APPENDIX 1

GLENLEE PRECINCT TECHNICAL STUDIES - RECOMMENDATIONS

LAND CAPABILITY – AECOM

Aecom (previously Maunsells) undertook a land capability assessment of the land. The assessment addressed contamination, mines subsidence, geotechnical conditions having regard to the coal emplacement, landfill gas and salinity.

The subject site is of variable terrain. It comprises the perimeter of floodplain lands, an elevated and highly variable plateau of reject emplacement, and two steeper ridges running directly east to the major bend in the Nepean River. The north eastern component of the Site comprises gently undulating lands which fall in a generally southerly direction to a natural water course with several on-line dams.

CONTAMINATION

The initial evaluation by desktop study and site inspection identified 11 areas that are potentially contaminated on the basis of current and historic land use including operational practices. The primary potential contaminants across the site, being represented in nine of the 11 identified areas, are hydrocarbons, also termed Petroleum, Oil and Lubricants (POL), associated with the operation of fuel storage and dispensing facilities and the operation of maintenance workshops. Anecdotal evidence exists that one or more electrical transformers were stored temporarily within a decommissioned coal washery building. Such items are associated with contamination risk due to loss of dielectric PCB fluid. The final potential contamination issue involves elevated nutrient concentrations in surface water associated with Camden Soil Mix's composting operations.

Management of POL contamination is typically not complex and follows procedures established by and for the service station industry, usually involving biological (landfarming) remediation techniques. Management of transformer oil impacts, if any are found, involves either: (a) treatment and off-site disposal; or (b) treatment and on-site containment. In the event that material was contained on-site in a purpose-built landfill cell, the location of the cell would impose very localised development constraints. Elevated nutrient concentrations in surface water and groundwater would be brought to acceptable standards within processes to be established as part of an integrated water cycle, involving conservation, flow (quantity) and water quality (pollution control) management targets and objectives.

For the purposes of a rezoning application and on the basis of previous studies with respect to the environmental risks potentially posed by washery reject, the deep fill reject material is not a contaminant and therefore not a development constraint. It is assumed that any residual areas of exposed coal and coal fines will be capped as part of future development works and that Construction Environment Management Plans (CEMPs) and Occupational Health and Safety Plans (OH& S Plans) for construction will deal with the presence of such material.

The areas of potential contamination are listed in this report that would form the basis of a checklist for future field based environmental investigations that will be required to be completed either during or prior to commencement of detailed development planning. None of the identified and listed constraints is of sufficient environmental concern to warrant more detailed investigation at this stage of the rezoning process as: (a) satisfactory literature and/or visual evidence exists with respect to indications of environmental risk; (b) all are able to be dealt with at the detailed planning stage in accordance with conventional engineering and environmental management methods; and (c) none constitute a risk to off-site receptors.

As a result of the above, engagement of a site auditor led to a course of action requiring:

- An upgrade of the AECOM preliminary report to a Phase 1 Investigation Report. Such work has been completed;
- Sampling and Quality Template Plans being commissioned for each of the areas of environmental concern to satisfy Phase 2 requirements;
- Remedial Action Template Plans be prepared for each area of environmental concern in accordance with Phase 3 requirements; and
- The preparation of a Site Audit Statement and Report.

Other minor issues were identified in respect of possible asbestos products in buildings and relative lack of knowledge of the rail spur.

MINE SUBSIDENCE

Mine subsidence within the Study Area will be primarily managed and mitigated through engineering solutions or by the selective exclusion of mining. On the basis of well-established subsidence mitigation practices, engineering solutions will likely consist of:

- Careful consideration of suitable types of development:
- Selection of building materials and building styles that would best cope with subsidence; and
- Ongoing monitoring and maintenance.

GEOTECHNICAL ISSUES

The presence of fill materials does not preclude the site from re-zoning or development. However, it is essential that more detailed geotechnical investigations be carried out during the planning and design phases of the development and that structures should not be founded within or located beneath these materials without prior assessment and treatment.

Geotechnical impacts or constraints within the Study Area will be managed and mitigated by ground treatment and appropriate zoning and planning of the development. Where treatment is required, this would generally involve localised ground improvement, drainage measures and/or slope regrading. Methods available for stabilising the emplacement area include consolidation through the application of surcharge (preloading), dynamic compaction and vibroflotation.

A well planned, designed and constructed drainage system, especially in the emplacement and shallow filled areas of the Study Area, will significantly reduce environmental and engineering risk across the development. The drainage system should:

- Efficiently manage the perched water table and any recharge;
- Be designed and constructed to limit slope erosion, run off and loss of debris from the site; and
- Form part of the integrated water cycle.

GEOTECHNICAL ISSUES – DOUGLAS PARTNERS

Additional investigation was also undertaken by Douglas Partners to provide information to AECOM. The investigation specifically assessed the coal waste emplacement and its appropriateness for future development for industrial purposes. The report provided the following recommendations:

Based on the results of the previous and current investigations, the following summary points can be made:

- The overall thickness of the filling within the emplacement is within the range 5 – 23 m with beds of low strength tailings encountered between layers of coarse reject. The maximum thickness of the tailings appeared to be around 3 m. Underlying the coal waste was alluvial clays then stiff residual clays with the thickness of alluvial clays increasing in the southeasterly direction. The water table currently determined must be considered as "perched" and would be significantly lower following decommissioning of the washery.
- Based on the results of the investigation, the site has been subdivided in two distinct areas and three zones, with Zones A and B comprising the Sada-owned western portion and Zone C being the Camden Soil Mix eastern portion. Zone A primarily comprises those areas where tailings are present, whilst Zone B is predominantly coarse reject. Zone C also appears to be predominantly coarse reject, but the thickness of lower strength alluvium is greater underlying Zone C than Zones A or B.
- An area nominated as Zone D (southern part of the Camden Soil Mix area) has only limited subsurface information available but aerial photography suggests this part of the site may have been used as a tailings pond.
- Laboratory testing has confirmed the field description of the tailings and coarse reject materials.
- In determining models for the various zones to be used for analysis purposes, the results of the continuous penetration testing have been used with some allowance made for variability in material strength and interbed thickness. For an applied surcharge of 80 kPa (60 kPa to equate to an average future fill requirement of 3 m and 20 kPa to equate to a future surface development), maximum consolidation settlements of 850 mm, 450 mm and 280 mm have been determined for Zones A, B and C. Greater consolidation settlements can be expected where fill greater than 3 m is proposed, with preloading considered to be the most effective means of accelerating settlement. Consolidation times have also been estimated on the basis of presumed coefficient of consolidation values (cv) that indicates up to 30 years will be necessary for 90% consolidation. As noted in the report, acceleration of the settlement will be necessary in order to optimise future development. If acceleration of settlement is not carried out, the prolonged consolidation period under self-weight would result in severe development limitations.
- In order to accelerate settlements, the use of preload (additional fill stockpiled temporarily) and the use of vertical (wick) drains within tailings deposits are discussed within. With the application of an 80 kPa surcharge following completion of filling (which is equivalent to about a 5 m high stockpile), the 90% consolidation times can be reduced to between 2 and 4 years, with the slightly longer than expected time for Zone C due to the deeper deposits of alluvial clays underlying the emplacement. Reduced consolidation times can be achieved with an increased stockpile (preload) height.
- Further reductions in time can be achieved by the installation of vertical drains in conjunction with the preload. Subject to the spacing of the vertical drains, consolidation times of around 1 year can be expected. Considering the likely high cost of the vertical drains and the understood lead time available for development of the site, it is considered that the required settlement to be completed prior to commencement of development can most likely be achieved with preloading only.
- Comment is also given within on earthworks procedures, development guidelines and future investigations. The additional investigations will determine the feasibility of wick drains and provide confirmation of consolidation times once the extent of tailings deposits has been determined. The monitoring of a trial placement with survey will also provide additional data relatively economically.

GROUNDWATER

The quality of perched groundwater in the washery reject emplacement platform has been assessed through analysis of seepage water which is expressed out of the sides of embankments. The water quality results, which include pH, turbidity, BOD and EC, are within site-specific licence limits and are consistent with those cited in other local studies. Other results indicate elevated conductivity compared to river conductivity; variable dissolved oxygen concentrations; and pH values similar to those in the river.

With respect to the perched water, data indicates that the washery site is not affecting water quality immediately downstream nor is it showing any signs of generating acid mine drainage.

No natural groundwater was encountered in any of the emplacement area boreholes but it can be expected to be present at around the level of the Nepean River. Based on literature research and knowledge of on-site hydrogeological conditions, the groundwater regime in the Study Area consists of:

- Groundwater in the shale and related beds in the Green Link/TRN areas;
- Perched [falling] groundwater in the southern platform area;
- Regional; groundwater in the alluvium in the floodplain area; and
- Deep groundwater in the Illawarra Coal Measures.

LANDFILL GAS

This part of the study concentrated on the landfill gas issues relating to the Spring Farm Resource Recovery Park. As this land does not form part of the planning proposal, except for the road, the issues relating to gas migration are not a matter of consideration. The assessment is available as part of the suite of technical reports.

SALINITY

The review of salinity indicates that:

- The washery reject emplacement area presents a low salinity risk; and
- Salinity impacts can be mitigated through sound management of the site's integrated water cycle and incorporation of salinity measures in design and construction of buildings and infrastructure.

Salinity and water quality are closely linked. Therefore, to the extent possible, the proposed development should be designed to have a closed water system in order to prevent surface waters generated on the Study Area recharging existing near-surface aquifers and raising groundwater levels further.

Sufficient is known with respect to salinity in the Study Area that development planning is able to proceed with certainty, that is, unanticipated saline conditions can be managed through engineering measures. However, as the salinity processes within the Study Area have not been investigated in detail, it will be necessary to conduct investigations to understand those processes on a locality-by-locality basis at the development stage.

CONCLUSION

The land capability assessment identified potential constraints with respect to the following issues:

- Soil and groundwater contamination;
- Mine subsidence;
- Geotechnical issues;
- Groundwater;

- Landfill gas;
- A coal seam methane gas well network; and
- Salinity.

ECOLOGY – HAYES ENVIRONMENTAL SERVICES

Hayes Environmental Services undertook an assessment of the ecological values of the subject land. The following is a summary of the assessment:

CONSTRAINTS AND OPPORTUNITIES

The Nepean River riparian corridor is of high ecological value on a regional scale, and should be protected through careful management of water and run-off from the study area. No native vegetation should be removed from this corridor.

There are extensive areas of very poor quality vegetation, and of exotic shrubland vegetation dominated by Olive that should be regenerated/revegetated as part of the proposed rezoning, to compensate for the loss of areas of CPW.

There is opportunity to create a significant and ecologically valuable wildlife corridor between the Australian Botanic Garden and the Nepean River. The corridor would ideally follow the existing alignment of Caleys Creek, south from the Botanic Gardens, and would then follow a new alignment around the southern boundary of the study area.

ASSESSMENT OF IMPACTS

The potential impacts of the proposed rezoning have been assessed pursuant to the *NSW Threatened Species Conservation Act 1995*, the *NSW Fisheries Management Act 1994*, the *NSW Environmental Planning & Assessment Act*, and against administrative guidelines for significance for the *Commonwealth Environment Protection & Biodiversity Conservation Act 1999*. In all cases, it was determined that the proposed rezoning would not be likely to impose a significant effect upon threatened species, populations or ecological communities.

The proposed rezoning of the study area (with recommended management of ecological values and off-sets) would improve upon the existing value of each of the following biodiversity values: threatened species habitat, endangered ecological communities, Caleys Creek, Nepean River, wildlife corridors, and Australian Botanic Garden.

On this basis, the proposed rezoning would result in an overall improvement in biodiversity values of the study area and of the locality.

ECOLOGICAL MANAGEMENT COMMITMENTS

The proposed rezoning of the study area has been assessed on the basis of the following:

- That the areas shown as 'green' on the ILP will be set aside primarily for conservation purposes, allowing for asset protection management as required, and some passive recreation opportunities where appropriate;
- Preparation and implementation of vegetation management plans for areas of retained vegetation within the study area;
- Commitment to a long-term weed control and vegetation management strategy for the areas currently described as exotic shrubland;
- Contribution towards establishment of a broad wildlife corridor along Caleys Creek, and extending around the southern boundary of the study area. This would include, in the first instance, rehabilitation of the existing drainage pathway, inclusion of a high flow diversion from the present diverted drainage to the Nepean River via the original

creek drainage to the river, and rehabilitation of the riparian corridor;
- Design of creek systems so as to establish a new 'natural' channel for Caleys Creek at the toe of the existing batter within the study area;
- Installation of appropriate water treatment systems to minimise pollutants (including nutrients) from leaving the study area, to the extent that existing impacts upon water quality from the study area are reduced.

CONCLUSION
On the basis of implementation of a range of ecological management measures, the proposed rezoning would not be likely to impose a significant effect upon threatened species, populations or ecological communities, as listed under the NSW TSC Act, NSW FM Act or Commonwealth EPBC Act.

Upon consideration of effects of the rezoning upon existing biodiversity values within the study area and locality, it has been determined that the proposed rezoning would result in an overall improvement in biodiversity values. The proposed rezoning of the study area has been compared to the objectives and guidelines of Camden Council's Natural Assets Policy. The ILP addresses and meets each of the objectives of this plan.

BUSHFIRE – ECOLOGICAL AUSTRALIA

The subject land is identified by Camden Council to be "bushfire prone" in accordance with the Bushfire Hazard maps. The nature of remnant vegetation, plantings and past clearing and emplacement practices has produced a unique vegetation and potential bushfire environment. The existing vegetation is generally located on the areas of more variable terrain, generally aligning with the riparian vegetation and ridges.

As such a bushfire hazard assessment was undertaken by Bushfire and Environmental Services now Ecological Australia. The assessment recommended the following:

"The bushfire protection measures recommended are designed to suit both the requirements for residential subdivision and industrial and commercial development. The recommendations are summarised below:

- Asset Protection Zone (APZ) to be provided between development and bushland;
- APZs to include perimeter access to allow the APZ to be utilised as defendable space (Part D.1.3);
- APZs to be managed in accordance the PBP fuel management specifications (Part D.1.4) by a designated responsible party (Part D.1.5);
- Buildings to have consideration of principles within AS 3959-1999 particularly screening and material combustibility and performance (Part D.2.2)[1];
- Access to comply with PBP. This is to include public roads and perimeter fire trails (Part D.3); and
- Service (water, electricity and gas) installation to comply with PBP and the relevant standards(Part D.4)."

Note: There is now no residential or commercial development proposed by this planning proposal.

TRAFFIC/TRANSPORT/ACCESSIBILITY - AECOM

The Site has an important strategic main road context. The major elements in the immediate main road network include the South Western Freeway (F5), Narellan Road, Camden Valley Way, Camden Bypass and the Northern Road. It is accessed by a local road network and importantly provides high order linkages with adjoining regions including the Greater Metropolitan Area.

The South Western Freeway and the arterial road network in the vicinity of Glenlee including Camden Valley Way and Narellan Road are operating at their theoretical capacity during the peak hours under current conditions. Heavy volumes of traffic on Narellan Road are reflected in the poor intersection performance at intersections on the approach to the F5 ramps.

The proposed Liz Kernohan Drive offers the prospect of linking the Camden Bypass and the Freeway and Menangle Road; its present route is planned to the eastern extremity of the Site. The immediate local road network, providing linkages to this higher order network comprises Richardson Road, Springs Road, Macarthur Road and the Camden Bypass.

The two roads that service the subject site from the west; Richardson Road (via a private road to the Spring Farm Resource Recovery Park) and Springs Road (via a second private road – Glenlee Road) are at the end of the road network.

No immediate passenger rail network is accessible; whilst the Glenlee rail siding provides access to the Main Southern Line, both up (towards Sydney) and down (away from Sydney). This siding has been reactivated and is a fully operational marshalling siding.

The local road network and intersections immediate to Glenlee along Springs Road and Richardson Road appear to operate efficiently. However, both roads are constrained by existing and future residential development in Spring Farm for any additional traffic, especially heavy vehicles. Currently, the Study Area is generating approximately 800 heavy vehicles per day, accounting for 40-50% of the daily traffic generation. The following summarises the assessment undertaken for the rezoning application.

CONSTRAINTS AND OPPORTUNITIES

In review of the existing traffic conditions of the Study Area, the following constraints could limit the development potential:

- Vehicular access to the site is via a private haul road and Springs Road in the short-term;
- Capacity constraints on the surrounding road network during peak periods (Narellan Rd, South Western Freeway ramps);
- Unresolved nature of planning of Liz Kernohan Drive between Spring Farm Urban Release Area and the South Western Freeway;
- Amenity of heavy vehicle movements on the fringe of the Spring Farm Release Area, in the short-term;
- Culture of high car use in the region (Camden and Campbelltown);
- Study Area currently not served directly by public transport; and
- Limited existing pedestrian and cycle facilities.

On the other hand, the proposed development could benefit from the following transport opportunities in the vicinity of Glenlee:

- Improved trip containment in the region as the proposed employment areas in Glenlee are located close to existing and proposed urban residential areas;

- Potential east-west road corridors focussed on Liz Kernohan Drive to relieve traffic congestion at Narellan Road;
- Provision of public transport services – potential of extended services to Spring Farm Urban Release Area and Mount Annan;
- The operational capacity and the condition of the existing rail infrastructure would enable the site to be upgraded as a rail terminal;
- Presence of rail facilities will significantly reduce the potential implications of road based haulage generated by the proposed integrated transport terminal/industrial facility; and
- Pedestrian and cycling connections with neighbouring residential areas in Camden.

Based on an assessment of the constraints and opportunities in the local area, the implications of the development traffic on the local transport networks has been reviewed to enable a comprehensive package of measures to be identified.

IMPACT ASSESSMENT

The main objectives of the transport impact assessment are to estimate the likely impacts of the proposed development on surrounding transport networks and to determine an appropriate mitigation package of measures to ameliorate traffic impacts.

The opportunity of re-opening the rail terminal will assist in the transfer of freight traffic from road to rail, therefore reducing the volume of heavy vehicles on the road network. The findings of this impact assessment have highlighted a number of transport infrastructure upgrades that will be required to mitigate the impacts of the proposed development in Glenlee. On the basis of the forecast trips generated by the proposed development, the package of measures will include, namely:

- A set of traffic signals at the intersection of proposed Liz Kernohan Drive and eastern Glenlee access (only if the link road is extended to connect with the South Western Freeway);
- Local upgrades to intersections of Liz Kernohan Drive/Richardson Road;
- Pedestrian footpaths on all major internal roads;
- Pedestrian facilities (dropped kerbs, refuges) at roundabouts;
- Cycle lanes on all major internal roads; and
- Bus service provision between Glenlee and Macarthur Interchange/Campbelltown Interchange by extension of current bus services in the locality during peak hours.

The proposed access to the Glenlee Study Area from the Liz Kernohan Drive West (via the new perimeter road along the western boundary of Spring Farm Resource Recovery Park) will be able to cater (as a two lane road) for the ultimate forecast traffic (2026) without its extension to the South Western Freeway (TRACKS forecast November 2007). Similarly, the traffic generated by the development will be able to be accommodated on upgraded Link Road (TRACKS forecast April 2008).

The final configuration of the Liz Kernohan Drive will be the subject of further review when current Council commissioned traffic modelling is complete.

RECOMMENDATIONS AND CONCLUSIONS

Key features of traffic impact management and general accessibility enhancement measures include:

- The proposed 2 lane Liz Kernohan Drive will adequately cater for both short-term (2016) and long-term (2026) traffic;
- Intersections on the local road network impacted by the Glenlee development, be

upgraded;

- Intersections be further enhanced in the event of the Liz Kernohan Drive East;
- A comprehensive accessibility policy be prepared with a view to increasing levels of pedestrian and cycle movement and reductions in vehicles usage;
- Transport service improvements, including an integrated package of bus service improvement that are responsive to the development of the Study Area; and
- Infrastructure improvements to provide easy pedestrian and cyclist access to Camden, Narellan and possibly Campbelltown with the connection of the Spring Farm Link to the South Western Freeway, together with cycle parking and comprehensive directional signage.

This "package" should address the impacts of the proposed redevelopment of Glenlee in a sustainable manner.

NOISE – BASSETT (AECOM)

To assess potential noise impacts from future developments, Bassett undertook an assessment of the area. It would be noted that the existing ambient noise levels of the surrounding environment are typically rural, with intervening road traffic noise. The following is a summary of the assessment:

The assessment has been carried out in accordance with the NSW Department of Environment and Climate Change's (DECC) Environmental Criteria for Road Traffic Noise (ECRTN), the Industrial Noise Policy (INP), relevant Australian Standards and the local environmental plans. Ambient noise measurements were undertaken and used to determine the relevant noise criteria for assessment.

The proposed development was assessed for road traffic noise, industrial noise and vibration impacts. The industrial noise assessment considers variable weather conditions that are a characteristic of the Glenlee area. The assessment considers the proposed Liz Kernohan Drive to the northern Glenlee site entrance in 2016 and the extension to the South Western Freeway in 2026. The results of the assessment indicate road traffic noise will result in mitigation measure requirements at Spring Farm at properties fronting the Liz Kernohan Drive in 2016 and 2026, and at Australian Botanic Gardens in 2026. The industrial noise assessment indicates compliance with the established criteria, and therefore, no mitigation measure will be required.

Properties at Spring Farm fronting the Liz Kernohan Drive will be exposed to noise levels that exceed the recommended criteria by up to 9 dB(A) during the day and 5dB(A) during the night time in 2026.

The area of the Australian Botanic Gardens adjacent to the Liz Kernohan Drive will be exposed to noise levels that exceed the criteria for passive recreational areas by 6dB(A) in 2026.

The use of a 'low noise surfacing' may typically reduce noise levels by up to 2 dB(A) compared with DGA, however a noise wall would achieve greater reduction in noise, typically by up to 5-10 dB(A).

Vibration impacts arising from the development should have no detrimental effects on the nearest receivers due to the distance from the railway line and the study area operations. Vibration due to truck movements may be more perceptible along the haul road/Springs Road where the road surface is less consistent. However, Springs Road will be closed once

the Liz Kernohan Drive is completed.

AIR QUALITY - AECOM

EXISTING ENVIRONMENT

The potential for air quality impacts is affected by many factors, including weather conditions, topography, existing air quality and local and regional land uses. The meteorology and topography of the Sydney Basin combine to influence air movement, with the daily pattern of air flow tending to transport polluted air from the eastern parts of the Sydney Basin to the west, where it can recirculate and persist.

The major sources of air pollution within the Macarthur region include motor vehicles, solid fuel heaters, bushfire and hazard reduction smoke, and emissions from industrial and rural activities. Air quality in this region is also affected by pollution originating from other parts of the Sydney Basin.

CONSTRAINTS, OPPORTUNITIES AND ISSUES

Issues that may place constraints on development include:

- The proximity of nearby residential development (both current and future);
- The predicted increase in traffic movements and traffic congestion;
- The prevalence of temperature inversions, as any nearby receiver may be affected under certain conditions;
- The topography of the Study Area, which may afford protection from winds and limit the movement of impacted air, but could also carry odour or pollutants from the Study Area; and
- The daily pattern of air flow, as pollutants originating from other areas of the Sydney Basin also affect the air quality of the Glenlee Study Area and Locality.

As the existing land uses in the area are of both an industrial and residential in nature, the proposed development is in keeping with the current uses. The impacts that current facilities may have on local air quality will change throughout the development of the Study Area, with the progressive closure and rehabilitation of these areas for other industrial and commercial uses.

IMPACT ASSESSMENT

The potential sources of air pollutants associated with the proposed development include:

- Various industrial sources;
- Increased traffic movements;
- Potential for traffic congestion, resulting in inefficient vehicle operation; and
- Electricity consumption, resulting in greenhouse gas emissions.

The impact of industrial sources on local air quality will vary, depending on the type of industry and its location within the Study Area.

DEVELOPMENT AND MANAGEMENT PRINCIPLES

The Glenlee Indicative Layout Plan (ILP) has been developed in a manner that reduces potentially adverse air quality impacts. The nature of the zoning within the development also reduces the potential for adverse impacts due to heavy industry, as business and commercial uses are encouraged in areas closest to sensitive receivers.

As the bulk of industrial uses will be located in the southern portion of the Study Area

(furthest from the majority of sensitive receivers), any impact on air quality at the receiver's location will be reduced.

Nevertheless, proposed industrial uses should be assessed for potential impact to air quality and, if necessary, measures should be implemented to mitigate and manage air quality and odour issues. Any potential impact on air quality as a result of an increase in both light and heavy vehicle traffic can be mitigated by encouraging other modes of transport, such as cycling, walking and using public transport. To facilitate this, the ILP includes a network of cycleways and footpaths.

Regulations governing buildings will increase energy efficiency and therefore assist in minimising greenhouse gas emissions.

RECOMMENDATIONS AND CONCLUSIONS

The proposed development is likely to generate a moderate increase in vehicle movements to and from the Study Area, predominantly a result of the employment generated in the area. The forecast increase in traffic has the potential for minor impacts on air quality, but would be able to be mitigated by encouraging non-car modes of travel through increased public transport and bicycle accessibility.

Proposed industrial activities will be required to comply with the *Protection of the Environment Operation Act 1997* and relevant regulations and be assessed in accordance with the NSW DECC "*Approved Methods for the Modelling and Assessment of Air Pollutants*", 2005. The assessment would be required on a case by case basis to ensure the range of potential pollutants, the dispersion characteristics at each occupied lot, and the appropriate mitigation measures are considered.

With the application of the development and management principles outlined within this report, it is considered the rezoning is unlikely to result in significant air quality impacts on surrounding sensitive receivers.

WATER CYCLE - AECOM

The extended Glenlee Drainage catchment comprises approximately 600ha and some 3 sub-catchments. It drains the landscape unit to the Nepean River system, a system with a P (Protected Waters) classification.
The majority of the Site drains to Caley's Creek, an ephemeral stream which has been redirected around the southern toe of the reject platform as a man-made drain. Seepage from the emplacement area is also captured by this drain. The drain discharges to a sedimentation dam and existing storage dam before entering the Nepean River.

Flood modelling for the Glenlee Precinct indicates that the entire Site development footprint is outside the existing 100 year ARI (and PMF). The existing perimeter drain and dams are, however, inundated. Mine subsidence would not change flood inundation impacts given the height of the emplacement.

The following assessment was undertaken by Aecom to address this aspect of the rezoning application given the context of the Site within the above catchment:

CONSTRAINTS, OPPORTUNITIES AND ISSUES

There are various issues, constraints and opportunities that determine the developable area and the water cycle and riparian management strategy options. These are outlined below.

ISSUES AND CONSTRAINTS

The constraints to be considered in the preparation of the water and riparian management strategy options for the Glenlee Study Area include:

- Water quality targets for the Study Area and the Nepean River will require allocation of land for water quality control measures;
- Environmental protection of the Mt Annan Botanical Gardens, from weeds and diseases
- Stormwater detention is required to reduce post development peak flows to pre-development peak flows. Appropriate areas will be required to provide necessary detention storage;
- Stormwater management measures that rely on concentrated infiltration into the natural or formed ground should not be considered due to potential raising of the groundwater levels beneath the site and the localised groundwater salinity issues. Therefore infiltration devices that slowly seep water into natural ground are not recommended;
- All development would need to be designed to have a "closed" water system to minimise potentially contaminated surface waters (or accidental spills of pollutants) generated on the Study Area entering the underlying groundwater system;
- Natural ground slopes in the north eastern corner of the Study Area are relatively steep with existing grades ranging from 4% to 16% from the ridges to creek lines;
- Maintaining existing riparian corridors set by DWE which may preclude water management control works in some areas;
- Difficulty of achieving a robust restoration outcome on batters of the Sada site which are very steep and comprise entirely of coal washery waste material;
- Locality is subject to strong weed invasion pressures (in particular African Olive), which will require a robust riparian restoration planting design and management approach;
- Confined boundary conditions through which the Category 1 watercourse passes along the southern boundary of the Study Area;
- Much of the Category 1 watercourse within the southern zone of the Study Area is a straight, formed earth channel with no remnant riparian community plant materials from which to regenerate a natural community; and
- Much of the main watercourse associated with the Study Area falls beyond the boundary.

If an integrated restoration and management approach is not undertaken with neighbouring landholders, management of the riparian corridor within the southern zone of the Study Area will be made more difficult due to downstream transport of weed propagules from adjoining sites.

OPPORTUNITIES

In the development of any water and riparian management strategy, it is desirable to build on the natural occurring physical and environmental assets of the site to maximise the quality of the ultimate living environment. The opportunities to be considered in the preparation of the water and riparian management strategy options for the Glenlee Study Area include:

- Maintain the existing riparian and bushland corridors, particularly along the eastern boundary adjacent to the Australian Botanical Gardens;
- Utilise existing watercourses, channels and dams on site (i.e. particularly along the southern and western boundaries) for stormwater quality and quantity control measures;
- Storage and re-use of stormwater for non-potable use and process, washdown use for industrial use;
- Collection and treatment of excess stormwater from the development roof/hardstand

areas for use to external commercial users, such as the Botanical Gardens;
- Consider the existing coal stockpile sub-grade for infiltration of stormwater for quality control;
- Utilise the existing coal stockpiles to provide freeboard above the 100 year ARI flood event for the development area; and
- Consider joint riparian corridor planning and management opportunities with neighbouring landholders, to create a significant, consolidated riparian and habitat corridor along the full length.

WATER CYCLE MANAGEMENT STRATEGY

Based on a review of the issues, constraints and opportunities on the Glenlee development site, and a review of various WSUD treatment and water management alternatives, the preferred strategy for water cycle management for the Study Area is summarised below.

WATER CONSERVATION AND REUSE

- In areas of open space or vegetated batters/slopes, use vegetation that does not require irrigation, or where irrigation is required, install a drip irrigation system.
- Use of collected stormwater (from roofs or pavements) or wastewater for industrial use within the development or within the adjacent Botanical Gardens.

FLOW MANAGEMENT

- For the industrial development areas, OSD tanks (either above or below ground).

WATER QUALITY

- Gross pollutant Traps (GPTs) – Screening of litter and coarse sediments including free oils and greases (typically a proprietary system).
- In general for the development areas, "end-of-line" bioretention ponds where possible.
- For the southern industrial / intermodal development area (over existing stockpile), the preferred option is OPTION A which involves the following:
  - Integration of the bioretention system (swales) along the outer perimeter road; and
  - Controlled discharge of treated water down the batter to the southern toe drain and ultimately to the Nepean River.

This option is compatible with the proposed riparian management strategy for the Study area. The above preferred water management strategy was assessed using detailed water balance and hydrological and water quality modelling to provide an increased level of confidence that the water cycle management system will meet the adopted water management targets and objectives that have been adopted for the Study Area in terms of water conservation, water quality and flow management.

RIPARIAN CORRIDOR MANAGEMENT STRATEGY

An outline riparian management strategy was developed for the Glenlee Study Area that seeks to provide a framework for a balanced planning outcome. The approach seeks to foster ecological corridors and green links, accommodate an arterial road, rehabilitate riparian corridors and facilitate sustainable water management outcomes. Although the strategy can be largely self-contained, there would appear to be superior natural system outcomes achievable if a strategy is developed co-jointly with Landcom's various development aspirations. Section 5 summarises the four (4) key site restoration principles for the Glenlee Study Area as follows:

- North-South Integrated Boulevard "Green Link": The Boulevard treatment will provide a green link between William Howe Reserve and the Australian Botanic Gardens. The treatment will comprise of a densely planted ground layer with a substantial canopy layer of locally occurring tree species, sufficient to provide significant amounts of

linking canopy on either side of the road.

- East-West Terrestrial Link: An East-West Terrestrial Link will be created between the Australian Botanic Gardens and the Nepean River. The link will be of substantial width, incorporating the headwaters of an existing dam on a minor tributary at the eastern end. However, the link will of necessity be either narrow or discontinuous at both the centre and western end due to steep site topography, and existing roads, including the entry road to the southern portion of the Study Area, and an access road up to the ridgeline top of the link.
- Potential Future Floodplain / Wetland Community: Subject to agreement with Landcom, the potential exists for a substantially enhanced riparian restoration outcome to the southern boundary area.

RECOMMENDATIONS AND CONCLUSIONS

WATER CYCLE MANAGEMENT

The proposed Glenlee development area requires water management measures to meet adopted water conservation, flow (quantity) and water quality (pollution control) management targets and objectives. These objectives were developed from relevant State and Local planning documents and development guidelines that address water cycle management.

Based on a preliminary assessment, a summary of the proposed water management measures for water conservation, flow and water within the Study Area was provided and demonstrated in a number of figures.

Adoption of the proposed water management measures will provide an integrated, sustainable approach to water cycle management in the context of the ILP by meeting the required performance objectives and targets set in this document. The specific strategies are currently being adopted either in full or part in other adjacent development areas such as Spring Farm and therefore demonstrating the practicality of their application to the Study Area.

RIPARIAN CORRIDOR MANAGEMENT

An opportunity exists to provide an integrated riparian corridor restoration approach that restores the existing highly depauperate riparian corridors associated with the Study Area into a substantial, integrated riparian/habitat corridor along its full length. Attributes of the corridor would include:

- The use of local provenance material to restore communities characteristic of those that would have been present;
- An integrated bush regeneration-driven approach to management of asset protection zones in conjunction with training and annual auditing by a specialist bushfire consultant;
- Potential for an additional new alignment of the main watercourse to link with the bordering the Proposed Menangle Park Urban Release Area, whilst retaining an enhanced southern boundary watercourse within the Study Area.

The following recommendations are made:

- Continuation of negotiations between Sada and Landcom with regard to providing a coordinated response to the riparian corridor restoration process;
- It is recommended that OPTION 1 be adopted as the preferred riparian corridor strategy which involves the restoration of the existing channel on the boundary and the immediate southern (reject) batter. This strategy is compatible with the preferred water management strategy for the Study Area; and
- Investigation of the potential to create a joint riparian management structure with neighbouring landowners to provide a coordinated approach to the management of the watercourse.

HERITAGE – INDIGENOUS AND EUROPEAN

The Site and, moreover the locality, display a range of Indigenous and European heritage qualities of varying levels of significance. There exists evidence of post occupation and movement of persons of Aboriginal background through the landscape.

The Site has no heritage listed items or areas. However, the Site comprises part of a broader cultural and natural landscape of exceptional significance and is proximate to places with national, state and/or local heritage significance in the Glenlee and Camden Park Estates. The significant coal related activities and infrastructure associated with the precinct, although of interest are not listed in their own right as heritage items and/or landscapes.

The Site also bears a sensitive relationship to the significant natural and cultural landscape of the Australian Botanic Gardens. In this regard an assessment of the proposed development was undertaken by Cultural Heritage Connections (Indigenous) and Historyworks (European) in conjunction with MUSEcape (visual and landscape assessment).

The following provides a summary of the above assessments:

INDIGENOUS HERITAGE

A desk-based analysis of the archaeological potential of the study area was undertaken using aerial photography, environmental data, reports on previous archaeological assessments for the region and identified areas of potential archaeological impact. On the basis of this analysis the study area was divided into five zones. In three of these zones it was determined that site inspection was necessary to complete an adequate assessment, and these zones were chosen for ground-truthing (on-site checks of the analysis). In general a precautionary approach was taken, with zones subjected to ground-truthing if there was any doubt as to the likelihood of finding archaeological resources in the area. As well as this the zones that were deemed to have no archaeological potential were also inspected to confirm this conclusion.

A detailed site inspection was undertaken on 28th November 2007. The inspection was carried out in collaboration with relevant indigenous community organisations. Two sites had been previously recorded on the NSW NPWS sites register database and these were relocated and their condition assessed. An additional five locations were recorded where Aboriginal objects were present. It was assessed by the archaeologists and the indigenous community representatives that there were unlikely to be any Aboriginal objects or areas of archaeological potential located within Zones One and Three.

The following recommendations for each zone were prepared in light of the relevant legislation, findings of the archaeological assessment and the Aboriginal community views (where known).

Zone Two: Proposed Link/North Road

This zone occupies the entire north eastern corner of the study area and is the least disturbed zone.

Lightly Disturbed/ High Archaeological Potential

Three new sites and one isolated artefact were located in this zone (Glenlee OS 1 2007, Glenlee OS 1 2007, Glenlee OS 1 2007, Glenlee IF 2 2007) despite overall poor visibility in the area. This demonstrates there is potential for further Aboriginal objects and areas of archaeological potential to occur in the zone.

It is recommended that if this area is to be subject to impact by the proposed development further archaeological investigation would be required. This zone of the study area should be subject to a program of systematic sub-surface testing under Section 87 of the *NPW Act* to establish the nature and extent of any intact archaeological deposits. The results of this exercise should then form the basis of decisions for ongoing management and further action, if any. This may include preservation of parts of the area and/or salvage of remaining material under Section 90 of the *NPW Act*.

Zone Three: SADA Coal Washery

This zone is located in the centre of the site at the southern end it does not however include the southern and eastern extremities of the site and there is no original landscape left intact. Heavily Disturbed/ Nil Archaeological Potential

There were no recorded archaeological sites on this zone of the study area and no new sites were located or expected to occur. The recommendation of this report is that this zone requires no further archaeological action.

Zone Four SADA Coal Washery/Nepean River

This zone is located along the western extremity of the study area between the coal washery fill area and the Nepean River.

Moderately Disturbed/ Low Archaeological Potential

There were no previously recorded archaeological sites on this zone of the study area and only one new isolated artefact (Glenlee IF 1 2007) was located.

The area has been subject to previous development disturbances and ongoing disturbance in the form of erosion. This area is likely to be subject to rehabilitation and revegetation rather than extensive redevelopment. It is the recommendation of this report that this zone requires no further archaeological investigation, however if the proposed development is likely to impact on the site (Glenlee IF 1 2007) a Section 90 application would be required and the artefact should be salvaged.

Zone Five: SADA Coal Washery/East

This zone is located along the eastern extremity and the south eastern corner of the study area between the coal washery fill area and the southern and eastern borders of the study area.

Moderately Disturbed/ Low-Moderate Archaeological Potential

There was one recorded archaeological site within this zone of the study area (NPWS ID: 52-2-2280). This area is described as being part of an open space area within the ILP and it may be possible to preserve the site as part of any rehabilitation of the area. It is recommended that if possible, the site 52-2-2280 be retained within the open space area of the development. If disturbance to the site is unavoidable a Section 90 permit would be required and the site should be salvaged prior to any development impact. No further additional archaeological investigations are considered warranted in this zone.

EUROPEAN HERITAGE

Given the extent of disturbance of the site itself, it is concluded that the proposal has no post-European heritage impact on disturbed parts of the site (much of the main Sada and

WSN lands). However, this report and the *Proposed Industrial Employment Land, Glenlee Precinct: Visual & Landscape Assessment* (MUSEcape) report find that the site is part of a wider cultural and natural landscape of exceptional significance, only sections of which have been accorded statutory protection. The site lies between three protected areas (Glenlee estate, Camden Park Estate and Australian Botanic Gardens) that have a significant relationship to each other. Existing development on the site has an impact on this significant landscape and the proposed development has the potential to have a greater impact if design and landscaping controls are not implemented to reduce the potential impact.

LANDSCAPE AND VISUAL

The Site is highly visible in the local and subregional landscape, the cultural and natural importance of the surrounding landscape having been highlighted above. It is noted that the highly variable nature of the Site and relationship with neighbouring landscapes has implications for the nature and extent of future development in terms of landscape amenity. In this regard MUSEcape undertook an assessment having regard to the issues discussed above in Section 4.2.2.8.2.

The following provides a summary of the assessment:

The Proposed Industrial Employment Land, Glenlee Precinct: Visual & Landscape Assessment (MUSEcape) report notes that the following factors are important in assessing landscape and visual impacts:

- Determination of visual exposure or visibility and the perception of the proposed building envelopes from viewing points in the public domain – the extent to which the area may be visible from surrounding public areas, the likely number of viewers, the period of the view, view distance and context of the view.
- Distance - the proportion of the total view frame occupied by any one of the proposed development envelopes will decrease with distance. In addition, atmospheric influences tend to reduce the level of contrast between development disturbances and the landscape in which it is located, thus reducing the level of visibility. Also, the level of development disturbance detail visible within the landscape is a factor of the size of the development disturbance and the view distance.
- Visual absorption capacity of the proposed development sites. This is an estimation of the ability of a particular area of landscape to absorb development without creating a significant change in visual character or a reduction in scenic quality of the area. The capacity to visually absorb development is primarily dependent on landform, vegetation and existing development.

That report then includes an assessment of impacts on the several landscape areas in proximity, including the Study Area itself, Australian Botanic Gardens, Glenlee homestead, Menangle Park, the Nepean River corridor, Camden Park Estate and Spring Farm areas. Of these, the report finds that the greatest potential for adverse impact is on Glenlee homestead and on parts of Australian Botanic Gardens. Impact on the other areas may be lesser or greater, depending on the distance of various viewpoints.

That report then recommends Development Guidelines for the Study Area to mitigate the potential impacts. The Proposed Industrial Employment Land, Glenlee Precinct: Visual & Landscape Assessment report should be referred to for the details of those Guidelines and the Guidelines should be incorporated in the proposed DCP for the site. In point form, the Guidelines cover:

- General assessment and design principles
- Natural landform protection
- Protection of significant views and vistas
- Road layout, site access and streetscape
- Siting and orientation
- Services
- Tree protection and preservation of remnant bushland
- Building character and form
- Outbuildings and ancillary structures
- Construction method
- External building materials
- Building height
- Building bulk
- Energy efficiency
- Shading
- Verandahs, porches and decks
- Warehouses, storage sheds
- Exterior finishes, colour schemes
- Car parking
- Garbage collection
- Fences, gates, berms and acoustic barriers
- Tree planting and other landscaping
- Drainage and open space corridors
- Signage
- Light spillage

Other recommendations are also made for the ILP. These include a recommendation for further analysis of the broad landscape settings of Glenlee homestead and its curtilage, Camden Park Estate, Australian Botanic Gardens and identified heritage items in Menangle Park. 3D modelling of major developments is recommended, as well as independent detailed assessments of the likely impacts of each development on Glenlee homestead and Camden Park Estate and their curtilages, Australian Botanic Gardens and identified heritage items in Menangle Park and elsewhere within the visual catchment of the Study Area.

The report emphasises that, if the proposed site coverage is to be achieved without undue visual and landscape impacts on nearby heritage items, existing and proposed residential areas and Australian Botanic Gardens, the implementation of design guidelines as suggested in the report and landscaping guidelines previously recommended by Distinctive Landscapes will be critical.

The final location, design and landscaping of new roads in the Study Area will also be critical in minimising impacts on the existing topography and landscape quality. Of particular importance will be the success of screening vegetation to ameliorate the visual impact of new infrastructure, and large warehouse and other industrial buildings.

The report concludes that the increase in the number and footprint of buildings compared with the present, changes in the type of development, the construction of new roads and other infrastructure will combine to produce changes in the landscape, but that these changes can be managed within acceptable limits provided strict adherence is paid to development design guidelines, landscape controls and subsequent management.

Thus, subject to these provisos, the report considers that the proposed development can be achieved without unacceptable visual and landscape impacts on the State Heritage Register

listed properties 'Glenlee' and 'Camden Park Estate' or on the major Government-owned scientific, educational and recreational asset that is Australian Botanic Gardens.

CONCLUSION

This report finds that the proposed development concept will have no adverse impact on post-European heritage within the disturbed parts of the site itself but has the potential to have an impact on a highly significant cultural landscape (including the undisturbed part of the site) if appropriate controls and development guidelines are not implemented[2].

The Glenlee Precinct Planning Project: Indigenous Archaeological Assessment (Cultural Heritage Connections) report also identifies a potential impact on Aboriginal cultural heritage and makes recommendations concerning site protection or salvage and further investigation that should be followed.

The Proposed Industrial Employment Land, Glenlee Precinct: Visual & Landscape Assessment (MUSEcape) report identifies – like this report – a potential impact on a significant landscape and recommends very detailed development guidelines, controls and management to mitigate that impact.

Overall, no fundamental objection is raised to the proposed development concept on heritage grounds, but it is strongly emphasised that the recommendations of these three reports should be adopted in order to manage impact on significant heritage qualities, both within the site itself and 'in the vicinity'.

It is also found that the legal framework for protection of the heritage qualities of the wider area is significantly impeded by an artificial administrative split between three LGAs. For example, a development in the Camden sector of the site may affect significant sites 'in the vicinity' in Campbelltown and Wollondilly LGAs, but none of the individual planning regimes is able to exercise control over that.

Although the various planning instruments may specifically control development in the vicinity of a heritage item or archaeological site, that is only enforceable within each respective LGA. Given the strong representation of rural heritage in large cultural landscapes in these three LGAs, it is recommended that consideration be given by each Council (or preferably all jointly) to undertaking studies to identify the wider settings of heritage items and examining the feasibility of ensuring full assessment of the impact of 'in the vicinity' developments on heritage items and their settings that may lie across local government boundaries.

CIVIL INFRASTRUCTURE – AECOM

POTABLE WATER SERVICING

EXISTING INFRASTRUCTURE CAPACITY

The study area is supplied with filtered water from the Macarthur Water Filtration Plant. Filtered water gravitates via a 1200mm diameter pipeline to supply the Narellan and Campbelltown South Water Supply Systems. Sydney Water has advised that the size of Narellan South Reservoir is sufficiently large enough to service the Glenlee site without requiring amplification. Sydney Water has also advised that the connection point for a new main to service the Glenlee will need to be on the existing outlet main from Narellan South Reservoir, to the north of the development site.

Sydney Water has made no allowances in its existing servicing plans for Glenlee, however, it has indicated that there is sufficient headworks capacity in the system to service the site.

CONSTRAINTS, OPPORTUNITIES AND ISSUES

There are several constraints, opportunities and issues which have been identified and listed below;

- BASIX (the Building Sustainability Index) requires that all new dwellings be constructed in order to reduce potable water consumption by up to 40% (compared to the metropolitan average). There are yet no requirements for industrial developments.
- As there are no reticulated recycled water mains serving the adjacent developments it has been assumed that an alternative source of water will be provided using rainwater tanks.
- As the reservoir has a full service level of 161m there are higher areas of the site that may not achieve the required minimum 20m minimum residual pressure when the reservoir level falls to its minimum operating level during normal operation. This means that properties above approximately RL 135m AHD may need to be boosted. This will need to be verified by detailed hydraulic modelling of the system at the concept design phase.
- As mentioned earlier there are no existing or planned reticulated recycled watermains in the nearby area and it is likely that rainwater tanks may need to be considered for potable water replacement.

RECOMMENDATIONS AND CONCLUSIONS

There are two potable water servicing options for Glenlee:

- The Narellan System to the north – the closest system (approx 800m)
- The Campbelltown South System to the east (approx 2-2.5km)

Sydney Water will not allow connection to the 750mm inlet main to Narellan which passes through the top corner of the site for operational reasons. Sydney Water will only permit connection to the outlet main side of the reservoir. The Campbelltown System is furthest away and hydraulic modelling would be required to ascertain a suitable connection point. This is not considered to have any advantages over the closer Narellan option.

It is recommended that further hydraulic modelling take place in the concept design phase to determine the most suitable connection point to Sydney Water's Narellan South System and to determine the high areas that are likely to receive sub-standard service pressures.

Further consideration of the use of recycled water can be given following Sydney Water's finalisation of its recycled water strategy for the West Camden catchment.

WASTE WATER SERVICING

EXISTING INFRASTRUCTURE CAPACITY

The nearest sewerage system to the study area is the West Camden Sewage System to the north. The West Camden Sewage Treatment Plant (STP) is currently undergoing amplification to 23MLD, this is due for completion in 2009.

To the north east of the Glenlee development area, there is the existing Glenfield Sewerage System that forms part of the Georges River systems that eventually drain to the Malabar STP. There is no sewerage system existing within the development area. Sydney Water has advised that although capacity has not been allowed for at West Camden STP to service the Glenlee development, there is sufficient capacity in the STP to service the development based on the predicted flows.

Sydney Water further advises that pumping station SP0691 has a defined capacity to serve the Spring Farm release area and is unlikely to have spare capacity for Glenlee. Based on a limited investigation of the capacity of the existing collection system it was advised that the

nearest connection point into the West Camden system is the Camden Submain located approximately 6 km away.

Sydney Water has advised that the modelled wet weather overflow frequency for the downstream Glenfield sewage collection system at several points exceeds the wet weather performance stipulated in the DECC STS license. Without augmentation of the system it is unlikely that wastewater flows from Glenlee could be accommodated.

CONSTRAINTS, OPPORTUNITIES AND ISSUES

Consultation with Landcom and Sydney Water has identified that the wastewater and water servicing strategy for Menangle Park has not yet been finalised and at this stage it is too early to determine whether there is potential to incorporate the Glenlee servicing with Menangle Park.

Sydney Water current policy is to advise all developers that under the *Water Industries Competition Act 2006,* other parties are allowed subject to licensing, to supply water and wastewater services in Sydney Water's Area of Operations. Sydney Water will seek advice from the developer with regard to the ownership and operation of the water related infrastructure servicing Glenlee.

RECOMMENDATIONS AND CONCLUSIONS

Based on advice from Sydney Water there is sufficient capacity in the existing West Camden STP to service the proposed development. There is also sufficient capacity in the Camden Submain to take the additional flows from Glenlee. At this stage there is still uncertainty as to the potential to incorporate the Glenlee servicing with the Menangle Park servicing.

POWER SERVICING

EXISTING INFRASTRUCTURE CAPACITY

The Camden Development site currently has an 11kV feeder, low voltage (415/240V) powerlines and distribution substations serving the old Glenlee Washery site which are supplied via Integral Energy's Camden zone substation. The Nepean Transmission Substation, which is immediately to its East, supplies the Camden Zone Substation. Assuming typical After Diversity Maximum Demand (ADMD) and assuming underground reticulation, the estimated electrical load is approximately 21MVA, which comprises a blend of residential, industrial, commercial and educational loads.

Integral Energy has advised that the Camden Zone Substation is nearly at capacity and only has approximately 4MVA of spare capacity which could be made available to the site for the initial stages of development. Integral Energy has indicated that the Nepean Transmission Substation has spare capacity to supply the Camden zone substation, but augmentation work at Camden Zone Substation is required to realise this capacity.

The next closest substation to the development area is Integral Energy's Narellan zone substation which is located to the North East and is not close enough to be considered for supply to the development.

CONSTRAINTS, OPPORTUNITIES AND ISSUES

Existing electrical distribution assets on the site will probably require removal and or conversion to an underground configuration to suit the detail design of the Glenlee Development. However, from our experience the relocation or removal of powerlines will be relatively straightforward with the removal of the washery. Typically new feeders will be designed to follow roadways with pole substations being replaced with pad-mounted arrangements.

RECOMMENDATIONS AND CONCLUSIONS

We have considered three options for servicing the development site. Option 1 considers using existing spare capacity in the network to release as much land as possible while waiting for Integral Energy to upgrade their substations. Option 2 considers using existing spare capacity until it is exhausted and then to assist Integral Energy with the upgrade of their Camden Zone Substation.

Finally, Option 3 looks at installing a mini zone substation on site. We applied a ranking system with a confidence factor to each option resulting Option 3 scoring the highest. If the development is to commence from the North West boundary and grow to the south east, we recommend that Option 1 and then 3 be implemented. The major recommendations are:

- A combined Option 1 and Option 3 is recommended – Utilize spare 11kV capacity then look to establish a mini zone substation possibly on site.
- The developer considers selling land for a possible new zone substation on site to help offset capital cost.
- The developer to make a detail application to Integral Energy setting out development timetable to initiate a more formal planning.

TELECOMMUNICATIONS

EXISTING INFRASTRUCTURE CAPACITY

Telephones are considered an essential service and Telstra has the obligation under its Universal Services Obligation (USO) set out under the Federal Telecommunications (Consumer Protection and Services Standards) Act 1999, to provide to all people in Australia, reasonable access, on an equitable basis, to the standard telephone service and payphones. The standard telephone service is a service for voice telephony. This service could potentially provide dial up connectivity of up to 1.5Mbps subject to commercial negotiations with Telstra.

Currently telecommunications infrastructure within the Glenlee precinct is very limited. The precinct is served from the Narellan exchange via a copper cable service. There is also a mobile communications tower on top of the ridge line in the centre of the site, and there is a fibre optic cable running through the site served from the Menangle Exchange which has limited capacity and is currently unused.

Standard deployment is provided by Telstra at no cost to the developer with the exclusion of the developer being responsible for the cost of providing a trench (which could be shared with other services in order to be more economical) and land on the verge for a remote above ground housing (a green box on the side of the road). The shared trench would be within the standard footpath allocation and will follow the subdivision road layout.

CONSTRAINTS, OPPORTUNITIES AND ISSUES

As stated earlier Telstra's standard deployment which provides a telephone connection point for all residences is copper cabling. The standard telephone service is a service for voice telephony which could possibly allow for up to 1.5Mbps dial up connectivity.

Telstra has indicated the site would be served from the existing Menangle Exchange. Telstra further indicated that it will only provide fibre optic network for commercial /industrial where it can get a return on it, that is at commercial rates. Telstra reiterated that the commercial rates and would need to be negotiated.

RECOMMENDATIONS AND CONCLUSIONS

Telecommunication services can be provided to the proposed Glenlee development by extending the existing trunk services.

Whilst Telstra currently meets its regulatory requirements to the area by providing voice services there is only a limited Broadband service and at this stage can only provide ADSL1(Asymmetric Digital Subscriber Line) at 1.5 Mbps at best. To accommodate the proposed development, the telecommunications network would require upgrade. Alternatively the developers can enter into a commercial agreement to have improved data services (fibre optic) to the site. This would be on a commercial basis and will need to be negotiated.

Based on initial servicing advice from the supplier there appears to be no impact on the site in regards to easement requirements. The services within the site to be laid in a common trench in the footpath allocation supplied at the developers expense.

GAS SERVICING

EXISTING INFRASTRUCTURE CAPACITY

Gas is not considered an essential service and the Glenlee Precinct currently has no gas mains available. Currently there is considerable gas infrastructure planned and existing in the Spring Farm area north of the Glenlee Precinct. This however does not mean that gas is automatically provided. Alinta has said that there is currently spare capacity but they do not reserve any capacity and therefore cannot guarantee capacity into the future.

CONSTRAINTS, OPPORTUNITIES AND ISSUES

The system demand for gas is set by availability, as it is not considered an essential service. Due to the fact that Glenlee is proposed to be a predominantly industrial development, gas demand is dependent on the types of industrial facilities that will occupy the site in the future.

After consultation with Alinta it was found that it would not reticulate the Glenlee precinct at this early stage of development.

RECOMMENDATIONS AND CONCLUSIONS

Gas services can be provided to the proposed Glenlee development by Alinta extending the existing trunk services. Negotiations with Alinta regarding the cost of the provision of gas services for Glenlee need to occur.

Alinta has advised that the decision whether or not to reticulate the precinct will depend on the budget cost of infrastructure and on the return that they are likely to receive. They are not obliged to provide any service if there is insufficient return.

Based on initial servicing advice from Alinta there appears to be no impact on the site in regards to easement requirements. The services within the site to be laid in a common trench in the footpath allocation supplied at the developers expense.

HUMAN SERVICES AND OPEN SPACE – BBC CONSULTING

No significant formal social infrastructure exists in the Site. Actions to implement the proposed strategy include the following:

- Council should seek agreement with the applicant in regard to the contributions to be made in relation to the above proposed human facilities and services in relation to the employment lands;
- The following discussions should be pursued by the applicant in relation to building the capacity of the employment lands to provide for their own human service needs:
  a. Discussions with the South West Area Health Service, New South Wales Ambulance Service and relevant occupational health and safety authorities, to determine the appropriate provision of medical services and facilities on site, and

design specifications in relation to ambulance and emergency access etc;

b. Liaison with local entertainment and club facilities to determine interest in operating such a facility on-site and the design requirements of such a facility;
c. Identification of appropriate convenience retail and commercial facilities, further design specifications and appropriate providers;
d. Identification of a possible commercial fitness centre provider, and negotiations to effect this;
e. Discussions with TAFE and Macarthur Community College to investigate opportunities for provision of training and adult education courses on-site, and any relevant design specifications (e.g. size of training room);
f. Discussions with the Greater Western Sydney Economic Development Board/ MACROC to investigate the potential for serviced offices to promote small business incubation;
g. Review of appropriate regulations in relation to the provision and design of a work-based child care centre, and the commencement of discussions with potential providers;
h. Liaison with Council in relation to cultural opportunities, particularly in respect of following:
    - Linkages to Glenlee House, its current operation and future opportunities;
    - Discussions with Council in relation to cultural (e.g. performance space and events), public art (e.g. sculpture) and recreational opportunities (e.g. integration with the proposed regional walking trail) provided by the site; and
    - Discussions with Australian Botanic Gardens in relation to any specific access design requirements.

THE DEVELOPMENT SCENARIO, ITS POTENTIAL IMPACTS AND MANAGEMENT IMPLICATIONS/PRINCIPLES

THE INDICATIVE LAYOUT PLAN – INSPIRE URBAN DESIGN & PLANNING

The ILP was developed through a series of workshops using a constraints and opportunities platform forged from the technical studies. This ILP was also expressed as a Statement of Desired Future Character. Key attributes include:

- An industrial employment precinct creating approximately 1500 job opportunities;
- A major wildlife corridor linking the Australian Botanic Gardens with the Nepean River;
- Several cross precinct 'green links';
- Provision for an extension of Liz Kernohan Drive and ultimate access to it; and
- An embellished Caley's Creek and perimeter riparian zone.

These employment figures will need to be revised following the deletion of the lands in the ownership of SITA. However, it is likely that there will be considerable employment numbers on the Site.

The amended ILP at Map 4 essentially has deleted the SITA land, which included residential and commercial lands. The latter proposed along the Liz Kernohan Drive. The new ILP proposes industrial land (IN1), environmental land (E3) and land for the road (SP2).

DEVELOPMENT SEQUENCING AND FEASIBILITY - MACROPLAN

In order to understand the likely sequencing and feasibility of the project, MacroPlan tested the viability of each of these land uses, having regard for potential land value uplift measured against likely development costs, other charges over time and the cost of infrastructure provision and funding (i.e. via direct provision, land offsets or through the payment of possible local and state infrastructure charges). These benefits and costs have been

proportionately applied to each of the four land parcels that make up the Glenlee landholding.

The purpose of the report was threefold:

- To identify the most appropriate land use to which each of the four parcels[3] should be put and therefore to maximise public and private benefits from any rezoning;
- To interrogate the sensitivities behind the various cost structures that support the land's rezoning in order to understand their implications for overall project viability; and
- To devise, on the basis of known costs, an appropriate infrastructure schedule that delivers appropriate public benefit without financially compromising the ability of each landowner to contribute to this outcome.

CONCLUSIONS

The work undertaken by MacroPlan for this report has confirmed that the highest and best use to which the Glenlee lands can be put involves a mix of residential, commercial, retail and industrial land uses in addition to the allocation of some land for open space purposes.

The real test, however, as to whether these land uses can be delivered depends not so much on whether they represent a "best fit" or what they contribute to the local economy but whether the overall return on investment to bring these uses to market outweighs the expected cost of that delivery, as fairly apportioned across the four constituent land owners.

MacroPlan has assessed the proportional distribution of development costs according to the value uplift associated with the ultimate development of the Glenlee lands to their highest and best use.

The outcome of this analysis, using 'current' development costs (including an assumed level of local and state-level development contributions from previous reports) demonstrates that the rezoning and development of the Glenlee site is viable provided its infrastructure costs can be kept at a reasonable level. In relation to costs, the following findings apply:

a) The most significant cost of developing the land, other than actual unavoidable development costs associated with local road and service provisions, relates to the provision of Liz Kernohan Drive (the proportion of which can be fairly attributable to the Glenlee owners has been estimated to cost over $23m.
b) Other local development contributions also add significantly to overall costs, being valued at almost $10m.
c) Potential state contributions for the project could add up to over $1.8m to development costs.
d) A significant portion of the site provides a strategic link between the Nepean River and the Australian Botanical Gardens and is suited to regional open space purposes. If this land were to be dedicated at current market value to government, its value would assist in compensating for other costs associated with the development.

MacroPlan's investigations in relation to the various components of the potential local and state contributions have confirmed that:

- Other community infrastructure previously mooted to be provided as part of a 'social hub' within the commercial precinct of the rezoning is not needed. Any demand generated for child care or related services within the employment zones will be met through private funding, i.e. if there is a business case to provide a child care centre at

this location the market will do so.

- A State Infrastructure Contribution (SIC) presently applies to the Growth Centres of northwest and south-west Sydney. The SIC is presently set at $150,000 per hectare for industrial land, although discounts apply for development undertaken prior to June 2011. In other areas the SIC levy is negotiated on a case by case basis.
  The Glenlee lands sit outside the South-West Growth Centre. For the purpose of its assessment MacroPlan has assumed the findings from other previous reports and has allowed for a SIC contribution of $1.85m, not including separate 'contributions' estimated for the Liz Kernohan Drive and regional open space.
- Local S94 contributions from the development of the Spring Farm precinct are presently applied to points 1-7 of the Liz Kernohan Drive. This road will eventually link the Camden Bypass to the South Western Freeway and will provide considerable improved access for residents and businesses at Camden and Menangle.
- An issue that arises from the rezoning of the lands is the apportionment of the Liz Kernohan Drive (i.e. from point 7 to its ultimate connection to Menangle Road at point 18) that would be attributable to the Glenlee lands if they were to be rezoned and the reasonableness of any charges applied for this construction.

Overall, our assessment of the various infrastructure items associated with the development of the Glenlee precinct and their attributable costs has demonstrated that it is not viable for the development to fund all of the infrastructure that has previously been mooted by Councils and the State Government.

As development of the Glenlee lands is necessary to facilitate the provision of the Liz Kernohan Drive and the strategic regional open space link between the Nepean River and the Mt Annan Botanical Gardens, an appropriate public authority approach to the project would be to seek to maximise the level of contribution possible for these matters.

These assets represent a significant addition to local amenity and accessibility and, if able to be provided, would substantially enhance the area's transport and ecological effectiveness.

On the basis of our investigations, and having regard for the otherwise prohibitive costs for undertaking the development, there is a strong case for the developer contributions required of the Glenlee site to be focused solely on those items that will generate the greatest local benefits, i.e. the extension of the Liz Kernohan Drive and the allocation of a regional open space link through the site.

The alternate of not facilitating the site's rezoning to its highest and best use potential would stifle the delivery of the Liz Kernohan Drive and the regional open space connection and would inhibit the transition of the Glenlee site from its current brownfield state to a higher and better use.

This alternative is not in the public interest. It should also be noted that MacroPlan's assessment of the likely economic multipliers associated with the ultimate development of the Glenlee lands has found that the rezoning will generate significant direct and indirect local employment opportunities (of up to 2,867 full-time jobs and a sizeable construction workforce). There are obvious very strong local multiplier benefits associated with the rezoning.

INFRASTRUCTURE STRATEGY

In respect of the above analysis undertaken by MacroPlan, an Infrastructure Strategy was prepared, which included a draft Section 94 Contributions Plan. The following is summarised.

The infrastructure impacts of the proposed Glenlee redevelopment are diverse in nature and encompass the natural systems framework, social/human environment and physical/engineering environment. Further, they generally occur in a broader significant development cost environment, given the current relative remoteness of the Precinct and the significant rehabilitation costs.

It is imperative that a balance be obtained in such environment. Local infrastructure impacts must undeniably be addressed. These encompass principally:

- External local roads and traffic facilities.
- Stormwater.
- Natural systems conservation.
- Community and recreation facilities.
- Open space.

Projected local commitments of $6,050,176 must be addressed and inform the preparation of a Developer Contributions Plan.

A contribution toward the value of regional infrastructure impacts has been derived and should potentially be administered through a Section 94 Contribution Plan. It has regard to regional ecological opportunities/objectives and takes the form of an enhanced Caleys Creek corridor at a projected value of $4,610,870. A total value of local and regional commitments of $10,661,046 is proposed.

This infrastructure strategy should form the foundation for finalising a funding strategy which addresses reasonable impact and has regard to the sensitivities of the total redevelopment equation.

It should be noted that the Department of Planning and Infrastructure initially responded to the Strategy and stated that this would be considered and that further advice would be provided. As the rezoning application lapsed, this aspect would need to be reconsidered.