

Holcim (Australia) Pty Ltd

Environmental Assessment – Proposed Modifications to Lynwood Quarry, Marulan

September 2010



Environmental Assessment Proposed Modifications to Lynwood Quarry, Marulan

Prepared by

Umwelt (Australia) Pty Limited

on behalf of

Holcim (Australia) Pty Ltd

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Report No.	2238/R19/V4	Date: September 2010



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Executive Summary

Background

Holcim (Australia) Pty Limited (Holcim) (formerly CEMEX and Readymix Holdings Pty Limited) was granted development consent on 21 December 2005 (DA 128-5-2005) by the New South Wales (NSW) Minister for Planning, to construct and operate a 5 million tonne per annum (Mtpa) hard rock quarry, known as the Lynwood Quarry (Quarry). The approved Quarry is located west of Marulan, approximately 160 kilometres south-west of Sydney and approximately 27 kilometres north-east of Goulburn. The Quarry will provide a long-term supply of high quality construction material into the Sydney, regional and local markets.

Since purchasing CEMEX's Australian assets including Lynwood Quarry in 2009, Holcim has been undertaking a detailed design study to progress the implementation of the project. As part of the detailed design study, Holcim identified opportunities to optimise the site infrastructure and site layout, resulting in operational efficiencies, product quality benefits and both operational and capital cost savings. Based on the findings of this detailed review study and in order to progress the implementation of the project, Holcim proposes to modify the existing consent for the approved project to obtain approval for the identified optimisations. Construction of the Quarry is planned to commence later this year with operations planned to commence in 2013.

The Proposed Modifications

The proposed modifications will not change the overall nature, components, approved production or the life of the approved Quarry, which currently provides for operations until 1 January 2038. The extent of the approved 30 year Quarry pit also remains unchanged. The key minor modifications proposed include:

- reconfiguration of the rail line from a balloon loop to a rail spur;
- change from a mobile to fixed in-pit primary crusher for the early years of the Quarry;
- relocation of the secondary crusher and associated elements to the southern side of the Main Southern Railway;
- change in initial quarry pit development as a result of the fixed in-pit primary crusher being utilised during the early years of the Quarry;
- relocation of the office and amenities away from the operational areas of the Quarry;
- a slight change to the western excess product emplacement area to allow for the relocated offices and amenities;
- realignment of the access road to eliminate the need for a bridge over the rail siding; and
- reconfiguration of other infrastructure components, services and facilities to optimise the site layout incorporating the above changes.

As a result of the proposed reconfiguration of the rail line and the associated changes to the Quarry infrastructure layout, a small increase to the approved disturbance footprint for the Quarry of approximately 10.5 hectares is required. This area equates to approximately 1 per cent of the total disturbance footprint for the approved Quarry.

Holcim is seeking approval to modify DA 128-5-2005 under Section 75W of the *Environmental Planning & Assessment Act 1979* (EP&A Act), to provide for the proposed modifications. The NSW Minister for Planning is the consent authority for the modification application.

Project Need and Benefit

The approved Quarry will provide significant benefits to the local area, region and State of NSW. The Quarry will provide a long-term, high quality supply of construction materials into the Sydney local and regional markets. This supply is needed to replace supply from existing quarries that are nearing the end of their resources and is essential for the security and economic viability of the Sydney construction industry. When operating at full capacity the Quarry will also provide direct employment for approximately 115 people, plus additional indirect employment within the local and state communities. Income for the community is estimated at about \$15 million in construction wages and about \$9 million a year in operational wages. The significant benefits of the Quarry were recognised by the NSW Minister for Planning when the Quarry was approved in 2005.

Consultation

Community and agency consultation are key to the preparation of an EA and necessary to determine the relevant issues to be addressed. There has been ongoing consultation with relevant stakeholders during the preparation of this EA for the proposed minor modifications. Consultation was also undertaken with the Registered Aboriginal Parties for the project as part of the Aboriginal archaeological and cultural heritage assessment process.

Consultation has been undertaken with relevant Government agencies including the Department of Planning (DoP), the Department of Environment, Climate Change and Water (DECCW), the Roads and Traffic Authority (RTA) and Goulburn-Mulwaree Council in relation to the implementation of the approved Quarry and the proposed minor modifications.

The key mechanism used for community consultation in relation to the proposed modifications included the distribution of newsletters to the Marulan community and surrounds. The newsletters provided details of the approved Quarry Project, the proposed modifications, consultation process and how the community can be involved in the approvals process. The newsletters also included a feedback form and an enclosed reply paid envelope so that community members could provide any feedback to Holcim and also included an offer to meet with Holcim to discuss the project in further detail. To date, twelve responses have been received and generally, the local community is supportive of the Quarry, recognising the employment opportunities that it provides and the benefits of the interchange at South Marulan. This finding is consistent with the outcomes of the community engagement program for the approved project in 2005, which identified that the project has strong local community support. A further community newsletter providing a summary of the environmental assessment outcomes will also be distributed by Holcim.

Environmental Assessment

This EA includes a detailed assessment of the potential environmental and social impacts of the proposed minor modifications. An overview of the key outcomes of this assessment is provided below.

Ecology

A detailed ecological assessment was undertaken for the proposed modifications to assess the impact of the changes to the approved disturbance footprint on ecological values. As a result of the proposed modifications, a small increase to the approved disturbance footprint for the Quarry of approximately 10.5 hectares is required. This area equates to approximately 1 per cent of the total disturbance footprint for the approved Quarry.

Three vegetation communities were identified within the Study Area during the field surveys undertaken for this assessment. These were: Derived Pasture (generally dominated by a mix of exotic and native species, although in the majority of the Study Area, where active grazing occurs, exotic species dominate in terms of their cover); a small area of Tableland Low Woodland; and Aquatic Vegetation (occurs along the ephemeral Joarimin Creek and one farm dam).

No endangered flora populations or Threatened Ecological Communities (TECs) were recorded, or are expected to occur, within the Study Area.

Native fauna habitat within the Study Area was minimal due to the highly disturbed nature of the area and the limited amount of understorey and canopy layers within vegetation communities. One threatened fauna species, the brown tree creeper (listed as vulnerable under the *Threatened Species Conservation Act 1995*), was recorded within the Study Area during the field surveys. No endangered fauna populations were recorded or are expected to occur within the Study Area. No threatened fauna species listed under the *Fisheries Management Act 1994* are expected to occur.

A detailed assessment of the potential impact of the proposed modifications on threatened species and communities listed under the *Threatened Species Conservation Act 1995*, the *Fisheries Management Act 1994* and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* was undertaken as part of the ecological assessment. These assessments found that the proposed modifications will not result in a significant impact on any threatened species or communities. The proposed modifications are not expected to result in significant impacts on ecological values.

Aboriginal Cultural Heritage and Archaeology

A comprehensive Aboriginal cultural heritage and archaeological assessment was undertaken for the proposed modifications in accordance with relevant Government guidelines and in consultation with the Registered Aboriginal Parties for the project.

A detailed survey of the additional disturbance area did not identify any sites, however, the survey did identify five areas as having the likelihood of retaining Potential Archaeological Deposits (PAD). The archaeological significance of the PADs were ranked according to their potential to have a subsurface artefactual assemblage that through its investigation could contribute to the archaeological/scientific understanding of the Aboriginal use of the landscape (their research potential).

PAD1 was assessed as having low overall archaeological significance, PAD2, 3 and 4 as having low to moderate overall archaeological significance and PAD5 as having moderate overall archaeological significance. None of the PADs were assessed as having overall high archaeological significance due to the levels of disturbance and the nature of size of their predicted assemblages.

To be updated once comments received from the Registered Aboriginal Parties.

Following discussions with the Registered Aboriginal Parties a range of management options have been assessed as appropriate and will be implemented as part of the proposed modifications to mitigate any potential impacts to Aboriginal Archaeology and Cultural Heritage values. To implement these proposed management strategies Holcim will require a variation to its existing s87/90 permit under the *National Parks and Wildlife Act 1974*. Should the proposed modifications be approved, Holcim will apply the DECCW for a permit variation.

Surface Water

The proposed minor modifications will not require significant changes to the detailed water management system designed for the project and outlined in detail in the EIS (Umwelt, 2005a) and the approved Water Management Plan (Umwelt, 2007g). The proposed modifications do have the potential to impact on the site water balance due to increasing stockpile dust suppression water demands associated with the proposed increase in stockpile areas on site, and have the potential to influence flooding in Joarimin Creek due to the proposed changes to the site infrastructure, including the proposed rail spur and modifications to access roads. The remaining key aspects of the design and operation of the water management system for the Quarry remain unchanged.

The surface water assessment found that:

- changes to the infrastructure layout, including the associated changes to infrastructure area site water management controls, can be managed in accordance with the existing Quarry site water management strategies and controls;
- the proposed modifications will not result in changes to the existing erosion and sediment control measures outlined in the approved Erosion and Sediment Control Plan (Umwelt, 2007g);
- the changes to the site water balance associated with the proposed modifications will result in a minor increase in the water deficit for the site. Holcim has secured an external water sources to address the predicted water deficit in dry periods;
- the proposed modifications will, consistent with the original assessment, not significantly alter the flow regimes in Joarimin Creek, Lockyersleigh Creek or Marulan Creek in terms of peak discharges, flood levels or peak in stream velocities on non-Holcim owned land either upstream or downstream of the Project Area;
- the project will continue to have a neutral or beneficial effect on water quality, as identified for the approved Quarry; and
- the minor changes to the annual flow volumes in the downstream creek systems resulting from the approved Quarry will not be influenced by the proposed modifications.

The approved Lynwood Quarry Water Management Plan (Umwelt, 2007g) and the Riparian Area Management Plans for Joarimin Creek and Lockyersleigh Creek (Umwelt, 2007h; Umwelt, 2007i) will be updated to incorporate the modifications, should the proposed modifications be approved.

Air Quality

To assess the potential air quality impacts associated with the proposed modifications, a detailed air quality impact assessment was completed. The Air Quality Assessment found that the predicted air quality impacts for the Quarry with the proposed modifications are not greatly different to those predictions made for the originally approved project. The assessment identified that due to the modified layout of the site, the levels predicted at some residences are marginally higher than previously assessed, whereas at other residences they are predicted to be marginally lower than previously assessed. In summary:

- maximum 24-hour average PM₁₀ concentrations associated with the proposed modifications are below the 50 µg/m³ goal at all residences;
- annual average PM₁₀ concentrations associated with the proposed modifications are below the 30 µg/m³ goal at all residences. If an annual average background PM₁₀ level of 13 µg/m³ is added to the model predictions, concentrations at all residences are still below the 30 µg/m³ goal;
- annual average TSP concentrations associated with the proposed modifications are below the 90 µg/m³ goal at all residences. If an annual average background TSP of 33 µg/m³ is added to the model predictions, concentrations at all residences are still below the 90 µg/m³ goal; and
- the predicted contribution of the Quarry to dust deposition levels is below the 2 g/m²/month criteria at all residences. Model predictions at residences are also below the 4 g/m²/month goal when an existing background dust deposition level of 1.6 g/m²/month is added.

The air quality impact assessment also found that there was no significant cumulative air quality impacts predicted to result from operation of the approved Quarry in combination with the other existing quarry operations.

Noise

A detailed Noise Impact Assessment was completed to assess the potential noise impacts of the proposed modifications. The Noise Impact Assessment for the proposed modifications identified that the noise impacts from the Quarry, with the proposed modifications, are predicted to comply with the consent noise criteria at all sensitive receiver locations under both calm and prevailing meteorological conditions with appropriate noise controls in place. Modelling of potential impacts to sleep disturbance also found that the maximum noise levels are predicted to be below sleep disturbance criteria specified in the consent for night-time operation of the Quarry. This being the case, sleep disturbance is unlikely to occur at residential locations surrounding the Quarry.

The assessment also found that the predicted noise levels of the Quarry with the proposed modifications are generally similar to the predicted noise levels of the approved Quarry. Although noise levels at certain assessment locations do increase slightly, these levels do not exceed the noise limits specified in the development consent conditions.

In regard to noise impacts during the construction phase, the noise impact assessment modeled the worst case scenarios for both the earthworks and foundation works phases. These are considered to be the phases with the potential worst case impacts during the construction phase. The assessment found that noise levels for earthworks and foundation works are predicted to meet the construction noise goals at all sensitive receiver locations.

Based on the findings of the noise assessment, the proposed modifications are not predicted to result in significant noise impacts and are not predicted to significantly change noise impacts when compared to the approved Quarry.

Visual

There are two aspects of the proposed modifications that have the potential to alter the visual impacts of the Quarry. These are the reconfiguration of project infrastructure and the slight change to the western excess product emplacement area. These components, their general nature (such as height) and general location remain unchanged, with the potential for adverse visual impacts as a result of the proposed modifications therefore being minimal. These elements of the quarry are not visible from the majority of surrounding public viewing locations due to intervening topography and vegetation.

A visual assessment was, however, completed for the proposed modifications finding that the proposed modifications are not predicted to significantly alter the visibility of the Quarry or the nature of impact of the Quarry on the existing visual amenity.

Construction Traffic

The original EIS (Umwelt, 2005) assessed the impacts associated with construction traffic volumes based on 135 vehicle trips per day, of which 18 would be heavy vehicles that would access the Project Area via Portland Avenue. As part of its detailed review of the project, Holcim has re-estimated the construction traffic volumes for the project. The estimated light vehicle movements remain unchanged, however, the estimated average daily heavy vehicle traffic movements have increased in the 15 to 18 month construction period prior to the commissioning of the Hume Highway interchange, from 18 vehicle trips per day to 30 vehicle trips per day. The increase in heavy vehicles, for this period, is necessary to allow the concurrent scheduling of site mobilisation and interchange works, allowing the interchange to be commissioned earlier than originally anticipated. It should also be noted that the heavy vehicle movements referred to in the original EIS included trips associated with the sale of product as well as construction traffic, however, Holcim is no longer proposing to sell product prior to the commissioning of the interchange.

Recent changes to the local road network by the RTA have also necessitated a change to the construction access routes for the project for vehicles travelling south on the Hume Highway. These vehicles will now need to use George Street and then Brayton Road to access the Hume Highway, as the RTA has recently closed the Marulan cross median intersection which allowed access from the Hume Highway onto Portland Avenue. George Street is the main street of Marulan Township and therefore has a number of shop frontages and the Marulan Public School.

The original EIS (Umwelt, 2005a) also outlined the construction traffic volumes required to access the northern portion of the Project Area via Stoney Creek Road. The traffic volumes in the original EIS were limited to 10 light vehicle trips per day on Stoney Creek Road, plus 10 heavy vehicle trips in the early months of construction (these movements would be under escort). As part of the proposed modifications Holcim is now seeking approval for 20 heavy vehicle trips per day on Stoney Creek Road, with a maximum of 45 heavy vehicle trips per day over a 90 day period, when material from the Project Area will be transported to the Hume Highway interchange to be used for construction. These additional movements will allow Holcim to utilise local resources from the initial pit excavation for the interchange construction rather than importing material from elsewhere, reducing the overall delivery distance associated with this material. The use of Stoney Creek Road is estimated to be for

a period of approximately eight months prior to the commissioning of the rail bridge in the Project Area.

Holcim recognises the potential for traffic during the construction phase to impact on the local community and is committed to keeping these impacts to as low as possible. The construction of the interchange has been re-scheduled to bring its completion further forward by six to nine months, thereby reducing the overall duration of construction traffic impacts. The construction phase traffic impacts will be managed in accordance with a Construction Traffic Management Plan, to be developed for the project in accordance with Condition 28 of Schedule 3 of the consent. This plan is required to be prepared in consultation with the RTA, Council and the Department of Lands and is to be approved by the Director-General of DoP.

To minimise the impacts associated with the alternate access routes on the Marulan Township and Marulan Public School, heavy vehicles will be limited to accessing the Project Area outside of school zone times (i.e. 8:00 am to 9:30 am and 2:30 pm to 4:00 pm on school days) wherever practicable, unless they are done under escort. Prior to the commencement of construction, Holcim will also undertake further consultation with the Marulan community regarding construction phase traffic arrangements and the controls that will be implemented to reduce impacts.

Socio-economic Impacts

In regard to the proposed modifications, the findings provided in the EA have identified that the proposed modifications will not result in any significant changes to the environmental and social impacts of the modified project when compared to the approved Quarry project. In particular, there are no proposed changes to the approved extraction rate or life of the Quarry, and there are no predicted changes in employment impacts. The economic benefits of the project including a significant contribution to the local and regional economies during both the construction and operational phases, also remain unchanged. Therefore, the socio-economic impacts of the Quarry with the proposed modifications will remain consistent with those of the approved Quarry.

Conclusion

The proposed modifications will not change any of the benefits of the approved Quarry and will also not result in significant environmental and social impacts when compared to the currently approved Quarry. The assessment also found that the predicted impacts of the Quarry with the proposed modifications are similar to those of the currently approved Quarry. Given the benefits of and need for the proposed modifications, the level of community support for the Quarry and considering the balance of the potential impacts of the proposed modifications on the environment and community, it would be reasonable to conclude that the benefits of the proposed modifications outweigh the impacts.

TABLE OF CONTENTS

1.0	Introduction	1.1
1.1	The Proponent	1.1
1.2	Overview of the Project.....	1.2
1.3	Overview of the Existing Environment	1.2
1.3.1	Description of Site and Surrounds.....	1.2
1.3.2	Land Ownership	1.3
1.3.3	Overview of Environmental Features	1.3
1.4	Overview of the Planning and Approval Process.....	1.4
1.5	Project Team.....	1.4
1.6	EA Structure	1.4
2.0	Description of Approved Project	2.1
2.1	Quarry Implementation Progress to date	2.2
2.2	Quarry Environmental Management System	2.3
3.0	Description of Proposed Modifications.....	3.1
3.1	Conceptual Quarry Design	3.2
3.2	Site Infrastructure.....	3.2
3.2.1	Rail Facility	3.3
3.2.2	Primary Crusher	3.4
3.2.3	Crushing and Screening Plant.....	3.4
3.2.4	Access Road	3.4
3.2.5	Increase to Approved Disturbance Footprint.....	3.4
3.2.6	Construction Access.....	3.4
3.3	Alternatives.....	3.6
3.4	Justification for the Proposed Modifications.....	3.6
4.0	Stakeholder Consultation and Identification of Key Environmental Issues	4.1
4.1	Stakeholder Consultation	4.1
4.1.1	Authority Consultation	4.1
4.1.2	Community Consultation	4.2
4.1.3	Other Stakeholder Consultation	4.3
4.2	Issues Raised by Stakeholders.....	4.3

5.0	Planning Context	5.1
5.1	Commonwealth Legislation	5.1
5.1.1	Environment Protection and Biodiversity Conservation Act 1999	5.1
5.1.2	Native Title Act 1993	5.1
5.2	State Legislation	5.2
5.2.1	Environmental Planning and Assessment Act 1979	5.2
5.2.2	Permissibility	5.3
5.2.3	Summary of Other State Legislation	5.3
5.3	State Environmental Planning Policies	5.5
5.3.1	SEPP Mining, Petroleum Production and Extractive Industries (Extractive Industries SEPP)	5.5
5.3.2	SEPP 44 - Koala Habitat Protection	5.6
5.3.3	SEPP 33 – Hazardous and Offensive Development	5.6
5.3.4	SEPP 55 – Remediation of Land	5.6
5.3.5	Drinking Water Catchments Regional Environmental Plan No. 1	5.6
5.4	Sydney to Canberra Corridor Strategy	5.7
5.5	Local Planning	5.7
5.5.1	Goulburn Mulwaree Local Environmental Plan 2009	5.7
6.0	Environmental Assessment	6.1
6.1	Preliminary Environmental Assessment	6.1
6.2	Ecological Assessment	6.3
6.2.1	Survey Methodology	6.4
6.2.2	Survey Results	6.4
6.2.3	Ecological Impact Assessment	6.9
6.2.4	Impact Mitigation	6.12
6.3	Aboriginal Cultural Heritage and Archaeological Assessment ...	6.12
6.3.1	Previous Archaeological Survey and Assessment	6.13
6.3.2	Predictive Model	6.14
6.3.3	Aboriginal Consultation	6.14
6.3.4	Survey Methodology and Results	6.15
6.3.5	Current Aboriginal Cultural Heritage and Archaeological Conservation Strategy	6.16
6.3.6	Significance Assessment	6.17
6.3.7	Impact of the Proposed Modifications	6.19
6.3.8	Management Measures	6.19
6.4	Surface Water Assessment	6.20
6.4.1	Water Management System	6.21
6.4.2	Erosion and Sediment Controls	6.22
6.4.3	Site Water Balance	6.22

6.4.4	Flooding	6.24
6.4.5	Water Quality	6.27
6.4.6	Annual Flow Volumes and Downstream Users	6.27
6.4.7	Surface Water Monitoring, Licensing and Reporting Procedures	6.28
6.4.8	Conclusions	6.29
6.5	Air Quality Assessment	6.30
6.5.1	Existing Air Quality Environment	6.30
6.5.2	Air Quality Criteria and Assessment Methodology	6.30
6.5.3	Air Quality Assessment Findings	6.30
6.5.4	Dust Management	6.32
6.6	Noise Assessment.....	6.32
6.6.1	Noise Criteria	6.33
6.6.2	Assessment Methodology	6.33
6.6.3	Noise Impact Assessment Findings	6.33
6.6.4	Noise Management	6.34
6.7	Visual Assessment.....	6.35
6.8	Greenhouse Gas and Energy	6.36
6.9	Transport.....	6.37
6.9.1	Construction Traffic	6.37
6.9.2	Rail.....	6.39
6.10	Soils, Land Capability and Agricultural Suitability.....	6.39
6.10.1	Soils	6.39
6.10.2	Land Capability	6.39
6.10.3	Agricultural Suitability	6.41
6.11	Rehabilitation.....	6.42
6.12	Socio-economic Assessment.....	6.43
6.13	Overview of Cumulative Impacts	6.44
7.0	Draft Statement of Commitments and Proposed Changes to Consent Conditions	7.1
7.1	Draft Statement of Commitments.....	7.1
	Compliance with this EA	7.1
	Update of Management Plans and Programs	7.1
	Ecology	7.1
	Cultural Heritage	7.1
	Surface Water	7.2
	Air Quality	7.2
	Noise	7.2
	Construction Phase Traffic	7.2

7.2	Proposed Changes to Consent Conditions	7.3
8.0	Conclusion and Ecologically Sustainable Development	8.1
8.1	Ecologically Sustainable Development	8.1
8.1.1	The Precautionary Principle	8.1
8.1.2	Intergenerational Equity	8.2
8.1.3	Conservation of Biological Diversity	8.3
8.1.4	Valuation and Pricing of Resources	8.3
8.2	Conclusion	8.3
9.0	References	9.1
10.0	Abbreviations and Glossary	10.1
10.1	Abbreviations	10.1
10.2	Glossary	10.2

FIGURES

1.1	Locality Plan	1.1
1.2	Local Area Plan	1.1
1.3	Project Area	1.1
1.4	Existing Land Use	1.3
1.5	Land Ownership	1.3
1.6	Topography and Drainage	1.3
2.1	Approved Conceptual Year 30 Quarry Plan	2.2
3.1	Indicative Year 5 Quarry Plan	3.2
3.2	Indicative Year 10 Quarry Plan	3.2
3.3	Indicative Year 30 Quarry Plan	3.2
3.4	Indicative Infrastructure Layout	3.2
3.5	Indicative Traffic Routes	3.4
5.1	Zoning	5.7

6.1	Ecological Results within the Study Area	6.6
6.2	Archaeological Terrain Units and Areas of Potential Archaeological Deposit.....	6.13
6.3	Modelled Existing 100 year ARI Storm Event Flood Extents	6.21
6.4	Modelled 100 year ARI Storm Event Flood Extent – Joarimin Creek ..	6.25
6.5	24-hour Average PM ₁₀ Contours Year 30	6.31
6.6	Annual Average PM ₁₀ Contours Year 30	6.31
6.7	Annual Average TSP Contours Year 30	6.31
6.8	Annual Dust Deposition Contours Year 30.....	6.31
6.9	Worst Case Noise Contours during Calm Meteorological Conditions Year 10 - Comparison between Approved and Proposed Projects	6.34
6.10	Project Visibility from Location 7	6.35
6.11	Project Visibility from Location 6	6.35
6.12	Project Visibility from Location 10	6.36
6.13	Soil Landscape Units.....	6.39
6.14	Existing Land Capability Classes.....	6.40
6.15	Post Quarrying Land Capability	6.41
6.16	Agricultural Land Suitability	6.41
6.17	Year 30 Conceptual Final Rehabilitation.....	6.42

APPENDICES

1	EA Form, Project Team and Schedule of Lands
2	Community Consultation Newsletters
3	Ecological Assessment of Significance
4	Aboriginal Archaeological Assessment
5	Air Quality Assessment
6	Noise Assessment

1.0 Introduction

Holcim (Australia) Pty Limited (Holcim) (formerly CEMEX and Readymix Holdings Pty Limited) was granted development consent on 21 December 2005 (DA 128-5-2005) (Consent) by the New South Wales (NSW) Minister for Planning, to construct and operate a 5 million tonne per annum (Mtpa) hard rock quarry, known as the Lynwood Quarry. The approved Lynwood Quarry is located near Marulan in the Southern Tablelands region of NSW (refer to **Figure 1.1**). A minor modification to change the infrastructure layout and reduce the extent of the Quarry pit was sought in January 2009 and subsequently approved on 7 May 2009 (DA 128-5-2005 MOD 1). In October 2009, Holcim acquired CEMEX's Australian operations, including the approved Lynwood Quarry. Construction of the Lynwood Quarry has not yet commenced.

The approved Lynwood Quarry (the 'Quarry') is located west of Marulan, approximately 160 kilometres south-west of Sydney and approximately 27 kilometres north-east of Goulburn (refer to **Figures 1.2** and **1.3**). The approved Quarry will provide a long-term supply of high quality construction material into the Sydney, regional and local markets.

Since purchasing CEMEX's Australian interests, Holcim has been undertaking a detailed design study to progress the implementation of the project. As part of this process, Holcim has identified opportunities to optimise the site infrastructure and site layout. These optimisations will result in operational efficiencies, product quality benefits and both operational and capital cost savings. Based on the findings of this detailed review, and in order to progress the implementation of the project, Holcim proposes to modify the approved project with the aim of obtaining approval for the identified optimisations. The overall nature and components of the Quarry and approved production rate of 5 million tonnes per annum (Mtpa) will remain unchanged, including the extent of the approved 30 year Quarry pit. Construction of the Quarry is planned to commence later this year with operations planned to commence in 2013.

Holcim has consulted with the Department of Planning (DoP) in regard to the proposed modifications and is seeking approval to modify DA 128-5-2005 under Section 75W of the *Environmental Planning & Assessment Act 1979* (EP&A Act), to provide for the proposed changes. This Environmental Assessment (EA) has been prepared by Umwelt (Australia) Pty Limited (Umwelt) on behalf of Holcim to assess the potential environmental and social impacts associated with the proposed modifications to the approved Quarry. The EA will be a supporting document to the modification application lodged with DoP. A statement of Authorship for the EA is included in **Appendix 1**.

1.1 The Proponent

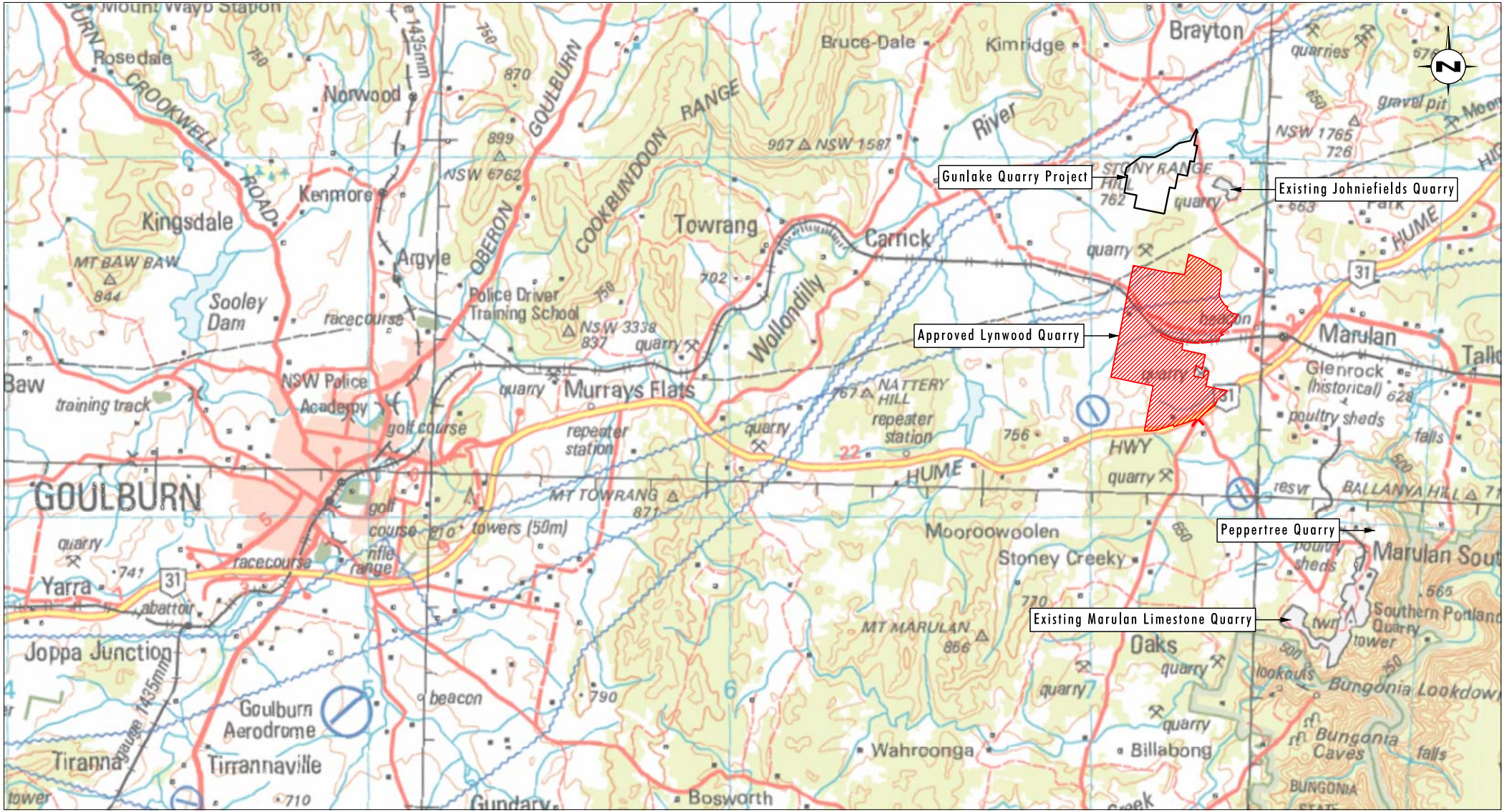
The proponent for the modification application is Holcim (Australia) Pty Ltd (Holcim). Holcim is one of the country's leading producers and suppliers of construction materials such as concrete and quarry products.

Holcim acquired CEMEX's Australian operations in October 2009. Lynwood Quarry was initially owned by Readymix Holdings Pty Limited, a member of the Rinker Group. CEMEX acquired the Rinker Group Limited and its Australian business, Readymix Holdings Pty Limited, in 2007. To avoid confusion, Holcim will be used to describe ownership of the Quarry and any associated approvals and/or management plans irrespective of timing, throughout this EA.

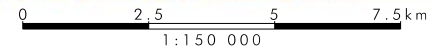
Holcim has been serving the Australian construction industry since 1901, originally under the well-known brands Readymix and Humes. Holcim has a network of over 200 concrete plants



FIGURE 1.1
Locality Plan

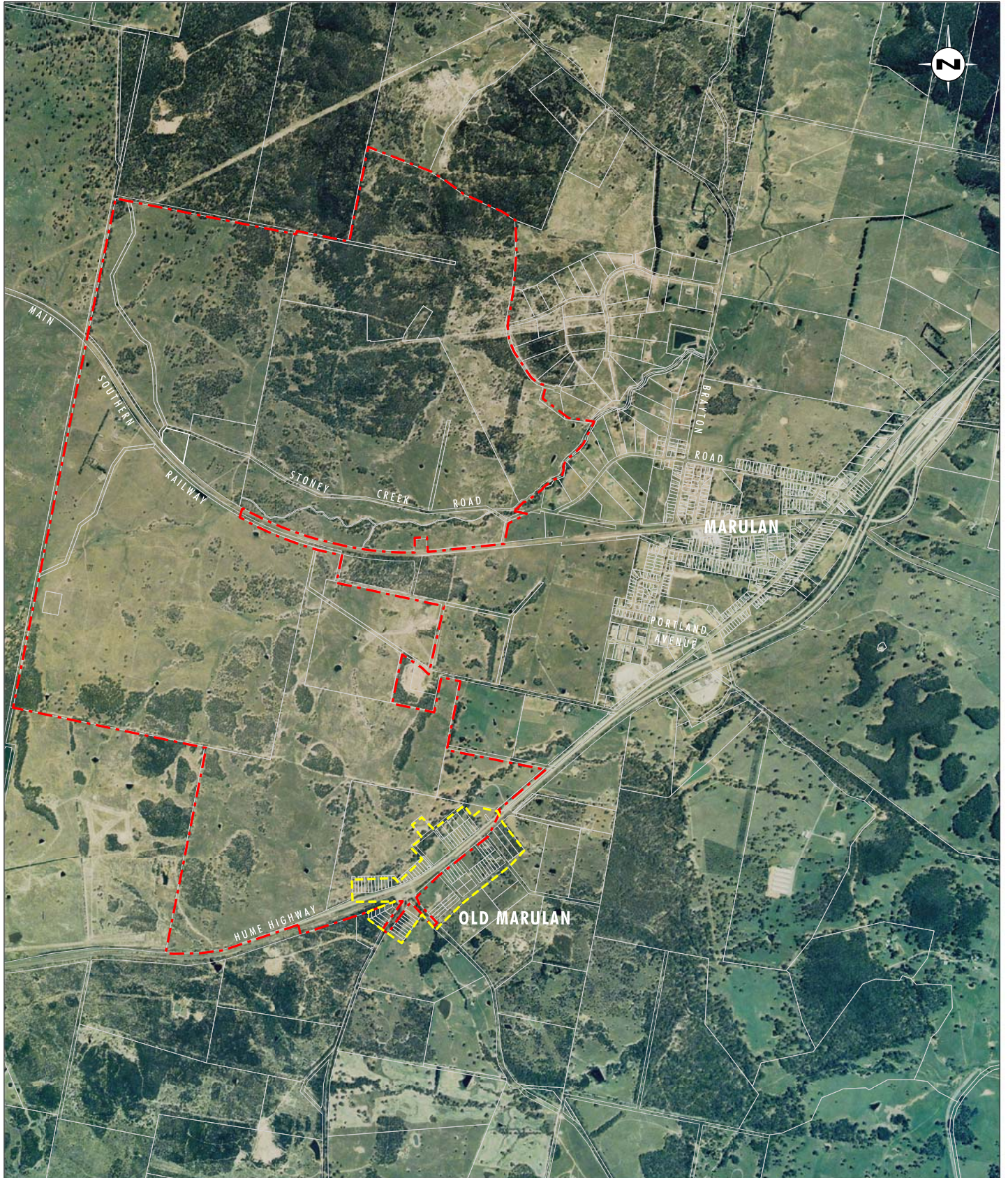


Source: Natmap



Legend
 Lynwood Quarry Project Area

FIGURE 1.2
 Local Area Plan



Source: LPI 2004, Readymix Holdings Pty Ltd (Aerial Photo March 2005)

0 0.5 1.0 1.5 km
1:32 000

Legend

- - - Project Area
- - - SHR Boundary Old Marulan Township

FIGURE 1.3
Project Area

and 88 quarry operations in Australia, which provide high quality concrete and quarry products to a diverse range of customers. Holcim's quarry products include rail ballast, aggregates, gravels, road pavement materials, manufactured and natural sands. These basic materials are essential construction products that go into making concrete and help to build community infrastructure.

1.2 Overview of the Project

As part of the detailed design process for the implementation of the approved Quarry, Holcim has identified opportunities that would optimise the site infrastructure and site layout. The purpose of the proposed minor modifications is to seek approval for these optimisations, realising operational, product quality and economic benefits.

The proposed minor modifications will not change the overall nature, components, approved production or the life of the approved Quarry, which currently provides for operations until 1 January 2038. The extent of the approved 30 year Quarry pit also remains unchanged. The key minor modifications proposed include:

- reconfiguration of the rail line from a balloon loop to a rail spur;
- change from a mobile to fixed in-pit primary crusher for the early years of the Quarry;
- relocation of the secondary crusher and associated elements to the southern side of the Main Southern Railway;
- change in initial quarry pit development as a result of the fixed in-pit primary crusher being utilised during the early years of the Quarry;
- relocation of the office and amenities away from the operational areas of the Quarry;
- a slight change to the western excess product emplacement area to allow for the relocated offices and amenities;
- realignment of the access road to eliminate the need for a bridge over the rail siding; and
- reconfiguration of other infrastructure components, services and facilities to optimise the site layout incorporating the above changes.

As a result of the proposed reconfiguration of the rail line and the associated changes to the Quarry infrastructure layout, a small increase to the approved disturbance footprint for the Quarry of approximately 10.5 hectares is required. This area equates to approximately 1% of the total disturbance footprint for the approved Quarry. The proposed additional disturbance area is within the approved Project Area for the Quarry. Further details of the proposed modifications are provided in **Section 3.0**.

1.3 Overview of the Existing Environment

1.3.1 Description of Site and Surrounds

The approved Project Area (refer to **Figure 1.3**) has historically been used for agricultural land uses, primarily grazing, with managed grazing currently ongoing on part of the Project Area. In line with feedback from the local community, Holcim is committed to providing for appropriately managed ongoing agricultural land uses on parts of the Project Area that are

not required for quarrying activities and where these uses will not adversely impact on environmental values. Construction of the approved Quarry has not yet commenced, however, some recent construction works have been undertaken on the property by Country Energy under a separate approval, including construction of an access road, electrical substation and transmission lines.

Agriculture is also the predominant land use surrounding the Project Area (refer to **Figure 1.4**). Other land uses within the vicinity of the Project Area are the residential area of Marulan, located approximately 1 kilometre to the east, rural residential areas to the north-east adjoining the Project Area, small areas of industrial land, an existing hard rock quarry approximately 2 kilometres to the north (Johniefelds Quarry, also operated by Holcim), transport corridors and associated services. Another quarry, the Gunlake Quarry, has also recently been approved and will be located approximately 2 kilometres to the north of the Project Area, with a further approval for a hard rock quarry and a limestone quarry operation located to the south-east of Marulan (refer to **Figure 1.2**).

Part of the land occupied by the former Old Marulan township occurs in the southern portion of the Project Area in the vicinity of the approved interchange intersection on the Hume Highway (refer to **Figure 1.3**). The Old Marulan township is listed on the NSW State Heritage Register (SHR). As part of the approved project, Holcim has undertaken extensive investigations regarding the portion of the SHR area to be impacted by the approved interchange intersection, including an extensive excavation. These works have been undertaken in close consultation with the Heritage Branch of DoP, and in accordance with permits under the *Heritage Act 1977*. A detailed report is currently being compiled for these studies.

1.3.2 Land Ownership

All of the land within the Project Area is owned by Holcim (refer to **Figure 1.5**) with the exception of some small areas of Crown land and private land holdings at Old Marulan, the Hume Highway corridor, the Main Southern Railway, a lot owned by Goulburn Mulwaree Council and the Country Energy Zone Substation. Full property descriptions for land within the Project Area are provided in **Appendix 1**. The Project Area shown on **Figure 1.5** corresponds to the approved development application (DA) boundary of DA 128-5-2005.

Since the approval of the Quarry in 2005, land adjoining the western boundary of the Project Area has also been purchased by Holcim. This land was purchased to provide an appropriate buffer between the Quarry and privately owned land to the west. Holcim already owned significant buffer lands surrounding the proposed Quarry in all other directions (refer to **Figure 1.5**).

1.3.3 Overview of Environmental Features

The Project Area lies within the catchments of Joarimin, Lockyersleigh and Marulan Creeks. Joarimin and Lockyersleigh Creeks drain to the Wollondilly River, which is part of the Warragamba Dam catchment area, forming part of Sydney's drinking water supply. Marulan Creek is part of the Shoalhaven River system which also contributes to Sydney's drinking water supplies. The topography of the Project Area generally consists of undulating ridges separated by drainage valleys, with elevations ranging from 710 metres Australian Height Datum (mAHD) in the north, to around 630 mAHD near Joarimin Creek (refer to **Figure 1.6**).

Annual average rainfall for Marulan is 665 millimetres and is slightly summer dominant. Annual average evaporation is, however, well in excess of rainfall, being 1205 millimetres. Average wind speeds are relatively high, particularly in autumn, winter and spring when westerly winds are dominant. Summer winds are predominantly from the east.

The majority of the Project Area has been previously cleared, however, large patches of remnant vegetation exist in the north of the Project Area. The balance of the Project Area consists of cleared grazing land with small patches of vegetation. During studies completed as part of the Lynwood Quarry Environmental Impact Statement (EIS) (Umwelt, 2005a), the vegetation was generally found to have been heavily modified by past and ongoing agricultural activities and was considered to be reasonably representative of regional vegetation communities and condition.

1.4 Overview of the Planning and Approval Process

Holcim is seeking a modification to development consent DA 128-5-2005 pursuant to Section 75W of the EP&A Act to provide for the proposed modifications. The Minister for Planning is the consent authority for the modification application. A detailed discussion of the planning context for the proposed modifications is included in **Section 5.0**.

If approval is granted under Section 75W of the EP&A Act, Holcim Australia will obtain, or update, all the necessary permits, licences and management plans as required by DA 128-5-2005 (refer to **Section 5.0**).

1.5 Project Team

Umwelt has prepared this EA on behalf of Holcim Australia. Specialist studies completed as part of the EA process include:

- an air quality assessment - undertaken by PAE Holmes Pty Ltd;
- a noise impact assessment – undertaken by Heggies Australia Pty Ltd; and
- ecology, Aboriginal archaeology and surface water assessments – undertaken by Umwelt' specialists.

Full details of the project team are provided in **Appendix 1**.

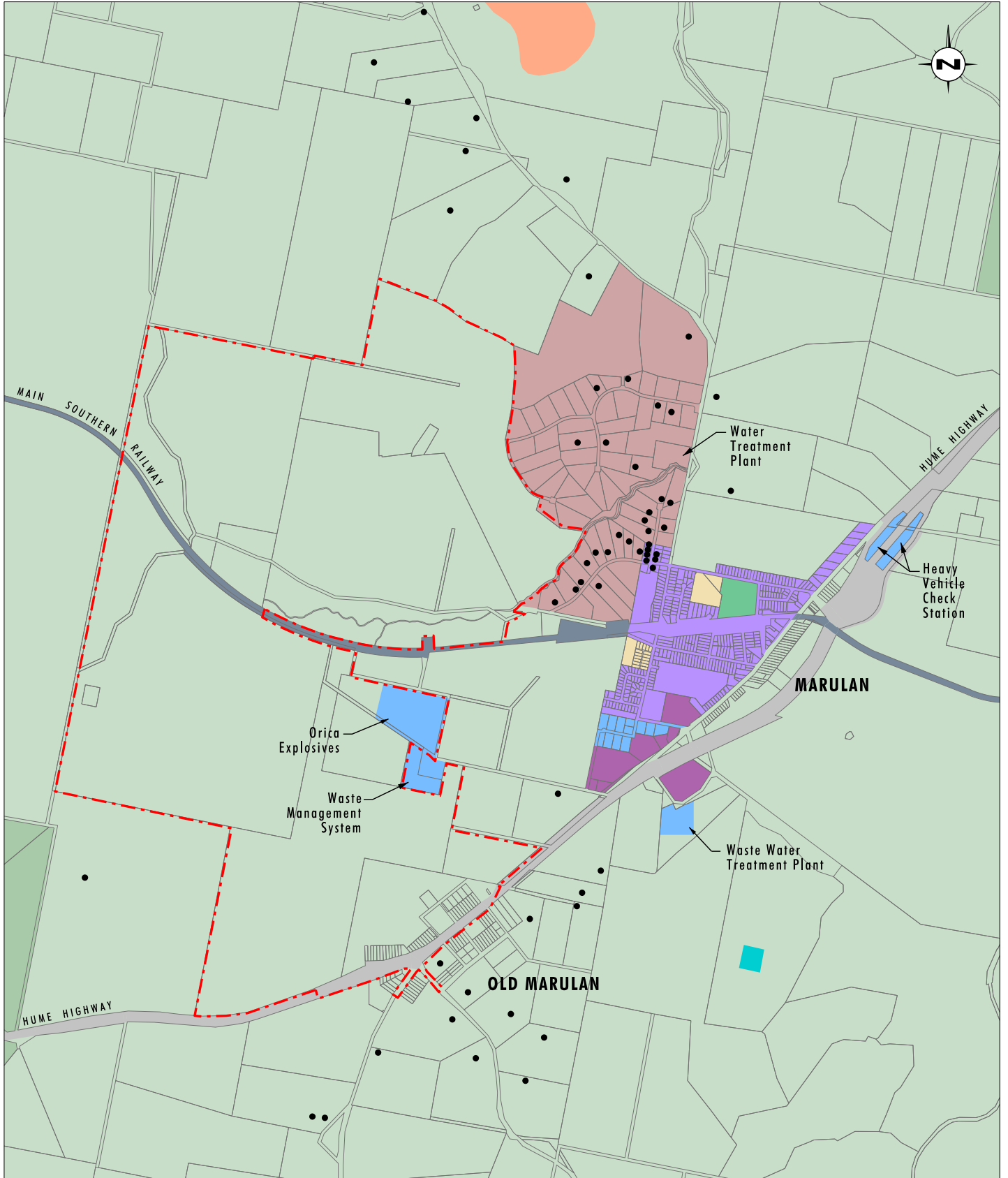
1.6 EA Structure

The purpose of this EA is to identify and assess the environmental and social impacts associated with the proposed modifications. The EA has been prepared in accordance with the requirements of the EP&A Act and Environmental Planning and Assessment Regulation 2004. An overview of the layout of this EA is provided below.

Section 1.0 provides the background and context for the proposed modifications, an overview of the existing environment and approval process, and the EA project team involved in producing the EA.

Section 2.0 contains a description of approved operations at the Quarry, a description of the Project implementation progress to date and an overview of the Environmental Management Strategy for the Quarry.

Section 3.0 provides a detailed description of the proposed modifications, the justification for the proposed modifications and other alternatives considered.



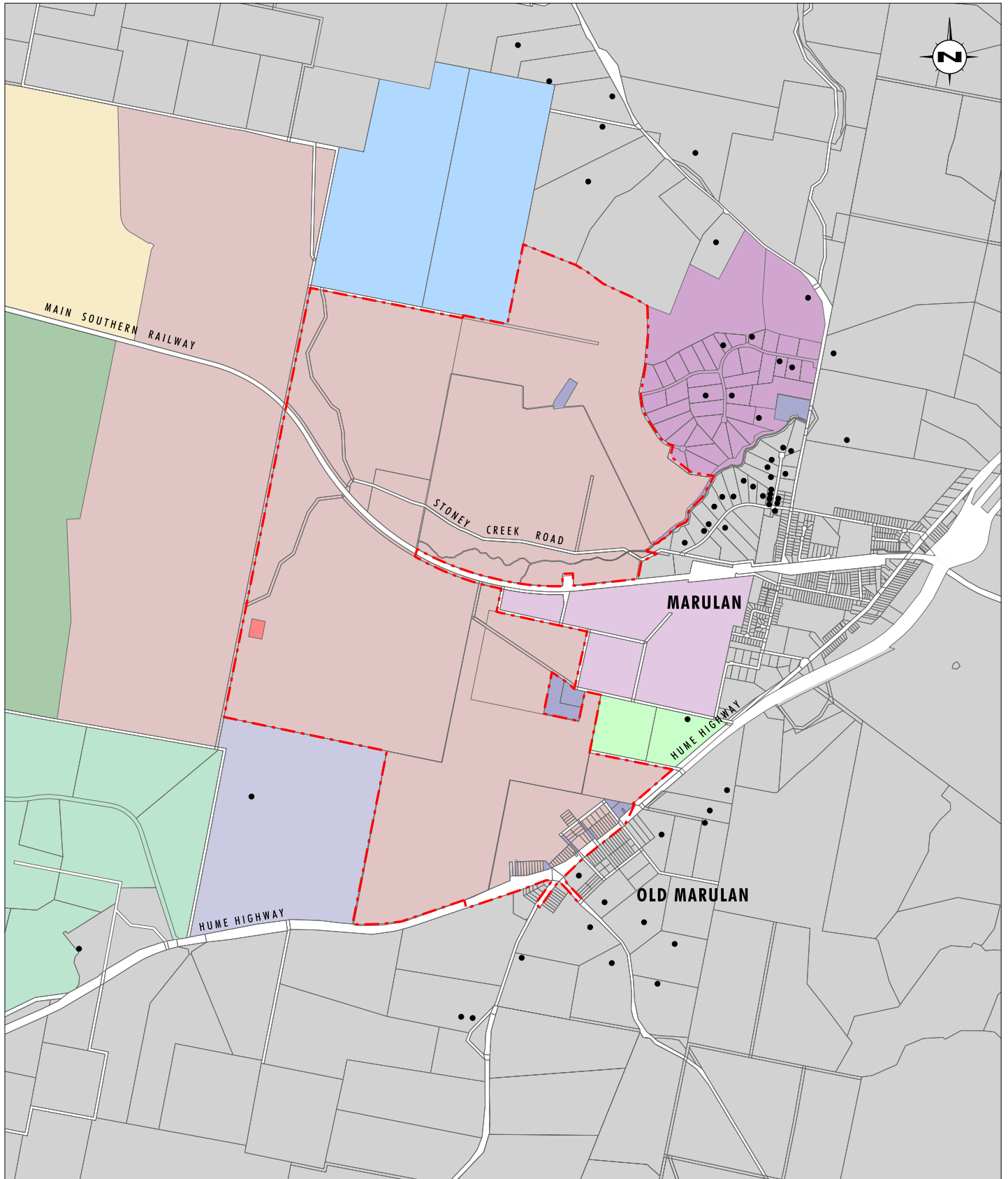
Base Source: LPI 2010

0 0.5 1 1.75 km
1:35 000

Legend

- - - Project Area
- Grazing
- Residential
- Rural Residential
- Industrial
- Business Highway Service
- Recreation
- Intensive Agriculture
- Open Space
- Pine Tree Plantation
- Highway
- Railway
- Quarry
- Residences

FIGURE 1.4
Existing Land Use



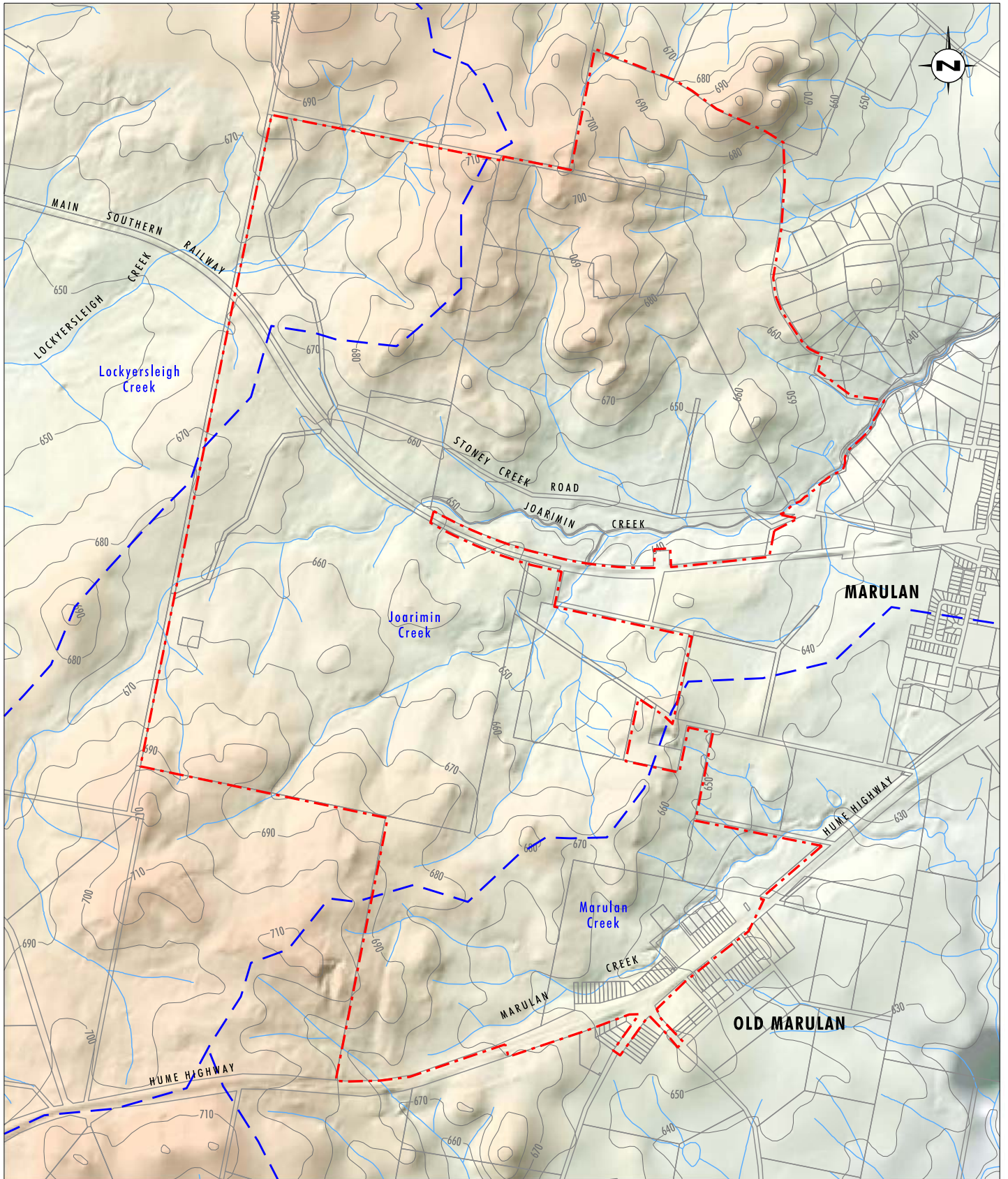
Base Source: LPI 2004, Readymix Holdings Pty Ltd

0 600 1200 1800m
1:38 000

Legend

- - - Project Area
- Residence
- Holcim Australia
- Crown Land/GM Council
- Newball Pty Ltd
- Tailored Property
- Other Private Land
- South Ck Dairy
- Oliveri
- Onions Investments
- Ranken Investments
- Dugan
- Rawson
- Country Energy

FIGURE 1.5
Land Ownership



Base Source: LPI 2004

0 0.5 1 1.25 km
1:25 000

Legend

- - - Project Area
- - - Catchment Boundary
- Contour (10m Interval)
- Creek / Drainage Line

FIGURE 1.6

Topography and Drainage

Section 4.0 describes the consultation process and the environmental and community issues identified as part of this process for detailed assessment in the EA.

Section 5.0 describes the planning context for the Project, including the applicability of Commonwealth and State legislation.

Section 6.0 contains an assessment of the environmental and social impacts of the proposed modifications, including the project specific and cumulative impacts as a result of the proposed modifications.

Section 7.0 details the Draft Statement of Commitments proposed to be adopted for the proposed modifications in order to mitigate impacts and the proposed modifications to the consent conditions.

Section 8.0 contains a conclusion and justification for the proposed modifications.

Section 9.0 and **Section 10.0** provide a list of references referred to in the EA and a list of abbreviations and glossary of technical terms.

2.0 Description of Approved Project

In May 2005, Holcim lodged a development application and accompanying Environmental Impact Statement (EIS) (Umwelt, 2005a) with the then Department of Infrastructure, Planning and Natural Resources (DIPNR) (now DoP) for determination by the then Minister for Infrastructure and Planning. The project was classed as a State Significant Development under Section 76A(7) of the EP&A Act. Development Consent was granted for the project on 21 December 2005.

The approved Quarry was planned to be constructed over a two year period with approval granted for 30 years of quarry operations. Key components of the approved Quarry include:

- a quarry pit providing sufficient resource for 30 years of extraction;
- overburden and excess product emplacement areas;
- a crushing and screening plant and associated stockpiles and materials handling facilities;
- a rail loop and train loading facility;
- a truck loading facility and access road (including Hume Highway interchange); and
- various other infrastructure including a pre-coat plant, workshop, laboratory, office and amenity buildings, wheel wash station, weighbridge and other minor infrastructure.

The Quarry has approval to produce up to five million tonnes per annum (Mtpa) of saleable quarry product over the approved initial quarrying period until the consent lapses on 1 January 2038 (allowing for two years construction and 30 years of operation from the granting of consent). The target resource has an expected life in excess of 90 years.

The Quarry has approval to transport all of the 5 Mtpa of product from the Project via the dedicated train loading facility, with up to 1.5 Mtpa of the total 5 Mtpa also approved to be delivered to markets by road transport via the Hume Highway.

Some of the material extracted as part of the quarrying process will not be suitable for processing and sale. Consequently, approval was obtained for emplacement areas as part of the Project. Due to quarry planning constraints and the potential for resource sterilisation, in-pit dumping will not be possible during the initial 30 year quarry plan, so out-of-pit emplacement areas were approved.

Approval was granted for the Quarry to operate twenty-four hours per day, seven days per week. As part of the Quarry design, Holcim committed to limiting the operating hours for some activities, to reduce potential noise impacts. The approved Quarry has an estimated maximum production workforce of 115 employees.

In 2009, Holcim sought approval to modify the design of the Quarry in accordance with Section 96(1A) of the EP&A Act. A Statement of Environmental Effects (SEE) was prepared by Umwelt (Umwelt, 2009a) on behalf of Holcim to assess the potential environmental impacts of the proposed modifications, which comprised:

- the quarry footprint being reduced in the western extent, which necessitated changes in the progression of the quarry pit, due to the identification of a fault in this area;
- a revised layout of Quarry site infrastructure including the crushing and screening plant;

- a revised conceptual design of the Hume Highway interchange; and
- approval for delivery of quarry product by road to all markets, due to the potential for staged construction.

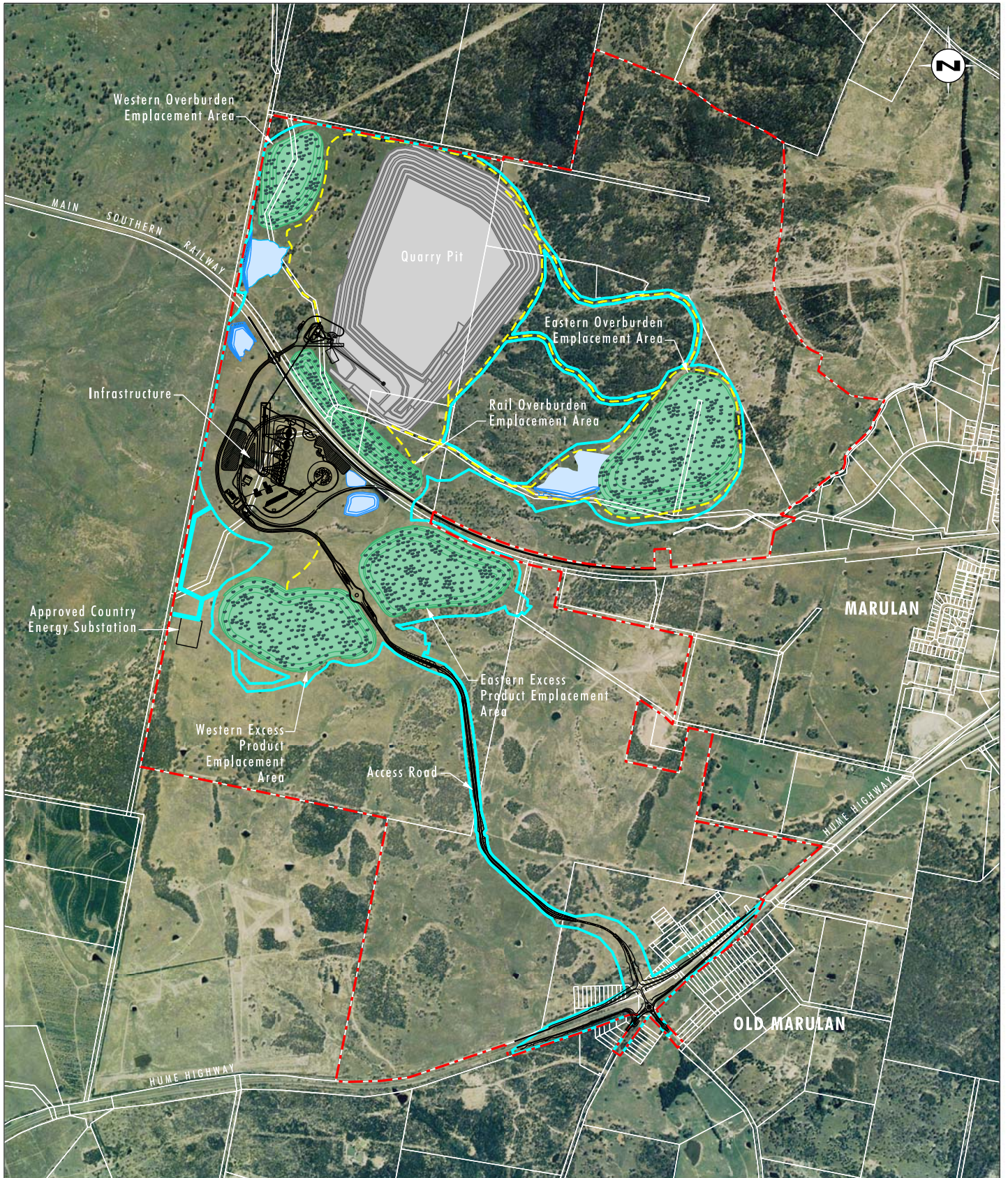
The remaining aspects of the approved project remained unchanged.

The modification was approved by the Minister for Planning on 7 May 2009. The currently approved 30 Year Quarry plan, incorporating the 2009 modification, is presented as **Figure 2.1**.

2.1 Quarry Implementation Progress to date

Since approval was granted in 2005, Holcim has progressed the implementation of the Quarry including progressing or obtaining the necessary supplementary approvals and reviewing the concept design and construction staging of the Quarry infrastructure. Key achievements to date include:

- preparation and subsequent approval of environmental management plans, including the Environmental Management Strategy;
- obtaining the required Aboriginal heritage investigation and impact permits under the *National Parks and Wildlife Act 1974* (NPW Act). The Aboriginal archaeology excavation program commenced in 2007 with fieldwork completed in January 2010;
- obtaining the required Section 60 permit (*Heritage Act 1977*) for the Old Marulan State Heritage Register (SHR) Area. The main excavation within the SHR area was completed in late 2007 with analysis and reporting works ongoing – a community open day was completed as part of the excavation program;
- obtaining the required approvals under the *Water Management Act 2000* (WMA Act);
- obtaining an Environment Protection Licence (EPL) under the *Protection of the Environment Operations Act 1997* (POEO Act) for the Quarry;
- progressing the detailed design of the Hume Highway Interchange. The Roads and Traffic Authority (RTA) has formally approved the Concept Design with the detailed design nearing completion;
- undertaking further detailed engineering design for the implementation of the Quarry and planning for the construction program;
- Australian Rail and Track Corporation (ARTC) approval has been received for the haul road and conveyor overpasses of the Main Southern Railway;
- the required external water supply for the Quarry has been secured, including issue of a licence under the WMA Act by the NSW Office of Water;
- design and approval of external water supply pipeline including:
 - agreements for construction of the external water pipeline over the high pressure gas mains along the route have been finalised;
 - Goulburn Mulwaree Council approval has been received for design of the pipeline under Brayton Road in accordance with the *Roads Act 1993*;



Base Source: LPI 2004, CEMEX Pty Ltd (Aerial Photo March 2005)

0 0.5 1 1.25km
1:25 000

Legend

- - - Project Area
- - - Haul Road
- Approved Disturbance Footprint
- Quarry Pit
- Emplacement Area
- Rehabilitated Area
- Dam

File Name (A4): R19_V1/2238_262.dgn

FIGURE 2.1

Approved Conceptual Year 30 Quarry Plan

- an agreement with the relevant landholder for an easement for the construction of the pipeline between the external water source and the Quarry nearing finalisation;
- the Crown Road Reserves within the Project Area have been closed and the land purchased;
- an application was made for the closure of the public road within the Project Area, which has been approved by Goulburn Mulwaree Council with the purchase of this land currently being progressed;
- the new Country Energy zone substation for the Marulan township within the Project Area has been built and is now operational;
- the proposed buffer zone on the western side of the Quarry, as outlined in the EIS (Umwelt, 2005a) has been purchased;
- an application has been lodged with the Dam Safety Committee for all major dams associated with the Quarry; and
- there has been ongoing consultation the community through periodic community information sheets and liaison with local community representatives.

As demonstrated by the list of key achievements to date for the implementation of the Quarry Holcim is committed to the development and operation of the Quarry. In addition, the proposed modifications are a result of the detailed design process being undertaken to implement the project, with plans for construction to commence late in 2010 and operations to commence in 2013.

2.2 Quarry Environmental Management System

A comprehensive Environmental Management Strategy (Umwelt, 2007a) has been prepared for Lynwood Quarry to provide the framework for environmental management of the project. The Strategy was prepared in accordance with Condition 1, Schedule 5 of the Consent and has been approved by DoP.

The Strategy provides the framework for environmental management during the construction and operation of the Quarry to ensure compliance with consent conditions and other legal requirements. It builds on the environmental management controls outlined in the EIS and the SEE. The Strategy also provides the framework for ongoing community involvement in the Project and identifies communication mechanisms between the Project and the local and wider community.

The Strategy was developed generally in accordance with ISO 14001, the international standard for environmental management systems (EMS). Implementation of this Strategy will assist Holcim to minimise the environmental impacts of the Project by facilitating continual improvement in environmental performance. The Strategy promotes proactive environmental management and identifies how the Quarry will seek to maintain and build on its good relationship with the local community and other key stakeholders.

Building on the Strategy and in accordance with the Consent, the following environmental management plans have also been prepared for the Project:

- a Water Management Plan which includes:
 - a water balance;

- an Erosion and Sediment Control Plan;
 - a Surface Water Monitoring Program;
 - a Ground Water Monitoring Program; and
 - a surface and groundwater response plan to address any potential adverse impacts associated with the development;
- an Aboriginal Heritage Management Plan;
 - a Rehabilitation and Landscape Management Plan, including Riparian Area Management Plans; and
 - an Environmental Monitoring Program which incorporates:
 - a Noise Monitoring Program;
 - a Blast Monitoring Program;
 - an Air Quality Monitoring Program; and
 - the Surface Water Monitoring Program and Groundwater Monitoring Program from the Water Management Plan.

A Construction Traffic Management Plan will also be prepared prior to the commencement of construction.

The proposed modifications do not change the overall environmental management approach for the project, with all of the above existing management plans proposed to be implemented for the modified Quarry. The management plans will be updated to reflect the changes required by the proposed modifications, if approved.

3.0 Description of Proposed Modifications

As part of the detailed design process for the implementation of the approved Quarry, Holcim has identified opportunities that would optimise the site infrastructure and site layout. As a result of this review, changes are proposed that are primarily aimed at obtaining operational efficiencies and product quality benefits, but will also result in both operational and capital cost savings.

The approved 30 year Quarry pit footprint will remain unchanged, and no increase is sought to the approved production rate of 5 Mtpa or the life of the Quarry, which is currently approved to operate until 1 January 2038.

Table 3.1 provides a comparison between the approved Quarry and the proposed modifications. As shown in **Table 3.1**, the key features of the Quarry remained unchanged.

Table 3.1 – Comparison of Currently Approved Lynwood Quarry Development and the Proposed Modifications

Major Project Components/Aspects	Currently Approved Lynwood Quarry	Proposed Modifications
Quarry Life	Quarry operations to cease on 1 January 2038	No change
Limits on Production	5 Mtpa saleable product	No change
Maximum Transportation of Product by Rail	5 Mtpa	No change
Maximum Transportation of Product by Road	1.5 Mtpa	No change
Total Disturbance Footprint	As shown on Figure 2.1 (approximately 950 hectares)	Slight increase (approximately 10.5 hectares) to allow for proposed infrastructure changes
Quarry Footprint	As shown on Figure 2.1	Changes to initial pit development, but overall Quarry extent and depth remain unchanged
Overburden and Excess Product Emplacement Areas	As shown on Figure 2.1	Slight change to the western excess product emplacement area to allow for the relocation of offices and amenities, but no change to the other indicative emplacement areas and no significant change in total area or capacity of the indicative emplacement areas
Hours of Operation	24 hours per day, 7 days per week. Restrictions on some operations to minimise potential noise impacts.	No change
Employment	Employment at maximum production of approximately 115 people (including road transport drivers).	No change
Construction Phase	Approximately two years of construction. Peak employment of approximately 140 people.	Approximately two years of active construction, however, works will now be staged over approximately three years. No change

Table 3.1 – Comparison of Currently Approved Lynwood Quarry Development and the Proposed Modifications (cont)

Major Project Components/Aspects	Currently Approved Lynwood Quarry	Proposed Modifications
	Approval for transport of up to 100,000 tonnes of product per annum by road prior to completion of interchange.	No product for sale will be transported from the site prior to the construction of the Hume Highway Interchange.
Infrastructure	As shown on Figure 2.1 .	Slight changes to infrastructure layout and realignment of the main access road
Rail Facilities	Balloon loop and loading facility as shown on Figure 2.1	Reconfiguration of the rail line from a balloon loop to a rail spur

3.1 Conceptual Quarry Design

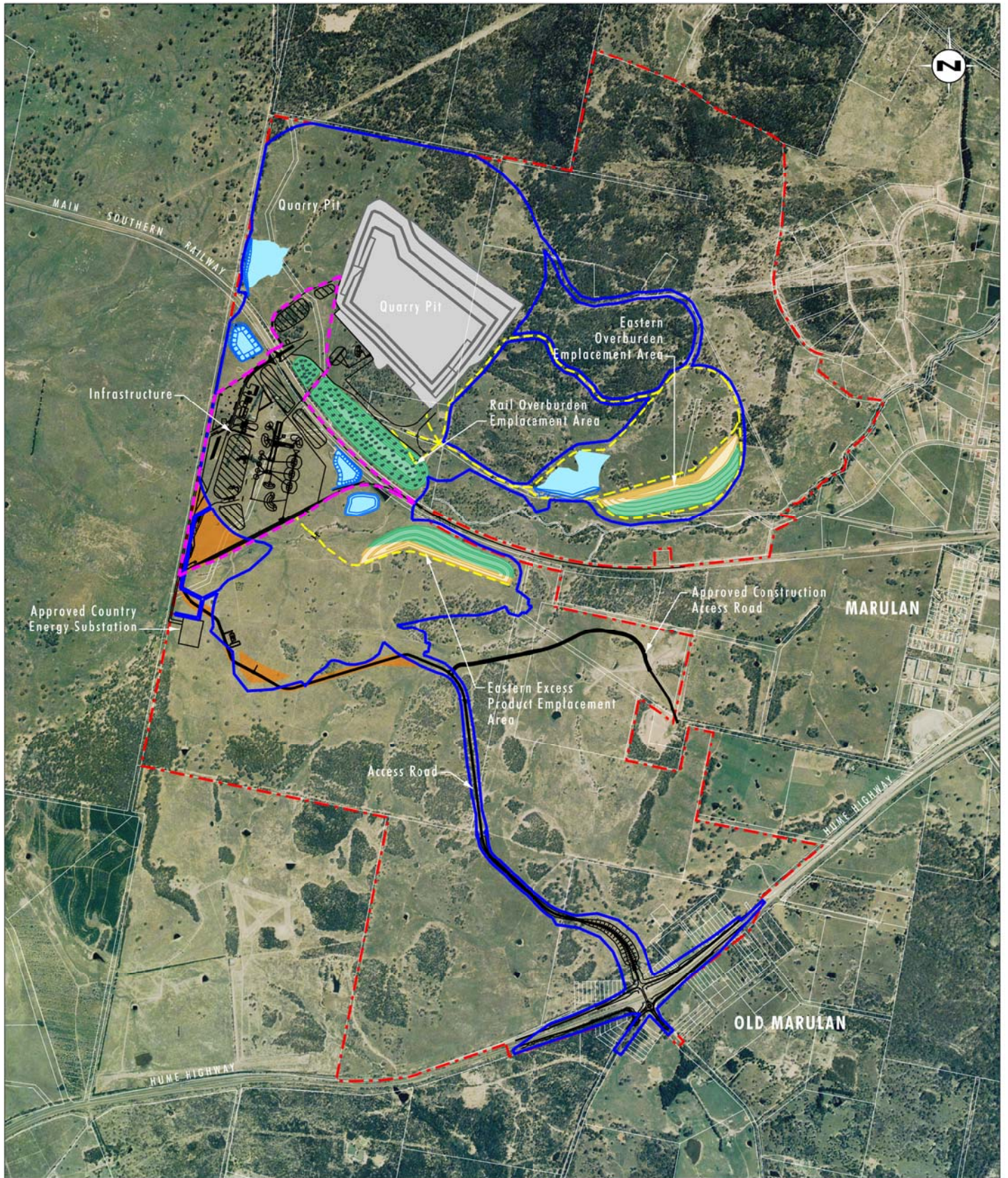
The initial stages of the conceptual Quarry pit design have been modified as a result of the detailed design process. The revised quarry pit designs allow for the primary crusher to be located in-pit. The revised indicative conceptual quarry pit designs are illustrated on **Figures 3.1 to 3.3**. The changes to the conceptual Quarry plan do not alter the total pit extent or depth of the approved Quarry footprint in Year 30 (refer to **Figure 2.1**). The location of the approved overburden emplacement areas and excess product emplacement areas will not change from that approved. A minor change in design of the western excess product emplacement area is required to accommodate the relocation of the offices, amenities and associated car park, which has been relocated away from the operational areas of the Quarry.

Maximum production is proposed to remain at the currently approved 5 Mtpa.

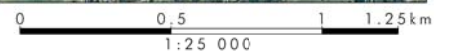
3.2 Site Infrastructure

The proposed modifications to the approved Quarry infrastructure include changes to the site infrastructure layout and some minor changes to plant and equipment. The proposed modifications are an outcome of the detailed design process that has been undertaken by Holcim for project implementation. This detailed design process has identified opportunities to optimise the site infrastructure and site layout resulting in improved operational efficiencies, product quality benefits and both operational and capital cost savings. The proposed changes to the site infrastructure are identified in **Table 3.2** and the revised indicative site infrastructure layout is shown on **Figure 3.4**. As the project is implemented, some further minor refinements of the layout of the indicative site infrastructure may occur as part of the engineering design and construction process, however, these minor refinements will not result in changes to the components, overall location or impacts of the site infrastructure. Further detail on the key changes proposed is provided in **Sections 3.2.1 to 3.2.6**.

The proposed modifications will not change the overall nature or components of the approved Quarry infrastructure.



Base Source: LPI 2010, Holcim Australia (Aerial Photo March 2005)

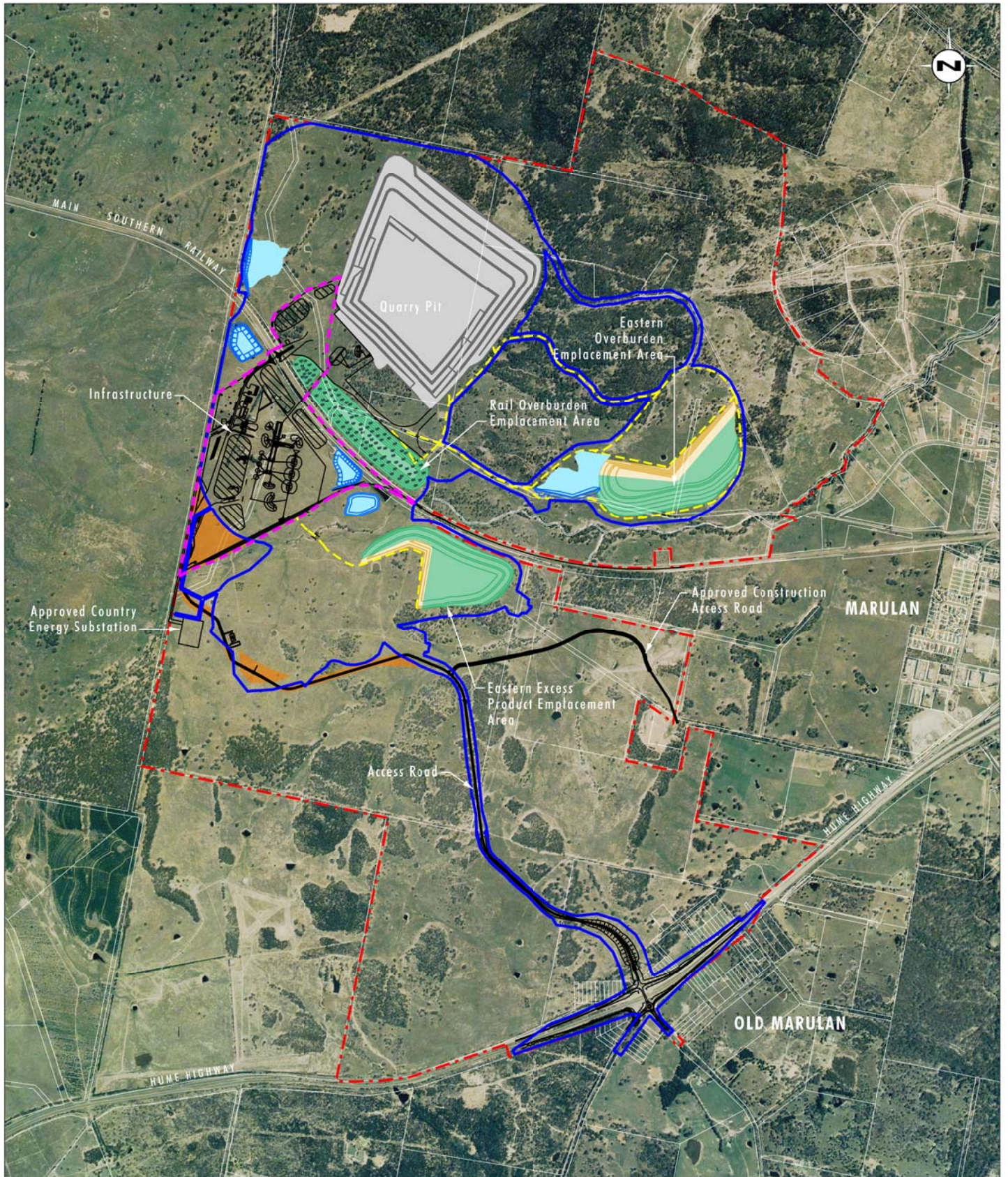


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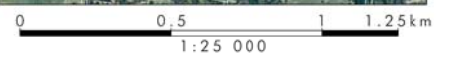
- Project Area
- Infrastructure Area
- Haul Road
- Approved Disturbance Footprint
- Modified Disturbance Footprint
- Quarry Pit
- Emplacement Area
- Rehabilitated Area
- Dam

FIGURE 3.1

Indicative Year 5 Quarry Plan



Base Source: LPI 2010, Holcim Australia (Aerial Photo March 2005)

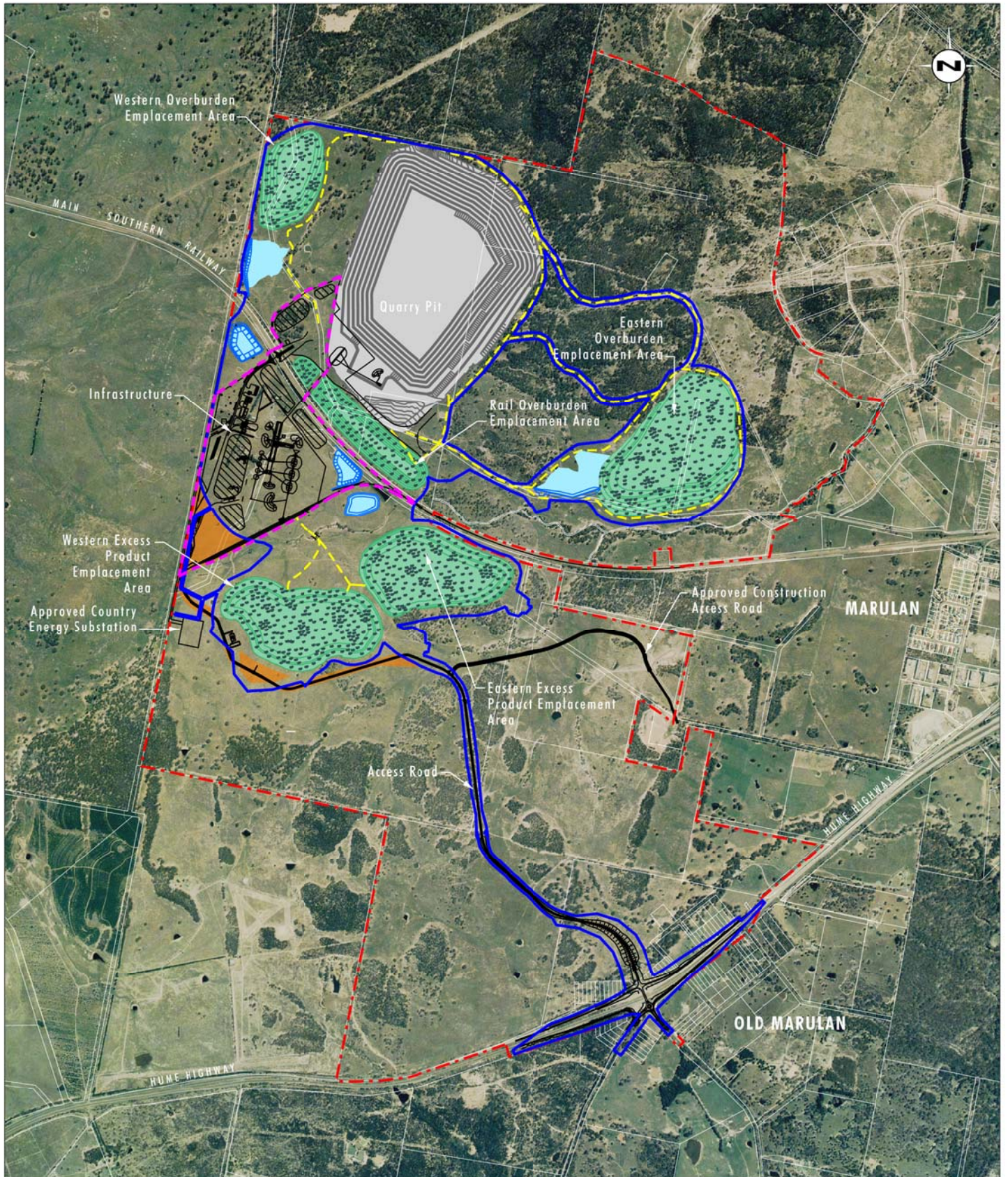


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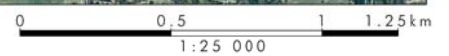
- Project Area
- Infrastructure Area
- Haul Road
- Approved Disturbance Footprint
- Modified Disturbance Footprint
- Quarry Pit
- Emplacement Area
- Rehabilitated Area
- Dam

FIGURE 3.2

Indicative Year 10 Quarry Plan



Base Source: LPI 2010, Holcim Australia (Aerial Photo March 2005)

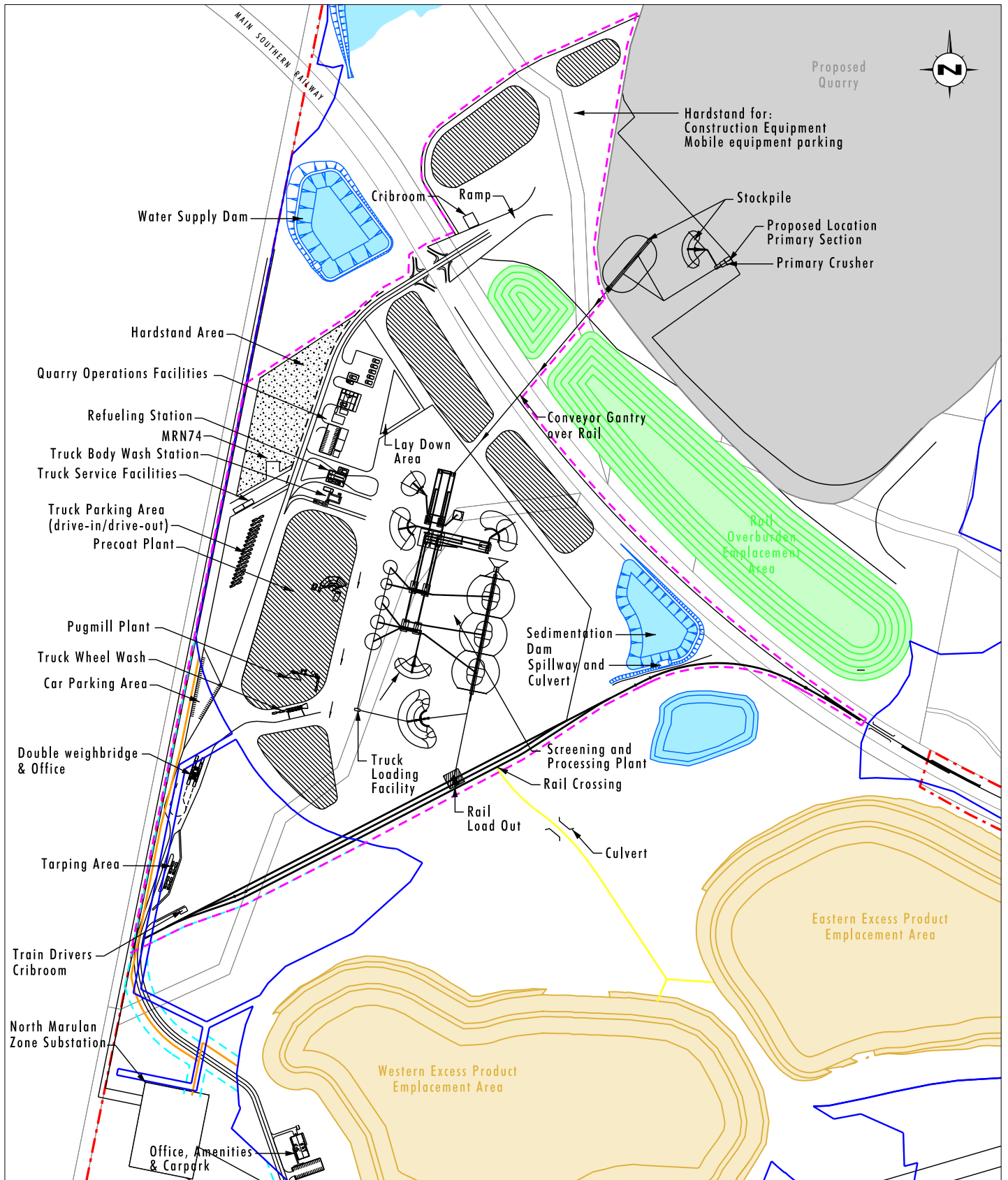


Legend

- Project Area
- Infrastructure Area
- Haul Road
- Approved Disturbance Footprint
- Modified Disturbance Footprint
- Quarry Pit
- Emplacement Area
- Rehabilitated Area
- Dam

FIGURE 3.3

Indicative Year 30 Quarry Plan



Source: Holcim
Base Source: LPI 2010

0 100 200 400m
1:8000

Legend

- Project Area
- Infrastructure Area
- Proposed Infrastructure
- Proposed Haul Road
- Product Stockpiling Area
- Approved Disturbance Footprint
- Modified Disturbance Footprint
- Transmission Line

FIGURE 3.4

Indicative Infrastructure Layout

Table 3.2 – Proposed Modifications to Approved Lynwood Quarry

Approved Project Component	Proposed Modifications
Rail Facility	<ul style="list-style-type: none"> • Change to main line turnout locations. • Change to spur line from balloon loop. • Changed load out point location. • Refer to Section 3.2.1.
Primary Crusher	<ul style="list-style-type: none"> • Change from mobile primary crusher in the early years of the Quarry to a fixed facility. • Minor change in location of the fixed primary crusher within the pit. • Refer to Section 3.2.2.
Post Primary Surge	<ul style="list-style-type: none"> • Previously post secondary surge. • Minor change in location. • Slight increase in size.
Conveyor Gantry over Rail	<ul style="list-style-type: none"> • Minor change in location.
Secondary Crusher	<ul style="list-style-type: none"> • Change in location from north to south side of Main Southern Railway.
Tertiary Crushing & Screening Plant	<ul style="list-style-type: none"> • Change in layout. • Minor change in location and orientation.
Product Stockpiles & reclaim system	<ul style="list-style-type: none"> • Change in location. • Change in layout of the product stockpiles and reclaim points.
Truck Loadout	<ul style="list-style-type: none"> • Change from automated loading facility to use of either automated loading facility or front end loaders to load trucks direct from stockpile.
Access Road	<ul style="list-style-type: none"> • Realigned to eliminate need for bridge over rail siding. • Refer to Section 3.2.4.
Construction Access	<ul style="list-style-type: none"> • Access from south via approved route. • Access from north via alternative routes. • Refer to Section 3.2.6.
Dams	<ul style="list-style-type: none"> • Minor change in location/size of Dam E (refer to Figure 3.4).
Weighbridge Workshop Offices Crib Rooms Refuelling Wheel Wash Vehicle Wash Bay	<ul style="list-style-type: none"> • Change in location (refer to Figure 3.4). • Reduced size for most facilities.

3.2.1 Rail Facility

The approved rail line configuration for the Quarry is a balloon loop (refer to **Figure 2.1**) which encloses the infrastructure area. As part of the detailed design reviews undertaken for project implementation, Holcim's optimal site layout for the Quarry required a reconfiguration of the balloon loop to a rail spur (refer to **Figure 3.4**). The rail spur is more cost effective and allows for greater flexibility in locating components of the infrastructure area as well as negating the need for an on-site bridge over the spur line, which is now proposed to be a crossing with the main access road for the Quarry being relocated.

3.2.2 Primary Crusher

A fixed in-pit primary crusher is proposed to be used for the early years of the Quarry replacing the mobile crushers previously planned (as described in the SEE (Umwelt, 2009a)). A fixed primary crusher was proposed in the SEE (Umwelt, 2009a) for the later years of the Quarry. As the primary crusher will now be fixed and located in-pit, its height and the position has changed. The fixed in-pit crusher will be located in the southern-central portion of the Quarry pit (refer to **Figure 3.4**).

In the future, a gyratory primary crusher may be utilised to replace the proposed jaw crusher, depending on operational needs. For the purposes of this assessment, the jaw crusher has been used to determine the environmental impacts associated with the use of the primary jaw crusher as this would be worst case in terms of potential impacts.

3.2.3 Crushing and Screening Plant

As part of the detailed design reviews undertaken for project implementation, Holcim's optimal site layout for the Quarry allows for the layout of the crushing and screening plant to be modified. The secondary crusher and associated plant elements will be located to the south of the Main Southern Railway. A slight change in location of the conveyor gantry over the Main Southern Railway will also be required. The revised indicative concept layout of the crushing and screening plant is shown on **Figure 3.4**.

3.2.4 Access Road

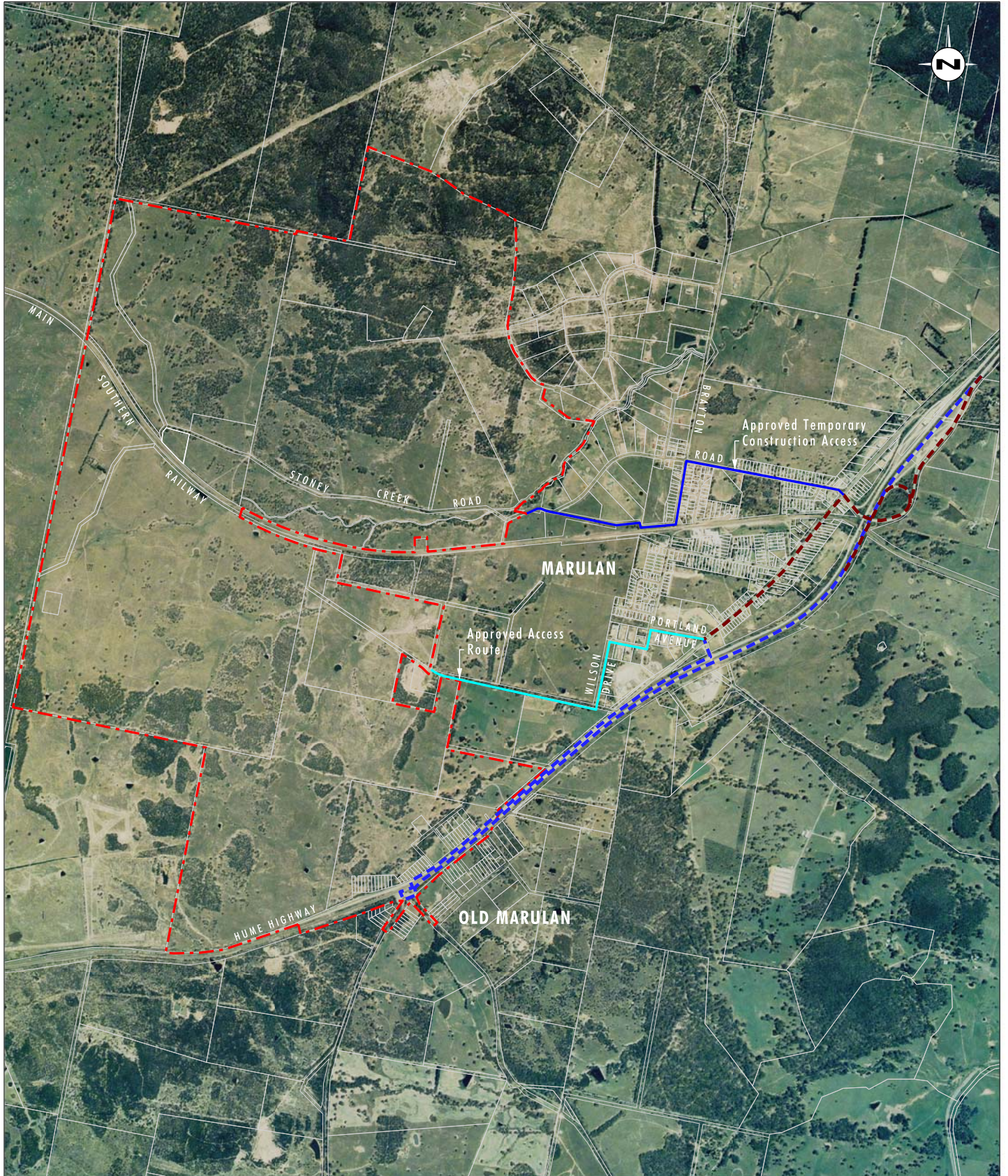
Part of the approved access road is proposed to be realigned to travel further west, past the recently constructed Country Energy North Marulan Zone Substation, accessing the infrastructure area near the western boundary of the Project Area (refer to **Figure 3.1**). The access road is proposed to be realigned to eliminate the need for the bridge over the spur line. The realigned access road will require a new crossing of the upper reaches of Joarimin Creek. The existing approved Joarimin Creek crossing point will be retained and be used for haul trucks taking material to the excess product emplacement areas as currently approved. The originally approved project design as outlined in the EIS (Umwelt, 2005a) also had two crossing points on Joarimin Creek.

3.2.5 Increase to Approved Disturbance Footprint

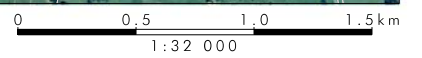
The proposed changes to the Quarry infrastructure will result in a slight increase to the approved disturbance footprint for the Quarry of approximately 10.5 hectares. The key modified components that contribute to this change are the proposed change to a rail spur line and the realignment of the main access road for the Quarry. The 10.5 hectare increase is located within the Project Area and equates to approximately 1% of the disturbance footprint for the approved Quarry (which is approximately 950 hectares).

3.2.6 Construction Access

The Lynwood Quarry EIS (Umwelt, 2005a) outlined the access routes for construction activities associated with the Lynwood Quarry (refer to **Figure 3.5**). The main access for construction traffic to the south of the Project Area (i.e. south of the Main Southern Railway) for vehicles coming south on the Hume Highway involved a right turn off the Hume Highway (at the Marulan cross median intersection) into Portland Avenue, then on to Wilson Drive, which currently provides access to the Marulan Waste Management Facility, Orica Explosives and the Country Energy North Marulan Zone substation. Vehicles travelling north on the Hume Highway would also use this access route via a left hand turn off the highway into Portland Avenue. This route was originally proposed as it allows construction phase



Source: LPI 2004, Readymix Holdings Pty Ltd (Aerial Photo March 2005)



Legend

- - - Project Area
- - - Access Road Construction
- Approved Access Route
- Approved Temporary Construction Access
- - - Alternate Access Route 1
- - - Alternate Access Route 2

File Name (A4): R19_V1/2238_264.dgn

FIGURE 3.5
Indicative Traffic Routes

traffic to access the Quarry without passing through any residential areas. The route does pass one isolated residence on Wilson Drive, however, this residence is on land that has recently been rezoned for industrial development. From Wilson Drive, the construction access traffic route follows the existing Country Energy construction access road.

The RTA has since closed the Marulan cross median intersection, which means that construction traffic requiring access to the southern portion of the Project Area when travelling on the southbound lanes of the Hume Highway will need to utilise alternative access points to Portland Avenue (refer to **Figure 3.5**). The alternative routes considered suitable for construction traffic, in consultation with the RTA, are as follows:

- construction traffic travelling on the northbound lanes on the Hume Highway can still use the approved route;
- construction traffic travelling on the southbound lanes on the Hume Highway could access Portland Avenue via the following routes:
 - exiting the Hume Highway at the truck inspection stations and going through the Marulan Township to access Portland Avenue via George Street (with no heavy vehicle movements around Marulan Public School during school zone times i.e. 8:00 am to 9:30 am and 2:30 pm to 4:00 pm); and
 - prior to the commencement of construction of the Hume Highway South Marulan Road interchange, south bound traffic could utilise the existing truck parking area at South Marulan Road to turn right onto the Hume Highway and use the approved route.

Both of these routes will be used to access the Project Area until the interchange is constructed.

The northern portion of the Project Area is still proposed to be accessed via Stoney Creek Road, which is currently used as the access point for the Lynwood property. Due to the closing of the Marulan cross median intersection, and following completion of the rail overpass, construction vehicles will also gain access to the Project Area via Stoney Creek Road. While this route still travels through the Marulan Township along Brayton Road, it avoids the centre of the town and the Marulan Public School. This access route will also be used during the construction phase in combination with the access routes discussed above.

Holcim is now proposing to implement a staged construction strategy that will see the majority of the construction materials delivered to site and the civil works, including the Hume Highway – South Marulan Road interchange, substantially completed before the construction of the crushing and screening plant commences, enabling access to the Project Area for the Quarry infrastructure construction phase via the Hume Highway – South Marulan Road interchange. Further details of construction traffic impacts are provided in **Section 6.9**.

As required by Schedule 3, Condition 28 of DA 128-5-2005, a Construction Traffic Management Plan is required prior to carrying out any development. This plan will be prepared in consultation with Council and the RTA and will identify the management controls to be implemented to minimise construction phase traffic impacts. The Quarry consultation program will also be used to inform the community about the access arrangements, the management controls to be implemented and the duration.

3.3 Alternatives

A detailed assessment of alternatives to the approved Quarry was undertaken as part of the original development assessment and approval process and document in the EIS (Umwelt, 2005a).

The key alternative that requires consideration in regard to the proposed modifications is the 'do nothing' alternative, that is, proceeding with the Quarry as currently approved and not proceeding with the proposed modifications. This alternative is not considered desirable as the detailed design process has identified opportunities to optimise the project resulting in operational efficiencies, product quality benefits and both operational and capital cost savings. It is acknowledged that the Quarry could theoretically proceed without the proposed changes, however, the changes provide substantial benefits to Holcim and as demonstrated in **Section 6.0**, they can be undertaken without resulting in significant environmental impacts. In these circumstances, it is considered that the 'do nothing' alternative is not an appropriate alternative.

3.4 Justification for the Proposed Modifications

Since purchasing CEMEX's Australian interests, Holcim has been undertaking a detailed design study to progress the implementation of the project. As part of this process, Holcim has identified opportunities to optimise the site infrastructure and site layout. These optimisations will result in operational efficiencies, product quality benefits and both operational and capital cost savings. These are significant benefits from Holcim's perspective and realising these benefits will allow Holcim to implement the project realising the broader economic benefits discussed below.

As previously documented, (Umwelt, 2005a and 2009), the approved Quarry will provide significant benefits to the local area, region and State of NSW. The Quarry will provide long-term, high quality supply of construction materials into the Sydney local and regional markets. This supply is needed to replace supply from existing quarries that are nearing the end of their resources and is essential for the security and economic viability of the Sydney construction industry. When operating at full capacity the Quarry will also provide direct employment for approximately 115 people, plus additional indirect employment within the local and state communities. These significant benefits of the project were recognised by the NSW Minister for Planning when the project was approved in 2005.

The Quarry will provide major economic benefits in the form of capital expenditure (approximately \$150M), wages (estimated at \$15M in construction wages and \$9M per annum in operational wages), annual operating expenditure, and through payment of State and Commonwealth taxes and fees.

The Lynwood Quarry EIS (Umwelt, 2005a) also identified that, during the preparation of the EIS (Umwelt, 2005a), the Quarry had the strong support of the local community, with approximately 80% of respondents to a random phone survey approving of the proposal and the majority of respondents (79%) indicating that they believed that the benefits the Quarry would bring to the area would outweigh any of the disadvantages. Holcim's ongoing consultation with the local community since this time, including consultation for this modification has continued to reinforce the community's strong interest in and support for the Quarry.

The proposed modifications to the Quarry will not change any of the benefits of the Quarry as identified in the EIS (Umwelt, 2005a) and SEE (Umwelt, 2009a), and as demonstrated in this EA, will not result in significant environmental impact.

4.0 Stakeholder Consultation and Identification of Key Environmental Issues

This section outlines the consultation undertaken and the key issues identified.

4.1 Stakeholder Consultation

Extensive consultation with the community, government authorities and other relevant stakeholders has been undertaken throughout the planning and assessment process for the project since 2005. The consultation program has continued throughout the design and project implementation process, aiming to inform stakeholders about the project and provide opportunities for feedback. Specifically for this proposed modification an engagement program has been undertaken to inform stakeholders about the project, obtain their views and identify any issues of concern to be investigated and addressed.

The consultation program for the proposed modification included the distribution of two community newsletters. Consultation was also undertaken with representatives of the local Aboriginal community as part of the Aboriginal archaeological and cultural heritage assessment process.

In addition, government authority consultation has been undertaken including meetings with the Department of Planning (DoP), meetings with Goulburn Mulwaree Council, meetings and consultation with other relevant government agencies and correspondence with the Department of Environment, Climate Change and Water (DECCW) regarding the planned approach to Aboriginal stakeholder consultation and the archaeological survey methodology.

The details of the consultation program are outlined below, with an outline of the issues identified though the consultation program contained in **Section 4.2**.

4.1.1 Authority Consultation

Since the approval of the Quarry in 2005, ongoing consultation with relevant government agencies has been undertaken as part of the project implementation process (refer to **Section 2.1**).

Specifically in regard to the proposed modifications, Holcim met with DoP on 7 June 2010. At this meeting, Holcim presented an overview of the status of the Quarry development, the proposed modifications, planned approval path and approach to the environmental assessment.

A letter was forwarded to DECCW on 23 June 2010 in relation to the Aboriginal Archaeology Assessment for the proposed modifications. The letter outlined the approach to stakeholder consultation and the proposed survey methodology. The letter also indicated that Holcim would seek to vary the existing AHIP 1100264 to include the additional areas impacted as part of this modification and any additional salvage/management requirements, should the proposed modification be approved.

A meeting was also held with the RTA regarding construction access routes on 14 July 2010. At this meeting, alternate construction access routes were discussed following the RTA's recent closure of the Hume Highway cross-median intersection at Portland Avenue which was planned to be used for construction traffic. Alternatives were discussed and further detail is provided in **Section 3.0**.

Discussions were also held with the DECCW NSW Office of Water regarding the status of approvals under the *Water Management Act 2000* and the changes to the water management system design resulting from the proposed modifications.

Consultation with the relevant government agencies during the preparation of the EA enabled key authority issues to be identified and the approach to the planning and approval process to be refined to ensure these issues to be appropriately addressed. A summary of the issues raised during the consultation process is outlined in **Section 4.2**.

4.1.2 Community Consultation

Holcim is committed to being an integral part of the Marulan community and has continued to consult with the local community regarding the Quarry since 2005. A community involvement program has been implemented for the Quarry by Holcim and has included:

- ongoing consultation with the local community regarding the status of the Quarry which has involved the delivery of periodic newsletters to Marulan and surrounding areas;
- a community open day and a community presentation being held as part of the historical heritage investigations undertaken in the Old Marulan State Heritage Register area. As part of this investigation process there has been ongoing consultation with the Marulan Historical Society;
- a sponsorship program which has included supporting Marulan Public School for projects such as sponsoring a gymnastics program for all students, purchase of a school notice board, purchase of 12 laptop computers and providing new storage areas for school equipment; and
- ongoing consultation with the registered Aboriginal stakeholders for the Quarry, including the implementation of the Cultural Heritage Management Committee.

The key mechanism used for stakeholder involvement in relation to the proposed modifications included the distribution a newsletter to the Marulan community and surrounds. The newsletter, attached as **Appendix 2**, provided details of the approved Quarry Project, the proposed modifications, consultation process and how the community can be involved in the approvals process. The newsletters also included a feedback form and an enclosed reply paid envelope was also provided so that community members could provide any feedback to Holcim. The feedback forms also included options for community members to nominate their preferred approach to consultation, including face to face meetings. Detail of feedback received to date is outlined in **Section 4.1.2.1** below. A further community newsletter will be distributed outlining the finding of this EA and providing further opportunities for feedback. Through this consultation process, it is considered that Holcim has provided an opportunity for all relevant community stakeholders to participate in the community consultation program for the proposed modification. Ongoing opportunities for community involvement will be provided throughout the construction and operation of the Quarry including through the establishment of the CCC as per condition 9 of Schedule 5 of the Consent.

4.1.2.1 Community Feedback

To date, seven responses have been received on the feedback forms provided by Holcim in relation to the community newsletter distributed regarding the proposed modifications, four responses have been received by phone and one letter has been received from the Marulan & District Historical Society. A summary of this feedback is provided below:

- generally, the local community is very supportive of the Quarry, recognising the employment opportunities that it provides and the benefits of the interchange at South Marulan, examples are quoted below;

“Access to and from Marulan would please many travelling along Jerrara Road from Burgonia and further south as well as Marulan residents after RTA closed southern egress. 80 speed limit on South Marulan and Jerrara Roads would also help”; and

“I think it would be good for Marulan to enhance job opportunities, for the community to grow and new families move to the local community”.

- three residents have raised concerns relating to noise, air quality and traffic impacts associated with the Quarry, examples are quoted below; and

“Will you be adding to the already heavy truck traffic on Brayton Road, residential end?; and

“...I was against the quarry the same as the Gunlake quarry as I think it is hard for people who live nearby having noise & dust around them...”

- the Marulan & District Historical Society has requested more information in relation to the archaeological dig undertaken in 2007 in the Old Marulan Town as part of the Hume Highway interchange investigations. As discussed in **Section 6.1**, the proposed modifications will not result in any changes to the impacts of the project on historic heritage values.

4.1.3 Other Stakeholder Consultation

A number of service providers who have infrastructure within or in close proximity to the Project Area have been consulted with during the Quarry implementation process. Providers consulted include Country Energy, ARTC and APA Group (which has assets formerly owned by AGL). Ongoing consultation will be undertaken with these stakeholders as the project progresses into the construction and operational phases.

4.2 Issues Raised by Stakeholders

Identification of the key environmental issues assessed in this EA is based on consideration of:

- the requirements of the relevant State Government agencies (refer to **Section 4.1.1**);
- community consultation and other stakeholder consultation (refer to **Sections 4.1.2 and 4.1.3**); and
- the planning and environmental context for the proposed modifications (refer to **Sections 5.0 and 6.0**).

The consultation undertaken by Holcim with the relevant Government agencies did not identify any specific issues to be addressed in the EA beyond those identified in the scoping process for the EA. As outlined in **Section 4.1.2.1**, the community feedback received for the proposed modifications has generally been positive, although the following key issues have been identified as part of this process to date:

- noise (addressed in **Section 6.6**);

- air quality (addressed in **Section 6.5**);
- traffic (addressed in **Section 6.9**); and
- historic heritage (addressed in **Section 6.1**).

5.0 Planning Context

The following section contains details of the relevant Commonwealth and State planning provisions and a discussion of the application of these planning provisions to the proposed modifications.

5.1 Commonwealth Legislation

5.1.1 Environment Protection and Biodiversity Conservation Act 1999

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), approval of the Commonwealth Minister for the Environment, Heritage, Water and the Arts is required for any action that may have a significant impact on matters of national environmental significance. These matters are:

- World Heritage properties;
- National Heritage Places;
- Ramsar wetlands;
- Cetaceans, migratory species, threatened species, critical habitats or ecological communities listed in the EPBC Act;
- Commonwealth land, marine areas or reserves; and
- Nuclear actions.

The only provisions of this legislation, which are potentially relevant to the proposed modifications, relate to potential impacts on migratory species, threatened species, or ecological communities listed under the EPBC Act. As outlined in **Section 3.0**, the proposed modifications will result in a small change to the approved disturbance footprint, resulting in an additional area of approximately 10.5 hectares being impacted. An ecological assessment has been undertaken for the proposed modifications including an assessment of potential impacts on matters of national environmental significance (refer to **Section 6.1** and **Appendix 3**). The ecological assessment found that the proposed modifications will not impact on migratory species, threatened species, or ecological communities listed under the EPBC Act and the approval of the Commonwealth Minister for the Environment, Heritage, Water and the Arts is not required.

5.1.2 Native Title Act 1993

The *Native Title Act 1993* (NT Act) is administered by the National Native Title Tribunal. The Tribunal is responsible for maintaining a register of native title claimants and bodies to whom native title rights have been granted. The NT Act prescribes that native title can be extinguished under certain circumstances, including the granting of freehold land. Areas of land within the Project Area where native title may not have been extinguished include public road reserves and Crown land.

A native title claim over the Marulan area, including the land within the Project Area, was lodged in 1997 by the Gundungurra Tribal Council Aboriginal Corporation. The notification of the claim is complete and it is currently subject to mediation. Accordingly, the appropriate processes under the NT Act in relation to the project must be undertaken so that Holcim

complies with the requirements of the Act in regard to any impacts on Crown land. The appropriate processes relating to Native Title have been followed in regard to the closure of Crown roads already completed for the Quarry.

5.2 State Legislation

5.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is administered by DoP and by local government. It is the primary legislation governing environmental planning and assessment for NSW.

The objectives of the EP&A Act relevant to the project encourage:

- the proper management, development and conservation of natural and artificial resources;
- the promotion and co-ordination of the orderly and economic use and development of land;
- the protection of the environment; and
- ecologically sustainable development.

Holcim is seeking to modify development consent DA 128-5-2005 under section 75W of the EP&A Act. The original consent, classified as a State Significant Development, was granted under Part 4 of the EP&A Act in May 2005. The Quarry was classified as a State Significant Development due to a declaration by the then Minister for Infrastructure and Planning on 3 August 1999. This declaration provided that extractive industries which include a total resource greater than 5 million tonnes and/or a proposed extraction rate greater than 200,000 tonnes per annum, are to be considered as State Significant Development

Because the original consent was deemed a State Significant Development and granted under Part 4 of the EPA&A Act, section 75W of the EP&A Act is available to modify DA 128-5-2005 pursuant to Clause 8(J)(8) of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), as outlined below.

8(J)(8) For the purposes only of modification, the following development consents are taken to be approvals under Part 3A of the Act and section 75W of the Act applies to any modification of such a consent:

- (a) ...
- (b) ...
- (c) *a development consent granted by the Minister under Division 4 of Part 4 of the Act (relating to State significant development) before 1 August 2005 or under clause 89 of Schedule 6 to the Act,*
- (d) ...

The development consent, if so modified, does not become an approval under Part 3A of the Act.

Clause 89 of Schedule 6 of the Act is as follows:

89 *State significant development matters*

- (1) *If a development application for State significant development is pending on the commencement of Part 3A of this Act, the application is to be determined (unless withdrawn by the applicant) as if the amendments made to this Act by Schedule 1 to the 2005 Amending Act had not been made.*

Therefore, based on the provisions of Clause 89 of the EP&A Act and Clause 8(J)(8) of the EP&A Regulation, the proposed modifications may be approved under Section 75W of the EP&A Act. The Minister for Planning is the determining authority for the proposed modification.

5.2.2 Permissibility

As outlined in **Section 5.5** extractive industries are permissible under the zonings that apply to the majority of the Project Area, however, they are not permissible under one zoning (IN2 Light Industrial). As discussed in **Section 5.3.1**, under the provisions of the Mining, Petroleum Production and Extractive Industries State Environmental Planning Policy 2007 (Extractive Industries SEPP) extractive industries are permissible in the area zoned IN2 with development consent. Therefore, the proposed modifications are permissible.

5.2.3 Summary of Other State Legislation

A summary of the other State Acts potentially applicable to the proposed modifications is included in **Table 4.1**, including an indication of which additional approvals will be required..

Table 4.1 - Summary of Other State Legislation

Act	Specific Approval Required for Proposed Modifications	Comments
<i>Protection of the Environment Operations Act 1997</i>	Yes	Holcim has obtained an Environment Protection Licence (EPL) for the Quarry. Should the proposed modifications be approved, the EPL will need to be modified to accommodate the proposed changes.
<i>Water Management Act 2000</i>	Yes	Approvals under Part 3A of the former <i>Rivers and Foreshores Improvement Act 1948</i> have been obtained for works within riparian zones. These permits remain in place, however, as a result of the proposed modifications, the nature of the works within the riparian zone of Joarimin Creek has changed and a Controlled Activity Approval under the <i>Water Management Act 2000</i> will be required for these works.
<i>Water Act 1912</i>	Yes	A Part 5 licence is required for the quarry pit. The Part 5 licence will need to be obtained for the revised quarry pit layout.
<i>Fisheries Management Act 1994</i>	No	A permit under this Act is not required as a Controlled Activity Approval will be obtained under the <i>Water Management Act 2000</i> for all works within creeks and therefore an approval under the Act is not required.
<i>National Parks and Wildlife Act 1974</i>	Yes	The Aboriginal Heritage Impact Permit (AHIP) (#1100267) currently held for the Quarry will be subject to a variation to include the additional disturbance footprint and any additional salvage/management requirements as a result of the proposed modifications (refer to Section 6.2 and Appendix 4).

Table 4.1 - Summary of Other State Legislation (cont)

Act	Specific Approval Required for Proposed Modifications	Comments
<i>Threatened Species Conservation Act 1995</i>	No	A licence under this Act is not required for any activity undertaken in accordance with a development consent granted under the EP&A Act. The ecological assessment completed for the proposed modifications has identified that the proposed modifications will not result in a significant impact on any threatened species, populations or communities (refer to Section 6.1 and Appendix 3).
<i>Roads Act 1993</i>	No	The <i>Roads Act 1993</i> determines the rights of the public and adjacent land owners to use public roads, and establishes procedures for the opening and closing of public roads. Under the Act applications are required to be made to the Minister for Lands for the closure of Crown roads and for works in public road reserves. Holcim has applied for the closure of the public road within the Project Area, which has been approved with the purchase of this land currently being progressed. Therefore, no approval under Section 138 will be required from Goulburn Mulwaree Council for the proposed modifications. A number of Crown roads within the Project Area have been closed to date as part of the implementation process for the project.
<i>Crown Lands Act 1989</i>	No	The proposed modifications will not result in any additional requirements under this Act. Holcim has substantially progressed the approvals required for the Project under this Act.
<i>Heritage Act 1977</i>	No	The proposed modifications will not impact on known heritage sites and therefore, there will be no additional permit requirements related to this Act beyond those associated with the currently approved Project and which are substantially progressed.
<i>Dams Safety Act 1978</i>	Yes	As outlined in the Lynwood Quarry EIS, a number of dams will be constructed as part of the Quarry. Some changes to the design and location of Dam E may occur as part of the proposed modifications. Holcim will consult with the Dams Safety Committee to confirm whether or not any of the dams will be prescribed dams (refer to Section 2.1).
<i>Native Vegetation Act 2003</i>	No	The provisions of this Act do not apply to any activity undertaken in accordance with a DA granted for designated development under the EP&A Act and therefore do not apply to the proposed modifications.
<i>Aboriginal Land Rights Act 1983</i>	No	Holcim is not aware of any land rights claims made over the Crown land within the Project Area at the time of preparation of this EA. Therefore Part 6 of the Act is not relevant to this assessment.

Table 4.1 - Summary of Other State Legislation (cont)

Act	Specific Approval Required for Proposed Modifications	Comments
<i>Environmentally Hazardous Chemicals Act 1985</i>	No	Holcim does not propose to store, transport or use any chemicals currently subject to a Chemical Control Order (CCO) under this Act. Should such chemicals be required during the life of the Project, Holcim Australia will manage the chemicals in accordance with the relevant CCO, including obtaining any appropriate licences.

As indicated in **Table 4.1**, in addition to approval under Section 75W of the EP&A Act, the following approvals will be required for the proposed modifications:

- a licence variation to the existing EPL under the *Protection of the Environment Operations Act 1997*;
- a Controlled Activity Approval under the *Water Management Act 2000*;
- a Part 5 licence under the *Water Act 1912* for the revised quarry pit;
- prior to disturbing land for the purpose of discovering an Aboriginal object it will be necessary to obtain a variation to the Section 87 AHIP (#1100267) from DECCW for the proposed modifications; and
- approval under the *Dams Safety Act 1978* for the proposed site dams, if required following consultation with the Dams Safety Committee.

5.3 State Environmental Planning Policies

State Environmental Planning Policies (SEPPs) are environmental planning instruments created by the State government. The SEPPs that are potentially relevant to the proposed modifications are discussed in the following sections.

5.3.1 SEPP Mining, Petroleum Production and Extractive Industries (Extractive Industries SEPP)

The Extractive Industries SEPP was gazetted in February 2007. The SEPP outlines where various extractive industries activities are permissible both with and without development consent. The SEPP also defines mining, petroleum production and extractive industries developments that are prohibited, exempt or complying developments. The SEPP identifies that extractive industries are permissible with development consent on land for which development for the purposes of agriculture or industry may be carried out (with or without development consent).

As discussed in **Section 5.5.1**, the Project Area is subject to four zonings under the Goulburn Mulwaree Local Environmental Plan (LEP), with extractive industries permissible with development consent in three of the four zones. Agriculture is permissible in all four zones, under the provisions of the *Goulburn Mulwaree Local Environmental Plan 2009*, and therefore under the provisions of the Extractive Industries SEPP the project is permissible.

5.3.2 SEPP 44 - Koala Habitat Protection

SEPP No. 44 – Koala Habitat Protection applies to the extent that a consent authority is restricted from granting development consent for proposals on land identified as core koala habitat, without the preparation of a plan of management. The EIS (Umwelt, 2005a) identified that there is no core koala habitat in the Project Area and this assessment has not changed that finding. Therefore the provisions of this SEPP do not apply.

5.3.3 SEPP 33 – Hazardous and Offensive Development

SEPP No. 33 – Hazardous and Offensive Development requires the consent authority to consider whether an industrial proposal is a potentially hazardous industry or a potentially offensive industry. The aim of this policy is to link the permissibility of a proposal to its safety and pollution control performance. The assessment process establishes whether the proposal is potentially hazardous or offensive and if this is not the case, SEPP 33 is not applicable.

The Quarry was determined, as part of the Lynwood Quarry EIS and approval process, not to be a hazardous or offensive development. As the key elements of the Quarry remain unchanged, and the nature and components of the proposed modifications do not result in significant environmental impact, the proposed modifications will not change this assessment.

5.3.4 SEPP 55 – Remediation of Land

SEPP No. 55 – Remediation of Land aims to provide a state wide planning approach to the remediation of contaminated land, and to reduce the risk of harm to human health and the environment, by consideration of contaminated land as part of the planning process. Under the SEPP, a consent authority must not consent to the carrying out of development on land unless it has considered potential contamination issues.

As identified in the EIS (Umwelt, 2005a), there are no known areas of contaminated land within the Project Area, with the past use primarily limited to agricultural purposes, resulting in a limited potential for contaminated areas to occur. This finding has not changed since this time. The portion of the land leased from Holcim by Orica Explosives was subject to a detailed development assessment process (including development of an EIS) prior to the establishment of the facility and therefore measures are in place to ensure contamination does not occur. There will be no impact on this portion of the land as part of the proposed modifications.

Based on the above, there are no known areas of contaminated land within the Project Area and SEPP 55 does not place any constraints on the proposed modifications.

5.3.5 Drinking Water Catchments Regional Environmental Plan No. 1

The Project Area lies within the catchments of Joarimin, Lockyersleigh and Marulan Creeks. Joarimin and Lockyersleigh Creeks drain to the Wollondilly River which is part of the Warragamba Dam catchment area, forming part of Sydney's drinking water supply. Marulan Creek is part of the Shoalhaven River system which also contributes to Sydney's drinking water supplies. As the Project Area falls within the drinking water supply catchments for Sydney, the Project must consider the Drinking Water Catchments Regional Environmental Plan No. 1 (REP), which from 1 July 2009 is to be taken to be a SEPP in accordance with Clause 120 of Schedule 6 of the EP&A Act relating to 'Continuation in force of existing SEPPs and REPs'. The aims of the SEPP are to create healthy water catchments that will deliver high quality water while sustaining diverse and prosperous communities. The SEPP

requires developments to demonstrate that they will have a neutral or beneficial effect on water quality. The Lynwood Quarry EIS and 2009 SEE demonstrated that the approved Quarry would have a neutral or beneficial effect on water quality. As the nature of the Quarry, key components, development approach and key components of the water management system have not changed, this assessment remains valid. However, the potential impacts of the proposed modifications on surface waters, especially in relation to the minor proposed increase (approximately 1% increase) to the disturbance footprint, have been assessed and are provided in **Section 6.3**. This assessment concludes that the proposed increase to the disturbance footprint will not result in any change to the Quarry's impact on water quality and that the modified Quarry project will comply with the neutral or beneficial effect test as specified in the REP.

5.4 Sydney to Canberra Corridor Strategy

This Strategy was updated and republished by DoP in 2008 (DoP, 2008). It outlines the broad strategic future planning direction for the land corridor along the Hume and Federal Highways. The Strategy is not detailed as it focuses on providing a development framework for those with planning responsibilities in the corridor. The approved Quarry is located within this corridor.

The Strategy has a number of key objectives relating to encouraging population and developing a major regional centre for the corridor. It also has a key objective of fostering local economic development and employment growth and maximising local employment opportunities to decrease reliance on commuting, provided that development is compatible with environmental considerations.

The Strategy also identifies the economic importance of minerals and extractive resources in the corridor and recommends that steps should be taken to ensure that these resources are not sterilised by competing land uses. The extractive resources are identified as a key strategic economic resource for the region and Sydney.

The approved Quarry is compatible with the aims and objectives of the Strategy and the proposed modifications do not affect this outcome. The Quarry will provide economic benefits and employment opportunities in the region and will be managed with due consideration for potential environmental impacts. The approved Quarry, with the proposed modifications will not adversely impact surrounding land uses.

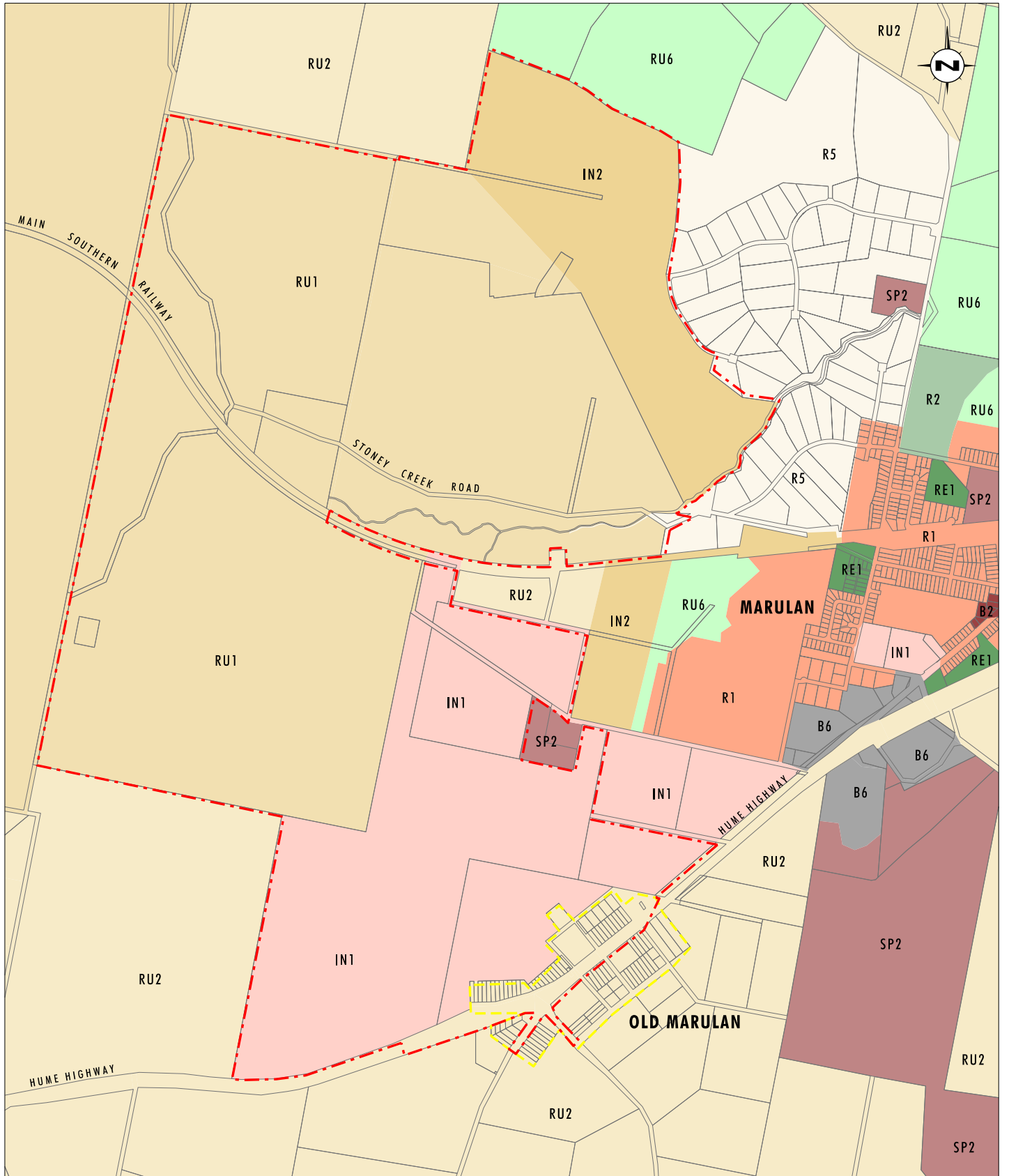
5.5 Local Planning

5.5.1 Goulburn Mulwaree Local Environmental Plan 2009

The local environmental planning instrument relevant to the proposed modifications is the *Goulburn Mulwaree Local Environmental Plan 2009* (LEP). The LEP was gazetted on Friday 20 February 2009 and applies to the Goulburn Mulwaree local government area (LGA).

The zonings that apply to the Project Area has changed due to the implementation of the Goulburn Mulwaree LEP 2009 (refer to **Figure 5.1**) compared to the zonings that applied to the site in 2005 when it was originally approved. There are now four zones in which the Project Area falls:

- RU1 – Primary Production;
- RU2 – Rural Landscape;



Source: Mulwaree Shire Council, 1995
Base Source: LPI 2004

0 0.5 1 1.25km
1:25 000

Legend

- - - Project Area
- - - SHR Boundary Old Marulan Township
- Infrastructure
- Transition
- Rural Landscape
- Primary Production
- Public Recreation
- R5 Large Lot Residential
- R2 Low Density Residential
- R1 General Residential
- IN2 Light Industrial
- IN1 General Industrial
- B6 Enterprise Corridor
- B2 Local Centre

FIGURE 5.1
Zoning

- IN1 – General Industrial; and
- IN2 – Light Industrial.

The majority of land subject to quarrying and associated activities as part of the project is zoned RU1 (refer to **Figure 5.1**). Extractive industries are permissible within three of the four zones, RU1, RU2 and IN1, with development consent. Extractive industries are however prohibited under the LEP within the zone IN2.

The permissibility provisions of SEPP (Mining, Petroleum Production and Extractive Industries) 2007 (Extractive Industries SEPP) are also relevant to this Project. The Extractive Industries SEPP specifies that '*extractive industry on land on which development for the purposes of agriculture or industry may be carried out (with or without development consent)*'. Consequently, the proposed modifications are permissible with development consent in zone IN2 under the provisions of the Extractive Industries SEPP as agriculture is permitted in zone IN2, and it is therefore the proposed modifications are permissible with development consent.

6.0 Environmental Assessment

6.1 Preliminary Environmental Assessment

As discussed in **Section 3.0**, the proposed modifications do not result to significant changes to the approved project. A preliminary environmental assessment was therefore completed for the proposed modifications to identify the environmental aspects which could potentially be impacted as a result of the proposed modifications and which required further detailed assessment as part of this EA. The findings of the preliminary environmental assessment are provided in **Table 6.1**, with reference to each of the environmental aspects potentially relevant to the project.

Table 6.1 – Potential Environmental Impacts associated with the Proposed Modifications

Environmental Aspect	Preliminary Environmental Assessment	Further Assessment Required for Proposed Modifications?
Soils, land capability and agricultural suitability	The proposed modifications will result in a slight increase (approximately 1% of the approved disturbance area) to the approved disturbance footprint of approximately 10.5 hectares. Therefore, there potentially could be impacts associated with the proposed modifications on soils, land capability and agricultural suitability for this additional area. Soil erosion issues are addressed as part of the surface water assessment.	Yes, refer to Sections 6.10 and 6.4 .
Topography	The nature of impact of the Project on the existing topography will not change substantially from the currently approved Project. The only changes associated with the proposed modifications relate to a slight change in the western edge of the western excess product emplacement area and minor changes to the constructed landform within the infrastructure areas and initial pit development. These changes do not change the impact assessment findings as outlined in the EIS (Umwelt, 2005a) and SEE (Umwelt, 2009a).	No
Land use	The proposed modifications will not result in any change to the nature of the Quarry and the final land use. Therefore, the impact of the proposed modifications on land use will not change.	No
Public infrastructure	The proposed modifications will not result in significant changes to the interaction of the Quarry with public infrastructure, as: <ul style="list-style-type: none"> • there are no changes to impacts on services and service infrastructure requirements; • there will be only minor changes to rail transport arrangements; and • the change in location of the conveyor over the Main Southern Railway does not alter its interaction with rail traffic. 	Refer to Section 6.9 for discussion of minor changes to rail movements
Traffic	Due to road closures undertaken by the RTA the construction phase access to the site needs to be revised.	Yes. Refer to Section 6.9

Table 6.1 – Potential Environmental Impacts associated with the Proposed Modifications (cont)

Environmental Aspect	Preliminary Environmental Assessment	Further Assessment Required for Proposed Modifications?
Groundwater	The location and maximum depth of the quarry pit have not changed from that currently approved and will not change the impact on groundwater. The potential for the proposed modifications to impact on groundwater otherwise remains unchanged.	No
Surface Water	The proposed modifications will result in minor changes to the interaction of the project with surface waters.	Yes, refer to Section 6.4
Ecology	The proposed modifications will result in an increase of approximately 10.5 hectares to the approved disturbance footprint (approximately 1% of the approved disturbance area). Therefore, the potential impact of the proposed modifications on the ecological values of this additional area has been assessed.	Yes, refer to Section 6.2
Air Quality	The changes in initial quarry pit development and the proposed changes to the infrastructure layout have the potential to change the air quality impacts of the Quarry.	Yes, refer to Section 6.5
Noise	The changes in initial quarry pit development and the proposed changes to the infrastructure layout have the potential to change the noise impacts of the Quarry.	Yes, refer to Section 6.6
Blasting	There will be no change in blasting impacts as a result of the proposed modifications as the location of the quarry pit has not changed and there are no changes proposed to blasting practice.	No
Aboriginal Archaeology	The proposed modifications will result in an additional disturbance footprint of approximately 10.5 hectares (approximately 1% of the approved disturbance area). Therefore, the potential impacts of the proposed modifications on Aboriginal archaeology have been assessed.	Yes, refer to Section 6.3
Historical Heritage	Although the proposed modifications will result in an additional disturbance footprint of approximately 10.5 hectares no impact on heritage sites will result from the proposed modifications.	No
Visual Amenity	The relocation of Quarry infrastructure has minimal potential to alter the visual impacts of the Quarry, however, some minor changes will occur.	Yes, refer to Section 6.7
Hazard	As discussed in Section 5.3.3 , the approved Quarry was determined as part of the original environmental assessment and approval process to not be a hazardous or offensive development. As the nature and components of the Project are not proposed to change as a result of the proposed modifications, the proposed modifications will not change this assessment outcome.	No
Greenhouse Gas and Energy	The proposed modifications are not considered to have the potential to significantly change the energy use or greenhouse gas emissions of the Quarry. However, further discussion regarding this issue is provided in Section 6.8 .	Yes, refer to Section 6.9

Table 6.1 – Potential Environmental Impacts associated with the Proposed Modifications (cont)

Environmental Aspect	Preliminary Environmental Assessment	Further Assessment Required for Proposed Modifications?
Rehabilitation	Rehabilitation of the Quarry will remain generally consistent with that currently approved, however, the change in design of Quarry infrastructure, the small increase in disturbance footprint and the slight change to the western excess product emplacement area will result in some minor changes.	Yes, refer to Section 6.11
Socio-economic Assessment	The socio-economic impacts of the Quarry will remain substantially unchanged, however, as the amenity aspects of the Quarry have some potential to change, the socio-economic impacts have been reassessed.	Yes, refer to Section 6.12

As indicated in **Table 4.1**, the following environmental aspects require further assessment in relation to the proposed modifications:

- ecology – refer to **Section 6.2**;
- Aboriginal archaeology – refer to **Section 6.3**;
- surface water – refer to **Section 6.4**;
- air quality – refer to **Section 6.5**;
- noise – refer to **Section 6.6**;
- visual amenity – refer to **Section 6.7**;
- greenhouse gas and energy – refer to **Section 6.8**;
- traffic – refer to **Section 6.9**;
- soils, land capability and agricultural suitability – refer to **Section 6.10**;
- rehabilitation – refer to **Section 6.11**; and
- socio-economic – refer to **Section 6.12**.

The key environmental assessment aspects identified in **Section 4.2** as an outcome of the consultation process for the proposed modifications are also addressed in the sections as indicated above.

6.2 Ecological Assessment

An ecological assessment was undertaken for the proposed modifications to ensure that any changes to the approved disturbance footprint, and changes to listings of threatened species, populations and communities, since the original assessment are appropriately addressed. This ecological assessment assesses the ecological impacts on areas outside the approved disturbance footprint which will be impacted by the proposed modifications (hereafter

referred to as the Study Area). The Study Area includes three isolated patches of land totalling approximately 10.5 hectares within the Project Area. These areas collectively make up the proposed changes to the approved disturbance footprint.

6.2.1 Survey Methodology

Literature Review

Prior to commencement of field surveys a review of all relevant and available literature was undertaken in order to gain a greater understanding of the ecological values of the Study Area and the locality. These included:

- searches of the DECCW Atlas of NSW Wildlife Database for listed flora and fauna species recorded (or with potential to occur) within a 10 kilometre radius of the study area;
- searches of the Department of Environment, Water, Heritage and the Arts (DEWHA) Protected Matters Database for listed flora and fauna species recorded (or with potential to occur) within a 10 kilometre radius of the study area; and
- information from previous ecological reports prepared by Umwelt for Holcim in 2005 (Umwelt, 2005b) and Country Energy in 2006 (Umwelt, 2006a) and 2007 (Umwelt, 2007b), to develop field methods, and to contribute to the impact assessment.

Field Survey

The Study Area for the proposed modifications was part of the ecological survey and assessment area assessed in the EIS (Umwelt, 2005b). However, for the proposed modifications, a field survey was undertaken on 18 June 2010 to update the field studies that were conducted previously by Umwelt (2005b), to ensure that any changes to the site, and changes to listings of threatened species, populations and communities, are appropriately addressed. The key objectives of field survey were to:

- identify, map and describe the vegetation communities occurring within the Study Area, with specific focus on potentially occurring threatened ecological communities (TECs);
- undertake opportunistic fauna observations and assess the quality of the fauna habitats present within the Study Area;
- identify if the Study Area supports, or has the potential to support, habitat for any threatened species, endangered populations or TECs listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act), NSW *Fisheries Management Act 1994* (FM Act) and the EPBC Act; and
- develop a flora and fauna species list to reflect the species diversity of the Study Area.

6.2.2 Survey Results

The Study Area is comprised of cleared pastureland, a small area of scattered trees, an ephemeral drainage line and a dam. The southern end of the modified disturbance footprint includes a Country Energy access road that traverses through pastureland. The Study Area has been historically used for agricultural activities which have resulted in heavily modified pastureland and a high level of degradation. Grazing has been widespread across the Study Area and has resulted in extreme modification of the species assemblage of the area.

Flora Species

Flora species recorded during the field surveys consisted mainly of exotic grasses, in particular serrated tussock (*Nassella trichotoma*), which comprised approximately 80 per cent of the total cover. **Table 6.2** lists all flora species recorded during the survey. The Study Area primarily comprised a mix of native and exotic Poaceae species. It should be noted that the Study Area has been highly modified and few species could be identified during the field surveys due to heavy grazing. Other species are highly likely to be present, however they were undetectable at the time of survey due to cool-season growth inactivity.

All vascular plants recorded or collected were identified using keys and nomenclature in Harden (1992, 1993, 2000 & 2002). Where known, changes to nomenclature and classification have been incorporated into the results, as derived from *PlantNET* (Botanic Gardens Trust 2010), the on-line plant name database maintained by the National Herbarium of NSW. Additional resources in Eddy *et al* (1998) and Lunt, Barlow and Ross (1998) were also used.

Table 6.2 – Flora Species Recorded during Field Surveys

Family/Subfamily	Scientific Name	Common Name
Magnoliopsida (Flowering Plants) – Liliidae (Monocots)		
Cyperaceae	* <i>Cyperus eragrostis</i>	umbrella sedge
Juncaceae	<i>Juncus continuus</i>	a rush
Poaceae	<i>Austrodanthonia racemosa</i> var. <i>racemosa</i>	a wallaby grass
Poaceae	<i>Austrostipa scabra</i>	speargrass
Poaceae	<i>Cynodon dactylon</i>	common couch
Poaceae	<i>Dichelachne micrantha</i>	shorthair plumegrass
Poaceae	* <i>Eleusine tristachya</i>	goose grass
Poaceae	<i>Entolasia stricta</i>	wiry panic
Poaceae	* <i>Nassella trichotoma</i>	serrated tussock
Poaceae	<i>Panicum effusum</i>	poison or hairy panic
Poaceae	* <i>Pennisetum clandestinum</i>	kikuyu grass
Poaceae	* <i>Phalaris aquatica</i>	phalaris
Poaceae	* <i>Vulpia bromoides</i>	squirrel tail fescue
Magnoliopsida (Flowering Plants) – Magnoliidae (Dicots)		
Apiaceae	<i>Hydrocotyle laxiflora</i>	stinking pennywort
Asteraceae	* <i>Hypochaeris radicata</i>	catsear
Asteraceae	* <i>Senecio madagascariensis</i>	fireweed
Fabaceae (Mimosoideae)	<i>Acacia decurrens</i>	black wattle, green wattle
Fabaceae (Faboideae)	* <i>Trifolium repens</i>	white clover
Myrtaceae	<i>Eucalyptus cinerea</i>	Argyle apple
Myrtaceae	<i>Eucalyptus rossii</i>	inland scribbly gum

Note: * denotes species not native to the Study Area.

Vegetation Communities

The vegetation communities in the Study Area have been heavily modified by past and ongoing agricultural activities which have resulted in a high level of degradation. Grazing has been widespread across the Study Area and has resulted in extreme modification of the species assemblage of the area.

Three vegetation communities were identified within the Study Area during the field surveys undertaken for this assessment. These are described below. The distribution of vegetation communities within the Study Area is shown on **Figure 6.1**.

Derived Pasture

The majority of the Study Area is covered by a pasture derived from the previous clearing of forest and woodland vegetation. It varies in structure and composition depending on grazing history. In general, the derived pasture is dominated by a mix of exotic and native species, although in the majority of the Study Area, where active grazing occurs, exotic species dominate in terms of their cover. The Study Area was primarily dominated by the exotic serrated tussock (*Nassella trichotoma*) and goose grass (*Eleusine tristachya*). Other common pasture species include the exotic fireweed (*Senecio madagascariensis*), cat's ear (*Hypochaeris radicata*), squirrel tail fescue (*Vulpia bromoides*), white clover (*Trifolium repens*), kikuyu (*Pennisetum clandestinum*), phalaris (*Phalaris aquatica*), and the native wallaby grass (*Austrodanthonia racemosa* var. *racemosa*) and speargrass (*Austrostipa scabra*).

Tableland Low Woodland

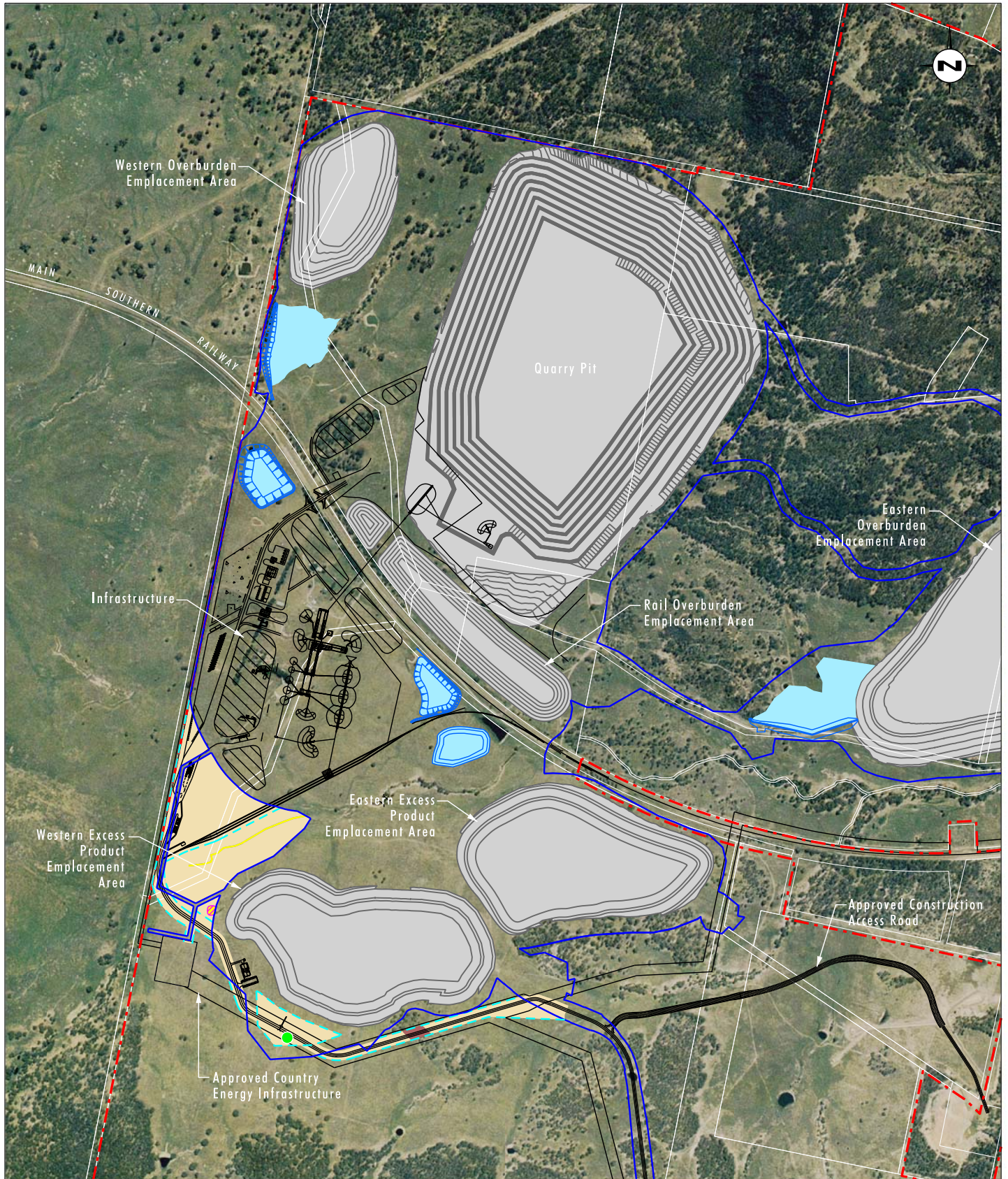
Tableland Low Woodland occurs adjacent to the main access road within the Study Area. The community contains a small stand of mature eucalypts comprising of Argyle apple (*Eucalyptus cinerea*) and inland scribbly gum (*E. rossii*). This community had no understorey vegetation and the groundcover was primarily dominated by a mix of native and exotic species including serrated tussock, common couch (*Cynodon dactylon*) wallaby grass and wiry panic (*Entolasia stricta*).

This community is likely to be an ecotone between tableland and riparian woodlands within the locality. The community in the Study Area has been highly modified due to previous clearing and heavy grazing activities. Mature stands of eucalypts were sparsely distributed around the existing Country Energy access track within the Study Area indicating previous disturbance and fragmentation of the community within the area.

Aquatic Vegetation

One ephemeral creek (Joarimin Creek), found to be in poor condition, runs through the Study Area. At the time of the field surveys the creek was dry and the aquatic vegetation occurring within and fringing the creek was found to be very species poor due to heavy cattle grazing and trampling. Species identified around this area included the exotic umbrella sedge (*Cyperus eragrostis*), and two native species, being a rush (*Juncus continuus*) and common couch (*Cynodon dactylon*).

The Study Area also contains one artificial dam (a farm dam), to the north of the existing Country Energy substation. The aquatic vegetation occurring within and fringing the dam was found to be very species poor, and very sparsely distributed. This was most likely as a result of stock grazing, for which the dam was established, with cattle having uncontrolled access to the dam. The most common aquatic species observed at the dam was a native rush (*Juncus continuus*).



Source: LPI 2010, Holcim Australia (Aerial Photo March 2005)

0 250 500 750m
1:15 000

Legend

- Project Area
- Approved Disturbance Footprint
- Modified Disturbance Footprint
- Aquatic Vegetation
- Derived Pasture
- Dam or Creek
- Tableland Low Woodland
- Brown Treecreeper

File Name (A4): R19_V1/2238_288.dgn

FIGURE 6.1

Ecological Results within the Study Area

Threatened Flora Species and Endangered Populations

No threatened flora species were identified within the Study Area during the field surveys undertaken for this assessment. A search of the DECCW Atlas of NSW Wildlife Database and DEWHA Protected Matters Database identified 15 threatened flora species that have been previously recorded or have the potential to occur within 10 kilometres of the Study Area (refer to **Table 1** in **Appendix 3.1**).

Camden woollybutt, listed as vulnerable under the TSC Act, was previously recorded in an isolated stand by Umwelt (2005b) just outside the current Study Area and within the footprint of the approved Quarry. At the time of the previous surveys, Camden woollybutt was subject to a preliminary determination under the TSC Act to be listed as a vulnerable species. It was considered likely that this species was either planted on this site, or it colonised in response to a major disturbance event due to its occurrence in one, small, dense stand with straight boundaries (Umwelt 2005b). This was confirmed by DECCW during a site inspection as part of the original development assessment and approval process. The species has since been listed as vulnerable under the TSC Act.

No endangered flora populations were recorded or are expected to occur within the Study Area.

Threatened Ecological Communities

No TECs were recorded within the Study Area during the field surveys undertaken for the proposed modifications to Lynwood Quarry.

Four TECs are known to occur within the region and were identified in the search of the DECCW Atlas of NSW Wildlife Database and DEWHA Protected Matters Database (refer to **Table 2** in **Appendix 3.1**). These include:

- Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory (endangered under the EPBC Act);
- White Box – Yellow Box – Blakeley’s Redgum Woodland and Derived Native Grassland (critically endangered under the EPBC Act and endangered under the TSC Act);
- Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions (endangered under the TSC Act); and
- Tablelands Frost Hollow Grassy Woodlands in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions (preliminary determination to be endangered under the TSC Act).

These TEC’s do not occur within the Study Area due the high domination of exotic grassland species present across the majority of the Study Area. The vegetation within the Study Area is heavily grazed and dominated by introduced species, with little or no canopy species that are characteristic of the species associated with the TECs outlined above.

Fauna Species

Opportunistic observations of local fauna identified a total of 13 vertebrate fauna species within the Study Area (refer to **Table 6.3**). The majority of species recorded were diurnal bird species that utilise the area for foraging.

Birds recorded were identified using descriptions in Pizzey and Knight (2007) and the scientific and common name nomenclature and taxonomy adopted by Birds Australia.

Mammals were identified using descriptions in Menkhorst and Knight (2004). Amphibians recorded were identified using keys and descriptions and the scientific and common name nomenclature of Cogger (2000).

Table 6.3 – Fauna Species Recorded during Field Surveys

Scientific Name	Common Name	Conservation Status	
		TSC Act	EPBC Act
MAMMALS			
Macropodidae			
<i>Macropus giganteus</i>	eastern grey kangaroo	-	-
BIRDS			
Anatidae			
<i>Chenonetta jubata</i>	Australian wood duck	-	-
<i>Anas superciliosa</i>	Pacific black duck	-	-
Artamidae			
<i>Gymnorhina tibicen</i>	Australian magpie	-	-
Cacatuidae			
<i>Cacatua roseicapillus</i>	galah	-	-
<i>Platycercus eximius</i>	eastern rosella	-	-
<i>Psephotus aematonotus</i>	red-rumped parrot	-	-
Climacteridae			
<i>Climacteris picumnus victoriae</i>	brown treecreeper	V	-
Corvidae			
<i>Corvus coronoides</i>	Australian raven	-	-
Meliphagidae			
<i>Manorina melanocephala</i>	noisy miner	-	-
Monarchidae			
<i>Grallina cyanoleuca</i>	magpie-lark	-	-
Sturnidae			
* <i>Sturnus vulgaris</i>	common starling	-	-
AMPHIBIANS			
Myobatrachidae			
<i>Crinia signifera</i>	brown froglet	-	-

Note: asterisk (*) denotes species not indigenous to the project area;

V denotes Vulnerable under the TSC Act or EPBC Act.

Fauna Habitats

Native fauna habitat within the Study Area was minimal due to the highly disturbed nature of the area and the limited amount of understorey and canopy layers within vegetation communities. Limited native fauna habitat occurs within the derived pasture and aquatic areas of the Study Area.

Limited habitat exists for woodland bird species with some occurrences of fallen logs from scattered woodland habitat surrounding the Study Area. Marginal habitat also exists in the Argyle apple and inland scribbly gum stands in the highly modified Tableland Low Woodland community within the Study Area. These trees will be avoided and therefore, will not be

impacted as a result of the proposed modifications. No hollow-bearing trees or suitable nesting habitat is present within the Study Area.

An abundance of foraging habitat within the derived pasture exists for native grazing species such as the eastern grey kangaroo (*Macropus giganteus*) which was recorded in large numbers in the Study Area during the field survey.

Aquatic habitats are limited within the Study Area with one dam and one ephemeral creek (Joarimin Creek) present. These habitats contained sparse emergent vegetation for amphibian and water bird species. The dam would provide suitable habitat for common foraging bird and duck species such as Australian wood duck (*Chenonetta jubata*) and Pacific black duck (*Anas superciliosa*) which were recorded during the field surveys.

Threatened Fauna Species and Endangered Populations

One threatened fauna species, the brown treecreeper (listed as vulnerable under the TSC Act), was recorded within the Study Area during the field surveys undertaken for this assessment. In addition, five threatened fauna species were recorded in the Project Area during the surveys undertaken for the original development assessment and approval process (Umwelt, 2005b), including the squirrel glider, speckled warbler, eastern bentwing-bat, eastern freetail-bat and eastern false pipistrelle. A further 26 species were identified as being previously recorded or having the potential to occur within 10 kilometres of the Study Area as a result of searching the DECCW Atlas of NSW Wildlife Database and DEWHA Protected Matters Database (refer to **Table 3** in **Appendix 3.1**).

No endangered fauna populations were recorded or are expected to occur within the Study Area. No threatened fauna species listed under the FM Act are expected to occur.

6.2.3 Ecological Impact Assessment

Approximately 10.5 hectares of additional vegetation is expected to be disturbed as a result of the proposed modifications to the Quarry's approved disturbance footprint. This area has been extensively historically cleared, disturbed and used as grazing pasture for cattle and contains few native vegetation species and little native fauna habitat.

6.2.3.1 Impact on Flora Species

The vegetation within the Study Area is of low ecological significance with approximately 80 per cent of the area dominated by weeds and pasture grasses, mainly the noxious weeds, serrated tussock and exotic goose grass. The native species recorded within the Study Area are widespread and commonly occurring within the region and therefore any disturbance to these will not be of any ecological significance.

The mature eucalypt trees within the highly modified Tableland Low Woodland community would not be removed or impacted as a result of the proposed modifications.

The majority of the Study Area does not have significant conservation value due to the following factors:

- most of the flora species recorded are widespread in the region; and
- the majority of dominant flora species recorded within the study area were exotic.

There is a potential for weeds and introduced flora to spread throughout disturbed areas into the adjacent woodland communities outside the Study Area. Weed species thrive within disturbed areas and can be easily distributed by seeds caught on vehicles, plant, equipment

or people. However, in this case, the Quarry area will be actively managed to control weeds and disturbed areas will be rehabilitated, reducing the potential for weed invasion to significantly impact on the existing floral assemblages of the Project Area.

6.2.3.2 Impact on Fauna Species

The Study Area is currently subject to impacts resulting from habitat fragmentation and edge effects from historical agricultural activities, which includes heavy cattle grazing. The Study Area supports minimal foraging habitat for local fauna due to the general disturbance of the area. The fauna species recorded during the field surveys, with the exception of the brown tree creeper are also widespread and common in the region. Additionally, the Study Area and Project Area, are surrounded by similar or better quality habitat and it is expected that foraging or roosting fauna in this area would be utilising the wider surrounds.

The proposed modification is not expected to result in the loss of fauna species diversity or abundance from within the local area due to the poor quality habitat that is to be cleared for the proposed modifications.

6.2.3.3 Impact on Threatened Species, Endangered Populations and TECs

Threatened Flora Species

No threatened flora species were identified within the Study Area during the field surveys undertaken for this assessment. A search of the DECCW Atlas of NSW Wildlife Database and DEWHA Protected Matters Database identified 15 threatened flora species that have been previously recorded or have the potential to occur within 10 kilometres of the Study Area.

It was not considered that any threatened flora species identified in the searches had the potential to occur within the Study Area. No further assessments are required.

Camden woollybutt, listed as vulnerable under the TSC Act, was previously recorded in an isolated planted stand by Umwelt (2005b) just outside the Study Area. The species was not found in the Study Area and will not be impacted by the proposed modifications.

Threatened Fauna Species

One threatened fauna species, the brown tree creeper (listed as Vulnerable under the TSC Act), was recorded within the Study Area during the field survey undertaken for this assessment. The scattered woodland vegetation surrounding the Study Area and Project Area would provide foraging and nesting habitat for this species. However, it is unlikely that the disturbance of primarily derived pastureland within the Study Area would result in a significant impact on the species considering the higher quality habitat adjacent to the Study Area and Project Area. An assessment of significance addressing potential impacts on this species was undertaken and is provided in **Appendix 3.2**. The assessment concludes that the proposed modification will not result in a significant impact on the species.

Additionally, a search of the DECCW Atlas of NSW Wildlife Database and DEWHA Protected Matters Database identified 26 threatened fauna species that have been previously recorded or have the potential to occur within 10 kilometres of the Study Area. It was considered that potential habitat for three species, striped legless lizard (*Delma impar*), speckled warbler (*Chthonicola sagittata*) and brown tree creeper (*Climacteris picumnus victoriae*) identified from these searches occurs within the Study Area. The brown tree creeper was also recorded during the surveys undertaken for this assessment. Additionally, potential impacts on the species that were previously recorded (Umwelt, 2005b) in the Project Area being the squirrel

glider, speckled warbler, eastern bentwing-bat, eastern freetail-bat and eastern false pipistrelle are assessed in **Appendix 3.1**.

An assessment of significance in accordance with the EP&A Act for threatened fauna species occurring, or that have the potential to occur, within the Study Area is included in **Appendix 3.2**.

An assessment of significance in accordance with the EPBC Act for threatened fauna species occurring, or that have the potential to occur, within the Study Area is included in **Appendix 3.3**.

Threatened Ecological Communities

No TECs were recorded within the Study Area during the field surveys undertaken for this assessment and none are expected to occur. No further assessments are required.

Migratory Species under the EPBC Act

No migratory species listed under the EPBC Act were recorded during the field survey undertaken for this assessment. Twelve migratory species were identified in a search of the DEWHA Protected Matters Database as previously recorded or having the potential to occur within 10 kilometres of the Study Area. One migratory species, the rainbow bee-eater (*Merops ornatus*), identified from the Protected Matters Database were found to have potential to occur within the Study Area. Seven migratory species have been previously recorded (Umwelt, 2005b) within the wider Project Area. It is not considered likely that these species would occur within the additional disturbance footprint associated with the proposed modifications.

The migratory species identified on the Protected Matters Database search that potentially occur within the Study Area are not considered to be part of an important population, as defined by the EPBC Act. Records of these species are distributed broadly across NSW, with no obvious concentrations of records in the local area to suggest the presence of an ecologically significant proportion of the population of these species. The Study Area is not at the limit of the known distribution for any of the species, nor is there evidence to suggest these species are declining in the local area. It is unlikely that the Study Area forms an area of important habitat. Therefore, the proposed modifications to the Quarry will not have a significant impact on any migratory species listed under the EPBC Act.

A full assessment of migratory species can be found in **Appendix 3.3**.

6.2.3.4 Key Threatening Processes

Key Threatening Processes that are relevant to the project include:

Clearing of native vegetation

The clearing of native vegetation is listed as a major factor contributing to the loss of biological diversity. As the Study Area has been cleared in the past and is dominated by introduced species, it may be concluded that this Key Threatening Process has already impacted the Study Area. Further planned clearing will increase this existing impact, however the majority of clearing to be undertaken in the Study Area involves the removal of exotic pasture species which lessens the impact on surrounding native vegetation. The eucalypts within the small area of Tableland Low Woodland within the Study Area would not be impacted as a result of the proposed modifications.

Removal of dead wood and dead trees

Low levels of dead wood and dead trees were present across the Study Area. These habitat features were more common in the woodland communities surrounding the Study Area. Small areas of dead wood occurring within the Study Area will require removal, however, the recommended salvage and relocation of suitable habitat resources will reduce the potential impact of this action.

Invasion of native plant communities by exotic perennial grasses

The Study Area currently supports high levels of exotic perennial grasses, thus this Key Threatening Process is likely to already impact the Study Area. The disturbance of the Study Area as a result of the proposed modifications may increase the prevalence of these species, however, this is not considered to be a significant risk considering the existing condition of the Study Area. Appropriate environmental management measures such as use of indigenous species only (and as appropriate, sterile cover crops) in rehabilitation plantings and eradication of weed species will serve to maintain this potential impact at acceptable levels.

6.2.4 Impact Mitigation

In order to reduce the potential impacts of the proposed modification on flora and fauna, the following measures will be implemented in addition to those outlined in the original ecological assessment (Umwelt, 2005b):

- mature eucalypt trees adjacent to the realigned section of the main access road will be retained and not disturbed by activities associated with the proposed modifications;
- where possible, retain habitat features such as fallen logs on-site that may be utilised by fauna. If the proposed modifications require the removal of fallen logs, it is recommended that they be relocated into adjoining native vegetation rather than removed from the site;
- ensure that the area to be developed is clearly delineated (e.g. through temporary fencing) to mitigate against potential impacts on adjacent native vegetation and to minimise the footprint for construction works; and
- the Rehabilitation and Landscape Management Plan (Umwelt, 2006b) developed for the approved Lynwood Quarry will be updated to include the Study Area.

6.3 Aboriginal Cultural Heritage and Archaeological Assessment

A comprehensive Aboriginal cultural heritage and archaeological assessment has been undertaken for the proposed modifications in accordance with DECCW guidelines and in consultation with representatives of the local Aboriginal community. The Aboriginal cultural heritage and archaeological assessment report is included as **Appendix 4**, with a summary of the key findings included in this section.

As part of the approved Lynwood Quarry project, Holcim in partnership with the Registered Aboriginal Parties has undertaken extensive Aboriginal archaeological and cultural heritage investigation of the Quarry site. This has included a comprehensive sub-surface investigation program that has included sub-surface testing both the recorded sites and Archaeological Terrain Units (ATUs) with the approved disturbance footprint. This comprehensive study has gathered extensive information about the archaeological values of the site. Through this process, the Registered Aboriginal Parties have provided a sound

understanding of the Aboriginal cultural values of the Project Area. This extensive existing knowledge of the cultural and archaeological values of the site provided a sound basis on which to undertake the assessment for the proposed modifications.

6.3.1 Previous Archaeological Survey and Assessment

Previous archaeological surveys and assessments undertaken at the Quarry have identified 94 Aboriginal archaeological sites within the project area. **Figure 6.2** indicates all the Aboriginal archaeological sites located during the investigations within the project area to date including the:

- survey of the Lynwood Quarry project area (Umwelt 2005c);
- surveys for the Country Energy infrastructure and modifications (Umwelt 2007c, 2007d, 2008a, 2008b);
- Stage 1 subsurface investigations (Umwelt 2008c);
- Stage 2 subsurface investigations (Umwelt 2008d, 2008e, 2009b);
- Stage 3 subsurface and surface salvage (Umwelt in prep.);
- annual site monitoring in compliance with the Lynwood Quarry Aboriginal Heritage Management Plan (AHMP) (Umwelt 2007e); and
- survey prior to 2005 (Navin 1990).

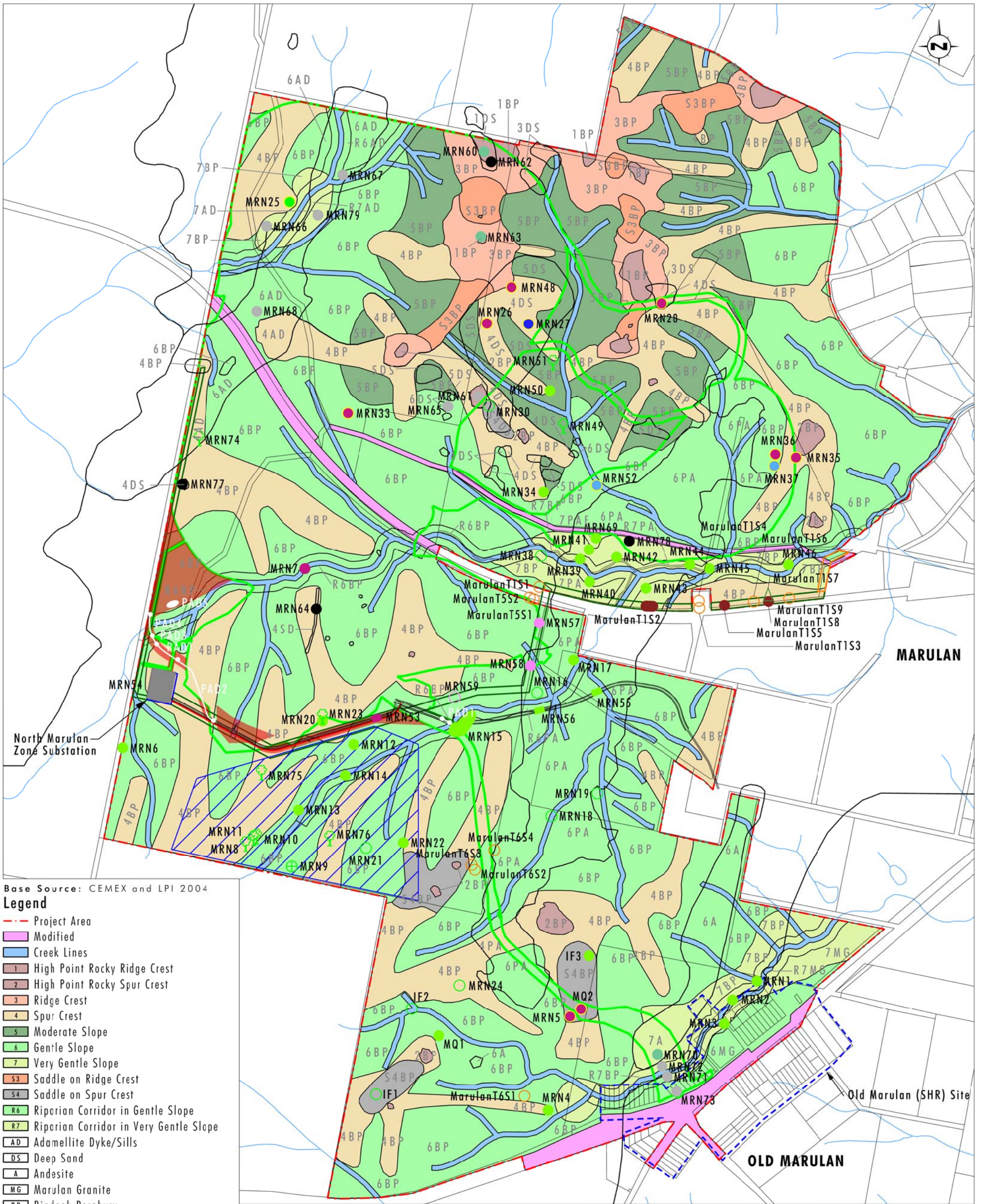
The 94 previously recorded sites included:

- 27 isolated finds;
- 56 artefact scatters;
- one *in-situ* boulder that has been used for grinding;
- nine scarred trees; and
- one stone arrangement.

The environmental and cultural context of the broader Lynwood Quarry Project Area has been studied in detail and reported in these previous studies. As part of these study processes the environmental and cultural context of the area has been utilised to divide the project area into ATUs. These ATUs are intended to divide the project area in to units that indicate how the areas have been historically used by Aboriginal people.

A total of 34 ATUs have been identified within the Lynwood Quarry Project Area. **Figure 6.2** indicates the location and extent of the ATUs. The ATUs have been derived from a combination of the information gathered in relation to stream order, geology, soils, landform element and cultural context.

Holcim has obtained permits from DECCW to allow for the archaeological investigations discussed above and to permit destruction of the sites within the approved disturbance footprint. Each of these sites has been salvaged in partnership with the Registered Aboriginal Parties. **Figure 6.2** outlines the current status of each of the recorded sites within the Project Area, including which sites have been salvaged.



Base Source: CEMEX and LPI 2004

Legend

- Project Area
- Modified
- Creek Lines
- 1 High Point Rocky Ridge Crest
- 2 High Point Rocky Spur Crest
- 3 Ridge Crest
- 4 Spur Crest
- 5 Moderate Slope
- 6 Gentle Slope
- 7 Very Gentle Slope
- S3 Saddle on Ridge Crest
- S4 Saddle on Spur Crest
- R6 Riparian Corridor in Gentle Slope
- R7 Riparian Corridor in Very Gentle Slope
- AD Adamellite Dyke/Sills
- DS Deep Sand
- A Andesite
- MG Marulan Granite
- BP Bindook Porphyry
- SD Siliceous Dyke
- PA Porphyritic Adamellite
- AD Adamellite Dyke
- PAE Elevated Area within Gentle Slope
- Stage 1 Construction Access Road to Substation
- Approved Underground Transmission Line
- Approved Transmission Line Easement
- Stage 1 Post Hole Monitoring Area
- 30 Year Approved Footprint/s.87/90 AHIP area
- Modified Disturbance Footprint
- Cultural Heritage Management Zone

- Sites Subsurface Tested in Stage 2A
- Artefact Scatter s87/90 Collection/Monitoring
- Artefact Scatter salvaged during Stage 1A
- Isolated Find salvaged during Stage 1A
- Artefact Scatter (CE) Conservation
- Artefact Scatter Located During Stage 2B s87/90 No Further Subsurface Salvage
- Isolated Find Located During Stage 2B s87/90 No Further Subsurface Salvage
- Artefact Scatter s87/90 Further Subsurface Salvage
- Isolated Find s87/90 No Further Subsurface Salvage
- Isolated Find (CE) Conservation
- △ Artefact Scatter located during Stage 2B Surface Collection only
- ⊕ Isolated Find (CE) Conservation
- ⊕ Grinding Stone (CE) Conservation
- Stone Arrangement Conservation
- Scarred Tree Conservation
- Isolated Find s87/90 No Further Subsurface Salvage
- Artefact Scatter s87/90 No Further Subsurface Salvage

FIGURE 6.2

Archaeological Terrain Units and Areas of Potential Archaeological Deposit

6.3.2 Predictive Model

Sections of three ATUs (6BP, R6BP and 4BP) occur within the additional area of disturbance that will be impacted by the proposed modifications. Based on the analysis of the ATUs and the extensive archaeological information gathered at the site to date, it was predicted that:

- ATU 6BP is likely to have:
 - isolated finds and small, low density, low complexity artefact scatters;
 - any subsurface artefactual material associated with sites is unlikely to retain archaeological integrity due to topsoil disturbance and topsoil loss (downslope movement due to gravity and slopewash); and
 - if sites are located they are most likely to contain flakes, broken flakes and flaked pieces manufactured from silcrete, quartz and quartzite.
- ATU R6BP is likely to have:
 - isolated finds and moderate density and low complexity artefact scatters;
 - any subsurface artefactual material associated with sites is unlikely to retain archaeological integrity due to topsoil disturbance and topsoil loss (scouring by overbank flows), except where they are in an aggradational/stable context (e.g. colluvial deposit at the base of the slope) and where they are above the level scoured by high water flows. In these cases they may retain some archaeological integrity; and
 - if sites are located they are most likely to contain flakes, broken flakes, retouched flakes and cores manufactured from silcrete, quartz and quartzite and to a lesser extent, chert and volcanic.
- ATU 4BP is likely to have:
 - isolated finds and low to moderate to high density and low to moderate complexity artefact scatters (density and complexity was found to vary between various past onsite testing locations with those sheltered from spring, autumn and winter winds having higher densities and greater complexity);
 - any subsurface artefactual material associated with sites is unlikely to retain archaeological integrity due to topsoil disturbance and topsoil loss (downslope movement due to slopewash); except where they are in a fairly stable context (i.e. on level spur crests where rock outcrops and/or remnant vegetation has acted to stabilise the soil). In these cases they may retain some archaeological integrity;
 - the sites are most likely to contain flakes, broken flakes, retouched flakes and cores manufactured from silcrete, quartz and quartzite and to a lesser extent, chert and volcanic; and
 - scarred trees may be present in areas where remnant vegetation exists.

6.3.3 Aboriginal Consultation

Consultation with Registered Aboriginal Parties for the Quarry has been undertaken since 2005 and has included the Gundungurra Aboriginal Heritage Association Inc (GAHAI), Gundungurra Tribal Council Aboriginal Corporation (GTCAC), Pejar Local Aboriginal Land Council (PLALC) and Peter Falk Consultancy (PFC). The consultation has been undertaken as part of the project approval and development process and has included the Lynwood Quarry EIS process, survey and assessment conducted on behalf of Country Energy and the

Section 87 (s.87) and Section 90 (s.90) Aboriginal Heritage Impact Permit (AHIP) applications for the Quarry.

All consultation for the project to date has been undertaken in accordance with the DECCW Interim Community Consultation Requirements for Applicants (2004). Subsequent to discussions with DoP it was determined that the Aboriginal heritage assessment to be undertaken for the proposed modifications was part of an ongoing process and that consultation with the Registered Aboriginal Parties already registered for the Quarry would continue. This is in line with the DECCW Aboriginal Cultural Heritage Consultation Requirements for applications published in March 2010. Holcim advised DECCW of the intention to continue with the existing consultation program under the DEC Interim Community Consultation Requirements for Applicants on 23 June 2010.

Gundungurra Aboriginal Heritage Association Inc (GAHAI), Gundungurra Tribal Council Aboriginal Corporation (GTCAC), Pejar Local Aboriginal Land Council (PLALC) and Peter Falk Consultancy (PFC) were advised by Holcim of the proposed modification to the Quarry in June 2010. At this time Holcim provided information in relation to the nature of the modifications and of the proposed intention to invite the Registered Aboriginal Parties to participate in a survey of the areas proposed for modification. The survey methodology proposed by Holcim provided for the inspection of the proposed modification areas in their entirety (i.e. 100% survey coverage).

The survey methodology was acceptable to all Registered Aboriginal Parties and GAHAI, GTCAC and PLALC accepted the invitation to have a representative participate in the fieldwork. PFC declined the invitation to participate in the fieldwork, but was involved in the consultation process.

The draft Aboriginal cultural and archaeological assessment report was provided to each of the Registered Aboriginal Parties for review and comment prior to its finalisation. Further details of consultation with the Registered Aboriginal Parties are provided in **Appendix 4**.

6.3.4 Survey Methodology and Results

6.3.4.1 Methodology

The survey methodology involved the inspection of all of the proposed additional disturbance areas (refer to **Figure 6.2**) in their entirety (i.e. 100% coverage). The field survey was undertaken by Umwelt's Aboriginal archaeologists and the Registered Aboriginal Parties on 6 July 2010. Following the completion of the survey, a meeting was held with the Registered Aboriginal Parties at Marulan. During the meeting, the results of the survey, the Aboriginal cultural heritage and archaeological significance of the ATUs proposed for impact and the various management options available for the ATUs were discussed and draft management recommendations prepared based on Registered Aboriginal Party comments and advice.

Survey transects were based on the ATUs which have been developed as analytical units for prior subsurface testing and salvage across the project area. Prior survey, subsurface testing and salvage results were used throughout the survey to provide an understanding of the archaeological potential of areas where ground surface visibility was restricted.

Information recorded during the survey included:

- the nature of the landforms and vegetation;
- the levels of visibility and exposure within the surveyed area;
- the effects of erosion and disturbance;

- the availability of Aboriginal resources;
- any Aboriginal archaeological sites that may be present (with recording to comply with DECCW standards and requirements);
- the likelihood that potential archaeological deposits (PADs) may be present within the proposed impact area; and
- any information provided by the registered Aboriginal Parties regarding the cultural significance of the area.

6.3.4.2 Results

The survey did not identify any sites (artefactual material), however the survey did identify five areas as having the likelihood of retaining PAD. The areas assessed as PAD are identified on **Figure 6.2**.

The survey also identified the following:

- all the survey areas had been heavily cleared;
- much of the length of the proposed access road (where it follows the existing Country Energy access road) appears to have been mechanically ripped historically (this is apparent from small to medium boulders brought to the surface or overturned and/or piled in the paddocks and from the results of earlier subsurface testing);
- almost all areas surveyed had lost the A1 soil horizon and parts of the A2 soil horizon due to ongoing downslope movement of the coarse, sandy, granitic soils through gravity and slopewash;
- slopewash had resulted in many areas of scouring;
- the soils of the spur crests were generally shallow to skeletal and more sparsely vegetated;
- minor areas of recent soil aggradation were noted in association with relatively broad, shallow grassy waterways (first order streams); and
- two areas of riparian corridor were assessed as likely to have retained semi-permanent water within chains of ponds in their respective creek channels.

6.3.5 Current Aboriginal Cultural Heritage and Archaeological Conservation Strategy

In accordance with the requirements of the consent and the recommendations of the original development assessment process (Umwelt, 2005a), Holcim has prepared an Aboriginal Heritage Management Plan (AHMP) to guide the management of the cultural and archaeological values of the Project Area. The AHMP was prepared in consultation with the Registered Aboriginal Parties and has been approved by DECCW and DoP. The AHMP establishes a Cultural Heritage Management Zone that conserves the culturally most important site within the Project Area, providing for long term conservation of a number of important sites. The AHMP also established an Aboriginal Heritage Management Committee to guide the ongoing management of the Project Area's cultural heritage values. Should the proposed modification be approved, the AHMP will be revised to incorporate the proposed modifications.

An important aspect of the management of Aboriginal archaeological sites and landscape values within the broader approved project area is the conservation of a representative sample of site types (and resources) within the various ATUs identified in the project area. In summary the project area conservation management strategy includes:

- 51 sites to be conserved *in-situ* and managed for conservation during the 30 year life of the quarry (including 19 isolated finds, 27 artefact scatters, one *in-situ* boulder that has been used for grinding and four scarred trees) that are within the broader Project Area boundary but which are outside the approved disturbance footprint; and
- 11 sites are to be conserved long term within a CHMZ (including one stone arrangement, five scarred trees, one isolated find and four artefact scatters).

One of the artefact scatters to be conserved (MRN69), was formerly within the approved development impact footprint. However, based on the outcomes of the subsurface testing program it has been afforded conservation status and Holcim has redesigned its approved footprint to avoid the ATU within which the site is located (Umwelt 2009b).

The remaining 32 sites (seven isolated finds and 25 artefact scatters) will be impacted/partially impacted by the currently approved Quarry disturbance footprint (27 sites) or works associated with Country Energy infrastructure related to the Marulan Electricity Supply Upgrade (5 sites). Permits under s90 of the NP&W Act have been obtained from DECCW to permit those impacts.

6.3.6 Significance Assessment

6.3.6.1 Aboriginal Cultural Significance

Throughout the history of the Lynwood Quarry Project Area survey, assessment and subsurface investigations it has been made clear by the GAHAI, GTCAC, PLALC and PFC that the entire Project Area and its surrounds are of traditional, historic and contemporary cultural significance to the Gundungurra Peoples and the Aboriginal Peoples that have associations with Gundungurra Country (refer to the Aboriginal Cultural Significance Statements in the preface of the Aboriginal Heritage Assessment provided in **Appendix 4**). In relation to the ATUs proposed for impact by the modification the following comments were provided by the Registered Aboriginal Parties.

This section of the report will be completed based on comments provided by the Registered Aboriginal Parties on the draft report.

6.3.6.2 Archaeological Significance

As no Aboriginal archaeological sites were located during the survey of the additional disturbance areas proposed for impact by the modification the archaeological significance assessment was based on the ATUs and the PADs identified during the survey. The ATUs have been previously assessed for their significance based on the outcomes of the surface survey and subsurface testing of Aboriginal archaeological sites and ATUs (Umwelt 2008e). The significance assessment for ATU 4BP has subsequently been revised based on the outcomes of the monitoring of works in the North Marulan Zone Substation area under Country Energy s.87/90 AHIP (#1089392) (refer to **Appendix 4**).

The ATU significance assessment is based on the archaeological significance of the known sites within each of the ATUs. The archaeological significance was assessed according to the value each site had to contribute to furthering the archaeological/scientific understanding of Aboriginal use of the landscape (their archaeological research potential). Six criteria were

assessed for each site to deduce its archaeological research potential from a local and regional perspective. These criteria were rarity, representativeness, integrity, connectedness, complexity and potential for archaeological deposit (refer to **Table 6.4**).

Table 6.4 – Significance Assessment and Conservation Status – Archaeological Terrain Units

ATU Description	Aboriginal Significance	Archaeological Significance	Research Potential	Conservation Status
6BP – gentle slope on Bindook Porphyry	low to moderate (variable)	Transect 2 – low Transect 4 – low Transect 6 – low Transect 8 – low to moderate Area North of proposed Rail siding – low	low low low low to moderate low	ATU6BP is the most commonly occurring ATU across the project area. A relatively large area of ATU 6BP will be impacted by the Quarry disturbance footprint, however, a larger area outside the disturbance footprint will be managed <i>in-situ</i> throughout the 30 year life of the quarry or conserved long-term within the Cultural Heritage Management Zone.
R6BP – gentle slope within the riparian corridor in the Bindook Porphyry	very high except where very eroded	Transect 1 – low Transect 8 – low to moderate Railway Siding Scoured/highly disturbed areas - low Elevated terrace - moderate	low low to moderate low moderate	The majority of R6BP will be conserved within the Joarimin Creek Riparian Corridor and the broader Quarry project area and also within the Cultural Heritage Management Zone.
4BP – spur crest in the Bindook Porphyry	low to extremely high (variable)	Transect 3 - low Transect 5 - low Transect 7 - moderate	low low moderate	ATU 4BP is the second most common ATU within the Quarry project area. While a relatively large area of the ATU is within the disturbance footprint an even larger area outside the disturbance footprint will be managed <i>in-situ</i> throughout the 30 year life of the quarry or conserved long-term within the CHMZ.

In general the ATUs within the additional disturbance areas proposed for impact by the proposed modifications were assessed as having low archaeological significance and low research potential. The areas of ATUs where this was not the case are within the areas identified as PAD.

6.3.6.3 Archaeological Significance of PADs

Archaeological significance of the PADs was ranked according to their potential to have a subsurface artefactual assemblage that through its investigation could contribute to the archaeological/scientific understanding of the Aboriginal use of the landscape (their research potential) using five of the six criterion identified for sites (rarity, representativeness, integrity,

connectedness and complexity). The sixth criterion – potential for archaeological deposit – was not relevant as the areas are already assessed as being PAD.

PAD1 was assessed as having low overall archaeological significance, PAD2, 3 and 4 as having low to moderate overall archaeological significance and PAD5 as having moderate overall archaeological significance. PAD5 was assessed as having the highest significance as elevated terraces in the upper tributary system are rare and representative locally and only slightly less rare and representative regionally (based on current knowledge of similar landscapes). PAD2, 3 and 4 owe their slightly higher overall archaeological significance to their proximity to the MRN54 site. None of the PADs were assessed as having overall high archaeological significance due to the levels of disturbance and the nature of size of their predicted assemblages.

6.3.7 Impact of the Proposed Modifications

There are no known Aboriginal archaeological sites within the proposed modification areas however, there are three ATUs and five areas of PAD which will be impacted by the proposed modifications. These are:

- 6BP - this ATU will be impacted by access road widening and construction, trenching for the underground electricity feeder, construction of the tarping area and double weighbridge and office facilities and works associated with the rail siding;
- R6BP – this ATU will be impacted by access road widening and construction, culverts in creek crossings, trenching for the underground electricity feeder, construction of the tarping area facilities and works associated with the construction of the rail siding and associated drainage infrastructure; and
- 4BP - this ATU will be impacted by access road widening and construction and trenching for the underground electricity feeder.

6.3.8 Management Measures

Following discussions with the Registered Aboriginal Parties the following preferred management options were assessed as appropriate from an Aboriginal cultural and archaeological perspective.

Please note that these may require revision based on further consultation with the broader membership of GAHI, GTCAC, PLALC and PFC.

- PAD1 (ATU R6BP), PAD2 (ATU 4BP), PAD3 (ATU 6BP) and PAD 4 (ATU R6BP) - within the access road corridor should be covered in geotextile and the modified access road constructed with imported fill in the same manner as the Country Energy access road across the MRN15 site – the only ground disturbance should be in relation to culverts – and all topsoil disturbed must be retained in the area for landscaping.
- PAD2 (ATU 4BP), PAD3 (ATU 6BP) and PAD 4 (ATU R6BP) - to be impacted by trench excavations related to the proposed underground electricity feeder should be monitored by Registered Aboriginal Parties and an archaeologist during topsoil removal and all topsoil disturbed should be spread over the infilled trench (refer to the Aboriginal Heritage Assessment provided in **Appendix 4** for details of methodology).
- PAD5 (ATU R6BP) - to be subsurface tested using the same methodology approved for all previous subsurface testing of ATUs under DECCW s.87 AHIP (#1077225) (Umwelt 2007f) – if warranted by the results of the subsurface testing further salvage will be

undertaken using the same methodology as approved for prior salvage under DECCW s.87/90 AHIPs (#1100264) (refer to **Appendix 4**).

- Impact without mitigation is endorsed for the remaining ATUs/sections of ATUs that are outside the areas identified as PAD.

The detailed management strategy is provided in the Aboriginal Heritage Assessment included in **Appendix 4**.

To implement the proposed management strategies Holcim will require a variation to its existing s87/90 permit. Should the proposed modifications be approved, Holcim will apply the DECCW for a permit variation.

6.4 Surface Water Assessment

A detailed surface water assessment was completed as part of the EIS (Umwelt, 2005a) for the approved Quarry providing detailed assessment of the required management approach, water balance and the potential water quality impacts. The key surface water components of the previously approved modification were subsequently assessed as part of the SEE (Umwelt, 2009a), however these minor modifications did not significantly affect the overall design of the water management system or the impacts.

In regard to the proposed modifications, the key aspects of the design and operation of the water management system for the Quarry remain unchanged. In particular, the overall footprint of the quarry pit and the design of most of the overburden emplacement areas are unchanged, and the majority of water management controls remain unchanged. The change to the design of the western excess product emplacement area is minor and does not change the overall disturbance footprint of the Quarry or impact on the design or function of the water management system.

The changes to the water management system required as a result of the proposed modifications are outlined and assessed in the following sections. Except where specified, the water management controls to be implemented as part of the proposed modifications remain as described in the EIS (Umwelt, 2005a), the SEE (Umwelt, 2009a), the Lynwood Quarry Water Management Plan (Umwelt, 2007g) and the three Riparian Area Management Plans prepared for the Project (Umwelt, 2007h, 2007i and 2007j). However, the Water Management Plan and the Riparian Area Management Plans for Joarimin Creek and Lockyersleigh Creek will need to be updated due to changes in these catchment areas, should the proposed modifications be approved.

The proposed modifications have the potential to impact on the site water balance by potentially increasing stockpile dust suppression water demands associated with the proposed increase in stockpile areas on site. These potential impacts are assessed in **Section 6.4.2**.

The proposed changes to the site infrastructure, including the proposed rail spur and modifications to access roads, have the potential to influence flooding in Joarimin Creek. These potential impacts are assessed in **Section 6.4.3**.

The overall design of the water management system (in particular the Quarry water management controls and erosion and sediment controls) will remain unchanged. As such the impacts of the approved Quarry on downstream water quality will remain unchanged. The assessment contained in the EIS, demonstrating that the approved Quarry is predicted to have a neutral or beneficial effect on water quality, also remains unchanged as demonstrated in **Section 6.4.5**.

6.4.1 Water Management System

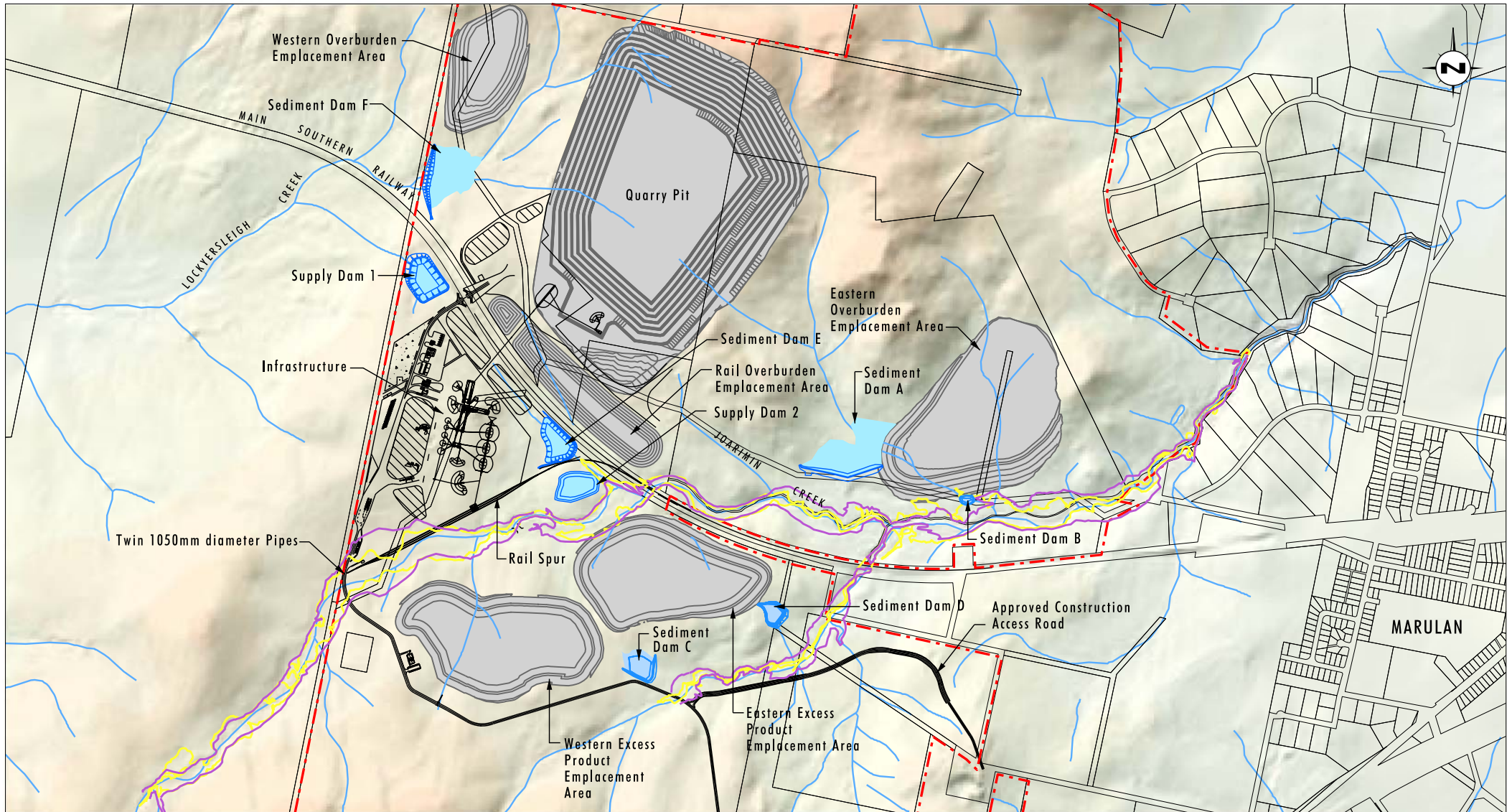
The proposed modifications to the layout of the infrastructure area will result in some modifications to the layout of the required water management system, and associated stormwater management system components (such as culverts and drains). The revised water management system components have been designed to meet the design criteria outlined in the EIS Surface Water Assessment (Umwelt, 2005d). The approved design criteria include:

- catch drains to convey peak discharge from critical duration 20 year Average Recurrence Interval (ARI) storm events from the overburden emplacement areas to sediment dams; catch drains to convey peak discharge from critical duration 20 year ARI storm events away from the top of the pit wall;
- design of all catch drains for two phases of rehabilitation after construction in accordance with (Draft) Guideline for Establishing Stable Drainage Lines on Rehabilitated Mine Sites (DLWC, 1999);
- design of Water Supply Dams 1 and 2 to be turkey nest dams (i.e. no external catchment areas);
- design of Sediment Dams A, B and F to Type D/F (Blue Book, Landcom, 2004) for the 5 day 90th percentile rainfall event for Goulburn; and
- design of Sediment Dams C and D to Type C (Blue Book, Landcom, 2004) for the 20 year ARI critical storm duration.

It is proposed that Sediment Dam E (i.e. the sediment dam capturing runoff from the infrastructure area) (refer to **Figure 6.3**) is designed to Type C (Blue Book) criteria for the 20 year ARI critical storm duration. The majority of the disturbed catchment area of this dam will consist of hardstand sealed areas. This area will also include a series of product stockpiles consisting typically of coarse grained materials. A range of water management system controls will be implemented as part of the existing water management system design for the infrastructure area to manage water quality including catch drains, sumps, oil separators and other controls such as ongoing monitoring and inspections.

It is also proposed that all sediment dams are designed to be consistent with the latest version of *Managing Urban Stormwater: Soils and Construction* (the Blue Book), including *Volume 1* (Landcom, 2004) and *Volume 2D Mines and Quarries* (DECC, 2008). The changes associated with using the latest version of the Blue Book that are proposed relate specifically to sediment dams and include:

- updated information for the 5 day 90th percentile rainfall depth for Goulburn of 28.6 mm (Landcom, 2004) as opposed to that originally used in the EIS of 36.7 mm (Landcom, 1998);
- use of a volume runoff coefficient of 0.9 for hardstand areas and in accordance with Table F3 of the Blue Book (Landcom, 2004) for other areas (e.g. 0.56) as opposed to that originally used in the EIS of 0.5 (Landcom, 1998); and
- for all Type C sediment dams used on site, the critical duration storm event will be determined for each dam individually based on the size of the catchment area in accordance with methods outlined in *Australian Rainfall and Runoff (AR&R)* (IEAust, 1987).



Base Source: LPI 2004

Note: Flood extent only shown for main channels of Joarimin Creek

Legend

- Project Area
- Pre Developed Modelled 100yr ARI Flood Extent
- Pre Developed Modelled 100yr ARI Flood Extent (EIS, Umwelt, 2005)
- Drainage Lines

FIGURE 6.3

Modelled Existing 100 year ARI
Storm Event Flood Extents

6.4.2 Erosion and Sediment Controls

As per the design of the approved Quarry, erosion and sediment control measures will continue to be incorporated into the detailed construction plans for, and built as a part of, the additional infrastructure to be constructed as a part of the proposed modifications. The design of the erosion and sediment controls will be as per the existing Erosion and Sediment Control Plan which forms part of the approved Lynwood Quarry Water Management Plan.

Erosion and sediment control measures currently required on site are outlined in the existing management plans. Relevant guidelines for erosion and sediment control include:

- *Managing Urban Stormwater – Soils and Construction, Volume 1 (the Blue Book)* (Landcom, 2004);
- *Managing Urban Stormwater – Soils and Construction, Volume 2A Installation of services* (Department of Environment and Climate Change (DECC), 2008);
- *Managing Urban Stormwater – Soils and Construction, Volume 2C Unsealed Roads* (DECC, 2008);
- *Managing Urban Stormwater – Soils and Construction, Volume 2D Main Road Construction* (DECC, 2008); and
- *Managing Urban Stormwater – Soils and Construction, Volume 2E Mines and Quarries* (DECC, 2008).

In addition, construction and remediation plans will detail the specific inspection, maintenance and revegetation requirements for each works area based on the construction program schedule and remediation works requirements. These control measures will be set out in the revised Lynwood Quarry Erosion and Sediment Control Plan should this modification be approved.

6.4.3 Site Water Balance

A site water balance for the Quarry was initially developed as part of the original surface water assessment completed as part of the EIS (Umwelt, 2005d). An updated site water balance was prepared as a component of the Lynwood Quarry Water Management Plan (Umwelt, 2007g). This site water balance was reviewed as part of the 2009 approved modification with no changes to the site water balance predicted to occur as a result of the approved modification.

6.4.3.1 Site Water Balance for Approved Quarry

The site water balance associated with the current approved Lynwood Quarry is documented in the original EIS Surface Water Assessment (Umwelt, 2005d) and the approved Lynwood Quarry Water Management Plan (Umwelt, 2007g).

The primary components of the Quarry water balance are:

- Inflows:
 - catchment runoff and rainfall onto dam surfaces;
 - groundwater inflows into the quarry pit;
 - import of potable water; and

- import of water to supplement process and dust suppression water.
- Demands:
 - crushing and screen plant;
 - haul road dust suppression;
 - stockpile dust suppression; and
 - potable water.

Water will also be lost from the water management system via evaporation from the water surfaces of dams.

The Quarry water balance was modelled without water being imported to the site or treated water overflowing from the sediment dams. The requirements to import water to Quarry and sediment dam overflows have been addressed after determining the water balance on site without these transfers/overflows.

Further details regarding the water balance model setup and calibration can be found in the *Surface Water Assessment Report - Lynwood Quarry EIS* (Umwelt, 2005d).

The annual water balance for a range of climatic conditions at a production level of 5 Mtpa was assessed for the EIS (Umwelt, 2005d). The predicted balance is detailed in **Table 6.5**.

Table 6.5 - 5 Mtpa Predicted Lynwood Quarry Water Balance

Rainfall Condition	Annual Rainfall (mm)	Water Balance (ML/Year)			
		Year 5	Year 12	Year 20	Year 30
Dry Year (10 th percentile)	407	-70	-83	-65	-48
Average Year (50 th percentile)	607	69	54	80	93
Wet Year (90 th percentile)	872	297	283	303	320

Source: Umwelt, 2005d

The maximum modelled future water deficit without importing water is 83 ML in a dry rainfall year in Year 12. This deficit will need to be met from water sourced externally from the site. Holcim has obtained a water allocation for an eternal water source to address this predicted water deficit. Similarly the maximum modelled future water surplus without importing water is 320 ML in a wet rainfall year in Year 30. The water management system has been designed to cater for this predicted surplus.

The results of the analysis for the driest historical five year period (based on 110 years of record), indicates that a total water deficit of 314 ML would occur over this five year period. This equates to an average supply requirement of 63 ML per year. Even when starting this period with 119 ML storage on-site (supply dams at full capacity), an average of 39 ML per year would need to be imported from external water sources in order to meet the predicted water demands for the site. The external water supply secured by Holcim will address this predicted deficit.

6.4.3.2 Potential Changes to Site Water Balance with Proposed Modifications

The Quarry water balance has been updated to consider the proposed modifications. The primary influence of the proposed modifications on the predicted site water balance is increases in the potential water used for stockpile dust suppression.

The proposed modification will result in an increase in the potential area of product stockpiles within the infrastructure areas. This increase in area is expected to potentially increase the water used for stockpile dust suppression on site from approximately 11 ML per year to 33 ML per year.

The proposed modifications are not expected to alter the availability of existing approved on-site water sources or have a significant influence on other water demands on site, including water for crushing and screening, haul road dust suppression or potable water

The updated Quarry water balance, taking into consideration potential changes to water demands for stockpile dust suppression, is shown in **Table 6.6**.

Table 6.6 - 5 Mtpa Predicted Lynwood Water Balance

Rainfall Condition	Annual Rainfall (mm)	Water Balance (ML/Year)			
		Year 5	Year 12	Year 20	Year 30
Dry Year (10 th percentile)	407	-92	-105	-87	-70
Average Year (50 th percentile)	607	47	32	58	71
Wet Year (90 th percentile)	872	275	261	281	298

The maximum modelled future water deficit with the proposed modifications without importing water is increased by 22 ML to 105 ML in a dry rainfall year in Year 12. This deficit will be addressed by water sourced externally from the site using the external supply secured by Holcim. Similarly the maximum modelled future water surplus without importing water is reduced by 22 ML to 298 ML in a wet rainfall year in Year 30.

The predicted changes in the site water balance associated with the proposed modifications would increase the external water sourcing, based on the worst five rainfall years in the historical rainfall record, from 63 ML per year to 85 ML per year. Even when starting this period with the on-site supply dams at full capacity an average of 61 ML per year would need to be imported from external water sources in order to meet the predicted water demands for the site with the proposed modifications. Again, this predicted deficit would be addressed by Holcim's external water supply.

6.4.3.3 Summary of Potential Impacts on Site Water Balance

The analysis indicates that the proposed modifications would potentially decrease the potential water surplus on site during average and wet rainfall years for the life of the quarry.

The analysis also indicates that during dry rainfall years the proposed modifications would potentially increase the site water deficit. To meet the modelled site water deficit it is considered that external water will need to be imported to site. Since the approval of the Quarry in 2005, Holcim has secured an appropriate external water supply for the project.

6.4.4 Flooding

6.4.4.1 Previous Assessment Results

The potential impact of the approved Quarry on flood flows, velocities and extents on Joarimin Creek, Lockyersleigh Creek and Marulan Creek were assessed as part of the original surface water assessment (Umwelt, 2005d). The assessment indicated that the Quarry would not increase flood flows, velocities or depths in Joarimin or Lockyersleigh

Creeks. A slight increase in flood level immediately downstream of the project area of up to 6 millimetres during the 20 year ARI storm events was predicted to occur in Marulan Creek.

The surface water assessment (Umwelt, 2009a) for the subsequent approved modifications indicated the following:

- Joarimin Creek: The proposed changes to the drainage design would not increase peak flow rates, velocities or flood levels downstream of the project area from those identified in the EIS along Joarimin Creek. In addition, the modelling indicates that in-channel velocities will remain within the existing ranges experienced in the creek and its tributaries.
- Lockyersleigh Creek: The proposed changes to the drainage design would not increase peak flow rates, velocities or flood levels downstream of the project area to those identified in the EIS along Lockyersleigh Creek. In addition, the modelling indicated that in-channel velocities would remain within the existing ranges experienced in the creek and its tributaries.
- Marulan Creek: No changes to the surface water impacts would occur in Marulan Creek.

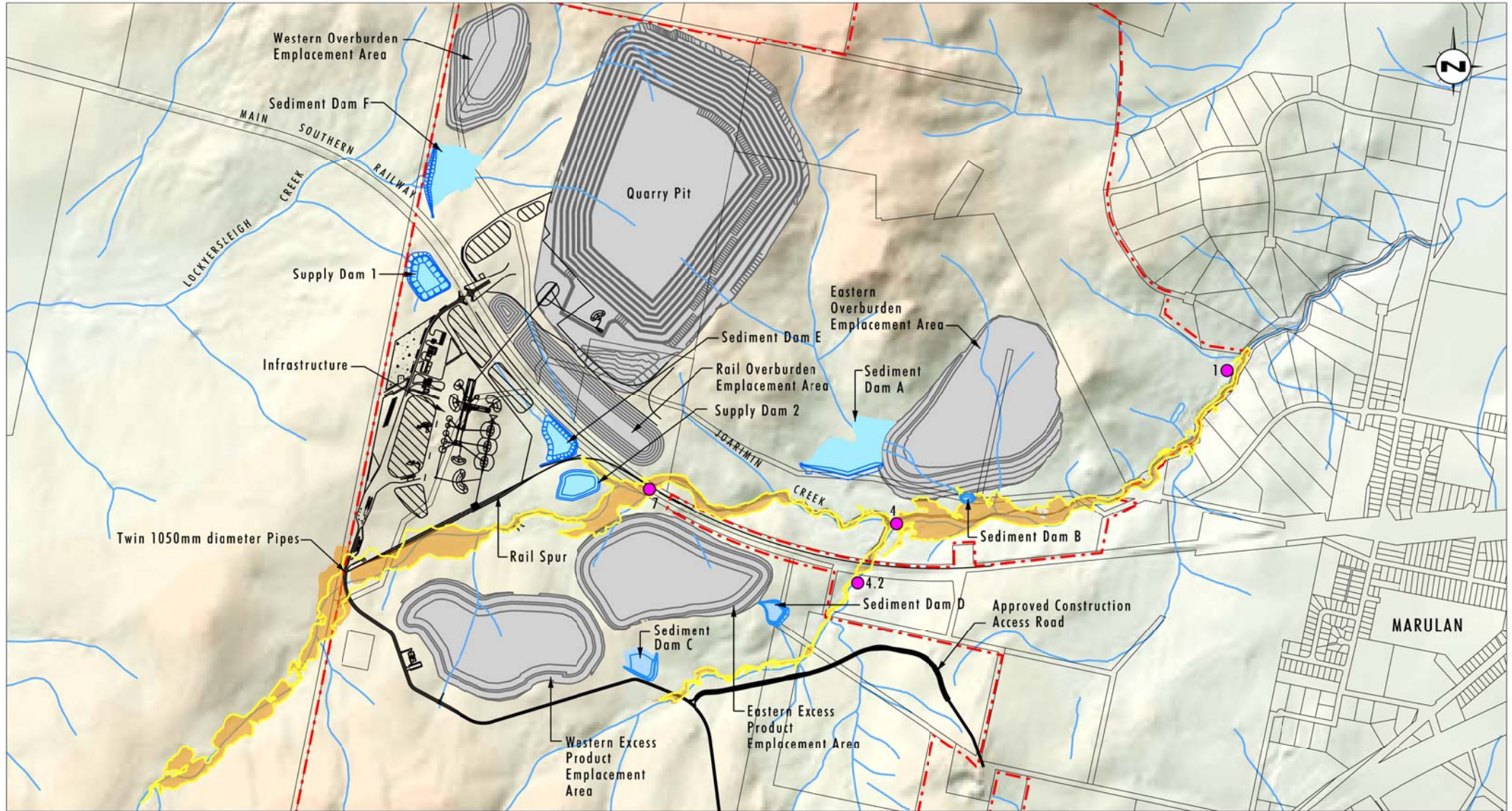
6.4.4.2 Potential Impacts with Proposed Modification

Since the preparation of the original EIS Surface Water Assessment (Umwelt, 2005d) and the subsequent modification (Umwelt, 2009a) more accurate topographical survey data has been sourced of the main channel of Joarimin Creek, its overbank areas and the infrastructure area. This topographical survey data has been gathered by Holcim as part of the detailed design process and has been used to update the one dimensional flood model of Joarimin Creek for the pre-developed (i.e. existing) scenario. The modelling methodology used for the updated pre-developed (i.e. existing) scenario flood model, including runoff and infiltration parameters, are the same as those used in the original EIS Surface Water Assessment (Umwelt, 2005d).

The flood elevation results from the updated model are comparable to the previous modelling (refer to Umwelt, 2005d). However, the modelling indicates increases in peak flow rates occur in some areas and typically the in channel velocities have decreased. These changes are considered to be a result of increases in channel flow conveyance areas and minor changes of grade within the site associated with the more accurate topographical survey and associated modelling. The updated 100 year ARI storm event modelled flood extent is shown on **Figure 6.4**.

The updated one dimensional flood model was subsequently modified to reflect the changes to the landform associated with the approved Quarry and proposed modifications. The modelled flood extent for the developed 100 year ARI storm event is also shown on **Figure 6.4**.

Results summarising peak flows, peak velocities and peak water levels for Joarimin Creek for the 100 year and 20 year ARI storm events are detailed in **Table 6.7** and **6.8**. Node locations are shown on **Figure 6.4**.



Base Source: LPI 2004

Note: Flood extent only shown for main channels of Joarimin Creek
Only primary node locations shown

Legend

- Project Area
- Node Locations
- Pre Developed Modelled 100yr ARI Flood Extent
- Post-developed Modelled 100yr ARI Flood Extent
- Drainage Lines

FIGURE 6.4

Modelled 100 year ARI Storm Event
Flood Extent - Joarimin Creek

Table 6.7 - Modelling Results – Joarimin Creek - 100 year ARI storm event

Node	Existing Joarimin Creek			Developed Year 30 Joarimin Creek (with proposed modifications)		
	Peak Flow in upstream reach (m ³ /s)	Peak Velocity in upstream reach (m/s)	Peak Water Level at Node (mAHD)	Peak Flow in upstream reach (m ³ /s)	Peak Velocity in upstream reach (m/s)	Peak Water Level at Node (mAHD)
1	53.62	2.3	630.1	46.35	2.2	630.0
4	27.09	1.2	639.5	20.66	1.1	639.5
4.2 (tributary)	12.51	1.0	640.8	11.52	0.9	641.0
7	23.50	0.8	652.6	18.48	0.8	652.5

Table 6.8 - Modelling Results – Joarimin Creek - 20 year ARI storm event

Node	Existing Joarimin Creek			Developed Year 30 Joarimin Creek (with proposed modifications)		
	Peak Flow in upstream reach (m ³ /s)	Peak Velocity in upstream reach (m/s)	Peak Water Level at Node (mAHD)	Peak Flow in upstream reach (m ³ /s)	Peak Velocity in upstream reach (m/s)	Peak Water Level at Node (mAHD)
1	34.40	1.9	629.8	31.48	1.9	629.7
4	17.05	0.9	639.4	14.43	1.0	639.4
4.2 (tributary)	8.24	1.0	640.5	7.87	0.8	640.7
7	14.89	0.8	652.4	12.95	0.8	652.4

Similar to the flood modelling results from the original EIS (Umwelt, 2005a) the current modelling results indicate that a small increase in peak water levels of up to 200 millimetres will occur at Node 4.2 on the tributary of Joarimin Creek. This increase is considered to be associated with changes in hydrograph timing in the tributary and the main channel of Joarimin Creek. The modelled increase in peak flood level is localised within the site immediately upstream of the Main Southern Railway and is considered negligible.

Modelling also indicates an increase in flood levels upstream of the proposed access road crossing of Joarimin Creek. Modelling indicates that the increases in flood levels will occur for a distance of approximately 170 metres upstream of the access road crossing with a maximum increase in flood depth during the 100 year ARI storm event of 1.5 metres immediately upstream of the proposed access road. Modelling indicates that this increase in flood depths will occur for a period of approximately 4.5 hours during the 100 year ARI storm event and is located on land owned by Holcim.

The outcomes from the flooding assessment of the proposed modifications indicate that the proposed modifications will, consistent with the original assessment, not significantly alter the flow regimes in Joarimin Creek in terms of peak discharges, flood levels or peak in stream velocities either upstream of downstream of the project area. As a result, the proposed modification is not expected to adversely impact on channel stability or in stream habitat of the Joarimin Creek system.

6.4.5 Water Quality

6.4.5.1 Sediment Loads

Holcim will operate the Quarry in accordance with the controls and procedures specified in the approved Lynwood Quarry Water Management Plan (Umwelt, 2007g), including the erosion and sediment controls outlined in **Section 6.3.2**. Those controls have been designed to limit erosion and sediment transport.

With these controls in place, and considering the minimal impact that the proposed modifications will have on the approved water management system, it is considered that the proposed modifications will not adversely impact on in stream habitat or sediment levels in Joarimin Creek, Lockyersleigh Creek or Marulan Creek or the downstream drainage systems.

6.4.5.2 Drinking Water Catchments Regional Environmental Plan No 1

Lynwood Quarry lies within the catchment areas of Joarimin Creek, Lockyersleigh Creek and Marulan Creek. Joarimin Creek and Lockyersleigh Creek drain to the Wollondilly River which is part of the Warragamba Dam catchment. Marulan Creek drains to the Shoalhaven River via Barbers Creek which is part of the Tallowa Dam catchment. Both Warragamba and Tallowa Dams contribute to Sydney's drinking water supplies. As such, all runoff from the project area flows into rivers that are managed by the Sydney Catchment Authority and managed under the Drinking Water Catchments Regional Environmental Plan No 1.

As part of the approved Quarry, runoff from all disturbed areas within the Year 30 Quarry footprint will be controlled on-site for treatment, ensuring sediment transport off-site is minimised and maintained below pre-development pollution loads. The EIS (Umwelt, 2005a) predicted a net reduction in pollutant loads of phosphorus and nitrogen from the Project Area by up to 2 tonnes per year and 199 kilograms per year respectively. The design of the water management system for the Quarry also provides that any oil/fuel spillages will be contained on-site, with no impact on downstream water quality.

The original EIS Surface Water Assessment (Umwelt, 2005d) indicated that the project would have a beneficial effect on water quality in the downstream creeks and in the Wollondilly River. The beneficial effect is due to reduction of sediment, nitrogen and phosphorus loads leaving the project area by reuse of water in the plant and for dust suppression, and treatment of water prior to release from the water management system. No changes were predicted in water quality in Marulan Creek. The improved management, including encouraging natural regeneration of the riparian corridors will also result in improved water quality. Management commitments in this regard are contained in the approved Rehabilitation and Landscape Management Plan.

Due to the minor nature of the overall changes to the Quarry water management system the proposed modifications are not predicted to alter the original assessment outcomes in regard to water quality and will maintain the identified beneficial effects of the project on downstream water qualities.

6.4.6 Annual Flow Volumes and Downstream Users

The approved Quarry project incorporates control of surface water runoff from the site. This will result in a decrease of annual flow volumes immediately downstream of the quarry on both Joarimin Creek and Lockyersleigh Creek.

Negligible changes to the catchment area of the quarry water management system will occur as a result of the proposed modifications (approximately 1%). As such, the proposed modifications will result in negligible changes to annual runoff volumes compared to the existing approved Quarry. Therefore, the proposed modifications will result in negligible changes to downstream annual flow volumes compared with the impacts of the approved Quarry. Environmental flows, sufficient to ensure that similar volumes of water are stored in the small water holes that exist in the creek system will continue to be maintained in the downstream reaches of Joarimin Creek with the proposed modifications.

6.4.7 Surface Water Monitoring, Licensing and Reporting Procedures

The quarry water management system that has been designed for the approved Quarry and as described in the approved Water Management Plan, Riparian Area Management Plans and Monitoring Programs, identifies the controls required to be put in place to manage surface water impacts as part of the project. As outlined in the preceding sections, the proposed modifications will result in minimal changes to the water management system. The existing controls designed for the Quarry are therefore appropriate and will be applied to the works and activities associated with the proposed modifications. Further details regarding the key required management measures are outlined in the following sections.

6.4.7.1 Surface Water Monitoring and Reporting

The Lynwood Quarry Water Management Plan (Umwelt, 2007g) and the three Riparian Area Management Plans prepared for the Quarry (Umwelt, 2007h, 2007i and 2007j) were approved by DoP in 2007. The Water Management Plan and the Riparian Area Management Plans for Joarimin Creek and Lockyersleigh Creek will be updated to incorporate the modifications, should the proposed modifications be approved.

Holcim will continue to monitor the water management systems and associated erosion and sediment control measures in accordance with the existing strategies and plans. This monitoring will be undertaken on a monthly basis and after storm events.

During the construction of the proposed infrastructure, all works and their erosion and sediment controls will be inspected on a regular basis to ensure that all required controls are in place and effective.

Following the completion of construction works, the work areas will be inspected in accordance with the inspection program provided in the approved Water Management Plan and after any rainfall events generating runoff until revegetation and stabilisation of drainage structures are complete.

All erosion and sediment controls and their monitoring and maintenance requirements for the construction phase of the proposed infrastructure will be detailed in a construction plan.

The existing surface water quality monitoring network for the Lynwood Quarry Project will be continued for the project.

The walls of all water management dams will be inspected biennially (every two years) for their structural integrity and for any maintenance requirements. The walls of the water management dams will be grassed and kept free of any trees and shrubs.

Water usage, rainfall, dam volumes and dam overflows will also be monitored for the Quarry to assist in the management of the quarry water management system. The water management dams will be monitored to ensure that any overflows or discharges are to an appropriate standard and in accordance with EPL conditions.

All monitoring results will be reported in the Annual Environmental Management Report (AEMR) which will be distributed to DoP, Industry and Investment NSW (I&I NSW) (formerly Department of Primary Industries), DECCW (including the NSW Office of Water (NOW) and other relevant government agencies. All monitoring data will continue to be retained in an appropriate database.

The results of the water quality monitoring will continue to be used to review the effectiveness of the Quarry water management system on an ongoing basis.

6.4.7.2 Licensing

The water management system for the Quarry forms part of the Quarry operation covered by the existing EPL held by Holcim. The EPL will be varied as required should this proposed modification be approved.

Lynwood Quarry has an approved Part 3A Permit under the *Rivers and Foreshores Improvement Act 1948* (act now repealed). An application for a modification and extension to this permit is currently with NOW. As part of this modification process the existing Part 3A permit will be transferred to a Controlled Activity Approval under the *Water Management Act 2000*. Potential changes to the Controlled Activity Approval may be required with the proposed modifications. The Controlled Activity Approval for the Quarry will be modified prior to works progressing in areas not covered by the existing Part 3A Permit.

Holcim will manage the Quarry in accordance with the required surface water and groundwater licences and in accordance with the provisions of the *Water Management Act 2000* and *Water Act 1912*.

6.4.8 Conclusions

This surface water assessment considers the potential surface water impacts of the proposed modifications to the current Project Approval. The assessment has indicated that:

- changes to the infrastructure layout, including the associated changes to infrastructure area site water management controls, can be managed in accordance with the current existing and proposed site water management strategies and controls (refer to **Section 6.4.1**);
- the proposed modifications will not result in changes to the erosion and sediment control design standards for the Quarry (refer to **Section 6.4.2**);
- the changes to the site water balance associated with the proposed modifications will result in a minor increase in the water deficit for the site, which is proposed to be addressed by the external water sources secured by Holcim (refer to **Section 6.4.3**);
- the proposed modifications will, consistent with the original assessment, not significantly alter the flow regimes in Joarimin Creek, Lockyersleigh Creek or Marulan Creek in terms of peak discharges, flood levels or peak in stream velocities either upstream of downstream of the Project Area (refer to **Section 6.4.4**);
- there will be negligible changes to water quality impacts downstream in Joarimin Creek, Lockyersleigh Creek and Marulan Creek which all drain to Sydney's drinking water supplies as a result of proposed modifications (refer to **Section 6.4.5**);
- the minor changes to the annual flow volumes in the downstream creek systems resulting from the approved Quarry will not be influenced by the proposed modifications (refer to **Section 6.4.6**); and

- the Quarry has been designed to operate in accordance with the relevant water planning policies/plans and legislation, including relevant licensing requirements under the *POEO Act 1997*, *Water Act 1912* and the *Water Management Act 2000*.

6.5 Air Quality Assessment

A detailed Air Quality Assessment was completed for the original EIS and the 2009 modification by Holmes Air Sciences (HAS) (HAS, 2005; HAS, 2008). To assess the potential air quality impacts associated with the proposed modifications, a revised assessment has been completed by HAS (now PAEHolmes). The Air Quality Assessment is provided as **Appendix 5**, with a summary of the key findings included below.

6.5.1 Existing Air Quality Environment

Holcim established an air quality monitoring network within and surrounding the Project Area in July 2004. This network includes both high volume air samplers (HVAS) measuring PM₁₀ and dust deposition gauges. As part of the EIS and the SEE for the 2009 modification, this monitoring network was used to calculate background air quality concentrations for assessment purposes in accordance with DECCW guidelines. Ongoing air quality monitoring has occurred since the preparation of the EIS.

Based on the monitoring data from 2004 to 2009, the following background concentrations have been applied at the nearest residences for impact assessment purposes:

- annual average TSP of 33 µg/m³;
- annual average PM₁₀ of 13 µg/m³; and
- annual average dust deposition of 1.6 g/m²/month.

6.5.2 Air Quality Criteria and Assessment Methodology

The relevant air quality criteria for the approved Project are those specified in Condition 12 of Schedule 3 of the Consent. These criteria are consistent with current DECCW criteria.

The Air Quality Assessment undertaken for the proposed modifications has been completed in accordance with DECCWs *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC, 2005). The assessment has also used the same general approach as the modeling prepared for the EIS and SEE so that any changes resulting from the proposed modifications can be identified. A detailed description of the assessment methodology used is provided in **Appendix 5**.

Three representative operational years were selected for modeling, being years 5, 10 and 30. These years were selected as they are considered to represent the range of operational phases that will be experienced at the Quarry. Point calculations were made for the same residential receiver locations used in the EIS and SEE.

6.5.3 Air Quality Assessment Findings

The Air Quality Assessment found that the predicted air quality impacts for the Quarry with the proposed modifications are not greatly different to those predictions made for the originally approved project in 2005 (EIS) or the Quarry with the 2009 modifications. The assessment identified that due to the modified layout of the site, the levels predicted at some

residences are higher than previously assessed, whereas at other residences they are predicted to be lower than previously assessed (refer to **Appendix 5**).

The air quality assessment also found that the predicted dust concentrations and dust deposition levels associated with the proposed modifications will comply with the relevant air quality criteria at all surrounding residential receivers. In summary:

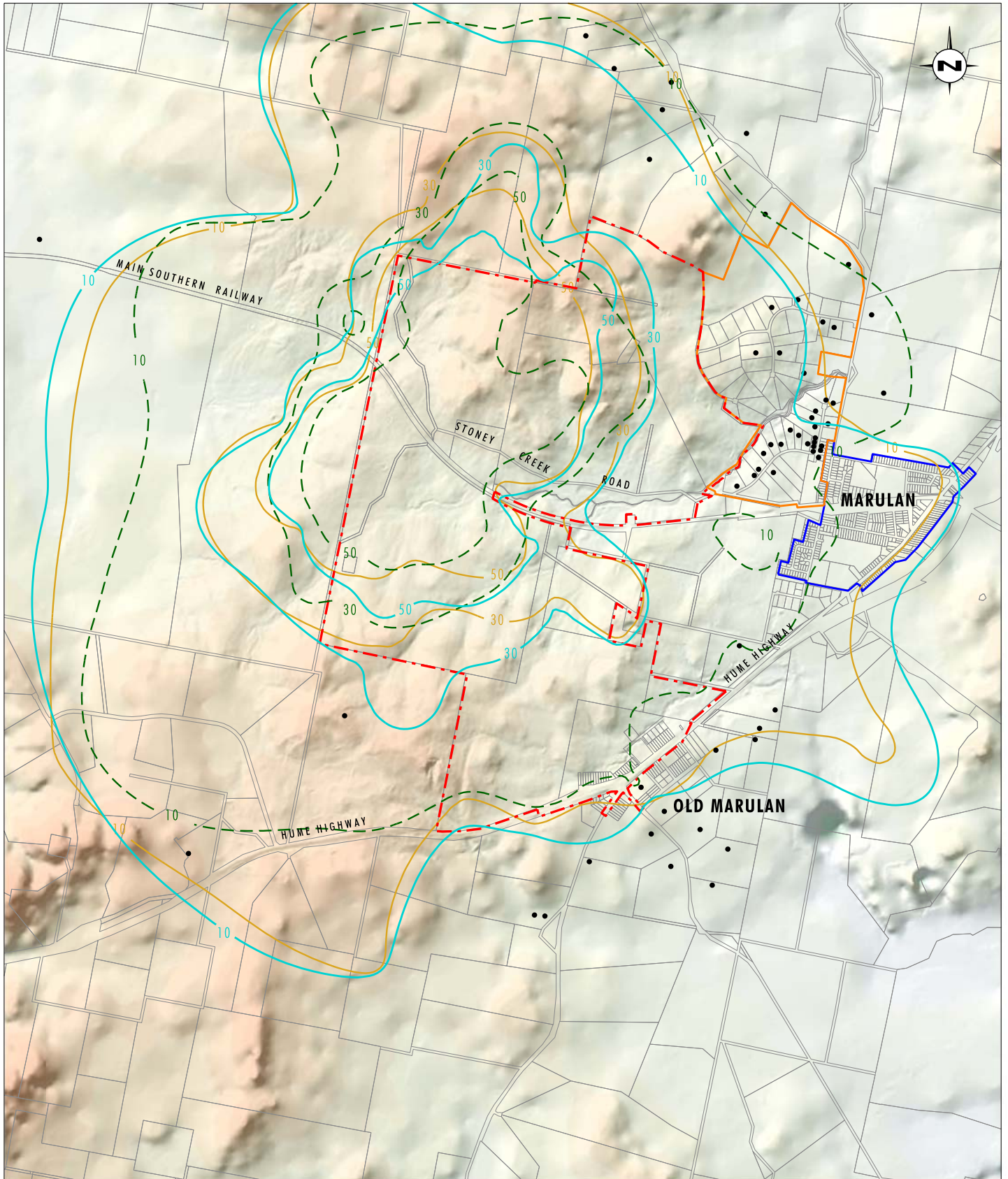
- maximum 24-hour average PM₁₀ concentrations associated with the proposed modifications are below the 50 µg/m³ goal at all residences;
- annual average PM₁₀ concentrations associated with the proposed modifications are below the 30 µg/m³ goal at all residences. If an annual average background PM₁₀ level of 13 µg/m³ is added to the model predictions, concentrations at all residences are still below the 30 µg/m³ goal;
- annual average TSP concentrations associated with the proposed modifications are below the 90 µg/m³ goal at all residences. If an annual average background TSP of 33 µg/m³ is added to the model predictions, concentrations at all residences are still below the 90 µg/m³ goal; and
- the predicted contribution of the Quarry to dust deposition levels is below the 2 g/m²/month criteria at all residences. Model predictions at residences are also below the 4 g/m²/month goal when an existing background dust deposition level of 1.6 g/m²/month is added.

To compare the predicted air quality impacts of the approved Project to the impacts of the proposed modifications, contour plots of the predicted air quality impacts are provided on **Figures 6.5 to 6.8** for year 30. As indicated on **Figures 6.5 to 6.8**, the air quality impacts for the proposed modifications are not significantly different to the impacts of the approved Quarry. As the predicted dust levels are below the relevant criteria at all residential receiver locations, the proposed modifications are not considered likely to result in a significant change to the air quality impacts of the approved Quarry.

The air quality impact assessment also assessed potential cumulative air quality impacts. The key potential contributors in regard to cumulative air quality impacts in the local area are the existing Johniefelds Quarry located to the north (also operated by Holcim) and the Gunlake Quarry also to the north which is currently under construction. The assessment of cumulative air quality impacts found that:

- in regard to annual average PM₁₀ the cumulative effect of the three quarries and other background sources is estimated at around 20 µg/m³. This satisfies the DECCW criteria for annual average PM₁₀ of 30 µg/m³;
- in regard to annual average TSP the cumulative effect of the three quarries and other background sources is estimated at around 42 µg/m³. This is well below the DECCW criteria for annual average PM₁₀ of 90 µg/m³; and
- in regard to annual average dust deposition the cumulative effect of the three quarries and other background sources is estimated at around 2.8 g/m²/month. This satisfies the DECCW criteria for annual average PM₁₀ of 4 g/m²/month.

Therefore, no significant cumulative air quality impacts are predicted to result from operation of the approved Quarry in combination with the other existing quarry operations and background air quality conditions.



Source: Holmes Air Sciences, 2005 (Refer to Appendix 5)
Base Source: LPI 2004

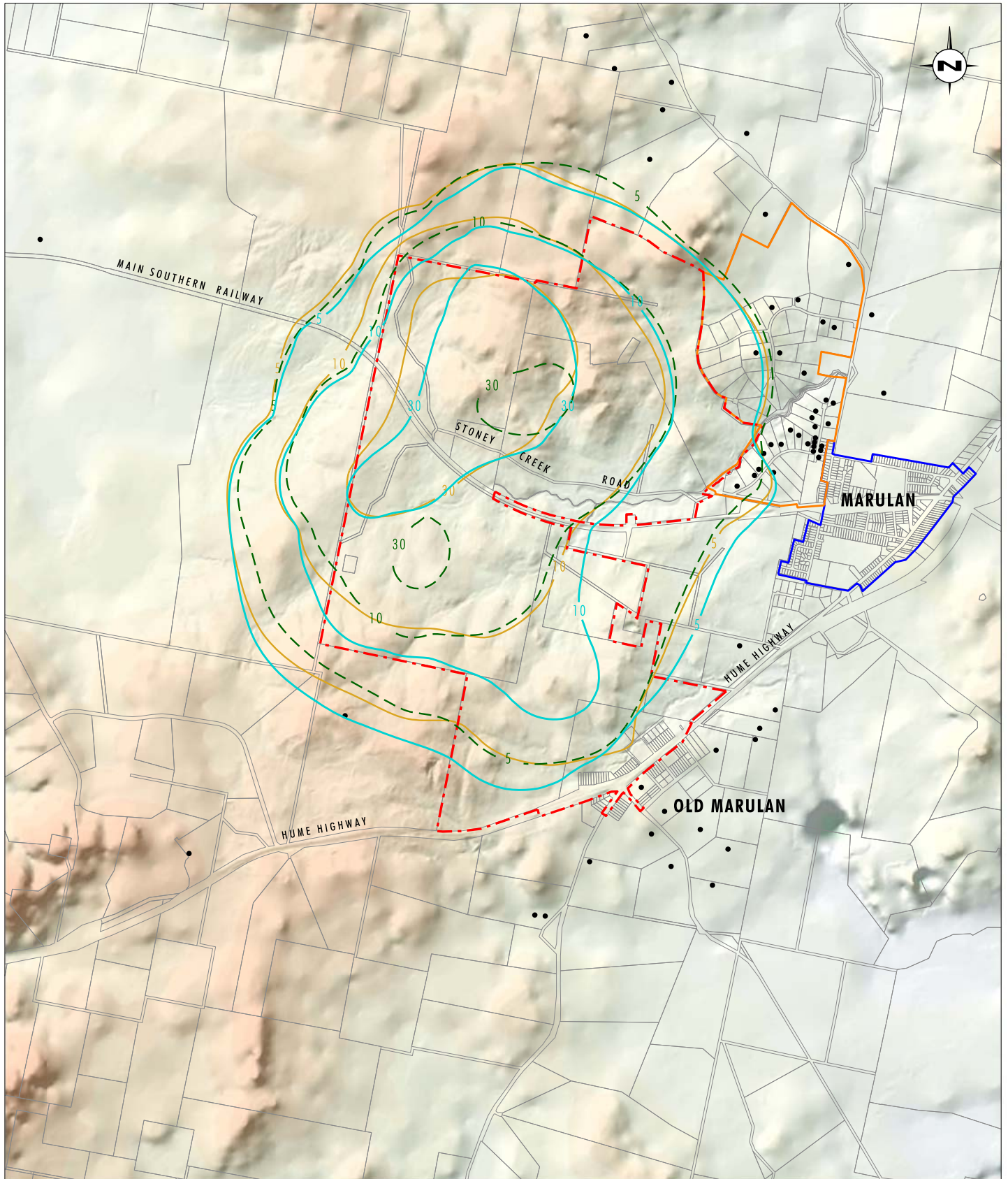
0 0.5 1 2km
1:42 000

Legend

- Project Area
- Proposed Modification PM₁₀ - 24hour (50µg/m³ - consent criteria)
- Originally Approved PM₁₀ - 24hour (50µg/m³ - consent criteria)
- Approved Modification PM₁₀ - 24hour (50µg/m³ - consent criteria)
- Residence
- Marulan Residential Area
- Marulan Rural Residential Area

FIGURE 6.5

24-hour Average PM₁₀
Contours Year 30



Source: Holmes Air Sciences, 2005 (Refer to Appendix 5)
Base Source: LPI 2004

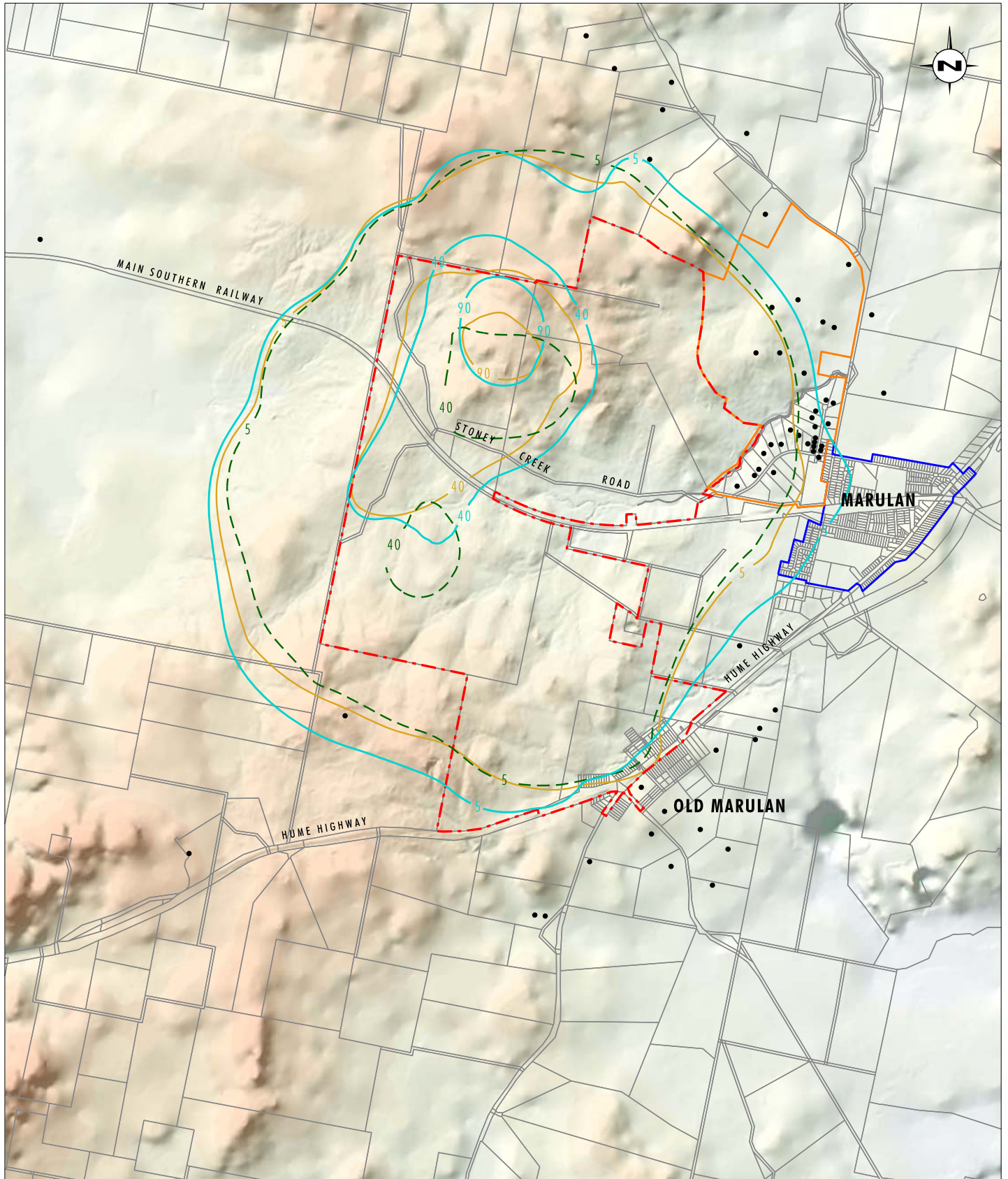
0 0.5 1 2km
1:42 000

Legend

- - - Project Area
- Proposed Modification PM₁₀ - Annual (30µg/m³ - consent criteria)
- Originally Approved PM₁₀ - Annual (30µg/m³ - consent criteria)
- - - Approved Modification PM₁₀ - Annual (30µg/m³ - consent criteria)
- Residence
- Marulan Residential Area
- Marulan Rural Residential Area

FIGURE 6.6

Annual Average PM₁₀
Contours Year 30



Source: Holmes Air Sciences, 2005 (Refer to Appendix 5)
Base Source: LPI 2004

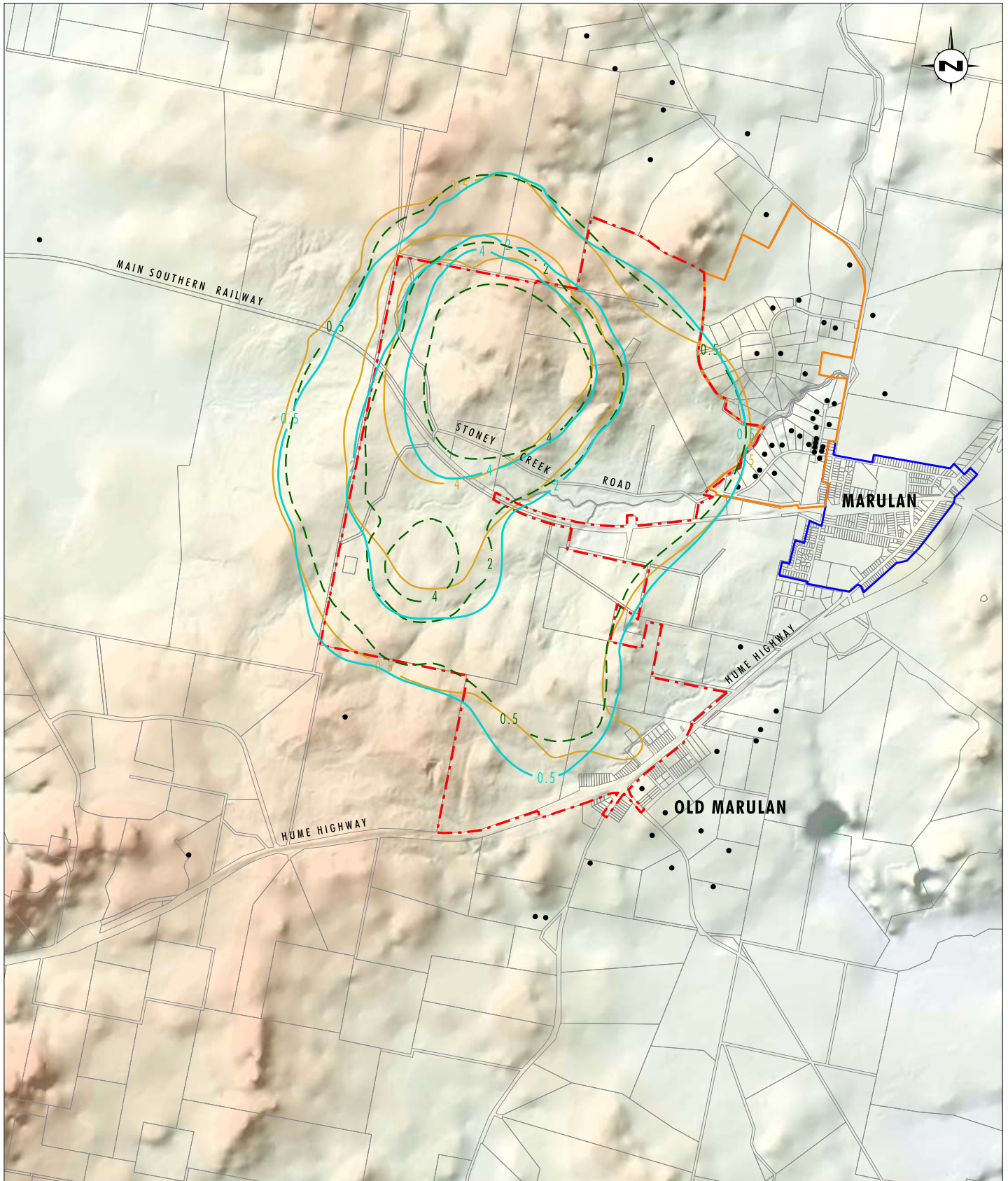
0 0.5 1 2km
1:42 000

Legend

- - - Project Area
- Proposed Modification TSP Annual ($90\mu\text{g}/\text{m}^3$ - consent criteria)
- Originally Approved TSP Annual ($90\mu\text{g}/\text{m}^3$ - consent criteria)
- - - Approved Modification TSP Annual ($90\mu\text{g}/\text{m}^3$ - consent criteria)
- Residence
- Marulan Residential Area
- Marulan Rural Residential Area

FIGURE 6.7

Annual Average TSP
Contours Year 30



Source: Holmes Air Sciences, 2005 (Refer to Appendix 5)
Base Source: LPI 2004

0 0.5 1 2km
1:42 000

Legend

- - - Project Area
- Proposed Modification Dust Deposition Annual (total 4g/m²/month - consent criteria)
- Originally Approved Dust Deposition Annual (total 4g/m²/month - consent criteria)
- - - Approved Modification Dust Deposition Annual (total 4g/m²/month - consent criteria)
- Residence
- Marulan Residential Area
- Marulan Rural Residential Area

FIGURE 6.8

Annual Dust Deposition
Contours Year 30

6.5.4 Dust Management

The dust management controls to be implemented for the modified Quarry will include:

- Holcim has purchased a significant land buffer around the quarry, significantly reducing the potential for adverse air quality impacts on privately owned land;
- enclosing conveyors on the top and on one side;
- enclosing the crushing and screening plant and the fitting of a dust extraction system;
- dust suppression sprays or dust collection systems on the primary crusher(s);
- fitting drills with either water sprays or dry dust collection devices;
- controlling stockpiles of fine material with water sprays;
- confining traffic to identified haul road routes;
- removal and rehabilitation of unnecessary roads;
- keeping exposed areas to a minimum;
- watering of haul roads;
- cleaning of areas which could become sources of windblown dust due to build-up of settled fine material;
- reviewing meteorological conditions prior to blasting to minimise the exposure of residences to dust emissions; and
- daily assessment of meteorological conditions to identify wind conditions that may be conducive to excessive dust generation – for example, very high winds, so that proactive measures can be taken to modify operations, as required, to reduce dust impacts.

In accordance with Condition 14 of Schedule 3 of the Consent, Holcim prepared an Air Quality Monitoring Program for the Quarry in consultation with DECCW. The program was subsequently approved by the Director-General of DoP. Ongoing air quality monitoring for the Project will be implemented in accordance with the approved Air Quality Monitoring Program and the EPL.

6.6 Noise Assessment

A detailed Noise Impact Assessment has been completed to assess the potential noise impacts of the proposed modifications by Heggies Pty Ltd (Heggies). The Noise Impact Assessment was completed in accordance with Australian Standard AS1055-1997 “*Description and Measurement of Environmental Noise*” Part 1, 2 and 3, and the NSW Industrial Noise Policy (INP), and with reference to the Environmental Noise Control Manual (ENCM) and Interim Construction Noise Guideline. The proposed modifications will result in changes to the initial development of the quarry pit, the primary crusher arrangements and the layout of the remaining site infrastructure. These changes have the potential to alter the noise impacts from the Quarry and therefore an assessment of noise impacts associated with the proposed modifications was completed.

The Noise Impact Assessment for the proposed modifications is included as **Appendix 6**. A summary of the key findings of the assessment is included below.

6.6.1 Noise Criteria

The noise criteria for the Quarry are specified in Condition 3 of Schedule 3 of the Consent. These criteria were generally derived from the Project Specific Noise Levels (PSNLs) determined for the Quarry as part of the EIS process and in accordance with the INP. A significant number of the consent noise goals are, however, lower than the PSNLs as DECCW's general terms of approval for the Quarry consent contained noise limits based primarily on noise impact predictions contained in the EIS as opposed to using the PSNLs. Therefore, the noise criteria as stipulated in the Consent and as used in this assessment of noise impacts associated with the proposed modifications, are more stringent than the PSNLs for the Quarry calculated in accordance with the INP. A table containing the noise criteria for the Quarry is provided in **Appendix 6**.

DECCW released Interim Construction Noise Guideline (ICNG) in July 2009, specifying new criteria for the assessment of construction phase noise impacts. These criteria are detailed in **Appendix 6**. The noise impacts of the Quarry during the construction phase were reassessed to compare the predicted impacts to these new guidelines.

6.6.2 Assessment Methodology

Modeling of the predicted noise levels from the modified Quarry project was undertaken in accordance with the INP and in a manner that was generally consistent with the modeling approach undertaken for the original noise assessments included in the EIS and the assessment undertaken for the 2009 modification. The assessment included calculation of single point noise calculations for the same residential receiver locations used in the previous assessments. The meteorological conditions modeled were also consistent with those used in the assessments.

Three representative operational years were selected for noise modeling being years 5, 10 and 30. These years were selected as they are considered to represent the range of operational phases that will be experienced at the Quarry and re-considered the worst case scenarios identified in the original assessment.

6.6.3 Noise Impact Assessment Findings

The Noise Impact Assessment for the proposed modifications has identified that the noise impacts from the Quarry, with the proposed modifications, are predicted to comply with the consent noise criteria at all sensitive receiver locations under both calm and prevailing meteorological conditions with appropriate noise controls in place (refer to **Appendix 6**).

Noise modeling was also conducted for sleep disturbance in acoustically adverse weather conditions, including temperature inversion and relevant drainage flow winds. The assessment found that the maximum noise levels are predicted to be below sleep disturbance criteria specified in the consent for night-time operation of the Quarry. This being the case, sleep disturbance is unlikely to occur at residential locations surrounding the Quarry.

The assessment also found that the predicted noise levels from the Quarry with the proposed changes to the operation and layout of the Quarry are generally similar to the predicted noise levels of the approved Quarry. Although noise levels at certain assessment locations do increase, these levels do not exceed the noise limits specified in the development consent

conditions. A comparison of the noise impacts of the proposed modification and the approved Quarry is provided on **Figure 6.9**.

In regard to noise impacts during the construction phase, the noise impact assessment modeled the worst case scenarios for both the earthworks and foundation works phases. These are considered to be the phases with the potential worst case impacts during the construction phase. The assessment found that noise levels for earthworks and foundation works are predicted to meet the construction noise goals at all sensitive receiver locations.

Based on the findings of the noise assessment, the proposed modifications are not predicted to result in significant noise impacts and are not predicted to significantly change noise impacts when compared to the approved Quarry.

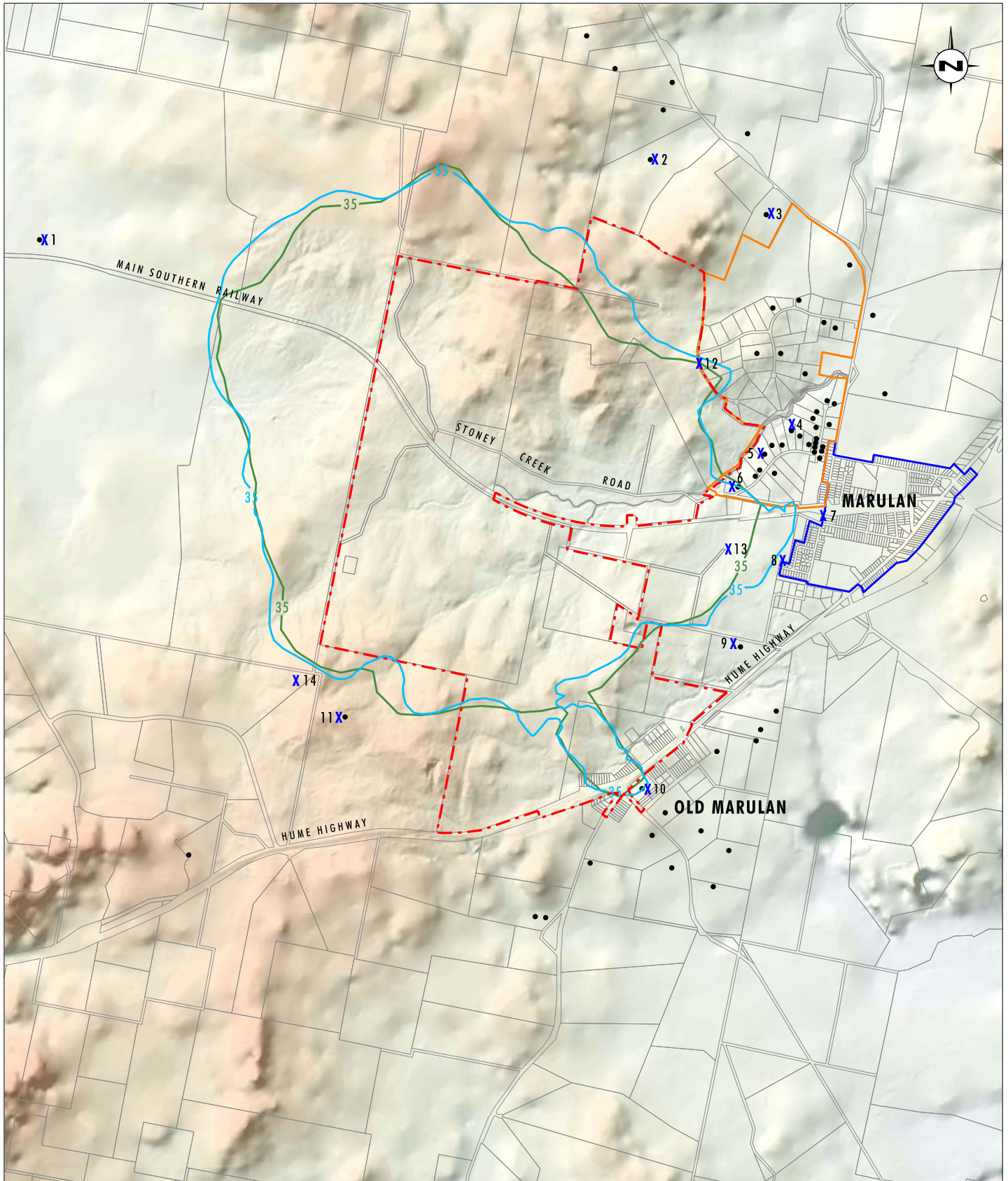
6.6.4 Noise Management

The Quarry has been designed to incorporate a range of noise management measures to minimise the potential for noise impacts on surrounding residential receivers as outlined in the EIS (Umwelt, 2005a) and the SEE (Umwelt, 2009a). The following additional noise management measures are an outcome of the proposed modifications:

- drilling will only occur during the daytime period;
- the stockpile loader and dump truck will only operate during the daytime period;
- the pugmill will only operate during the daytime and evening period;
- the primary crusher will only operate during the daytime and evening period;
- only one sales loader will operate during the night-time period; and
- the rough terrain forklift will only operate during the daytime period.

The existing engineering and management controls for the approved Quarry are as follows:

- Engineering controls:
 - all crushing and screening facilities are enclosed by buildings, including the primary crusher;
 - the pug mill is enclosed by a building;
 - the scalps screen has a rubber screen deck;
 - train loading bins are lined on the base to reduce impact noise when bins are being loaded from empty; and
 - trucks dumping the leading row of overburden on the eastern overburden emplacement area will have attenuation to a maximum sound power level of 111 dBA when dumping.
- Management Controls:
 - drilling will only occur during the daytime period;
 - the grader will operate during the daytime only;
 - the overburden removal and emplacement fleet will operate during the daytime only;



Source: Holmes Air Sciences, 2005 (Refer to Appendix 5)
Base Source: LPI 2004

0 0.5 1 2km
1:42 000

Legend

- - - Project Area
- Proposed Modification Noise Level (dBA)
- Approved Quarry Predicted Noise Level (35dBA)
- Residence
- X14 Noise Assessment Location
- Marulan Residential Area
- Marulan Rural Residential Area

FIGURE 6.9

Worst Case Noise Contours during Calm Meteorological Conditions Year 10 - Comparison between Approved and Proposed Projects

- when operating on the eastern emplacement areas, the majority of operations occurring on the top of the emplacement areas will occur behind an earth mound created by the first row of dumping;
- no dumping will occur on the leading edge of either the eastern overburden emplacement area or the eastern excess product emplacement area while the dozer is operating on the leading face;
- the load and haul fleet will operate during the daytime and evening only; and
- the number of finished product trucks at night shall be limited to 32 movements per hour.

Holcim is committed to achieving the noise mitigation outcomes achieved by the above management controls. As technological advances occur and through implementing operational management controls, Holcim may be able to achieve the same noise mitigation outcomes through alternative means. Holcim may therefore modify the above management controls in response to these technological advances or operational controls, provided that the same overall noise management outcomes are achieved.

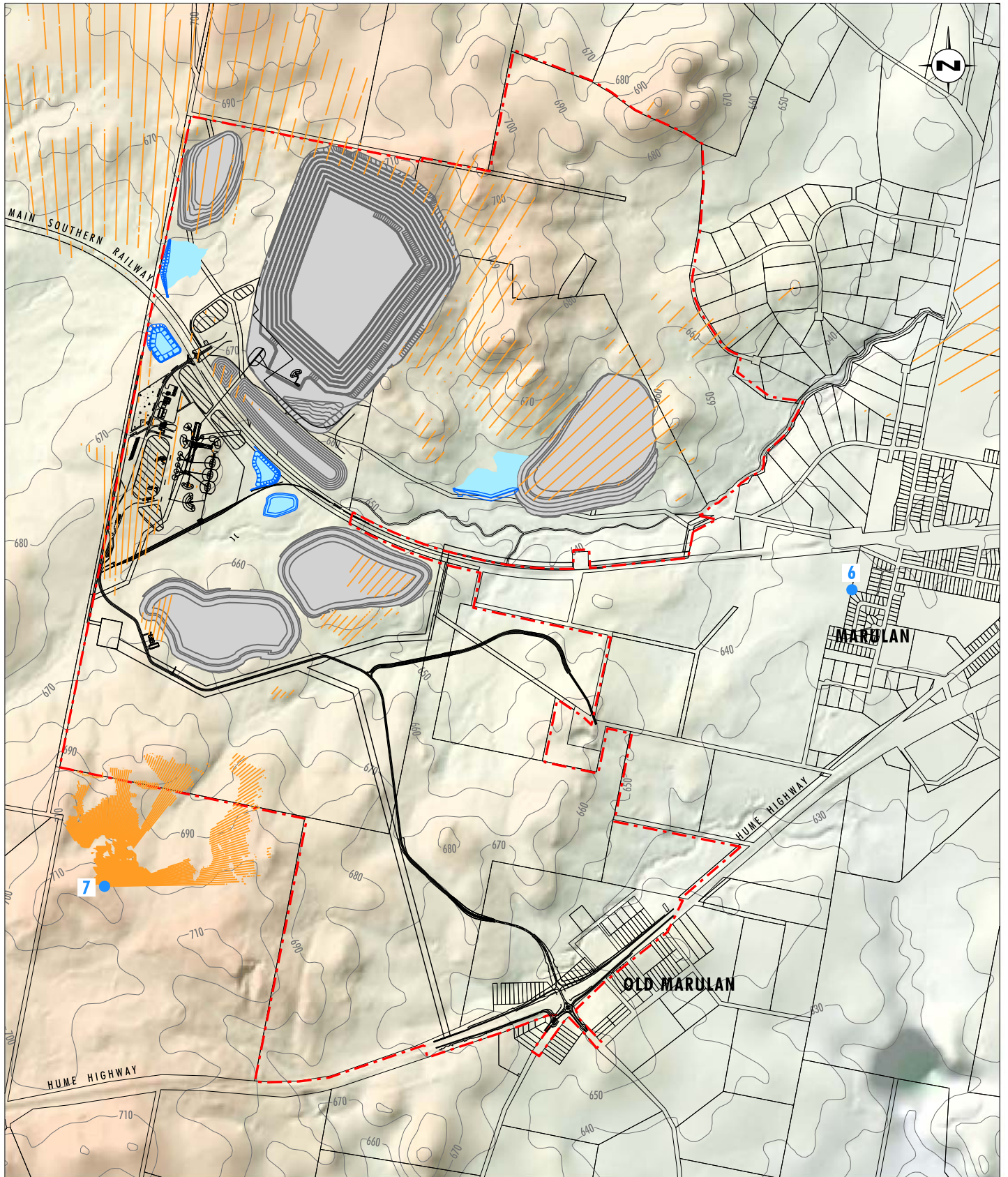
6.7 Visual Assessment

A detailed visual assessment was undertaken as part of the EIS (Umwelt, 2005a), identifying that the key features of the Quarry that will be visible from surrounding residential areas will be the overburden and excess product emplacement areas. These emplacement areas will be progressively rehabilitated so that the visual impacts are reduced to the minimum duration possible. The assessment also found that views of Quarry infrastructure would not be possible from most locations, with limited views possible from two residential locations. The most significant views would be from a residence from the south of the Quarry located on an elevated area (Assessment Point 7 as shown in **Figure 6.10**). The other residential area with potential views are residences on the western margins of Marulan near the Main Southern Railway which were identified as having potential long distance views of the most elevated points in the infrastructure area.

There are two aspects of the proposed modification that have potential to alter the visual impacts of the Quarry. These are the reconfiguration of project infrastructure and the slight change to the western excess product emplacement area. These components, their general nature (such as height) and general location remain unchanged.

As indicated on **Figure 6.10**, the residence at Assessment Point 7, which is located on an elevated area of land to the south of the Project Area, will have potential views across the majority of the Quarry and associated works. These views are expected to be partially shielded by intervening vegetation. The visible areas from Assessment Point 7 are shown on **Figure 6.10**, indicating that from this location and based on topography (i.e. no allowance for screening vegetation) the western excess product emplacement area and parts of the infrastructure area will be visible. This assessment outcome is consistent with the findings of the assessment for the approved Quarry and there are not predicted to be significant differences in the visual impacts from this location.

The potential views from Assessment Point 6 (refer to **Figure 6.11**), indicate that based on topography (i.e. no allowance for screening vegetation) glimpses of the infrastructure area may be visible. It is likely that intervening vegetation will screen the majority of these potential views. As there are no significant difference to the components or heights of the buildings in the infrastructure area when compared to the approved Quarry, there are not predicted to be any significant changes in visual impacts at this location as a result of the proposed modifications.



Base Source: LPI 2004, CEMEX Pty Ltd

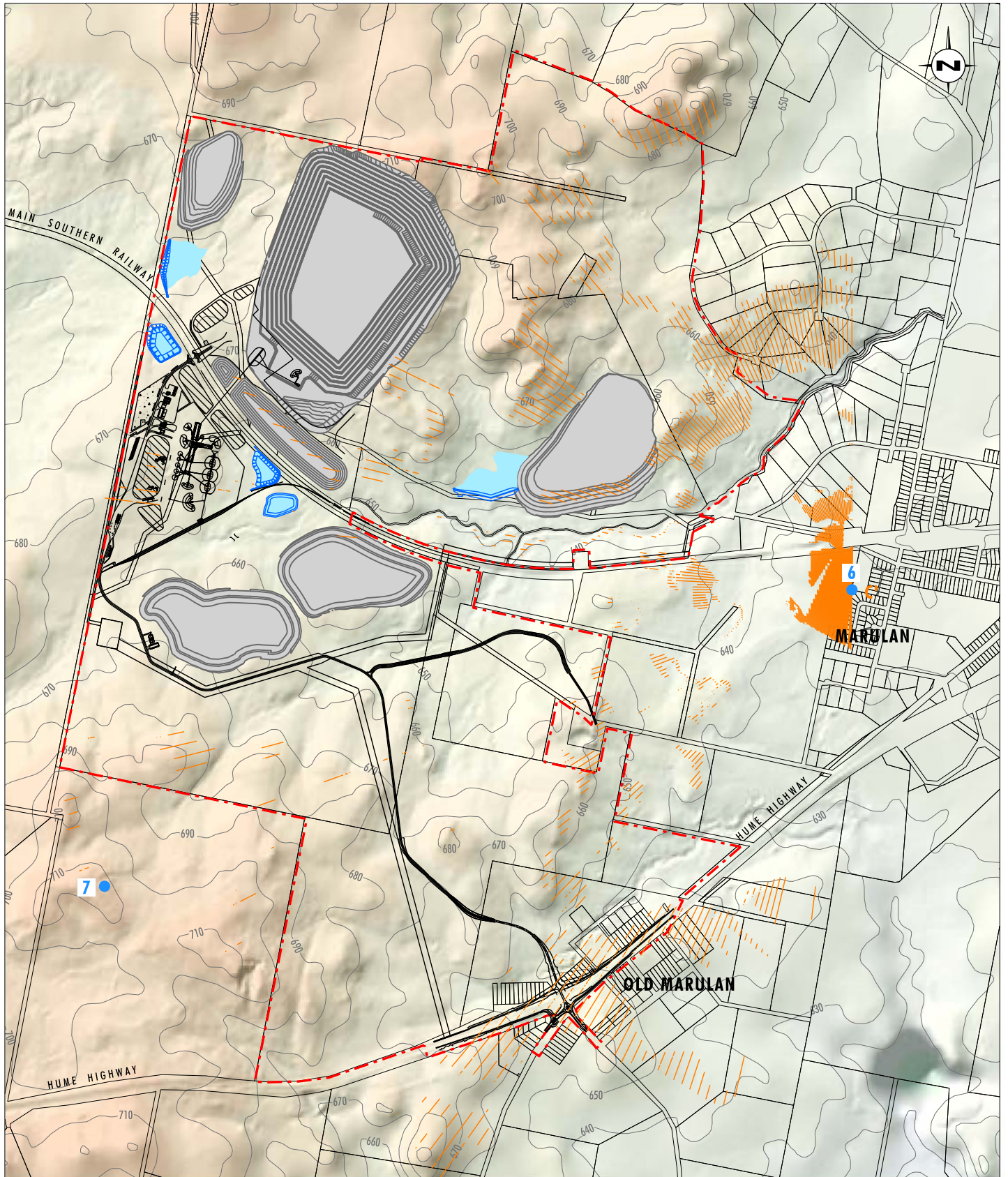
0 0.5 1 1.25km
1:25 000

Legend

- - - Project Area
- Assessment Point
- ▨ Areas visible from Location 7

FIGURE 6.10

**Project Visibility from
Location 7**



Base Source: LPI 2004, CEMEX Pty Ltd

0 0.5 1 1.25km
1:25 000

Legend

- - - Project Area
- Assessment Point
- ▨ Areas visible from Location 6

FIGURE 6.11

Project Visibility from
Location 6

The potential views from a new residence located to the south-west of the Project Area that did not exist at the time of preparation of the EIS (Umwelt, 2005a), referred to as Assessment Point 10 (refer to **Figure 6.12**) also require assessment. The potentially visible areas from this location are shown on **Figure 6.12** and are considered to be consistent with the views that would have been associated with the approved Quarry, as there are no significant differences to the components or heights of the buildings in the infrastructure area. The views from this area are mainly shielded by intervening topography and vegetation. However, some views are likely to be possible of the infrastructure and emplacement areas, although the visual impacts are not expected to be significant from this area, given that the glimpses of the infrastructure and emplacement area will be from a distance of approximately 2.5 kilometres.

Consistent with the commitments regarding the approved Quarry, the buildings in the infrastructure area will be coloured in natural tones and the emplacement areas will be progressively rehabilitated to reduce potential visual impacts.

Views of project infrastructure and the Quarry pit will also be available to commuters traveling along the Main Southern Railway. However, as identified in the EIS for the approved Quarry (Umwelt, 2005a), the duration of these views will be very short due to the speed of the trains. The proposed modifications are not expected to alter the nature of these impacts.

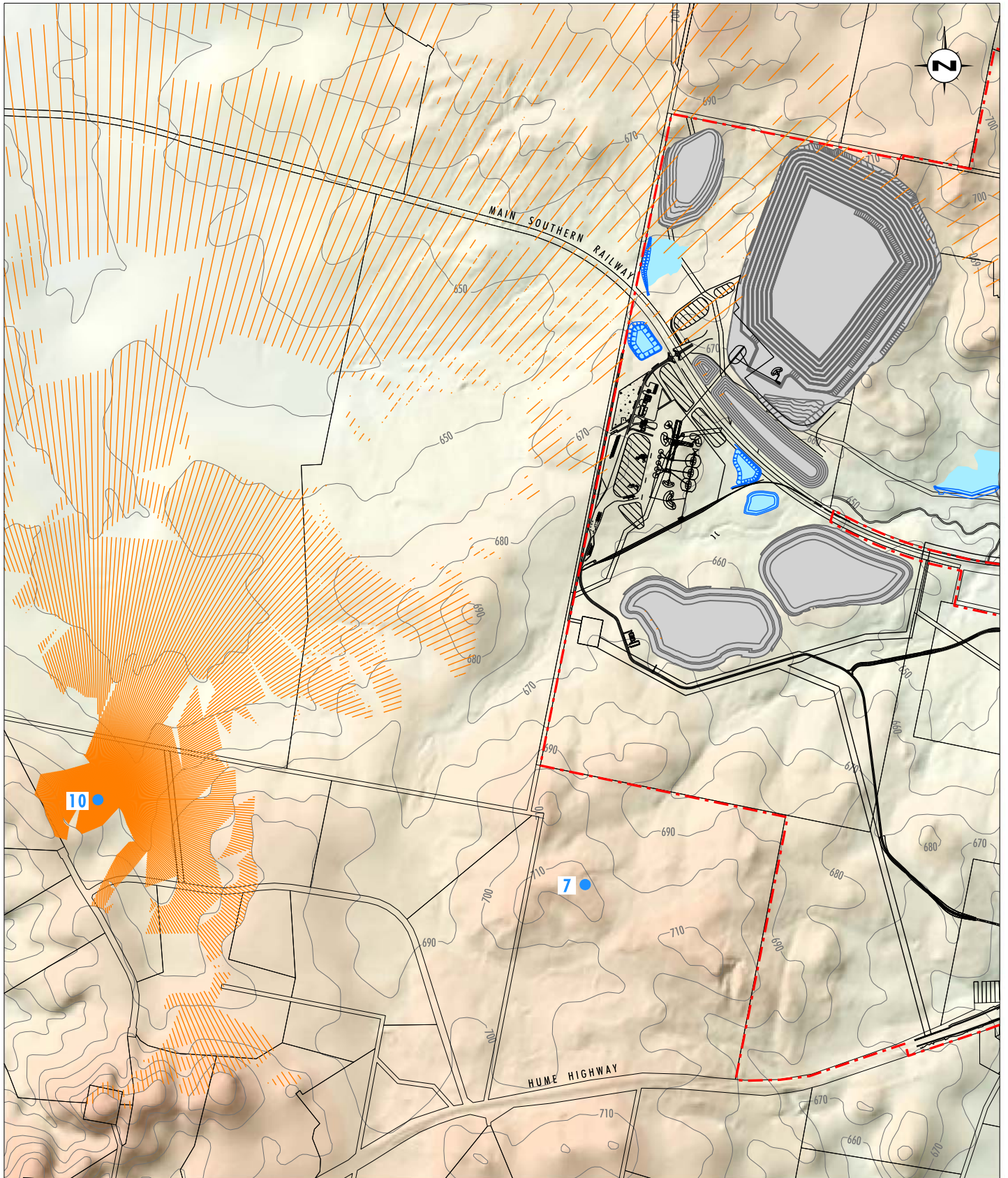
In summary, the proposed modifications are not expected to significantly alter the visibility of the Quarry or the nature of impact of the Quarry on the existing visual amenity.

6.8 Greenhouse Gas and Energy

Although there are changes proposed to the infrastructure layout and initial quarry pit development, the potential for the proposed modifications to significantly change the energy use and greenhouse gas emissions compared to the approved Quarry is considered minimal. There are no significant changes the project components, general location or operations and no significant changes expected to electricity or fuel usage. Therefore, total energy use and total greenhouse gas emissions associated with the proposed modified project are considered to be consistent with those of the approved Project.

As previously committed for the approved Quarry, Holcim will review opportunities for reducing energy consumption on an ongoing basis during the detailed design process and once the operation has commenced including:

- setting energy use and greenhouse emission reduction targets;
- using energy monitoring and auditing as a management tool;
- providing training on energy management to site personnel;
- monitoring the fuel efficiency of diesel equipment;
- considering the energy efficiency of new equipment when making purchasing decisions; and
- using high efficiency electric motors.



Base Source: LPI 2004, CEMEX Pty Ltd

0 0.5 1 1.25 km
1:25 000

Legend

- - - Project Area
- Assessment Point
- /// Areas visible from Location 10

FIGURE 6.12

Project Visibility from
Location 10

Holcim's performance in regard to energy efficiency and minimisation of greenhouse gas emissions is driven by its Environmental Policy which commits that Holcim will:

- ensure energy efficiency, optimum use of raw materials and the reduction of waste in all operations; and
- respond to the challenges presented by climate change by identifying opportunities to reduce its carbon footprint.

Holcim designs and manages its operations to achieve these commitments and this approach will be applied to Lynwood Quarry.

6.9 Transport

6.9.1 Construction Traffic

As outlined in **Section 3.2.6**, the approved construction access routes to be utilised for the Quarry have to be modified from those in the original EIS (Umwelt, 2005a) as the RTA has recently closed the Marulan cross median intersection on the Hume Highway. This means that the construction traffic requiring access to the southern portion of the Project Area when travelling on the southbound lanes of the highway will need to utilise alternative access points to Portland Avenue (refer to **Figure 3.5**). The alternative routes considered suitable for construction traffic, in consultation with the RTA, are as follows:

- construction traffic travelling on the northbound lanes on the Hume Highway can still use the approved route;
- construction traffic travelling on the southbound lanes on the Hume Highway could access Portland Avenue via the following routes:
 - exiting the Hume Highway at the truck inspection stations and going through the Marulan Township to access Portland Avenue via George Street (with no heavy vehicle movements around Marulan Public School during school zone times i.e. 8:00 am to 9:30 am and 2:30 pm to 4:00 pm); and
 - prior to the commencement of construction of the Hume Highway South Marulan Road interchange, south bound traffic could utilise the existing truck parking area at South Marulan Road to turn right onto the Hume Highway and use the approved route.

Both of these routes will be used to access the Project Area until the interchange is constructed.

The original EIS (Umwelt, 2005a) assessed the impacts associated with construction traffic volumes based on the busiest 5 month period of construction activities, where it was estimated that 135 vehicle trips per day (i.e. 270 vehicle movements per day), which includes 18 vehicle trips per day for heavy vehicles, would access the site via Portland Avenue. The overall construction timeframe is estimated to be 24 months. As part of its detailed review of the project, Holcim has re-estimated the construction traffic volumes for the project. The estimated light vehicle movements remain unchanged, however, the estimated average daily heavy vehicle traffic movements have increased in the 15 to 18 month construction period prior to the commissioning of the Hume Highway interchange, from 18 vehicle trips per day to 30 vehicle trips per day. The increase in heavy vehicles, for this period, is necessary to allow the concurrent scheduling of site mobilisation and interchange works, allowing the interchange to be commissioned earlier than originally anticipated. It should also be noted

that the heavy vehicle movements referred to in the original EIS included trips associated with the sale of product as well as construction traffic, however, Holcim is no longer proposing to sell product prior to the commissioning of the interchange.

In addition to the revised heavy vehicle traffic volumes outlined above, the construction access routes now required for vehicles travelling south on the Hume Highway and vehicles leaving the site and travelling south will now involve the use of George Street and then Brayton Road to access the Hume Highway. George Street is the main street of Marulan Township and therefore has a number of shop frontages and the Marulan Public School.

The construction phase traffic impacts of the project will be managed in accordance with a Construction Traffic Management Plan prepared in accordance with Condition 28 of Schedule 3 of the consent. This plan is required to be prepared in consultation with the RTA, Council and the Department of Lands and is to be approved by the Director-General of DoP. The plan will include measures to:

- maintain the public roads;
- minimise the potential noise and safety impacts associated with the construction traffic; and
- keep the community informed of any traffic disruptions that would be caused by the development.

The Construction Traffic Management Plan will also include a Road Dilapidation Report of the public roads on the construction access routes. Holcim will maintain these roads during the construction phase to ensure for safe use for all road users. Other specific management requirements for construction phase traffic resulting from the changes in access routes due to the RTA road closures will be discussed with the relevant roads authorities (in particular Council, the roads authority for George Street and Brayton Road) to ensure that construction phase traffic impacts are reduced to as low as possible.

The original EIS (Umwelt, 2005a) also outlined the construction traffic volumes required to access the northern portion of the Project Area via Stoney Creek Road. The traffic volumes in the original EIS were limited to 10 light vehicle trips per day on Stoney Creek Road, plus 10 heavy vehicle trips in the early months of construction (these movements would be under escort). As part of the proposed modifications Holcim is now seeking approval for 20 heavy vehicle trips per day on Stoney Creek Road, with a maximum of 45 heavy vehicle trips per day over a 90 day period, when material from the Project Area will be transported to the Hume Highway interchange to be used for construction. These additional movements will allow Holcim to utilise local resources from the initial pit excavation for the interchange construction rather than importing material from elsewhere, reducing the overall delivery distance associated with this material. Access to the eastern side of the interchange is not possible directly from the site and therefore trucks hauling fill material to this area must go through Marulan to access the Highway.

The use of Stoney Creek Road is estimated to be for a period of approximately 8 months prior to the commissioning of the rail bridge in the Project Area, which will allow access via the main construction access route along Portland Avenue and Wilson Drive. The Construction Traffic Management Plan will also address the use of Stoney Creek Road during the construction phase.

To minimise the impacts associated with the alternate access routes (refer to **Figure 3.5**) on the Marulan Township and Marulan Public School, heavy vehicles will be limited to accessing the Project Area outside of school zone times (i.e. 8:00 am to 9:30 am and 2:30 pm to 4:00 pm on school days) wherever practicable, unless they are done under escort.

6.9.2 Rail

The original EIS (Umwelt, 2005a) sought approval for product to be moved by rail from the Quarry with an average of four trains per day and a maximum of six trains per day. The required number of trains, as a result of the proposed modifications, has risen slightly from an average of 4 trains per day to 4.5 trains per day due to the intent to use smaller trains, however, the maximum number of trains required for product transportation will not increase from six. As such, the potential impacts associated with train movements for the Quarry, based on the worst case scenario (i.e. six trains per day), are considered to be consistent with those outlined in the original EIS (Umwelt, 2005a).

6.10 Soils, Land Capability and Agricultural Suitability

6.10.1 Soils

Soil landscape mapping of the Marulan region has been undertaken by DIPNR (2003) at 1:100,000 scale. As the proposed modifications result in an increased disturbance footprint of approximately 10.5 hectares (equating to approximately 1% of the disturbance footprint for the approved Quarry), impacts to soils in this additional area need to be assessed as part of this EA.

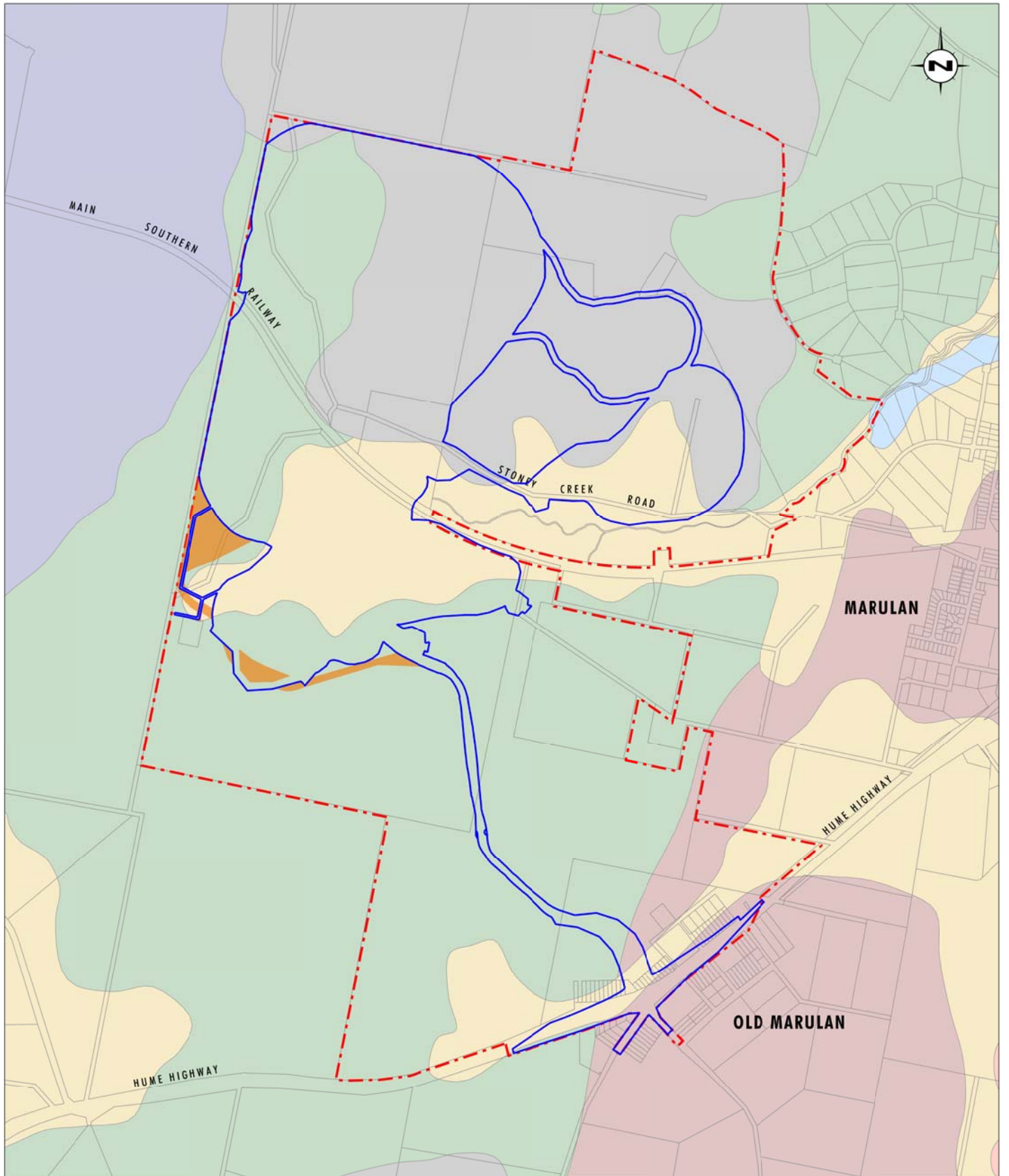
There are four soil landscape units that occur in the Project Area (refer to **Figure 6.13**). These four landscape units include the Bindook Road soil landscape, Bindook Road variant A soil landscape, Jaqua soil landscape and Marulan soil landscape. There are two soil landscape units present in the additional 10.5 hectares to be disturbed, being the Bindook Road and Jaqua soil landscapes.

These two soil landscapes are generally characterised as having a weak sandy loam material in the A1 horizon, with the subsoils being clayey in nature. These soils generally have a moderate to high concentrated and non-concentrated flow erodibility and a moderate to severe gully erosion risk, with gully erosion present in many drainage lines in the Project Area. Some subsoils within these soil landscape groups are dispersive. In addition, the fertility of the soil is low over the majority of the Project Area with some small patches having moderate fertility. Lower slopes are generally poorly drained with soils generally having moderate to high salinity. The plant available water holding capacity (PAWC) of the soils is moderate to low across the site.

The potential impact to soils associated with the proposed modifications is expected to be minimal as the area is relatively small when compared to the approved disturbance footprint (approximately 1%) and the area contains generally poor quality soils. The management measures for impacts to soils associated with water are outlined in **Section 6.4.2** relating to erosion and sediment control and **Section 6.11**, which relates to the rehabilitation of disturbed areas.

6.10.2 Land Capability

A detailed assessment of the land capability, defined as 'the ability of the land to accept a type of intensity of use permanently, or for specified periods under specific management, without permanent damage' (Houghton and Charman 1986), of the Project Area was undertaken for the original EIS (Umwelt, 2005a). As the proposed modifications result in an additional disturbance footprint of approximately 10.5 hectares (equating to approximately 1% of the disturbance footprint for the approved Quarry), impacts to land capability in this additional area have been assessed as part of this EA.



Source: DIPNR, 2003
Base Source: LPI 2004

0 0.5 1 1.25 km
1:25 000

Legend

- - - Project Area
- Approved Disturbance Footprint
- Modified Disturbance Footprint
- Soil Landscape Units
- Bindook Road
- Jaqua
- Marulan
- Paddy's River
- Lockyersleigh
- Bindook Road Variant A

FIGURE 6.13
Soil Landscape Units

Rural land capability classes for NSW have been developed by the former NSW Soil Conservation Service (now a division of the Land and Property Management Authority (LPMA)). This classification divides land capability into eight classes based on the biophysical characteristics of the land and the extent to which these will limit a particular land use. The relevant classification classes associated with the proposed modifications are provided in **Table 6.9**. The classifications outline the types of land uses which may be appropriate for a location and also the potential land management practices which may need to be undertaken to protect the productivity of the land.

Table 6.9 – Relevant Land Capability Classes

General Capability	Land Capability Classes	Interpretations and Implications
Suitable for grazing and occasional cultivation	IV	Land not suitable for cultivation on a regular basis owing to limitations of slope gradient, soil erosion, shallowness or rockiness, climate, or a combination of these factors. Comprises the better classes of grazing land.
	V	Land not suitable for cultivation on a regular basis owing to considerable limitations of slope gradient, soil erosion, shallowness or rockiness, climate, or a combination of these factors. Soil erosion problems are often severe. Production is generally lower than for grazing lands in Class IV.

Source: Emery (1986)

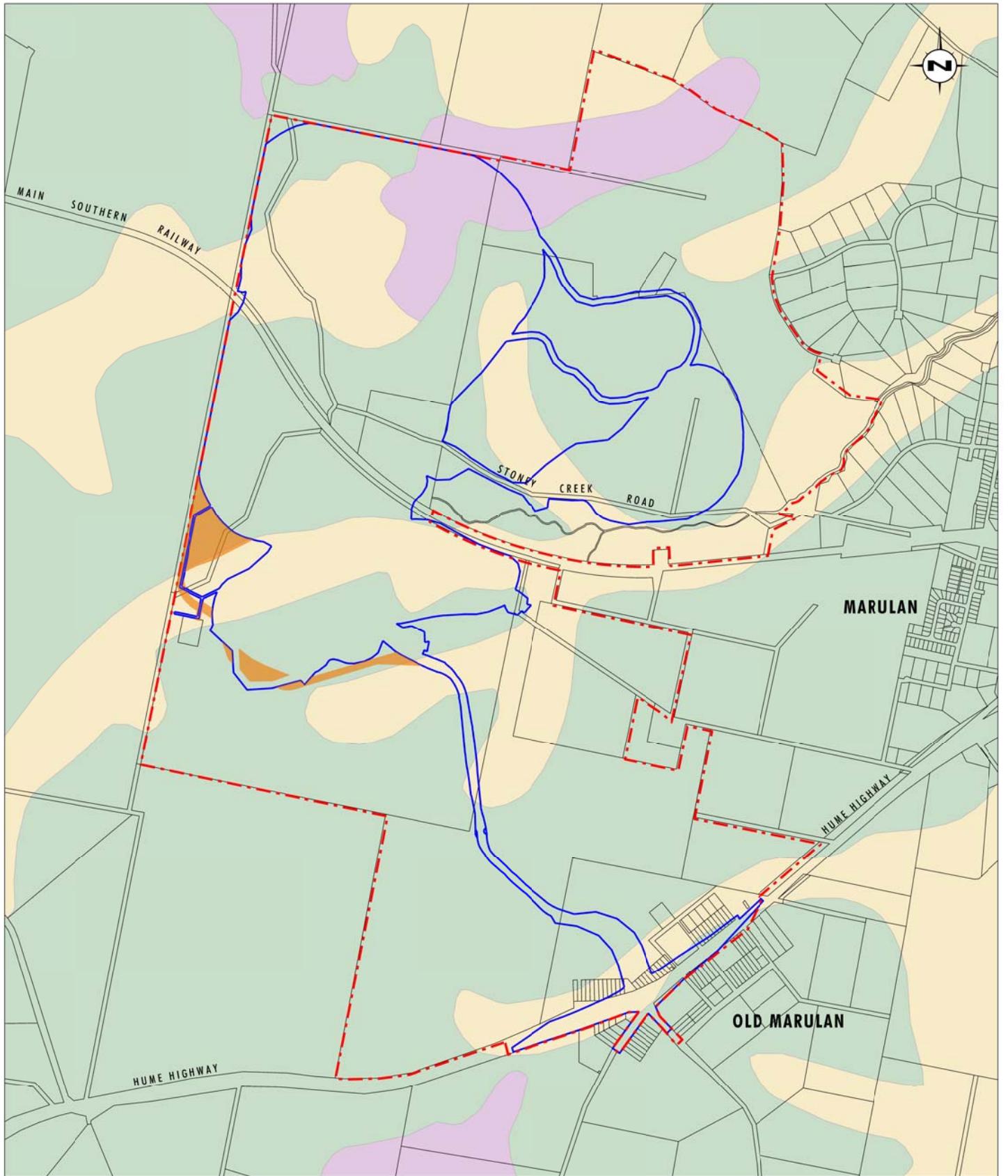
The land capability classes within the additional area subject to disturbance associated with the proposed modifications are capability Classes IV and V (refer to **Figure 6.14**). The majority of the additional disturbance area is classified as Class V land, that is, land which is suitable for grazing and occasional cultivation, and is generally land occurring in the vicinity of drainage lines including along the main channel and tributaries of Joarimin Creek.

Class IV land requires a number of soil conservation measures to be implemented in order to maintain its agricultural productivity. Recommended measures include pasture improvement, stock control, application of fertiliser and minimal cultivation for establishment and re-establishment of permanent pasture as necessary. Class V land requires these same measures to ensure ongoing productivity, however, it is also recommended that structural conservation works such as absorption banks, diversion banks and contour ripping may be required.

The additional 10.5 hectares of land subject disturbance associated with the proposed modifications is, and has historically been, used for low intensity grazing. Based on the findings of the archaeological investigation works, there has also been some past cultivation of the area. Holcim has committed to appropriate ongoing agriculturally productive use of the land within the Project Area for areas that are not required for quarrying activity or that need to be protected due to their ecological, cultural or archaeological values. Management measures in this regard are specified in the approved Rehabilitation and Landscape Management Plan for the Quarry.

6.10.2.1 Post Quarrying Land Capability

As discussed in the approved Rehabilitation and Landscape Management Plan and **Section 6.11**, the approved disturbance footprint is planned to be rehabilitated to establish increased areas of native vegetation with a ground cover of native grasses. The rehabilitated area will be suitable for managed grazing, however, it is proposed to manage the area



Source: Soil Conservation Service, 1986
Base Source: LPI 2004

0 0.5 1 1.25km
1:25 000

Legend

- - - Project Area
- Approved Disturbance Footprint
- Modified Disturbance Footprint
- Class IV
- Class V
- Class VI

FIGURE 6.14
Existing Land Capability Classes

predominantly for its habitat values, particularly the area north of the Main Southern Railway. The quarry pit itself will be rehabilitated through the establishment of trees on the final quarry benches (Umwelt, 2005a; Umwelt, 2009a).

The anticipated post quarrying land capability is shown on **Figure 6.15**.

The post quarrying land capability of the increased disturbance footprint is expected to be predominately Class V and VI, that is, land which is suitable for grazing but not for cultivation.

6.10.3 Agricultural Suitability

A detailed assessment of the agricultural suitability of the Project Area was undertaken as part of the EIS (Umwelt, 2005a). As the proposed modifications result in an additional disturbance footprint of approximately 10.5 hectares, impacts to agricultural suitability in relation to the increased disturbance footprint require assessment. The findings are outlined below.

Agricultural suitability is an assessment of the potential agricultural productivity of an area of land. It is based on consideration of land capability together with limitations such as climatic factors, soil physical characteristics, soil chemical characteristics, erosion potential, drainage, stoniness, soil depth and topography. Agricultural suitability in NSW has been classified into five classes by NSW Agriculture, now Department of Industry and Investment (NSW Agriculture, 1988). These five classes are:

- Class 1 - suitable for intense cultivation;
- Class 2 - suitable for cultivation;
- Class 3 - suitable for grazing and pasture improvement;
- Class 4 - marginally suitable for grazing; and
- Class 5 - unsuitable for agriculture.

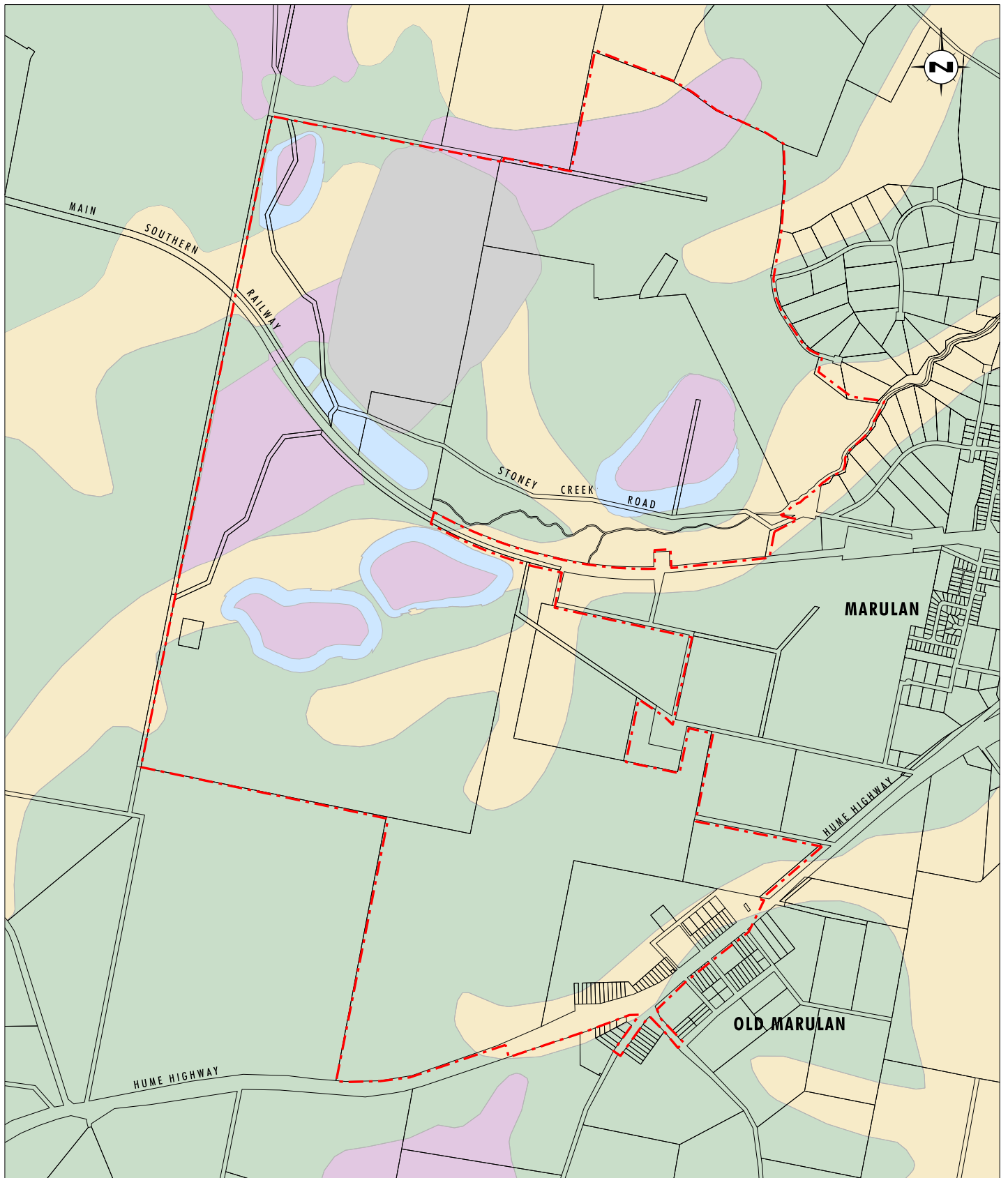
Agricultural suitability mapping of the additional area subject to disturbance associated with the proposed modifications indicates that one agricultural suitability class occurs, being Class 4 (refer to **Figure 6.16**). A more detailed description of the characteristics of Class 4 is included below (adapted from NSW Agriculture, 2002).

Class 4 – Land that is suitable for grazing but not suitable for cultivation. Agriculture is based on native pastures or improved pastures established using minimum tillage techniques. Production may be seasonally high but the overall production level is low as a result of major biophysical, social and economic constraints.

As shown on **Figure 6.16**, the area associated with the increase to the approved disturbance footprint is classified as Class 4 land, being marginally suitable for grazing but not suitable for cultivation. Based on the agricultural suitability mapping, the proposed additional disturbance footprint area does not contain high quality agricultural land.

6.10.3.1 Post Quarrying Agricultural Suitability

The agricultural suitability of the area associated with the proposed modifications will be Class 4. Native woodland/open forest vegetation with a native grass groundcover will be established on the rehabilitated emplacement areas and decommissioned infrastructure areas, with this land all being potentially suitable for low intensity managed grazing.



Base Source: LPI 2004

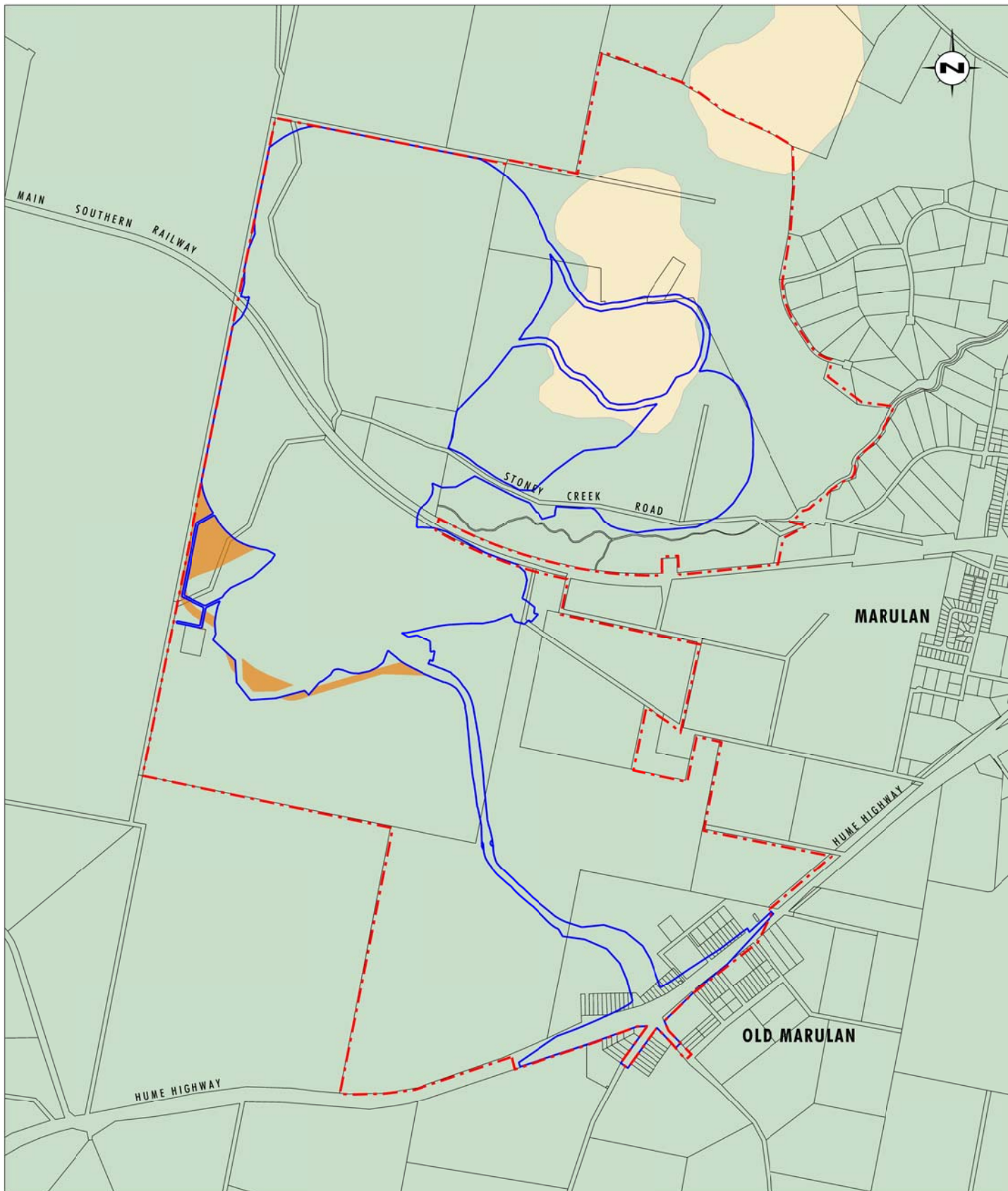
0 0.5 1 1.25km
1:25 000

Legend

- - - Project Area
- Class IV
- Class V
- Class VI
- Class VII
- Class VIII

FIGURE 6.15

Post Quarrying Land Capability



Source: NSW Agriculture, 1988
Base Source: LPI 2004

0 0.5 1 1.25 km
1:25 000

Legend

- - - Project Area
- Approved Disturbance Footprint
- Modified Disturbance Footprint
- Class 4
- Class 5

FIGURE 6.16
Agricultural Land Suitability

6.11 Rehabilitation

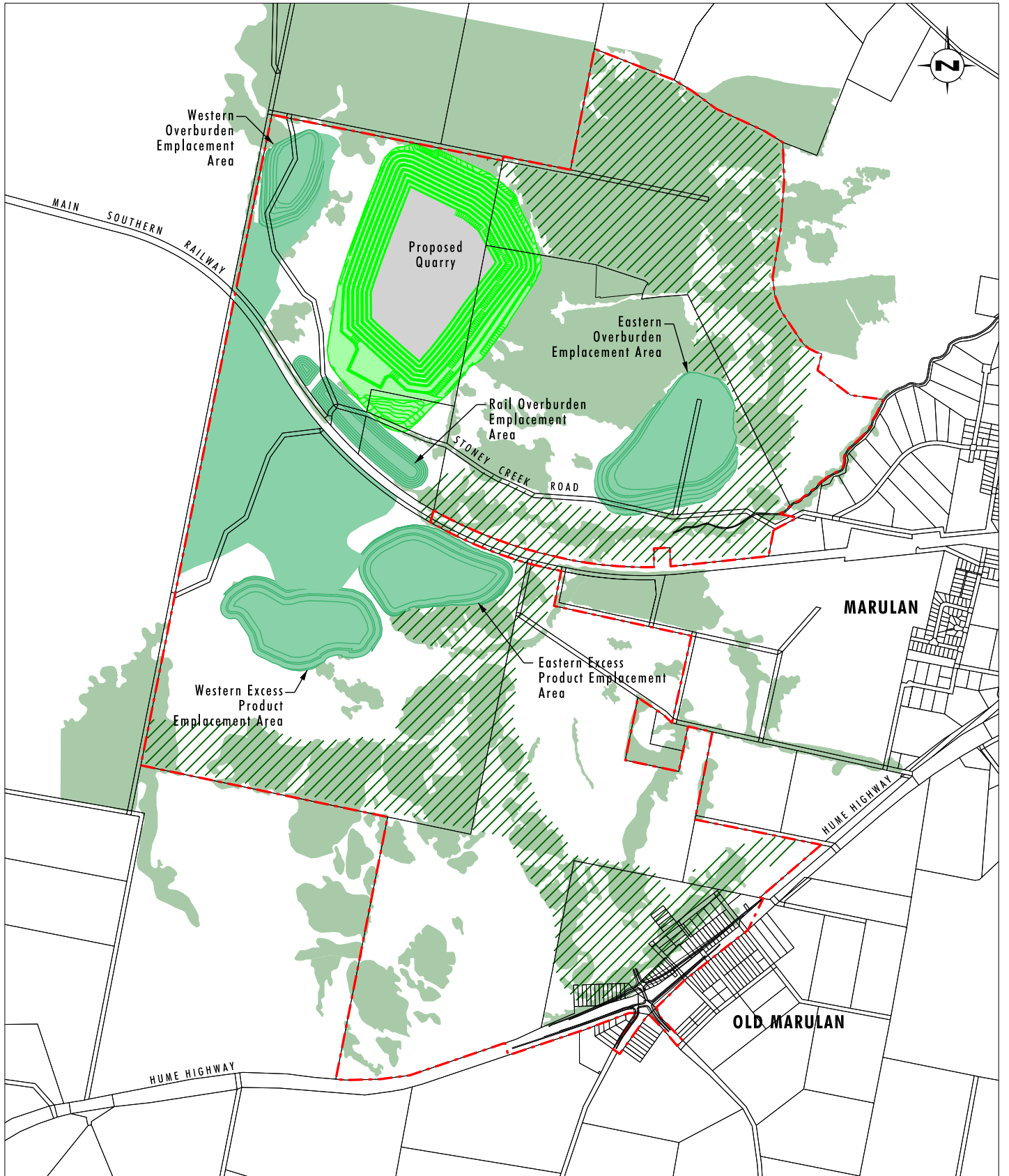
In accordance with Condition 44 of Schedule 3 of the Consent, a detailed Rehabilitation and Landscape Management Plan (Umwelt, 2006b) has been prepared for the Project. This plan provides a detailed description of the planned approach to rehabilitation of the Quarry, including the rehabilitation of the quarry pit. The only aspects of the proposed modifications which have the potential to revise the rehabilitation strategy outlined in the Rehabilitation and Landscape Management Plan are the slight change to the western edge of the western excess product emplacement area, the reconfiguration of the infrastructure layout and the small increase to the disturbance footprint. No changes are proposed to rehabilitation completion criteria or final land use.

The Rehabilitation and Landscape Management Plan prepared for the Quarry and approved by DoP provides a detailed description of the strategies that will be used to rehabilitate the areas disturbed by quarrying operations. These strategies will be applied to the modified aspects of the projects outlined above including:

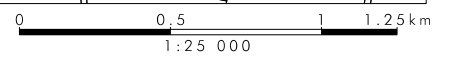
- the surface of the western excess product emplacement area will be shaped to have swales, small drainage hollows and a generally irregular landform to resemble the natural surrounding landform;
- shaped areas will be topsoiled using a 0.2 metre topsoil depth where possible, which is higher than the pre-quarrying average topsoil depth across the Project Area;
- areas where topsoil has been replaced will then be seeded with a native species and cover crop mix to achieve a woodland/open forest type native vegetation community;
- stripped topsoil will be placed in stockpiles no greater in depth than three metres and will be deep ripped and seeded if they are to remain in place for longer than six months;
- areas containing the surface infrastructure will be re-contoured. The reshaped areas will then be seeded with a native tree and grass species mix to establish woodland vegetation;
- all haul roads will also be removed and water management controls either removed or modified to assist in stabilisation of the final landform and to capture any sediment runoff from the rehabilitated areas; and
- surface habitat features consisting of large rocks, logs and trees from clearing undertaken in the Project Area will also be placed across the rehabilitated area. These features will provide potential fauna habitat and will aid in achieving a stable landform, with placed cleared trees also potentially acting as a local seed source.

The Rehabilitation and Landscape Management Plan (Umwelt, 2006b) includes a conceptual final rehabilitation plan for the Quarry, should the Quarry cease operations at the end of the currently approved Quarry life. A revised conceptual final rehabilitation plan for the proposed modifications to the approved Quarry is included as **Figure 6.17**.

Should the proposed modification be approved, the Rehabilitation and Landscape Management Plan will be updated to incorporate the proposed modifications.



Base Source: LPI 2004



Legend

- - - Project Area
- Existing Vegetation
- Rehabilitated Area
- Rehabilitated Quarry Batters
- Assisted Natural Regeneration (Habitat Corridor Function Enhancement)

FIGURE 6.17

Year 30 Conceptual
Final Rehabilitation

6.12 Socio-economic Assessment

The approved Quarry, once implemented, will provide significant socio-economic benefits. The key benefits include:

- the Project will provide a long-term, high quality supply of construction materials into the Sydney and regional markets. This supply is needed to replace supply from existing quarries that are nearing the end of their resources and is essential for the security and economic viability of the Sydney construction industry;
- when operating at full capacity, the Project will provide direct employment for approximately 115 people at the Quarry (including road transport drivers), flow-on employment for an estimated 129 people and security of employment for personnel working in Holcim's Sydney region concrete business; and
- the Project will also provide major economic benefits in the form of capital expenditure (approximately \$150M), wages (estimated at \$15M in construction wages and \$9M per annum in operational wages), annual operating expenditure, and through payment of State and Commonwealth taxes and fees.

A detailed social impact assessment was completed as part of the original development assessment and approval process, including a detailed community involvement program. This program demonstrated that the Quarry, at the time of approval, had the strong support of the local community with key findings including:

- the majority of the local community was supportive of the project, with approximately 80% of respondents to a random phone survey approving of the proposal;
- nearly all respondents (92%) believed the proposed Quarry would make an important contribution to the local economy and that it would not detract from the area (78%); and
- the majority of respondents (79%) believed that the benefits a quarry would bring to the area would outweigh any of the disadvantages.

Since the approval of the project, Holcim has been involved with the community on an ongoing basis through preparation of periodic community newsletters, sponsorship programs and open days associated with ongoing site activities such as the historical heritage investigations.

Specifically in relation to the currently proposed modifications, Holcim has undertaken an engagement program that has given the community opportunities to provide current feedback on the project. The feedback received has been generally positive and is primarily based around the desire for local employment opportunities and the new interchange intersection to be constructed as part of the project. Several issues of concern have also been raised by some community stakeholders as outlined in **Section 4.1.2.1**. These issues are addressed in the relevant environmental assessment sections throughout **Section 6.0**.

In regard to the proposed modifications, the findings provided in this EA have identified that the proposed modifications will not result in any significant changes to the environmental and social impacts when compared to the approved Quarry project. In particular, there are no proposed changes to the approved extraction rate or life of the Quarry, and there are no predicted changes in employment impacts. Therefore, the socio-economic impacts of the Quarry with the proposed modifications will remain consistent with those of the approved Quarry.

6.13 Overview of Cumulative Impacts

The potential cumulative impacts associated with the proposed modifications have been discussed throughout **Section 6.0** and are addressed in each of the relevant specialist reports included as appendices to this EA. The key points from these assessments are outlined below.

In regard to the cumulative impacts of the proposed modifications on soils, land capability and agricultural suitability, the proposed change in disturbance footprint is small, equating to approximately 1% of the disturbance footprint of the approved Quarry. Considering the very small extent of impact, the proposed modifications are not expected to result in significant cumulative impacts in related to these environmental aspects.

This EA has also identified that:

- there will be no significant change to visual impacts as a result of the proposed modifications;
- the proposed modifications will not result in significant impacts on ecological values;
- there will no significant change to rehabilitation outcomes as a result of the proposed modifications;
- there will not be any significant changes to the surface water impacts of the project with there not being any substantial changes to the water management system for the Quarry. The flooding impacts on property downstream of the Project Area remain consistent with the approved Quarry and the assessment has found that the project will continue to result in a neutral or beneficial effect on water quality. The proposed modifications will result in an increase in external water demand during dry conditions, however, Holcim has an existing external water supply that will address this issues;
- there will be no significant change to the socio-economic impacts of the Quarry as a result of the proposed modifications; and
- heavy traffic volumes associated with construction activities are now estimated to be higher than those predicted in the EIS (Umwelt, 2005a) and the approved construction access routes are proposed to be changed for vehicles travelling south on the Hume Highway due to RTA changes to the road network. The potential impacts associated with construction traffic will be of a shorter duration than the approved Quarry and the construction activities associated with crushing and screening plant is now planned to occur following the commissioning of the Hume Highway interchange, allowing traffic in the later phases of construction to use this interchange and avoid travelling through Marulan. Holcim is committed to reducing construction phase traffic impacts to as low as possible and will develop a construction traffic management plan in consultation with the RTA, Council and the Department of Lands to achieve this aim. Holcim will also undertake further consultation with the Marulan community regarding traffic arrangements for the construction phase.

The proposed modifications are therefore not expected to result in significant cumulative impacts in regard to these issues.

In regard to potential cumulative amenity impacts there are a several existing industrial sources which could potentially impact on the local environment and community in addition to the approved Quarry. The Marulan Waste Management Facility, Orica Explosives storage depot, the Marulan light industrial area, Johniefelds Quarry and Gunlake Quarry all need to

be considered in regard to potential cumulative impacts. The key findings of the cumulative impact assessments relating to these issues are summarised below.

Air Quality

Potential cumulative dust impacts have been assessed as part of the Air Quality Impact Assessment for the proposed modifications. The key potential contributors in regard to cumulative air quality impacts in the local area are the existing Johniefelds Quarry located to the north (also operated by Holcim) and the Gunlake Quarry also to the north which is currently under construction. The assessment of cumulative air quality impacts found that:

- in regard to annual average PM₁₀ the cumulative effect of the three quarries and other background sources is estimated at around 20 µg/m³. This satisfies the DECCW criteria for annual average PM₁₀ of 30 µg/m³;
- in regard to annual average TSP the cumulative effect of the three quarries and other background sources is estimated at around 42 µg/m³. This is well below the DECCW criteria for annual average PM₁₀ of 90 µg/m³; and
- in regard to annual average dust deposition the cumulative effect of the three quarries and other background sources is estimated at around 2.8 g/m²/month. This satisfies the DECCW criteria for annual average PM₁₀ of 4 g/m²/month.

Therefore, no significant cumulative air quality impacts are predicted to result from operation of the approved Quarry in combination with the other existing quarry operations and background air quality conditions.

Noise

Potential cumulative noise impacts have been assessed as part of the Noise Impact Assessment for the proposed modifications. The noise impact assessment assessed the noise impacts associated with the modified quarry operations and industrial noise sources in the surrounding area and then compared the predicted cumulative noise levels with the consent noise criteria, which were determined in consideration of both intrusive and amenity (cumulative) noise criteria.

During the previous noise assessment (Heggies, 2005) the only location where significant existing industrial noise was evident was noise monitoring Location N4. Noise from existing industrial sources, i.e. a fertiliser handling facility, at this location was measured during the daytime at LAeq (15minute) 51 dBA, with no contribution during the evening or night-time periods. The fertiliser handling facility has now closed and so cumulative noise impact at this location no longer applicable.

Since the approval of Lynwood Quarry in 2005 an additional quarry, Gunlake Quarry, approximately 2 kilometres to the north of the Project Area, has been approved. The closest noise sensitive receiver location to the Gunlake Quarry is Location 2. Noise levels predicted at Location 2 for the operation of the Lynwood Quarry are below 30 dBA for all stages of development. The Environmental Assessment (Olsen, 2008) for Gunlake Quarry indicates that noise levels in the vicinity of Location 2 would be below 35 dBA. The cumulative impact of the combined operation of Lynwood Quarry and Gunlake Quarry is predicted to comply with the amenity criteria for all sensitive receiver locations surrounding the Lynwood Quarry.

7.0 Draft Statement of Commitments and Proposed Changes to Consent Conditions

7.1 Draft Statement of Commitments

If approval is granted under Section 75W of the EP&A for the proposed modifications, and in addition to current commitments and consent conditions for Lynwood Quarry, Holcim will commit to the following:

Compliance with this EA

1. To carry out the project generally in accordance with the modification application and this EA report.

Update of Management Plans and Programs

2. Within 12 months of the granting of approval for the modification, or as otherwise agreed with the Department of Planning, Holcim will update all of the environmental management plans and programs required by the development consent.

Ecology

3. To reduce the potential impacts of the proposed modifications on ecological values, the following management and mitigation measures will be implemented:
 - mature eucalypt trees adjacent to the realigned section of the main access road will be retained and not disturbed by activities associated with the proposed modifications.
 - where possible, retain habitat features such as fallen logs on-site that may be utilised by fauna. If the proposed modifications require the removal of fallen logs, it is recommended that they be relocated into adjoining native vegetation rather than removed from the site; and
 - ensure that the area to be developed is clearly delineated (e.g. through temporary fencing) to mitigate against potential impacts on adjacent native vegetation and to minimise the footprint for construction works.

Cultural Heritage

4. To reduce the potential impacts of the proposed modifications on cultural heritage and archaeological values, the following management measures will be implemented:
 - within the areas identified as Potential Archaeological Deposit, construct the realigned section of the access road on a geotextile layer using imported fill to avoid ground disturbance. The only ground disturbance will be in relation to culvert installation and all topsoil disturbed will be retained in the area for landscaping;
 - monitoring is to be undertaken by the Registered Aboriginal Parties and an archaeologist during topsoil removal within PAD2, PAD3 and PAD4 during the trench excavations related to the proposed underground electricity feeder. All topsoil disturbed will be spread over the infilled trench (refer to Appendix 4 of the EA for the detailed methodology); and

- undertaking subsurface testing of PAD5 using the same methodology approved for previous subsurface testing. If warranted by the results of the subsurface testing, further salvage will be undertaken using the same methodology as approved for prior salvages.
5. Holcim will apply to DECCW for a s87/90 AHIP variation in order to implement the proposed management strategies.

Surface Water

6. All sediment dams will be designed in accordance with the latest version of Managing Stormwater: Soils and Construction (the Blue Book), including Volume 1 (Landcom, 2004) and Volume 2D Mines and Quarries (DECC, 2008).
7. Sediment Dam E (i.e. the sediment dam capturing runoff from the infrastructure area) will be designed to Type C (Blue Book) criteria for the 20 year ARI critical storm duration.

Air Quality

8. Air quality management measures will be implemented for the modified project in accordance with the measures outlined in **Section 6.5.4** of the EA.

Noise

9. In addition to the existing noise management measures that form part of the approved Quarry project, Holcim will implement the following additional management measures specific to the proposed modifications:
- the stockpile loader and dump truck will only operate during the daytime period;
 - the pugmill will only operate during the daytime and evening period;
 - the primary crusher will only operate during the daytime and evening period;
 - only one sales loader will operate during the night-time period; and
 - the rough terrain forklift will only operate during the daytime period.

Holcim is committed to achieving the noise mitigation outcomes achieved by the above management controls. As technological advances occur and through implementing operational management controls, Holcim may be able to achieve the same noise mitigation outcomes through alternative means. Holcim may therefore modify the above management controls in response to these technological advances or operational controls, provided that the same overall noise management outcomes are achieved.

Construction Phase Traffic

10. To minimise the potential impacts from increased heavy vehicle traffic volumes, and the alternate access routes now required for the Project, Holcim will commit to the following management measures in relation to the proposed modifications:
- no product for sale will be transported from the site prior to the commissioning of the Hume Highway Interchange;

- heavy vehicle movements will be limited to accessing the Project Area outside of school zone times (i.e. 8:00 am to 9:30 am and 2:30 pm to 4:00 pm on school days) wherever practicable, unless they are done under escort; and
- prior to the commencement of construction, Holcim will consult with the Marulan community regarding construction phase traffic arrangements and the controls that will be implemented to reduce impacts.

7.2 Proposed Changes to Consent Conditions

Based on the proposed modifications, should the Minister elect to approve the modification application, Holcim suggests the following changes be made to the conditions of DA 128-5-2005 (not changes highlighted by strikethrough text (deletions) or underline (additions)):

Schedule 2, Condition 2 and 3

- The Applicant shall carry out the development generally in accordance with the:
 - DA-128-5-2005;
 - EIS for the *Proposed Lynwood Quarry Marulan, Volumes 1 to 4*, dated May 2005; and
 - Modification Application DA-128-5-2005 MOD 1 and the accompanying SEE titled "*Proposed Minor Modifications to Lynwood Quarry, Marulan*", dated January 2009; and
 - Modification Application (#) and the accompanying EA titles 'Environmental Assessment for Proposed Modifications to Lynwood Quarry, Marulan', dated August 2010; and
 - Conditions of this consent.
- If there is any inconsistency between the above documents, the most recent document shall prevail to the extent of the inconsistency. However, the conditions of the approval shall prevail to the extent of any inconsistency. An inconsistency includes any contrariety between the documents that both can not exist or be met together as well as any general lack of agreement between the above documents.

Schedule 3, Condition 5

Operating Hours

- The Applicant shall comply with the operating hours in Table 2:

Activity	Day	Time
Construction Works	Monday – Friday	7am to 6pm
	Saturday	8am to 1pm
	Sunday and Public Holidays	None
Topsoil/ overburden removal/emplacment; Drilling	Any day	7am to 6pm
Blasting	Monday - Saturday	9am to 5pm
	Sunday and Public Holidays	None
Extraction	Any day	7am to 10pm
Processing (crushing, screening, stockpiling); loading, delivery, and distribution; maintenance	Any day	Anytime

Table 2: Operating Hours

Unless it can establish an alternative means of achieving the noise criteria specified in Condition 3 of Schedule 3, the Applicant shall also comply with the operating hours in Table 2a:

Activity	Day	Time
<u>Excess product stockpile loader and associated dump truck</u>	<u>Any day</u>	<u>7am to 6pm</u>
<u>Primary Crusher and Pugmill</u>	<u>Any day</u>	<u>7am to 10pm</u>

Table 2a: Operating Hours

Schedule 3, Condition 18

Sediment Dams

18. The Applicant shall ensure that:
- Sediment Dams A, B, ~~E~~, and F are capable of treating the 90th percentile 5 day rainfall event; and
 - Sediment Dams ~~C~~ and D and E are capable of treating the 1:20 year ARI Critical Duration Storm Event.

Notes:

- For more information on the location of Sediment Dams A to F see Appendix 4; and*
- ~~*A 90th percentile five day rainfall event is 37mm of rainfall over any 5 day period; and*~~
- ~~*A 1:20 year ARI Critical Storm Event is 30mm of rainfall over any 25 minute period.*~~
- Dams will be designed to be in accordance with "Managing Stormwater: Soils and Construction (the Blue Book)", including Volume 1 (Landcom, 2004) and Volume 2 (DECC, 2008).*

Schedule 3, Condition 26

Construction Traffic

26. The Applicant shall ensure that:

- construction traffic on the temporary construction access is kept to ~~a~~ the minimum required, and in accordance with the traffic volumes specified in the Construction Traffic Management Plan required by condition 28;
-

Appendix 1 – Schedule of Land

Update as per schedule of lands in EA.

Appendix 2 – Limits of Extraction

Replace with updated figure incorporating the modifications.

Appendix 4 – Location of Sediment Dams

Replace with updated figure incorporating the modifications.

Appendix 5 – Construction Traffic Routes

Replace with updated figure incorporating the modifications.

Appendix 8 – Conceptual Final Landform

Replace with updated figure incorporating the modifications.

8.0 Conclusion and Ecologically Sustainable Development

8.1 Ecologically Sustainable Development

The EP&A Act aims to encourage ecologically sustainable development (ESD) within NSW. As outlined in **Section 5.0**, the proposed modification requires approval from the Minister for Planning under Section 75W of the EP&A Act. As such, the Minister needs to be satisfied that the Quarry is consistent with the principles of ESD. This section provides an assessment of the proposed modifications in relation to the principles of ESD.

To justify the proposed modifications with regard to the ESD principles, the benefits of the Quarry in an environmental and socio-economic context, with the proposed modifications, should outweigh any negative impacts. The ESD principles encompass the following:

- the precautionary principle;
- inter-generational equity;
- conservation of biological diversity; and
- valuation and pricing of resources.

Essentially, ESD requires that current and future generations should live in an environment that is of the same or improved quality than the one that is inherited.

8.1.1 The Precautionary Principle

The EP&A Regulation defines the precautionary principle as:

Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In the application of the precautionary principle, public and private decisions should be guided by:

- (i) Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
- (ii) an assessment of the risk-weighted consequences of various options.

In order to achieve a level of scientific certainty in relation to potential impacts associated with the proposed modifications, this EA has undertaken an extensive evaluation of all the key components. Detailed assessment of all key issues and necessary management procedures has been conducted and is comprehensively documented in this EA.

The assessment process has involved a detailed study of the existing environment and the use of engineering and scientific modelling and study to assess and determine potential impacts as a result of the proposed modifications. To this end, there has been careful evaluation to avoid, where possible, irreversible damage to the environment.

The decision making process for the design, impact assessment and development of management processes has been transparent in the following respects:

1. Relevant government authorities and community representatives were consulted during EA preparation (refer to **Section 4.0**). This enabled comment and discussion regarding potential environmental impacts and proposed environmental management procedures.
2. Holcim has an established Safety, Health and Environmental (SHE) Management System. In addition, the approved Quarry incorporates environmental management plans, procedures and environmental monitoring, that will be revised in regard to the proposed modifications. In addition, the management controls that will be implemented by Holcim as part of the implementation of the Quarry have been clearly specified in **Section 6.0** and the development consent for the approved project.
3. This EA has been undertaken on the basis of the best available scientific information about the Project Area. Where uncertainty in the data used in the assessment has been identified, a conservative worst case analysis has been undertaken and contingency measures have been identified to manage that uncertainty. A validation program has also been proposed to measure predicted against actual impacts of the proposed modifications (refer to **Section 6.0**), so that contingency measures, if required, can be implemented in a timely and pro-active manner.
4. An auditing and review process is an integral component of Holcim's existing SHE management system for the Quarry (and as required by the development consent), providing for verification of future Quarry performance by independent auditors and relevant government agencies. Holcim will implement this auditing and verification process in regard to the proposed modifications.

8.1.2 Intergenerational Equity

The EP&A Regulation defines intergenerational equity as:

Intergenerational equity namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

Intergenerational equity refers to equality between generations. It requires that the needs and requirements of today's generations do not compromise the needs and requirements of future generations in terms of health, bio-diversity and productivity.

The key objective of the proposed modifications is to ensure the long-term viability of the Quarry by incorporating identified operational and economic efficiencies into the Quarry design. As part of Quarrying operations to recover a substantial, hard rock resource, a comprehensive rehabilitation strategy has been developed for the Project Area, including an approved Rehabilitation and Landscape Management Plan (Umwelt, 2006b). The Rehabilitation and Landscape Management Plan provides a description of the strategies that will be used to rehabilitate the areas disturbed from quarrying operations including the quarry pit and the establishment of a Habitat Management Area and Core Riparian Corridors within the Project Area. The proposed revegetation of the emplacement areas and selected other disturbed areas to woodland/grassland will improve the habitat quality of the site and local area, whilst also providing areas for ongoing agricultural use. The planned revegetation will include using species that are consistent with the Tableland Low Woodland, Tableland Grassy Box-Gum Woodland and Western Tablelands Dry Forest vegetation communities.

As detailed in **Section 6.0**, the proposed modifications can be undertaken without having a significant impact on the local environment or community and is predicted to meet all relevant amenity criteria at the nearest residential locations. The environmental management measures discussed in **Section 6.0** have been developed to minimise the impact of the

proposed modifications on the environment and community to the greatest extent reasonably possible.

The management of environmental issues as outlined in this EA will maintain the health, diversity and productivity of the environment for future generations.

8.1.3 Conservation of Biological Diversity

The conservation of biological diversity refers to the maintenance of species richness, ecosystem diversity and health and the links and processes between them. All environmental components, ecosystems and habitat values potentially affected by the proposed modifications are described in this EA. Potential impacts are also outlined and measures to ameliorate any negative impact are outlined in the statement of commitments (refer to **Section 70**).

The ecological assessment completed for the proposed modification (refer to **Section 6.2**) has found that due to the degraded nature of the habitats and the minimal area of disturbance, the proposed modifications will not have a significant impact on biodiversity. In addition, the approved Rehabilitation and Landscape Management Plan for the Quarry will ensure that native vegetation will be established in the Project Area which will assist in improving the ecological values of the Project Area and surrounds in the medium to long term.

8.1.4 Valuation and Pricing of Resources

The goal of improved valuation of natural capital has been included in Agenda 21 of Australia's Intergovernmental Agreement on the Environment. The principle of improved valuation and pricing refers to the need to determine proper values of services provided by the natural environment. The objective is to apply economic terms and values to the elements of the natural environment. This is a difficult task largely due to the intangible comparisons that need to be drawn in order to apply the values.

The proposed modifications optimise the valuation and pricing of the hard rock resource with minimal impact by:

- ensuring the long-term viability of the Quarry by optimising the site layout, providing product quality benefits and improving operational and economic efficiencies; and
- maximising the efficient extraction of the hard rock resource through detailed design and planning.

Quarry feasibility considerations have included the costs of integration of effective management measures to minimise potential environmental and social impacts.

8.2 Conclusion

Since purchasing CEMEX's Australian interests, Holcim has been undertaking a detailed design study to progress the implementation of the project. As part of this process, Holcim has identified opportunities to optimise the site infrastructure and site layout. These optimisations will result in operational efficiencies, product quality benefits and both operational and capital cost savings. These are significant benefits from Holcim's perspective and realising these benefits will allow Holcim to implement the project realising the broader economic benefits discussed below.

As discussed in **Section 6.10**, the Quarry will provide significant benefits to the local area, region and State of NSW, as there is a need for ongoing supply of high quality construction materials into the market place. Specifically, the Quarry will provide a long-term, high quality supply of construction materials into the local, regional and Sydney markets. The supply into the Sydney market is particularly critical given the approaching closure of the Penrith Lakes Scheme which supplies a significant proportion of the construction materials for the Sydney market. Lynwood Quarry will provide a secure source of high quality construction materials, providing for the ongoing viability of the Holcim Sydney businesses, including the concrete business.

When operating at full capacity, the Quarry will provide direct employment for approximately 115 people, plus additional flow-on employment, providing significant employment benefits to the region. The Quarry will also provide major economic benefits in the form of capital expenditure (approximately \$150M), wages (estimated at \$15M for construction wages and \$9M per annum in operational wages), annual operating expenditure, and through payment of State and Commonwealth taxes and fees.

The Quarry continues to have the general support of the local community, primarily based on its contribution to local employment, contribution to the local and regional economies, and due to the construction of an interchange at the existing intersection of the Hume Highway and South Marulan Road.

The proposed modifications will not change any of the benefits of the approved Quarry. This EA has also identified that the proposed modifications will not result in significant environmental and social impacts and that the predicted impacts are similar to those of the currently approved Quarry. The EA has identified the required management and mitigation measures to be implemented as part of the project, building on the measures provided in the existing consent conditions.

On considering the balance of the potential impacts of the proposed modifications to the approved Quarry on the environment and community, and the benefits of and the need for the proposed changes, it would be reasonable to conclude that the benefits of the proposed modifications outweigh the impacts.

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In preparation for Holcim.

10.0 Abbreviations and Glossary

10.1 Abbreviations

AHD	Australian Height Datum
AGL	The Australian Gas Light Company Ltd
ARTC	Australian Rail Track Corporation
CCO	Chemical Control Order
CIS	Community Information Sheet
DA	Development Application
dBA	Decibel
DCP	Development Control Plan
DECCW	Department of Environment, Climate Change and Water
DGRs	Director – Generals Requirements
DI&I	Department of Industry and Investment
DoP	Department of Planning
DPI	Department of Primary Industries (former, now DI&I)
DUAP	Department of Urban Affairs and Planning
DWE	Department of Water and Energy
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPA	Environment Protection Authority of NSW (former, now DECCW)
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000 (NSW)</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>
EPL	Environment Protection Licence

ha	Hectares
HVAS	High Volume Air Sampler
LEP	Local Environmental Plan
LGA	Local Government Area
m	Metres
MIC	Maximum Instantaneous Charge
ML	Megalitres
Mt	Million tonnes
Mtpa	Million tonnes per annum
NT Act	<i>Native Title Act 1993</i>
POEO Act	<i>Protection of the Environment Operations Act 1997 (NSW)</i>
RTA	Roads and Traffic Authority
SEE	Statement of Environmental Effects
SEPP	State Environmental Planning Policy
SHE	Safety, Health and Environment Management System
TSC Act	<i>Threatened Species Conservation Act 1995 (NSW)</i>
TSP	Total suspended particulate matter, usually in the size range of zero to 50 micrometres
TUAP	Transport and Urban Planning Pty Ltd
Umwelt	Umwelt (Australia) Pty Limited
yr	Year

10.2 Glossary

A1 Horizon:	The uppermost layer of soil generally containing some humus.
Acoustics:	Sound and its characteristics.
AHD:	Australian Height Datum.
Alluvium:	Sediment deposited by a flowing stream, e.g., clay, silt, sand, etc.
Amenities:	Lunch room, showers, toilets.

Amenity:	An agreeable feature, facility or service which makes for a comfortable and pleasant life.
Aquifer:	A water-bearing rock formation.
Arboreal:	Adapted for living and moving around in trees.
Archaeological:	Pertaining to the study of culture and description of its remains.
Attenuation:	The reduction in magnitude of some variable in a transmission system, for example, the reduction of noise with distance as it travels through air.
Average Recurrence Interval (ARI):	The statistically calculated interval likely to be exceeded once in a given period of time. A term used in hydrology, also known as return period.
Background Noise:	Existing noise in the absence of the sound under investigation and all other extraneous sounds.
Baseline Studies:	Studies conducted to establish prevailing environmental conditions.
Batter:	The excavated or constructed face resulting from earthmoving operations.
Catchment Area:	The area from which a river or stream receives its water.
Conservation:	The management of natural resources in a way that will preserve them for the benefit of both present and future generations.
Crumb:	Rounded, soft soil aggregate less than 5 mm in diameter.
Dangerous Goods Act 1975:	Legislation which places controls on the handling of certain goods including explosives, gases, flammable liquids and radioactive substances.
Decibel (dB):	A unit for expressing the relative intensity of sounds on a logarithmic scale from zero (for average least perceptible sound) to about 130 (for the average pain level).
Decibel dB(A):	A modified decibel scale which is weighted to take account of the frequency response of the normal human ear.
Dispersibility:	The proportion of clays and fine silts (defined by having a particle size of less than 0.005 mm) in a soil which can disperse into water on wetting.
Dispersible Soils:	Soils in which the clay fraction forms a suspension on wetting - can lead to tunnelling and gully erosion if not appropriately managed.
Ecology:	The science dealing with the relationships between organisms and their environment.

Ecosystem:	Organisms of a community together with its non-living components through which energy and matter flow.
Effluent:	The liquid waste of sewage and industrial processes.
Electrical Conductivity:	The measure of electrical conduction through water or a soil-water suspension generally measured in millisiemens per centimetre or microsiemens per centimetre. An approximate measure of soil or water salinity.
Environmental Planning and Assessment Act 1979:	NSW Government Act to provide for the orderly development of land in NSW.
Environment Protection and Biodiversity Conservation Act 1999:	Commonwealth legislation that regulates development proposals that have an actual or potential impact on matters of national environmental significance.
Erodibility:	The susceptibility of a soil to undergo erosion, based on the inherent characteristics of the soil.
Evapotranspiration:	The combined loss of water by evaporation from the soil or surface water and by transpiration from plants and animals.
Fauna:	All vertebrate animal life of a given time and place.
Floodplain:	Large flat area of land adjacent to a stream which is inundated during times of high flow.
Flora:	All vascular plant life of a given time and place.
Geology:	Science relating to the earth, the rocks of which it is composed and the changes it undergoes.
Geomorphic Processes:	Processes involved in the formation of the earth's surface features.
Geotechnical:	Relates to the form, arrangement and structure of geology.
Groundwater:	Sub-surface water which is within the saturated zone and can supply wells and springs. The upper surface of this saturated zone is called the water table.
Habitat:	The environment in which a plant or animal lives; often described in terms of geography and climate.
Hydrogeological:	The relation of hydrological phenomena to the surface geology.
Hydrology:	Science that relates to the properties, distribution and circulation of the earth's water.
Igneous:	Rock derived from magma which has cooled and solidified closer to the earth's surface (volcanic) or within the earth's crust (plutonic) - forms sills and dykes.

Indigenous:	Native to, or originating in, a particular region or country.
<i>In situ:</i>	In its original place.
Intrusion:	The forcing of extraneous matter, like molten rock, into some other formation.
Kilo Volt (kV):	One thousand volts.
L_{A1} Noise Level:	The noise level exceeded for one per cent of the time. It is used in assessment of sleep disturbance.
L_{A10} Noise Level:	The noise level, measured in dB(A), which is exceeded for 10 per cent of the time, which is approximately the average of the maximum noise levels.
L_{A90} Noise Level:	The noise level, measured in dB(A), exceeded for 90 per cent of the time, which is approximately the average of the minimum noise levels. The L ₉₀ level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes.
L_{Aeq} Noise Level:	The average noise energy, measured in dB(A), during a measurement period.
L_{AMax} Noise Level:	The maximum noise energy, measured in dB(A), during a measurement period.
Land Capability:	The ability of a parcel of land to be used in a sustainable manner (that is without permanent damage) for a given land use.
Landform:	Sections of the earth's surface which have a definable appearance (e.g. cliff, valley, mountain range, plain, etc).
Leaching:	The process of removing soluble matter(s) from soil or rock by water.
Lithotype:	Type of lithogy or rock unit.
Mean:	The average value of a particular set of numbers.
Measured Resources:	Those rock resources for which the density and quality of points of observation are sufficient to allow a reliable estimate of the rock thickness, quality, depth, and <i>in situ</i> tonnage and properties of the rock relevant to its proposed usage.
Median Value:	A value above and below which there are equal numbers of data values.
Megalitre (ML):	One million litres.
Meteorology:	Science dealing with atmospheric phenomena and weather.
Mitigate:	To lessen in force, intensity or harshness. To moderate in severity.
Native:	Belonging to the natural flora or fauna in a region.

Outcrop:	Bedrock exposed at the ground surface.
Pan Evaporation:	The rate of evaporation from a standard shallow circular pan. The pan is filled with water and the loss of water is measured once a day.
Particulates:	Fine solid particles which remain individually dispersed in gases.
Peak Discharge:	Maximum discharge down a stream following a storm event.
Permeability:	The capacity of rock or solid to transmit fluids (through pores, bedding planes or joints).
pH:	Scale used to express acidity and alkalinity. Values range from 0-14 with seven representing neutrality. Numbers from seven to zero represent increasing acidity whilst seven to fourteen represent increasing alkalinity.
Piezometer:	A small diameter bore lined with a slotted tube used for determining the standing water level of groundwaters.
Precipitation:	Rain, snow, sleet, dew formed by the condensation of water vapour in the atmosphere.
Protection of the Environment Operations Act 1997:	NSW legislation administered by DEC that regulates discharges to land, air and water.
Rating Background Level (RBL):	A period (day, evening or night) background noise level determined in accordance with chapter 3 of the EPA Industrial Noise Policy (EPA, 2000).
Recycling:	The return of waste materials to the production system so that the need for use of raw materials is reduced.
Rehabilitation:	The process of restoring to a condition of usefulness. In regard to quarrying, relates to restoration of land from a degraded or quarried condition to a stable and vegetated landform.
Revegetation:	The process of re-establishing vegetation cover.
Salinity:	A measure of the concentration of dissolved solids in water.
Sedimentary Rocks:	Any rock formed by the laying down of sediments (includes sandstone, mudstone, siltstone, claystone and conglomerates).
Sedimentation:	Deposition or settling of materials by means of water, ice or wind action.
Sedimentation Dam:	A dam built to retard dirty runoff to allow sediment to settle out before allowing clean water discharge.
Sewage:	Waste matter discharged to a sewer.
Sewerage:	Works for collecting, treating and disposing of sewage.

Slurry:	A fluid composed of part liquid, part solid which can be pumped.
Socio-economic:	Combination of social and economic factors.
Sound Power Level (SWL):	The total sound energy radiated per unit time measured as 10 times a logarithmic scale, the reference power being 12 picowatts.
Sound Pressure Level (SPL):	Fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals.
Subcrop:	A unit of material that occurs just below the soil profile.
Surface Drainage Patterns:	The pattern described by water flowing over the land surface when viewed from above.
Surface Infrastructure:	Any man made object, facility or structure on the surface of the land.
Time of Concentration:	The time required for all parts of a catchment to simultaneously contribute runoff flow to a given outlet point.
Topography:	Description of all the physical features of an area of land and their relative positions, either in words or by way of a map.
Total Dissolved Solids (TDS):	A measure of salinity expressed in milligrams per litre (mg/L).
Total Suspended Particulates (TSP):	A measure of the total amount of un-dissolved matter in a volume of water or air usually expressed in milligrams per litre (mg/L) (for water) or micrograms per cubic metre ($\mu\text{g}/\text{m}^3$) for air.
Turbidity:	A measure of the amount of suspended solids (usually fine clay or silt particles) in water.
Understorey:	Vegetation which grows below the canopy of a forest.
Volatile Matter:	Matter which is readily transformed to a gaseous state.
Woodland:	Land covered by trees that do not form a closed canopy.

APPENDIX 1

EA Form, Project Team and Schedule of Lands

APPENDIX 2

Community Consultation Newsletters

APPENDIX 3

Ecological Assessment of Significance

APPENDIX 4

Aboriginal Archaeological Assessment

APPENDIX 5

Air Quality Assessment

APPENDIX 6

Noise Assessment

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