa	10.2	26.0	0		9.2	E	31	12:43	17.6	37		ENE	13	1029.7	25.4	16		NE	15	1027.4
2	Su	10.0	24.7	0		9.4	ENE	30	08:01	16.0	25		ENE	15	1032.3	24.0	14		E	11	1028.9
3	Mo	11.3	23.9	0		9.2	NE	43	02:34	15.1	34		NNE	15	1032.1	23.1	18		NE	19	1028.1
4	Tu	9.5	23.4	0		9.2	NE	46	08:54	14.6	49		NE	30	1029.7	23.0	21		NNE	13	1025.9
5	We	7.5	24.2	0		6.8	NNE	50	02:44	15.6	32		N	19	1024.2	23.1	15		NNE	22	1020.5
6	Th	12.6	23.2	0		0.0	NNE	72	09:00	18.9	15	8	NNE	46	1015.1	23.1	12	8	N	35	1010.1
7	Fr	10.7	18.7	19.0		5.2	N	67	01:30	13.3	92	8	N	28	1011.3	16.6	67	6	W	20	1011.9
8	Sa	9.6	20.3	7.2		4.6	NW	69	15:26	12.9	85	7	NNW	17	1011.3	18.1	54	8	NNW	35	1004.6
9	Su	9.3	17.5	15.6		5.6	W	57	13:46	12.9	74	6	NNW	6	1011.1	16.0	69	8	W	20	1010.6
10	Mo	12.4	18.7	10.2		1.7	WNW	81	12:59	15.1	91	8	NW	28	1003.8	11.9	90	8	W	30	1003.2
11	Tu	9.5	16.1	27.2		3.3	W	43	08:04	10.3	83	8	SSW	22	1010.8	14.6	74	7	NW	9	1013.4
12	We	9.1	18.2	8.4		5.0	SSW	35	10:35	12.5	88	7	N	13	1022.5	16.5	55	7	WSW	20	1021.5
13	Th	8.3	18.0	2.0		5.8	N	31	12:31	12.2	89	8	NE	9	1024.2	16.9	71	7	N	13	1022.5
14	Fr	7.3	17.6	1.0		4.9	NNW	50	15:27	11.7	94	8	E	9	1024.7	15.1	86	8	W	13	1022.3
15	Sa	7.5	18.6	5.0		4.3	SSW	31	05:12	11.6	95	8	NNE	7	1026.7	16.4	76	7	SSW	15	1025.2
16	Su	7.9	18.6	0		5.0	WSW	35	12:40	12.7	91	8	N	6	1027.4	15.5	79	8	SSW	20	1025.4
17	Mo	7.6	17.2	1.8		5.6	ENE	30	12:01	12.5	77	8	SSE	11	1030.4	15.7	55	6	E	17	1028.2
18	Tu	3.5	17.9	0		9.1	S	24	14:07	8.2	80		S	6	1028.7	16.8	46		S	7	1024.5
19	We	3.0	18.6	0		9.0	ENE	31	08:51	11.5	62		ENE	22	1024.5	17.8	37		E	15	1021.5
20	Th	4.8	19.3	0		5.3	ENE	39	07:48	11.9	48	1	ENE	20	1020.3	18.2	42	8	ENE	13	1016.9
21	Fr	11.8	23.5	0		8.9	ENE	37	00:45	16.9	47	2	NE	4	1014.0	23.0	35	5	NNW	19	1011.9
22	Sa	12.8	21.5	0		2.8	WSW	54	21:48	17.6	80	8	N	20	1011.8	20.3	64	7	N	15	1007.3
23	Su	13.9	20.1	48.4		4.0	NW	46	14:39	15.2	95	8	N	13	1010.1	17.9	67	8	WNW	37	1009.8
24	Mo	11.9	19.3	3.4		5.5	WNW	30	02:08	13.7	89	8	NNW	7	1020.8	18.3	58	7	WNW	15	1020.8
25	Tu	13.7	20.7	0		4.4	N	33	10:50	15.4	75	8	NNW	7	1022.8	19.6	49	6	N	17	1018.4
26	We	12.1	19.3	0.2		3.6	WSW	54	19:01	14.7	87	8	N	24	1011.6	18.3	87	8	NNW	22	1006.5
27	Th	11.2	17.4	23.6		3.7	WNW	76	12:16	12.0	89	8	NW	11	1010.6	12.3	81	8	WNW	31	1010.2
28	Fr	7.4	15.3	20.4		7.8	SSW	48	00:39	9.5	89	3	NNW	7	1024.2	14.7	58	3	SW	2	1024.8
29	Sa	8.7	18.2	0		2.4	NW	41	16:00	12.1	73	8	N	11	1026.1	16.9	60	8	NNW	24	1023.0
30	Su	11.0	16.4	0.2		0.2	WNW	33	15:30	11.9	75	8	N	19	1020.9	16.3	70	8	NW	20	1017.8
Statistics for June 2019																					
Mean		9.5	19.7			5.4				13.5	71	7		15	1020.5	18.2	54	7		18	1018.1
Lowest		3.0	15.3			0.0				8.2	15	1	NE	4	1003.8	11.9	12	3	SW	2	1003.2
Highest		13.9	26.0	48.4		9.4	WNW	81		18.9	95	8	NNE	46	1032.3	25.4	90	8	WNW	37	1028.9
Total				193.6		161.5															

Temperature, humidity, wind, pressure, cloud and rainfall observations are from Pearce RAAF {station 009053}. Sunshine observations are from Perth Airport {station 009021}

The mean sea level pressure at Perth Airport is provided for convenience. On most occasions it will be within 1 hPa of that at Pearce.Some cloud observations are from automated equipment; these are somewhat different to those made by a human observer and may not appear every day.

IDCJDW6108.201906 Prepared at 13:03 UTC on 1 Jul 2019

Appendix D – Noise Measurement Results

Unattended Noise Measurements
Lot 503 Flynn Drive, Neerabup

Environmental Noise Levels Day, Evening and Night

Logger Location - Southern boundary of Lot 503

ARL Environmental Noise Logger	
Logger Serial Number	8780D4
Measurement Title	20190619_150410
Measurement started at	19/06/2019 - 15:04:12
Measurement stopped at	02/07/2019 - 11:32:57
Frequency Weighting	A
Time Averaging	Slow
Statistical Interval	15 min
Pre-measurement Ref.	114.0
Post-measurement Ref.	114.0
Engineering Units	dB SPL

		$L_{Aeq,T}$ dB(A)			$L_{A01,T}$ dB(A)			$L_{A10,T}$ dB(A)			$L_{A90,T}$ dB(A)		
Date	**Day**	**D**	**E**	**N**	**D**	**E**	**N**	**D**	**E**	**N**	**D**	**E**	**N**
19/06/2019	Wednesday	—	51	47	—	60	58	—	55	49	—	35	35
20/06/2019	Thursday	55	51	46	63	60	56	58	54	48	48	38	37
21/06/2019	Friday	56	48	43	64	57	54	59	52	46	46	32	31
22/06/2019	Saturday	54	52	46	60	59	55	57	56	48	46	45	36
23/06/2019	Sunday	53	52	47	60	60	57	56	56	50	43	43	36
24/06/2019	Monday	55	48	43	63	58	55	59	52	44	45	30	29
25/06/2019	Tuesday	54	49	43	62	58	55	57	53	45	45	33	32
26/06/2019	Wednesday	56	51	53	64	59	61	59	55	56	48	40	43
27/06/2019	Thursday	59	52	49	65	60	59	62	56	52	51	41	37
28/06/2019	Friday	56	50	43	64	58	54	59	54	45	46	35	31
29/06/2019	Saturday	52	48	43	60	57	54	55	52	45	42	34	31
30/06/2019	Sunday	52	47	46	60	57	56	55	52	48	41	34	34
Average		**54**	**49**	**45**	**62**	**58**	**56**	**57**	**53**	**48**	**45**	**36**	**34**

Note

— No noise data available

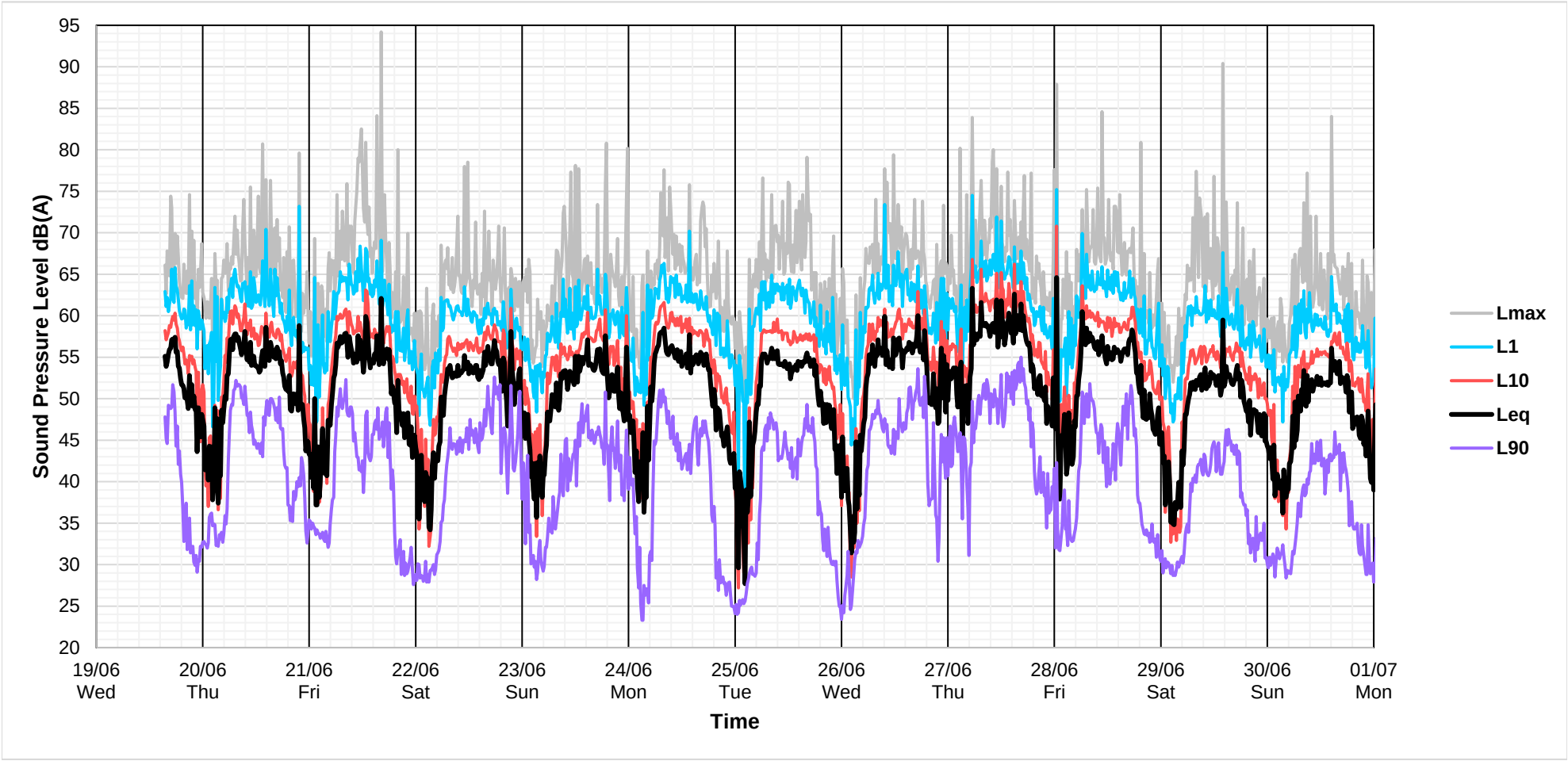
Day (D): 7:00am to 7:00pm

Evening (E): 7:00pm to 10:00pm

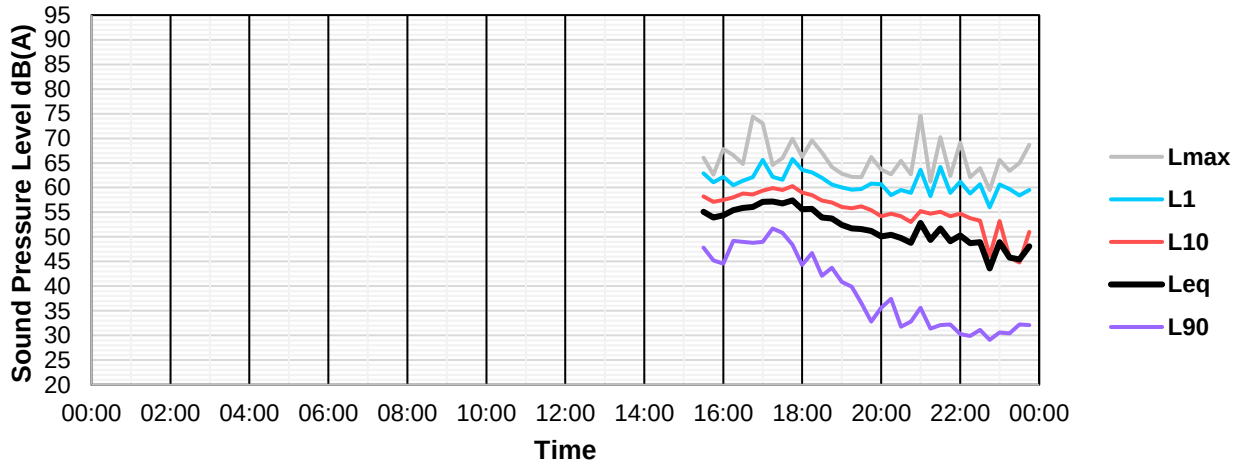
Night (N): 10:00pm to 7:00am

Rainfall recorded on this day

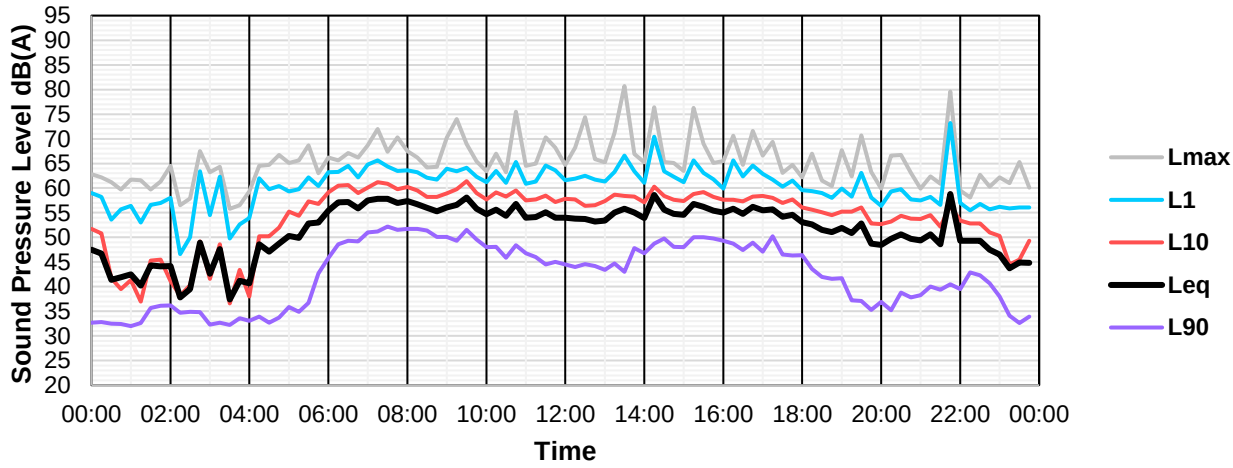
Unattended Noise Measurements
19 June to 30 June 2019



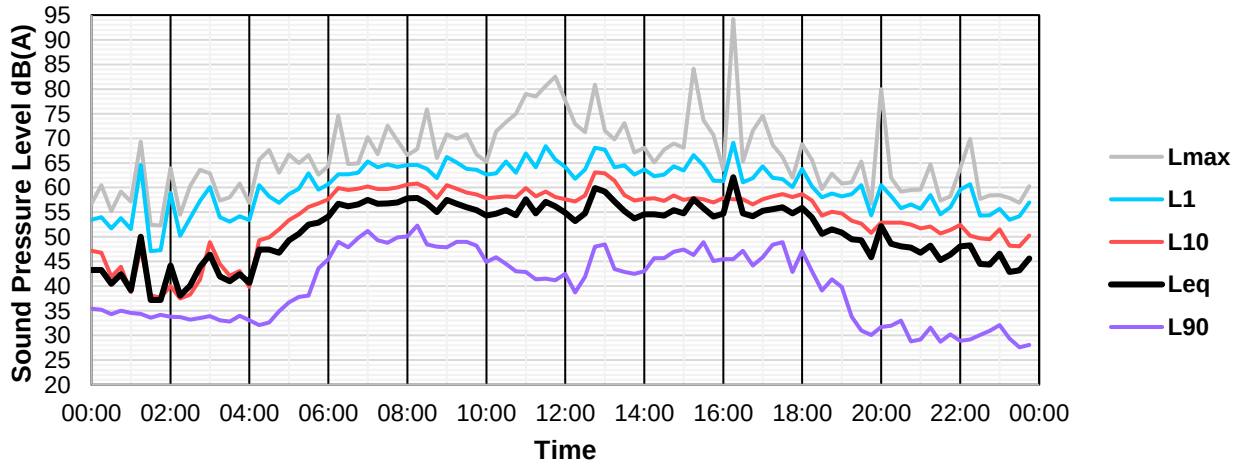
Unattended Noise Measurements
Wednesday 19 June 2019



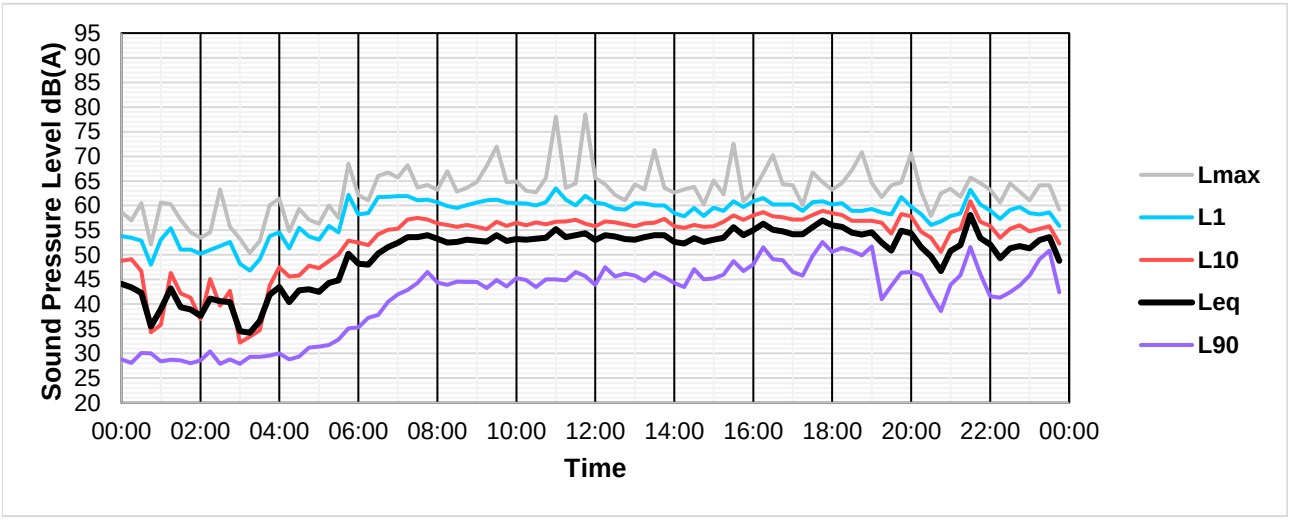
Unattended Noise Measurements
Thursday 20 June 2019



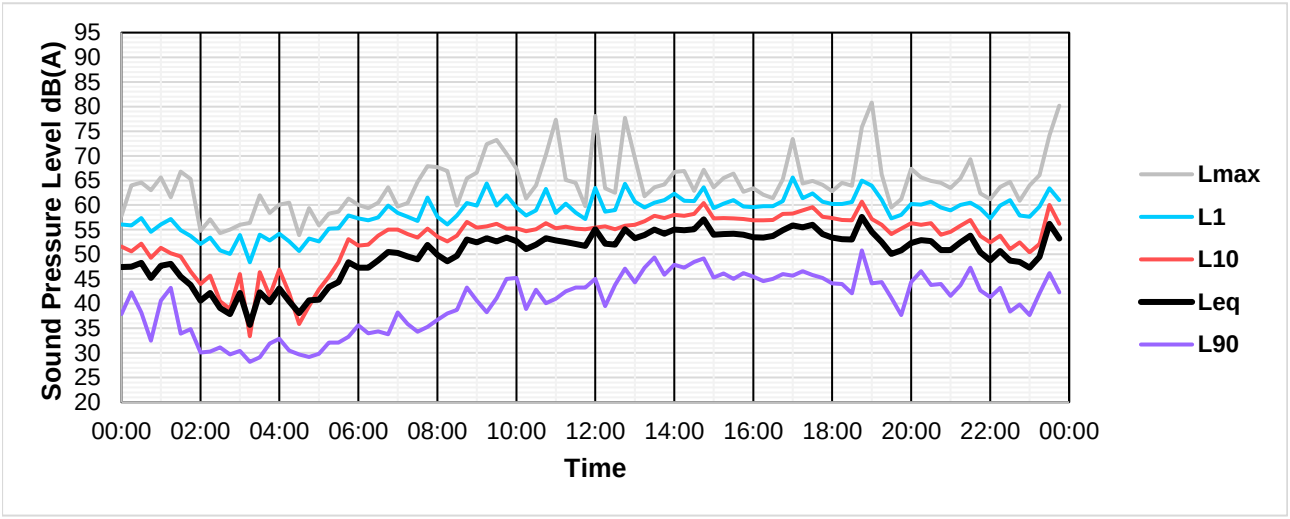
Unattended Noise Measurements
Friday 21 June 2019



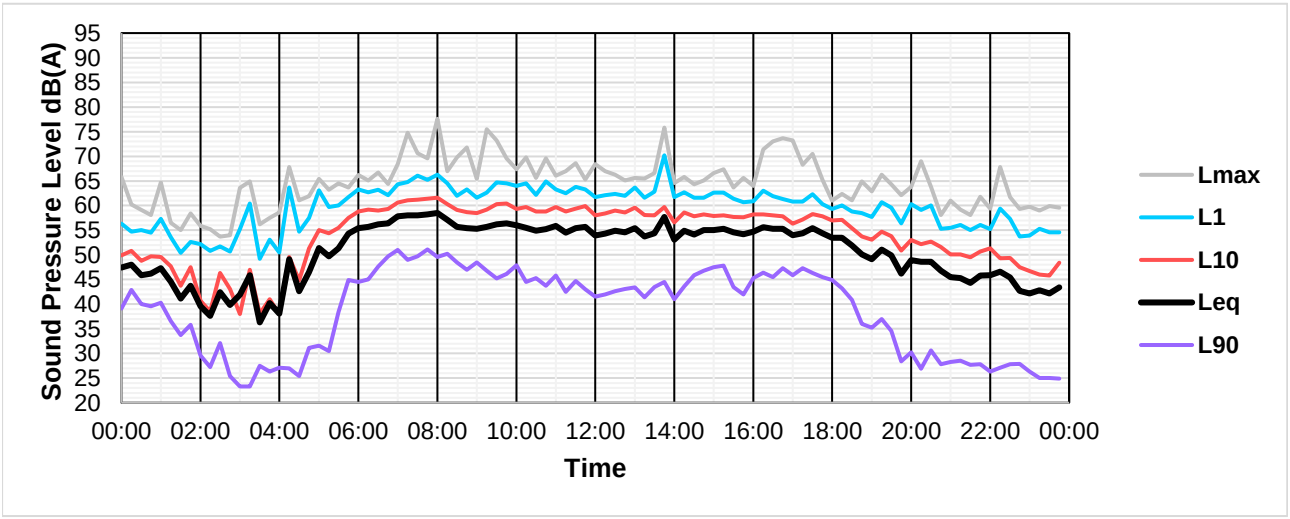
Unattended Noise Measurements
Saturday 22 June 2019



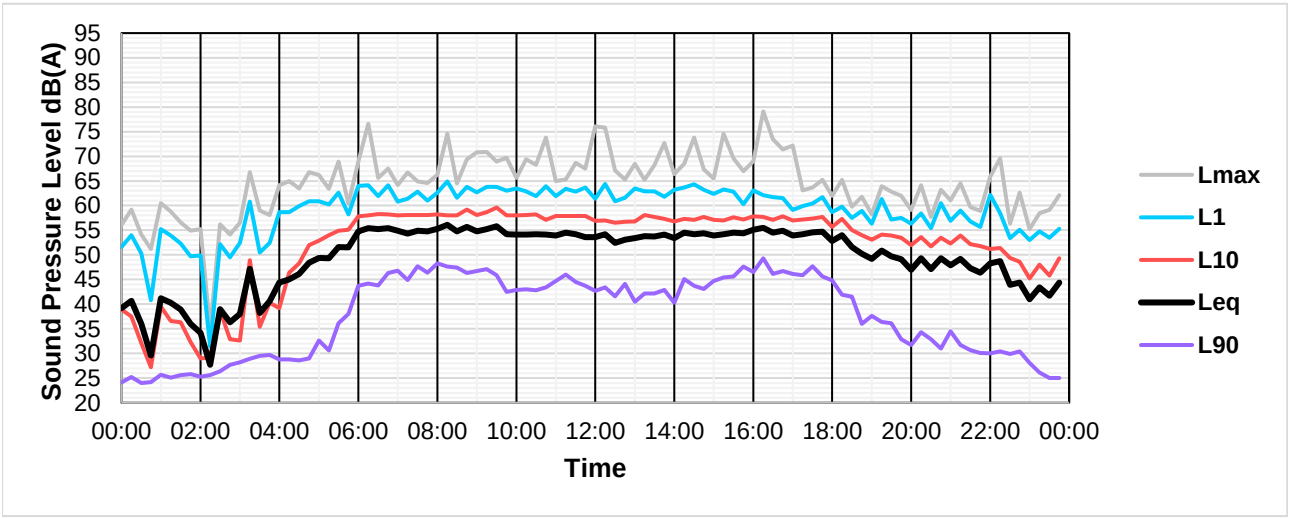
Unattended Noise Measurements
Sunday 23 June 2019



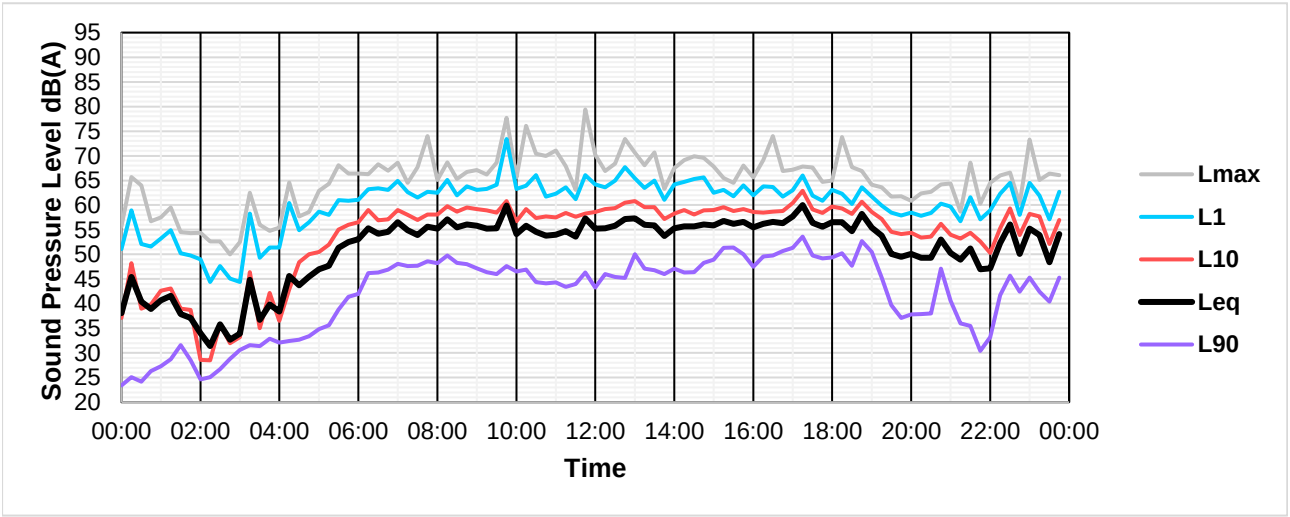
Unattended Noise Measurements
Monday 24 June 2019



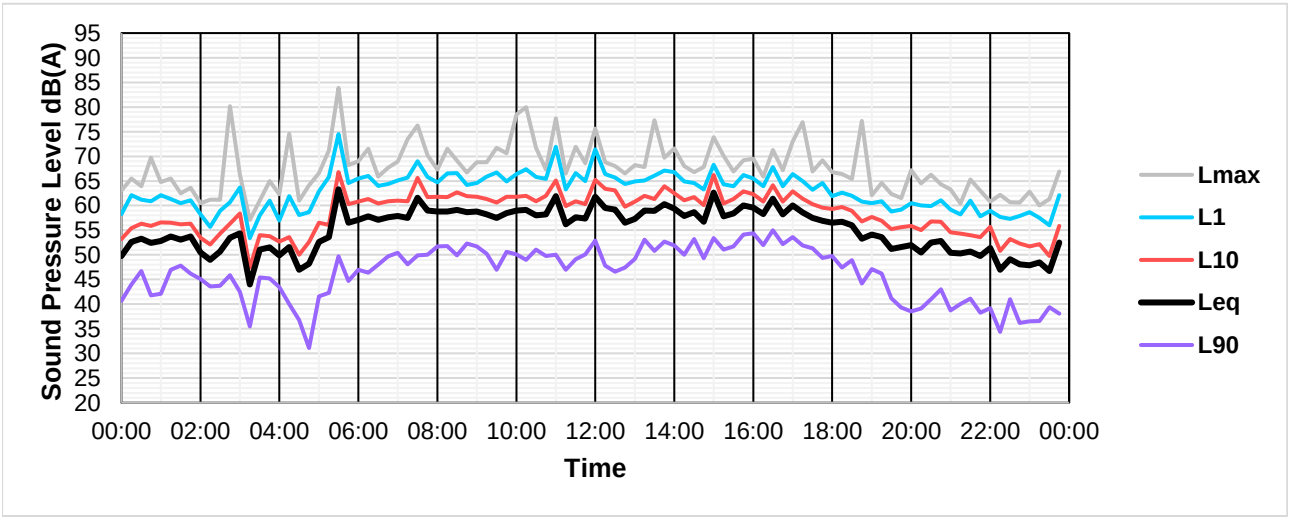
Unattended Noise Measurements
Tuesday 25 June 2019



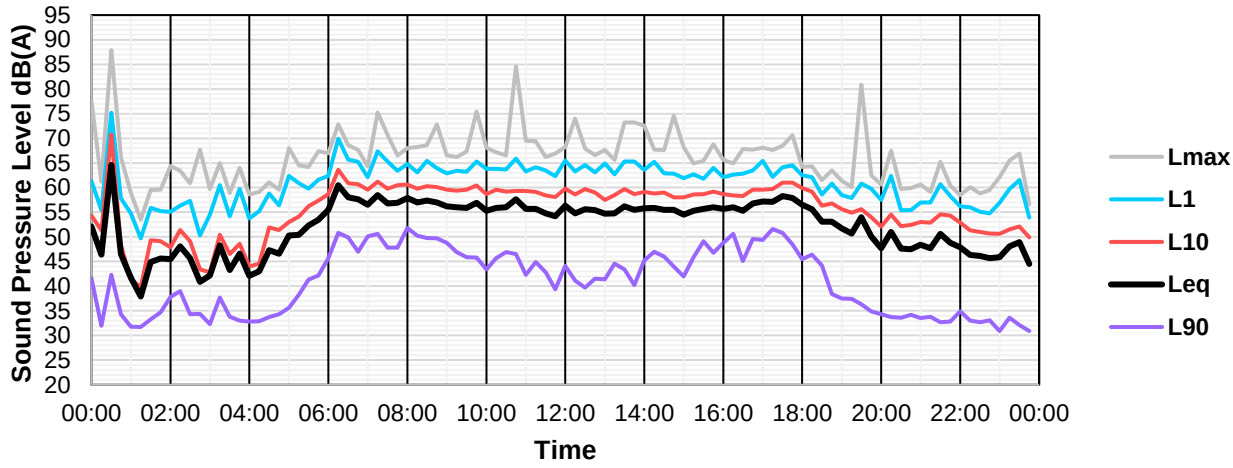
Unattended Noise Measurements
Wednesday 26 June 2019



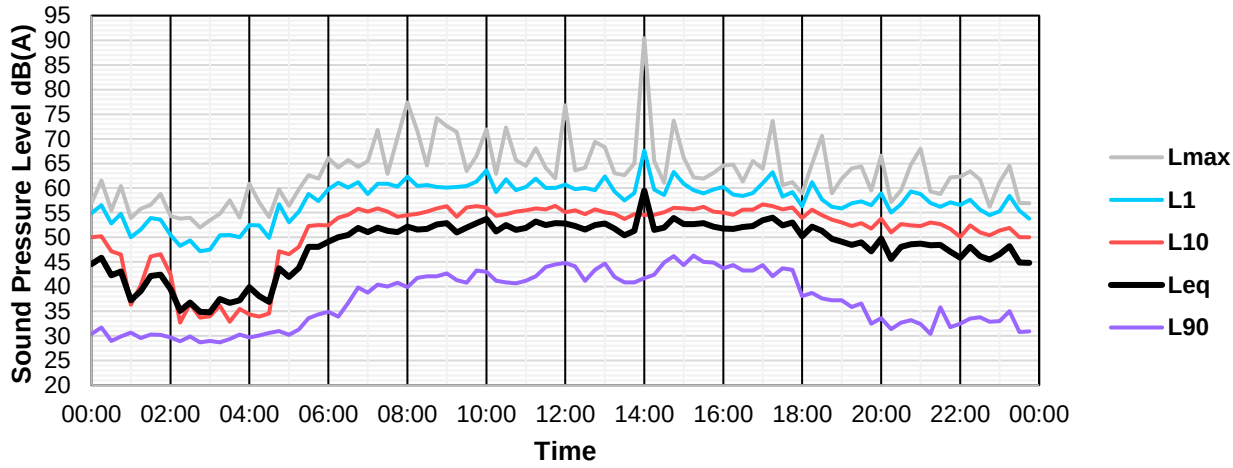
Unattended Noise Measurements
Thursday 27 June 2019



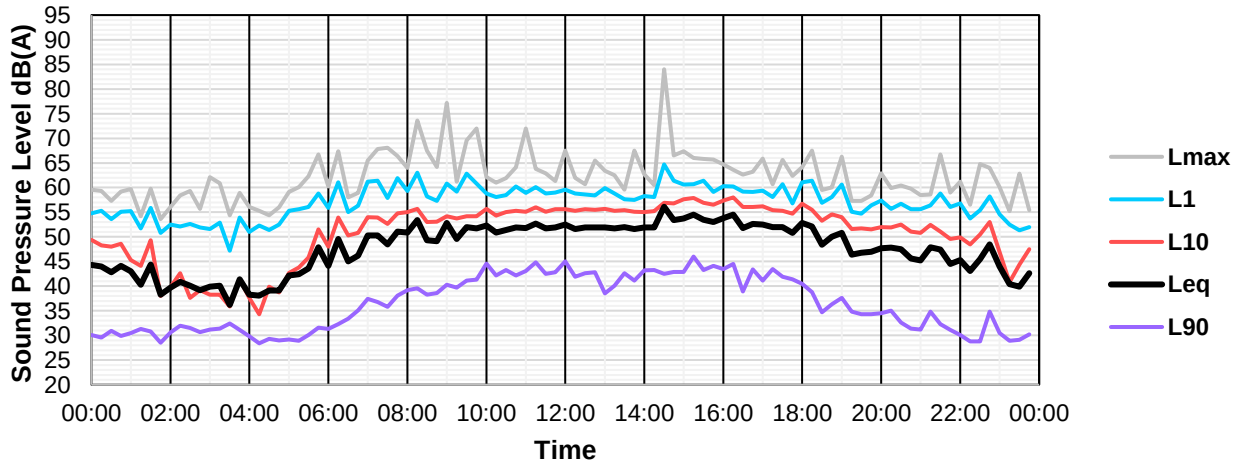
Unattended Noise Measurements
Friday 28 June 2019



Unattended Noise Measurements
Saturday 29 June 2019



Unattended Noise Measurements
Sunday 30 June 2019



Appendix E – Operational Noise Contour Maps

Clearing at Stage 1

ATP CONSULTING ENGINEERS

ATP190527

Initial Clearing Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Clearing with bulldozer at Stage 1

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

- Area source (clearing with dozer)
- Building

SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 50m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4

Years 1-5

ATP CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 1-5, Pit depth 3m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 50m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4

ATP CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 1-5, Pit depth 10m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 50m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4

ATP CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 1-5, Pit depth 20m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

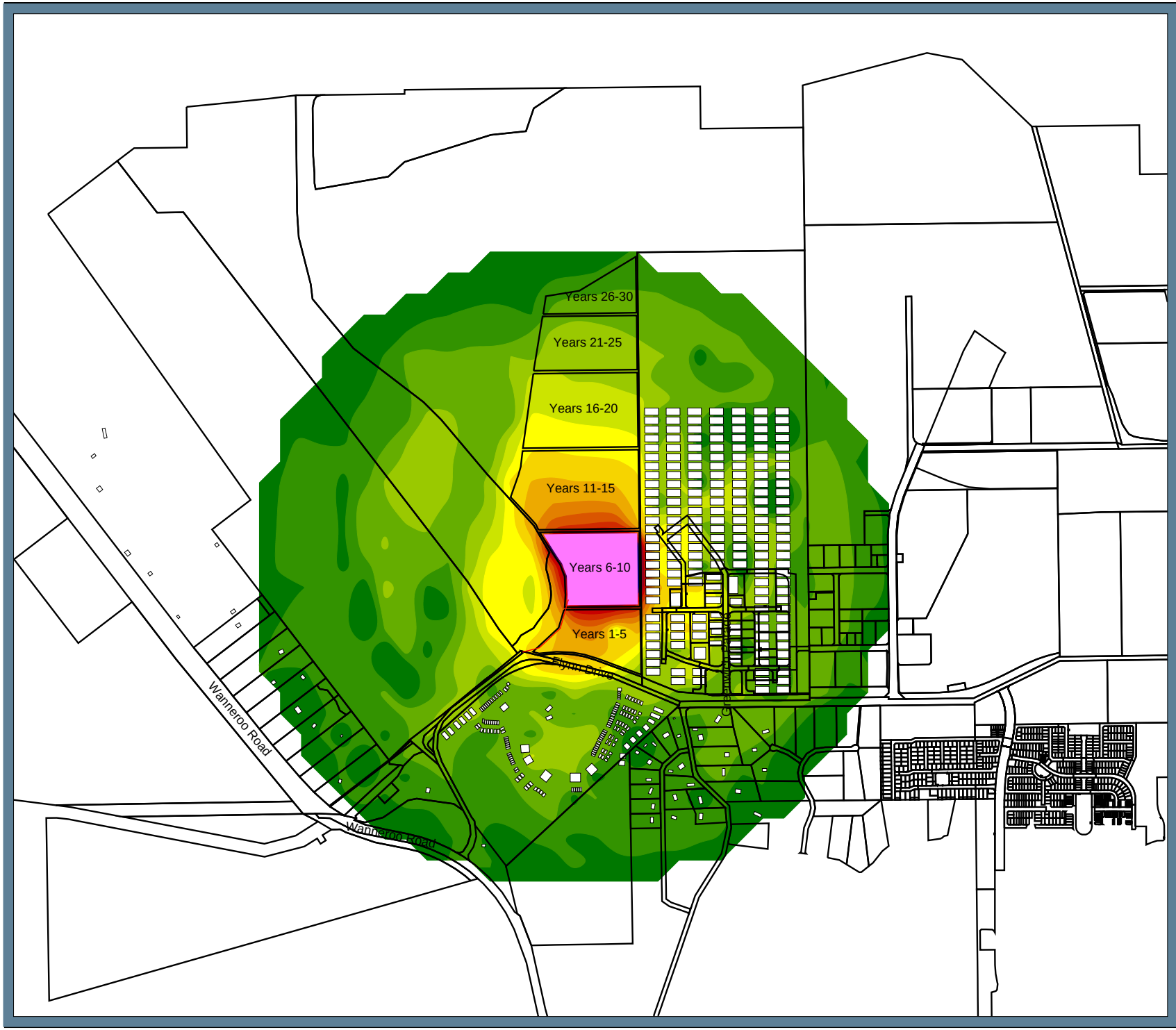
SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 50m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4

Years 6-10



ATP CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 6-10, Pit depth 3m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

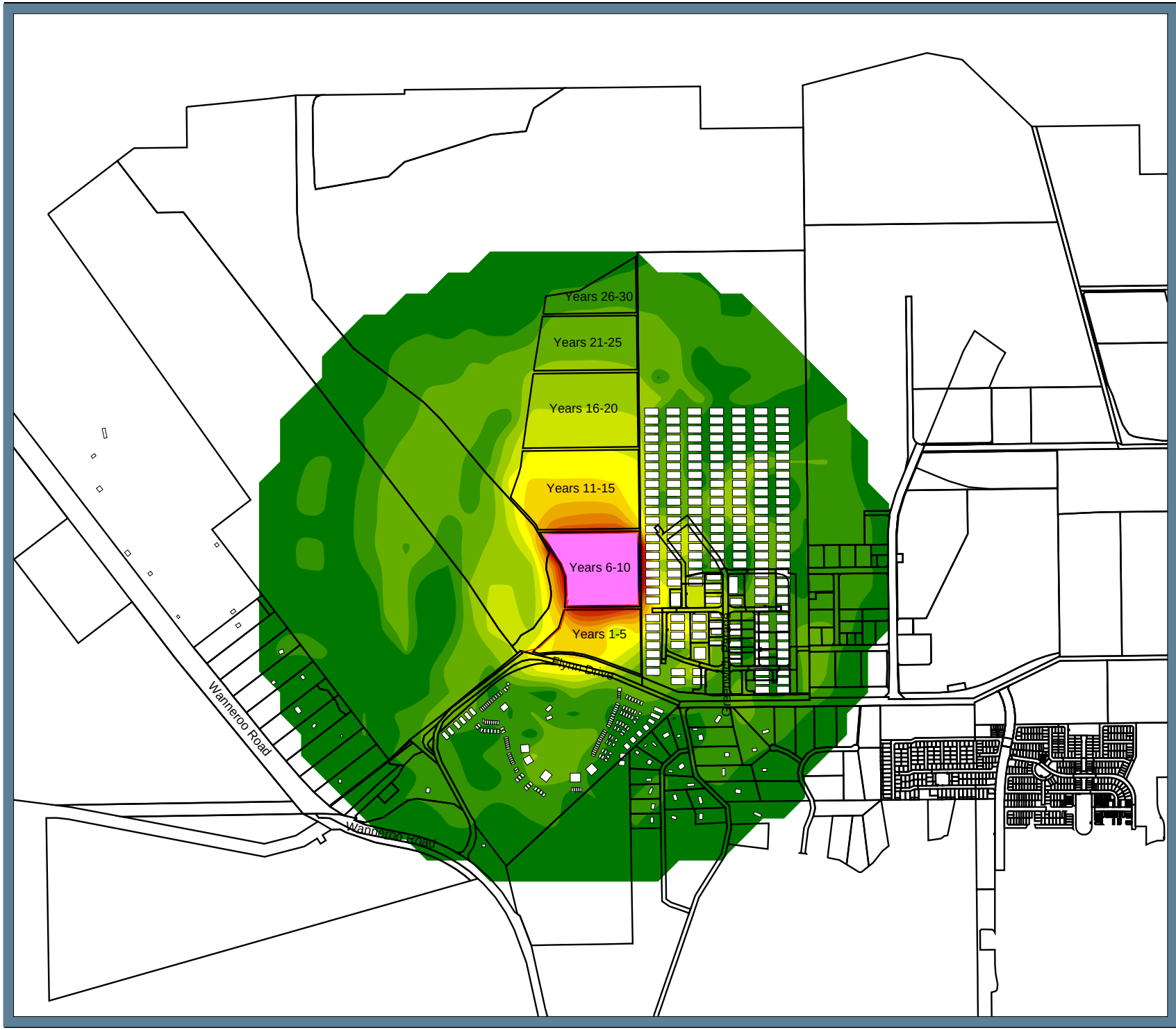
- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 100m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4



ATP CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 6-10, Pit depth 10m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

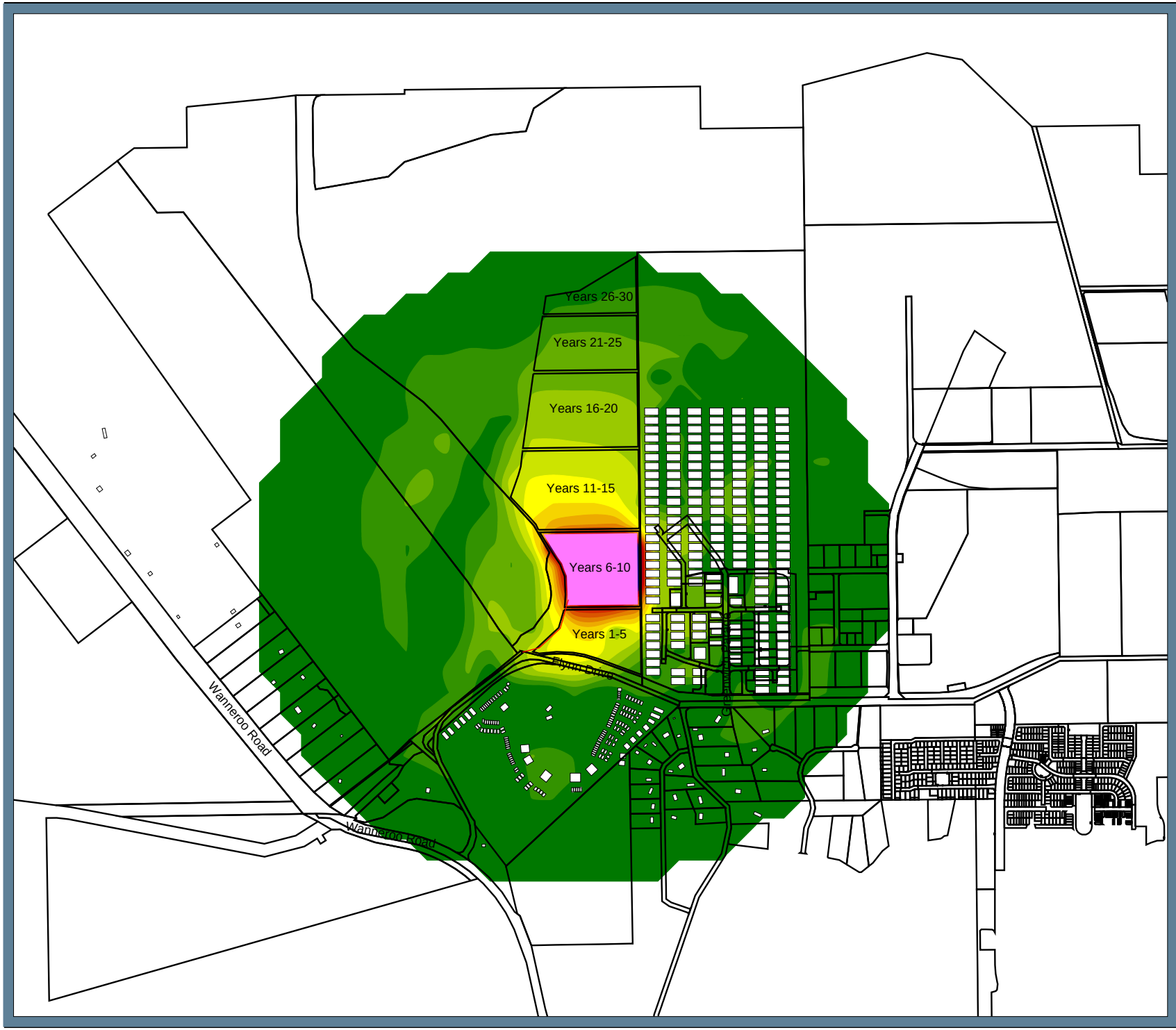
- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 100m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4



ATP CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 6-10, Pit depth 20m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

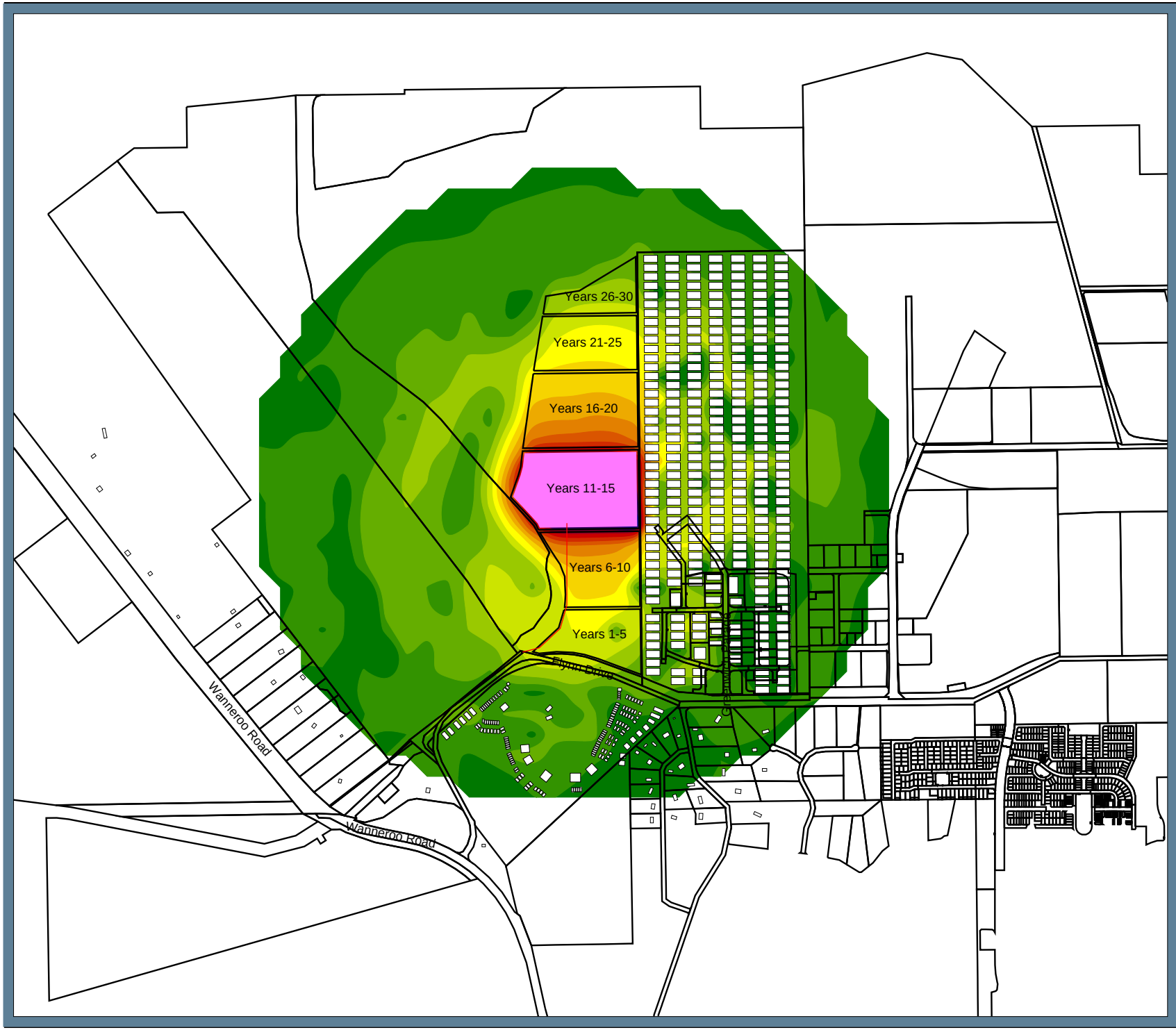
SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 100m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4

Years 11-15



ATP CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 11-15, Pit depth 3m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

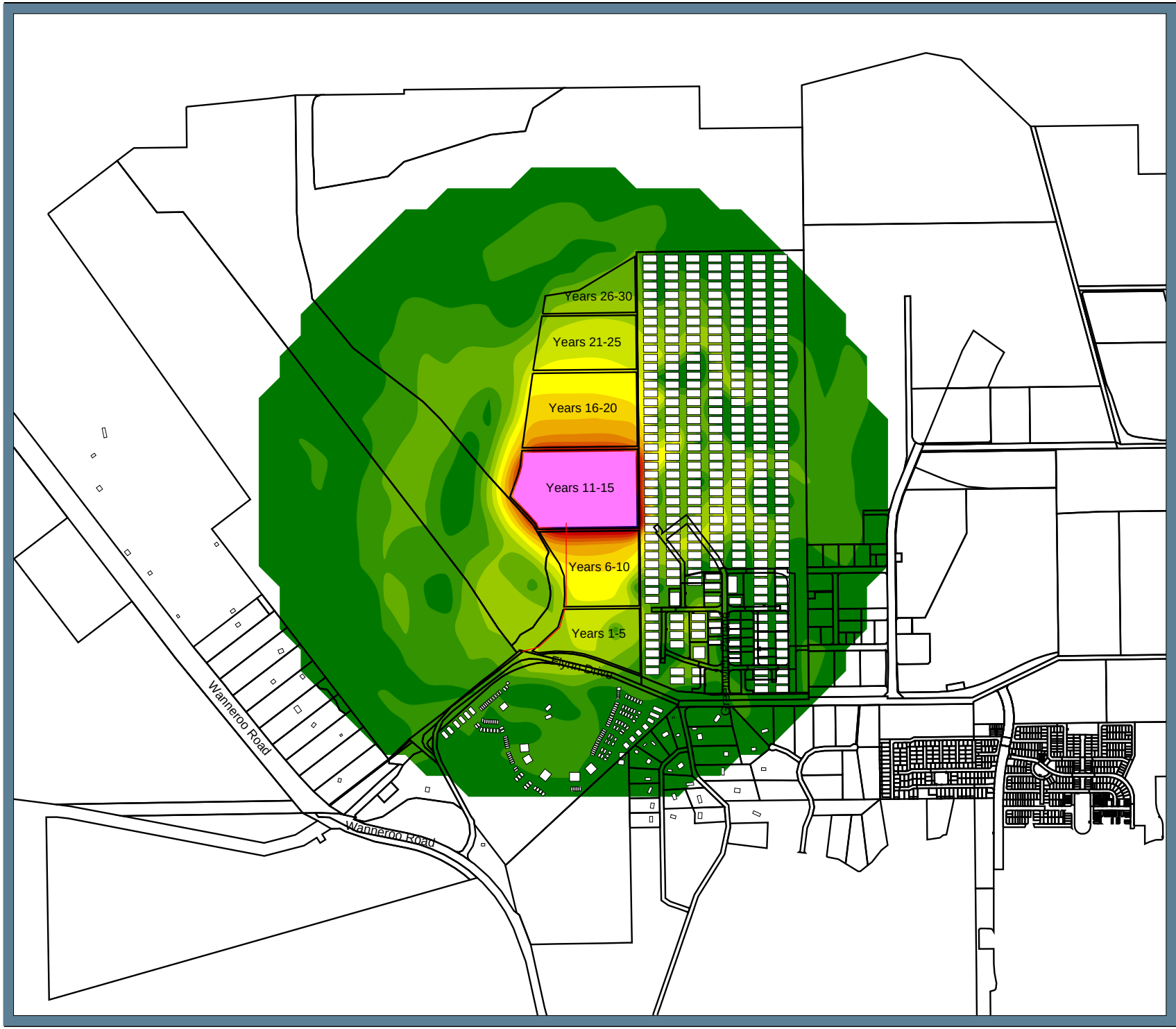
- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 100m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4



ATP CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 11-15, Pit depth 10m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

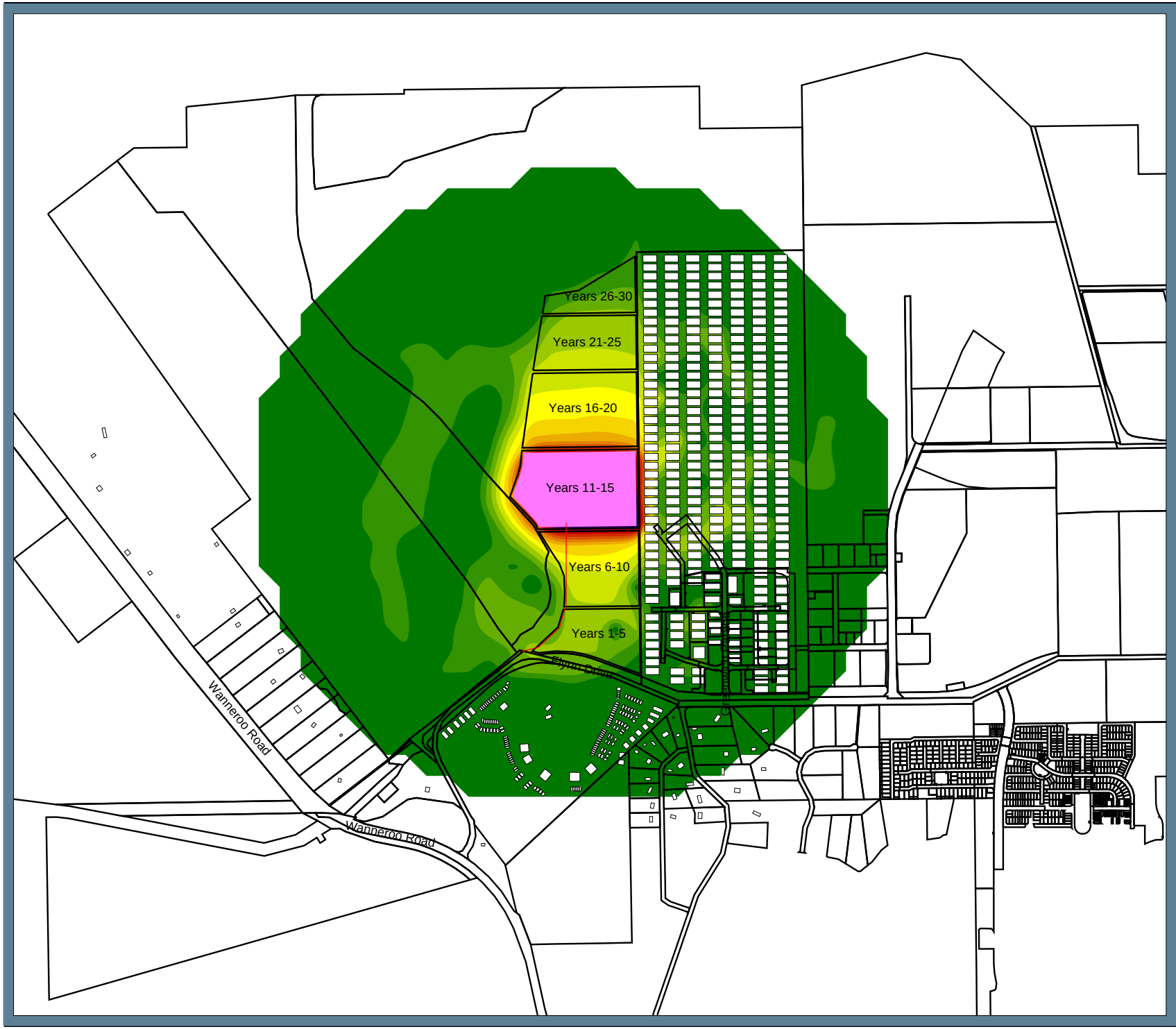
- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 100m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4



ATP CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 11-15, Pit depth 20m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
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45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

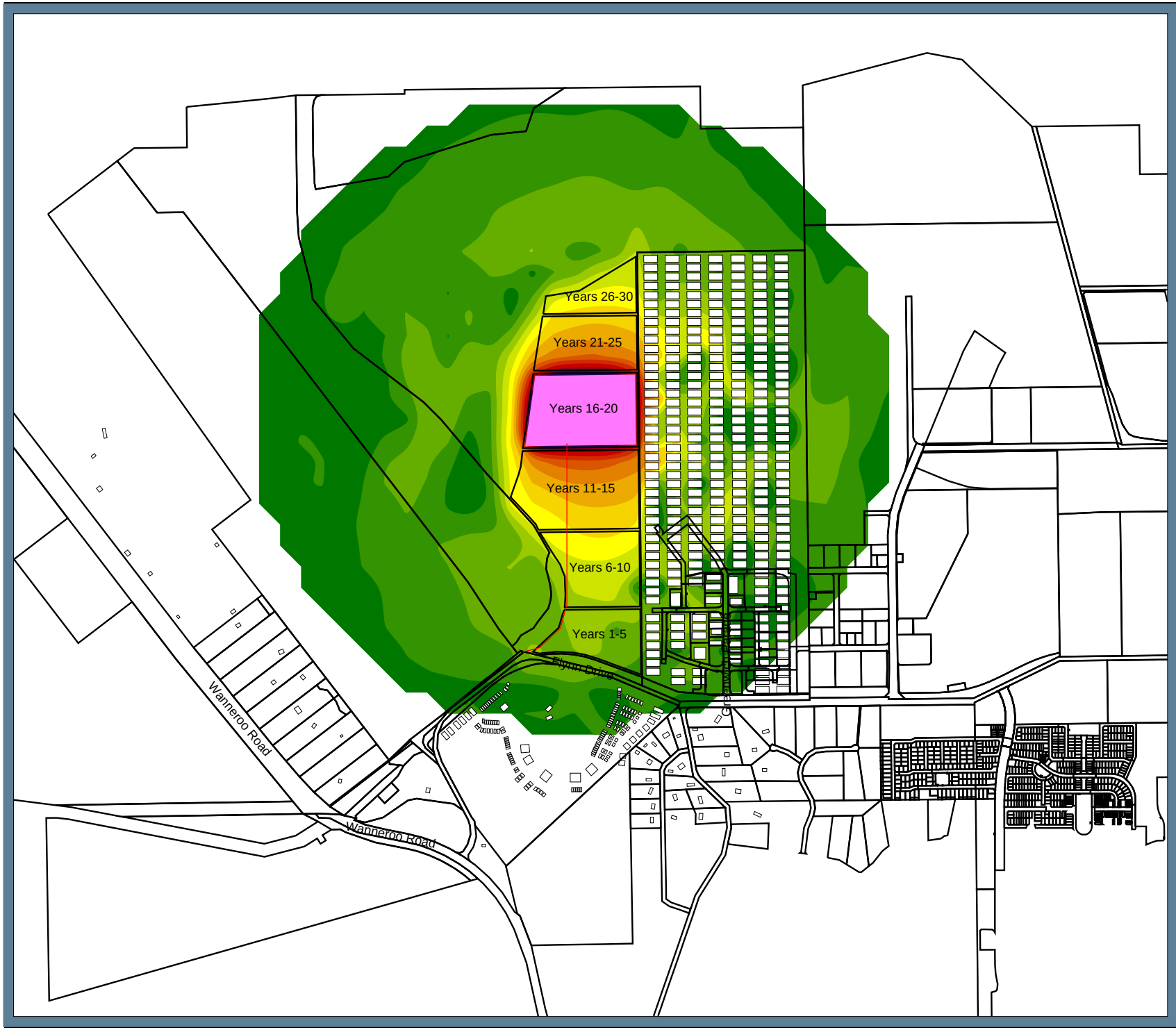
SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 100m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4

Years 16-20



ATP CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 16-20, Pit depth 3m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

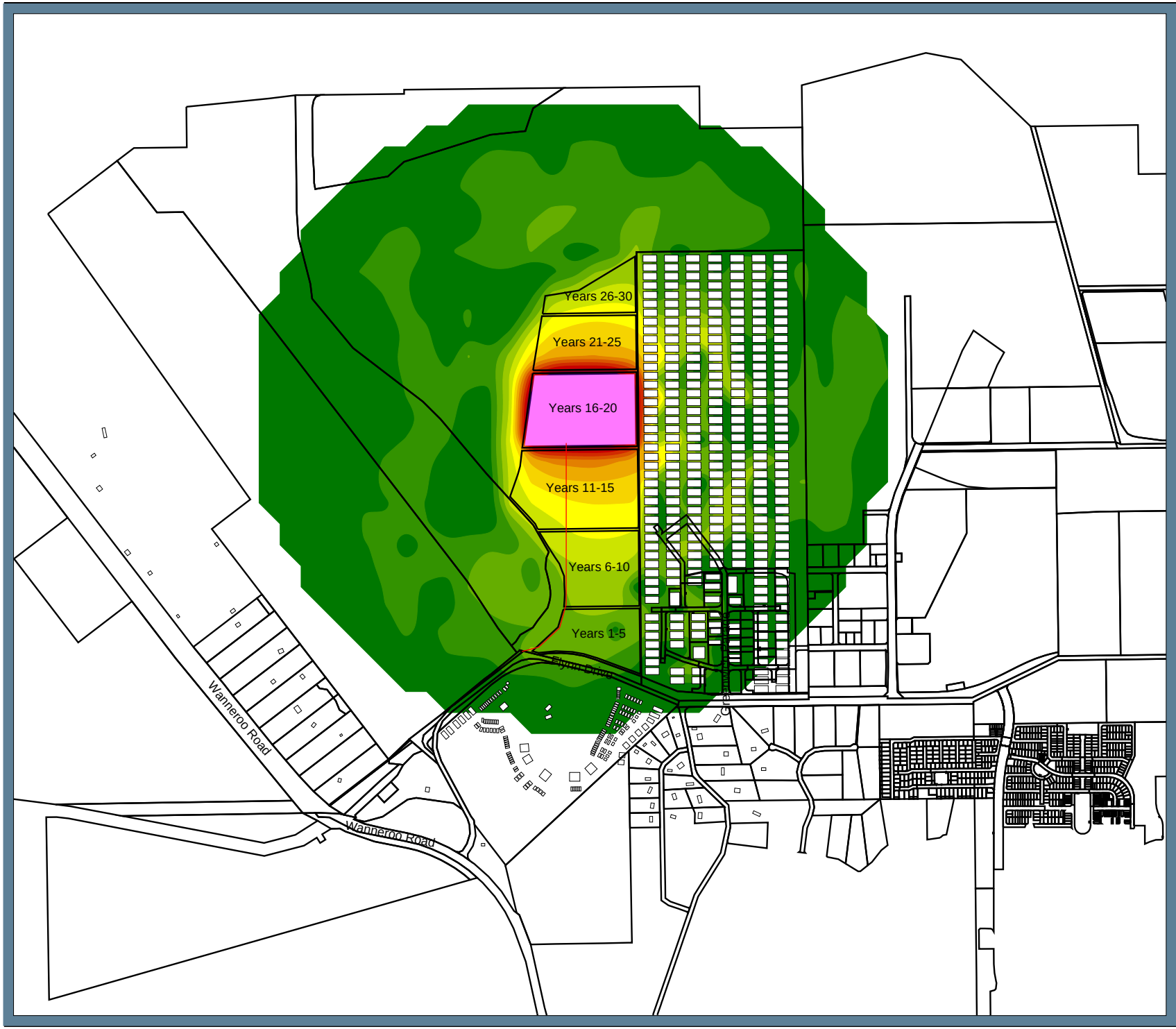
- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 100m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4



ATP CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 16-20, Pit depth 10m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
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45 <	<= 48
48 <	<= 51
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63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

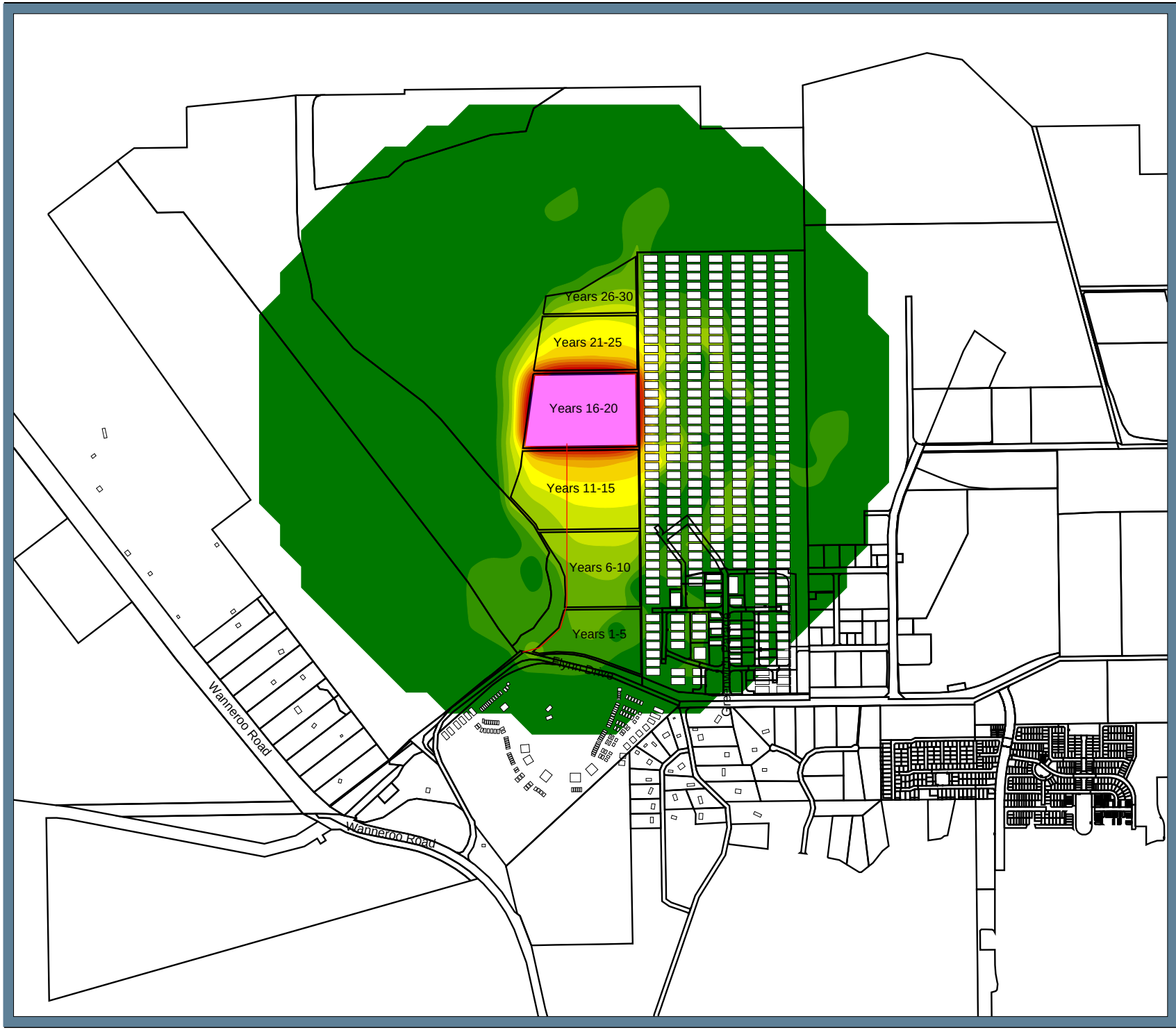
- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 100m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4



ATP CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 16-20, Pit depth 20m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

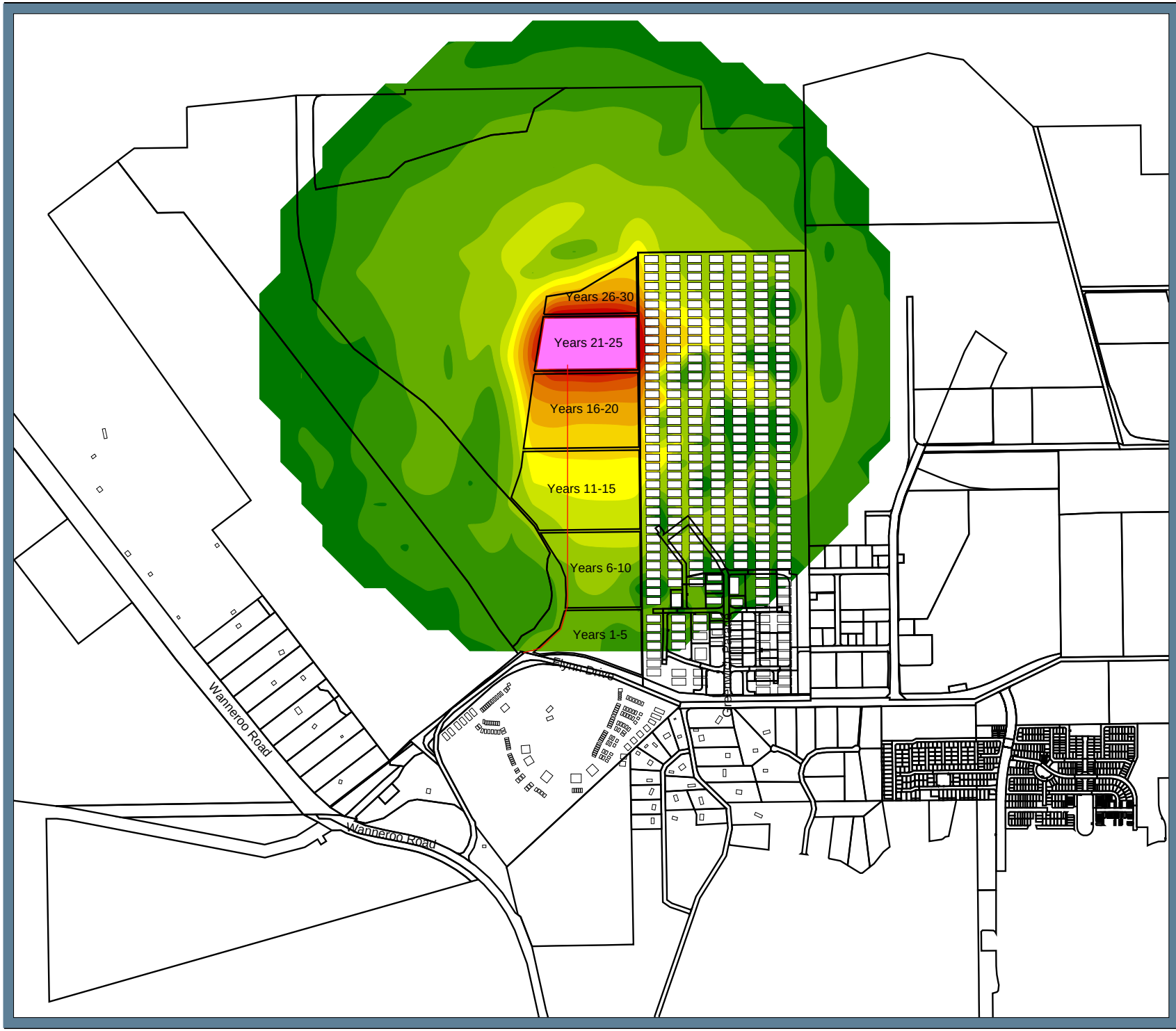
SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 100m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4

Years 21-25



ATP CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 21-25, Pit depth 3m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

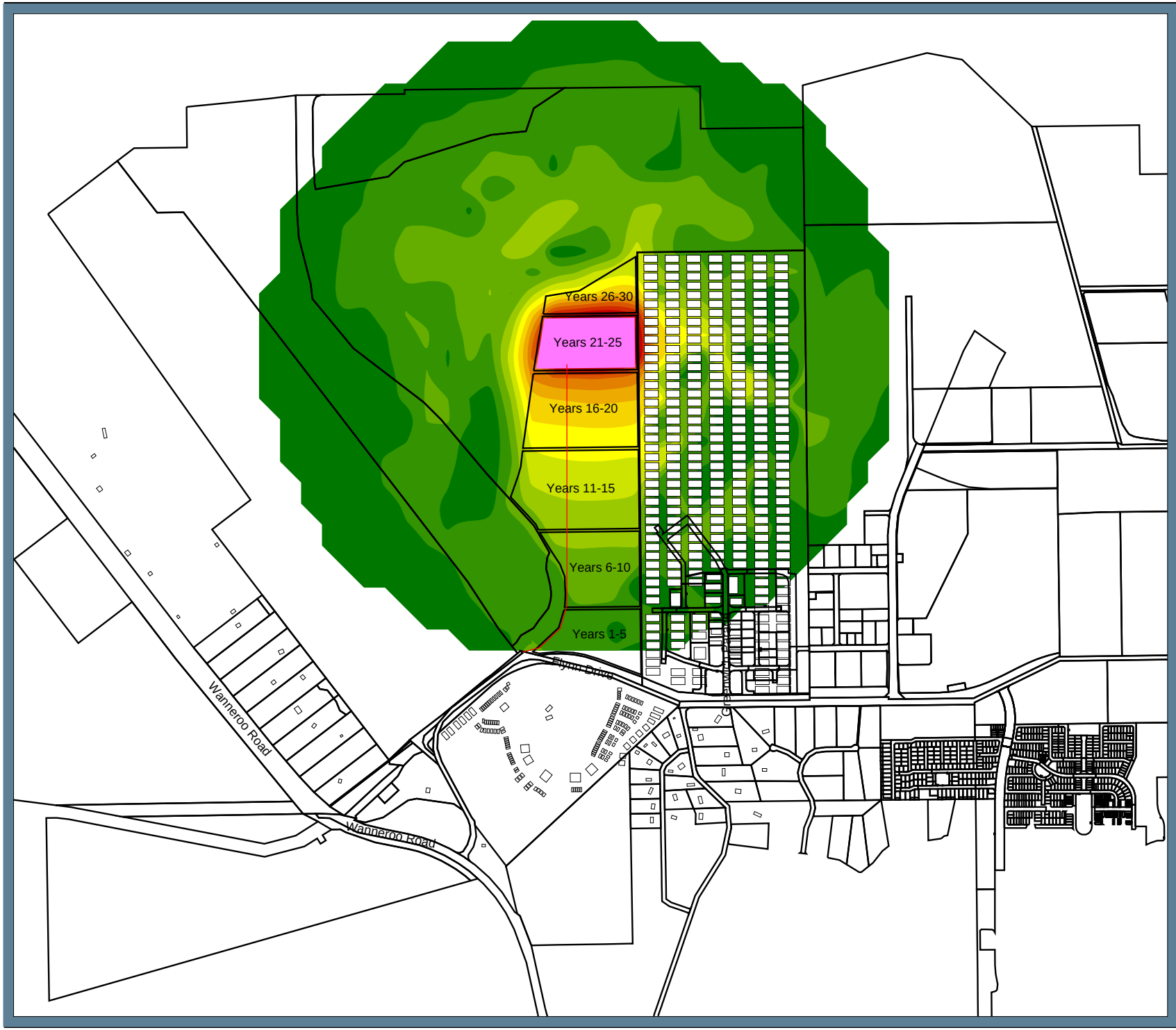
- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 100m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4



ATP CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 21-25, Pit depth 10m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 100m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4

ATP CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 21-25, Pit depth 20m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 100m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4

Years 26-30

CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 26-30, Pit depth 3m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 100m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4

CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 26-30, Pit depth 10m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 100m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4

CONSULTING ENGINEERS

ATP190527

Proposed Quarrying Operations Lot 503 Flynn Drive, Neerabup (Phase 1 Area)

Operational Noise Levels

Years 26-30, Pit depth 20m

$L_{10,adj,T}$ Day dB(A)
at 1.5m above ground level

	<= 33
33 <	<= 36
36 <	<= 39
39 <	<= 42
42 <	<= 45
45 <	<= 48
48 <	<= 51
51 <	<= 54
54 <	<= 57
57 <	<= 60
60 <	<= 63
63 <	<= 66
66 <	<= 69
69 <	<= 72
72 <	

Legend

- Area source (quarry)
- Line source (access road)
- 3m high earth mound
- Building

SCALE @ A4 1:25000

0 100 200 400 600 800 1000 m

N

Grid Spacing: 100m
Project Engineer: Sam Fraser
Created: 3/07/2019
Processed with SoundPLAN 7.4

APPENDIX J – Application for an Extractive Industry Licence

Local Government Act 1998
City of Wanneroo

APPLICATION
FOR AN EXTRACTIVE INDUSTRY LICENCE

1. Name LandCorp (Western Australian Land Authority (Applicant)

2. Address Level 6, 40 The Esplanade,

Perth, WA 6000

3. Telephone...9482 7833

4. Address and locality of proposed excavation site .....

Lot 503 398 Wattle Avenue, Neerabup

5. Lot No 503

7. Plan or Diagram No ...DP 409677.....

8. Certificate of Title Volume 2915 Folio 803

9. Owner of the land
.....Western Australian Land Authority.....

10. Address of Owner of the Land .....
Locked Bag 5, Perth Business Centre, Perth WA 6849

11. Material to be excavated Limestone and sand.....

12. If the application covers land that is the subject if an existing licence:

Date of Issue of the licence .....

Date of expiration of that licence .....

Conditions applicable to that licence .....

.....

13. Term of licence sought .....20 Years.....

14. Previously Submitted with this application :

(a) 3 copies of excavation site plans and supporting information in accordance with Clause 8(1)(a);
(b) 3 copies of works and excavation program in accordance with Clause 8(1)(b);
(c) 3 copies of rehabilitation and decommissioning program in accordance with 8(1)(c);
(d) datum peg evidence;
(e) Licensed surveyor's certificate certifying the correctness of 8(1) (a) and (d) above;
(f) Evidence of compliance with Clause 9 (1) and (2);
(g) Copies of all land use planning approvals;
(h) Written consent of the owner of the excavation site;
(i) And other information that the local government has required;
(j) Licence application fee

The application applies for a licence in respect of the proposed excavation site in accordance with and subject to the City of Wanneroo Local Law relating to Extractive Industries.

Dated this .....Fifteenth..... day of .....May..... 2019

.....
Signature of Applicant

.....
Signature of Owner of the Land

.....
Signature of existing licensee
(if applicable)

APPENDIX K – Department of the Environment and Energy (EPBC)

Approval

Neerabup Industrial Estate, Neerabup, WA (EPBC 2012/6424)

This decision is made under sections 130(1) and 133 of the *Environment Protection and Biodiversity Conservation Act 1999*.

Proposed action

person to whom the approval is granted	Western Australian Land Authority
proponent's ABN	34 868 192 835
proposed action	To clear native vegetation and extract limestone at Flynn Drive, Neerabup, WA, then construct an industrial development area [See EPBC Act referral 2012/6424, variation request received 4 December 2013, and variation request received 8 December 2017].

Approval

Controlling Provision	Decision
Listed threatened species and communities (sections 18 & 18A)	Approve

conditions of approval

This approval is subject to the conditions specified below.

expiry date of approval

This approval has effect until 30 June 2033.

Decision-maker

name and position	Gregory Manning Assistant Secretary Assessments (WA, SA, NT) and Post Approvals Branch
signature	
date of decision	20 September 2018

Conditions attached to the approval

1. The person taking the action must not **clear** more than 69.2 hectares of **Carnaby's Black Cockatoo habitat** within the **project area**.

2. To avoid potential impacts on **Carnaby's Black Cockatoo**, the person taking the action must ensure that **clearing** conducted during the breeding season (August to December) is preceded by investigations to detect the presence of **Carnaby's Black Cockatoo**. The person taking the action must:

    a. within (7) seven days prior to **clearing**, ensure that all **suitable nesting trees** to be **cleared** are investigated to detect the presence of **Carnaby's Black Cockatoos** in a hollow or hollows;

    b. ensure the investigation is undertaken by a **suitably qualified and experienced person**; and

    c. prior to conducting the investigation/s, notify the **Department** of the **suitably qualified and experienced person** appointed to undertake the investigation/s.

3. If a **Carnaby's Black Cockatoo** is detected in a hollow or hollows, the person taking the action must:

    a. Notify the **Department** in writing that a **Carnaby's Black Cockatoo** was detected in a **suitable nesting tree or trees**;

    b. Clearly mark all **suitable nesting trees** with fencing and signage that must be located within two metres of the base of each **suitable nesting tree**;

    c. Not **clear** any **suitable nesting tree** or any vegetation within 10 metres of any **suitable nesting tree** until a **suitably qualified and experienced person** has verified in writing that the hollow or hollows is no longer being used by a **Carnaby's Black Cockatoo**; and

    d. Within (5) five days of the **suitably qualified and experienced person** verifying that the hollow or hollows are no longer being used by a **Carnaby's Black Cockatoo**, provide the **Department** with written evidence from the **suitably qualified and experienced person** confirming their verification.

4. The person taking the action must maintain or improve the **habitat quality** of the existing **Carnaby's Black Cockatoo foraging and/or breeding habitat** at the **offset property** for a minimum of (20) twenty years from the date of this approval.

5. Within (30) thirty days after the **commencement** of the action, the person taking the action must advise the **Department** in writing of the actual date of **commencement**.

6. The person taking the action must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval and make them available upon request to the **Department**. Such records may be subject to audit by the **Department** or an independent auditor in accordance with section 458 of the **EPBC Act**, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the **Department's** website. The results of audits may also be publicised through the general media.

7. Within (3) three months of every (12) twelve month anniversary of the **commencement** of the action, the person taking the action must publish a report on their website addressing compliance with each of the conditions of this approval. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the **Department** at the same time as the compliance report is published.

8. Within (30) thirty days after **completion** of the action, the person taking the action must advise the **Department** in writing of the actual date of **completion** and provide a map clearly defining the location and boundaries of **Carnaby's Black Cockatoo habitat** that has been **cleared** within the **project area**, and be accompanied with a **shapefile**.

9. Upon the direction of the **Minister**, the person taking the action must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the **Minister**. The independent auditor must be approved by the **Minister** prior to the commencement of the audit. Audit criteria must be agreed to by the **Minister** and the audit report must address the criteria to the satisfaction of the **Minister**.

10. If, at any time after (5) five years from the date of this approval, the person taking the action has not **commenced** the action, then the person taking the action must not **commence** the action without the written agreement of the **Minister**.

Definitions

Carnaby's Black Cockatoo is the **EPBC Act** listed threatened species *Calyptorhynchus latirostris.*

Carnaby's Black Cockatoo habitat is foraging habitat in the form of *Banksia sessilis* Tall Open scrub and *Banksia* woodland, and potential breeding habitat in the form of Tuart (*Eucalyptus gomphocephala*), Marri (*Corymbia calophylla*) and Jarrah (*E. marginata*) woodland.

Carnaby's Black Cockatoo foraging and/or breeding habitat is foraging habitat in the form of *Banksia* woodland, Marri (*Corymbia calophylla*) - Jarrah (*E. marginata*) woodland and/or potential breeding habitat in the form of Tuart (*E. gomphocephala*) forest containing Tuart trees with a diameter at breast height of 50 centimetres or greater, or Marri (*E. marginata*) – Jarrah (*E. marginata*) woodland that contains Marri or Jarrah trees with a diameter at breast height of 50 centimetres or greater.

clear, clearing or cleared is the killing or destruction, removal, severing or ringbarking of trunks or stems, or the doing of any other substantial damage to the vegetation in the **project area**.

commence/commencement/commenced is any ground disturbing activities that are associated with the action, including vegetation **clearing** or construction of infrastructure, blasting, earthmoving, grading and gravel extraction but excluding construction of fences, signage or geotechnical investigations.

completed or **completion** is the time at which the approved action has reached the maximum allowable clearing limit (as defined in Condition 1).

Department is the Australian Government Department or any other agency administering the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

EPBC Act is the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

habitat quality is the ecological condition of a place that enables **Carnaby's Black Cockatoo** to persist.

independent person is a person that provides impartial and credible advice to the party that commissions them.

Minister is the Commonwealth Minister administering the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) and includes a delegate of the Minister.

offset attributes is an excel file ('.xls') capturing relevant attributes of the **offset property**, including the corresponding **EPBC Act** reference ID number, the physical address of the **offset property**, coordinates of the boundary points in decimal degrees, the **EPBC Act** protected matters for which the **offset property** compensates, any additional **EPBC Act** protected matters that are benefiting from the **offset property**, the size of the **offset property** in hectares and the legal mechanism used to protect and conserve the **offset property**.

offset property is an area of land labelled 'Offset Area' on the map at Appendix 2. It is within Lot 1, Wannamal Road West, Mindarra, Western Australia.

project area is the area labelled 'Project Area' on the map at Appendix 1.

shapefile means an ESRI shapefile containing '.shp', '.shx' and .'dbf' files and other files capturing attributes of the **offset property** and the **completed** action, including the shape, **EPBC Act** reference ID number, **offset attributes** and **EPBC Act** protected matters relevant to the site.

suitable nesting tree or trees are mature Tuart (*Eucalyptus gomphocephala*), Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*) trees with a diameter at breast height of 50 centimetres or greater, with one or more hollows at least 20 centimetres in diameter.

suitably qualified and experienced person is an **independent person** with relevant tertiary qualifications and a minimum of 5 years' experience surveying **Carnaby's Black Cockatoos** in the South West of Western Australia.

Appendix 1: Neerabup Industrial Estate (Stage 1)

Legend

- Lot 503
- Lot 701 (superseded)
- Project Area
- Bush Forever Site

0 150 300 600
Metres
Datum/Projection:
GDA 1994 MGA Zone 50

N

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Appendix 2: Offset Area

Legend

- Lot 1, Wannamal Road West, Mindarra
- Offset Area
- Carnaby's Black Cockatoo Foraging Habitat

0 200 400 800
Metres
Datum/Projection:
GDA 1994 MGA Zone 50

N

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Prepared by: SM Date: 26/07/2018