Holcim (Australia) Pty Limited

Preliminary Risk Screening for Proposed Minor Modification to Holcim Regional Distribution Centre (RDC), Rooty Hill, NSW

September 2010

Umwelt
Environmental Consultants

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Prepared by

Umwelt (Australia) Pty Limited

on behalf of

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A Final Hazard Analysis for Rooty Hill Regional Distribution Centre, Umwelt 2008.

1.0 Introduction

1.1 Background

Holcim (Australia) Pty Limited (Holcim) obtained project approval under Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act) in April 2006 (Approval No. 05_0051) to construct and operate a Regional Distribution Centre (RDC) for quarry products located at Rooty Hill, New South Wales (NSW) (refer to **Figure 1.1**). Holcim has not yet constructed the RDC and is currently seeking to modify the 2006 Project Approval to allow for minor modifications to the RDC as outlined below (refer to **Figure 1.2** and **Section 1.3**).

Since the approval was granted and building on the recent change in ownership Holcim conducted a review of the approved RDC project and has identified operational, capital and environmental benefits in modifying the approved layout of the RDC. Accordingly Holcim is seeking a modification to the 2006 Project Approval to allow these minor modifications to the approved RDC (modified RDC). The proposed minor modifications are detailed in **Section 1.3**.

Umwelt (Australia) Pty Limited (Umwelt) was commissioned by Holcim to undertake and document a Preliminary Risk Screening (PRS) to assess potential off-site impacts due to the proposed modifications to the approved RDC. This PRS was prepared as part of the Environmental Assessment (EA) to support the modification application for the Project. Umwelt has prepared this PRS to address the requirements of the NSW Department of Planning (DoP), *State Environmental Planning Policy 33 (SEPP 33) Hazardous and Offensive Developments* (1994) and the *Hazardous Industry Planning Advisory Paper No.6 – Guidelines for Hazard Analysis* (DUAP, 1997) regarding the proposed modification.

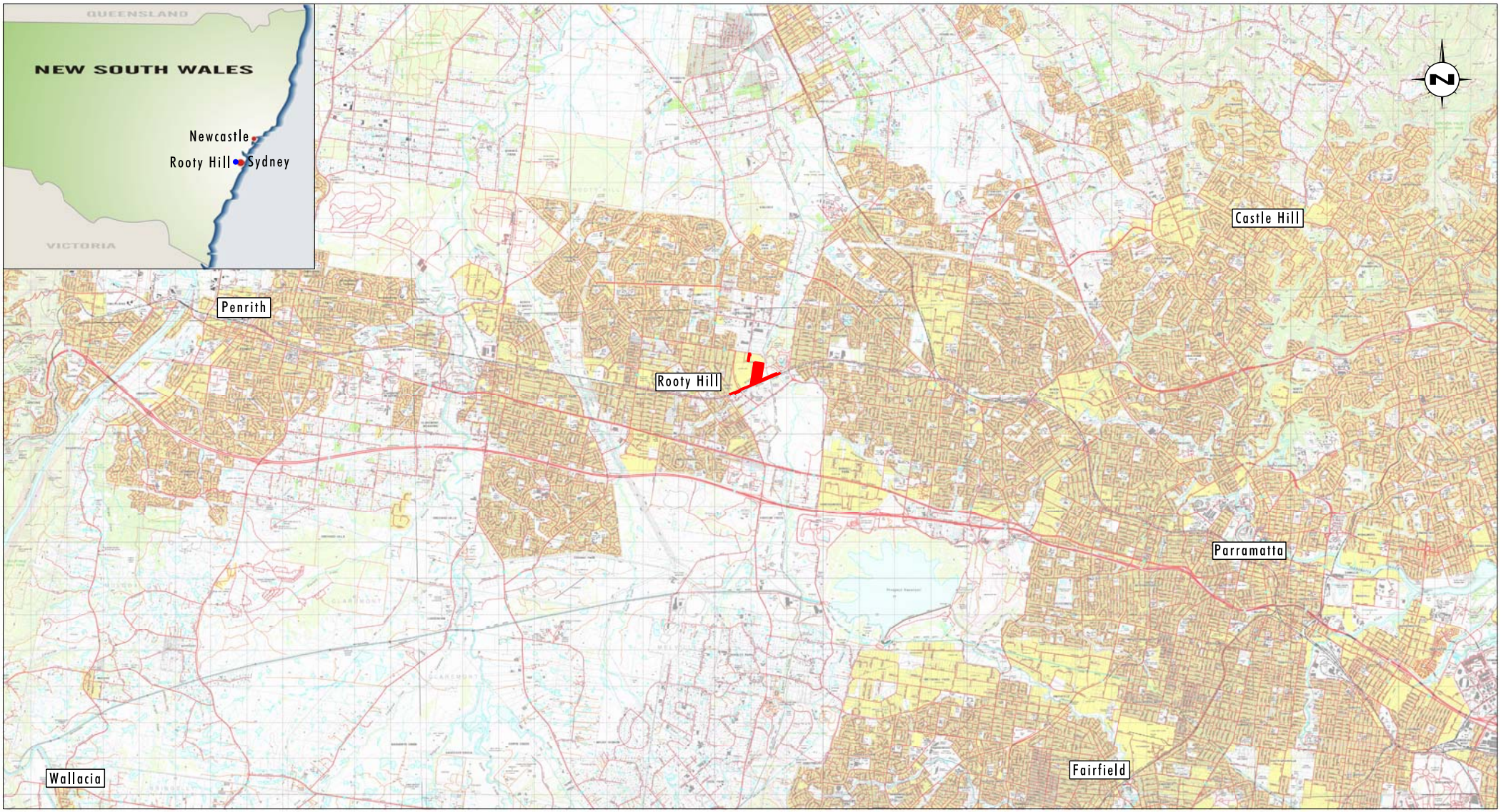
1.2 Approved RDC

Holcim currently supplies the Sydney market with quarry products from the company's Penrith Lakes Development Corporation (PLDC) operations. However, this resource is nearly depleted and the facility is approaching closure. Consequently Holcim has located alternative sources of quarry products to meet the needs of its Sydney market. These quarry materials will come from quarries outside the Sydney basin, including the new Lynwood Quarry near Marulan in the Southern Tablelands region of NSW. The approved RDC will allow Holcim to receive, store and distribute construction materials to meet customer requirements in the Sydney region.

The RDC is approved to handle up to 4 Mtpa of quarry product. Construction materials such as sand and aggregate will be transported by rail to the RDC from quarries outside the Sydney basin. These materials will be blended at the RDC as required and distributed by road to the Sydney market.

The approved RDC includes the following:

- regional office building and materials testing laboratory;
- rail siding and rail unloading facility;
- elevated steel storage bins and truck load out facilities;
- ground storage and reclaim facilities;



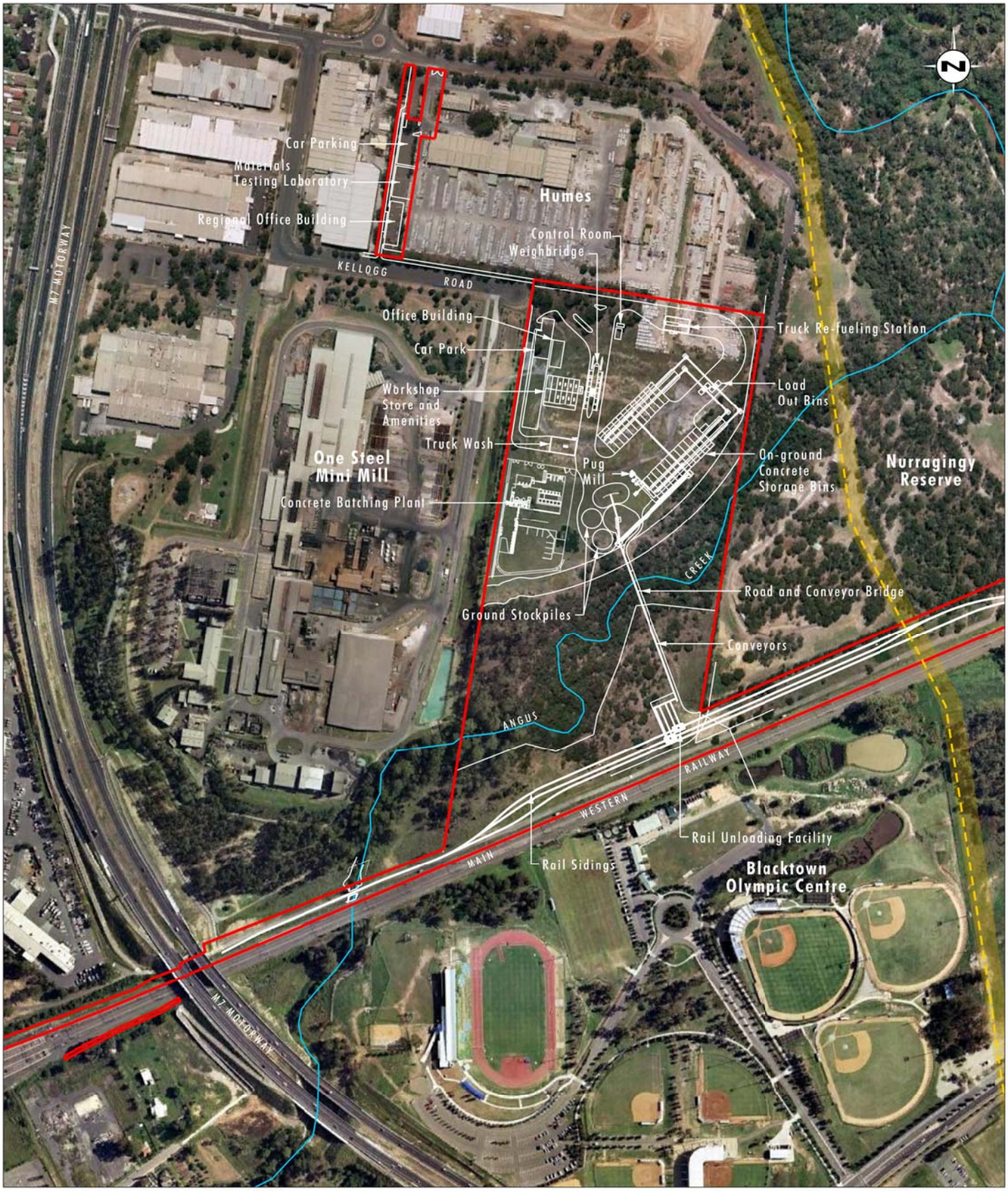
Source: Department of Lands 2006

Legend

Approved RDC Site Boundary

FIGURE 1.1

Locality Plan



Source: Holcim and Google Earth 2010

0 100 200 300m
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Legend

- Approved RDC Site Boundary
- Indicative Modified RDC Layout
- Sydney to Newcastle Gas Pipeline
- Sydney to Newcastle Gas Pipeline Easement

FIGURE 1.2

Indicative Modified RDC and Sydney to Newcastle Gas Pipeline

- Blending Plant/Pug Mill;
- conveyor system linking the unloading station to the storage and truck load out facilities;
- workshop, stores, site offices and amenities facilities, truck washdown facilities, truck refuelling, weighbridges, truck and car parking;
- Concrete Batching Plant (CBP);
- bridges at two locations over Angus Creek; and
- realignment of the existing North Parade and creation of New North Parade.

The approved RDC will operate 24 hours per day, seven days a week. The RDC will take approximately two years to build and will employ approximately 220 people during construction. During operation of the approved RDC, approximately 250 people will be employed on-site. At 4 Mtpa the approved RDC will dispatch approximately 400 heavy vehicles from the site on an average day. All traffic to the RDC will access the site via Kellogg Road, with the exception of some minor traffic associated with the laboratory. Vehicles accessing Kellogg Road to/from the south will do so via Woodstock Avenue direct from the M7. Heavy vehicles accessing Kellogg Road to/from the north will do so via Glendenning Road and Power Street direct from the M7.

1.3 Proposed Modifications to the RDC

The modified RDC will involve minor changes to the approved, but yet to be constructed RDC.

The proposed minor modifications include:

- changing from elevated steel storage bins to on-ground concrete storage bins, reducing the height of the storage facility by about 10 metres;
- changing the configuration and location of the rail unloader and rail sidings to accommodate shorter trains, for the initial phase of the development;
- reducing the payload capacity of trains, for the initial phase of the development;
- removal of the ground storage bins that were originally sited west of the steel storage bins;
- closure of North Parade by Blacktown City Council rather than relocation of the road;
- increased ground storage area at the radial stacker; and
- minor changes to the locations of the office, workshop and other internal facilities to improve operating efficiencies and to allow for the layout changes outlined above.

The proposed minor changes to the RDC will not result in changes to overall RDC components or to the approved RDC capacity of 4 Mtpa. The RDC will operate in much the same way as is currently approved. There will be no change to the number, size or tonnages of heavy vehicles accessing the facility during construction or operation of the RDC. Traffic arrangements and traffic volumes will not change from the currently approved RDC design.

1.4 Statutory Requirements

If a development triggers the requirements of *SEPP 33 Hazardous and Offensive Developments* (1994), in that it is considered potentially hazardous, a Preliminary Hazard Analysis (PHA) is required to accompany the development application.

A development is considered potentially hazardous if the storage of hazardous substances exceeds specific screening thresholds. A development may also be considered potentially hazardous based on the number of traffic movements involving hazardous materials associated with the facility. If a proposed development is found to be potentially hazardous with respect to transportation, a route evaluation study will also be required.

SEPP 33 also applies to developments that are 'potentially offensive'. A development is considered potentially offensive if it requires an Environment Protection Licence (EPL) from the NSW Department of Environment, Climate Change and Water (DECCW). Under SEPP33, if a development cannot obtain the necessary pollution control licences then it may be classified as 'offensive industry'.

The approved RDC was not found to be a potentially hazardous development as part of the original development assessment and approval process. The proposed modified RDC involves no changes to overall components of the facility or to the approved RDC capacity of 4 Mtpa. There will also be no change to the number, size or tonnages of heavy vehicles accessing the facility during the construction or operation phases. Therefore the proposed modified RDC is not considered to be potentially hazardous. However, the proposed modified RDC would only be classified as potentially offensive as it will be able to meet the requirements for licensing by DECCW.

SEPP 33 is not specific on the risk assessment requirements for a potentially offensive development. However, the *Multi-Level Risk Assessment Guidelines* (DUAP, 1999) provided by the Department of Planning (DoP), indicate that the objective of a risk assessment is to progress the analysis and assessment only as far as is needed to demonstrate that the operation does not or will not pose a significant risk to the surrounding land uses. It is therefore considered that a PRS is an appropriate level of assessment for a potentially offensive development such as the RDC.

1.5 Scope

Umwelt (Australia) Pty Limited (Umwelt) was commissioned by Holcim to undertake and document a PRS to assess potential off-site impacts of the proposed modified RDC, located at Kellogg Road, Rooty Hill. This PRS was prepared as part of the EA for the proposed modified RDC.

Further information on the methodology used for the PRS is provided in **Section 3.0**.

2.0 Site Description

2.1 Location

The site is in the lower part of the Hawkesbury-Nepean catchment which covers an area of approximately 22,000 km^2 to the west and north of Sydney.

The site is drained by Angus Creek, a tributary of Eastern Creek which flows into South Creek before flowing into the Hawkesbury River near Windsor. Angus Creek flows from the south-west to the north-east across the RDC site. Angus Creek confluences with Eastern Creek in the Nurragingy Reserve to the east of the RDC site (refer to **Figure 1.1**).

The site comprises an irregular shaped area of approximately 26 hectares bounded by Humes Concrete Products Facility and Woodstock Avenue to the north, the Nurragingy Reserve to the east, the Main Western Railway line to the south and the OneSteel Mini Mill to the west (refer to **Figure 1.2**). The site ranges in elevation from approximately 40 mAHD in the north-west corner to approximately 32.5 mAHD in the southern section, with a gentle undulating slope of approximately 1.5% generally from Kellogg Road to the Main Western Railway line bisected in the southern half of the site by Angus Creek. The natural terrain of the site has been altered by the placement of stockpile material in the northern portion of the site. This stockpile originated from the OneSteel Mini Mill and has resulted in slight changes to the topography of the site.

The approved regional office building and materials testing laboratory will be located on a portion of the Humes site that is currently used for vehicle parking and storage (refer to **Figure 1.2**).

2.2 Surrounding Land Uses

The site is situated within a developed industrial area in Western Sydney approximately 35 km to the west of the Sydney Central Business District. The RDC site is a greenfields site in that the site has not previously been developed. Humes (a division of Holcim) have been using a small portion of the northern part of the RDC site to store concrete pipe products.

Land use directly adjacent to the RDC site includes general industry such as the OneSteel Mini Mill and the Humes Concrete Products Facility located immediately to the west and north of the RDC site respectively. The Nurragingy Reserve, a passive recreation area, forms the eastern boundary of the RDC site, the Main Western Railway line forms the southern boundary of the RDC site and the M7 Motorway is located to the west of the industrial area (refer to **Figure 1.2**).

Other land use types in the surrounding area include the Rooty Hill residential area located west of the M7 Motorway and the Doonside residential area located to the east of Nurragingy Reserve. South of the main western railway line are the Blacktown Olympic Centre (in Aquilina Reserve) and Morreau Reserve.

The site is located approximately 600 metres from the nearest residents on Station Street to the west and approximately 800 metres from the nearest residents on Knox Road to the east.

The Sydney to Newcastle High Pressure Natural Gas Pipeline, operated by Alinta is located in an easement adjacent to the eastern boundary of the RDC site within Nurragingy Reserve.

3.0 Hazard and Risk Assessment Methodology

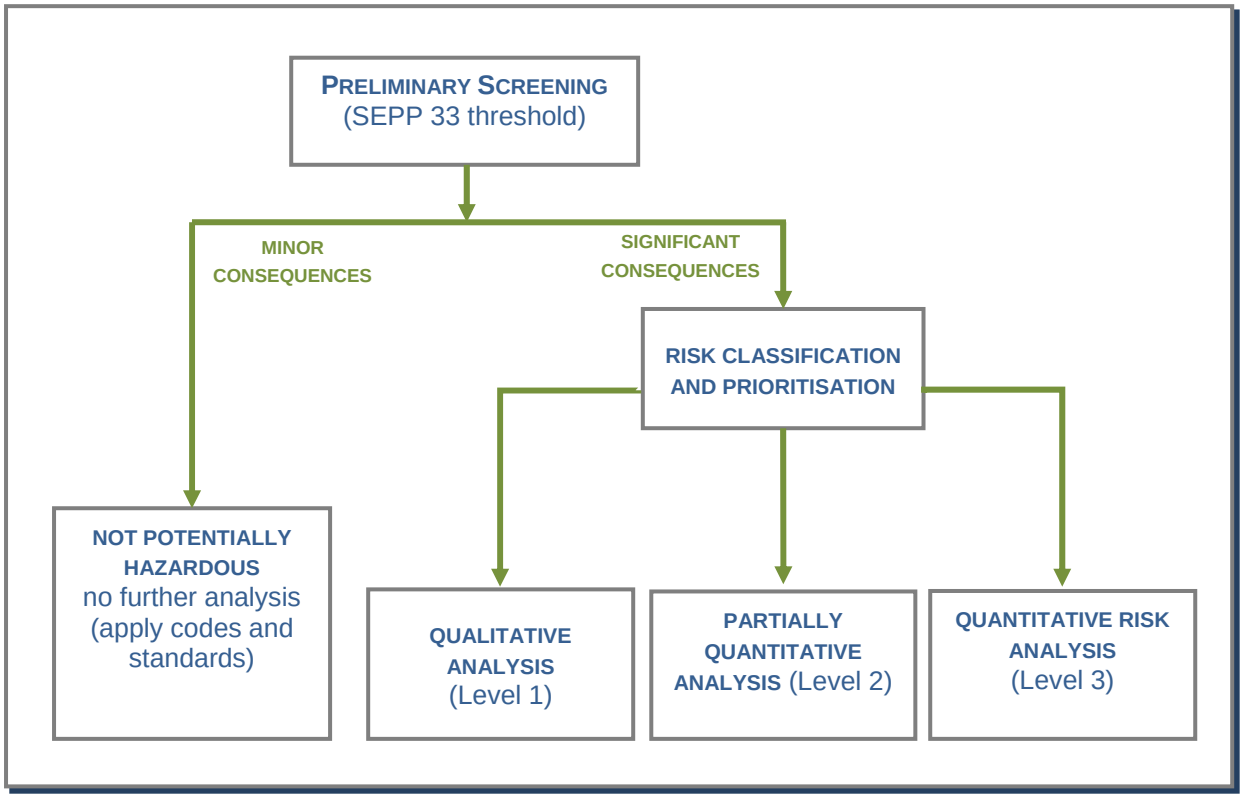
Under SEPP 33, a preliminary risk screening of a proposed development is required to determine if the development is potentially hazardous and whether further analysis and assessment is required to support the Development Application (refer to **Figure 3.1**). Further assessment is required if the preliminary screening indicates that there is a potential for significant consequences to occur as a result of the proposed development.

Where further analysis and assessment is required, *Hazardous Industry Planning Advisory Paper* (*HIPAP) No. 6 – Guidelines for Hazard Analysis* (DUAP, 1992a) and *Multi-level Risk Assessment* (DUAP, 1999) note that a Preliminary Hazard Analysis (PHA) should be undertaken to identify and assess all hazards that have the potential for off-site impact. The expectation is that the hazards would be analysed to determine both the potential for a hazardous event to occur and the consequences to people, property and the environment.

The preliminary risk screening involves identification and assessment of the storage and transport of specific dangerous goods classes that have the potential for significant off-site effects. Due to the types and quantities of substances used in the RDC and associated concrete batching plant the approved development was not classified as potentially hazardous. Since the proposed modification involves no significant changes to the RDC components, the operation of the RDC and associated concrete batching plant, the capacity of the RDC or the transportation arrangements, the hazard classification would remain unchanged. However, the proposed modified RDC will require an EPL from DECCW and is therefore classified as a potentially offensive development.

As discussed in **Section 1.2**, it is considered that a preliminary risk screening will be sufficient to demonstrate that the RDC with the proposed modification does not or will not pose a significant risk to the surrounding land uses.

Figure 3.1 Multi-Level Risk Assessment Approach



4.0 SEPP 33 Preliminary Risk Screening

4.1 Introduction

The objective of the risk screening process is to assist consent authorities to determine if a proposed development is potentially hazardous and therefore subject to further risk analysis and assessment requirements under SEPP 33.

The preliminary screening methodology concentrates on the storage and/or transport of specific dangerous goods classes that have the potential for significant off-site effects. A complete description of the methodology is provided in *Applying SEPP 33: Hazardous and Offensive Development Application Guidelines (Applying SEPP 33)* (DUAP 1994).

4.2 Methodology

To determine whether the proposed facility is potentially hazardous the following information has been collated:

- quantity of materials used in the modified RDC;
- dangerous goods classification for each material, if applicable;
- mode of storage;
- distance of the stored material from the site boundary; and
- average number and size of annual and weekly road movements of hazardous material to and from the facility.

This information has been assessed against the relevant SEPP 33 screening thresholds outlined in *Applying SEPP 33* (DUAP 1994) in order to determine whether the facility is considered potentially hazardous.

4.3 Inventory

The proposed inventories of feed stock and products that will be stored at the site and their dangerous goods classification are listed in **Table 4.1** and the proposed inventories of feed stock and products that will be transported to and from the facility are listed in **Table 4.2**.

The inventory assessment does not include information on products associated with the Concrete Batching Plant (CBP) as the CBP was not found to be potentially hazardous during the original development assessment and the proposed modifications involve no changes to this facility.

The Dangerous Goods Class 2 products identified in **Table 4.1** are not considered potentially hazardous as they do not exceed the screening thresholds outlined in *Applying SEPP 33* (DUAP 1994).

The Dangerous Goods Class 3 (Combustible) products identified in **Table 4.1** do not require risk analysis and assessment under SEPP 33, however these products are required to be handled in accordance with *Australia Standard AS 1940-2004: Storage and Handling of Flammable and Combustible Liquids* (Standards Australia, 2004).

Table 4.1 – Inventory of Feed Stock and Products

Product [1]	Dangerous Goods Classification	Storage Mode	Distance of Stored Material from Site Boundary
Aggregate and sand	Not classified	In on-ground concrete storage bins	25 m to Nurragingy Reserve at closest point 100 m to Humes
Diesel Fuel	Class 3 (Combustible – C1)	Double skinned, self bunded, above ground tank	25 m to Humes 150 m to OneSteel
Gas – Oxygen, Acetylene, LPG	Class 2	Dedicated gas storage area near workshop	50 m to OneSteel
Oil	Class 3 (Combustible – C2)	Oil storage tanks and drums located at workshop	50 m to OneSteel
Grease	Not classified	In workshop	50 m to OneSteel

Note 1: Figures relate to the RDC only and do not include the CBP

Table 4.2 – Estimated Transport and Throughputs of Feed Stock and Products

Product [1]	Transport Volumes	Transport Frequency [2]
Imports		
Aggregate and Sand	Approximately 2,780 tonnes per train	Approximately 18 movements in two days (9 deliveries)
Diesel Fuel	Approximately 60,000 litres per week	Approximately 4 movements per week (2 deliveries)
Workshop deliveries	vary	Approximately 24 movements per day (12 deliveries)
Exports		
Aggregate and Sand	Approximately 13,000 tonnes per day	Approximately 834 movements per day (417 deliveries)

Note 1: Figures relate to the RDC only and do not include the CBP.

Note 2: Worst case daily traffic estimates when fully operational at 4Mtpa.

4.4 Results of Preliminary Screening

The proposed modification involves no changes to the inventories that were documented as part of the 2005 EA for the approved RDC. The approved workshop store (refer to **Figure 1.2**) will store small inventories of Class 2 substances that do not exceed the relevant screening thresholds outlined in the guideline *Applying SEPP 33* (DUAP 1994) and are therefore not considered potentially hazardous. The oil and diesel fuel stored on site are Class 3 (Combustible) substances however these substances do not require assessment against the relevant screening thresholds outlined in the guideline *Applying SEPP 33* (DUAP 1994). Therefore, the modified RDC is not considered to be a potentially hazardous development with respect to the storage or use of hazardous substances.

The modified RDC involves no change to approved traffic arrangements or traffic volumes and the transport volumes and frequency do not exceed the SEPP 33 screening thresholds.

Therefore, the modified RDC is not considered to be potentially hazardous with respect to the transport of hazardous substances.

The proposed modified RDC will require an EPL and therefore it is considered to be a potentially offensive development.

The Alinta Sydney to Newcastle High Pressure Natural Gas Pipeline has not been identified as a potential hazard during the preliminary risk screening since the process is focussed on the storage and transportation of specific classes of dangerous goods. However the pipeline is located in close proximity to the RDC site (refer to **Figure 1.2**) and during the construction phase, construction activities associated with the rail siding will be undertaken within the pipeline easement. Therefore, the potential hazards associated with the gas pipeline have been addressed in **Section 5**.

5.0 Risk Analysis and Assessment

5.1 Introduction

The preliminary risk screening (refer to **Section 4**) indicates that the modified RDC is not considered to be a potentially hazardous development and therefore no further risk analysis and assessment is required. However the Sydney to Newcastle High Pressure Natural Gas Pipeline is located in close proximity to the RDC site (refer to **Figure 1.2**) and during the construction phase, construction activities associated with the rail siding will be undertaken within the pipeline easement.

The Sydney to Newcastle High Pressure Natural Gas Pipeline is operated by Alinta and comprises a 508 millimetre diameter 8 millimetre thick steel pipeline. The pipeline has an operating pressure of approximately 7000kPa and is located within an easement that is approximately 24.68 metres (80 ft) wide. The easement runs approximately north-south, outside the eastern boundary of the RDC site (refer to **Figure 1.2**).

Condition 1.12 of the Project Approval (PA 05-0051) granted in April 2006 required the preparation of a Final Hazard Analysis (FHA) to review the potential impact of the RDC on the Sydney to Newcastle High Pressure Natural Gas Pipeline.

The FHA prepared by Umwelt in April 2008 in response to Condition 1.12 of the Project Approval (PA 05-0051) has been provided in **Appendix A**. The methodology, assessment and results of the FHA are summarised in **Sections 5.2** to **5.3**.

5.2 FHA Methodology

The methodology used for the preparation of the FHA was based on the Hazard Industry Planning Advisory paper (HIPAP) from DoP and *AS2885 Pipelines - Gas and Liquid Petroleum – Operation and Maintenance*. The steps involved in the preparation of the FHA included:

- a hazard identification study to identify:
  - possible causes of risks and potentially hazardous incidents associated with the proposed development with respect to the Sydney to Newcastle High Pressure Natural Gas Pipeline; and
  - potentially hazardous incidents that have the potential for off-site impact;
- qualitative risk analysis and assessment of the consequence/likelihood of the hazardous incidents that have the potential for off-site impact;
- identification, with the proponent, of appropriate safeguards and procedures which may be employed to minimise risk to the adjacent land users; and
- an outline of operational and organisational safety controls.

A facilitated hazard identification study was undertaken as part of the preparation of the FHA with key stakeholders including representatives from Cemex (now Holcim), Alinta and the consulting engineers Hughes Trueman.

The hazard identification study identified a number of credible hazard scenarios associated with the development in relation to the gas pipeline and a level 1 qualitative risk analysis and

assessment was then completed. The risk assessment criteria used were consistent with *Australian Standard AS4360 - Risk Management* (AS4360).

5.3 Summary of Results

The hazard identification study and qualitative risk assessment undertaken as part of the FHA found that none of the risks associated with the gas pipeline constitute extreme risks and it was determined that these risks could be mitigated and managed with a range of technical and non-technical safeguards.

The key technical control measures identified during the hazard identification study included:

- design of piping and structures in accordance relevant standards;
- geotechnical assessment to determine soil stability prior to construction activities;
- use of appropriate equipment to minimise the impact on the pipe in the event of contact; and
- use of process and design controls including limited excavation depths, buffer distances and designated crossings to limit potential for contact with or overstress of the pipe.

The key non-technical safeguards and procedures identified during the hazard identification study included:

- assessment of process designs, site layout and design changes;
- procedural control including Alinta's Daily Permit System and site inductions;
- preparation of operating/construction procedures, including awareness and training;
- cessation of operations in adverse weather conditions;
- implementation of site speed limit, driver training, route selection and physical barriers where appropriate;
- provision of physical controls including fencing of siding during construction;
- limiting access to authorised personnel only and implementation of security patrol if necessary;
- appropriate training and supervision of operations; and
- provision of ongoing maintenance and operation procedures.

The FHA concluded that the risk of off-site impacts associated with the development is negligible and the risk of propagation and cumulative impacts on surrounding land uses is negligible.

6.0 Conclusion and Recommendations

Preliminary risk screenings undertaken in accordance with SEPP 33 for both the development (completed as part of the 2005 Environmental Assessment (NECS, 2005)) and the proposed modified RDC have found that the proposed modified RDC is not considered a potentially hazardous development but is only considered a potentially offensive development as it will be able to meet the requirements for licensing by DECCW. Therefore, under SEPP 33, no further risk analysis and assessment is required for the proposed modification to the approved RDC at Rooty Hill.

However, the close proximity of the site to the Sydney to Newcastle High Pressure Natural Gas Pipeline was identified as a potential issue. An FHA was undertaken by Umwelt in 2008 to review the potential impact of the RDC on the Sydney to Newcastle High Pressure Natural Gas Pipeline and a summary of the FHA is provided in this preliminary risk screening. The FHA identified a number of credible hazard scenarios associated with the gas pipeline during the construction phase of the facility and determined that these risks can be mitigated and managed with a range of technical and non-technical safeguards.

Therefore the risk of off-site impacts associated with the development is considered to be negligible. It is also considered that the risk of propagation and cumulative impacts on surrounding land uses with respect to the Sydney to Newcastle High Pressure Natural Gas Pipeline is negligible.

7.0 Glossary and Abbreviations

Term	Meaning
AS	Australian Standard
CBP	Concrete Batching Plant
Consequence	The outcome of an event expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain. There may be a range of possible outcomes associated with an event.
DECCW	Department of Environment, Climate Change and Water
DoP	Department of Planning
DUAP	Department of Urban Affairs and Planning (now DoP)
EA	Environmental Assessment
EPL	Environment Protection Licence
FHA	Final Hazard Analysis
Hazard	The potential or possibility for harm to occur.
Hazardous Materials	Substances falling within the classification of the Australian Code for Transportation of Dangerous Goods by Road and Rail (Dangerous Goods Code).
HIPAP	Hazardous Industry Planning Advisory Paper
Likelihood	A qualitative measure of probability or frequency.
Monitor	To check, supervise, observe critically, or record the progress of an activity, action, or system on a regular basis in order to identify change.
PHA	Preliminary Hazard Analysis
RDC	Regional Distribution Centre
Residual Risk	The level of risk remaining after risk reduction measures have been applied.
Risk	The chance of something happening that will impact on objectives. It is measured in terms of consequence and likelihood.
Risk Analysis	A systematic use of available information to determine how often specified events may occur and the magnitude of their consequences.
Risk Assessment	The combination of risk identification, risk analysis and risk evaluation.
Risk Evaluation	The process used to determine risk management priorities by comparing the level of risk against pre-determined standards, target risk levels or other criteria.
Risk Identification	The process of determining what can happen, why and how.
Risk Management	The culture, processes, and structures that are directed towards the effective management of potential opportunities and adverse effects.
Risk Treatment	That part of risk management that involves the implementation of policies, standards, procedures and physical changes to eliminate or minimise adverse risks.
SEPP	State Environmental Planning Policy

8.0 References

Standards Australia 2004, AS/NZS 4360: 2004 - Risk Management.

Department of Planning 2008, Applying SEPP 33 Consultation Draft.

DUAP 1999, Multi-level Risk Assessment.

DUAP 1997, Multi-Level Risk Assessment.

DUAP 1994, Applying SEPP 33: Hazardous and Offensive Development Application Guidelines.

DUAP 1993, Hazardous Industry Planning Advisory Paper No. 1 – Industry Emergency Planning Guidelines.

DUAP 1992, Hazardous Industry Planning Advisory Paper No. 2 – Fire Safety Study Guidelines.

DUAP 1990, Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning.

DUAP 1992a, Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis.

Umwelt 2008, Final Hazard Analysis for Rooty Hill Regional Distribution Centre

APPENDIX A

Final Hazard Analysis for Rooty Hill Regional Distribution Centre, Umwelt 2008

Cemex Australia Pty Ltd

DRAFT

Final Hazard Analysis for Rooty Hill Regional Distribution Centre

April 2008

Umwelt
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Final Hazard Analysis for Rooty Hill Regional Distribution Centre

Prepared by

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Executive Summary

Cemex Australia Pty Ltd (Cemex) has approval to construct and operate a Regional Distribution Centre (RDC) at Kellogg Road, Rooty Hill. Construction materials will be transported by rail to the site. Materials will then be blended on-site and distributed by road to the Sydney market. A concrete plant will also operate at the site. The project will involve the construction of a rail siding over the Newcastle to Sydney High Pressure Natural Gas Pipeline which is managed, operated and maintained by Alinta. Umwelt (Australia) Pty Limited (Umwelt) has prepared this Final Hazard Analysis (FHA) to address the requirements of the NSW Department of Planning (DoP) regarding this pipeline.

This FHA has been prepared to comply with the requirements of condition 1.12 of the RDC project approval (PA 05-0051) granted in April 2006. Condition 1.12 of the project approval requires the preparation of a FHA based on the detailed design of the project, with a particular focus on the risks associated with the Sydney to Newcastle Natural Gas Pipeline. The FHA included the findings of a qualitative risk review compiled during a hazard identification study.

The hazard identification study involved discussions with key stakeholders associated with the development. This study identified a number of credible hazard scenarios associated with the development. As a result of this study it was found that these risks can be mitigated and managed with a range of technical and non-technical safeguards. The risk of off-site impacts associated with the development was found to be negligible. The study also found that the risk of propagation and cumulative impacts on surrounding land uses is negligible.

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1.0 Introduction

Cemex Australia Pty Ltd (Cemex) was granted project approval (PA 05-0051) in April 2006 by the Minister for Planning to construct and operate a Regional Distribution Centre (RDC) at Kellogg Road, Rooty Hill within the Blacktown Local Government Area in Western Sydney (refer to **Figure 1.1**). Construction materials will be transported by rail to the site. Materials will then be blended on-site and distributed by road to the Sydney market. A concrete plant will also operate at the site. The project approval allows for the distribution of up to four million tonnes of construction material (excluding concrete) a year from the site. The RDC has approval to operate 24 hours per day, seven days a week. An Environmental Assessment Report (EAR) was prepared by National Environmental Consulting Services (NECS) (2005) as part of the assessment process for the RDC.

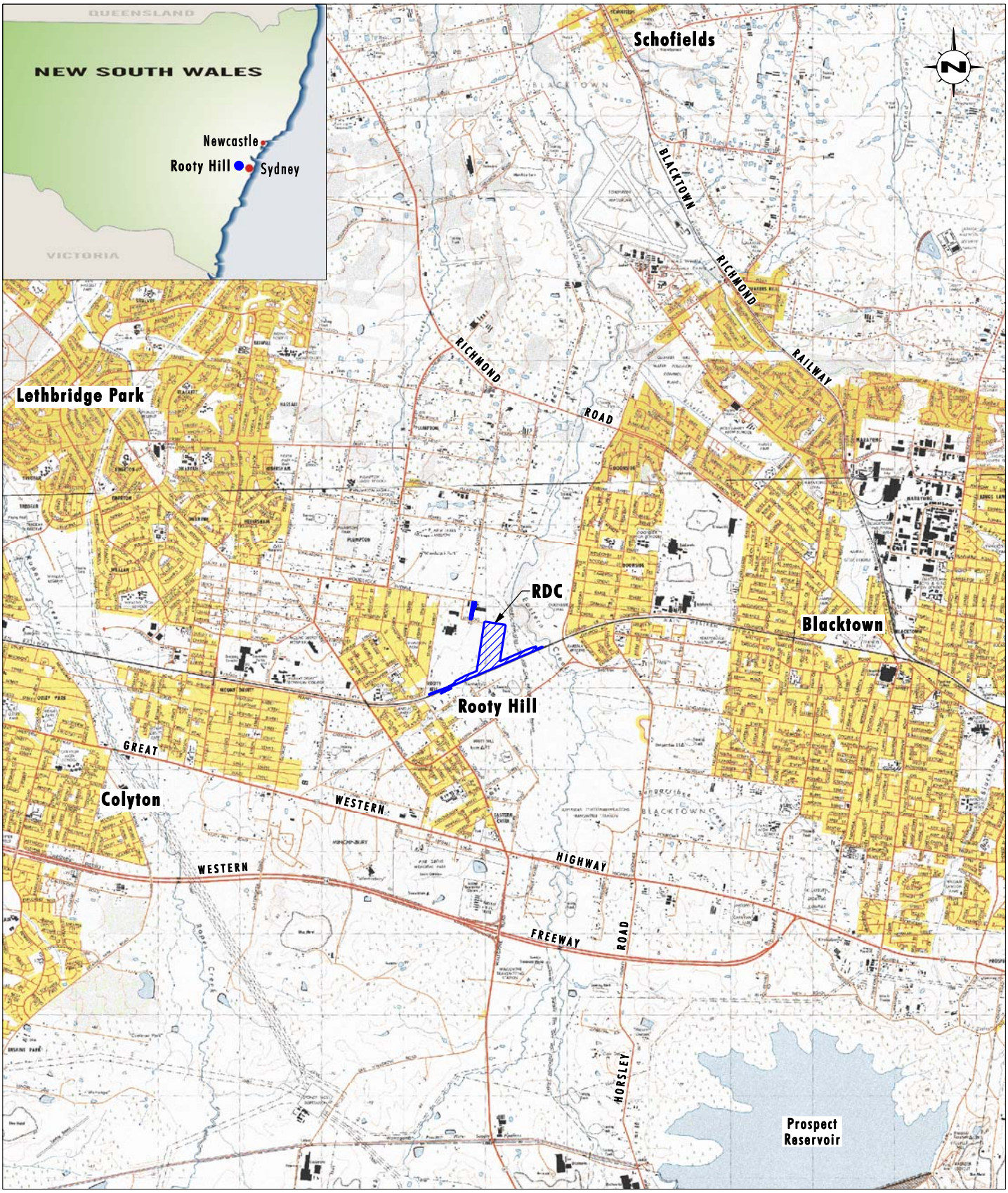
The proposed RDC will involve the construction of a rail siding over the Newcastle to Sydney High Pressure Natural Gas Pipeline which is managed, operated and maintained by Alinta (refer to **Figure 1.2**). Umwelt (Australia) Pty Limited (Umwelt) has prepared this Final Hazard Analysis (FHA) to address the requirements of the NSW Department of Planning (DoP) *Hazardous Industry Planning Advisory Paper No.6 – Guidelines for Hazard Analysis* (DUAP, 1997) regarding this pipeline.

1.1 Overview of the Project

The RDC site comprises an area of approximately 20 hectares and is situated approximately 35 kilometres west of the Sydney Central Business District (refer to **Figure 1.1**). The proposed site layout is shown in **Figure 1.2**. The RDC will be constructed over an approximate two year period, with construction anticipated to begin in late 2009. The RDC will receive and distribute products such as sand and aggregate to the Sydney construction materials market. It is envisaged that the concrete batching plant will be constructed first and will begin operation as soon as it is constructed.

The RDC will comprise:

- a regional office building and quarry materials and concrete testing laboratory;
- a rail siding with aggregate unloading facility;
- storage bin area with load out facilities;
- ground storage and reclaim facilities;
- Blending Plant/pug Mill;
- a conveyor system linking the unloading station to the storage and truck load out facilities;
- workshop, stores, site offices and amenities facilities, truck washdown facilities, truck refuelling, weighbridges, truck and car parking;
- concrete batching plant;
- bridges at two locations over Angus Creek; and
- realignment of North Parade.



Source: LPI, NSW 2000

0 1.0 2.0 3km
1:65 000

Legend

Project Area

FIGURE 1.1

Locality Plan

Source: Readymix Holdings Pty Ltd

0 100 200 400m
1:9 000

Legend

- Project Area
- Location of Noise Wall

FIGURE 1.2

Site Development Plan

1.2 Project Approval Conditions

This FHA has been prepared in accordance with condition 1.12 of the project approval:

> 1.12 *Prior to the commencement of construction of the project, the Proponent shall undertake a Final Hazard Analysis based on the detailed design of the project and with a particular focus on risks associated with the Sydney to Newcastle Natural Gas Pipeline. The Final Hazard Analysis shall be undertaken in accordance with Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis (DUAP, 1997) and AS2885 Pipelines - Gas and Liquid Petroleum – Operation and Maintenance. The Final Hazard Analysis shall be submitted for the approval of the Director-General prior to the commencement of construction works.*

2.0 Site Description

2.1 Location

The site is in the lower part of the Hawkesbury-Nepean catchment which covers an area of approximately 22,000 km^2 to the west and north of Sydney.

The site is drained by Angus Creek, a tributary of Eastern Creek which flows into South Creek before flowing into the Hawkesbury River near Windsor. Angus Creek flows from the south-west to the north-east across the site. Angus Creek confluences with Eastern Creek in the Nurragingy Reserve to the east of the site (refer to **Figure 1.1**).

The site comprises an irregular shaped area of approximately 20 hectares bounded by Humes and Woodstock Avenue to the north, the Nurragingy Reserve to the east, the Main Western Railway line to the south and the OneSteel Mini Mill to the west (refer to **Figure 1.2**). The site ranges in elevation from approximately 40 mAHD in the north-west corner to approximately 32.5 mAHD in the southern section, with the site experiencing a gentle undulating slope of approximately 1.5% from Kellogg Road to the Main Western Railway line. The natural terrain of the site has been altered by the placement of stockpile material in the northern portion of the site. This stockpile originated from the OneSteel Mini Mill and has resulted in slight changes to the site's topography (refer to **Figure 1.2**).

The development also includes a section of the Humes site that is currently used for vehicle parking and storage. It is proposed to construct the regional office and laboratory buildings on this portion of the Humes site (refer to **Figure 1.2**).

2.2 Surrounding Land Uses

The surrounding land uses include:

- industrial developments to the northern and western boundaries including:
  - the OneSteel Mini Mill;
  - Humes Concrete Pipes and Products facility;

- recreational land uses including the Nurragingy Reserve on the eastern boundary of the site and Blacktown Olympic Park to the south (south of the Main Western Railway);
- the Main Western Railway Line on the southern boundary of the property;
- the M7 Motorway (to the west); and
- residential developments at Rooty Hill and Doonside to the west and east respectively (refer to **Figure 1.2**).

3.0 Risk Assessment Methodology

State Environmental Planning Policy (SEPP) 33 – Hazardous and Offensive Development requires a preliminary risk screening of a proposed development to determine if the development is potentially hazardous and if a Preliminary Hazard Analysis (PHA) is required as part of the development assessment process. The preliminary screening involves identification and assessment of the storage of specific dangerous goods classes that have the potential for significant off-site effects.

Where a PHA is required, *Hazardous Industry Planning Advisory Papers* (HIPAP) *No. 6 – Guidelines for Hazard Analysis* (DUAP, 1992) and *Multi-level Risk Assessment* (DUAP, 1999) note that the PHA should identify and assess all hazards that have the potential for off-site impact. The expectation is that the hazards are analysed to determine the consequence to people, property and the environment and their potential to occur.

The requirement for a Final Hazard Analysis (FHA) assumes that a PHA has been completed as part of the Department of Planning's (DoP) seven step hazard analysis process outlined in HIPAP No. 5 – *Hazard Audit Guidelines* (1993). The role of the FHA is to demonstrate that the risk posed by the project to the surrounding land users has been managed to an acceptable level.

Preliminary risk screening of the development, completed as part of the EAR for the RDC (NECS, 2005), indicated the development was not potentially hazardous. Under SEPP 33 the RDC is only considered potentially offensive as it will require an Environment Protection Licence (EPL). As the development was not considered to be potentially hazardous it did not require the preparation of a PHA or necessitate the completion of a FHA to demonstrate that the hazards identified in the PHA have been managed to an acceptable level.

Notwithstanding, Section 1.12 of the project approval requires the preparation of a FHA that reviews the potential impact of the RDC on the Sydney to Newcastle High Pressure Natural Gas Pipeline. The FHA has been based on the findings of a qualitative risk review undertaken using a facilitated hazard identification study involving all the relevant parties.

The methodology used for the preparation of the FHA, the qualitative risk review and the facilitated hazard identification study is based on the DoP's HIPAP and *AS2885 Pipelines - Gas and Liquid Petroleum – Operation and Maintenance*. The steps involved in the preparation of a FHA include:

- identification of the possible causes of risks and potentially hazardous incidents associated with the proposed development with respect to the Sydney to Newcastle High Pressure Natural Gas Pipeline;
- identification of potentially hazardous incidents that have the potential for off-site impact;

- qualitative assessment of the consequence/likelihood of the hazardous incidents that have the potential for off-site impact;
- identification, with the proponent, of appropriate safeguards and procedures which may be employed to minimise risk to the adjacent land users; and
- an outline of operational and organisational safety controls.

4.0 Qualitative Risk Assessment

4.1 Introduction

A qualitative risk assessment uses words and descriptive scales to determine the risk of any potentially hazardous incidents associated with a proposed development. This risk is then assessed against qualitative criteria to determine whether the facility could cause an incident of a magnitude significant in terms of risk to people, property or harm to the biophysical environment.

Low and acceptable risks can be allowed with minimal mitigation, however if the risks are significant a higher level of analysis will be required.

4.2 Methodology

In accordance with the HIPAP6, a qualitative risk assessment requires (as a minimum):

- hazard identification using word diagrams, simplified fault/event trees and checklists;
- generalised consequence analysis of key risk contributors to demonstrate that their consequences are confined to within the project boundaries. This analysis incorporates the results of any preliminary screening and risk classification and prioritisation assessments;
- evaluation of the risks against the qualitative criteria in *HIPAP No. 4 Risk Criteria for Land Use Safety Planning* (DUAP 1992); and
- demonstration of adequacy of the proposed technical and management controls to ensure the ongoing safety of the proposed development.

These assessment steps were implemented for the Rooty Hill RDC.

4.3 Hazard Identification

4.3.1 Hazardous Materials

Alinta manage, operate and maintain the Sydney to Newcastle High Pressure Natural Gas Pipeline. The pipeline:

- is a 20 inch or 508 millimetre diameter steel pipeline and 8 millimetre thick pipe;
- has an operating pressure of approximately 7000kPa;

- is located in an easement that is 24.682 metres (80 ft) wide and typically has a depth of cover of 1000 millimetres over the pipeline. Under the railway line the depth would typically be approximately 2000 millimetres; and

- is not central to easement, but is located on the western boundary, typically with the pipeline 6 metres off the western boundary and 18 metres from the eastern boundary. The site markers don't necessarily indicate the precise location of the pipeline but are part of aerial and ground survey data.

With respect to the railway line passing over the pipeline easement:

- when the loading over the pipeline has the potential to overstress pipe and can not meet conditions of AS 2885, a protection casing is provided to shield the pipe from the external loading; and

- casing under railway lines are generally constructed of steel and typically extend 7 metres from the outer track.

4.3.2 Hazardous Event Identification

A hazard identification study was facilitated by Umwelt on 5 December 2007 and included representatives from Cemex, Alinta and Hughes Trueman. The participants have experience in relation to the design and operation of materials handling facilities and the Alinta representatives have extensive experience with the management, operation and maintenance of the Sydney to Newcastle High Pressure Natural Gas Pipeline. The purpose of the hazard identification study was to review the interactions between the High Pressure Natural Gas Pipeline and the construction and operation of the RDC with the objective of identifying significant safety, occupational health and environmental hazards both on-site and off-site. The representatives present at the hazard identification study are outlined in **Table 4.1**.

Table 4.1 – Representatives Present at Hazard Identification Study

Representative	Organisation
Rhett Duncan	Cemex
Mitch Ryan	Cemex
Richard Savage	Cemex
David Thomas	Cemex
Meng Cheng	Alinta
James Maldon	Alinta
Antonis Anastassiades	Hughes Trueman
Tim Procter	Umwelt
Rebecca Warren	Umwelt

The hazard identification study included:

- a review of the site layout, construction materials and timeline;

- a review of the infrastructure, equipment, physical environment and construction activities,;

- consideration of the range of tasks, both routine and occasional, on the site;
- an overview of relevant legal standards; and
- a review of any potential occupational health and safety impacts and environmental impacts.

A hazard study provides the opportunity for people to think creatively and examine ways in which hazards might arise in a meeting environment. To reduce the chance that something is missed, it is done in a systematic way using guide words to identify hazards. This study was carried out in accordance with *HIPAP No 4 – Risk Criteria for Land Use Safety Planning* (DUAP, 1992) and comprises part of a qualitative risk assessment.

The hazard study involved discussion of the scope of the project, followed by identification of hazards regarding safety, occupational health and environment. The hazard identification process was based on a brainstorming session using guidewords such as:

Hazardous event	Material spillage
Vehicle accident / collision	Release during loading/unloading
Injury	Fire
Electrical fault	Human error
Structural failure	Dangerous goods
Hazardous substances	Maintenance
Process control	Security

The hazards identified were discussed and safety or mitigation measures were documented. The potential hazardous events and outcomes of these discussions were recorded as word diagrams in the meeting minutes presented in **Section 4.5.** These word diagrams outline the causes, consequences and proposed preventative and mitigative control measures for the potential hazardous events identified in the meeting.

4.4 Qualitative Risk Criteria

The qualitative risk assessment criteria have been developed to identify key risks to the environment, society, heritage and business reputation. The criteria are based on a risk assessment matrix consistent with *Australian Standard AS4360 - Risk Management* (AS4360). The qualitative assessments of risk severity and likelihood (refer to **Table 4.2 to 4.4**) were used to help provide a general assessment of the hazards with off-site consequences, which are presented in **Section 4.5**. The overall risk level was determined by using the matrix in **Table 4.2**.

Table 4.2 - Qualitative Measures of Environmental Consequence

Severity Level	Natural Environment	Legal/Government	Heritage	Community/ Reputation/Media
(1) Insignificant	Limited damage to minimal area of low significance.	Low-level legal issue. On the spot fine. Technical non-compliance prosecution unlikely. Ongoing scrutiny/attention from regulator.	Low-level repairable damage to commonplace structures.	Low level social impacts. Public concern restricted to local complaints. Could not cause injury or disease to people.
(2) Minor	Minor effects on biological or physical environment. Minor short-medium term damage to small area of limited significance.	Minor legal issues, non-compliances and breaches of regulation. Minor prosecution or litigation possible. Significant hardship from regulator.	Minor damage to items of low cultural or heritage significance. Mostly repairable. Minor infringement of cultural heritage values.	Minor medium-term social impacts on local population. Could cause first aid injury to people. Minor, adverse local public or media attention and complaints.
(3) Moderate	Moderate effects on biological or physical environment (air, water) but not affecting ecosystem function. Moderate short-medium term widespread impacts (e.g. significant spills).	Serious breach of regulation with investigation or report to authority with prosecution or moderate fine possible. Significant difficulties in gaining future approvals.	Substantial damage to items of moderate cultural or heritage significance. Infringement of cultural heritage/ sacred locations.	Ongoing social issues. Could cause injury to people, which requires medical treatment. Attention from regional media and/or heightened concern by local community. Criticism by Non-Government Organisations Environmental credentials moderately affected.
(4) Major	Serious environmental effects with some impairment of ecosystem function. Relatively widespread medium-long term impacts.	Major breach of regulation with potential major fine and/or investigation and prosecution by authority. Major litigation. Future project approval seriously affected.	Major permanent damage to items of high cultural or heritage significance. Significant infringement and disregard of cultural heritage values.	On-going serious social issues. Could cause serious injury or disease to people. Significant adverse national media/public or Non-Government Organisations attention. Environment / management credentials significantly tarnished.

Table 4.2 - Qualitative Measures of Environmental Consequence (cont)

Severity Level	Natural Environment	Legal/Government	Heritage	Community/ Reputation/Media
(5) Catastrophic	Very serious environmental effects with impairment of ecosystem function. Long term, widespread effects on significant environment (e.g. national park).	Investigation by authority with significant prosecution and fines. Very serious litigation, including class actions. Licence to operate threatened.	Total destruction of items of high cultural or heritage significance. Highly offensive infringements of cultural heritage.	Very serious widespread social impacts with potential to significantly affect the well being of the local community. Could kill or permanently disable people. Serious public or media outcry (international coverage). Damaging Non-Government Organisations campaign. Reputation severely tarnished. Share price may be affected.

Table 4.3 - Qualitative Measure of Likelihood

Level	Descriptor	Description	Guideline
A	Almost Certain	Consequence is expected to occur in most circumstances.	Occurs more than once per month.
B	Likely	Consequence will probably occur in most circumstances.	Occurs once every 1 month – 1 year.
C	Occasionally	Consequence should occur at some time.	Occurs once every 1 year - 10 years.
D	Unlikely	Consequence could occur at some time.	Occurs once every 10 years – 100 years.
E	Rare	Consequence may only occur in exceptional circumstances.	Occurs less than once every 100 years.

Source: AS/NZS 4360:2004 Risk Management

Table 4.4 - Qualitative Risk Matrix

Likelihood of the Consequence	Maximum Reasonable Consequence				
	(1) Insignificant	(2) Minor	(3) Moderate	(4) Major	(5) Catastrophic
(A) Almost certain	11 High	16 High	20 Extreme	23 Extreme	25 Extreme
(B) Likely	7 Moderate	12 High	17 High	21 Extreme	24 Extreme
(C) Occasionally	4 Low	8 Moderate	13 High	18 Extreme	22 Extreme
(D) Unlikely	2 Low	5 Low	9 Moderate	14 High	19 Extreme
(E) Rare	1 Low	3 Low	6 Moderate	10 High	15 High

Source: AS/NZS 4360:2004 Risk Management

4.5 Results of Qualitative Assessment

The results of the hazard identification session are presented in **Table 4.5**. For the purposes of this assessment, significant risks have been defined in **Table 4.5** as those with a risk rating of high or extreme, as defined by risk values exceeding 9 and 17 respectively. None of the risks associated with the development were found to constitute extreme risks.

The activities with 'low' to 'moderate' risks will be mitigated and managed with the safeguards outlined in **Table 4.5**. High consequence low probability risks such as aircraft crashes have been incorporated into **Table 4.5** but it is considered highly unlikely that such events will occur as, for example, the site is not located under an airport flight path.

On the basis of the hazard identification study it is anticipated that a qualitative assessment of the risks associated with the development is sufficient for compliance with DoP requirements as the risks associated with this development have been found to be low.

Table 4.5 – Hazard Identification Study

Plant:	**Rooty Hill – Regional Distribution Centre**	**Date:**	05.12.2007
Drawing No:	**Site Master Layout**		
Description:	**Construction activities adjacent to or over the Sydney Newcastle High Pressure Gas Pipeline**		

Prevention and Mitigation measures identified relevant to each of the Hazardous Events identified include:

- Design pipe in compliance with AS 2885 and 4799
- Use of appropriate equipment including excavator/backhoe fitted with a cleanup or "gummy" bucket to limit tooth penetration in event of contact with pipe
- Limit excavation depths and working with a buffer distance above the pipe to prevent contact with the pipe
- Use of equipment that can offset the bucket to remove necessity to straddle pipeline, preventing overstress of pipeline
- Designated crossing covered with steel plate to prevent overstress of pipeline
- Soft procedural controls including Alinta's Daily Permit System
- Fencing of siding during construction
- Construction works supervised by Alinta Permit Officer
- Access to authorised personnel only

Additional Measures that should be generically applied during each step of the construction phase include:

- Operator awareness and training
- Soft procedural controls including supervision
- Route selection

Term:	**Definition:**
S	Severity – Table 4.2
P	Probability – Table 4.3
R	Risk – Table 4.4

Table 4.5 – Hazard Identification Study (cont)

Plant: Rooty Hill – Regional Distribution Centre **Date:** 05.12.2007

Drawing No: Site Master Layout

Description: Construction Phase – Railway Siding Construction

Hazardous Event	Possible Cause	Potential Consequence	Prevention and Mitigation	S	P	R	Additional Measures
Physical damage of pipe during excavation	Equipment or traffic causing damage during excavation for foundation preparation, pouring of foundations	Overstress of pipeline Pipe failure Damage to pipeline	Pipe location to be determined by Alinta Excavation of pipeline supervised by Alinta or Alinta approved contractor	2	D	5	Site inspection (and geotechnical assessment if required) to ensure machine access route is appropriate
Physical damage of pipe during installation of culverts	Dropping equipment / material during construction activities	Pipe failure Damage to pipeline	Maintain a minimum thickness of material covering the pipe as directed by Alinta to prevent contact with pipe Maintain a buffer distance between construction activities and pipe trench to prevent contact with pipe Ensure appropriate rigging and lifting procedures are in place Fitting protective covers (as appropriate) around pipeline when exposed Fencing of area during construction especially when the pipe is exposed	2	D	5	Control of construction activities when the pipeline is exposed

Table 4.5 – Hazard Identification Study (cont)

Hazardous Event	Possible Cause	Potential Consequence	Prevention and Mitigation	S	P	R	Additional Measures
Physical damage of pipe when backfilling trench	Failure of protective structure during controlled backfill or construction of railway siding	Overloading of pipeline Pipe failure Damage to pipeline	Protective structure installed in accordance with relevant standards Design of protective structure to appropriate standards to ensure strength of underlying structure adequate Geotechnical assessment to identify load bearing capacity of soils and structure	3	D	9	Protective measures in place to identify failure of pipe culvert and how it occurred Installation procedure for protective structure to include appropriate buffer distances and offsets to ensure stability of surrounding ground and measures to ensure the protective structure is not compromised
Physical damage of pipe during railway construction	Equipment or traffic causing damage during laying of railway line	Overstress of pipeline Pipe failure Damage to pipeline	Geotechnical assessment to ensure railway embankment design compatible with soil's structural ability Limited excavation depth should prevent contact with pipe Specification for Compaction of Sub-grade to be prepared in compliance with geotechnical assessment	2	D	5	Provide designated routes for construction machinery Ensure structures, signs, etc are installed outside the buffer area associated with pipe easement to prevent contact with pipe Alinta to review and approve specification for compaction of sub-grade
Physical damage of pipe during road realignment	Equipment or traffic causing damage during alignment of road and/or access road	Overstress of pipeline Pipe failure Damage to pipeline	Design of road Sub-grade and pavement to appropriate standards Geotechnical assessment to identify load bearing capacity of soils and structure Limited excavation depths should prevent contact with pipe	3	D	9	Provide designated routes for construction machinery Ensure structures, signs, etc are installed outside the buffer area associated with pipe easement to prevent contact with pipe Alinta to review and approve specification for compaction of sub-grade

Table 4.5 – Hazard Identification Study (cont)

Plant: Rooty Hill – Regional Distribution Centre **Date:** 05.12.2007

Drawing No: Site Master Layout

Description: Construction Phase - Noise Wall over Gas Pipeline

Hazardous Event	Possible Cause	Potential Consequence	Prevention and Mitigation	S	P	R	Additional Measures
Physical damage of pipe during earthworks preparation	Equipment or traffic causing damage during earthworks preparation for noise wall construction	Pipe failure Damage to pipeline	Design of noise wall and foundations to relevant standards	4	E	10	Noise wall design to include footing supports that go below pipe invert Provision of ready access to Alinta staff in the event of incident or for repairs
Failure of footings and/or pipeline	Failure of noise wall causing damage to footings and/ or pipeline during operational life of noise wall	Pipe failure Damage to pipeline	Design of noise wall and foundations to relevant standards	4	D	14	Review of design requirements by Alinta Design to consider failure point of noise wall to be reached before foundations fail Provision of ready access to Alinta staff in the event of incident or for repairs

Table 4.5 – Hazard Identification Study (cont)

Plant: Rooty Hill – Regional Distribution Centre **Date:** 05.12.2007

Drawing No: Site Master Layout

Description: Construction Phase – Powerlines over Gas pipeline

Hazardous Event	Possible Cause	Potential Consequence	Prevention and Mitigation	S	P	R	Additional Measures
Physical damage to pipeline	Equipment or traffic causing damage during relocation of inground high voltage powerlines	Damage to pipeline Contact during construction of auger hole	Pipeline location to be provided by Alinta	4	E	10	Engineering controls designed to the satisfaction of Alinta. This would likely include details on crossing point, buffer between pipeline and power line, materials of construction and construction techniques
Physical damage of pipe during realignment of aerial powerlines	Equipment or traffic causing damage during earthworks preparation Auguring of holes for power pole	Pipe failure Damage to pipeline	If the powerline realignment requires construction activities near the pipeline easement then construction works to be supervised by Alinta Permit Officer	4	E	10	Alinta to provide an indication of the distance from the pipeline easement where they relinquish control of construction activities Location selection of power poles near pipeline easement to the satisfaction of Alinta. Provision of ready independent access to Alinta staff in the event of incident or for repairs

Table 4.5 – Hazard Identification Study (cont)

Hazardous Event	Possible Cause	Potential Consequence	Prevention and Mitigation	S	P	R	Additional Measures
Physical damage to cathodic protection upstands	Damage during earthworks or construction activities Not accessible	Damage to cathodic protection of pipeline or casing, may result in pipe or casing damage Location of existing upstands inaccessible	Redesign cathodic protection system so not located within construction boundary Access to railway corridor in accordance with RailCorp procedures	2	B	12	Ensure ongoing pipeline maintenance and operation procedures are not compromised by placement of upstands Provision of ready independent access to Alinta staff in the event of incident or for repairs

Table 4.5 – Hazard Identification Study (cont)

Plant: Rooty Hill – Regional Distribution Centre **Date:** 05.12.2007

Drawing No: Site Master Layout

Description: Operational Phase – Railway Operations

Hazardous Event	Possible Cause	Potential Consequence	Prevention and Mitigation	S	P	R	Additional Measures
Loss of electrical isolation of siding	Operation of railway siding or damage to rails	Electrocution Fire	Comply with RailCorp design standards and procedures Ensure that lines are not connected to prevent possibility of circuit being completed	5	E	15	Awareness training of RDC Staff
Derailment	Operation of railway	Damage to pipeline	Comply with RailCorp design standards and procedures Ensure barriers are in place where appropriate Enforce a maximum train speed limit of 25 km/h	4	D	14	Driver training and awareness Awareness training of RDC Staff
Injury to personnel during railway operations	Railway-related accident during pipeline maintenance activities Railway-related accident during staff access to cathodic protection stands by Alinta staff	Personal injury Death OH&S compromised	Redesign cathodic protection system so upstands are not located within the railway corridor Comply with RailCorp design standards and operating procedures Cathodic protection operates in isolation to activities associated with the railway line	4	E	10	Ongoing maintenance and operation procedures Provision of ready independent access to Alinta staff in the event of incident or for repairs Awareness and training of RDC Staff

Table 4.5 – Hazard Identification Study (cont)

Plant: Rooty Hill – Regional Distribution Centre **Date:** 05.12.2007

Drawing No: Site Master Layout

Description: Overview - Gas Pipeline

Hazardous Event	Possible Cause	Potential Consequence	Prevention and Mitigation	S	P	R	Additional Measures
Failure of safety protocols	Failure of Permit system	Unidentified or unmanaged pipe failure	Alinta Daily Permit system to be supported by other soft procedures Site inductions, checklists, permits and other procedures to be implemented	2	D	5	Additional measures to be incorporated into the construction phase to reduce reliance on the Daily Permit system and Alinta construction supervision
Flooding	Inadequate drainage High rainfall Blockage of stormwater system	Inundation of construction site	Site drainage designed in accordance with construction and operation Site Water Management Plan Ensure compaction of soils over pipeline to satisfaction of Alinta	2	C	8	Review of site drainage and controls if necessary
Unauthorised access	Exposure of pipeline during construction activities Unauthorised access by public Breach of security/ sabotage	Damage or interference with pipeline and/or footings	Fencing of construction activities Authorised personnel only Appropriate signage Cover exposed pipeline when excavation unattended Request extension of patrolling of Nurragingy Reserve by Blacktown City Council	2	B	12	If high levels of unauthorised access are identified during the construction phase, a security patrol will be enforced Ensure clear signage is provided Ensure un-staffed areas are secure

Table 4.5 – Hazard Identification Study (cont)

Hazardous Event	Possible Cause	Potential Consequence	Prevention and Mitigation	S	P	R	Additional Measures
Lightning	Pipeline exposed during construction activities and lightning resulting in physical damage to the pipeline	Pipe failure Damage to pipeline Personal injury Fire	Pipeline has been designed in accordance with AS 2885 and 4799 All equipment and heavy machinery to be located at a distance to exposed pipe and excavation activities All works to comply with Alinta's construction requirements for exposed structures No works to be undertaken in periods of adverse weather conditions	4	E	10	Site to be covered in periods of adverse weather conditions Alinta to provide an indication of the distance they require machinery away from the exposed pipeline
Catastrophic failure of pipeline	Damage / puncture to pipeline Metal fatigue Faulty fabrication Corrosion	Full bore rupture of pipeline	Pipeline has been designed in accordance with AS 2885 and 4799 Construction works supervised by Alinta Permit Officer	5	E	15	Soft procedural controls including supervision Additional controls to be recommended by Alinta following review of daily construction schedule Emergency response control centre will be triggered by pressure drop in pipeline Emergency contact details to be provided by Alinta

Table 4.5 – Hazard Identification Study (cont)

Plant: Rooty Hill – Regional Distribution Centre **Date:** 05.12.2007

Drawing No: Site Master Layout

Description: Overview – All Areas at Regional Distribution Centre

Hazardous Event	Possible Cause	Potential Consequence	Prevention and Mitigation	S	P	R	Additional Measures
Flooding	Inadequate drainage High rainfall Blockage of stormwater system	Inundation of site	Site drainage designed in accordance with construction and operation SWMPs	2	C	8	Review of site drainage and controls if necessary
Unauthorised access	Unauthorised access by public Breach of security/ sabotage	Damage or interference construction activities Injuries to people	Fencing of construction activities Authorised personnel only Appropriate signage	2	B	12	If high levels of unauthorised access are identified during the construction activities, a security patrol will be enforced Ensure clear signage is provided Ensure un-staffed areas are secure
Vehicle accident	Poor road or traffic conditions Driver error due to inattention/distraction Impact with equipment Inadequate training	Damage to pipeline and/or footings Injuries to people	Site speed limit (20km/hr) Driver training and choice of routes to reduce accident potential Physical barriers, e.g. bunding and bollards Drug and alcohol policy	3	D	9	Driver awareness and training Route selection
Lightning	Physical damage leading to equipment failure	Personal injury Fire Damage to plant and equipment	Equipment designed in accordance with relevant Australian Standards Structures fitted with lightning protection as required No works to be undertaken in periods of adverse weather conditions	2	E	3	First Aid available and safety measures in place Operator awareness and training regarding risks associated with adverse weather

Table 4.5 – Hazard Identification Study (cont)

Hazardous Event	Possible Cause	Potential Consequence	Prevention and Mitigation	S	P	R	Additional Measures
Adverse weather conditions including bushfire, high winds, earthquake	Environmental conditions leading to equipment failure	Personal injury Plant failure	Equipment designed in accordance with relevant Australian Standards Structures designed to relevant codes for wind and earthquake No works to be undertaken in periods of adverse weather conditions	4	E	10	Ensure all designs meet relevant codes of practice
Confined spaces	Failure to observe safety requirements	Personal injury	All workers working within confined spaces are appropriately trained and are provided with the necessary equipment All confined spaces fitted with signs and, where appropriate, locks	4	E	10	Requires all staff to be aware of location and requirements for confined spaces
Aircraft crash	Pilot error Bad weather Plane fault	Fire propagation to flammable material around the site Environmental release	Aircraft operating in accordance with aviation standards No additional risk to the gas pipeline as a result of the development	5	E	15	While this has a high potential consequence the potential of this occurring is highly unlikely as plant is not located near any flight paths

5.0 Risk Analysis

Risk analysis involves comparing the level of risk found during the qualitative analysis with previously established risk criteria, and deciding whether or not that level of risk can be accepted. Such decisions take into account the wider context of the hazard and include consideration of the tolerability of the hazards borne by external parties.

Low and acceptable risks can be allowed with minimal further mitigation, however, they should be monitored and periodically reviewed to ensure they remain at this level. Higher level risks should be treated using appropriate safeguards.

Risk analysis and assessment generally involves the following processes:

- assess the risk of potential hazardous events which may have off-site implications using appropriate qualitative techniques (e.g. a risk matrix). This will determine whether existing off-site risk levels will be increased by the development;

- assess the impacts of the proposed development on individual and societal risk, surrounding land uses, the potential for a cumulative impact through the propagation of the incident and risk to surround biophysical environment;

- identify risks associated with propagation from existing hazardous events in nearby equipment/processes; and

- management of residual risks using safeguards.

5.1 Risk of Potential Hazardous Events

The risk assessment identified that catastrophic failure of high pressure gas pipeline would have the greatest consequence in or around the site during the construction activities. Catastrophic failure of the pipeline can occur because of damage to or puncturing of the pipeline, metal fatigue, faulty fabrication or corrosion. To minimise the potential for full bore rupture of the pipeline, the pipeline has been designed in accordance with AS 2885 and AS 4799, construction works around the pipeline will be supervised by an Alinta Permit Officer, and there will be a range of procedural controls in place either resulting from the design review or the review of the daily construction schedule. The highest probability event leading up to catastrophic failure of pipeline during the proposed construction activities would be associated with accidental damage to the pipeline.

The risk assessment identified that physical damage of the pipe during earthworks preparation and construction activities constitutes the most probable hazard associated with the construction activities for the RDC in or around the pipeline easement. Possible causes identified include:

- equipment or traffic movement across the pipeline easement causing damage to the pipeline during earthworks preparation for extension of the pipelines protective casing, construction of the railway siding and construction of the noise wall;

- physical contact during excavation of the pipeline and installation of the protective casing, or the auger hole for power or lighting poles or noise wall foundations; or

- failure of protective casing around the pipeline or failure of the noise wall causing damage to footings and/ or pipeline during operational life of noise wall.

Preventative measures identified include:

- the appropriate design of foundations and structures to the relevant codes or practice and standards;
- the design of foundations to minimise the potential for interaction between the foundations and the pipeline;
- designs being reviewed by the appropriate Alinta representatives where a foundation and structure could interact with the pipeline;
- other engineering related controls being designed to the satisfaction of Alinta. This would likely include details on crossing points, buffer distances between the pipeline and foundations, footings and power lines, and materials of construction and construction techniques; and
- equipment or traffic that could cause damage during earthworks preparation being controlled by the Alinta Permit system.

Other risks that were considered to have some significance included:

- damage to cathodic protection of the pipeline or casing resulting in pipe or casing damage. This is to be addressed by redesigning the cathodic protection system so that the upstands are not within the construction boundary;
- safe access to the cathodic protection for Alinta personnel. This is to be addressed by redesigning the cathodic protection system so that the upstands are not within the construction boundary and can be accessed without entering the railway corridor;
- electrical isolation of the railway siding from main railway system to ensure there is no electrical hazard associated with trains on the siding. This is to be addressed by ensuring all designs comply with RailCorp standards and procedures;
- train derailment leading to pipeline damage. This is to be addressed by ensuring all designs comply with RailCorp standards and procedures, that barriers are in place where appropriate and that the maximum train speed limit of 25 km/h is enforced;
- unauthorised access to the construction area while the pipeline is exposed. This is to be addressed by the installation of suitable boundary fence and security patrol as appropriate; and
- the potential for damage to the pipeline during adverse weather events, which will be minimised by ensuring all equipment and heavy machinery is located at suitable distances from the exposed pipe and excavation activities, and no works are undertaken in periods of adverse weather conditions. Where practical the site/exposed pipeline is to be covered in periods of adverse weather conditions.

A number of high consequence low probability risks were also identified during the risk assessment and these are presented in **Table 4.5**.

5.2 SEPP33 and Societal Risk

The assessment of societal risk is undertaken as part of the SEPP 33 screening and risk prioritisation process. The qualitative assessment indicated that SEPP 33 screening was not required and it is considered that the societal risk associated with the development is negligible. Additionally, due to the lack of dangerous goods involved with the proposed development and buffer distance to nearest residential and recreational areas, societal risk was not further investigated.

5.3 Propagation Analysis

A potentially hazardous event within a plant can cause further hazardous events in the same development or other developments. The qualitative assessment identified that there are no risks associated with the development with significant off-site impacts (refer to **Table 4.5**). Therefore it is considered that the risk of propagation associated with the proposed development is negligible.

5.4 Risk to Biophysical Environment

The main concern for risk to the biophysical environment is generally with effects on whole systems or species populations. For the development, the construction activities will be confined within the site boundary and away from the off-site biophysical environment. The impacts of the hazardous events which have the potential to occur at the site are predicted to be relatively low and generally restricted to within the site boundary. These risks will be managed using the measures outlined in **Table 4.5** and **Sections 5.1** and **5.6**. There are not expected to be any toxicological or combustion product impacts associated with the potential hazardous events for the development. The FHA has indicated that there are no hazardous events associated with the facility that would threaten a whole system or species population.

The construction activities will be subject to regular maintenance and inspection procedures by Alinta, and the operation will be undertaken in accordance with railway operating regulations.

The site is part of a highly modified landscape associated with the existing and previous industrial land uses in the area and the risks associated with this development are considered to be very low. The EAR (NECS, 2005) prepared for the RDC found that it was unlikely that the development would significantly impact any threatened or endangered species or endangered ecological communities. Site disturbance and vegetation removal will be minimised to the immediate vicinity of the construction activities as described in the Soil and Water Management Plans prepared for the development (Umwelt, 2007). Therefore it is considered that the consequences associated with the development will not threaten the long-term viability of the ecosystem or any species within it and the likelihood of these consequences is not significantly greater than background risk levels.

Therefore it is considered that the risk to the biophysical environment will be acceptable.

5.5 Transport Risk Analysis

The impacts of the proposed development on the existing traffic environment are expected to be minimal. Potential impacts are constrained to the delivery of construction materials and access during construction and maintenance activities. No dangerous materials will be

transported during these activities. No potential hazard events associated with these traffic movements of any significance were identified during the risk assessment.

5.6 Summary of Risk Management Measures

The key technical control measures identified in **Table 4.5** include:

- design of piping and structures in accordance relevant standards;
- geotechnical assessment to determine soil stability prior to construction activities;
- use of appropriate equipment to minimise the impact on the pipe in the event of contact; and
- use of process and design controls including limited excavation depths, buffer distances and designated crossings to limit potential for contact with or overstress of the pipe.

The key non-technical safeguards and procedures identified in **Table 4.5** include:

- assessment of process designs, site layout and design changes;
- procedural control including Alinta's Daily Permit System, site inductions and other procedures;
- operating procedures, including awareness and training;
- cessation of operations in adverse weather conditions;
- implementation of site speed limit, driver training, route selection and physical barriers where appropriate;
- provision of physical controls including fencing of siding during construction;
- limiting access to authorised personnel only and implementation of security patrol if necessary;
- appropriate training and supervision of operations; and
- provision of ongoing maintenance and operation procedures.

6.0 Conclusion

The preparation of a FHA for the facility was undertaken to comply with requirements of the DoP regarding the potential impacts of the RDC on the Sydney to Newcastle High Pressure Natural Gas Pipeline. The FHA included the findings of a qualitative risk review compiled during a hazard identification study.

The hazard identification study involved discussions with key stakeholders associated with the development. This study identified a number of credible hazard scenarios associated with the development. As a result of this study it was found that the risks associated with these scenarios can be mitigated and managed with a range of technical and non-technical safeguards. The assessment found that the risk of off-site impacts associated with the development is negligible. The assessment also found that the risk of propagation and cumulative impacts on surrounding land uses is negligible.

7.0 Glossary and Abbreviations

Term	Meaning
AS	Australian Standard
Consequence	the outcome of an event expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain. There may be a range of possible outcomes associated with an event
DECC	Department of Environment and Climate Change
DoP	Department of Planning
DUAP	Department of Urban Affairs and Planning (now DoP)
EAR	Environmental Assessment Report
EPL	Environmental Protection Licence
FHA	Full Hazard Analysis
Hazard	the potential or possibility for harm to occur
Hazardous Materials	substances falling within the classification of the Australian Code for Transportation of Dangerous Goods by Road and Rail (Dangerous Goods Code)
HIPAP	Hazardous Industry Planning Advisory Paper
Likelihood	a qualitative measure of probability or frequency
Monitor	to check, supervise, observe critically, or record the progress of an activity, action, or system on a regular basis in order to identify change
PHA	Preliminary Hazard Analysis
Residual Risk	the level of risk remaining after risk reduction measures have been applied
Risk	the chance of something happening that will impact on objectives. It is measured in terms of consequence and likelihood
Risk Analysis	a systematic use of available information to determine how often specified events may occur and the magnitude of their consequences
Risk Assessment	the combination of risk identification, risk analysis and risk evaluation
Risk Evaluation	the process used to determine risk management priorities by comparing the level of risk against pre-determined standards, target risk levels or other criteria
Risk Identification	the process of determining what can happen, why and how
Risk Management	the culture, processes, and structures that are directed towards the effective management of potential opportunities and adverse effects
Risk Treatment	that part of risk management that involves the implementation of policies, standards, procedures and physical changes to eliminate or minimise adverse risks
SEPP	State Environmental Planning Policy

8.0 References

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