



**DEVELOPMENT SERVICES ATTACHMENTS
ORDINARY MEETING OF COUNCIL
WEDNESDAY 20 SEPTEMBER 2023**

REPORT NUMBER	REPORT TITLE AND ATTACHMENT DESCRIPTION	PAGE NUMBER(S)
DS01 – 09/23	Application for Development Approval – Extractive Industry (Gravel) – Lot 40 (21) Djarlma Road, Chittering Attachments 1. Excavation Management Plan 2. Assessment of Vegetation and Clearing 3. Schedule of Submissions	1 – 120

EXCAVATION – REHABILITATION
MANAGEMENT PLAN

GRAVEL EXTRACTION

LOT 40 DJARIMA ROAD
CHITTERING



SHIRE OF CHITTERING

MAY 2023



HALL-ALL CONTRACTING

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Prepared by



Landform Research

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Summary

Hallgrav Pty Ltd, who operate the Bindoon Hill gravel operation, is applying for Planning Consent and Extractive Industries Licence for the taking of laterite gravel from the eastern part of Lot 40 Djarima Road Chittering.

The Shire of Chittering Town Planning Scheme 6, Agricultural Resource Zone has the objective of allowing for the extraction of basic raw materials as well as providing for environmental protection and agricultural production. The proposal has been designed to comply with the objectives of the zone.

The soils are to be reconstructed to enable the agricultural areas to be retained and not lost from production at the completion of extraction with the soils to be improved.

The area of extraction is approximately 18.4 hectares.

The portion of land lies west of Great Northern Highway with a bitumen crossover and access already constructed by Main Roads. The location is immediately south of the proposed commencement of the Bindoon Bypass.

The quarry is to be used to extract and manufacture road making materials such as natural gravel and laterite duricrust and manufactured gravel for local Shires and Main Roads.

The site is cleared land with scattered trees that was a pine plantation which has been felled. Scattered Jarrah and Marri trees occur on site and will be retained and therefore no clearing permit will be required.

A licence for crushing and screening of materials will be required under *Environmental Protection Act 1986 Part (V)*.

It is expected that up to 100,000 tonnes, ranging up to 200,000 tonnes in some years, of crushed products and gravel might be removed each year.

It is possible that if large contracts are won, such as for Main Roads, that gravel will be able to be supplied to Main Roads for the Bindoon Bypass as additional to the annual rate of extraction..

With an anticipated 100,000 to 200,000 tonnes of gravel anticipated to be produced per year, excluding supply to the Bindoon Bypass, and say an average of 30 tonnes per truck, that amounts to around 11 to 22 laden truck movements per day over a 300 day operating year. With larger trucks and an average load of say 40 tonnes, the number of laden truck movements drops down to around 8 – 16 per day.

The proposed pit will have a life of at least 10 years depending on market demands for the products.

Topsoil and overburden will be removed and stored separately in perimeter bunds to improve visual screening. Both the gravel and the underlying laterite/duricrust will be excavated, with the ferricrete being crushed by mobile crushing equipment located on the floor of the excavation.

The thickness of the resource and depth of the proposed pit is 1 – 3 metres.

Following excavation, the surface will be re-contoured to match the existing land surface, and then seeded with pasture species. Revegetation of the land surface will be progressively undertaken.

Extraction, processing and carting will be restricted to 6.00 am to 6.00 pm Monday to Friday and 6.00 am to 1.00 pm Saturday. There will be no work on Sundays or Public Holidays.

Safety of the excavation and processing will be to *Work Health and Safety (Mines) Act and 2022 Regulations*.

A 10 year length of approval is requested.

PROJECT SUMMARY

ASPECT	PROPOSAL CHARACTERISTIC
EXCAVATION	
Total area of excavation applied for, including the land already open	18.4 hectares (approx.)
Rate of excavation based on average anticipated volumes.	Dependent on contracts and whether supply will be made to the Bindoon Bypass. 100,000 to 200,000 tonnes laterite gravel per year without Main Roads requirements for the Bindoon Bypass which will be additional.
Operational time	Most working days of the year
Life of project	10 years
Area cleared per year	None required as it is an old pine plantation. Scattered and isolated native trees on site will be retained.
Area mined per year	Variable. Depends on contracts. To extract 200,000 tonnes of gravel will require up to 4 – 5 hectares of resource.
Dewatering requirements	Water collecting in the pit will be retained in the pit. No dewatering will be required.
Maximum depth of excavations	1 – 3 metres at final depth
PROCESSING	
Resources	Gravel and laterite duricrust crushing will be conducted on site
Water requirements	3 000 kL approx, per day in dry conditions, for an anticipated 100 work days per year in dry weather.
Water supply source	Supplied from farm dams or brought to site as required in tanker trucks.
INFRASTRUCTURE	
Total area of plant and stock	Located within laterite gravel pit.
Area of settling ponds	Not required as the walls of the pit will contain water.
Fuel storage	Mobile refueling with no onsite storage.
TRANSPORT	
Truck movements	Variable but approximately 8 – 22 laden truck movements per day entering directly to Great Northern Highway. To supply the Bindoon Bypass ,access to Great Northern Highway may not be required if transport is permitted along the Bypass alignment.
Access	Existing access road to Great Northern Highway.
WORKFORCE	
Construction	Mobile operation with no specific construction.
Operation	2 – 4 persons
Hours of operation	Hours of operation, will be 6.00 am to 6.00 pm Monday to Friday inclusive, and 6.00 am to 1.00 pm Saturday, excluding Public Holidays and Sundays.

WESTERN



AUSTRALIA

REGISTER NUMBER	
40/DP410792	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
N/A	N/A

RECORD OF CERTIFICATE OF TITLE
UNDER THE TRANSFER OF LAND ACT 1893

VOLUME 2929 FOLIO 42

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.

BGRoberts
REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 40 ON DEPOSITED PLAN 410792

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

VISTA HOLDINGS PTY LTD OF 1ST FLOOR, 183 SCARBOROUGH BEACH ROAD, MOUNT HAWTHORN
(AF N651308) REGISTERED 20/6/2017

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

- I. *EXCEPT AND RESERVING METALS, MINERALS, GEMS AND MINERAL OIL SPECIFIED IN TRANSFER 71/1960.

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: DP410792
 PREVIOUS TITLE: 2704-66
 PROPERTY STREET ADDRESS: NO STREET ADDRESS INFORMATION AVAILABLE.
 LOCAL GOVERNMENT AUTHORITY: SHIRE OF CHITTERING

NOTE I: N651308 THIS LOT/TITLE CREATED AFTER PORTION OF THE LAND TAKEN FROM THE FORMER LOT WITHOUT PRODUCTION OF THE DUPLICATE TITLE BY TAKING ORDER N651308. CURRENT DUPLICATE FOR THE WITHIN LAND IS STILL VOL1927 FOL497 EDITION 0.

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
FLORA and VEGETATION To maintain representation, diversity, viability and ecological function at the species, population and community level.	Vegetation communities and/or biodiversity may be significantly impacted by clearing, weeds and dieback.	E	1	Low	The site is a pine plantation that has been cleared, with only isolated Marri and Jarrah trees remain. The larger habitat trees will be protected. There are no native species in the ground cover, that is comprised of pasture species. A Clearing Permit CPS 10053/1 has been applied for.	Figure F.	E	1	Low
	Threatened Communities may be impacted by inadvertent impacts.	E	1	Low	None recorded.		E	1	Low
	Priority species may be affected by clearing, disturbance, weeds, dieback and other impacts.	E	1	Low	None recorded.		E	1	Low
	Threatened Species may be impacted by inadvertent impacts.	E	1	Low	None recorded.		E	1	Low
	Weeds may become established and impact on the local and on site biodiversity	C	2	Med	A weed management program is proposed and will be used in conjunction with normal farm management	Weed Management Plan Section 5.6	C	1	Low
	Dieback disease may be present and impact on the local and onsite vegetation.	E	1	Low	The site has few plants that are susceptible to or can sustain dieback, therefore its presence is unlikely even though the land is used for agricultural purposes.	Dieback Management Plan Section 5.7	E	1	Low
	The developments may fragment communities, biodiversity and ecological linkages.	E	1	Low	The site is a pine plantation that has been cleared, with only isolated Marri and Jarrah trees remain. The larger habitat trees will be protected. There are no native species in the ground cover, that is comprised of pasture species. A Clearing Permit CPS 10053/1 has been applied for.	Figure F.	E	1	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
TERRESTRIAL FAUNA To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.	Communities and fauna and/or biodiversity may be significantly impacted by clearing, weeds and dieback.	E	1	Low	The site is a pine plantation that has been cleared, with only isolated Marri and Jarrah trees remain. The larger habitat trees will be protected. There are no native species in the ground cover, that is comprised of pasture species. A Clearing Permit CPS 10053/1 has been applied for. All Black Cockatoo habitat trees > 500 mm diameter are identified and will be retained.	Figure F.	E	1	Low
	Threatened Faunal Communities may be impacted by inadvertent impacts.	E	1	Low	No Threatened Communities occur on site.		E	1	Low
	Priority Fauna species may be affected by clearing, disturbance, weeds	E	1	Low	There are no Priority Fauna Communities on site.		E	1	Low
	Threatened Fauna Species may be impacted by inadvertent impacts.	E	1	Low	A Clearing Permit CPS 10053/1 has been applied for. All Black Cockatoo habitat trees > 500 mm diameter are identified and will be retained.	Figure F.	E	1	Low
SUBTERRANEAN FAUNA To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.	The development may have an impact on an isolated population of subterranean fauna.	E	1	Low	The site is laterite gravel with no subterranean cavities.		E	1	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
LANDFORMS To maintain the variety, integrity, ecological functions and environmental values of landforms and soils.	The local landform may be altered to a form that is not compatible with the surrounding geomorphology.	D	2	Low	The site will only be lowered by around 2 metres and the landform will not be altered.		D	2	Low
	The final land surface should be fit for its required end use.	E	1	Low	The end use will continued to be pasture and productive agricultural land.		E	1	Low
	The development and final landform will not lead to significant visual impacts.	C	2	Med	There will be some visual impact during extraction that will be managed. At the end of excavation the visual landscape will be returned to the pre-mined condition. Visual management has been considered.	Section 5.1	D	2	Low
	The final landform and soils may be subject to erosion by wind, water or other processes.	C	1	Low	The gravel excavation operations are designed to minimise erosion and dust. Drainage will be internal with no release of surface water.		D	2	Low
	Acid soils are not exposed or are managed to ensure that there are no long term adverse effects.	E	1	Low	Not present		E	1	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
HYDRO - GEOLOGICAL PROCESSES To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected.	The ecological functions of watercourses are to be maintained.	E	1	Low	Drainage will continue to be internal with no release of surface water. There are no on site or nearby watercourses.		E	1	Low
	Groundwater may be impacted by changes to recharge, over-pumping, alterations to flow paths or lead to significant evaporation and water loss.	D	1	Low	The operations are based on elevated laterite gravel profile. The water table is deep, well below the base of the pit with a separation to the water table of > 5 metres. All water is to be retained on site in the base of the pit.		E	1	Low
	Wetlands may be altered by draining or flooding, potentially changing their ecological functions and biodiversity.	E	1	Low	There are no local wetlands on the resource areas.		E	1	Low
WATER QUALITY To maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.	Hydrocarbons, fuels and other chemicals are stored in a manner that they pose no risk to the environment.	C	2	Med	Fuel and hydrocarbon management programs are in place. No fuel is to be stored on site. The loader is to be refueled at the landowner's dwelling.	Section 5.4	D	2	Low
	Runoff from operations is contained and all water is either retained or treated to removed sediment and any deleterious materials.	E	1	Low	All water is to be retained on site in the base of the pit.		E	1	Low
	Water quality	D	2	Low	See above		D	2	Low

	during and after development and operations is not adversely affected or altered.								
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Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
OFFSITE EMISSIONS To maintain representation, diversity, viability and ecological function at the species, population and community level.	Dust emissions are minimised or controlled to ensure that the local amenity is protected.	C	2	Med	The closest section of the pit is 300 metres from a service station and truck parking located to the north east across Great Northern Highway, the same distance as the clay pit to the east. Excavation will only occur within the 300 to 500 setback to the services station with processing and stockpiles located with a setback of >500 metres. The site complies with the EPA Generic Buffer distances for low impact quarries when adequately managed.	Section 5.3	D	2	Low
	Dust emissions will not significantly impact on local and on site personnel health or quality of life.	E	1	Low	See above.		E	1	Low
	Noise levels will comply with the <i>Environmental Protection (Noise) Regulations 1997</i> .	D	2	Low	The closest section of the pit is 300 metres from a service station and truck parking located to the north east across Great Northern Highway, the same distance as the clay pit to the east. Excavation will only occur within the 300 to 500 setback to the services station with processing and stockpiles located with a setback of >500 metres. The site complies with the EPA Generic Buffer distances for low impact quarries when adequately managed. Noise bunding is proposed to the east and the pit will be worked from the floor. Noise levels can be managed to comply with the Regulations.	Section 5.2	E	1	Low
	Noise levels and operational procedures will be used to protect on site personnel health and safety.	C	2	Med	The operations are designed to minimise on site noise and the potential for offsite noise. Occupational Health and safety requirements will be met.		D	2	Low
	Emissions gases and other materials potentially adverse to human health	D	2	Low	There are no gaseous or other potential harmful emissions from the operations. The only emissions will be from vehicles. Great northern Highway lies to the east.		D	2	Low

	will not be used or will be managed.								
	Potential impacts from blasting will comply with the <i>Environmental Protection (Noise) Regulations 1997</i> and guidelines for ground vibration.			NA	There is no blasting.				NA
	Employ procedures and design the operations to minimise the risk of excessive greenhouse emissions.	E	1	Low	The gravel extraction is located strategically next to Great Northern Highway and the commencement of the Bindoon Bypass to minimise the generation of greenhouse gases.		E	1	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
HERITAGE Known heritage sites will be protected.	Known aboriginal heritage sites will be protected.	E	1	Low	No archaeological or ethnographic sites are known from or recorded on Department of Planning, Land and Heritage databases.		E	1	Low
	Sites of European heritage will be protected.			NA	None known				NA
	Heritage sites uncovered during operations will be independently assessed and managed through communication with the community, Government and traditional owners.	E	1	Low	A commitment is made to this.	Section 2.5 Heritage	E	1	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
SOCIAL and HEALTH To minimise the impact on the local community	Human health is protected from adverse impacts of dust, noise, other emissions and chemicals.	E	1	Low	Gravel and sand grains such as this carry no known health impacts.		E	1	Low
	Transport may impact on local, and regional roads or school bus routes.	E	1	Low	Transport will be directly to Great Northern Highway.		E	1	Low
	The operations have been designed to provide sufficient buffers and visual protection.	E	1	Low	The closest section of the pit is 300 metres from a service station and truck parking located to the north east across Great Northern Highway, the same distance as the clay pit to the east. Excavation will only occur within the 300 to 500 setback to the services station with processing and stockpiles located with a setback of >500 metres. The site complies with the EPA Generic Buffer distances for low impact quarries when adequately managed. There will be some visual impact during extraction that will be managed. At the end of excavation the visual landscape will be returned to the pre-mined condition. Visual management has been considered.	Section 5.1	E	1	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
<p>CLOSURE AND REHABILITATION</p> <p>To ensure that premises are closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed outcomes and land uses, and without unacceptable liability to the State</p>	At the end of excavation the created soils should be deep enough or of sufficient quality to be sustainable to meet the long term end use or ecological values.	C	2	Med	<p>A void is to be retained at the end of excavation and reformed to a swale in the landscape at a depth of 2 metres lower than the pre-mine condition.</p> <p>Rehabilitation will be directed towards the final end land use of a return to pasture and productive agricultural land.</p> <p>Topsoil will be transferred directly from an area being cleared and spread across the surface of the areas to be rehabilitated. If direct transfer is not possible, any material stored in dumps will be respread.</p>	Section 6.0	D	2	Low
	All infrastructure, roads, hardstand, non natural materials are to be removed from site progressively when not required and all removed at the end of the project.	C	2	Med	This is committed to.	Section 5.4	D	2	Low
	No materials are to be left on site that may cause long term detrimental outcomes in terms of impacts to soils, water, heritage, vegetation health or other factors.	C	2	Med	This is committed to.	Section 5.4	D	2	Low
	All contaminated materials are to be removed from site prior to closure.	C	2	Med	All contaminated materials are to be removed from site prior to closure.	Sections 5.4 and 6.0	D	2	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
RESOURCE REQUIREMENTS Basic Raw Materials are required for continued use by the community and for future developments.	There is significant basic raw material on site that is suitable for community resources.			NA	The gravel extraction is located strategically next to Great Northern Highway and the commencement of the Bindoon Bypass to minimise the generation of greenhouse gases.	Figure 1			NA

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
COMMUNITY CONSULTATION To provide a community consultation process commensurate with the size nature and time line of the project.	The proposal will be advertised and the nearby people will be able to comment.			NA	The Shire of Chittering has been consulted with respect to the proposed renewal of the sand excavation and will advertise the proposed sand pit.				NA
	A complaints and improvements procedure will assist management of the site.			NA	An ongoing complaints program is proposed.	Complaints Procedure contained in Section 5.3			NA

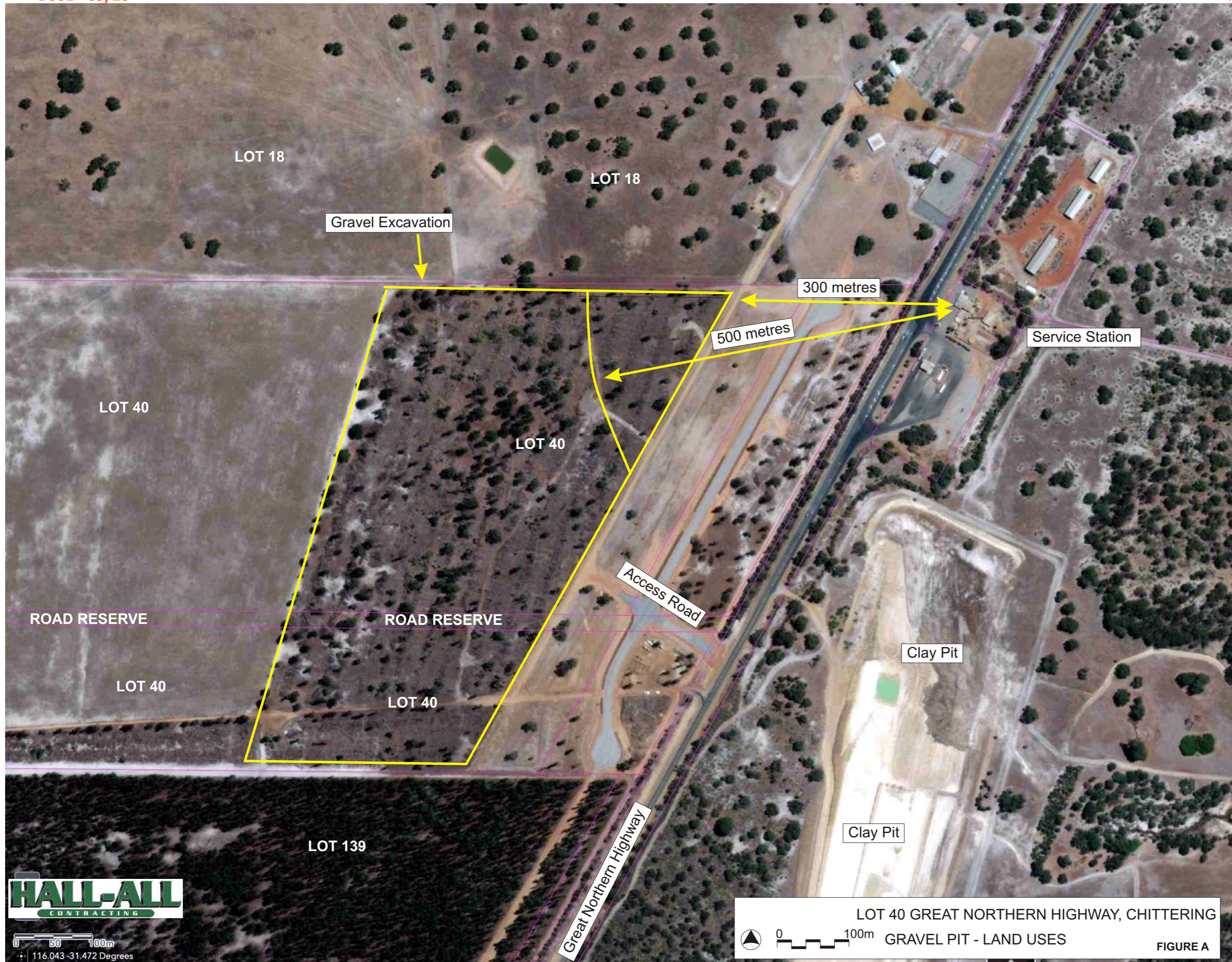
Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
PLANNING COMPLIANCE To comply with Government Policy, planning zones and procedures.	The project is designed to comply with State and Local Planning requirements.	E	2	Low	The project is designed to comply with State and Local Planning requirements in particular SPP 2.5. The Land zoning is "Agricultural Resource". The zoning lists basic raw materials within the objectives of the zone. State Planning Policy 2.5 (SPP 2.5) requires basic raw materials to be identified, protected, used in a staged manner and not impinged by competing land uses. SPP 2.5 prevails over the Town Planning Scheme, which should reflect the intent of the State Planning Policy. Complies with Town Planning Scheme 6 and the Extractive Industries Local Law with a minor modification to enable a consistent land surface to be created at the end of excavation.	Sections 2.2 and 2.3 Land Zonings and Policies	E	2	Low
	The area of potential impacts is not large enough to significantly impact on essential or desirable land uses.	E	2	Low	The disturbance footprint is will be small and low impact with a return to productive pasture. The excavation will lead to reconstructed soils of better agricultural quality.		E	2	Low
	The development will not adversely impact on an area identified as having high agricultural or community values.	E	1	Low	The disturbance footprint is will be small and low impact with a return to productive pasture. The excavation will lead to reconstructed soils of better agricultural quality.		E	1	Low

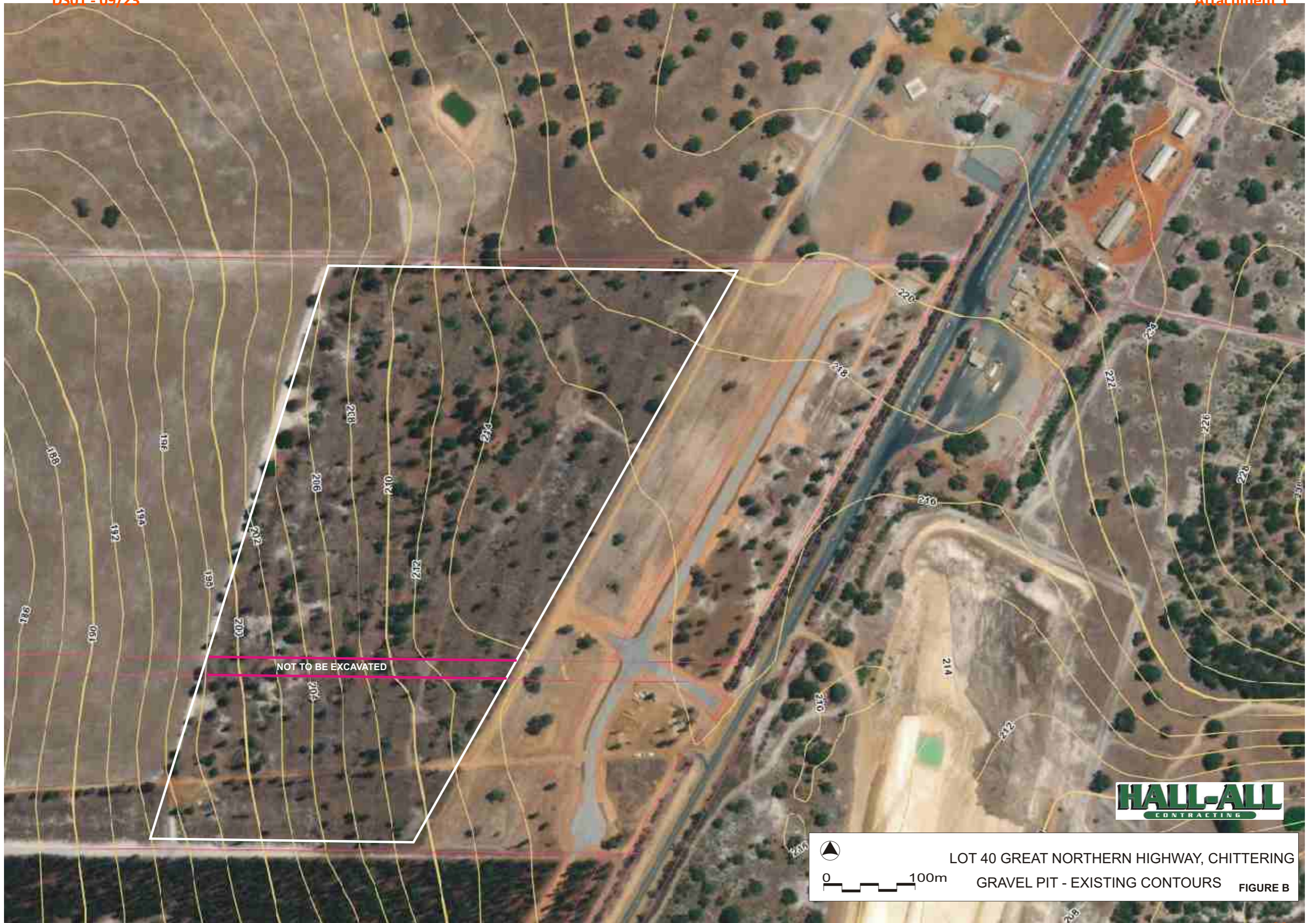
Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
SAFETY To ensure that the project provides high levels of safety to on site personnel and the community	Ensure that the project provides high levels of safety to on site personnel.	C	2	Med	The operations are designed to comply and operate to the <i>Work Health and Safety (Mines) Act and 2020 Regulations</i> . The operations are registered under the Department of Mines Industry Regulation and Safety, SRS system. A Fire Management Plan is in place in combination with normal farm fire management.		D	2	Low
	Ensure that potential impacts are retained on site and do not cause significant risk of safety to the local and wider community.	D	2	Low	Transport is unchanged as directly to Great Northern Highway. The site is fenced and installed with locked gates.		D	2	Low
	Have in place a transport policy to ensure that transport along public roads is conducted in a safe manner.	E	1	Low	Transport is unchanged as directly to Great Northern Highway. The site is fenced and installed with locked gates. The crossover and access is sealed and was constructed by Main Roads.		E	1	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
GEOTECHNICS To ensure that all ground and geological materials is safe commensurate with the operations and final land surface.	The operational and final land surfaces will be made safe and not subject to subsidence, slippage or other adverse conditions.	C	2	Med	The end use is a gentle swale only 2 metres deep, and a return to pasture and productive land. Managed by DMIRS under the <i>Work Health and Safety (Mines) Act and 2022 Regulations</i> .		D	2	Low
	The quarry and operations will comply with the <i>Mines Safety and Inspection Act 1994</i> .	C	2	Med	Hall-All Contracting is committed with complying with the relevant Acts and Regulations. Managed by DMIRS under the <i>Work Health and Safety (Mines) Act and 2020 Regulations</i> .		D	2	Low
	The operational and final surfaces and features are designed to be not affected by extreme climate events.	E	1	Low	The end use is a gentle swale and a return to pasture and productive land. There will be no alteration to drainage or other local landforms.		E	1	Low

RISK MATRIX

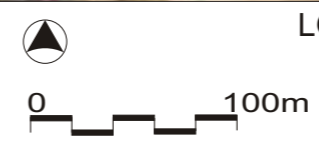
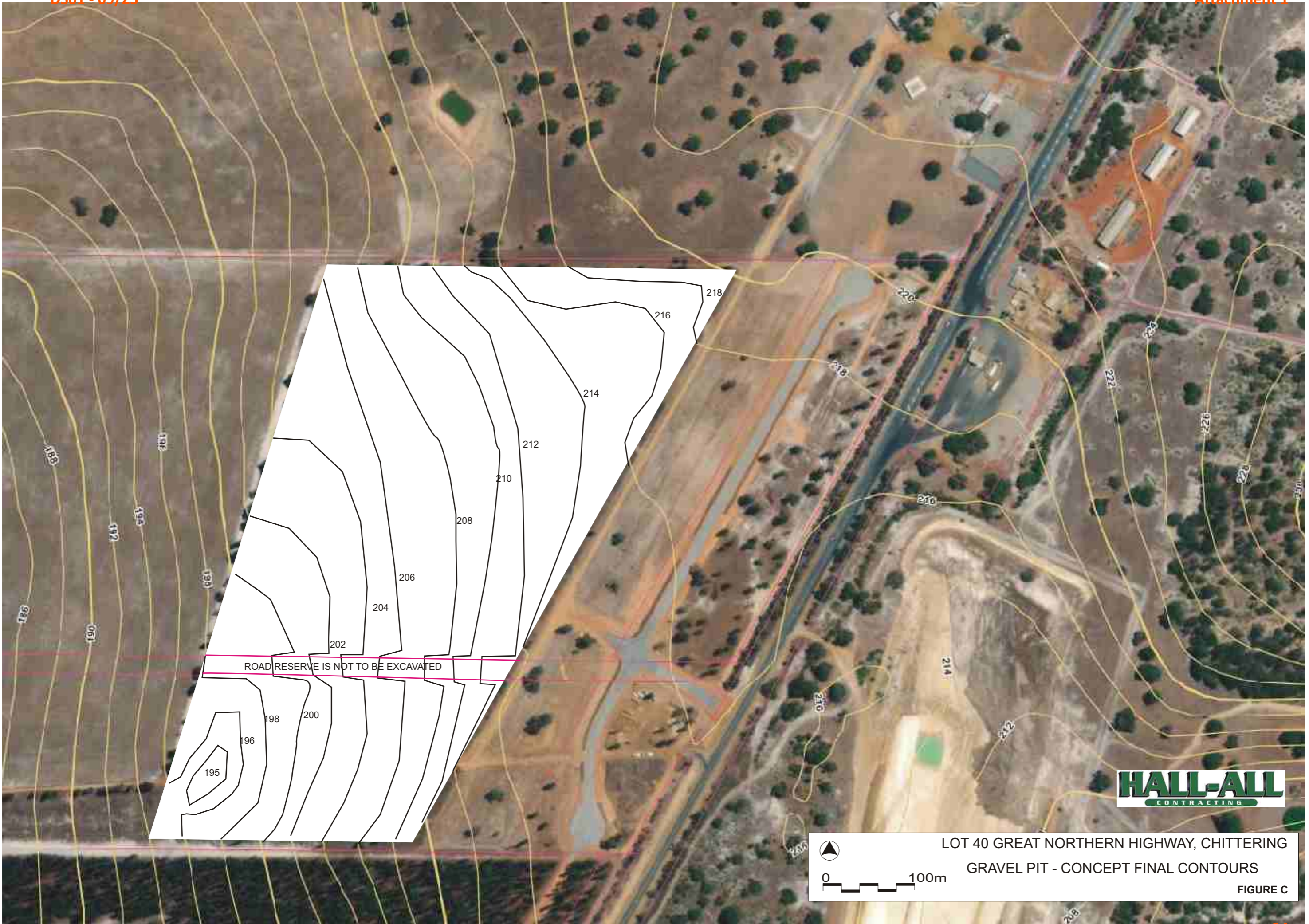
			Effect / Consequence				
			1	2	3	4	5
Type			Insignificant	Minor	Moderate	Major	Severe
Environmental Impact			No discernible, adverse impact, individuals of species may be affected locally.	Discernible effect on the environment but no adverse impact, minor number of individuals of species may be affected locally	Minor adverse effect to the environment (including public amenity), moderate loss of individuals of species locally.	Moderate damage to ecosystem function, major loss of individuals of species locally, loss of public amenity.	Significant long-term damage/loss to ecosystem function, extinction of a species locally
Likelihood	A Almost Certain	Likely that the unwanted event could occur often (once per week) during the life of an individual item or system	Medium 11	High 16	High 20	Very High 23	Very High 25
	B Likely	Likely that the unwanted event could occur several times per year during the life of an individual item or system.	Medium 7	Medium 12	High 17	High 21	Very High 24
	C Possible	Likely that the unwanted event could occur sometime (once per year) during the life of an individual item or system.	Low 4	Medium 8	High 13	High 18	High 22
	D Unlikely	Unlikely, but possible for the unwanted event to occur once in the life of an individual item or system.	Low 2	Low 5	Medium 9	High 14	High 19
	E Rare	Highly unlikely that the unwanted event could ever occur in the life of an individual item or system.	Low 1	Low 3	Medium 6	Medium 10	High 15





LOT 40 GREAT NORTHERN HIGHWAY, CHITTERING

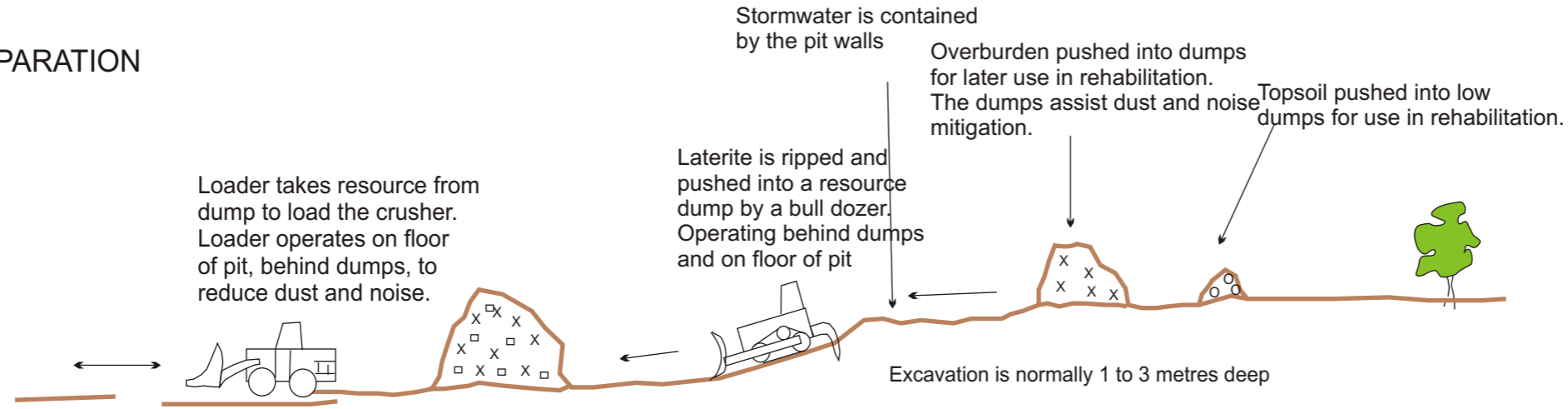
GRAVEL PIT - EXISTING CONTOURS FIGURE B



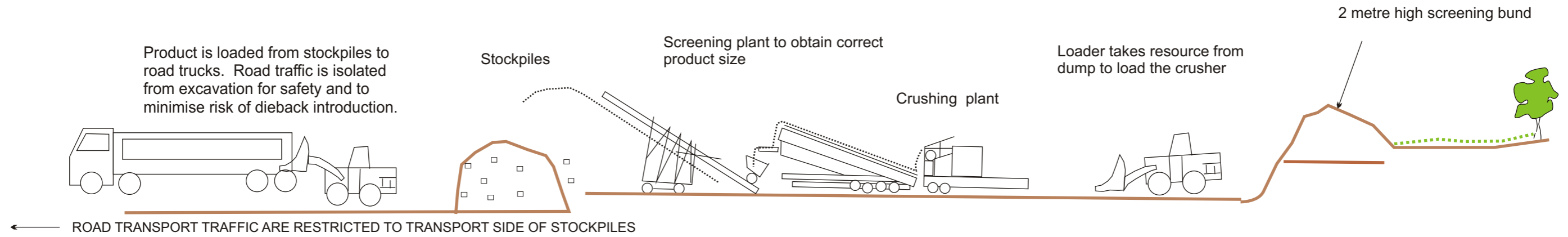
LOT 40 GREAT NORTHERN HIGHWAY, CHITTERING
GRAVEL PIT - CONCEPT FINAL CONTOURS

FIGURE C

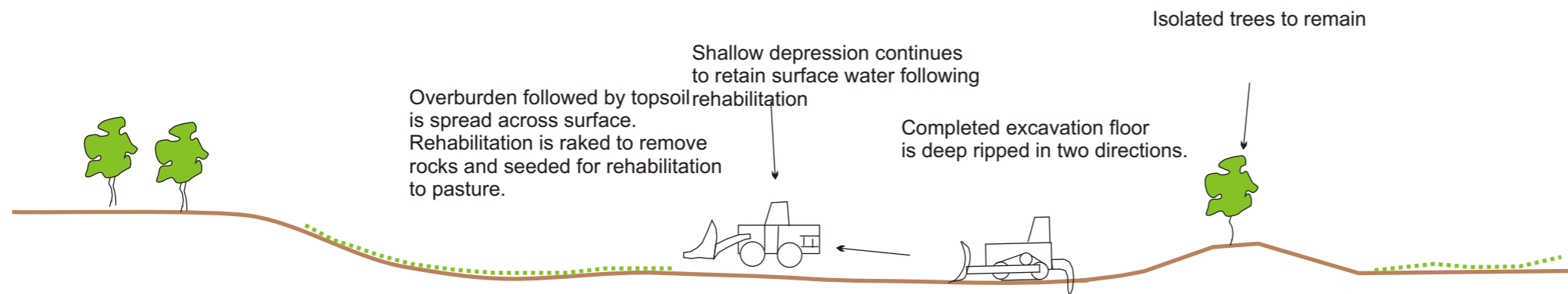
RESOURCE PREPARATION



PROCESSING



LAND RESTORATION AND REHABILITATION



CONCEPT EXTRACTION AND REHABILITATION



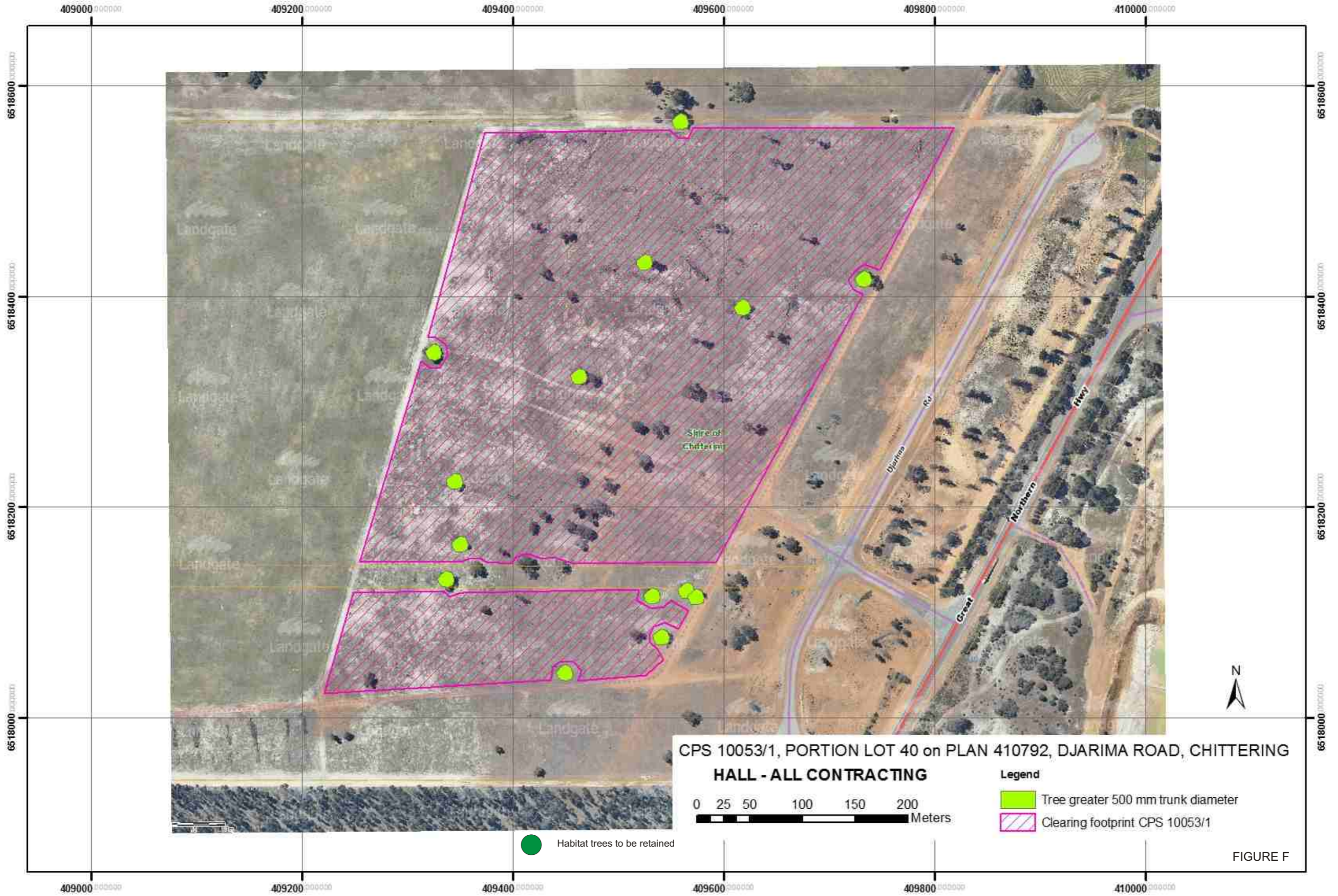
FIGURE D





LOCATION OF THE BINDOON BYPASS

FIGURE E



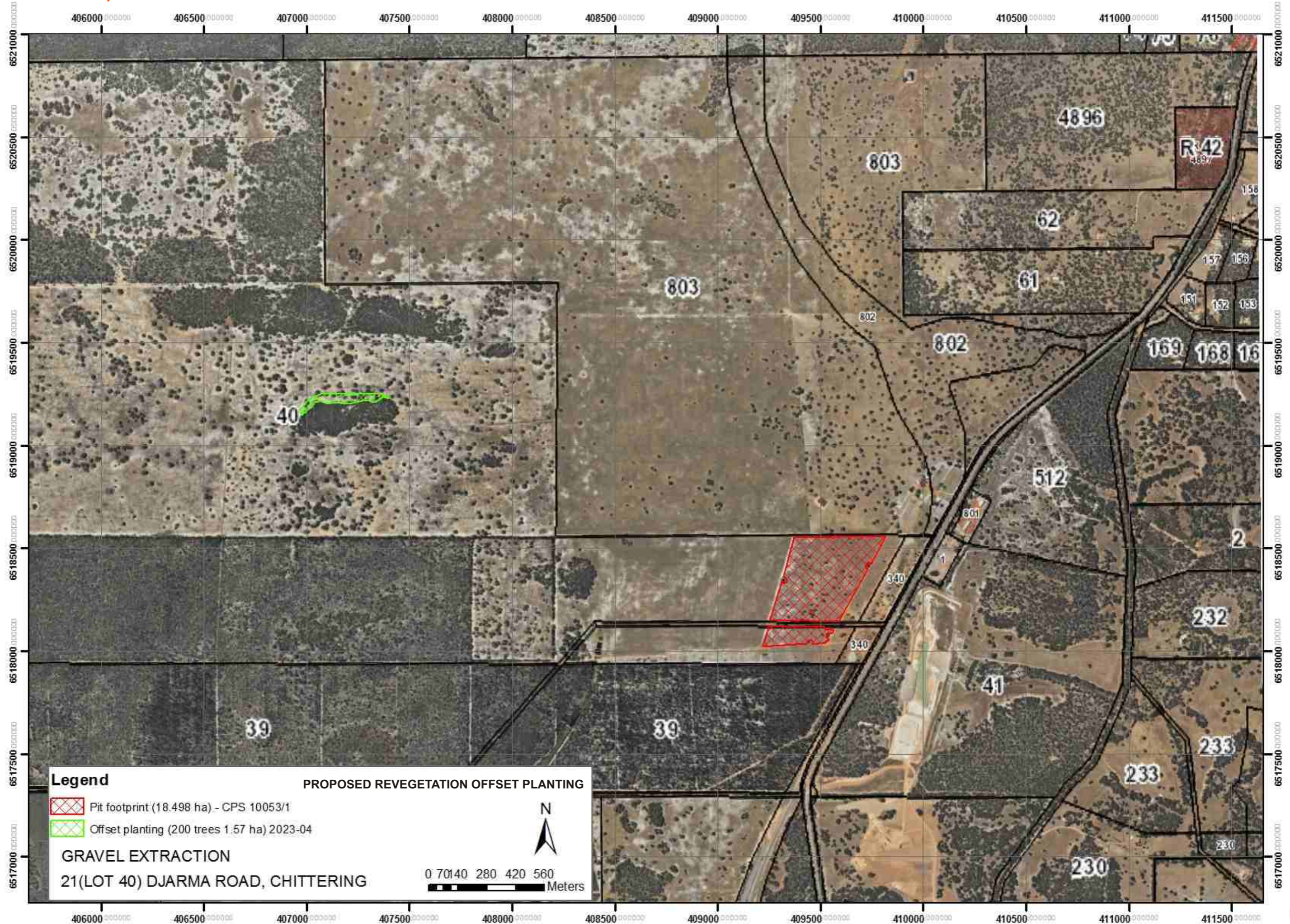


FIGURE G

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PROJECT SUMMARY

ENVIRONMENTAL RISK

FIGURES 1 - D

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1.0 INTRODUCTION

1.1 Proposal

A laterite gravel resource is identified on Lot 40, Djarima Road, Chittering on an old pine plantation.

This proposal seeks approval to extract and crush gravel.

1.2 Existing Approvals

There are no existing quarrying approvals on site.

1.3 Importance and Rationale

The importance of gravel for local developments such as in the Shire of Chittering is recognised by the Western Australian Planning Commission in State Planning Policy 2.5, Rural Planning (2016) and SPP 2.4 (2021).

Whilst gravel is common within the Shire of Chittering there are constraints on many of the resources from proximity to existing developments and conservation considerations.

As this resource is very close to the proposed Bindoon Bypass, and is located across a cleared pine plantation, it makes sense to take this resource.

1.4 Requested Planning Approval

The proposal is seen as a temporary land use during which valuable basic raw materials are extracted and the land will be returned to productive pasture which will have the land capability improved.

A Development Approval and Extractive Industries Licence is sought for ten (10) years.

1.5 Proponent

The proponent is Hall-All Contracting.

Contact can be made through

Manager
HALL-ALL CONTRACTING

PO Box 96 Muchea WA 6501
Phone 8571 4362
hall_all2@bigpond.com

1.6 Location and Ownership

The land is described as;

Table 1: Lot Details

LOT	ROAD	LOCATION	VOLUME	FOLIO	PLAN
40	Djarima Road Chittering		2929	42	410792

Landholders – Vista Holdings Pty Ltd – 183 Scarborough Beach Road, Mount Hawthorn.

The adjoining land to the north and south is held by the owners of Lot 40. Therefore no specific set back is required. Figure 1.

The location of the Bindoon Bypass is shown at Figure E in the Summary.

1.7 Description of the Resource

Laterite is commonly used to describe the material extracted. Sometimes the term duricrust is used to describe the hard capping to the laterite. The term ferricrete is also used in a more scientific way to describe the material. In the literature, however, the terms are often used in place of each other.

Laterite (ferricrete) gravel and duricrust is associated with ancient erosion surfaces under which massive laterite cap rock developed. The duricrust is exposed as infrequent outcrops across the extraction area with a variable layer of overlying gravel.

The thickness of the duricrust is variable, normally 0.5 - 1.0 metres, overlain by laterite gravel of variable thickness from 0.2 to 3.0 metres.

The overlying gravel is often termed “Natural Gravel”, whereas the crushed duricrust is often called “Manufactured Gravel”.

Natural Gravel is extracted using a loader loading directly to a road truck. Sometimes a screen is used to prepare various grades of gravel.

Manufactured gravel/ferricrete is obtained by using a bulldozer and then crushing the underlying laterite duricrust with a mobile crusher and screening the products.

Crushed ferricrete is also superior to natural gravels because the particles are angular and bed down better than the rounded gravel particles. It is also superior because the manufacturing process is designed to mix the correct proportion of fines, gibbsite rich materials and clays to ensure Main Roads and other specifications for road making are exceeded. As ferricrete is manufactured from natural gravels and laterite, it is brown like the majority of the soils and local roads, and is therefore most suitable for country roads and road verges.

1.8 Aims of the Proposal

- Provide an additional supply of laterite gravel.
- Maximise the use of basic raw materials in the local area, to enable greenhouse gases, transport, and other environmental issues associated with alternative resources, to be minimised.
- Help to keep the prices of local basic raw materials at the lowest possible levels, by maintaining small transport distances. This benefits the whole community.
- Comply with State Planning Policy No 2.5, Rural Planning (201), and SPP 2.4 (2021) which aim to provide basic raw materials prior to sterilisation of the area by development.
- Supply gravel for the Bindoon Bypass if contracts are won. Figure E in Summazry.
- Tidy the site, remove pine trash and reconstruct the soils for continued agricultural land uses.

2.0 PLANNING ASSESSMENT

2.1 Current Land use

Lot 40 is part of a grazing property.

The resource lies on an old Pine Plantation that has recently been cleared.

That land is too rough currently to provide good grazing. The excavation will tidy the site and reconstruct the soils for continued agricultural land uses.



Figure 1: Overview of the excavation area; to the west

2.2 State Government Policies

2.2.1 State Government Policies and Planning Schemes

State Planning Policy 1.0, State Planning Framework Policy

The State Planning Policy Framework provides for the implementation of a planning framework through the recognition and implementation of Regional Planning Policies above Local Planning Schemes and Policies.

Within each layer of planning, there are a number of key policies and strategies to provide guidance to planning and development to enable sustainable communities to develop, expand and prosper without compromising the environment and future generations.

Planning is governed under the *Planning and Development Act 2005*. This Act enables Government to introduce State and Regional Planning Schemes, Policies and Strategies to provide direction for future planning. The State and Regional Schemes sit above Town Planning Schemes and Strategies introduced by Local Government.

Strategies and Policies provide guidance on how planning is to be undertaken and how proposed developments are to be considered. These Strategies and Policies are at the State, Regional and Local levels.

Schemes are gazetted documents that provide for consideration and approval of proposed developments. These are normally at the Regional and Local Level.

In addition to the documents produced under the *Planning and Development Act 2005*, the *Local Government Act 1995* provides Local Governments with a mechanism to prepare Local Laws to manage issues of local significance.

With respect to the supply of sand and gravel, the overarching document is the;

State Planning Policy 1.0 State Planning Framework.

A number of State Policies have been released under the State Planning Framework Policy.

State Planning Policy 2.0, Environment and Natural Resources Policy
State Planning Policy 2.4, Basic Raw Materials
State Planning Policy No 2.5, Agricultural and Rural Land Use Planning
State Planning Policy No 4.1, State Industrial Buffer Policy

These are considered in turn.

A number of other key State Government Policies are also relevant to the local regional planning such as the State Planning Strategy 2050 released in 2014.

State Planning Strategy, 2050 (2014)

State Planning Strategy 2050 comprises a range of strategies, actions, policies and plans to guide the planning and development of regional and local areas in Western Australia and assists in achieving a coordinated response to the planning challenges and issues of the future by State and Local Governments.

The approach in the strategy considers Basic Raw Materials as listed below.

Table 2: State Planning Strategy BRM Supply

ELEMENT	2050 OUTCOMES	MEASUREMENT	ASPIRATIONS
Basic raw material (BRM) supply	Accessible and affordable supplies of BRM are available close to demand	The cost of supplying basic raw materials to the building and construction on industry	<ul style="list-style-type: none"> ➤ Appropriate polices are in place to manage existing and future BRM supplies over the long term. ➤ BRM are optimally used for their highest purpose. ➤ The securing of BRM sites is managed through robust strategic sequential land use planning and development control prior to final land use ➤ Demand for BRM is partly managed through compact settlement structures that contain high-density built form.

The environmental management of the quarry has been developed to minimise short and long term impacts on the local community and environment.

The operations have been designed to continue to provide good environmental management that minimises environmental change and enables continued rural land uses.

State Planning Policy 2.0, Environment and Natural Resources Policy

This policy provides for the protection of all natural resources under a number of sections;

- 5.1 General Measures
- 5.2 Water Quality including stormwater and wetlands
- 5.3 Air Quality
- 5.4 Soil and Land Quality
- 5.5 Biodiversity
- 5.6 Agricultural Land and Rangelands
- 5.7 Minerals Petroleum and Basic Raw Materials
- 5.8 Marine Resources and Aquaculture
- 5.9 Landscape
- 5.10 Greenhouse Gas Emissions and Energy Efficiency.

In addition to recognising the importance of protecting air quality, soil and land quality, water and wetlands and landscapes, the importance of Basic Raw Materials to the community is identified with reference to *SPP 2.4 Basic Raw Materials*, *State Gravel Strategy 1998* and *State Lime Strategy 2001*. See Section 2.1 of this management plan.

Section 5.7 of SPP 2.0, deals with Minerals, Petroleum and Basic Raw Materials.

Part of Section 5.7 states;

Basic raw materials include sand, clay, hard rock, limestone and gravel together with other construction and road building requirements. A ready supply of basic raw materials close to development areas is required in order to keep down the cost of land development and the price of housing.

Planning strategies, schemes and decision making should:

Identify and protect important basic raw materials and provide for their extraction and use in accordance with State Planning Policy No 10 (2.4); Basic Raw Materials.

Support sequencing of uses where appropriate to maximise options and resultant benefits to community and the environment.

The other factors of the natural environment are provided with the best protection possible, by this management plan, by selection of the site, operational staging and footprint and rehabilitation, bearing in mind the constraints of excavating and processing the resource.

State Planning Policy No 2.5, Rural Planning, 2016

SPP 2.5 Agricultural and Rural land Use Planning predominantly deals with the continued rural use of suitable land and its protection for the future. The policy was updated in December 2016 and provides strong measures to identify, protect and use basic raw materials.

SPP 2.5 does reiterate the need to protect and use basic raw materials, although SPP 2.4 (2021) is Statewide and now supersedes SPP 2.5 with respect to Basic Raw Materials.

Basic Raw Materials are included in the definitions as;

Sand (including silica sand), clay, hard rock, limestone (including metallurgical limestone), agricultural lime, gravel, gypsum, and other construction materials. The materials may be of State, regional or local significance depending on the resource location, size, relative scarcity, value and demand for the product.

Amongst seeking to protect agricultural values, Policy Objective 4 (c) states

Outside the Perth and Peel Planning regions, secure significant basic raw material resources and provide for their extraction.

Section 5.9 deals with Basic Raw Materials and seeks to achieve the following in an environmentally acceptable manner;

Protect the resources until the resource is extracted (5.9.a)

Identify significant basic raw materials on sub-regional and local planning strategies, region and local planning schemes (5.9.b, 5.9.c, 5.9.d)

The extraction of basic raw materials should not be generally prohibited (5.9.e)

Provide for sequential land use (5.9.f)

Limit sensitive land uses to locations demonstrated to not limit existing or potential extraction of basic raw materials (5.9.g)

Provide for the consideration of native vegetation or significant biodiversity values and may require retention and protection of vegetation and environmental assets (5.9.h)

Have regard for the potential impacts of fragmentation and connectivity of native vegetation (5.9.i)

Maintain adequate buffers to protect water quality in public drinking water source areas (5.9j).

SPP 2.5 also supports preventing conflicting land uses (5.12.1), supports the generic buffers recommended by other Government documents such as the EPA Guidelines for separation distances (5.12.3), and seeks to restrict subdivision from impinging on basic raw material resources.

Policy SPP 2.5 is also supported by Guidelines that seek to protect the Landscape and secure Transport Routes.

State Planning Policy No 2.4, Basic Raw Materials, 2021

The updated Basic Raw Materials policy now covers the State and takes over the functions relating to BRM from SPP 2.5. The Policy seeks to identify and protect Regionally Significant Basic Raw Materials in addition to local basic raw materials that are operating or resources that have been identified.

The support for Basic Raw Materials also considers the various planning and environmental matters and considerations with establishing and operating quarries. The proposed renewal of planning approval recognizes the staged use of an identified sand resource in line with the Policy.

State Planning Policy No 4.1, State Industrial Buffer Policy

SPP 4.1 discusses the need to consider adjoining land uses when locating buffers but does not prescribe set buffers for operations such as this. The development and processing of the resource has been designed to maintain maximum buffer distances. In situations where the buffers are less, actions such as the provision of perimeter bunding to provide visual and noise management, tree planting and operational procedures are used to mitigate and reduce impacts.

This is discussed further in *Section 2.11 Surrounding Landuses and Buffers* of SPP 4.1.

2.3 Local Government Policies and Schemes

2.3.1 Local Government Policies and Planning Schemes

Shire of Chittering Town Planning Scheme No 6.

The resource area is zoned Agriculture Resource in the Shire of Chittering Town Planning Scheme. Lot 40 is zoned Agricultural Resource.

Agricultural Resource Zone

AMD 21 GG 3/4/09; AMD 62 GG 14/02/17

The objectives of the Agricultural Resource zone are to:

- a) preserve productive land suitable for grazing, cropping and intensive horticulture and other compatible productive rural uses in a sustainable manner;
- b) protect the landform and landscape values of the district against despoliation and land degradation;
- c) encourage intensive agriculture and associated tourist facilities, where appropriate;
- d) allow for the extraction of basic raw materials where it is environmentally and socially acceptable.

The Agricultural Resource Zone has the objective of allowing for the extraction of basic raw materials as well as providing for environmental protection. The proposal has been designed to comply with the objectives of the zone.

Basic Raw Materials are covered by section 5.16 of the Town Planning Scheme. This provides for the extraction of materials provided adequate buffers and environmental management are in place. The proposal has been designed to comply with Section 5.16 Basic Raw Materials with adequate separation distances available to dwellings, and detailed environmental management proposed.

Shire of Chittering Local Planning Strategy – 2019

The Shire of Chittering Local Planning Strategy has a number of aims and objectives, which have been considered during the environmental management of the proposed quarry application.

Section 3.3.6 of the Strategy discusses Basic Raw Materials, but relates mainly to the identified “significant geological supplies”, but does permit extraction in other areas in locations not near a townsite or other sensitive locations. The proposed extraction site lies near the alignment of the Bindoon Bypass in an area where there are already clay and gravel extraction sites.

The taking of the gravel and the lowering of the soils will not impact on the agricultural capability of the land as the soils can be reconstructed to their original land capability or better as the old plantation impacts will be removed and the soils will be reformed to better agricultural potential.

2.3.2 Local Government Extractive Industries Licence

The **Shire of Chittering Local Law – Extractive Industries** specifies the information that is required to be submitted in relation to the application for a quarry and provides guidance with the long term management of the operations.

It is noted that, in law, Planning Consent under the Town Planning Scheme has been determined to prevail over a Local Law.

The local law also provides for buffers in Section 6.1 of the Local Law. Section 6.1 allows variations to the buffers by way of conditions imposed. The proposed quarry complies with the provisions or intent of the Local Law – Extractive Industries.

2.3.3 Current Land Zonings

Lot 40 is zoned “Agricultural Resource”.

2.3.4 End Use – Sequential Planning

After gravel excavation the land will be returned to improved productive agricultural land.

The contoured surface will therefore be restored slopes and form that match the adjoining land form and land uses.

Gentle swales will be formed which will enable the soils to naturally drain and maintain the environmental flows.

2.4 Legislative Framework

There have been no significant changes to the scale and nature of the local land uses over the past few years.

2.4.1 Relevant Legislation

Table 3: Legislative Framework

Legislation	Environmental Factor regulated/affected	Discussion	Action
<i>Aboriginal Heritage Act 1972</i>	Aboriginal heritage sites	A database search of DPLH has been conducted and no site recorded.	A commitment is made to halt activities that may impact on a site if any is found during excavation, pending assessment by consultants.
<i>Aboriginal Cultural Heritage Act 2020</i>	Aboriginal Heritage	A database search of DPLH has been conducted and no site recorded.	The operations will be a Tier 3 activity under the Act. The provisions of the Act will be complied with.
<i>Planning and Development Act 2005.</i>	Development approvals for on site constructions and any ensuing environmental impacts.	Planning Consent is required from the Shire of Chittering Town Planning Scheme.	A concurrent application for development approval and Extractive Industries Licence is lodged.
Shire of Chittering, Local Planning Policy 2019.	The application and management of quarries is covered by the Policy.	This assessment and Management Plan has considered the issues outlined in the Policy and has addressed them and other factors as necessary.	The Excavation and rehabilitation Plan uses “Best Practise” to mitigate potential environment and social impacts.
<i>Shire of Chittering Local Law - Extractive Industries</i>	The operations of the quarry are regulated by both the Planning Approval and Extractive Industries Licence	An Extractive Industries Licence is required.	An application for an Extractive Industry Licence is concurrently lodged.
<i>Health Act 1911</i>	Environmental and health impacts from waste water treatment and community health.	No matters of significance that would trigger this legislation have been identified.	The proposal complies with the Department of Health Guideline for Dust separation. (See Dust Management) No waste materials will be disposed of on site.
<i>Department of Planning, Land and Heritage Transport Impact Guidelines 2016</i>	New developments may need to consider transport options.		Discussions have been held with Shire of Chittering officers with respect to this project. Transport will be directly to Great Northern Highway via an already constructed crossover. It is possible that transport of gravel for the Bindoon Bypass if a contract is won can be supplied along the Bypass road alignment. Great Northern Highway at this location has recently been upgraded and a suitable crossover constructed.
<i>Western Australian Planning Commission</i>	New developments may need to consider fire risk and mitigation such as a	This is a gravel pit with no structures that present a fire risk. The pit acts as a fire management	No assessment is required because there is no significant fire risk and WAPC 2016 Planning Bulletin 111/2016 does not require a BAL Attack assessment.

<i>Planning Bulletin 111/2016</i>	bushfire policy and BAL attack document.	zone as it is devoid of vegetation.	No structures or developments are present on site or are proposed.
<i>Environmental Protection Act 1986 Part IV - Assessment</i>	Referred to the EPA if the project is or may constitute a significant environmental impact.	This is a gravel pit in an area where small quarries are common.	No referral to the EPA will be required as the proposal is self assessed as not having a "Significant Environmental Impact". See the attached Environmental Risk Assessment.
<i>Environmental Protection Act 1986 Part V – DWER Licence</i>	Environmental factors that may be significantly impacted related to Prescribed Premises- Processing and Screening	If screening or crushing in excess of 5 000 tonnes per year is operated, the operation will require a Department of Water Environment Regulation Licence.	A DWER Licence will be applied for prior to crushing and screening which triggers the "Prescribed Premises"; 5 000 tonnes per annum.
<i>Environmental Protection (Noise) Regulations 1997</i>	Noise impacts.	The excavation is located over 300 metres from the closest sensitive premises which is the service station and truck stop to the north east across Great Northern Highway. The proposed extraction is 300 – 1050 metres from the facility with only the north eastern corner being < 500 metres from the service centre. A commitment is made not to locate the crusher within the 300 – 500 metre zone of the extraction area. The proposed excavation therefore complies with the EPA generic buffer guidelines.	Noted. See Noise Management and setback – Buffers. Sections 3.0 and 5.3. It is noted that there is a clay extraction area located just east of Great Northern Highway which is 300 metres from the proposed gravel pit and only 250 metres from the service station and truck parking area.
<i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i>	Clearing and disturbance of native vegetation.	<i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004.</i>	Isolated trees will be required to be cleared. A Clearing Permit CPS 10053/1 and it is understood to meet DWER requirements.
<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>	Matters listed on the EPBC database.	The matters listed under the <i>EPBC Act 1999</i> which might apply to this site such as Black Cockatoo.	The proposal does not require the clearing of Black Cockatoo habit trees which have been excluded from the development. Does not trigger the EPBC Black Cockatoo Guidelines.
<i>Biodiversity Conservation Act 2016 (WA)</i>	Provides for the protection of flora and fauna.		Isolated trees will be required to be cleared. A Clearing Permit CPS 10053/1 and it is understood to meet DWER requirements.
<i>Conservation and Land Management Act 1984</i>	Parks and Reserves and issues relating to flora and fauna.	There are no known issues or nearby reserves that will trigger this legislation.	Noted.

<i>Heritage Act 2018 (WA)</i>	Heritage	No heritage matters are identified locally or on quarry footprint. DPLH databases were searched.	Noted.
<i>Waterways Conservation Act 1976</i>	Water quality and management of surface water	There are no watercourses on the extraction site or nearby. All water will be retained in the pit.	Water Management has been prepared and is included. Section 5.6.
<i>Rights in Water and Irrigation Act 1914</i>	Water quality and management of surface water	See above	See above.
<i>Country Areas Water Supply (CAWS) Act 1947</i>	Water supplies		Water will be sourced from farm dams or brought to site as required by road tanker.
State Agreement Acts	Specific acts that relate to certain large projects that may impact on some locations.	Not applicable	
<i>Contaminated Sites Act 2003</i>	Contaminated materials that may arise from excavation or be used in excavation and processing.	The only factor that is likely to fall under this category is the storage and use of maintenance items and on site maintenance.	No materials are present or to be used which would trigger this legislation apart from normal fuel and maintenance. Water Management Plan (Section 5.6) has been prepared that includes commitments to remove any contaminated soils or other material regularly and at the end of excavation as part of the closure actions.
<i>Dangerous Goods Safety Act 2004</i>	Potential for dangerous good to impact on the environment.	Refers to fuel, which is required and blasting under the <i>Dangerous Goods Safety (Explosives) Regulations 2007</i> .	Hall-All Contracting will comply with the requirements for fuel through management plans that will be implemented. Fuel and Servicing Management Plans are included in the attached Water Management. Section 5.6.
<i>Work Health and Safety (Mines) Act and 2022 Regulations.</i>	Safety and management of mining operations which in turn may impact on the environment.	Compliance with the Project Management Plan when it is submitted and approved.	Mine Safety The site will be registered under the SRS and a Project Management Plan, Risk Assessment and Emergency plans approved. The Project Management Plan addresses all aspects of mining. The SRS System addresses ongoing Health and Safety.

2.4.2 Stakeholders

The Proposal will be advertised to the local property owners as part of the consideration by the Shire of Chittering.

A summary of the discussions with the local people is provided in Table 2, Stakeholder Register.

Table 4: Stakeholder Summary

Stakeholder	Date - Timing	Potential Considerations	Proponent Response - Outcome
Internal Stakeholders			
Internal Management	<ul style="list-style-type: none"> Ongoing Day to day management of the operations, Future directions and ownership. 	<ul style="list-style-type: none"> The methods of operation are not proposed to be significantly different from other gravel quarries. 	
Landholder	<ul style="list-style-type: none"> A number of meetings have been held with the landowner through 2020 – 2021 with respect to the proposal. 	<ul style="list-style-type: none"> The landowner wishes the pine trash to be removed, the gravel extracted and pasture re-established. 	
External Stakeholders			
EPA	<ul style="list-style-type: none"> Excavation for clay and gravel as well as sand has occurred in the local area and is still occurring. 	<ul style="list-style-type: none"> No referral is necessary. The existing pit is small and does not represent a significant environmental impact that would normally be assessed by the EPA. 	
Department of Biodiversity Conservation and Land Management	<ul style="list-style-type: none"> Manages native flora and fauna 	<ul style="list-style-type: none"> No clearing is proposed. 	
Shire of Chittering	<ul style="list-style-type: none"> Provides Planning approval and issues the Extractive Industries Licence for the quarry under the Local Law. Regulates land zonings and planning in conjunction with the Western Australian Planning Commission Controls the measures used to prevent bush fires. 	<ul style="list-style-type: none"> Hall-All Contracting have discussed the proposal with Council officers and will work with the Shire of Chittering in complying with the conditions and minimising local impacts. Great Northern Highway at this location has recently been upgraded and a suitable crossover constructed. 	
Nearby landowners	<ul style="list-style-type: none"> The excavation is located over 300 metres from the closest sensitive premises which is the service station and truck stop to the north east across Great Northern Highway. The proposed extraction is 300 – 1050 metres from the facility with only the north eastern corner being < 500 metres from the service centre. A commitment is made not to locate the crusher within the 300 – 500 metre zone of the extraction area. The proposed excavation therefore complies with the EPA generic buffer guidelines. 	<ul style="list-style-type: none"> It is noted that there is a clay extraction area located just east of Great Northern Highway which is 300 metres from the proposed gravel pit and only 250 metres from the service station and truck parking area. Nearby landowners will be notified by the Shire during advertising of the proposal. 	
Department of	<ul style="list-style-type: none"> Maintains heritage databases 	<ul style="list-style-type: none"> Department of Planning Lands and Heritage database has 	

Lands Planning and Heritage (DAA) and traditional land holders		been searched and no sites have been found.
DWER	<ul style="list-style-type: none"> • May provide advice on aspects of environmental impact and management. • Issues clearing permits under the <i>Environmental Protection Act 1986</i>. (Not required) 	<ul style="list-style-type: none"> • Clearing Permit CPS 10053/1 has been applied for and some interaction and discussions with DWER have been had. It appears that the proposed clearing and offset planting will meet the criteria for issuing a Clearing Permit.
	<ul style="list-style-type: none"> • A DWER Licence is required under <i>Part IV of the Environmental Protection Act 1986</i> for crushing or screening if the annual volumes exceed 5000 - 50 000 tonnes. (Category 70 Prescribed Premises). 	<ul style="list-style-type: none"> • A DWER Licence will be applied for, for crushing and screening of material.

2.5 Heritage

A search of the Department Lands Planning and Heritage database does not reveal aboriginal sites on this portion of Lot 40.

The site has been an operating farm for many years, with ongoing soil disturbances through that time.

Should any archaeological site be uncovered, work will cease in that area pending an assessment of the site by an independent consultant, traditional owners and the Department of Planning Lands and Heritage as required. The provisions of the *Aboriginal Cultural Heritage Act 2020* will be complied with.

2.6 Complaints Mechanism

The following complaints mechanism is proposed. See also Dust Management Table 8.

- The contact details will be displayed at the entrance to the operations.
- A complaints book will be provided and maintained.
- Upon receipt of a complaint it will be investigated and action taken if the complaint is determined to be legitimate.
- When a complaint is found to be legitimate, any reasonable actions to mitigate the cause of the complaint will be taken, to prevent a recurrence of the situation in the future.

- Details of any complaints, the date and time, means by which the complaint was made, the nature of the complaint, the complainant, investigations and any resulting actions and the reasons, will be recorded in the Complaints Book.
- The Shire of Chittering will be informed of any complaint or any other report provided to a Government Department within 3 working days.
- The complaints book will be made available for viewing or requested details made available to the City or any other official upon request.

3.0 BUFFERS AND SOCIAL IMPACTS

3.1 Consideration of nearby sensitive premises

The quarry is designed to maximise the setbacks to the closest sensitive premises.

The main environmental issues identified in relation to buffers and setbacks to sensitive premises, in addition to those generally recognised by the various Government and Published guidance's are;

- Visual amenity
- Dust management
- Noise management
- Local amenity
- Cumulative impacts of quarries

3.2 Policies

3.2.1 *Generic and State Buffers*

A number of Government Policies relate to buffer distances and the protection of basic raw materials. State Planning Policy No 4.1, State Industrial Buffer Policy, (draft July 2004) discusses the need to consider adjoining land uses when locating buffers but does not prescribe set buffers for operations such as this.

SPP 4.1 discusses the need to provide buffers both on site and offsite with respect to industry including extractive industries. It does not however specify any distance for the buffer, but notes that site specific studies should be prepared that will demonstrate that the extractive industry can operate in a manner compatible with nearby sensitive premises.

The State Industrial Policy 4.1 does not specify a set buffer distance, but notes that buffers are to be based on "scientific study" and are flexible. It further specifies the buffers by reference to other documentation such as the Environmental Protection Policies, EPA and DWER standards and DPLH Generic Industrial Buffer Guidelines; that is the EPA 300 - 500 metre generic buffer used in SPP 2.4 and SPP 2.5 that are used in the absence of supporting or scientific studies and information.

EPA guidance "Separation Distances between Industrial and Sensitive Land Uses", June 2005 lists the generic buffers for quarries with crushing processing and milling on a case by case basis with the guideline for sand and limestone excavation generic buffer as 300 – 500 metres depending on the extent of processing.

The Draft DWER Buffer Guidelines (DER 2015) have been withdrawn.

The buffer documents and SPP 2.4 (2021) all now defer to the EPA 2005 Guidance Statement.

The buffer referred to can be both on site and offsite although in this case only on site buffers are required.

A generic buffer relates to the distance at which there are unlikely to be any problems without some further investigations and does not mean that smaller buffers are not acceptable.

Both SPP 2.4 and 2.5 support preventing conflicting land uses, (SPP 2.5, Section 5.12.1), supports the generic buffers recommended by other Government documents such as the EPA Guidelines for separation distances (SPP 2.5 Section 5.12.3), and seeks to restrict subdivision from impinging on basic raw material resources.

The issue of appropriate buffers is a matter of the distance and protection measures to prevent impact on adjoining land users. This applies mainly to noise, dust and visual impact, all of which are treated separately.

The walls of the pit, and perimeter bunding will be used to reduce noise transmission. During land clearing the topsoil will be pushed to the edges of the pit to form a low bund during excavation.

Excavation will be worked from inside out on the floor of the pit working below natural ground level with a perimeter low bund of topsoil stored to be respread at the end of mining.

Based on the nature of the operation, equipment used and excavation methods, it is proposed that the crusher and stockpiles will be located 500 or more metres away from the closest sensitive premises, which is the service station and truck parking to the north east across Great Northern Highway. This means that the only activity within the north eastern corner of the pit will be excavation.

It is noted that there is a clay quarry located 300 metres to the east across Great Northern Highway. That operation is 250 metres to the service station at its closest, extending further away.

The proposed gravel quarry is not considered to be any different to the local clay extraction based on potential environmental impacts.

There are no residential properties near the existing excavation area, with over 1,000 metres separation to all dwellings apart from a dwelling to the north which is owned by the current landowner of Lot 40.

The key management will be mainly noise. Dust could potentially be generated, but as the gravel stays moist that will negate dust risk during extraction, crushing and screening. The main potential source of dust is wheel disturbances of gravel hardstand.

Noise is managed under the *Environmental Protection (Noise) Regulations 1997*. The Regulations must be complied with or the pit cannot operate. Based on other quarries and with just the use of a loader or an excavator compliance with the Noise Regulations will be able to be achieved

The proposed pit therefore complies with the EPA Generic Buffer Guidelines when the specific site conditions are considered. The offsite impacts can be satisfactorily managed.

3.2.3 Local Government Extractive Industries Licence

The **Shire of Chittering Local Law – Extractive Industries** specifies the information that is required to be submitted in relation to the application for a quarry and provides guidance with the long term management of the operations.

The local law also provides for buffers in Section 6.1 of the Local Law. Section 6.1 allows variations to the buffers by way of conditions imposed.

The design of the proposed quarry has considered the provisions of the Local Law – Extractive Industries but has modified the buffers.

The reason is that Lot 40 and the proposed excavation is cut by a road reserve that is undeveloped. See Figure A in the Summary.

The adjoining Lots to the south and north are owned by the same people/entity as Lot 40. Therefore no setback to those properties is required. See Figure A in the Summary.

If the 50 metre requirement of Section 6.1 (a) is applied, a substantial amount of resource will be excluded, but the greater impact will be that strip of land with straight lines elevated by around 2 metres above the adjoining land will result at the end of excavation. This will not provide a consistent end land form and is to be avoided. Further the land on either side, north, south, west are all owned by the same landholder and therefore a consistent final land surface is more logical. Figure A in the Summary.

The proposal is similar to the clay excavation to the east of Great Northern Highway with respect to the buffers as discussed above. It is proposed that crushing and screening is not conducted within the small north east section of pit that has a buffer of 300 – 500 metres to the service centre. Figure B located in the Summary

4.0 EXISTING ENVIRONMENT

4.1 Climate

The climate of the area is classified as Mediterranean, with warm to hot Summers and cool wet Winters.

Climatic data is recorded at Gingin, west of the site. Precipitation is 671 mm per annum, of which most falls in the months April to October inclusive.

Average maximum temperatures at Bullsbrook reach 33.2 degrees Celsius for the hottest months, January and February, but fall to 18.2 degrees Celsius in July. Average minima for the coldest month August, is 6.1 degrees Celsius.

The predominant summer winds are from the east at 9.00 am and from the south west at 3.00 pm

Gingin Ap Climate

GINGIN AP LONG-TERM AVERAGES

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Mean Max (°C)	33.2	33.2	30.7	26.7	22.7	19.6	18.2	19.1	20.6	24.4	28.0	30.5	25.5
Mean Min (°C)	16.6	17.1	15.3	12.1	9.1	7.3	6.1	6.6	7.4	9.2	12.0	14.3	11.0
Mean Rain (mm)	18.4	16.9	21.8	30.6	76.8	114.2	128.2	110.9	84.8	36.0	20.4	10.0	671.7
Median Rain (mm)	0.4	3.0	7.6	22.4	74.3	121.5	109.9	117.6	88.9	31.8	11.9	2.4	612.4
Mean Rain Days	2.3	2.0	4.5	6.8	10.8	13.3	16.3	14.8	13.9	8.4	5.2	3.3	97.4

GINGIN AP DAILY RECORDS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
High Max (°C)	44.5	46.3	43.0	37.8	34.8	28.4	25.8	28.0	34.8	39.3	42.8	45.3	46.3
Low Max (°C)	19.1	16.7	17.6	15.7	14.4	12.1	12.6	13.5	13.5	16.6	18.3	19.5	12.1
High Min (°C)	29.8	29.2	27.0	22.8	21.6	17.0	16.0	16.1	18.7	21.7	23.5	27.5	29.8
Low Min (°C)	5.7	6.6	2.0	1.8	-1.2	-3.6	-3.7	-2.3	-1.5	-0.1	1.8	4.4	-3.7
High Rain (mm)	95.0	74.0	49.6	43.6	40.0	70.2	86.0	49.8	47.0	38.0	24.6	19.6	95.0

GINGIN AP MONTHLY RECORDS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
High Mn. Max (°C)	35.5	35.2	32.8	28.9	25.5	22.9	19.3	22.2	22.9	28.1	30.9	32.7	26.3
Low Mn. Max (°C)	30.3	30.4	28.7	23.9	20.9	18.0	16.3	17.6	18.6	21.5	24.1	25.3	24.5
High Mn. Min (°C)	19.3	20.6	17.5	15.0	13.3	11.2	12.1	8.8	11.0	11.8	14.3	17.0	12.8
Low Mn. Min (°C)	14.0	14.9	12.9	9.1	6.0	3.9	3.2	3.8	5.3	7.2	10.4	10.7	9.7
High Rain (mm)	96.2	152.2	106.6	94.8	139.0	236.4	213.6	172.6	161.2	93.2	82.0	57.6	881.6
Low Rain (mm)	0.0	0.0	0.0	0.2	27.2	23.6	42.5	26.6	23.2	8.4	0.0	0.0	421.8

GINGIN AP ANNUAL TEMPERATURES & RAINFALL

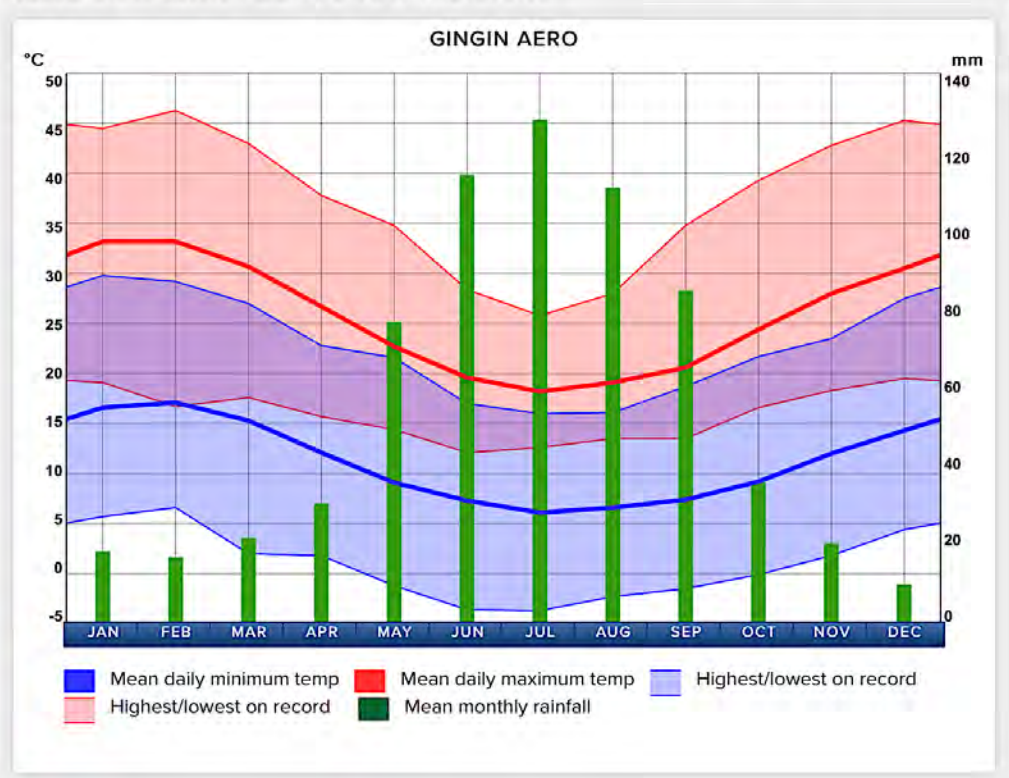


Figure 2: Climate Data for Gingin Airport the most representative weather station

4.2 Geology and Geomorphology

The site lies on a gently undulating remnant of a Tertiary erosion surface at an elevation that ranges from 194 metres in the south western corner to 220 metres in the central northeast.

Laterite soils and gravels cover the surface and represent the remnants of an ancient soil horizon developed on schists, gneisses and granites of the Chittering Metamorphic Belt.

The portion of Lot 40 approximately straddles the Darling Fault GSWA 1 : 250 ,000 geological mapping (Geoview) as shown below. The interpreted alignment of the Darling Fault is shown as a dotted black line. West of the Darling Fault is the Mesozoic sediments on the Dandaragan Plateau, between the Darling Fault and the Gingin Scarp. The red is granite, the buff/orange colour laterite gravel and the yellow is sand over gravel. East of the Darling Fault the basement is granite gneisses and schists.

The typical profile of the deposit is very shallow grey brown sandy gravel, yellow brown pisolitic gravels with an intermittent sheet of overlying sand 0 – 0.5 metres thick.

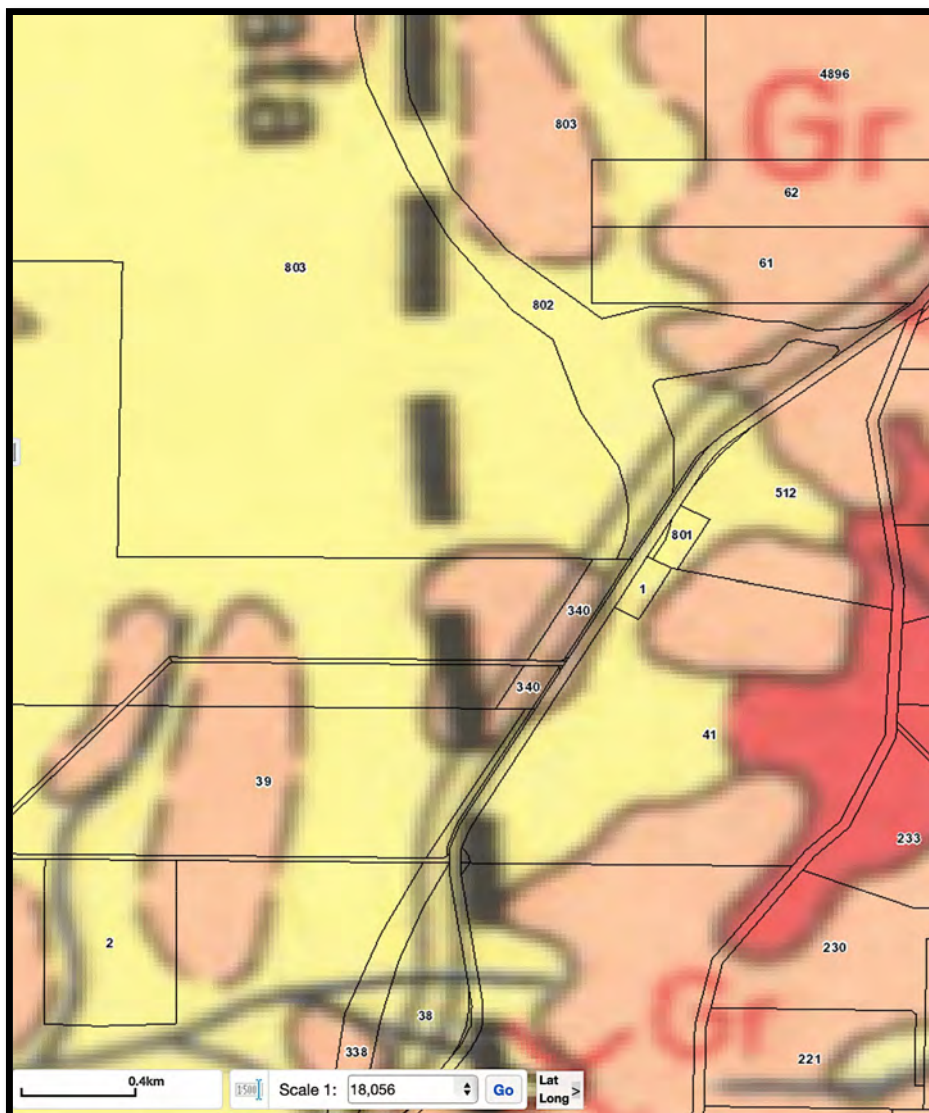


Figure 3: Geology map of the local area

4.3 Soils and Regolith

The typical soil profile is a grey brown loamy gravel and loamy gravel soil over yellow brown pisolitic gravels and laterite duricrust. The underlying duricrust varies from 0.5 to 1 metres in thickness. Under the duricrust is a variable depth of gibbsite rich pallid subsoils developed on the deeply weathered rocks of the Underlying Mesozoic sediments.

The soil system is classified as being on the boundaries of Mogumber (Mb), Karamal (Ka) and Coolakin (Cek) in Smolinski, 1998, *Soils of the Chittering Area, South West Forest Region, Western Australia, Department of Agriculture WA*. These are broad agricultural groupings that can vary locally as is the situation here.

In reality the soils are relatively even across the resource and in the field are laterite sandy gravels over duricrust with a variable sheet of overlying each white sand

The reconstructed soils, at the completion of excavation, will be a blend of gravel and gibbsite rich materials to form manufactured gravelly loam soils of good water and nutrient holding capacity.



Figure 4: Resource area showing the cleared pine plantation



Figure 5: Laterite duricrust resource that will be crushed and removed

4.4 Acid Sulfate

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 formed the basis for much of the assessment procedures in Australia, including those adopted by the Western Australian Planning Commission and the Department of Water Environment Regulation.

DWER 2015 released two documents, Identification and investigation of acid sulphate soils and acidic landscapes and *Treatment and management of soil and water in acid sulphate soil landscapes*. These two documents provide the guidelines for Western Australia.

The *Acid Sulfate Manual (DPLH)* 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.

Lot 40 and the surrounding land has been visited by Lindsay Stephens of Landform Research, and the laterite and soils observed on a number of occasions.

Materials at risk under reducing conditions are normally grey in colour or have been grey with no brown or red brown iron oxides. Where exposed to the atmosphere there is a change to brown iron oxides, with yellow jarosite and other alteration minerals that are distinctive.

Potential acid sulfate soils or rocks are tested under conditions which speed up the natural oxidation of the soils on exposure to the atmosphere. Natural oxidation can occur within hours and days of exposure and is normally complete for small samples within a month. Laboratory testing speeds up this process with the use of H₂O₂ or other oxidising agent and then tries to quantify the amount of oxidation and acid development.

On site the soils are laterite and sand that are oxidised and do not carry any risk of acid sulphate potential. This concurs with Nattaporn-Prakongkep, R J Gilkes, B Singh and S Wong, 2011, *Mineralogy and chemistry of sandy soils in the Perth metropolitan area of the Swan Coastal Plain*, Department of Environment and Conservation who concluded that there is no risk of acid sulfate soils in sands unless there is peat or organoferricrete present and excavation proceeds below the water table. In such situations no testing would be required because there is no risk.

Even though the site potentially straddles the eastern edge of the Dandaragan Plateau the elevation, watertable and rock type do not support acid sulphate conditions. Only the carbonaceous shales which underlay some clay pits at depth to the south and west are at risk locally of developing acid as they carry sulphides when not weathered.

The soils are highly oxidised, with the site lying well above the water table. Soils of this type have no risk of sulphides and no risk of developing acidic conditions.

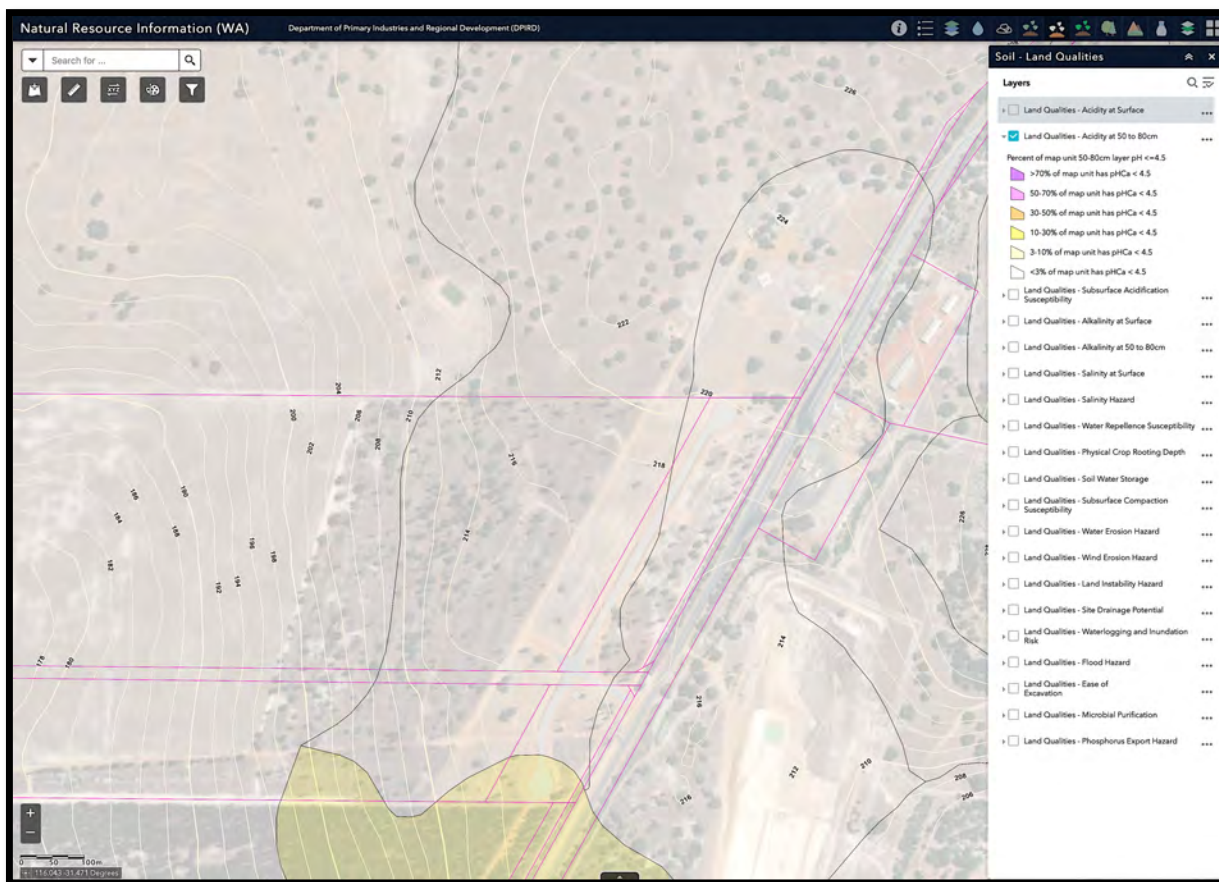


Figure 6: NRM Soil mapping showing the lack of soil acidity

4.5 Hydrogeology

Surface Water

There is no surface runoff of water on the gravel resource due to the porosity and permeability of the laterite, with precipitation draining to the deep water table.

The site is not subject to any watercourses or flood paths as it lies on the plateau remnant of the Dandaragan Plateau.

The surface water and superficial groundwater are the only relevant considerations for this proposal.

Groundwater

There is no surface runoff of water, with precipitation draining to the water table. It has been estimated that 30% of the rainfall will reach the superficial aquifer with an unknown amount filtering into the deeper aquifers, based on the pasture on the sand.

There are no acid sulfate or salinity issues, with the soils and water being fresh and elevated in the landscape.

The Department of Water Environmental Regulation Water Quality Protection Note 15 WPQN for Extractive Industries permits a final land surface of 0.5 metres above the highest winter water table.

On this site it is interpreted that the groundwater is at least 5 – 10 metres below the land surface.

The excavation of gravel from the site will only average down to 2 metres depth of excavation and complies with the DWER guidelines and WPQN 15 and uses the management actions wherever there is environmental benefit.

4.6 Flora and Vegetation

The resource area was pine plantation which has now been felled.

There are occasional Marri *Corymbia calophylla* and some local Jarrah *Eucalyptus marginata*. These are isolated and scattered and will be retained. Therefore no clearing permit will be sought.



Figure 7: Current vegetation on site

4.7 Fauna

The fauna on site will already be significantly depleted by the clearing as there are just scattered Eucalypts on site which will be retained. Therefore no Black Cockatoo feeding habitat will be impacted.

There is no native vegetation as ground cover.

4.8 Wetlands

There are no wetlands on site.

5.0 PROJECT DESCRIPTION

4.1 Extraction and Processing

5.1.1 Controls

Excavation is to be conducted to conform to the Mines Safety and Inspection Act (1994) and Regulations (1995).

The operations is to be managed by a licensed Quarry Manager and are regularly inspected by the District Inspector of Resources Safety, DMIRS

4.1.2 Construction Time

The construction time will be minimal as there are no constructed developments proposed. All excavation will be completed by mobile excavation and processing equipment.

4.1.3 Excavation Procedures

The proposed quarry will provide a range of strategically placed road making and construction materials in the Chittering Region that are used by local Authorities such as the Shire of Gingin, the Shire of Chittering and local residents and potentially to the Bindoon Bypass.

The laterite duricrust and gravel is to be extracted in a sequence starting with the removal of topsoil and overburden, the extraction of gravel and then duricrust where applicable, and finally the restoration of the land surface.

- The topsoil will be pushed to the side of the proposed pit to act as a screening and noise buffer.
- In later stages it may be possible for the topsoil to be spread directly onto an area of rehabilitation.
- Overburden is then scraped or pushed from the surface with the loader and transferred directly to an area being rehabilitated. If a rehabilitation area is not available the overburden is to be stored in windrows or low dumps adjacent to the edge of the excavation area, in dumps separate from the topsoil.
- The location of any topsoil and overburden dumps will be along the edge of the excavation area.
- Over time material in existing dumps and windrows will be used and new dumps created as excavation moves in a staged progression, but whilst in place the dumps will provide some screening.
- Where possible overburden is to be pushed up to form a bund along the lower edge of the excavation area to provide a separation to the pasture, water, noise and visual barrier when this does not compromise future excavation.

- Excavation of the resource is to be worked as an inside out operation. Vehicles will continue to work on the floor of the excavation and work towards the edges of the excavation.
- The depth of the excavation will depend on the thickness and quality of the resource which is expected to vary from 1 to 3 metres deep, but averaging 2 metres.
- Excavation will continue to be conducted in "cells" to ensure that precipitation falling in the pit is contained within the pit. The typical cell will usually be in the order of 2 - 3 metres deep over an area of around 2 hectares. In addition to the working pit, sufficient ground is required to be open to provide space for crushing and screening and the storage of stockpiles.
- Where pockets of duricrust extend to depth, a bulldozer will be required to rip the duricrust. The bulldozer will then push the ripped duricrust into dumps ready for the loader to collect and feed to the mobile crushing and screening plants.

5.1.4 Final Contours

The final profile of the excavated surface will be to *Mines Safety and Inspection Act 1994* as explained in documents such as *Guidelines on Safety Bund Walls Around Abandoned Open Pits* (DOIR 1991).

The final contours will be around 2 metres below the natural land surface with proposed batter slopes of 1 : 4 to 1 : 6 vertical to horizontal which will be established with a gently undulating floor of the pit to provide geotechnical stability.

As the pit will average only 2.0 metres deep the final land surface will be similar to the existing land surface except that it will be slightly lower.

The Concept Final Contours are shown on the attached plan.

Wherever possible, rehabilitation will be progressive to ensure that the amount of ground that is open at any one time is minimised. As access is currently through the existing pit, rehabilitation of this pit is not possible at this time.

5.2 Processing

A Works Approval and then Licence will be applied for under *Part (V) of the Environmental Protection Act 1986*.

- All static and other equipment will be mobile. Crushers and screens are to be located on the floor of the quarry to provide visual and acoustic screening.
- Stockpiles of products are to be retained on the floor of the pit where possible to reduce visual impact. If sufficient floor space is not made available, then the portable crushing equipment will have to be located on natural ground surface, which is not desirable for noise, dust, or water management.

- At the end of excavation the floor of the quarry will be ripped, covered by a layer of overburden and top soil (if not weed affected), and rehabilitated with pasture.
- If crushing is required, a larger floor area is required to locate the portable crushing equipment and stockpiles on the floor of the pit. When commencing operations or when there is insufficient ground open, the crushing and screening of the resource may need to be located on the natural land surface until sufficient excavated area is available.
- Approximately four hectares will be required for a crushing/screening operation using a bulldozer and crusher/screen.
- Ripping results in raw product of a size suitable for feeding to the mobile crusher.
- As the excavation progresses the crusher is moved to maintain a minimum distance between the active face and the processing facility. This reduces the area of excavation open at any one time and maximise the ground that can be prepared for rehabilitation. It also reduces the travel distances for the excavation equipment and helps reduce the risk of dust generation.
- Laterite duricrust will be fed into the crusher by a rubber tyred loader.
- From the crusher the material will be screened using a mobile powered screen.

5.3 Stockpiles

Stockpiles of laterite (duricrust) boulders and the various manufactured products will be created to ensure a constant supply. Sometime oversize will be generated which if not crushed will be placed back into the pit and covered during rehabilitation.

5.4 Equipment

- All static and operational equipment will work on the quarry floor to provide maximum sound and visual screening.
-
- The operation will use modern equipment that is regularly serviced. In general contractors will be used.
- All equipment will be serviced onsite by mobile service vehicles for minor servicing Major services will be conducted offsite.
- Refuelling is proposed to be from mobile tankers. At this stage there is not anticipated to be any fuel stored on site.

Table 5: Anticipated Operating Equipment

Equipment	Comment
Site office and/or containers	If required this will be a small portable facility.
Toilet system	A serviced portable toilet will be used.
Bulldozer	Used to rip and remove the duricrust/caprock
Mobile crushing plant	To crush the duricrust/caprock and produce the manufactured gravel.
Mobile screening plant	Provides the various gravel products.
Water tanker	Will be retained on site when dust is potentially generated. Used for dust suppression on the quarry floor as required. Water is to be sourced from the tank nearby which utilises water from a bore in the south west of Lot 7.
Loader	Normally on site at all times. Loading and handling products and natural gravel.
Fuel Storage	Fuel is not proposed to be stored on site. Vehicles are refueled from mobile tankers. The method used is the same as most mine and construction sites as well as many farming properties.

5.5 Hours of Operation

Hours of operation will be 6.00 am to 6.00 pm Monday to Friday inclusive, and Saturday from 6.00 am to 1.00 pm, excluding Sundays and Public Holidays. This is similar to the operations of nearby quarries in the local area.

5.6 Access and Transport

Access is directly to Great Northern Highway at a Main Roads constructed entrance. The crossover is sealed and constructed at a location with good sight lines.

If a contract is won to supply gravel for the construction of the Bindoon Bypass, which initiates at Lot 40, it is anticipated that transport may be able to be conducted along the Bypass alignment, thus negating the need for that truck traffic to enter the Highway.

With an anticipated 100,000 to 200,000 tonnes of gravel anticipated to be produced per year, excluding supply to the Bindoon Bypass, and say an average of 30 tonnes per truck, that amounts to around 11 to 22 laden truck movements per day over a 300 day operating year. With larger trucks and an average load of say 40 tonnes, the number of laden truck movements drops down to around 8 – 16 per day.

The only internal roads will be temporary transport across the excavated floor. No access roads will be required to be constructed.

5.7 Seasonal or Temporary Closure

Table 3 Seasonal Closure and Campaign Closure

TEMPORARY Closure Objective	Actions for Care and Maintenance Greater than 12 months
1.0 COMPLIANCE	
All legally binding conditions and commitments relevant to closure and rehabilitation will be met.	Prior to undertaking temporary closure. <ul style="list-style-type: none"> ➤ Review the latest documentation. ➤ Assess compliance with the conditions and commitments ➤ Faces and the landform are to comply with DMIRS Safety Guidelines and be stable for the long term.
2.0 SAFETY	
Make the site safe.	Prior to undertaking temporary closure. <ul style="list-style-type: none"> ➤ Secure the site and any plant or structures to be left. ➤ Mobile plant and other equipment not required will be removed from site. ➤ The site will be cleaned, structures will be removed. ➤ Provide fencing, bunding, signage or other measures as required to provide a safe site, particularly above any faces. <p>Security</p> <ul style="list-style-type: none"> ➤ Complete activities to make the site safe. ➤ Provide bunding and warning signs above faces as required. ➤ Provide locked gates or log access restraints as required or maintain staff on site. ➤ Check and maintain perimeter fences. ➤ Visual audit of completed ground, to verify compliance.
3.0 HYDROGEOLOGY	
Ensure that there are no materials that could cause pollution or environmental harm.	<ul style="list-style-type: none"> ➤ Remove fuel service materials. ➤ Remove any materials from which leaching may occur.
4.0 BIODIVERSITY	
Minimise the risk to on site or offsite biodiversity.	<ul style="list-style-type: none"> ➤ Implement Weed Management. ➤ Inspect the site for Significant Environmental and Declared weeds. Treat accordingly,
5.0 STAKEHOLDERS	
Ensure stakeholder issues are considered.	<ul style="list-style-type: none"> ➤ Prior to temporary closure, as necessary, consult with the relevant stakeholders. ➤ If care and maintenance continues, modify procedures in response to changes in stakeholder position, policies or conditions.

5.8 Water Use

Water is used to be used for dust suppression as required for the access road and processing areas. It is proposed that water used on site will be drawn from a farm dam or brought to site as required.

Generally less than 3 000 kL of water/day for around 100 production days in the drier months is expected to be used.

Water is required in the event of dust suppression being required for the access road and processing areas.

Water may also be used to wet the duricrust ahead of dozing. It can be used to wet down stockpiles and to wet product that is being crushed and screened as required to minimise dust generation.

Normally during crushing and screening the resource is often sufficiently moist to not require wetting down. At other times moisture is required to assist dust mitigation. There is however a fine balance because too much water can cause the screens to stick and clog.

Drinking water will be brought to the site as needed.

5.9 Workforce

The workforce will vary, depending on the level of operation and market demands, but usually 2 – 4 persons will work on site plus truck drivers as they access the operations.

5.10 Safety

Excavation safety

Excavation will be conducted to *Work Health and Safety (Mines) Act and 2022 Regulations*. Excavation practices, and operations procedures are in compliance with the Act. Health and safety issues are overseen by the DMIRS.

Hall-All Contracting have in place Safety Management Plans at all their sites and a site specific Emergency Response Plan to cover operational procedures, which include workforce induction and training to ensure that all employees involved are made aware of the environmental and safety implications associated with all stages of the mining activities.

Where applicable Safe Operating Procedure Sheets are prepared and made available for hazards. Workers and staff on all sites are trained in the use of the procedures and all employees provided with site induction and training as necessary prior to commencing work on the site.

All vehicles have two way radio capability. No light vehicles are permitted on site without registering with mobile plant on site. Full personal protection is required for all persons on site at all times.

Emergency

- The site is within mobile phone contact and all vehicles are equipped with two way radios.

- The loader will excavate from the face using an in – out movement, only approaching the face from a perpendicular movement which is the safe option.
- Personal protection is to be worn by all persons on site, with a minimum of hi – viz, safety boots, long clothing, hearing and eye protection and helmets when near the face or operating machinery.
- Road trucks are separated from the operating loader or dozer. Site warning signs and directions will be installed as required to maintain safety.
- Safety bunds or temporary fences will be used above any active vertical faces.
- Warning signs are to be maintained as required.
- Emergency preparedness plans will be developed and implemented.
- Staff and contractors are to be inducted and trained as necessary and have the relevant qualifications to fulfill the tasks they are assigned to.
- Where applicable Safe Operating Procedure Sheets are made available for hazards. Workers and staff on all sites are trained in the use of the procedures and all employees provided with site induction and training as necessary prior to commencing work on the site.

Fire

There is less potential fire risk from quarries than other land uses because quarries clear 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 no greater than a rural property.

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

Western Australian Planning Commission Planning Bulletin 111/2016 provides for an exemption of a bushfire plan requirement because there will be no structures that will burn and the open ground will form a fire break. It also provides for an exemption where the proposed activity is a continuation of existing activities. This applies to this continuation of sand extraction.

The Department of Mines Industry Regulation and Safety, SRS and PMP systems, with the registration of all quarries, requires bushfire planning to be covered under that system.

The management actions that are used to minimise fire risk are summarised below.

- Vehicles will be restricted to operational area, particularly on high fire risk days.
- Diesel rather than petrol powered vehicles are used.
- Perimeter fire breaks will be maintained by the landowner for Lot 40.

- The mobile plant on site will be available to assist with emergency fire management when safe to do so.
- Water supplies will be drawn from existing farm supplies or brought to site as required.
- The farm fire fighting unit is available for fire management.
- The site is to be secured from unauthorised access by maintaining the existing fencing and locked gates.
- Public access will not be permitted.
- An emergency muster area is to be provided.
- On site communications and worker induction and training will be provided.
- The site is within mobile phone range, adjacent to Great Northern Highway and the surrounding area is relatively flat and any bushfire smoke will readily be noticed.

6.0 ENVIRONMENTAL IMPACTS AND MANAGEMENT

The aims of the Environmental Management are to minimise the effects of gravel excavation on the local environment and return the area to a landform compatible with the surrounding area.

The environmental management is designed to reflect best practise, outlined in particular in;

Department of Resources, Energy and Tourism (Commonwealth), 2011, *A Guide to Leading Practice Sustainable Development in Mining*, and guidelines produced by Environmental Protection Authority, Department of Water, Environment Regulation, Department of Mines Industry Regulation and Safety, Western Australia Planning Commission and the Local Authority.

The Environmental Risk Matrix in this document Summary is considered to the principles of AS/NZS ISO 14001:2004 (Environmental Management Systems) and AS/NZS ISO 19011:2014 (Guidelines for auditing Management Systems). The principles of AS/NZS 31000:2009 (Risk Management Guidelines) are also used when considering any risks.

6.1 Aesthetics

There are a number of management actions that can be taken in quarries to minimise visual impact and these will be used wherever possible.

Guidance on visual impact is contained in *Department of Planning Land and Heritage, 2007, Visual Landscape Planning in Western Australia DPLH 2007*. Guidance can also be found in *Forest Commission of Victoria, undated, Landscape Types of Victoria*.

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.

The pit is set back a minimum of 200 metres from Great Northern Highway. The location of the pit is just south of the construction site for the start of the Bindoon Bypass at this location and will therefore be subject to some excavation and construction activity whilst the Bypass is being constructed.

To assess the potential for the site to be visible the site was inspected, and drone photography used in addition to Google Earth Pro.

There are few intervening trees. Therefore the use of low bunding on the eastern side of the excavation is proposed.

- Topsoil will be pushed into low bunds 2 metres high along the eastern side of the excavation area. As the floor of the pit will be around 2 metres deep there will be four metres of landform (pit depth and perimeter topsoil bund) to provide visual protection to the east. The stockpiles may show above the perimeter bunding but will be natural brown colours of laterite and will blend into the landscape.
- At the location of Lot 40 the traffic speed along Great Northern Highway will assist in reducing the size of the visual impacts on a time basis for traffic on the Highway.

- Progressive rehabilitation of all completed, excavated or disturbed areas will be implemented.
- The pit will be worked on the floor, below natural ground level.
- Operations will be staged, and the components located appropriately to minimise visual exposure.
- Where safety permits mobile and other plant and structures will be coloured to reduce visual impact.
- The components of the operations will be located in positions where they are less visible where possible, such as behind stockpiles or bunds.
- Good house cleaning practices such as orderly storage and removal of disused equipment or waste will be practised.

Light Overspill

It is not proposed that the facility will operate at night. The only lighting that might be required at night could be security lighting. Security lighting is located to minimise light visibility from Great Northern Highway and adjoining land.

6.2 Noise Management

Noise Management is designed to comply with Best Practise, such as Institute of Quarrying Australia/Queensland Government, Noise Management.

6.2.1 Regulatory Framework

Noise can originate from a number of operations and may impact on onsite workers, or travel offsite and impact on external sensitive premises. Both potential noise impacts are addressed by reducing the noise generated from the quarrying and processing operations.

Offsite noise is governed by the *Environmental Protection (Noise) Regulations 1997*.

The Noise Regulations, require that sensitive premises including dwellings in non industrial and rural areas, are not subjected to general noise levels (excluding blasting), during the hours 7.00 am to 7.00 pm Monday to Saturday that exceed 45 dBA. Allowable noise to 55 dBA is permitted for up to 10% of the time and to 65 dBA for 1% of the time. Noise levels are not to exceed 65 dBA during normal working hours.

Between 9.00 am and 7.00 pm on Sundays and Public Holidays, and between 7.00 pm and 10.00 pm on all days, the base level is 40 dBA.

At night, between 10.00 pm and 7.00 am Mondays to Saturday, and before 9.00 am on Sundays and Public Holidays the permitted level drops to 35 dBA.

The 10% and 1% “time above” allowances apply at night and on Sundays and Public Holidays as well.

There are penalties for tonality of 5 dB, modulation 5 dB and 10 dB for impulsiveness, that are added to the permitted levels. That is, if the noise is tonal or modulated the permitted levels drop by 5 dB. Impulsiveness is not likely to be relevant for the quarry under normal circumstances.

The Noise Regulations provide for Construction Noise exemptions to enable construction of the site such as the building of the screening bund and opening the pits.

Influencing factors that raise the allowable noise levels are activities such as external industrial noise, some nearby land uses and busy roads. These are not relevant to this site.

Under Schedule 1 of the Noise Regulations the premises on which the extraction of basic raw materials are extracted, is classified as Industrial Land for the purposes of calculating influencing factors. This was defined as the whole cadastral boundaries in State Administrative Tribunal decision {2013} WASAT 139, Bushbeach v City of Mandurah. In this case the premises is quite small and approximates the area of disturbance and will have little impact on the influencing factors.

At a distance greater than 15 metres from the sensitive premises (eg dwelling), and commercial premises, a base level of 60 dBA applies at all times, with the 10% time permitted to be up to 75 dBA and the 1% permitted to be up to 80 dBA. For industrial premises the base level is 65 dBA at all times with the 10% time permitted to be up to 80 dBA and the 1% permitted to be up to 90 dBA.

The closest sensitive premises is the service station to the north east across Great Northern Highway but that is a commercial premises. There are no dwellings within 1,000 metres of the proposed excavations.

6.2.2 Environmental Noise Management

The types of equipment proposed to be used are listed below. Not all plant will be on site at any one time and that provides for contingencies to reduce the operational noise on site if necessary at certain times.

Based on the experience of Landform Research and the operation of many other gravel quarries the proposed gravel excavation will easily be able to comply with the Noise Regulations at the closest sensitive Premises, the service station that is located 300 metres to the north east across Great Northern Highway.

Table 6: Noise management

General Noise	Management
Objectives	The Operations will comply with the <i>Environmental Protection (Noise) Regulations 1997</i>.
Legislation and Guidelines	<i>Environmental Protection (Noise) Regulations 1997.</i> DWER Works Approval and Licence under <i>Part V of the Environmental Protection Act 1986</i> to be applied for in relation to crushing and screening of gravel in excess of 5,000 tonnes per year.
Planning Management	<p>Noise Regulations</p> <ul style="list-style-type: none"> Hall-All Contracting is committed to compliance with the Regulations. The Noise Regulations provide for Construction Noise exemptions to enable construction of the site such as the building of the western screening bund. <p>Site Selection</p> <ul style="list-style-type: none"> The site has been selected based on the resource location, and the quarry designed to maximise the setbacks and noise impacts to the closest sensitive premises. The access road and crossover is already in place. <p>Close Sensitive Premises</p> <ul style="list-style-type: none"> A service station and truck parking is located 300 metres from the north eastern corner of the proposed excavation. It is noted that there is a clay quarry located 300 metres to the east across Great Northern Highway. That operation is 250 metres to the service station at its closest, extending further away. Based on the nature of the operation, equipment used and excavation methods, it is proposed that the crusher and stockpiles will be located 500 or more metres away from the closest sensitive premises which is the service station and truck parking to the north east across Great Northern Highway. This means that the only activity within the north eastern corner of the pit will be excavation. The proposed gravel quarry is not considered to be any different to the clay extraction based on potential environmental impacts.
Construction Management	<p>Construction of Bunding and Pit Preparation</p> <ul style="list-style-type: none"> The first excavation will be the pushing of topsoil and overburden to the east to form an eastern perimeter bund to 2 metres high. The pit will operate behind the bund at an excavation of 1 – 3 metres depth. The access road is already constructed by Main Roads and is sealed. <p>Design and Construction of the Quarry</p> <ul style="list-style-type: none"> All crushing and screening is to take place on the floor of the pit behind the topsoil bund, located so that a separation of 500 metres to the service station is provided.
Operational Management	<p>Haul Road</p> <ul style="list-style-type: none"> The access road is already constructed by Main Roads and is sealed which will minimise the banging of truck trays. <p>Quarry Operations</p>

	<ul style="list-style-type: none"> • All crushing and screening is to take place on the floor of the pit behind the topsoil bund, located so that a separation of 500 metres to the service station voided. • Processing consists of a mobile crusher and screening plant located on the floor of the pit in a location to maximise landform screening when road base is being produced. The solid walls of the pit perimeter will provide significant noise attenuation to the closest dwellings. There is also a limestone batching plant on site. • The crushing plant will be a mobile plant located adjacent to the face and bund and land form to maximise noise mitigation and noise carry to the east. • All plant will be maintained in good condition with efficient mufflers and noise shielding. • Lights or low frequency frog beepers are to be used rather than high pitched beepers to restrict noise intrusion. • No drilling and blasting is proposed. • Excavation is to be conducted using a bulldozer and loader. • All equipment is fitted with noise shields and efficient silencers. • The noise suppression measures on the crushing and screening plants will be closely monitored, and appropriate signage posted. <p>Truck Movements</p> <ul style="list-style-type: none"> • Truck movements along internal roads will be restricted to the existing hardstand. • Trucks will enter and leave the site directly from Great Northern Highway. • Transport on Public Roads is exempt from the Noise Regulations. • Internal roads will be maintained in good condition to minimise the banging of trays and other potential noise impacts. <p>Operational Site Code</p> <ul style="list-style-type: none"> • A site code is in place at other Hall-All Contracting quarries and will be used on this site. • This may include limiting the number and type of plant operating at any one time as required to maintain compliance with the Noise Regulations. <p>Contingencies</p> <ul style="list-style-type: none"> • Shutdown will be used to save fuel and maintenance costs in addition to noise minimisation. • There is good flexibility to plan the equipment use to reduce noise levels further even though that is not necessary for compliance with the Noise Regulations. This can include the location of the plant such as the crusher, number and type of plant operating at any one time, use of bunding or shielding, changing the mobile plant, providing better silencing etc. <p>Operating Hours</p> <ul style="list-style-type: none"> • Quarrying and processing operations are to be conducted during normal working hours between 6.00 am to 6.00 pm, Monday to Saturday excluding Public Holidays. • The hours between 6.00 am and 7.00 am are part of the night time assigned noise levels and therefore at that time normally only gravel will be loaded. The crushing and screening plants will not normally operate before 7.00 am. • Contingencies are available to reduce noise levels further such as limiting the number and type of plant operating at any one time as required to maintain compliance with the Noise Regulations.
<p>Monitoring</p>	<p>Complaints</p> <ul style="list-style-type: none"> • A complaints recording and investigation procedure is to be implemented and maintained. • All complaints will be recorded, investigated and if substantiated action taken to correct the

	<p>issue raised.</p> <ul style="list-style-type: none"> • Where possible the complainant will be contacted to explain the procedures and actions taken to resolve the issue.
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6.2.3 Occupational Noise

The management of occupational noise is normally handled by providing all necessary hearing protection, as well as conducting worker inductions and educational programs for all staff, and hearing tests which are required. Regular site audits of quarry and mining operations are normally conducted by the Department of Mines Industry Regulation and Safety.

- Hall-All Contracting conducts site induction and training for all personnel at all their sites.

Personal Noise Protection

All staff will be regularly checked for hearing under the Mines Safety and Inspection Act, the SRS and Project Management System that are required under DMIRS safety regulation. See below under Operational Noise.

As part of its commitments, Hall-All Contracting are pro-active with worker safety awareness;

- by providing all necessary safety equipment such as ear protection,
- identifying sections of the plant where hearing protection is required, as well as,
- conducting induction and educational programs for its staff.
- Training will be conducted under the *Mines Safety and Inspection Act 1995*, the SRS and Project Management System that are required under DMIRS safety regulation.
- All personal noise protection equipment is provided to staff.
- Warning signs are used to identify areas of potential noise associated with mobile plant.

The DMIRS conducts regular inspections of all quarries.

6.3 Dust Management

6.3.1 Nature of Quarry Dust

The greatest proportion of dust in quarries is visible dust. Dust during quarrying operations is only a problem when there is inadequate management of the dust risk. Most management consists of wetting down the products and keeping them moist, with other management being the use of screens and curtains on processing plant.

Most dust on a quarry site is generated;

- During vehicle movements on hard surface such as internal and hardstand.
- From crushing and screening of laterite.
- From dust lift off by wind, mainly from hardstand and vehicle movements.

As dust has the potential to be generated from crushing and processing, its treatment and management will form an integral part of a DWER Works Approval and Licence that will be required for crushing and screening of laterite gravel in excess of 5,000 tonnes per year under *the Environmental Protection Act 1986 Part (V)* and is normally conditioned in that approval.

Commonly called "dust," scientists and regulators refer to the term particulate matter (or PM) to describe the range of particles that exists in the air or in air breathed in.

Particulate matter exists naturally in the atmosphere, eg sea-salt spray and pollens. Small sized PM can be increased due to human activities such as vehicle exhaust, industrial processes, power stations, mining, farming and wood heaters, or smoke from bushfires.

Exposure to small sized PM can be associated with health and amenity impacts if the exposure is excessive.

The likely risk of these impacts depends on a range of factors including the size, structure and composition of the PM. The various dust particle size is also explained in *DEC (DWER) 2011 Guideline for Managing the Impacts of Dust and Associated Contaminants from Land Development Sites, Contaminated Sites Remediation and other Related Activities. This Guideline supersedes the 1996 Guideline.*

Particulate matter needs to be suspended in the air to carry any distance, and will only carry short distances if the grains are too large to move. The particles that are able to be suspended are called Suspended Particulate Matter and the total amount of that is referred to as TSP.

Quarry Dust Composition

There is data specifically from mining, (predominantly coal) from New South Wales (NSW Health) where particulate levels have been measured to be;

PM <2.5 microns as 2 – 5% of emissions (One micron is 1 / 1000 of 1 mm).

PM_{< 2.5} are invisible and called “fine particles”. They are the main health issue and are caused by vehicle emissions whether they are along roads or on private land. Vehicle emissions will not occur at night or at other times when the site is not active.

PM 2.5 – PM10 microns as 15 – 45%

PM 10 (particles between 2.5 and 10 microns) are invisible and called “coarse particles”. They can be breathed in, but are removed by alveoli and mucous. (NSW Health). This dust may be generated when land is cleared and topsoil disturbed or the site is subject to traffic in summer.

PM>10 microns as 50 – 70%

PM>10 is visible dust and will, based on the resource, be the vast majority of the particles.

Normally all sizes of dust are generated together, and there will be visible dust being generated when invisible dust is being formed. Therefore any visible dust present is a good sign and an early indicator of a dust risk. A summary of the sources and proportions of dust is shown in; NSW EPA and NSW Ministry of Health Environmental Health Branch 2015, Review of the health impacts of emission sources, types and levels of particulate matter air pollution in the ambient air in NSW.

This is backed up by occupational monitoring through the Department of Mines Industry Regulation and Safety. Unpublished data from operating quarries shows quarries are compliant or can readily be made compliant with the health and safety and community standards through normal dust management practices.

6.3.2 Dust Standards

To provide for air quality in populated areas an Australian Standard was established.

The Ambient Air Quality NEPM as an instrument was established in 1998 under the *National Environment Protection Act 1994* (NEPC Act) is to provide a nationally consistent framework for monitoring and reporting on six common ambient air pollutants – carbon monoxide, lead, nitrogen dioxide, photochemical oxidants (ozone), sulfur dioxide and particulate matter (PM) as the larger size fraction of PM₁₀. It was varied in 2003 to include smaller sized particles, PM_{2.5}.

Following much review and consultation, the Air NEPM was amended on 4 February 2016 to upgrade the PM_{2.5} and to add *1-year average PM₁₀ of 25 µg/m³* to complement the 24-hour average PM₁₀ of 50 µg/m³.

An exceedance of 1-day average standards in excess of normal historical fluctuations and background levels, was also added and is directly related to bushfire, jurisdiction-authorised hazard reduction burning or continental-scale windblown dust.

Western Australia has a goal of achieving the National Environment Protection Standard for PM₁₀ in ambient air, in line with the National Environment Protection (Ambient Air Quality) Measure (NEPM), based on the PM₁₀ for a daily PM₁₀ (visible dust) level that did not exceed 50 µg/m³, with an allowance only for exceedances for ‘exceptional’ events, such as bushfires.

The NEPM is applicable to populated areas as it has been found that at operating quarries in the Rural Area that dust management is readily achieved in compliance with the NEPM standards and therefore the normal dust management involves the identification and treatment of visible dust as a very effective means of managing dust.

In 2011 the DWER released Dust Management Guidelines that acknowledged the NEPM standards but relies on visual dust management. Visual dust management is the norm for quarries in Western Australia and in DWER Licences.

5.3.3 Dust Risk

Dust management is an integral part of the extraction and processing of any basic raw material.

The dust risk assessment is based on the *DEC (DWER) 2011 Guideline for Managing the Impacts of Dust and Associated Contaminants from Land Development Sites, Contaminated Sites Remediation and other Related Activities*.

DEC (DWER) 2011 Guidelines provide for dust risk assessments to be conducted, management proposed and implemented and a visual monitoring procedure and complaints mechanism to be used.

The Guidelines are for uncontrolled sites or for sites to determine what management of dust might be necessary. Therefore two scores have been used in the risk assessment.

- From the assessment of the setbacks of the proposed operations and prevailing winds, the main risk is from the easterly winds on mornings, especially in summer when the soils, hardstand and stockpiles are at their driest.
- Note that the dust risk methodology assesses the dust risk at the closest sensitive premises such as the buildings at the service station to the north east at a distance of 300 – 1050 from the pit, across Great Northern Highway.

Table 7: Dust Risk (DWER 2011 Guidelines)

PART A Number	Item	Score		Score
		Crushing, screening and general operations without dust management, located > 500 metres from sensitive premises.	Crushing, screening and general operations with dust management, located > 500 metres from sensitive premises	Operations with dust management, within the 300 – 500 metre pit area.
1	Nuisance potential of the material	Medium to High when trafficked and untreated - 4 to 6.	Low when trafficked and untreated - 2.	Low with – 2
2	Topography and vegetation screening	Sheltered and screened -1	Sheltered and screened -1	Medium screening - 6

3	Area of site activities	Active trafficked areas at any one time are 1 - 5 hectares in area - 3	Active trafficked areas at any one time are 1 - 5 hectares in area - 3	Active trafficked areas at any one time are 1 - 5 hectares in area - 3
4	Type of work being undertaken	Bulk earthworks - 9	Bulk earthworks - 9	Bulk earthworks - 9
	Summer total without dust measures	Maximum = 17 -19 -	Maximum = 15	Maximum = 20

PART B Number	Item	Score	Score	
		Crushing, screening and general operations without dust management, located > 500 metres from sensitive premises.	Crushing, screening and general operations with dust management, located > 500 metres from sensitive premises	Operations with dust management, within the 300 – 500 metre pit area.
1	Distance to premises	Premises between 500 – 1000 metres – 6.	Premises between 500 – 1000 metres – 6.	Premises between 100 - 500 metres – 12.
2	Effect of prevailing wind	Premises affected by prevailing wind - 6 (Main winds are easterly in the morning and south westerly in the afternoon)	Premises affected by prevailing wind - 6 (Main winds are easterly in the morning and south westerly in the afternoon)	Premises affected by prevailing wind - 6 (Main winds are easterly in the morning and south westerly in the afternoon)
	Total Part B	Maximum Premises = 12	Maximum Premises = 12	Maximum Premises = 18

Activity	Calculated Score Part A x Part B	Allocated Risk of Dust
Crushing, screening and general operations without dust management, located > 500 metres from sensitive premises.	Maximum Premises A and B = 19 x 12 = 228	Classification 2 Low Risk, Dust management will be required for pit best practice and worker environment. This is provided and the assessed levels are as provided below.
Crushing, screening and general operations with dust management, located > 500 metres from sensitive premises	Maximum Premises A and B = 15 x 12 = 180	Classification 1 Negligible Risk, No recommended actions or contingencies required for the dwellings. Dust management will be required for pit best practice and worker environment.

Operations with dust management, within the 300 – 500 metre pit area.	Maximum Premises A and B = 20 x 18 = 360	Classification 2 Low Risk, Dust management will be required for pit best practice and worker environment. This is provided and the assessed levels are as provided below.
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The dust risk assessment based on the *DEC (DWER) 2011* shows a Low to Negligible risk with the greatest risk when the excavations are being completed in the north eastern corner of the resource area, between 300 and 500 metres from the service station.

The dust risk to Great Northern Highway is similar or less because a direct westerly wind is much less common than the south westerly sea breeze.

Further, there have been several studies relating to the distance dust travels from quarrying activities on gravel roads in flat open ground.

Oudwater S, 2017, Modelling of dust emission in dimension stone quarry, Aalto University School of Engineering, Finland showed that for drilling and other activities associated with hard rock quarries, 95% of the dust down to PM10 settles within 20 metres of the quarrying activity. The amount of dust deposited at a distance of 30 metres was around 2% of that deposited at the source of the activity.

In addition data from *Oudwater S, 2017*, and *Jones D N, L Bemedede, A R F Bond, C Dexter and C L Strong, 2016* show that the majority of quarry dusts are larger particles and settle quickly within less than 40 metres, further reducing the risk of dust impacts.

The study also confirmed that finer dust particles PM5, which are the most significant for health) were the result of combustion engines with little being produced by the abrading of rocks.

Jones D N, L Bemedede, A R F Bond, C Dexter and C L Strong, 2016, Dust as a contributor to the road effect zone: a case study from a minor forest road in Australia, Australian Journal of Environmental Management Volume 23, No 1 p 67 – 80 noted that dust deposition at a distance of 40 metres from a gravel road in forest varied from 8% to 30% of the deposition at the roadside depending on the level of vegetation cover. They also found that mammals were not significantly impacted by the dust compared to when the road was sealed.

The same will apply to this site, even though the dust originates from gravel extraction and processing and tyre impacts.

5.345 Tree Belts and Buffer Management

Dust particles are readily stopped by tree belts and distance, with which the site complies. Tree belts slow the wind and allow the dust to settle.

The Queensland Guidelines predominantly relate to agricultural spray drift, but based on particle size also relates to dust.

The Guidelines provide for a buffer of 300 metres for open agricultural land, which is applicable to the proposed operations, dropping down to 40 metres where an effective tree belt is in place. The Western Australian Department of Health also uses the same guidelines. The Guidelines are based on field studies and demonstrate the effectiveness of tree belts and distance in providing screening against particulate travel.

On this site it is noted that the distance to the closest sensitive premises is a minimum of 300 metres along relatively flat ground to the service facility to the north east across Great Northern Highway or to Great Northern Highway.

That land surface has isolated trees and pasture.

The buffer distances are able to manage dust as prescribed by the *Department of Natural Resources Queensland (1997) and Department of Health WA, 2012*.

Further the excavation will be undertaken from the floor of the pit with the wall of the pit and the perimeter bund providing around 4 metres of wind protection.

6.3.5 Monitoring of Excessive Dust

When dust visual trigger conditions are detected and/or alerted, relevant action is taken. This can include additional water suppression, modification of procedure, delay until more favourable conditions are present, use of alternative equipment etc.

Human monitoring can detect potential dust risks prior to, and take action prior to, significant dust being generated. They notice dust immediately such as from tyres, whereas machine monitoring has to rely on significant dust being generated, travelling to the boundaries of the premises and triggering an alarm. The operators would be negligent if they let the dust get to that level of impact prior to taking action.

The problems associated with machine operated dust monitoring are that the monitors and samplers used do not separate the organic particles from inorganic particles. On quarry sites the continuous monitors and high volume samplers have been found to register the highest volumes on smokey days.

The samplers and particle monitors do not identify which particles actually come from the quarry and do not differentiate the inorganics from the organics. Further they do not provide instantaneous feedback from dust management. The measurements are normally added or averaged. For example an alarm may trigger when a daily limit has been reached, at which time the actual cause of the dust may well have been resolved and so the exceedance cannot be related to the actual operating conditions. There is a travel time for dust to reach the monitor even if the monitor is located at the boundary of the site.

The auditable condition is visible dust crossing the boundary of the premises; the lot boundary. This is the condition used on Department of Water Environmental Regulation Licences and all other quarries such as sand, limestone, gravel and hard rock quarries in Western Australia and has worked well in the past.

It is also the method used by the DMIRS and DWER to rapidly assess occupational dust on site.

The quarry manager and leading hand are ultimately responsible for site supervision of dust. They will travel around the operations and pit frequently and are in two way radio contact with all mobile plant.

All operators on site are to be instructed to be vigilant to dust generation and management and report any excessive dust or potential dust management issues.

Visual monitoring is even more effective when complemented by an extensive reporting and complaints process and this will be used.

The effectiveness of the dust management is shown by no complaints regarding dust normally being received at Hall-All Contracting operations. Hallgrav Pty Ltd operate the gravel pit on Bindoon Hill and as far as is known there have been no complaints known relating to dust from that excavation within the past five years.

Table 8: Dust Management Actions

Activity	Dust Management
Objectives	<p>Minimal dust moving off site and minimum dust generated on site or from the access roads.</p> <p>No visible dust to cross the boundary of Lot 40.</p> <p>No dust impact on sensitive premises or Great Northern Highway.</p>
Legislation and Guidelines	<p><i>WQPN 15 Extractive Industries near sensitive water resources (2019)</i></p> <p><i>DEC (DWER) 2011 Guideline for Managing the Impacts of Dust and Associated Contaminants from Land Development Sites, Contaminated Sites Remediation and other Related Activities</i></p>
Construction - Clearing	<p>Land Clearing - Opening</p> <ul style="list-style-type: none"> • A Clearing Permit CPS 10053/1 has been applied for. • This involves removing the topsoil for use in revegetation and construction of the screening bunds, followed by removal of the overburden. • Construction will take place when the soils are moist. If conducted in summer water will be used to wet down the soils and overburden prior to removal if dust is generated. • Roads and traffic areas will be wetted down as required. • Clearing and reinstating pasture, topsoil and overburden will be confined to the wetter months, April to October, where possible. <p>Construction of the Topsoil Perimeter Bunds</p> <ul style="list-style-type: none"> • The bulldozer will form the bund first by pushing the topsoil and overburden to the perimeter in the east. • If winds are sufficiently strong, or other weather conditions are unacceptable to negate the effects of dust management, operations will cease until conditions improve and compliance can be achieved.
Operation	<p>Excavation</p> <ul style="list-style-type: none"> • Similar excavation methods to all other gravel quarries are proposed.

Activity	Dust Management
	<ul style="list-style-type: none"> • The excavation of laterite gravel is not generally dusty in itself, it is the traffic on the floor of the pit and on hard stand areas and any processing that is more likely to generate excessive dust. • For excavation to remove up to 100,000 tonnes per year excavation will be at the rate of around 60 tonnes per hour on up to 300 operational days. To produce 200,000 in a year, double the extraction rate will be required. • Excavation will normally be undertaken by the loader or excavator loading to a haul truck or directly to the crusher. • Excavation will be undertaken as low in the pit as permitted by the quarry planning to provide maximum shelter for dust protection. • Trafficked roads and hard stand will be wetted down as required. • The loading and hard stand will be watered as required to suppress dust. In summer this will normally equate to being watered 2 to 4 times per day and in winter little or no watering is anticipated to be required. • Internal roads and hardstand surfaces will be maintained in good condition (free of potholes, rills and product spillages) and with suitable grades. • A water truck will be retained on site for road and other wetting down product and gravel as applicable. • Use of a sealant such as a polymer, chemical or emulsified oil or bitumen on the internal roads to reduce water use remains an option to supplement water treatment if required or applicable. • Misting is a contingency for the loading and tipping areas using a moderate mobile misting machine. • If winds are sufficiently strong, or other weather conditions are unacceptable to negate the effects of dust management, operations will cease until conditions improve and compliance can be achieved. <p>Processing</p> <ul style="list-style-type: none"> • Treatment with water will be used where required. • Sprinklers or wetting down of internal roads, traffic and loading areas. • A water truck will be located on site as necessary during operations and the active hardstand and access road treated as needed. • Processing and stockpiles will be located more than 500 metres from the service centre to the north east. • Plant location, and approach with respect to wind directions, will be used to minimise impact on operators. • All crushing and screening plant will be located on the pit floor below natural ground. • Water sprays, mists and additives to crushing and screening cycles will be added with screens covers and misters at drop points. • The mobile plant will be screened and shielded where possible and treated with misters and other dust control at other points. • Use and maintain filters on all operational plant. • Regular appropriate emptying of filter collection devices. • Face hoppers and drop points away from prevailing winds. • Reduced pressure in plant, hoppers and bins can assist in preventing the loss of dusty air. • Misting is a contingency for the loading and tipping areas using a moderate mobile misting machine.

Activity	Dust Management
	<ul style="list-style-type: none"> • If winds are sufficiently strong, or other weather conditions are unacceptable to negate the effects of dust management, operations will cease until conditions improve and compliance can be achieved. <p>Stockpiles and Loading</p> <ul style="list-style-type: none"> • Processing and stockpiles will be located more than 500 metres from the service centre to the north east. • A water truck is to be located on site as necessary during operations and the active hardstand and access road treated as needed. • The number of stockpiles will be minimised . • Stockpiles in sheltered areas located low in the landscape, well below the natural surface and behind the perimeter bunding and face. • The elevation of stockpiles will be minimised. • The drop height to stockpiles and loading will be minimised. • Finer products will be located inside or screening by stockpiles of coarse materials. • Misters and skirts will be used at drop points as appropriate . • Misting is a contingency for the loading and tipping areas using a moderate mobile misting machine. <p>Unattended Site</p> <ul style="list-style-type: none"> • A sign will be erected at the entrance to the pit with details and contacts of the operator who can be contacted if excess dust is generated. • The operator contacts will be provided to the closest dwellings to enable contact if excess dust is generated. • Stockpiles will be located where they are screened by the pit walls and other measures. • If dust becomes an issue when unattended during summer months dust suppression will be maintained which could include the use of a water cart, sprinkler systems on stockpiles, windbreak materials, surface stabilisation sprays and other measures as required.
External Transport	<p>Access and Road Transport</p> <ul style="list-style-type: none"> • The access road and crossover are constructed and is bitumen. • All loads for transport outside the pit will be to be covered. • All trucks will be required to be dust free and not carrying pebbles and other materials outside the tray. • The hardstand is to be maintained in good condition (free of potholes, rills and product spillages). • Loader drivers are instructed on the best means of loading to minimise overflow and spillage. • Trucks are to be inspected by their drivers prior to leaving the site and brushed down as necessary to remove loose materials.
Occupational Dust	<p>On Site Health and Amenity</p> <ul style="list-style-type: none"> • Air conditioned cabins will be maintained on all vehicles. • A readily auditable trigger of no visible dust to cross the property boundary in line with DWER Licence and best practice in WA. • The trigger for dust management is the generation of visual dust.

Activity	Dust Management
	<ul style="list-style-type: none"> The leading hand or Quarry Manager is normally the loader driver who is in the best position to assess dust generation and to direct remediation. A commitment is made that no visible dust will cross the boundary to impact on dwellings. On site operators are instructed to visually monitor dust, report and treat any visible dust. <p>Mines Safety and Inspection Act</p> <ul style="list-style-type: none"> Occupational dust associated with the quarrying processes falls under the <i>Mines Safety and Inspection Act 1994 and Regulations 1995</i> overseen by the DMIRS who regularly inspect the site. Included in the program are personal dust monitoring assessments. If on site dust is managed offsite dust risk is also managed. Operations will cease if conditions are not favourable or when visible dust is crossing the boundary. The latest weather conditions to increase the awareness of dust risk. On site induction training will include observation and mitigation where possible of all dust emissions.
Rehabilitation	<p>Rehabilitation</p> <ul style="list-style-type: none"> Scheduled activities such as ripping, overburden and topsoil spreading are to be undertaken at times when the materials are less likely to blow or during suitable wind conditions. If conducted in summer and the soils are not sufficiently wet to suppress dust, water canon will be used to wet down the soils and overburden prior to removal. Land restoration is infrequent and normally conducted only once per year. Where possible restoration will be completed in wetter months or when winds are blowing away from sensitive premises. If winds are sufficiently strong, or other weather conditions are unacceptable to negate the effects of dust management, operations will cease until conditions improve and compliance can be achieved.
Monitoring	<p>Monitoring</p> <ul style="list-style-type: none"> Human monitoring can detect potential dust risks prior, and take action prior, to significant dust being generated. They notice dust immediately such as from tyres, (The research by Sairanen M and O Selonen, 2018, <i>A Review of dust emission dispersions in rock aggregate and stone quarries, International Journal of Mining, Reclamation and Environment</i>, demonstrates that visual assessment of dust agrees with the measured concentrations of dust). The most effective dust monitoring is the sighting of visible dust. Dust can be detected as soon as it leaves the wheels of vehicles and detection is not reliant on dust travelling to a machine monitor located near the boundary. The auditable condition is visible dust crossing the boundary of the premises; the lot boundary. This is the condition used on DWER Licences and all other quarries such as sand, limestone, gravel and hard rock quarries in Western Australia and has worked well in the past. A comprehensive visual monitoring program is to be implemented with all workers instructed to inform the Quarry Manager/leading hand if dust levels are excessive. The Quarry Manager/leading hand will then organize the appropriate dust management to reduce or mitigate dust. <p>Complaints</p> <ul style="list-style-type: none"> All complaints relating to dust are to be investigated immediately on receipt of a

Activity	Dust Management
	<p>complaint.</p> <ul style="list-style-type: none"> A record of all dust complaints is to be maintained together with the mitigation measures to be used to reduce the dust impacts. See the example below. <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>Appendix 3.</p> <p>Procedures to be adopted following a complaint from a land development site</p> <p>The procedures to be adopted by the developer following receipt of a dust-related complaint from a member of the public should be as follows:</p> <ul style="list-style-type: none"> Record the details of the complaint as specified below. The complaint form should be retained by the developer and be made available upon request by the local government or an authorised DEP officer. Take measures to control any excessive dust by implementing the contingency arrangements which have been specified for the agreed site classification. If the developer regards the complaint to be unjustified, then the developer should forward the details of the complaint to the local government within 24 hours. <p>As a guide, the procedures to be adopted by local government, following receipt of a dust-related complaint from a member of the public or passed on by the developer, should be as follows:</p> <ul style="list-style-type: none"> Record the details of the complaint as specified below or on a local government-approved complaint form. The complaint form should be retained by the local government and be made available upon request to an authorised DEP officer. Evaluate the complaint by conducting a visual inspection, preferably as soon as possible, taking into account the prevailing weather conditions which were being experienced at the time the complaint was lodged. If the complaint is valid, instruct the developer to take measures to control any excessive dust by implementing the contingency arrangements which have been specified for the agreed site classification. If the local government regards the complaint to be unjustified, contact the complainant and inform them of these findings. If the local government is unable to resolve the complaint, after exhausting all possible avenues, then the local government may request advice from the DEP. </div>

6.4 Water Management

Surface Water

There is no surface runoff of water on the gravel resource due to the porosity and permeability of the laterite, with precipitation draining to the deep water table.

The site is not subject to any watercourses or flood paths as it lies on the plateau remnant of the Dandaragan Plateau.

The surface water and superficial groundwater are the only relevant considerations for this proposal.

Groundwater

There is no surface runoff of water, with precipitation draining to the water table. It has been estimated that 30% of the rainfall will reach the superficial aquifer with an unknown amount filtering into the deeper aquifers, based on the pasture on the gravel.

There are no acid sulfate or salinity issues, with the soils and water being fresh and elevated in the landscape. See Section 4.4 Acid Sulfate.

The Department of Water Environmental Regulation Water Quality Protection Note 15 WPQN for Extractive Industries permits a final land surface of 0.5 metres above the highest winter water table.

On this site it is interpreted that the groundwater will be at least 5 – 10 metres below the land surface.

The excavation of gravel from the site will only average down to 2 metres depth of excavation and complies with the DWER guidelines and WPQN 15 and uses the management actions wherever there is environmental benefit.

No dewatering is proposed. All water is to be retained in the pit and infiltrate into the gravel.

The materials listed in Table 9 are considered for their potential to impact on water quality.

Table 9: Materials Inventory – Characterisation

Type	Comment	Treatment	Reference
Acidic materials and drainage	Not present. Therefore there is no risk of acidic conditions developing as a result of exposure of the resource to oxidation from the atmosphere. The materials are highly oxidised laterite gravel. The water table will not be exposed.	No treatment necessary. Geological examination of the rock does not reveal any sulphides or sulphide weathering products or any at risk materials. The laterite crusts that are exposed to the atmosphere on the Darling Scarp carry no sulphides.	Field geological examination by staff. Field geological examination of the general area and other hard rock quarries in the same geological rock units by Landform Research.
Ablutions waste	The site will be serviced by an approved portable	The facilities and wastes will be removed from site	

Type	Comment	Treatment	Reference
	waste water system when operational.	on closure.	
Dangerous Goods and Services	<p>FUEL</p> <p>The various plant will be refuelled from mobile tanker and on site tanks.</p> <p>None will remain on closure.</p>	Any rock, earth, soil or other materials, impacted by significant drips and spills will be removed offsite to an approved waste site or location. Fuel is discussed in the Water Management.	Table 10
	<p>SERVICE MATERIALS</p> <p>Only minor lubrication will be conducted on site, such as changing a hose. On site servicing will be conducted by dedicated service truck that collects and removes waste hydrocarbons and service materials. All major servicing will be conducted offsite.</p> <p>None will remain on closure</p>	A Service Management Plan is provided.	Table 10
General waste	All waste will be collected and removed from site on a regular basis.	Regularly removed from site to an approved disposal area.	Table 10

Table 10: Water Management

Surface Water Volumes	
Objectives	<i>There will be no significant change to the quality or quantity of surface or groundwater.</i>
Legislation and Guidelines	<p><i>Minesite stormwater</i></p> <p><i>WQPN 15 Extractive Industries near sensitive water resources (2019)</i></p> <p><i>DWER 2003, Mine Void Water Resource Issues in Western Australia, Water and Rivers Commission (DWER) Report Hydrogeological Record Series Report HG 9.</i></p> <p><i>Read J and P Stacey, 2009, Guidelines for Open Pit Slope Design, CSIRO, CRC.</i></p> <p><i>Stormwater Management Manual for Western Australia, Department of Environment WA, 2004.</i></p>
Management	<p>Water Management on Closure</p> <ul style="list-style-type: none"> At the end of excavation the land surface will be similar to the pre-mined surface except the pit area will be around 2 metres lower. The reconstructed soils will be planted to pasture. With the removal of the pines the recharge will have increased slightly and this will be maintained at closure assisting in negating a drying climate.

	<ul style="list-style-type: none"> • Surface water will be retained in the pit to infiltrate into the ground. • Overall the water balance at closure is anticipated to be similar to the pre- mine condition which will help combat a drying climate. <p>Refuelling</p> <ul style="list-style-type: none"> • Extraction of gravel is a clean operation similar to sand excavation in the nature of the risk to groundwater. Similar quarries have operated on the Darling Scarp for many years with no known significant pollution incidents. • Hall-All Contracting have safety and pollution management procedures for all their operations. They also use self contained service and recovery vehicles to undertake minor servicing in the field. • Fuel will be brought to site for refuelling. <p>Fuel Spill Management</p> <ul style="list-style-type: none"> • Diesel fuel will be transported to site as required by mobile tanker, the same procedures used at the Bindoon Hill gravel operations. • Soils and roadbase 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. • Refuelling and lubricating activities will only be used in designated areas. Equipment for the containment and clean-up of spills is to be provided in these areas. • Spillage will 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). • In the event of a spill or adverse incident, activities will be stopped in that area until the incident is resolved. • Any spills will be contained by the excavation or processing area. A fluid spill emergency response kit will be located on at the refuelling area. For larger spills soil and resource will quickly be placed around the spill to contain it in as small an area as possible. When contained, the contaminated aggregate/loam soils will be scooped up and removed to an approved landfill or other approved site. • All significant adverse incidents (such as a fuel spill of >5 litres) in one dump, will be recorded, investigated and remediated. A record is to be kept of incidents and the Local Authority and Department Water Environmental Regulation notified within 24 hours. • Transport chemicals in accordance with the <i>Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code)</i>. <p>Servicing and Maintenance</p> <ul style="list-style-type: none"> • All major servicing of vehicles will be conducted off site. • Servicing plant and equipment will be in accordance with a maintenance schedule. • Lubricating and minor maintenance activities are to occur in designated areas in the processing area and pit. Equipment for the containment and clean-up of spills is to be provided. • Spillage will 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.
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	<ul style="list-style-type: none"> • Self contained service trucks are to be used that recover all waste liquids and solid materials for recycling and removal from site. • Waste oil and other fluids derived from the routine maintenance of mobile machinery, will be transported off site and disposed off at an approved landfill site. Grease canisters, fuel filters, oil filters and top-up oils will be stored in appropriate containers in a shed or brought to the site as required. • Vehicle washdown is not proposed. • Regular inspections and maintenance of fuel, oil and hydraulic fluids in storages and lines will be carried out for wear or faults. • Accidental spill containment and clean-up protocol will be implemented as necessary. • Any waste chemicals derived during routine maintenance activities will be stored in appropriate sealed containers within a designated storage area or taken from site and disposed of at an approved facility. • Rubbish generated is to be recycled wherever possible and periodically disposed of at an approved landfill site. <p>General Wastes</p> <ul style="list-style-type: none"> • The site will be maintained in a tidy manner by removing all rubbish regularly offsite. • The potential for rubbish to be dumped relates mainly to unauthorised access and is low as the site is set back from roads and public areas. Access restrictions such as gates or barriers will be installed when the site is unmanned and equipment retained on site. • Any illegally dumped materials are to be removed promptly to an approved landfill or other suitable site, depending on the nature of the material. • Non essential or old plant and materials will be removed from the site. Locked gates and the existing fences will be maintained to prevent illegal dumping and contamination of water. • 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 on site. Waste storage containers will be sealed so that rainfall cannot enter, therefore preventing the formation of leachates. • Wastes generated will be recycled wherever possible and periodically disposed of at an approved landfill site. • Regular inspections (at least weekly) will be conducted to ensure no wastes, litter and the like are present in or around the excavation and processing area. <p>Wastewater Disposal</p> <ul style="list-style-type: none"> • A service portable toilet system will be used when the site is manned. • Serviced means they are pumped out by a licensed contractor from Perth or locally.
Monitoring	<ul style="list-style-type: none"> • No monitoring is required. • There is no groundwater on site that can be monitored.
Actions	<ul style="list-style-type: none"> • Maintain and upgrade as necessary the surface water management features.

6.5 Biodiversity Management

6.5.1 Flora and Vegetation

The excavation area was a pine plantation but has been cleared and will be returned to pasture and productive agricultural land.

There are only isolated Marri *Corymbia calophylla* and Jarrah *Eucalyptus marginata*, which will be retained and excluded from quarrying. A five metre setback to the trees retained will be provided. No native understory is present on site.

No clearing permit is required as the trees compliant with the Native Vegetation Clearing Regulations will be retained.

6.5.2 Fauna

The fauna on site will already be significantly depleted by the clearing as there are just scattered Eucalypts on site, which will be retained. Therefore no Black Cockatoo feeding habitat will be impacted.

There is no native vegetation as ground cover. No management of fauna is required.

6.6 Weed Management

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.

The weed management will form part of the normal farm management to prevent the introduction and or spread of significant environmental weeds.

Weed management is to be used to minimise impact on site remnant vegetation and on adjoining properties. Good management practices are to be used as part of the ongoing normal quarry operations. The management is based on the *Guidelines, Department of Environment and Energy, Arrive Clean, Leave Clean*, which relates to the management of weeds and plant diseases.

Generally if the actions are taken to manage weeds then the risk of spread of plant pathogens is also reduced. Not all potential impacts will apply to this quarry and the main impacts affecting this site are also listed.

The land is stocked and it has been noted in other locations that once stock are removed the weed species tend to increase and spread. It is likely that as seedlings weed species are removed by grazing but once that pressure is removed the weeds are able to grow to maturity and seed.

Therefore in areas where stock are removed as a consequence of excavation weed management often needs to be more diligent than it is for normal pasture management.

Inspections conducted to monitor the presence and introduction of weeds will be carried out twice per year, in spring and autumn when weeds are best treated with herbicide.

Weeds are most readily treated when actively growing before they set seed, by treating from the edges of the infestation back to the most dense infestation.

Table 11: Weed Management

WEED MANAGEMENT			
Environmental Objectives	<i>There will be no additional weed species or extensions or density of the existing loading of exotic plants.</i>		
Legislation and Guidelines	<i>Biosecurity and Agriculture Management Act 2007.</i>		
Item	Management	Timing	Area
Management of Weeds	<p>Weeds are most likely to impact on; Disturbed areas such as overburden dumps, topsoil stockpiles. Edges of access roads and the stockpile and processing area. Pasture where stock are removed. Edges of firebreaks.</p> <p>The main sources of weeds are likely to be; Weeds spread through the movement of topsoil during land clearing and construction earthworks which produces soft moist soils where weeds can gain a fast hold. Spread of existing weeds currently on site. Rubbish dumped by the public. Materials or waste brought to site by employees. Soil and seeds from vehicles arriving at site. This often applies to trucks that have carried something else such as grain, or vehicles to be used in earthworks. Wind blown seed from surrounding land as would apply to Cotton Bush. Birds and other vectors. This is more common than is often given credit for. eg Solanum species and Blackberries..</p>		
	<p>Development of the Pit Conduct a pre-clearing inspection to delineate weed impacted areas and devise a treatment method for each infestation. Preferably treat weeds prior to commencing earthworks. All vehicles and equipment to be used on site, will be clean and free from soil or plant material when arriving at site. Vehicles accessing the site, whether they be road trucks or light vehicles, will be required to be clean prior to leaving developed areas. Dirty vehicles will not be permitted to enter the site.</p>	Prior to clearing	Access road, stockpile and other construction areas.
	<p>Operations and Closure No soil and vegetation will be brought to the site apart from that to be used in rehabilitation and that is to be weed free.</p>	Operations	All areas

	<p>A dedicated sweep out and treatment station for trucks will be provided where any weed germinations from the truck sweep out are able to be identified and dealt with by mechanical removal or spraying.</p> <p>Plants and seeds to be used in rehabilitation will be free from weeds.</p>		
Monitoring of Weeds	<p>Monitoring</p> <p>Inspect clearing, disturbance activities, topsoil dumps prior to rehabilitation and revegetated areas.</p> <p>Visually inspect operational and adjoining areas and revegetation at least twice annually for at least three years following closure. These inspections will utilise experienced staff or on site staff who have been trained in the identification of the weed species occurring on site.</p> <p>Provide inspections of gutters, drains, access roads and surface water treatment areas where there is an increased risk of weed introductions.</p> <p>Edge vegetation, disturbed areas and areas of increased soil moisture will be regularly monitored and treated as appropriate.</p>	<p>Operations twice yearly. Prior to closure.</p> <p>Revegetation twice yearly for three years following closure.</p>	All areas
Actions	<p>Treatment of Weed Infestations</p> <p>Any significant weeds or weed infestations will be treated.</p> <p>Treatment of weeds will be undertaken prior to commencement of earthworks</p> <p>Illegally dumped rubbish is a major source of weeds and is removed promptly.</p> <p>Weeds will be sprayed with broad spectrum spray prior to planting or seeding in weed affected soils and when they occur on pasture or in revegetation.</p> <p>Weed management will work from least affected areas to most affected.</p> <p>Declared weeds are to be treated promptly by mechanical action or spraying.</p>	<p>Prior to commencement of earthworks.</p> <p>When weeds are present and as a minimum twice yearly.</p>	All areas

6.7 Dieback Management

Phytophthora cinamomi is restricted to the areas greater than the 600 mm rainfall isohyets and may occur on this site, although with the lack of understorey there are limited susceptible species to lead to the spread of dieback. Dieback is normally carried by water and spore movement downslope with little or no spread upslope.

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.

In many ways the management of the site for plant pathogens is similar to that for the management of weeds, and the two management practices should be considered together.

Table 12: Dieback Management

DIEBACK MANAGEMENT			
Environmental Objectives	No specific dieback environmental objective is warranted because of the very low risk to as there are few susceptible trees and no nearby native vegetation.		
Legislation and Guidelines	<i>Biosecurity and Agriculture Management Act 2007.</i>		
Baseline Data	<p><i>DBCA 2017, Phytophthora Dieback Management Manual, Forest and Ecosystem Management FEM079.</i></p> <p><i>Dieback Working Group 2005, Management of Phytophthora Dieback in Extractive Industries.</i></p> <p><i>Dieback Working Group, 2000, Managing Phytophthora Dieback, Guidelines for Local Government.</i></p>		
Item	Management	Timing	Area
Management of Dieback	<p>If some spread of the fungus spores did occur on site it will be contained because the excavated land will be internally draining.</p> <p>When the pit is operating all water generated within the pit will be captured and retained. <i>Phytophthora</i> is not known to survive very well in basins ponds or lakes.</p> <p>Any topsoil and overburden storage is to be located in dry areas around the pit perimeter.</p> <p>Quarry traffic is to be restricted to the designated access roads, pit and stockpile areas apart from clearing land and maintaining fire breaks.</p> <p>The access road is sealed and transport trucks will therefore run along the bitumen roads to their destination and return. This run is considered low risk for dieback and trucks will not require cleaning during the transport phase.</p> <p>As defined by best practice, Hall-All Contracting will require vehicles used onsite or for transport to be clean and free from soil or plant material prior to arriving on site from an area known or thought to be dieback infected.</p> <p>Cleaning is to be conducted offsite and all drivers and plant operators are to be made aware of the need to have clean trucks and plant when initially arriving on or accessing the site.</p> <p>The site is to be secured from unwanted access with by maintaining the existing perimeter fencing, gates.</p> <p>A hygienic site is maintained by not bringing any soil or plant material onto the site except for rehabilitation purposes or from known dieback free areas.</p> <p>All plants, seeds, and other materials used in rehabilitation, are to be sourced from dieback free areas.</p> <p>Illegally dumped rubbish or material will be promptly removed from site.</p> <p>Rehabilitated surfaces are to be free draining and not contain wet or waterlogged conditions.</p>	All times	All areas

	The Weed Management Policy will be complied with.		
Monitoring of Dieback	<p>Monitoring</p> <p>No dieback monitoring is proposed or required for normal soil conditions.</p> <p>Product monitoring by routine testing will be used to verify that the product is dieback free and that status will be available for clients and contracts.</p>	Annual review	Product testing

7.0 REHABILITATION AND CLOSURE

7.1 Background

The excavated area is cleared and will be returned to pasture with isolated remnant Jarrah – Marri.

Proposed Final Contours are a similar land surface to the current surface with the surface lowered by around 2 metres, (Section 5.14 Final Contours).

An audit of the potential materials that may be present from mining at closure is presented below.

Table 7 Materials Inventory

Type	Comment	Treatment	Reference
Soil	Topsoil is natural and contains no detrimental materials.	None required. To be used in rehabilitation.	
Subsoils - Overburden	Subsoil gravel is natural and contains no detrimental materials.	Non required. Generally taken as resource.	
Waste rock and non surface material and tailings	Not present. The pit bottoms in gravel loam subsoils which is a natural material normally occurring on the surface.	None required.	
Saline surface water	The water quality is fresh.	No treatment necessary	
Saline ground water	The water quality is fresh.	No treatment necessary	
Acidic materials and drainage	Not present. The sand does not contain sulfides and there is no risk of acidic materials developing. The elevated laterite gravel does not carry acidic materials or any at risk materials. <i>Concurs with Nattaporn-Prakongkep, R J Gilkes, B Singh and S Wong, 2011, Mineralogy and chemistry of sandy soils in the Perth metropolitan area of the Swan Coastal Plain, Department of Environment and Conservation.</i>	No treatment necessary.	Field geological examination by Landform Research and the soil test holes excavated in a grid across the resource area.
Sodic or dispersive materials	The water quality is fresh and there are no clays or susceptible materials.		Field geological examination by Landform Research
Asbestos – asbestiform minerals	None present.		Field geological examination
Radioactive materials	Not present	The laterite does not contain abnormal levels of radioactive minerals.	Published WA Geological Survey radiometric mapping
Metallic or chemical materials	Not present	No metallic or sulfidic materials or minerals are present in these laterites.	Field geological examination and experience and published information.
Tailings storage	Not required		

Ablutions waste		Serviced portable toilet system is to be provided.	Water Management Section 6.4
Dangerous Goods and Hazardous Materials	FUEL The various plant will be refueled from mobile tanker. <i>None will remain on closure.</i>	Any soil or other materials with drips and spills will be removed offsite to an approved waste site or location.	Water Management Section 6.4
	SERVICE MATERIALS Only minor lubrication will be conducted on site All major servicing will be conducted offsite. <i>None will remain on closure</i>	Any wastes will be collected and removed from site promptly to an approved recycling or waste disposal area. Only minor servicing will be conducted on site. All major servicing will be conducted offsite.	Water Management Section 6.4
General waste		Regularly removed from site to an approved disposal area	Water Management Section 6.4

7.2 Closure Implementation

The closure planning will be updated from time to time as the excavation progresses forwards. This will include both anticipated costs and procedures.

The following procedures will be used for final closure and rehabilitation of any stage of excavation and on completion of the gravel pit.

The closure of completed areas of the operations will be progressive with closure of all remaining ground at the end of operations.

Maintenance and monitoring will be conducted until completion criteria is met. A three year cut off is provided for rehabilitated soils.

Unexpected or early closure will be completed in the same way as permanent closure below but the full rehabilitation will be completed as one operation.

Closure Objectives

- Stable post-mining landscape, and the minimisation of wind and water erosion.
- Match slopes and landform to those of the surrounding local area.
- Maximum slopes of 1 : 4 to 1 : 6 vertical to horizontal are to be provided except in the pits, bunds, dams and other locations where slightly steeper slopes may be applicable
- Provide for the protection of the local groundwater resource in terms of both quality and quantity.

- Achieve weed species at levels not likely to threaten the pasture and land uses.

Table 13: Site Closure and Rehabilitation

Closure Stage	Methodology	Timing
GENERAL		
Compliance with all legally binding conditions and commitments.	<p>Legal Compliance</p> <ul style="list-style-type: none"> Prior to closure, stakeholders will be consulted to check whether the closure planning, where possible, considers their interests and carry them out as necessary. The latest documentation will be reviewed to determine whether there are any outstanding stakeholder issues. All legal requirements and commitments and conditions of approval will be complied with. This includes Planning Approval, Extractive Industries Licence, DWER Licence and any other relevant legally binding conditions. An audit table of all conditions and commitments that relate to closure and conducting an audit of those items upon the completion of each stage of rehabilitation and annually until sign off, will be compiled and used to verify the closure process. 	Prior to and at closure
Removal of non natural materials	<p>Non Natural Materials</p> <ul style="list-style-type: none"> All non natural inert materials associated with quarrying will be collected and removed from site unless required for internal roads. This includes plant, buildings and other structures or materials not required for future farming or other uses. The portable waste water system will be removed. 	At closure of each completed area and final closure
Removal of wastes from site.	<p>Waste Removal</p> <ul style="list-style-type: none"> There will be no tailings, adverse soil or other materials or features on site and none are proposed during future excavations. A visual audit of completed ground will be conducted, to verify compliance with “no contamination to be left”. Soil testing will be undertaken if there is evidence of adverse materials remaining such as fuel spills. All hydrocarbon contaminated soils will be removed offsite to an approved landfill. Any potential contaminated areas such as refuelling zones will be assessed and sample tested as necessary and any contaminated materials removed and the area remediated. If contaminated sites are identified, they will be treated in accordance with the <i>Contaminated Sites Act 2003 (WA)</i>. As a result of any testing remediation will be undertaken to ensure that the site is not contaminated. 	At closure of each completed area and final closure
LANDFORM AND SOILS		
Geotechnical stability and safety.	<p>Geotechnical</p> <ul style="list-style-type: none"> The highest faces will be around 2 metres with shallow sloping angles and will carry no geotechnical risk. 	Construction of interim or the final land

Closure Stage	Methodology	Timing
	<ul style="list-style-type: none"> • Even so the faces will be pushed down to a 1 : 4 or 1 : 6 vertical to horizontal slope. <p>Safety</p> <ul style="list-style-type: none"> • Compliance with the <i>Mines Safety and Inspection Act 1994</i>. • All areas will be inspected to ensure the land surfaces and access points, are stable to erosion from wind and water. • Holes, sumps drains, ditches and the like will be filled and removed. • Visual observations of the landforms. An audit of the completed land will be made to verify compliance. 	surfaces.
Ground Preparation for revegetation.	<p>Landform Reconstruction</p> <ul style="list-style-type: none"> • Dieback and Weed Management principles will be used. • All ground once occupied such as hardstand and roads that are not required for future uses to be deep ripped and soils reconstructed. • Subgrade rock and overburden will be used for land restoration and closure. • If not required, roadbase, hardstand and any other inert materials left over from the site operations will be scraped and picked up and used to backfill the pit faces or reused. • Perimeter bunding will be pushed down into the pit and spread to recreate the soil. <p>Preparation for Revegetation</p> <ul style="list-style-type: none"> • The soils will be constructed from overburden and subsoils. • Fill and backfill areas will be left soft and undulating as the planting substrate. • Where available and weed free, topsoil, will be used to reconstruct the soil profile. 	At closure of any completed disturbed ground or stage of operations and at final closure.
The surfaces are to be free from erosion.	<p>Slope Erosion</p> <ul style="list-style-type: none"> • With such low slopes water erosion will not be an issue. • The pit will retain surface water runoff. • Wind erosion is not an issue with gravel quarry reconstruction and no action is required. 	Monitoring of erosion for three years or until stable.
REVEGETATION		
Weed and Dieback	<p>Hygiene</p> <ul style="list-style-type: none"> • Implement the Dieback Management. • Implement the Weed Management. 	All stages of revegetation
Revegetation	<p>Revegetation</p> <ul style="list-style-type: none"> • Any disturbed areas that are no longer required will be rehabilitated using the methods described above within 12 months of becoming available. Rehabilitation will be to pasture. • The preferred method of revegetation is to use the pasture seed from existing topsoil on pasture areas. However this may be deficient and additional seed is likely to be required. • The sowing of pasture and crop will be integrated into the normal 	At closure of any completed disturbed ground or stage of operations and at final closure.

Closure Stage	Methodology	Timing
	<p>farming systems. Seeds of pasture species will be spread by normal farm practice at rates and species determined by the land holder with advice from either a consultant or the Department of Primary Industries and Regional Development.</p> <ul style="list-style-type: none"> • The pasture species will be matched to the soil types and rainfall. The location falls into the “High Rainfall Coastal” planting regime with sandy soils. Suitable perennial legumes include Birdsfoot trefoil, Lucerne, Strawberry Clover, and Sulla. Perennial pasture includes Perennial Ryegrass, Phalaris, Cocksfoot, and Summer Active Tall Fescue, Kikuyu and Rhodes Grass. Annual pasture species include Italian Ryegrass, Serradella, subterranean clover. • The actual species used will be determined by the individual season, nature of the rainfall in the preceding months and stocking/hay production proposed by the landholder which may change from time to time. • Seeding rates are 2 – 5 kg/ha depending on the species used; for example Ryegrass is seeded at 3 kg/ha whereas Rhodes Grass is seeded at 4 kg/ha. • Pre-seeding weed control will be used where topsoils contain weed species. • Any weeds likely to significantly impact on the rehabilitation will be sprayed with Roundup or other herbicide or grubbed out, depending on the species involved. Fusilade will be used where grasses present an impediment to rehabilitation <p>Monitoring</p> <ul style="list-style-type: none"> • During late summer an assessment of the success of the rehabilitation will be made to determine the rehabilitation requirements for the following winter. • Monitoring includes visual assessments and, where necessary, counts to determine the success of the rehabilitation and restoration, as follows; <ul style="list-style-type: none"> • Pasture density • Pasture growth • Pasture regeneration • Weed infestation • Steps will be taken to correct any deficiencies in the vegetation. <p>Fertiliser</p> <ul style="list-style-type: none"> • Fertiliser will be used as 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 only used at each tube plant. 	<p>Monitoring will be maintained until completion criteria is met and stabilised for 3 years.</p>

REFERENCES

Acid Sulfate Soil Management Advisory Committee NSW, 1998, *Acid Sulfate Manual*.

AS/NZS ISO 19011:2014 (*Guidelines for auditing Management Systems*)

Australian Geomechanics Society, 2003, *Engineering Geology of Perth, Parts 1 and 2, Volume 38 No 3 and No 4*.

Bastian L V, 1996, *Residual soil mineralogy and dune subdivision, Swan Coastal Plain, Western Australia*, Australian Journal of Earth Sciences 43, 31-44.

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

Department of Conservation and Land Management, 1980, *Atlas of Natural Resources of the Darling System*.

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*. Department of Environmental Protection, Perth.

Department of Environment and Conservation, 2011 *Guideline for Managing the Impacts of Dust and Associated Contaminants from Land Development Sites, Contaminated Sites Remediation and other Related Activities*.

Department of Environmental Protection (1997b). *Environment Protection (Noise) Regulations 1997: Summary of the Regulations*. Department of Environmental Protection, Perth.

Department of Health WA, 2012, *Guidelines for Separation of Agricultural and Residential Land Uses which uses the same criteria* (Pages 112 – 118).

Department of Minerals and Energy (1991). *Environmental Management of Quarries: Development, Operation and Rehabilitation Guidelines*. DOIR, Perth.

Department of Resources, Energy and Tourism (Commonwealth), 2011, *A Guide to Leading Practice Sustainable Development in Mining*.

DWER 2015, *Identification and investigation of acid sulphate soils and acidic landscapes*.

DWER 2015, and *Treatment and management of soil and water in acid sulphate soil landscapes*.

EPA guidance "*Separation Distances between Industrial and Sensitive Land Uses*".

Firman J B, 2006, *Ancient weathering zones, pedocretes and palaeosols on the Australian Precambrian shield and in adjoining sedimentary basins: a review*, IN *Journal of the Royal Society of Western Australia, Volume 89 part 2*.

Geological Survey of Western Australia, 1990, *Geology and Mineral Resources of Western Australia, Memoir 3*.

Jones D N, L Bemede, A R F Bond, C Dexter and C L Strong, 2016, *Dust as a contributor to the road effect zone: a case study from a minor forest road in Australia*, Australian Journal of Environmental Management Volume 23, No 1 p 67 – 80

National Environment Protection Act 1994 (NEPC Act)

Oudwater S, 2017, *Modelling of dust emission in dimension stone quarry*, Aalto University School of Engineering, Finland.

Planning and Development Act 2005.

Planning Guidelines Separating *Agricultural and Residential Land Uses*, Department of Natural Resources Queensland 1997 Pages 65 – 111).

Playford, P E, A E Cockbain and G H Low, 1976, *Geology of the Perth Basin Western Australia*, Geological Survey of Western Australia Bulletin 124.

Sairanen M and O Selonen, 2018, *A Review of dust emission dispersions in rock aggregate and stone quarries*, *International Journal of Mining, Reclamation and Environment*,

Shire of Chittering Local Law – Extractive Industries

Shire of Chittering Town Planning Scheme 6.

Smolinski, 1998, *Soils of the Chittering Area, South West Forest Region, Western Australia*, Department of Agriculture WA.

Western Australian Planning Commission, State Planning Policy 1.0 State Planning Framework.

Western Australian Planning Commission, State Planning Policy 2.0, Environment and Natural Resources Policy.

Western Australian Planning Commission, State Planning Policy No 2.5, Agricultural and Rural Land Use Planning.

Western Australian Planning Commission, State Planning Policy No 4.1, State Industrial Buffer Policy.



Landform Research

ASSESSMENT OF VEGETATION and CLEARING PROPOSED GRAVEL EXCAVATION – OLD PINE PLANTATION

23 January 2023

21 (LOT 40), DJARIMA ROAD, CHITTERING
Lot 40 on Plan 410792, Volume 2929, Folio 42

1.0 Background

Lot 40 Djarima Road, Chittering was planted to pines which have been recently harvested.

As there is a gravel resource on the portion of Lot 40, it makes sense that the gravel is extracted prior to the land being returned to productive pasture. An application for Development Approval for gravel extraction has been applied for to the Shire of Chittering.

A few scattered Eucalypts, mainly *Corymbia calophylla* germinated and grew whilst the pine plantation was in place and these remain on the subject land. Also present on site or adjoining are 14 Black Cockatoo Habitat trees with a chest diameter of > 500 mm. These predate the pine plantation, which was planted around them. These trees are proposed to be retained.

Being larger, those trees have greater potential to develop hollows and so are proposed to be retained.

In all there are approximately 40 regrowth Eucalypt trees on the 18.49 hectares of proposed clearing. At 100 m² per tree that amounts to around 0.4 hectares of proposed clearing. In addition it is proposed to plant 200 local native Eucalypt trees to compensate for the removal of the 40 regrowth trees.

As a road reserve cuts Lot 40 the clearing permit application excludes that road reserve, although the road reserve is included within the application for Development Approval and Extractive Industries Licence through the Shire of Chittering. Inclusion of the road reserve will enable the Shire to source gravel from the reserve if required.

There are also some Marri seedlings approximately 12 plus months old that have germinated since clearing, mostly self seeding from under the existing trees.

It is believed that the 40 trees constitute around 0.4 hectare in area and their removal is sought under the *Environmental Protection (Clearing of Native Vegetation Regulations 2004)*. The proposed clearing has the allocated CPS number 10053/1.

The regrowth trees germinated and grew within the life of the pine plantation, are limited in area and number, and there is no understorey.

2.0 Aims of the Survey

- Conduct a flora and vegetation survey.
- Map any vegetation communities.
- Conduct a targeted search for potentially significant species.
- Provide a list of flora species that occur on the subject land.
- Determine the quality of the vegetation.

Assess the remnant vegetation for trees identified as being potentially significant to Black Cockatoos;

- Trunk diameter > 500 mm
- Potential for nesting hollows
- Whether hollows have been used by Black Cockatoos.

3.0 Survey Description

Lindsay Stephens of Landform Research reviewed the vegetation on Stage 3 on 10 May 2022.

During the survey the site was walked in an anticlockwise circle with every tree being examined.

All native species observed during the survey were identified and the original vegetation was considered. A definitive study of the exotic species was not warranted and not conducted as the land is parkland pasture.

Because of the disturbed nature of the site and type of species no sample plots were required.

The nature of the land meant that there were no significant constraints on the survey or the survey effort.

Table 1: Survey – Potential Constraints

Survey	Potential Constraint	Comment
Competency of the assessor	No	The vegetation study was completed by Lindsay Stephens of Landform Research who holds appropriate botanical qualifications and experience with Jarrah Marri Forest and local vegetation. Lindsay has observed the vegetation on at least three occasions at different times of the year.
Available published information	No	No published information is available for this site because the natural community has been cleared for plantation. However with the disturbed nature of the site desktop information on the original vegetation complexes is of less use. The site has only one species, <i>Corymbia calophylla</i> .
Timing of the Survey	Slight	The survey was conducted in Autumn on 10 May 2022. All species were readily identifiable as noted above only one native

		species was present, over pasture. No groundcovers are likely because the ground cover is completely replaced by pasture that is subject to grazing by cattle. The density and number of exotic pasture species mean that there is little chance of small and herbaceous native species being present.
Adequacy of the survey	No	The site was surveyed by walking across the site and back, ensuring that any native tree was reviewed. The open nature of the site areas that every species has likely been recorded. Every tree on site was inspected and measured if likely to be >500 mm. Those less than 500 mm were not recorded.
Vegetation Condition	No	The vegetation consists of exotic grass ground cover under isolated <i>Corymbia calophylla</i> .
Sources of plant identification	No	Published works, previous surveys, knowledge of the assessor, were used to identify species. A number of ground photographs and drone photographs were taken. As the local native species were all identified in the field no pressed specimens were required.
Follow up work required.	No	Not required at this stage.

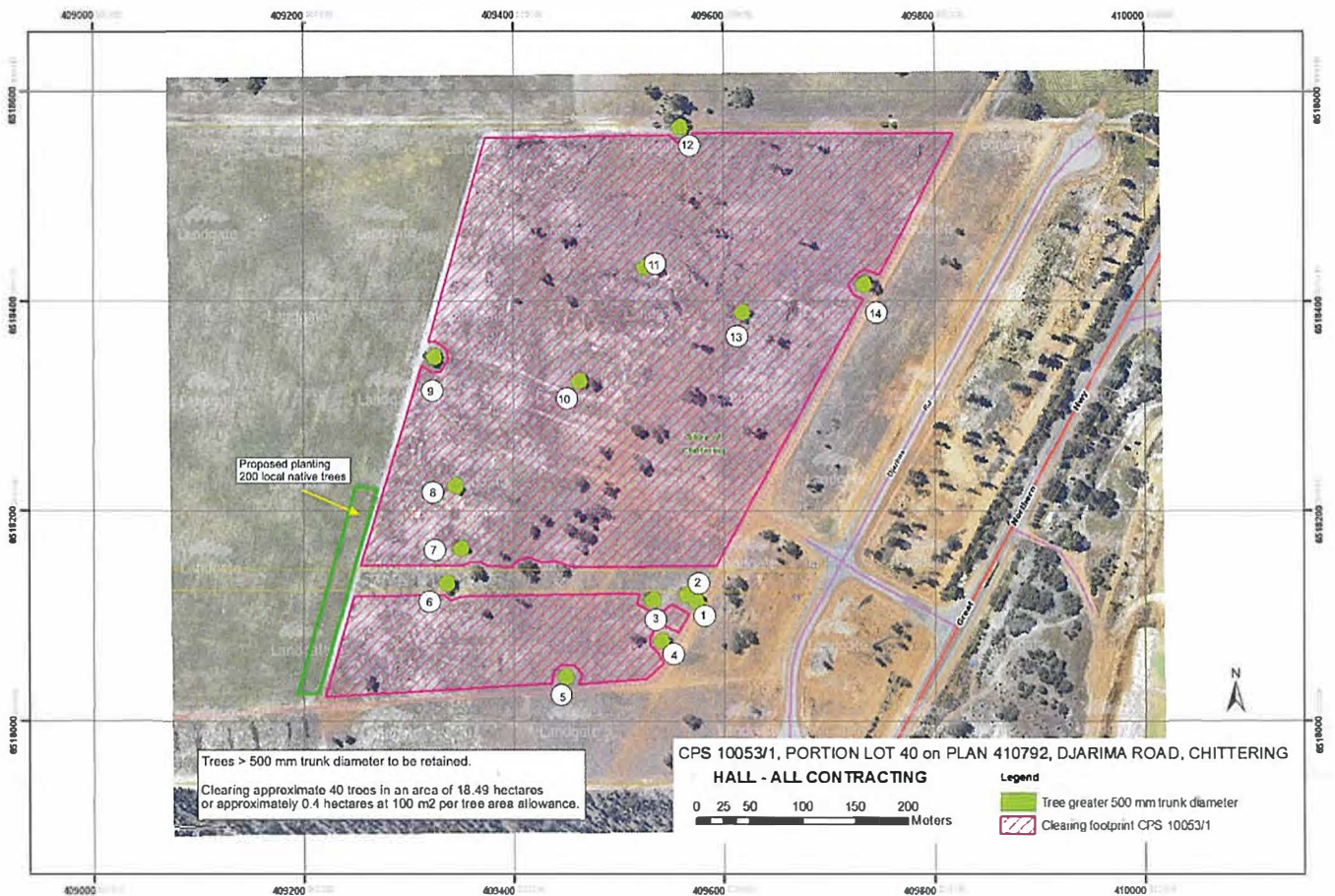


Figure 1 Location of trees >500 mm chest diameter. To be excluded from excavation

4.0 Site Description

The gravel resource lies on a remnant of a Tertiary erosion surface at an elevation that ranges from 194 metres in the south western corner to 220 metres in the central northeast.

Laterite soils and gravels cover the surface and represent the remnants of an ancient soil horizon developed on schists, gneisses and granites of the Chittering Metamorphic Belt. The typical profile of the deposit is very shallow grey brown sandy gravel, yellow brown pisolitic gravels with an intermittent sheet of overlying sand 0 – 0.5 metres thick.

The typical soil profile is a grey brown loamy gravel and loamy gravel soil over yellow brown pisolitic gravels and laterite duricrust. The underlying duricrust varies from 0.5 to 1 metres in thickness. Under the duricrust is a variable depth of gibbsite rich pallid subsoils developed on the deeply weathered rocks of the Underlying Mesozoic sediments.

The soil system is classified as being on the boundaries of Mogumber (Mb), Karamal (Ka) and Coolakin (Cek) in Smolinski, 1998, *Soils of the Chittering Area, South West Forest Region, Western Australia, Department of Agriculture WA*. These are broad agricultural groupings that can vary locally as is the situation here.

In reality the soils are relatively even across the resource and in the field are laterite sandy gravels over duricrust with a variable sheet of overlying leached white sand.

The reconstructed soils, at the completion of excavation, will be a blend of gravel and gibbsite rich materials to form manufactured gravelly loam soils of good water and nutrient holding capacity.



Figure 2 Subject land, view to the north west

5.0 Description of the vegetation

According to Heddle EM, OW Loneragan and JJ Havel, 1978, contained in; *Vegetation Mapping for the Atlas of Natural Resources, Darling System Western Australia*, Department of Conservation and Environment, the vegetation complex was originally "Yallanbee Complex in Low Rainfall Woodland of *Eucalyptus wandoo*-*E. accedens* and less consistently an open forest of *E. marginata* and *E. calophylla*. Dominant vegetation Types M and less consistently H and G".

In Mattiske E M and Havel J J, 1998, *Vegetation Complexes – Perth 1 : 250,000 Perth Sheet* the vegetation is listed as "Yallanbee Complex described as Woodland of *Eucalyptus wandoo*-*E. accedens* less consistently open forest of *E. marginata* subsp *thalassica*-*Corymbia calophylla* on laterite uplands and breakaway landscapes in arid and periarid areas.

The site was originally Marri with some Jarrah Forest. No Wandoo or Powderbark Wandoo is present on site or nearby. See Figures 2 – 6.

The land was cleared for pine plantation and in recent years that has been cleared. At planting of the pines the land was pasture with the larger trees were retained. All other species had been removed.

During the growth of the pines a few Marri germinated and grew and those trees are what remains on site today, together with 14 larger trees that are thought to have been present prior to the planting of pines. It is possible that some Marri germinated under the lines and because of edge effects with greater light and soil moisture availability have been able to grow fast enough to reach a chest diameter of 500 mm.

Following the clearing of the pines there has been scattered to isolated self seeding from the existing trees that has lead to seedling growth of 0 – 2 years in age.

There is only one species of native plant *Corymbia calophylla* present on site and no Threatened or Priority species of vegetation communities.



Figure 3 Subject land, view to the west



Figure 4 Subject land, view to the south west



Figure 5 View to the south west

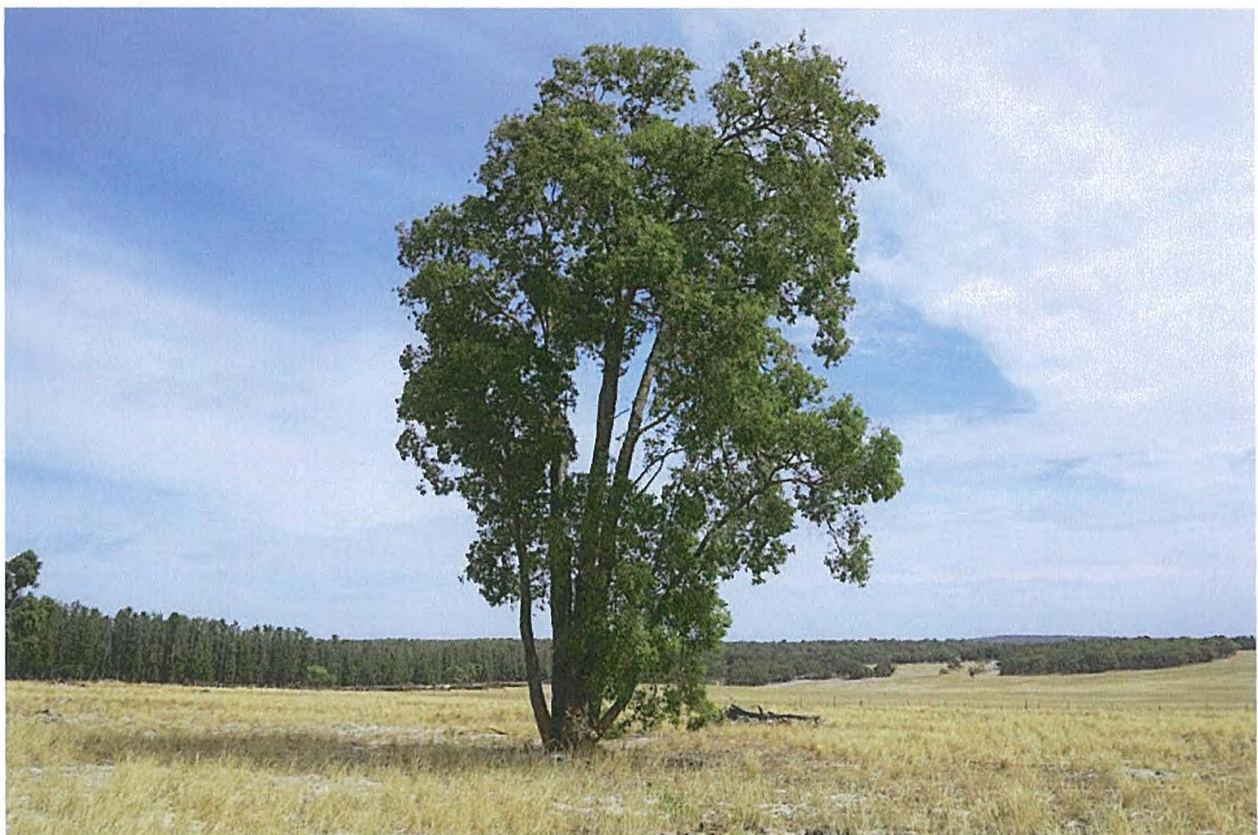


Figure 6 Multistemmed Marri *Corymbia calophylla*, with some stems > 500 mm

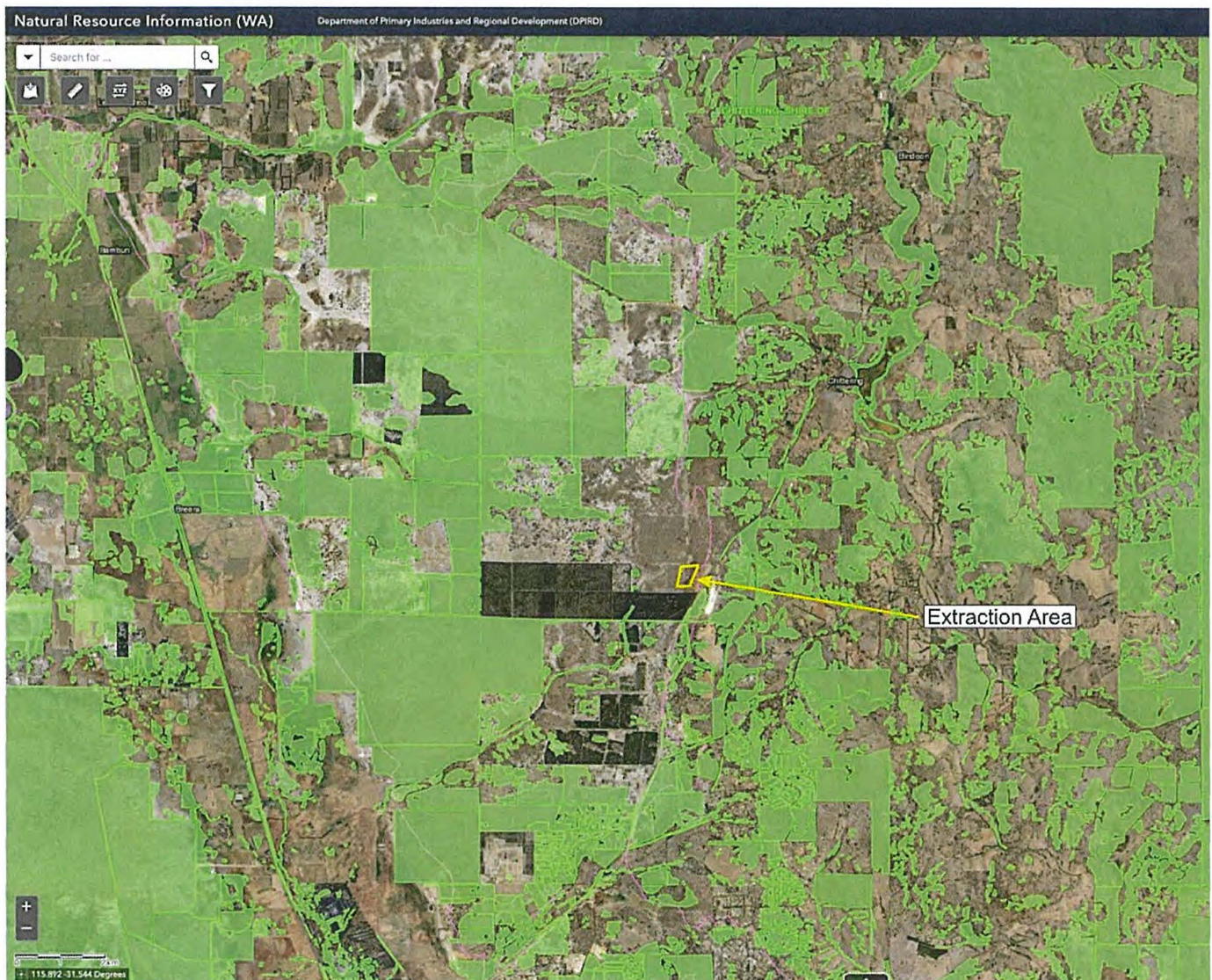


Figure 7 Extraction site located on cleared land and extent of local remnant vegetation

6.0 Significance of the Vegetation on site.

EPA Position Statement No 2, December 2000, Environmental Protection of Native Vegetation in Western Australia, specifically targets the retention of native vegetation in the Agricultural Areas in 4.1, Clearing in the agricultural areas for agricultural purposes. In 4.3, Clearing in other areas of Western Australia, it is unclear what "other areas" refers to, but may refer to retention of a 30% threshold in non agricultural areas. See Figure 7.

Section 4.3 Clearing in other areas of Western Australia, (EPA Position Statement No 2, December 2000) expects that clearing will not take vegetation types below the 30% of the pre-clearing vegetation as recommended by ANZECC, 1999, National Framework for the Management and Monitoring of Australia's Native Vegetation. The National Objectives and Targets for Biodiversity Conservation 2001 - 2005 (Commonwealth of Australia 2001) also recognise 30% as the trigger value.

The threshold for constrained areas such as the Perth Metropolitan Region is placed at 10% by Government, (CPS 2682/1, and EPA Guidance No 10 Level of Assessment for proposals affecting natural areas within the System 6 region and Swan Coastal Plain portion of the System 1 Region page 9).

Bush Forever 2000 used a cut off of 10% for the Perth Metropolitan Area as a guidance to the significance of the vegetation complexes. The Western Australian Government's Urban Bushland Strategy recognised a minimum of 10% of Pre-European distribution of vegetation complexes, and the Regional Forests Agreement Process recognised 15%.

The only native species recorded on site is *Corymbia calophylla*.

The vegetation on site consists of regrowth trees and 14 trees larger than 500 mm chest diameter. No trees have observable hollows and certainly none large enough for Black Cockatoo nesting. See Figures 1 – 6.

Even so the 14 larger trees are to be excluded from clearing and gravel extraction.

If the pines were replanted then there would be an exemption under the Clearing Regulations to clear the native plants to make way for the pines. In this situation where the pines are not to be replanted than that removal of native species is not permitted unless under Clearing Regulations.

The Vegetation Complex, Yallanbee 6 is has 16.25% remaining of which just 1% are in secure land tenure.

Yallanbee 6 Vegetation Complex is shown in the Shire of Chittering Local Biodiversity Strategy, 2010, as having a pre-European extent of 2,7,581 hectares and a current area of 4,482 hectares or 1% in secure tenure. For the whole of the Shire of Chittering 38% of the Pre-European Vegetation was remaining in 2016 (CPS 6678 Decision Report).

On the other hand at the time of the mapping for the Shire of Chittering Local Biodiversity Strategy the subject land will have been classified as Pine Plantation and therefore not counted in the area of remaining vegetation. That is the removal of the scattered regrowth trees will not impact on the % of Yallanbe 6 vegetation remaining.

Moreover, the same vegetation complex, Yallanbee 6 is widespread east of the Swan Coastal Plain, in the Gingin Scarp and northern Darling Range. Yalanbee 6 extends from north of Bindoon to nearly Boyup Brook in the south. Murray 2 extends from north of Bindoon well to the south, but not quite as far as Boyup Brook. Moondah is restricted to valleys of the Gingin Scarp to the west and north west.

Locally there is significant remnant vegetation in Excellent Condition all around the subject land. Locally therefore the taking of the trees will not cause a significant impact.

Within the wider region Matiske Vegetation Complex recorded that Yallanbee 6 had a Pre-European Extent of vegetation as 198,396 hectares and a cover at 2016 of 93,230 hectares of 47% remaining, (CPS 6678 Decision Report) and 21% represented in Government managed lands.

With the exception of the Gingin Complex, all other vegetation complexes on the Dandaragan Scarp have well over 30% of Pre-European vegetation remaining. This site lies within the Mogumber Complex South which in 2018 had 38.6% of the Pre-European extent remaining (CAR Reserve Analysis, DBCA 2019).

Based on Heddle Vegetation Complex Yalanbee the Pre-European extent and extents at 2016 were 158,392 hectares and 82,350 hectares of 52% remaining.

Bearing in mind all the above figures would have counted the subject land which was under pine plantation as being represented in the already cleared land, there will be no impact on the recorded vegetation representation.

7.0 Trees > 500 mm Chest Diameter

Trees with trunk diameter > 500 mm and trees with hollows suitable for black cockatoo use are listed under the EPBC Act 1999, 2017 Draft Guidelines for three threatened black cockatoo species; Carnaby’s cockatoo (endangered), Baudins cockatoo (Vulnerable) and red-tailed black cockatoo and 2012 EPBC Act Referral Guidelines for three threatened black cockatoo species as being of significance to the breeding of black cockatoos.

Trees of that size or trees with suitable hollows for breeding normally are recommended to be referred to the Commonwealth for assessment if they are to be cleared. Smaller trees that do not meet that criteria are not normally recommended to be referred to the Commonwealth unless there is significant feeding habitat.

There is a bilateral agreement in place between the State and the Commonwealth covering referrals to the Commonwealth under the State Clearing regime.

On the basis of the referral guidelines it is likely that any trees that are proposed to be cleared of > 500 mm trunk diameter should be considered for referral to the Commonwealth.

Apart from the Prescribed Clearing provisions as listed under the Conclusions below, all other clearing should be referred to the Department of Water Environment Regulation for a Clearing Permit prior to any disturbance.

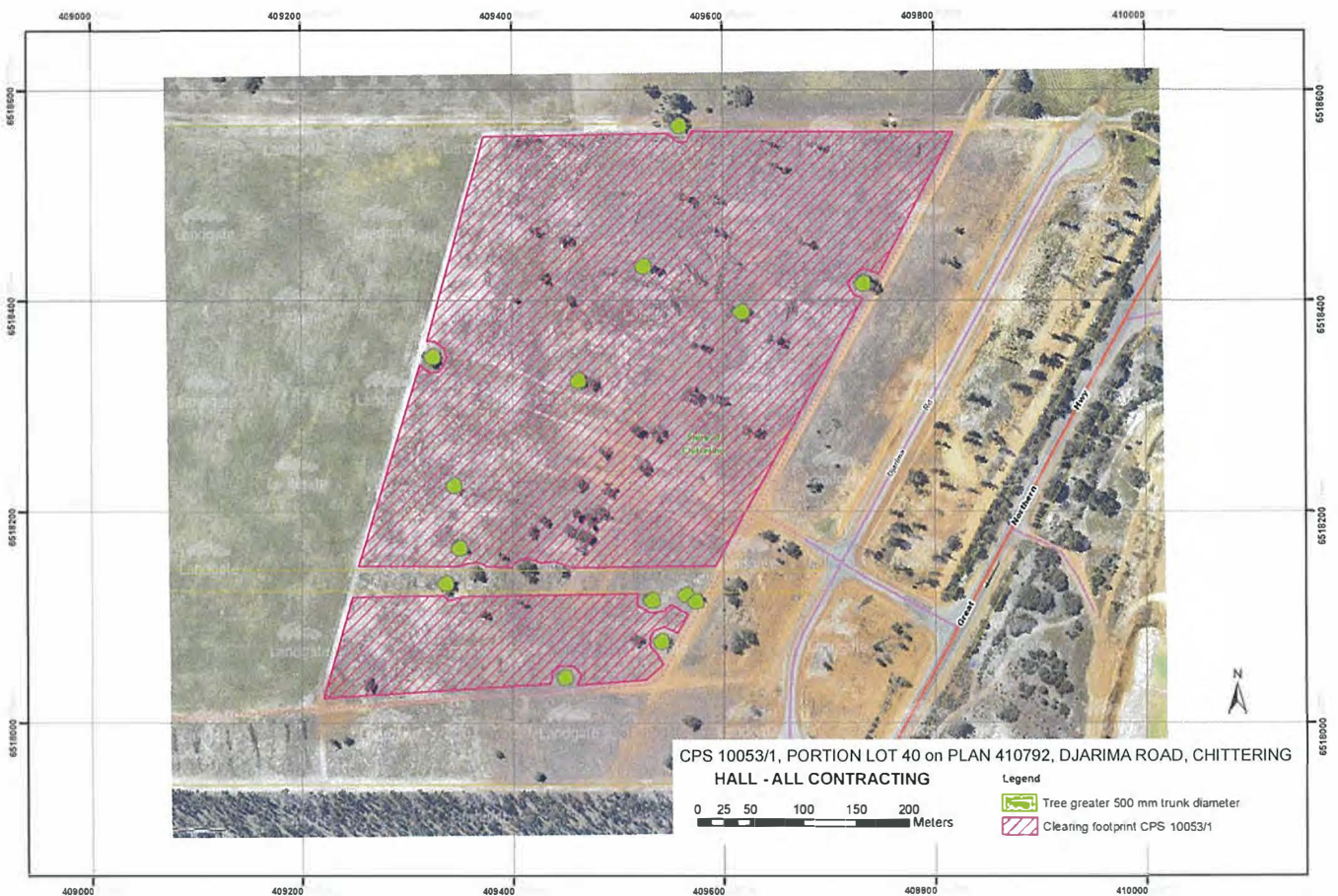


Table 2 Table of trees with trunk diameter > 500 mm in Stage 3

No	Species	Diameter	Easting	Northing	Comment
1	Marri	600 mm	409 573	6518 119	
2	Marri	500 mm	409 563	6518 126	
3	Marri	700 mm	409 529	6518 120	
4	Marri	600 mm	409 542	6518 077	
5	Marri	600 mm	409 447	6518 045	
6	Marri	multistem	409 343	6518 130	multistem
7	Marri	700 mm	409 351	6518 169	multistem
		600 mm			
8	Marri	700 mm	409 343	6518 223	
9	Marri	700 mm	0409 325	6518 341	multistem
		700 mm			
10	Marri	600 mm	409 465	6518 326	multistem
		700 mm			
11	Marri	700mm	409 530	6518 433	
12	Marri	1150 mm	409 559	6518 571	
13	Marri	650 mm	409 614	6518 390	
14	Marri	700 mm	409 735	6518 417	

8.0 Offset Planting

The planting of 200 trees of *Eucalyptus marginata* and *Corymbia calophylla* will provide an offset to the loss of vegetation. See Figure 1.

At the end of excavation the vegetation will be returned to parkland pasture, with the topsoil replaced and the existing large trees to be retained. The large trees (> 500 mm diameter) will not require protection from stock which are anticipated to be sheep and cattle as currently grazed on Lot 40.

The offset planting area will be fenced to protect the young seedlings and enable them to be re-established.

Any of the 200 trees to be planted as tube stock that do not survive will be replanted. That is the completion criteria will be 200 established *Corymbia calophylla* trees at three years of age.

9.0 Conclusions - Clearing Principles

The removal of around 40 trees with an estimated 100 metre canopy diameter equates to around 40 m² per tree or 0.4 hectares, well below the 1.0 hectares for a significant amount of clearing. That level of canopy diameter will also account for the regrowth seedlings.

Bearing in mind all the above figures would have counted the subject land, which was under pine plantation as being represented in the already cleared land, there will be no impact on the recorded vegetation representation.

The subject land is classified as cleared within all assessments of the Pre-European are of remnant vegetation and therefore there will be no impact on the published or existing remnant native vegetation complexes.

The subject land could be cleared if pines were to be replanted and the plantation continued.

All trees with a chest diameter of 500 mm or greater will be retained. See Figure 7.

There is only one species of native plant *Corymbia calophylla* present on site and no Threatened or Priority species of vegetation communities.

In all, the proposed clearing is compatible with all Clearing Principles and it is believed that the 40 trees constitute < 1 hectare in area and their removal may possible under the Clearing Referral Exemptions under the "Very Low Impact Guidelines" of the *Environmental Protection (Clearing of Native Vegetation Regulations 2004)*.

Lindsay Stephens

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SCHEDULE OF SUBMISSIONS – EXTRACTIVE INDUSTRY; 5079 GREAT NORTHERN HIGHWAY, CHITTERING

AGENCY SUBMISSIONS			
Submitter	Comment	Proponent Response	Shire Officer Response
Aboriginal Heritage Operations, Department of Planning, Lands & Heritage	I have reviewed the Register of Aboriginal sites and heritage places as well as the DPLH Aboriginal heritage database. The results indicate that the proposed works do not intersect with any known Aboriginal sites or heritage places and therefore no approvals under the Aboriginal Heritage Act 1972 are required.	Noted. The database had been searched.	Noted.
Department of Health	<p>Public Health Impacts Historically, and in general, gravel quarries have posed significant dust complaints from nearby land users.</p> <ul style="list-style-type: none"> DOH welcomes combined use of the proposed dust mitigation strategies, namely separation distance, vegetation belts, water spray and consideration of wind direction/speed. However, the DOH does not, in principle, support visual dust management for quarries in WA as this approach does not consider fine dust crossing the boundary and which typically forms the bulk of complaints to DOH and local government. Neither does DOH agree that human monitoring is an adequate or desirable substitute for an integrated dust monitoring alarm system. Notwithstanding DOH's position on visual dust monitoring, on this occasion DOH will support the management plan given the other very good strategies but may require the Shire of Chittering to work with the DWER to require dust monitoring - should visual monitoring in conjunction with the proposed dust mitigation strategies fail over time. DOH recommends that the resultant quarry void not be used for the disposal of waste, or otherwise infilled, prior to reclamation. 	<p>No waste is to be placed on site as committed to in the management plan.</p> <p>From other studies of extractive industries and quarries, the fine particles in dust are most related to vehicle emissions. They constitute a very small proportion of the dust if generated, at 2 – 5%.</p> <p>Normally all sizes of dust are generated together, and there will be visible dust being generated when invisible dust is being formed. Therefore any visible dust present is a good sign and an early indicator of a dust risk. A summary of the sources and proportions of dust is shown in; NSW EPA and NSW Ministry of Health Environmental Health Branch 2015, Review of the health impacts of emission sources, types and levels of particulate matter air pollution in the ambient air in NSW.</p> <p>Machine monitored dust is less effective because it is always retrospective as dust has to travel to the monitor and so there are time delays. Dust monitoring on other mines and quarries has found dust can be readily controlled through water treatment.</p> <p>In the management plan the proponent commits to managing dust and will take the steps that are necessary to ensure dust is not an environmental of health problem</p> <p>All quarries operate under the <i>Work, Health and Safety 2020 legislation and WHS (Mines) Regulations 2022</i>, which require dust management from a health perspective, supervised through DMIRS and normally includes representative personal dust monitoring. If on site dust is controlled there will be no risk of adverse dust impacts off site where any dust levels will be even lower.</p>	<p>Dust management is recommended to be imposed as a condition of development approval. The Shire's <i>Health Local Law 2017</i> additionally contains provisions for the escape of dust that causes a nuisance.</p> <p>The future use of a quarry void is not for consideration at this point in time. It is however recommended as a condition of approval that the exhausted pit be rehabilitated back to pasture land in accordance with the provided rehabilitation measures.</p>
Department of Water & Environmental Regulation	<p>The Department has identified that the referral has the potential for impact on water or environmental values and management. While the Department does not object to the proposal key issues and recommendations are provided below, and these matters should be addressed:</p> <p>Based on the information provided, the proposed operations will be categorised as Prescribed Premises as per Schedule 1 of the Environmental Protection Regulations 1987:</p>	<p>There is a commitment to apply for a <i>Category 12 or 70 Environmental Protection Act Part V Licence</i>. This cannot be undertaken until planning approvals are provided.</p> <p>Hall-All Contracting has such Licences for their other operations.</p>	<p>It is recommended that suitable advice notes are included on any approval granted that remind the applicant of the requirement for a clearing permit and also a 'works approval'.</p> <p>Following receipt of these initial comments from DWER, it has been further advised that a clearing permit has been supported in-principle, subject to a 1.57ha revegetated offset being provided.</p>

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	<p>Category Category description Production design or capacity</p>		
	<p>12 Screening, etc. of material: premises (other than premises within category 5 or 8) on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated</p> <p>50000 tonnes or more per year</p> <p>The Environmental Protection Act 1986 makes it an offence to undertake any work which causes a premises to become, or become capable of being, a Prescribed Premises unless the work is undertaken in accordance with a works approval. It is also an offence under the EP Act to cause an emission or alter the nature or volume of waste, noise or odour from the Prescribed Premises, unless done so in accordance with a works approval or licence or a registration (for operation) is held for the premises.</p> <p>Activities such as crushing and screening during extractive industry operations, may cause the premises to become prescribed for the purposes of Part V Division 3 of the Environmental Protection Act (EP Act). This will occur if the proposed crushing and screening equipment has a design capacity (when operated 24/7 or at a capacity limited by a planning approval) that meets or exceeds the specified production or design capacity of the relevant category under Schedule 1 of the Environmental Protection Regulations 1986.</p> <p>The applicant is therefore advised that they may meet the requirement for Prescribed Premises and as such require a works approval to construct/install the equipment (mobile or otherwise) and a licence or registration to operate. It should be noted that planning approvals may influence the Department’s determination of production or design capacity, where an approval has the effect of restricting capacity (such as constraining hours of operation).</p> <p>The purpose of a works approval is to allow the Department to assess the environmental acceptability of a proposal’s potential to cause emissions and discharges during construction and operation. Note that any works approval or licence issued under Part V of the EP Act will only regulate emissions associated with the crushing and screening operation (such as dust, noise and contaminated stormwater). It does not extend to the environmental impacts of extracting the material from the ground or transport off-site.</p> <p>The Department has no record of this premises and has not received any applications relating to this proposal. The applicant is therefore advised to refer to the information and Industry Regulation Guide to Licensing available at http://www.der.wa.gov.au/our-work/licences-and-works-approvals and / or if they have queries relating to works approvals and licences to contact the Department at info@dwer.wa.gov.au or 6364 7000.</p>		
<p>Department of Mines, Industry Regulation & Safety</p>	<p>Although Extractive Industry Licences (EILs) fall outside the Mining Act 1978, information on mineral resources, including basic raw materials, is of importance to the Geological Survey and Resource Strategy Division, within DMIRS. The information is used in our MINEDEX database, which is a source of information for</p>	<p>Noted.</p> <p>The crushed laterite materials will be used for main and local roads, such as the Great Northern Highway bypass.</p>	<p>Noted.</p>

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	<p>our State-wide resource mapping system - GeoView. The locations and status of basic raw materials extraction sites are also valuable inputs to our resource assessment and land use planning role.</p> <p>Our aim is for the database to be a comprehensive and up-to-date source of information on all mining-related activities throughout the State. It is a database that is used to inform other government agencies, as well as the general public, of the location of mines and mineral resources. You are encouraged to use it whenever researching information on mineral or petroleum resources, and including basic raw materials.</p> <p>The Department of Mines, Industry Regulation and Safety (DMIRS) has determined that this proposal raises no significant issues with respect to mineral and petroleum resources, geothermal energy, and basic raw materials.</p>		
<p>Department of Primary Industries and Regional Development</p>	<p>DPIRD does not object to the abovementioned proposal, subject to the following comments.</p> <ul style="list-style-type: none"> DPIRD notes the intention to retain the existing native vegetation. To enable the monitoring of the health of the trees, each tree should be identified, mapped, and have its health recorded before the excavation commences. DPIRD notes the plans for weed management. The planned surveys prior to, during, and after operations are important, as is ensuring cleanliness of vehicles. DPIRD notes that the proposal intends to use 3000 kL of water/day for around 100 production days. This is a large amount of water, and more information is required to assess whether the source(s) of the water can sustain that level of extraction. DPIRD recommends the proponent contact the Department of Water and Environmental Regulation about this aspect. 	<p>All trees have been assessed and a Clearing Permit application has been lodged. (CPS 10053-1).</p> <p>The anticipated water requirement is an error and should read 3000 kL per year. That is equivalent to double that normally permitted for a rural dwelling without a licence. If the volumes are not available on site they will be sourced from a licenced external supply and brought to site as required as happens at other Hall-All operations.</p>	<p>It is recommended that 10m buffers are implemented around each tree identified for retention, to ensure its ongoing survival and health.</p> <p>Weed management is recommended to be enforced through a condition of development approval.</p> <p>Officer's note that the reference to 3000kL per day in the application report was an error.</p>
<p>Chittering Landcare</p>	<ol style="list-style-type: none"> Proponent states in the summary that water use will be likely to be 3000 kl/day (3,000,000 litres) in dry conditions and expects this will be required for 100 working days per year. This is a large volume to source. Is this correct? The plan is to obtain this water from farm dams or have it trucked in. <ol style="list-style-type: none"> Will a farm dam be able to provide this amount of water? If water is to be trucked in how many trucks per day will be required? Research indicates water tanker trucks hold maximum of 100,000 litres and most seem to be 20,000 or less litres so to truck in 3,000,000 litres per day would require additional 30 to 150 laden trucks per day during dry times. Proposal states 8-16 or 11- 22 laden truckloads of gravel per day going out depending on size of truck. Water carted could increase truck movements up to 177 laden trucks per day in dry times. In Table 5 (page 32 of Landform Research report) it is stated a water tanker will be retained on site and will source water from a nearby tank which utilises water from a bore in the south west of Lot 7. Neither the location of the tank or of Lot 7 is indicated on the plan or map. 	<p>The anticipated water requirement is an error and should read 3000 kL per year. That is equivalent to double that normally permitted for a rural dwelling without a licence. If the volumes are not available on site they will be sourced from a licenced external supply and brought to site as required as happens at other Hall-All operations.</p> <p>The water will only be provided from a licensed source. It is not known what status the bore considerations on Lot 7 Toy Road are at or even whether that water would be used. If a water source is not an approved or licenced source it will not even be considered.</p> <p>The unmade road reserve is excluded from the application.</p> <p>As the Shire of Chittering owns the gravel within the road reserve it would be up to the Shire to initiate discussions for the gravel resource to be taken. Taking the gravel from the road reserve would produce an consistent final land surface and negate the need for any setbacks to that reserve.</p>	<p>Officer's note that the reference to 3000kL per day in the application report was an error.</p> <p>The reference to Lot 7 is likely to be an error in the reporting.</p>

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	<p>It is assumed it is Lot 7 Toy Road for which an application has been submitted to install a bore and tanks and to sell the water. This application has yet to be approved. There is no indication that the bore has the capacity to deliver this volume of water.</p> <ol style="list-style-type: none"> 4. Under State Planning Policy 2.4 Basic Raw Materials 2021 section (p8 of Landform Research report) it is stated “the proposed renewal of planning approval recognises the staged use of an identified sand resource. There is no mention of sand extraction in the application. 5. There is an unmade road reserve through the site which the proponent proposes to also extract resources from. It is argued that leaving a buffer each side of the road reserve and not removing gravel from the road reserve would leave behind a significant amount of resource and as the property to north and south of the road reserve is owned by the same person (who it seems is currently using the road reserve) it makes sense to remove it all. As a road reserve is public land, the owner of the land on either side does not have an automatic right to make use of the land or to approve some-one else to take resources from this road reserve <ol style="list-style-type: none"> a. Has the manager (presumably Department of Lands) given approval for the adjoining owner to use the land in the past? b. has it also given approval for the gravel extraction to be undertaken from the road reserve and for the adjoining owner to continue using the land afterwards? 6. Proponent intends to have crushing equipment in the floor of the pit as noise and dust mitigation measure. However also states a water management plan is not required as there will be no dewatering and water will be retained in the pit. This implies equipment will be operating in a pool of water at certain times and dewatering may be required in some circumstances. Council approval is required before any dewatering is carried out. 7. Proponent reports there are isolated Marri and Jarrah trees on site but no native understorey. Proposal is to not apply for a clearing permit on the basis that the isolated jarrah and marri trees will not be cleared but a five metre setback will be left around them and the trees retained. <ol style="list-style-type: none"> a. The 5 metres needs to be measured from the drip line rather than the trunk of the trees. b. This needs to be around a clump of trees rather than individual trees. c. even this may not ensure survival of the trees if a depth of 2m to 3 m is being removed from all the way around them. At closure of the pit, these trees will still be sitting 2m above the final ground level again reducing survival of these trees. 8. Weed control will be monitored in spring and autumn and weeds treated to prevent seed set. It is planned to use Fusilade where grasses pose an impediment to rehabilitation. Note Fusilade is not very effective against African Lovegrass which is a common weed on roadsides in the Chittering area and likely to be brought in on vehicles. 	<p>Sand is not proposed to be excavated as there is no sand on the proposed excavation area.</p> <p>There will be no pool of water on the floor of the pit. The floor of the pit will slope gently and a small amount of water will temporarily lie in one corner of the pit during heavy rainfall events and soak into the ground and evaporate. The crushing plant will site on slightly elevated part of the pit floor.</p> <p>The same excavation and water management methods are used by Hall-All Contracting on other gravel operations and at all similar gravel pits with no water issues. The Shire regularly inspects those other gravel operations.</p> <p>All trees have been assessed and a Clearing Permit application has been lodged. (CPS 10053-1).</p> <p>African Lovegrass was introduced by DPIRD as stock pasture and is readily controlled by stock who do not let it form seed. The end use of the site is to return the land to productive pasture and therefore Lovegrass will be managed as part of normal property management.</p> <p>Dieback testing is normally conducted by BioScience at other Hal-All Contracting operations. There are no plant species present on site that support dieback and so the risks of its presence are lower. Clients who purchase gravel will specify whether the receiving site is dieback infested, dieback free or uninterpretable and then decide whether the gravel produced is suitable for their requirements.</p> <p>Growth rates of <i>Banksia</i> are too long for them to be impacted by dieback during excavation if dieback is present.</p> <p>BioScience who undertake the dieback testing for Hall-All Contracting do use baiting for dieback using <i>Banksia</i> seedlings as required.</p> <p>Growth rates for any tree belt will be too slow to provide dust suppression. The land is to be returned to parkland pasture and an offset planting is offered in CPS 10053-1, yet to be determined by DWER.</p>	<p>The reference to a ‘sand resource’ is likely to be an error in the reporting.</p> <p>Gravel extraction from the unmade road reserve is not to be extracted and any approval granted will reflect this.</p> <p>Dewatering is not proposed as part of this application.</p> <p>It is recommended that a 10m buffer is applied to the ‘drip zone’ of any tree identified for retention.</p> <p>Pursuant to the Weed Management Plan, it will incumbent on the applicant to ensure the herbicide used is effective against any weeds that present themselves at the site.</p>
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	<p>9. The Dieback plan is inadequate. The intent is to have gravel dieback tested routinely with status to be supplied to clients and contracts. This is not possible without adequate organic material in the gravel to test. The site needs to be checked for possible Dieback before any works are started. It is a big risk in spreading Dieback by distributing gravel for roadworks or driveways. There are too many examples of this happening in Chittering Shire. There are a number of species of Phytophthora and this may need to be ascertained during the pretesting of the site.</p> <p>10. Prior to the extraction of the gravel, a vegetated strip needs to be established using Marri trees (<i>Corymbia calophylla</i>) and Bull Banksia (<i>Banksia grandis</i>), 3m wide inside the firebreak and along the eastern and northern boundaries. The banksia trees will certainly indicate if Dieback is a problem.</p> <p>This vegetated strip would also help to mitigate dust nuisance for the Chittering Roadhouse.</p>		<p>The dieback management measures provided in the application are consistent with other extractive industries management measures approved by the Shire. The planting of vegetation as a 'dieback indicator' is not considered to be reasonable to be imposed as a planning condition due to time required for the plants to establish.</p> <p>The dieback management measures included in the application are proposed to be enforced through a condition of development approval with routine testing of dieback will be reported in the annual reporting requirements.</p>
<p>Main Roads WA (Late Submission)</p>	<p>Please see below MRWA comments for the proposed extractive industry for Shire to consider including as conditions.</p> <ul style="list-style-type: none"> • Access from the gravel extraction quarry onto the Great Northern Highway shall only be via Djarlma Road. • Great Northern Highway must remain free of mud and debris at all times from the gravel quarry. • No excessive dust is to be allowed to blow across Great Northern Highway from the gravel quarry that may cause a traffic hazard. • Warning signage for trucks entering and leaving Djarlma Road shall be installed on the Great Northern Highway at the quarry owners expense. • There shall be no damage to the Great Northern Highway pavement surface due to the increase in truck movements from the proposed gravel quarry. Any damage is to be reported immediately to the Wheatbelt region and repaired to Main Roads WA satisfaction, at the quarry owners expense. 		<p>Main Roads comments are noted and have been recommended to be applied to any development approval granted either as conditions of approval or advice notes, where appropriate.</p>
<p>PUBLIC SUBMISSIONS</p>			
<p>Submitter</p>	<p>Comment</p>	<p>Proponent Response</p>	<p>Shire Officer Response</p>
<p>OPPOSE Marilyn Don, Chittering</p>	<p>In Regards to the Gravel Excavation I would like to make a submission AGAINST this going ahead on the basis of protecting the health of YAL YAL creek that is in a direct line to the west and down hill of the proposal. Our major concern is the effect that will be caused to this water way if Acid sulphate soils is released and the runoff associated with that affects this water way!</p>	<p>Response prepared on behalf of Hall-All Contracting</p> <p>Background</p> <p>Yaldon Orchard lies 1100 metres south west from the proposed gravel extraction. Lot 40 and the adjoining land to the south, drains</p>	<p>Shire officers have recommended the imposition of a condition that requires an acid sulfate soil monitoring and management plan be prepared and implemented for the life of the development.</p>

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	<p>This I turn will destroy our business as we use the water from that system to water our Avocado and Mango orchard that we have established over the last 39 years.</p> <p>The YAL YAL system is also a haven for an abundance of wild life bird life and plant life.</p> <p>We would also like to make you aware that the same water coarse also feeds into the Gnangara mound, this very important spring fed echo system would not be destroyed due to a gravel Excavation so close to the water coarse, the impact will be devastating and would in fact cause us to proceed with legal action!</p> <p>I strongly suggest you to reject this application and look at the damage that can be caused from Acid Sulphate Soils, we have witnessed first hand the damage that this can cause in this area.</p> <p>Please take our concerns seriously when making your decision !</p>	<p>west to the headwaters of Yal Yal Brook which forms part of the catchment of Ellen Brook.</p> <p>The adjoining land south of Lot 40 is planted pine plantation and native vegetation.</p> <p>Lot 40 is cleared to pasture. Until recently the proposed the gravel excavation site was planted to mature pine plantation. The excavation is proposed to remove 1 – 3 metres of gravel from the proposed pit and return the land to productive pasture.</p> <p>Acid Sulfate Risk</p> <p>As summarised in Sections 4.2, 4.3 and 4.3 of the Management Plan, geological mapping of the Darling Fault by the Geological Survey of WA (see Figure 3 in the Management Plan) shows the pit as being east of the Darling Fault. The basal geology to the east of the fault consists of granite and schist, which carry no sulfides and no risk of acid sulfate.</p> <p>The only materials that locally carry sulfides are glauconitic shales and mudstones of the upper Mesozoic such as the Osborne Formation or Muchea formations, which are limited in extent.</p> <p>In turn these only carry sulfides when they are below the water table under reducing conditions (no oxygen).</p> <p>Such materials are dark grey, black or greensish in colour. As noted in Section 4.4 of the Management Plan the presence of sulfides below the water table and not above is discussed in Nattaporn-Prakongkep, R J Gilkes, B Singh and S Wong, 2011, Mineralogy and chemistry of sandy soils in the Perth metropolitan area of the Swan Coastal Plain, Department of Environment and Conservation.</p> <p>Above the water table the rocks and soils are oxidised, brown – yellow in colour and carry no sulfides. The base of the excavations will only be 1 -3 metres in depth and will not intersect any clays or shales and are located well above the water table, which is 20 plus metres under the site and at 142 to 152 metres at Yal Yal Brook. The proposed pit lies at a minimum elevation of 196 metres AHD.</p> <p>The other way that the sulfides can be oxidised is through reduction in the elevation of the water table due to reduced water recharge or a drying climate. Once completely oxidised the acidity will cease being released and the soils will again be stabilised.</p> <p>The recharge to the soils can be estimated from standard hydrogeological principles and many studies of soil moisture in Western Australia and elsewhere.</p>	
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		<p>Groundwater flow connections will also have to travel 700 metre through soils, sand rock and sediments to reach Yal Yal Brook, which would negate any potential impacts.</p> <p>The proposed operations comply with DWER Water Quality Protection Note 15 Extractive Industries.</p> <p>Conclusion</p> <p>There is no potential for any water impacts on Yal Yal Brook from the proposed excavation.</p> <p>The only change that could possibly occur is an increase in recharge to the water flows to the Brook as a result of the removal of the pine plantation.</p> <p>The proposal has been located and designed to take into the hydrogeology and negate any potential impacts on Yal Yal Brook and adjoining land users.</p>	
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*Note: Comments are as per original submission received by the Shire.