5.5 Ongoing Monitoring

Monitoring should be undertaken to ensure that stormwater quality management measures are working effectively. Monitoring would rely primarily on visual inspections and potentially sampling. Visual inspections should be undertaken for sediment traps, pits, diversions, GPTs, catch drains and all stormwater conveyance structures.

5.6 Water Demand Management and Reuse

To address Integrated Water Cycle Management, potable water conservation could be achieved by:

» Demand Management; and

» Substitution using fit for purpose principals.

Potable water conservation could lead to wastewater flow reduction, which leads to benefits to the environment in terms of reduced treated discharges. In addition roof and stormwater harvesting would reduce discharge to the environment when used in fit-for-purpose substitution.

Demand management should be maximised and could include water savings fittings, low flow showerheads, water efficient appliances and low water demand toilets. Demand management would need to be implemented in order to meet, as a minimum, the requirements of BASIX.

All dwellings that have sufficient roof areas could be provided with roof rainwater harvesting tanks. The rainwater tanks would overflow to the site sub-surface stormwater system and the road stormwater drainage system.

6. Conclusions

A number of opportunities for management of stormwater quality, quantity and flooding exist at the Minmi/Link Road site. This management would benefit from the implementation of Water Sensitive Urban Design (WSUD) practices. WSUD encompasses all aspects of urban water cycle management including water supply, wastewater and stormwater management, that promotes opportunities for linking water infrastructure, landscape design and the urban built form to minimize the impacts of development upon the water cycle and achieve sustainable outcomes.

A WSUD strategy for management of stormwater quality and quantity has been developed for the site that nominates:

- On-lot treatment of stormwater quantity and quality, before discharge to the road stormwater system;
- In flatter areas, vegetated swales along the identified main flow routes, consisting of open channel systems, which are used to remove sediment and suspended solids;
- Precinct scale co-located detention/ bio-retention basins to treat the quantity and quality of stormwater flows. These systems would essentially comprise a dry basin (to provide detention function) combined with bio-retention (to provide water quality treatment function) situated in the invert of the basin. The bio-retention system would potentially need to be lined in areas to prevent contamination of groundwater;
- Gross pollutant traps and other structural measures, at critical locations as required, before discharge to the detention systems; and
- Provision of rainwater tanks in all areas should be maximised in accordance with Council's requirements;
- Habitable floor levels of new residences and, commercial developments located 500 mm above the 100-year ARI event flood level;
- For development in flood storage areas and flood ways development must not lead to a significant increase in flood levels, flood damages, flood behaviour or flood hazard at the site or elsewhere; and
- Areas that are inundated by the PMF require a flood evacuation strategy. Elevated areas would provide suitable evacuation muster areas, of which it is considered there are sufficient throughout the precinct.
- Simulations for the 100-year future climate (2100) allowing for a 30% increase in rainfall intensity and volume have shown that in a 100-year ARI event, flood levels adjacent to the site are expected to increase by less than 0.3 m in the upper reaches. In the lower reaches where the creeks discharge to Hexham Swamp, the increase could be around 0.7m. While this does not cause a significant increase in flood extent, dwelling floor levels would need to consider these impacts, and be located above these flood levels.

To test the effectiveness of the WSUD strategy, numerical modelling was used as follows:

- Flood peaks and flood levels for the creeks within the precinct were determined using RAFTS and TUFLOW;
- Volumes of detention that responded as best possible to the Concept Plan and which throttled flood peaks were determined using RAFTS; and

» Appropriate Water Sensitive Urban Design strategies for stormwater quality management throughout the precinct, which responded as best possible to the Concept Plan and which achieved Council's pollution load targets were determined using MUSIC.

The results of the numerical modelling has shown that the proposed WSUD strategy together with the flood plain management adequately satisfies the requirements of the NCC and LMCC DCP's and the NSW Floodplain Development Manual for management of stormwater quantity, quality and flooding at the Minmi Link Road site.

7. References

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Appendix A

Site Location and Concept Plan

370,000

6,370,000

Black Hill Site

Sydney to Newcastle Freeway

Hexham Swamp

Sydney to Newcastle Freeway

Existing Minmi Village

Minmi Site

Link Road North Site

Link Road

Link Road South Site

6,360,000

370,000

LEGEND

1:50,000

0 205 410 820 1,230 1,640 2,050

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 56

O

Legend

CA Land Holdings

Coal & Allied
Report for Lower Hunter Land
Project - Phase 2

Locality Map

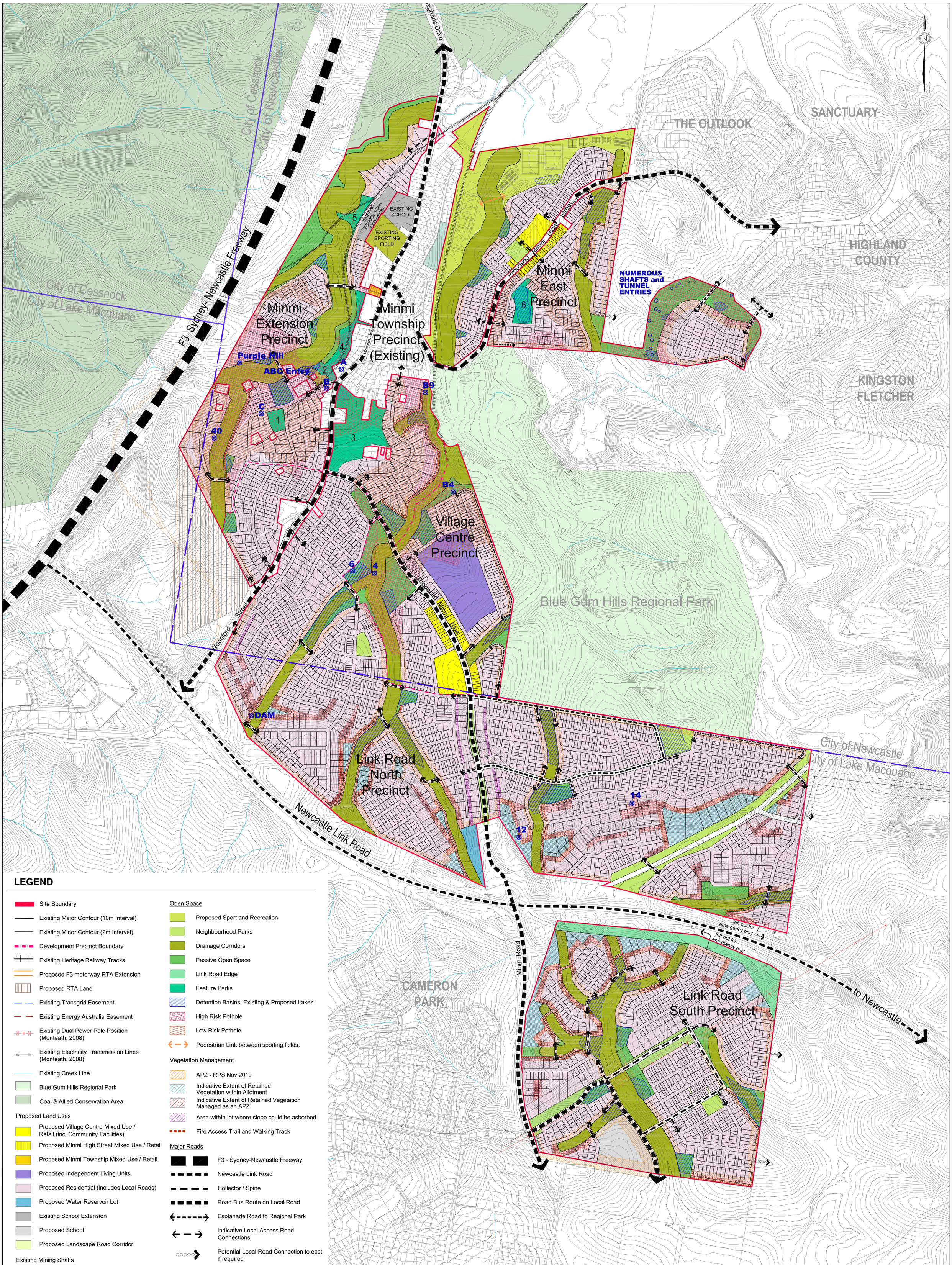
Job Number	21-16058
Revision	Draft
Date	6 October 2008

Figure A.1

B:\Template\GHD-A3-PORTRAIT.mxt

10 Bond Street Sydney NSW 2000 Australia **T** 61 2 9239 7000 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by: R Berg



LEGEND

- Site Boundary
- Existing Major Contour (10m Interval)
- Existing Minor Contour (2m Interval)
- Development Precinct Boundary
- Existing Heritage Railway Tracks
- Proposed F3 motorway RTA Extension
- Proposed RTA Land
- Existing Transgrid Easement
- Existing Energy Australia Easement
- Existing Dual Power Pole Position (Monteath, 2008)
- Existing Electricity Transmission Lines (Monteath, 2008)
- Existing Creek Line
- Blue Gum Hills Regional Park
- Coal & Allied Conservation Area

Proposed Land Uses

- Proposed Village Centre Mixed Use / Retail (incl Community Facilities)
- Proposed Minmi High Street Mixed Use / Retail
- Proposed Minmi Township Mixed Use / Retail
- Proposed Independent Living Units
- Proposed Residential (includes Local Roads)
- Proposed Water Reservoir Lot
- Existing School Extension
- Proposed School
- Proposed Landscape Road Corridor

Existing Mining Shafts

- Shaft Locations (Located)
- Wallsend Borehole Colliery (WBC) Entry Location
- Shaft Locations (Uncertain)

Open Space

- Proposed Sport and Recreation
- Neighbourhood Parks
- Drainage Corridors
- Passive Open Space
- Link Road Edge
- Feature Parks
- Detention Basins, Existing & Proposed Lakes
- High Risk Pothole
- Low Risk Pothole
- Pedestrian Link between sporting fields.

Vegetation Management

- APZ - RPS Nov 2010
- Indicative Extent of Retained Vegetation within Allotment
- Indicative Extent of Retained Vegetation Managed as an APZ
- Area within lot where slope could be asborbed
- Fire Access Trail and Walking Track

Major Roads

- F3 - Sydney-Newcastle Freeway
- Newcastle Link Road
- Collector / Spine
- Road Bus Route on Local Road
- Esplanade Road to Regional Park
- Indicative Local Access Road Connections
- Potential Local Road Connection to east if required

50 0 50 100 150 200 250 300 350 400 450 500 550 600 650 700m

Scale 1:5000

Note
All dimensions and areas are approximate only, and are subject to survey and Council approval.

Dimensions have been rounded to the nearest 0.1 metres.

The boundaries shown on this plan should not be used for final detailed engineers design.

REVISION
C: 25/11/2010 Add small section of residential to site
D: 28/01/2011 Adjust size of village centre parcels

Level Datum		Date	28-01-2011
Origin		Comp By.	JLS/CWC
		DWG Name.	24311-15L.dwg
		Local Authority	NEWCASTLE/LAKE MACQUARIE
Scale	Sheet	Locality	MINMI
1:5000	A0	Job Reference	24311

CLIENT
COAL & ALLIED

INDICATIVE LAYOUT PLAN

PROJECT
PROPOSED SUBDIVISION

Plan Ref **24311-35** | Rev **D**

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Appendix B

Flood Maps