Figure 5-2 North Shore Precinct APZ Locations and Dimensions

Figure 5-3 Central Precinct APZ Locations and Dimensions

5.6.2.3.2 Access

A number of factors must be assessed regarding access arrangements as detailed within the PBP. The proposed modifications are assessed against these factors below;

Alternate access and egress

> The proposed modified concept layouts for both the North Shore and Central Precincts are assessed as having a logical public road configuration that will provide multiple access/egress points ensuring alternate directions for evacuation and response, thus demonstrating compliance with PBP.

Perimeter access

> All hazard interface locations with APZs have adequate access provided by way of public perimeter roads, thus demonstrating compliance with PBP.

Design and Construction Standards

> All public roads have been designed to allow compliance with the PBP design and construction standards as detailed in **Appendix H**. The Concept Layout for the two precincts is able to satisfy PBP access requirements.

5.6.3 Mitigation Measures

5.6.3.1 Conditions of Approval

The Concept Plan Approval included a number of additional requirements for all future approvals under the Concept Plan Approval with regards to bush fire as detailed in **Table 5-15**. These requirements are considered sufficient for assessment of the Proposed Modification.

Table 5-15 Tallawarra Lands Concept Plan Conditions of Approval – Bush fire

Tallawarra Lands Concept Plan Conditions of Approval		
Schedule 3 – Future Environmental Assessment Requirements		***Response***
Rural Fire Service Requirements	**23 Location of buildings and facilities on Bush fire Prone Land to consider the requirement for Asset Protection Zones** Future applications which include Bush fire Prone Land must be accompanied by bush fire assessment report which demonstrates that the development meets the requirements of *Planning for Bush fire Protection 2006.*	All development Applications that include bushfire prone land will be accompanied by a Bush fire assessment report. The design of the layout as detailed within the Modified Concept Plan have taken into account the requirements stipulated within *Planning for Bush fire Protection 2006.*
	24 Bush fire protection for the access to the tourist facility Future applications for the tourist facility include a bush fire assessment report that demonstrates that development complies with Section 4.2.7 of *Planning for Bush fire Protection 2006*, including asset protection zones and roads.	The future application for development of a tourist facility will be accompanied by a bush fire assessment report that details that the requirements stipulated within *Planning for Bush fire Protection 2006* have been taken into account.

5.6.3.2 Statement of Commitments

Mitigation measures identified by the SoCs that are applicable to Bush fire, and which would apply to the Modification Proposal, are listed in **Table 5-16** below.

Table 5-16 Tallawarra Lands Concept Plan Statement of Commitments – Bush fire

Tallawarra Lands Concept Plan Statement of Commitments		*Response*
Bush fire	22. TRUenergy commits to implementing the recommendations and management measures contained in the Bush fire Planning Assessment prepared by Eco Logical Australia dated 4 February 2011.	BridgeHill will continue to commit to the recommendations and management measures contained in the Bushfire Assessment prepared by ELA (2011b) as well as the additional

	recommendations contained within the Peterson Bush fire Assessment (2017).

Bush fire issues associated with the development of the Tallawarra Lands would be managed in accordance with the Concept Plan Approval and associated SoCs referred to above. There are considered adequate to address the potential impacts of the Modification Proposal.

5.7 Geotechnical

A Geotechnical Report was prepared by Cardno (2017b) to address the SEARs, with the full assessment contained at **Appendix I**. The SEARs addressed in this section are identified in **Table 5-17**.

Table 5-17 Secretary's Environmental Assessment Requirements (Geotechnical)

Secretary's Environmental Assessment Requirements	Precinct	Comments
Impacts of potential earthworks however detailed assessment would be undertaken as part of future detailed DA	Central	There is a risk of erosion and disturbance of the soils during earthworks. Additional investigation / laboratory tests of erodibility of the soils is required prior to works commencing. This area poses moderate risks, however, these can be managed by appropriate engineering design, to be determined by further intrusive investigation and assessment. It is anticipated that expanding the area poses limited slope instability risk for residential development following appropriate engineering design
	North Shore	There is a risk of erosion and disturbance of the soils during earthworks. Additional investigation / laboratory tests of erodibility of the soils is required prior to works commencing. The expanded areas of the North Shore Precinct are not expected to have significant geotechnical constraints.

5.7.1 Tallawarra Lands Concept Plan

A Geotechnical, Contamination and Ground Water Investigation Report for the Tallawarra Lands was prepared by Coffey Environments (2010) for the North Shore, Central and Southern precincts of the site. The objective of the report was to collect and collate information on contamination, geotechnical, groundwater and acid sulfate soil concerns. The geotechnical report was reviewed as part of the investigations undertaken and remains the technical geotechnical assessment for the overall approved Concept Plan, with the Cardno (2017b) assessment providing the additional technical assessment for the areas of proposed modification consistent with the Coffey (2010) assessment.

During the initial planning phase of the investigation for the site, a list of preliminary terrain units was formulated to better target the various areas of the site with subsurface investigation works. The preliminary terrain units were coded as follows:

> (A) – Ash Dams

> (B) – Undulating slopes

> (C) – Low lying with soft soils

> (D) – Steep slopes

A simple qualitative rating system was developed as part of the assessment to provide a broad indication of the relative difficulty for development from the geotechnical perspective within the various terrain units at the subject site. A summary of the geotechnical constraints taken from the report is provided in **Figure 5-4** below.

Figure 5-4 Summary of Geotechnical Constraints based on Simple Qualitative Rating System

Green	Generally no significant geotechnical constraints to urban development within these areas. Further geotechnical assessment works required during planning and detailed design stages for future development. The 'A' (Alluvial) and 'H-L' (Hillside – Lower) terrain units are included in this category. These areas of the site are more suited to either residential single or two storey housing or commercial type developments. Some earthworks required to develop housing over the Alluvial Terrain areas.
Yellow	Land requiring some geotechnical engineering assessment to design and construct standard urban developments such as residential subdivisions. More limited ground treatment necessary compared to 'Red' areas below. Development possible but would require input from the geotechnical engineer. The 'F-3' (Ash Pond 3, <2m of Unit 5A soils), 'F-5' (General Fill), 'F-E1' (Fill over Unit 5A soils <2m thick) and 'E-1' (Unit 5A soils <2m thick) areas fall into this category.
Light Purple	Moderate risk (with some high risk) of landslide in these areas. Further detailed geotechnical assessment works would be necessary to further refine areas suitable for development. Some of this land may be excluded from future development. The 'H-U' (Hillside – Upper) areas fall into this category.
Red	Land requiring significant geotechnical assessment to design and construct to urban development standard. Development could be possible but would likely require significant geotechnical remedial works. Detailed geotechnical advice during the planning and design stages would be required. The 'F-1' (Ash Pond 1+2 with <2m of Unit 5A soils), 'F-2' (Ash Ponds 1+2 with >2m of Unit 5A soils), 'F-4' (Ash Pond 3 with >2m of Unit 5A soils), 'F-E2' (Fill overlying Unit 5A soils thicker than 2m) and 'E-2' (Unit 5A soils thicker than 2m) all fall into this category.

The areas generally considered feasible for development from the geotechnical perspective were:

> The North Shore Residential Precinct

> The Display Village and Central Residential Precinct and the Local Centre, the northern sections of the Employment Lands, and the Tourism area

> Some areas of the Employment Lands and the western portions of the Lakeside Residential Precinct

The areas that are considered to be more technically challenging (from a geotechnical perspective) for development were:

> The remainder of the Employment Lands generally south of Yallah Bay Road and the Sports Ground.

> The Primary School and Retirement Living area and the remainder of the Employment Lands near the Primary School and Retirement Village, and the central and eastern parts of the Lakeside Residential Precinct.

5.7.1.2 Site Investigation

A site walkover to identify areas of environmental and chemical concern and geotechnical constraint was undertaken as part of the assessment. The following site investigations were conducted:

> A Geotechnical investigation which consisted of 86 test pits, 7 boreholes, 9 groundwater monitoring wells and 24 peizocones. The depth of investigation varied between 0.5m and 24m.

> 24 Cone penetration tests and pore pressure dissipation tests were carried out.

> A Shrink swell test, particle size distribution including hydrometer and the Attenberg Limits test with linear shrinkage were conducted on selected samples.

The Central Precinct was divided into two parts. The site adjacent to the proposed expansions was identified as Zone 2 (D) and the proposed modification site was identified as Zone 4(B) (D). The North Shore Precinct was identified as Zone 1 (B) and was adjacent to Zone 4 (B) (D).

Summaries of each of the zones are detailed in the subsections below.

5.7.1.3 Central Precinct

According to the ASS Mapping presented in the report, the Central Precinct was a 'No Known Occurrence' zone for ASS.

Rock depths within the Central Precinct were determined to be at 1.0m – 3.0m depth. An area of fill was identified during the study in the north west portion of the precinct, with an inferred depth of 1.0m – 2.0m.

The geotechnical assessment of the zones within the Central Precinct determined the following:

Zone 4 (B) (D):

> *"Upper steep slopes of hillside areas generally with slopes greater than about 10°, either colluvial and/or residual soils present in the areas. Soil cover generally less than 2m in most areas with some deeper areas near gullies overlying Budgong Sandstone."*

> *"Moderate Risk (with some high risk) of landslide in these areas. Further detailed geotechnical assessment works would be necessary to further refine areas suitable for development. Some of this land may be excluded from future development."*

5.7.1.4 North Shore Precinct

According to ASS Mapping presented in the report, the North Shore Precinct was also a 'No Known Occurrence' zone for ASS.

Rock depths were determined to be at 1.0m – 2.0m in depth. An area of fill was identified during the study in the north eastern portion of the site with an inferred depth of 1.0m – 2.0m.

The geotechnical assessment of the zones within the North Shore Precinct determined the following:

Zone 1 (B):

> *"Lower undulating footslopes of hillside areas, generally with slopes less than or equal to about 10°, either colluvial and/or residual soils present in the areas. Soil cover generally less than 2m in most areas with some deeper areas near gullies overlying Budgong Sandstone."*

> *"Generally no significant geotechnical constraints to urban development within these areas. Further geotechnical assessment works required during planning and detailed design stages for future development."*

5.7.2 Concept Plan Modification Impact Assessment

A Geotechnical Report was prepared by Cardno (2017b) to review geotechnical constraints associated with the Tallawarra Lands to address the SEARs requirements for the proposed modification to the Tallawarra Concept Plan. A site walkover and site investigation was conducted for the modification areas.

A summary of the investigations is provided in the subsections below.

5.7.2.1 Central Precinct

A site walkover was conducted which identified steep slopes within the Central Precinct. Although no dams were located within the expanded areas, several dams were located on site suggesting high ground water levels. The investigation also found existing structures located adjacent to the site.

Site investigations consisted of six (6) hand augured test pits. The encountered subsurface stratum and rock levels are detailed in Table 5-1 of the Geotechnical Report at **Appendix I**. The depth of sandstone levels were consistent with the subsoil investigation conducted by Coffey, and the geology was found to be consistent with the Wollongong Area Coastal Quaternary Geology Map.

Further intrusive investigation is recommended to confirm the extent of any instability prior to works being undertaken. The Central Precinct (expansion area) poses moderate risks; however, these can be managed by appropriate engineering design, to be determined by further intrusive investigation and assessment.

5.7.2.2 North Shore Precinct

During the site walkover, undulating slopes were observed in the North Shore Precinct. Several dams were also recorded within the precinct.

Site investigations consisted of ten (10) hand augured or excavated test pits. The encountered subsurface stratum and rock levels are detailed in Table 5-2 of the Geotechnical Report at **Appendix I**. The depth of sandstone levels were consistent with the subsoil investigation conducted by Coffey, and the geology was found to be consistent with the Wollongong Area Coastal Quaternary Geology Map.

The expanded areas of the North Shore Precinct are not expected to have major geotechnical constraints. The existing data provides sufficient geotechnical information at this stage to understand the geotechnical constraints. Consequently, the proposed expansion does not present further geotechnical constraint.

5.7.3 Mitigation Measures

5.7.3.1 Statement of Commitments

Mitigation measures identified by the SoCs that are applicable to Geotechnical, and which would apply to the Modification proposal, are listed in **Table 5-18** below.

Table 5-18 Tallawarra Lands Concept Plan Statement of Commitments – Geotechnical

Tallawarra Lands Concept Plan Statement of Commitments		*Response*
Geotechnical	5a. TRUenergy commits to undertaking further geotechnical engineering assessment of those parts of the Concept Plan development footprint identified as being constrained in the Geotechnical, Contamination and Groundwater Investigation dated 30 July 2010, prepared by Coffey Environments.	Further Geotechnical Investigations will be undertaken as part of individual Development Applications for actual works on site.

Geotechnical issues associated with the development of the Tallawarra Lands would be managed in accordance with the Concept Plan Approval and associated SoCs referred to above. These are considered adequate to address the potential impacts of the Modification Proposal.

5.8 Contamination

An Environmental Site Assessment (ESA) was prepared by Cardno (2017c) to address the SEARS, with the full assessment contained at **Appendix J**. Additionally, BridgeHill has engaged Easterly Point Environmental to act as the site auditor for the development of the site, with an Interim Site Audit Advice contained at **Appendix O**. The SEARs addressed in this section are identified in **Table 5-19**.

Table 5-19 Secretary's Environmental Assessment Requirements (Contamination)

Secretary's Environmental Assessment Requirements	Response
10. Groundwater/Contamination/Acid Sulphate Soils	
The modification request shall: • Undertake a review of the current hydrogeological setting, with an update of the remediation of contamination within the approved Concept area;	A Geotechnical Report has been prepared by Cardno (refer to **Appendix I**) to review the current hydrogeological setting on the site.
• Identify whether the proposed additional footprint comprises contaminated land or groundwater contamination and include a detailed description of the soil sampling methodology, any required remediation measures and ongoing site contamination management in accordance with *Contaminated Land Management Act 1997* (CLM Act) and the *Managing Land Contamination: Planning Guidelines*;	**Section 4-6** of **Appendix I**
• Include an updated investigation of AEC, including:	This requirement is not considered relevant to the ESA

○ The potential for contaminants to be present in soil and groundwater in the vicinity of the ash ponds to be mobilised and transported to the adjacent shallow aquifer, duck creek and the receiving waters of Lake Illawarra and measures to address this, including the feasibility of remediation of contaminated soils and/or containment of contamination sources; ○ Potential for contamination in the vicinity of the Ash Ponds to adversely affects GDEs on the site; ○ Measures to ensure that the environmental attributes of conservation lands on the site are not adversely impacted upon by soil and groundwater contaminants; ○ Any risks to human health or the environment; ○ Recommendations for ongoing management of contaminated groundwater.	due to the considerable distance between the modification areas and the ash ponds to south. The ash ponds are not located in the North Shore or Central precincts.
• Provide verification by an auditor accredited under the CLM Act of the adequacy of the above investigation, effectiveness of any proposed remediation, and suitability of the site for the proposed modification in accordance with SEPP 55 – Remediation of Land;	An auditor has been engaged to review the investigation, with further details at **Appendix O**
• Assess and advise on the status of the contamination matters specified in Schedule 3 Future Environmental Assessment Requirements 11 and 12 of the Concept Approval and, if any of those requirements have been triggered, information on their progression;	Refer to discussion in **Appendix J** regarding the requirements of Schedule 3, Requirements 11 and 12.

5.8.1 Tallawarra Lands Concept Plan

To inform the Concept Plan, Coffey Environments completed a Geotechnical, Contamination and Groundwater Investigation (2010) of the Tallawarra Lands. The objectives of the investigation were to obtain information in relation to geotechnical, contamination, groundwater and acid sulfate soil issues within the Tallawarra Lands to assess the feasibility of the Concept Plan. The scope of the investigation included a desktop study, intrusive site investigations to assess subsurface conditions, sampling and analysis of site soil and groundwater, interpreting data collected and reporting the findings.

5.8.1.1 Contamination

The contamination assessment identified nine potential AECs associated with potentially contaminating activities/sources that included:

> AEC 1 – Ash Ponds;

> AEC 2 – Other Fill Sources of Unknown Origin and Quality;

> AEC 3 – Weathering of Hazardous Building Materials, Pesticide Use, Chemical Storage;

> AEC 4 – Former Heggies Contractor Area;

> AEC 5 – Small Testing Laboratory and Coal Fired Oven;

> AEC 6 – Filling and Disposal of Waste in Farm Dams or Other Areas;

> AEC 7 – Weed Control;

> AEC 8 – Oil Skimmer Area; and

> AEC 9 – Access Road and Grassed Area.

The investigation identified soil contamination within AEC2, AEC3, AEC4, AEC8 and AEC9. The contamination identified exceeded human health investigation levels for residential with accessible soils. The contamination included asbestos and lead, arsenic, petroleum hydrocarbons and aldrin (pesticides). It is likely that the contamination is localised to the AEC and the associated activity, which may have caused the contamination.

The assessment determined that the potential for soil contamination to constrain the proposed Concept Plan is low, and that further investigation of the identified AECs that fall within the proposed development areas can be addressed at the time of any earthworks for subdivision. Areas outside of the AECs are not

suspected of having had activities that could have caused land contamination. Consequently, further assessment of these areas was not considered appropriate.

Elevated concentrations of zinc, copper and arsenic were reported at some locations exceeding the provisional based phytoxicity levels. This may indicate that some plant species sensitive to zinc and arsenic could be affected if this soil was used as a growing medium.

The former ash ponds were the largest potential AEC at the site. Elevated concentrations of heavy metals and ammonia were reported in groundwater collected from monitoring wells targeting the ash ponds. It is likely that the power station ash could be contributing to the contamination identified on the site, however, the natural surrounding environment cannot be ruled out as a potential source. As a result, further assessment would be required to determine the significance of the exceedances.

5.8.1.2 Acid Sulfate Soils

The results of the assessment indicate that acid sulfate soils are present within certain parts of the site. A combination of a desktop study, field mapping, logging and analytical testing was used to assess the extent of the site where acid sulfate soils could exist. These areas were predominately in the southern parts of the site with low lying alluvial/estuarine environments. The majority of these areas where the Concept Plan shows building zones coincide with the former ash ponds, and have already been filled or will most likely require filling to raise grounds levels due to flooding issues. Therefore, significant disturbance to underlying acid sulfate soils is unlikely and is not considered to pose a major constraint for redevelopment of the site based on the Concept Plan.

5.8.2 Concept Plan Modification Impact Assessment

An ESA was prepared by Cardno (2017c) to assess for potential contamination in portions of the North Shore and Central Precincts of the proposed Tallawarra Lands development that were not encompassed in the original Concept Approval. The following sections summarise the key findings of the assessment.

5.8.2.1 Background

The ESA forms a portion of the Modification request and specifically addresses the SEARs (as detailed in Section 1.5 of the assessment contained in **Appendix J**).

5.8.2.2 Soil Analytical Results

Fieldwork and soil sampling activities were undertaken by an experienced environmental scientist. Based on the soil analytical results, soils are impacted with Contaminants of Potential Concern (COPC) at concentrations above one of the Tier I screening values as summarised below:

> One soil sample reported a copper concentration that exceeds the NEPM EIL criteria for urban residential and public open space.

> Four soil samples reported copper at concentrations that exceed the NEPM EIL criteria for national parks and areas of high conservation value.

> Soil samples with elevated concentrations of copper were generally collected from the topsoil layer between surface and 0.2 m bgl, although one exceedance was reported at a depth of 1.0 m bgl.

> All samples that reported elevated copper in surface soils were collected from the Central Precinct and the sample with elevated copper at 1.0 m bgl was collected from the North Shore Precinct.

5.8.2.3 Preliminary CSM and Risk Assessment

During the assessment, a preliminary Conceptual Site Model (CSM) was developed to assess the fate and transport of COPCs relative to site specific subsurface conditions with regard to their potential risk to human health and the environment.

The assessment identified that there are currently no COPCs present in the Central and North Shore Precinct modification areas at concentrations above the Tier I human health screening values. Potential human receptors in the modification areas are currently limited to farm workers and workers completing maintenance on subsurface utilities.

Copper is present at the site at concentrations above the Tier I ecological screening values. Ecological receptors of significance were not identified at or within close proximity to the modification areas. The nearest significant ecological receptors are located outside of the Tallawarra Lands development footprint and include Duck Creek to the south and Lake Illawarra to the east and north. Therefore, the likelihood of a completed receptor pathway is unlikely under the current land use. If soil disturbance and earthworks are required during the proposed redevelopment of the site, potential mismanagement of excavated soil could result in a completed pathway.

The exceedances of the Tier I ecological screening levels were marginally above the criteria and concentrations were relatively consistent across the sampling locations indicating that they may be representative of background concentrations. The overall potential risk to the local environment based on the measured copper concentrations is considered low. A site auditor accredited under the Contaminated Land Management Act 1997, has been engaged by Bridgehill to provide audit services during the assessment and remediation of the site. The auditing provides an additional level of diligence to ensure a comprehensive assessment is undertaken.

5.8.3 Mitigation Measures

5.8.3.1 Conditions of Approval

The Concept Plan Approval included a number of additional requirements for all future approvals under the Concept Plan Approval with regards to contamination management as detailed in **Table 5-20**. These requirements are considered sufficient for assessment of the Proposed Modification.

Table 5-20 Tallawarra Lands Concept Plan Conditions of Approval – Contamination

Tallawarra Lands Concept Plan Conditions of Approval		
	Schedule 3 – Future Environmental Assessment Requirements	***Response***
Future Environmental Assessment Requirements	**11 Further investigation of the Areas of Environmental Concern and engagement of a Site Auditor accredited under the *Contaminated Land Management Act 1997*** Future applications that include those lands nominated as Areas of Environmental Concerns (AECs) in the Coffey Environments Report (2010) must be accompanied by a further environmental assessment report. In addition to adopting the recommendations contained in Section 12 of the Coffey Environments Groundwater Modelling Assessment report, the further investigations must consider: • The potential for contaminants present in the soil and groundwater in the vicinity of the ash ponds to be mobilised and transported to the adjacent shallow aquifer, Duck Creek and ultimately to the receiving waters of Lake Illawarra, and measures to address this including the feasibility of remediation of contaminated soils and/or the containment of the sources of contamination; • Measures to ensure that the environmental attributes of conservation lands on the site are not adversely impacted on by contaminants present in the soil and groundwater; • Recommendations for the ongoing management of contaminated groundwater; • The potential for the contamination present in soil and groundwater in the vicinity of the ash ponds to adversely affect groundwater dependent ecosystems on the site; and • Any risks to human health or the environment. Following the completion of the further investigations, the proponent must engage a Site Auditor accredited under the Contaminated Land Management Act 1997 to verify the adequacy of the investigations (and any proposed remediation) and certify that the site is suitable for the proposed use.	An ESA has been prepared by Cardno (2017) as described in **Section 5.8.3**. The ESA has considered the potential for contaminants present in the soil and groundwater within the modification areas. The ESA also outlines measures to address contaminants and ensure that the environmental attributes if conservation lands on the site are not adversely impacted. Marc Salmon of Easterly Point Environmental Pty Ltd, a site auditor accredited under the Contaminated Land Management Act 1997, has been engaged by Bridgehill to provide audit services during the assessment and remediation of the site. An Interim Site Audit Advice is contained at **Appendix O**.

	12 Engagement of a site auditor to verify the adequacy of asbestos soil sampling and asbestos contamination investigations The first future application to Council must include a verification from a Site Auditor accredited under the *Contaminated Land Management Act 1997* to assess the adequacy of the investigations and asbestos soil sampling undertaken by Douglas Partners (July 2010) and certification of the suitability of the site for the proposed use.	An auditor called on to verify the adequacy of an investigation undertaken 7 years previously will almost certainly require that additional supplementary investigations be undertaken, which are of uncertain scope at this stage. Where remediation is required in order for any part of the site to be made suitable for its approved Concept Plan use, it will not be possible to obtain the required certification as to land use suitability at the superlot subdivision stage. It is proposed to amend this condition to require site auditor verification and certification of site use suitability as part of any development application for subdivision of the land (excluding superlot subdivision). The certification of land use suitability should also be extended to allow a certification either that the land is suitable for the use *or can be made suitable for the use, subject to implementation of a RAP*, to allow for the possibility that some remediation works may need to be undertaken in conjunction with subdivision works.

5.8.3.2 Statement of Commitments

Mitigation measures identified by the SoCs that are applicable to contamination, and which apply to the Modification Proposal, are listed in **Table 5-21** below.

Table 5-21 Tallawarra Lands Concept Plan Statement of Commitments – Contamination

Tallawarra Lands Concept Plan Statement of Commitments		Response
Land Contamination	6. TRUenergy commits to continuing investigations into the areas of environmental concern (AECs) identified in the Geotechnical, Contamination and Groundwater Investigation dated 30 July 2010, prepared by Coffey Environments. The AECs to be further investigated are those parts of the site that fall within proposed development areas.	An ESA has been provided to further investigate the areas of environmental concern within the proposed development areas (refer to **Appendix J**).
	6a. TRUenergy commits to managing land contamination in accordance with State Environmental Planning Policy No. 55 – Remediation of Land and the Managing Land Contamination: Planning Guidelines.	The proposal complies with the provisions of SEPP 55 (as discussed in **Section 4.5.4**).
	7. TRUenergy commits to undertaking any requirements for remediation and management as part of the findings from the further investigations of the AECs.	An ESA has been prepared that provides mitigation measures to be implemented for the remediation and management of contamination on the site (refer to **Appendix J**),
	8. TRUenergy commits to implementing the recommendations detailed in the Preliminary Hydrogeological Assessment – Ash Ponds dated 23 November 2010, prepared by Coffey Environments.	The recommendations detailed in the Preliminary Hydrogeological Assessment – Ash Ponds will be implemented as part of

	construction works associated with the Lakeside Precinct. Energy Australia are retaining ownership of this parcel of land.
9. The recommendations detailed in the Register of Hazardous Materials Report in Residences in North Shore Precinct dated 15 March 2010 prepared by Coffey Environments will be implemented.	The recommendations detailed in the Register of Hazardous Materials Report in Residences in the North Shore Precinct will be implemented to avoid any adverse environmental impacts.

Contamination issues associated with the development of the Tallawarra Lands would be managed in accordance with the Concept Plan Approval and associated SoCs referred to above. These are considered adequate to address the potential impacts of the Modification Proposal.

5.9 Visual and Urban Design

A Visual Impact Assessment has been prepared for the North Shore and Central Precincts of the Tallawarra Lands by Cardno (2017d) to address the SEARs, with the full assessment contained at **Appendix K**. The SEARs addressed in this section are identified in **Table 5-22**.

Table 5-22 Secretary's Environmental Assessment Requirements (Visual Impact Assessment)

Secretary's Environmental Assessment Requirements	Where Addressed
4. Visual Impacts	
The modification request shall provide a detailed visual impact assessment of the proposal from key viewpoints including views towards the site from Shellharbour LGA. The assessment shall provide a comparative analysis of the visual impacts of the proposed compared against the Concept Approval.	**Section 5.9.2 and Appendix K**

5.9.1 Tallawarra Lands Concept Approval

Richard Lamb & Associates prepared a 'Visual, landscape and scenic resource management considerations report' (Lamb 2011) to inform the Tallawarra Lands Concept Plan Approval. DFP (2011) incorporated the outcomes of this report into the overall Environmental Assessment for the Tallawarra Lands, with Lamb (2011) recommending a range of visual and urban design considerations that should be reviewed in the development of the site.

To inform this report, an assessment of the existing character of the site was undertaken. The site is characterised by a rural setting, comprising mostly of grazing land on a varied topography. The Tallawarra power station and its associated distribution network provide a distinct industrial feel to certain aspects of the site. The site is elevated to the north with Mount Brown prominent with low-lying areas to the south along the Lake Illawarra foreshore. Other prominent features around the site include the various riparian creek lines and swamp vegetation, with some significant stands of vegetation.

Lamb (2011) divided the site into four scenic quality zones based on their intrinsic visual constraints, with visual exposure from external viewing locations, physical and natural features and their spatial arrangement with the immediate surrounding context. The visual catchment for the site was determined as being relatively large based on the proposed development on the slopes of Mount Brown being visible from the surrounding residential suburbs. Close viewing locations relate to Yallah Bay Road, the Princes Highway and public recreation areas along the Lake Illawarra Foreshore. Middle and distant views are available from the surrounding suburbs of Koonawarra, Kanahooka, Albion Park, Oak Flats, Shellharbour, Mt Warrigal, Windang, Primbee, Lake Heights and Berkeley. This is predominately a factor of the lakeside location of the Tallawarra Lands.

The visual impact of the proposed concept plan was then assessed from these locations to compare the existing situation with the proposed development. This assessment investigated the impact from a range of close, middle and distant views. This assessment found that the Approved Concept Plan would provide the following impacts;

> The proposed concept plan is compatible with the scenic resource management principles.

> In most views residential developments on the site will be seen in the context of the residential developments of the lakeside suburbs such as Koonawarra, Haywards Bay, Oak Flats, Shellharbour, Mt Warrigal and others and/or the suburbs of Dapto and Kanahooka.

> The employment uses (industry/business) are proposed on parts of the site with low external visual exposure and will not have any significant visibility for the external domain with the exception of some views from the south and southwest of the site.

> Other employment uses (neighbourhood centre and enterprise/business) are also proposed on parts of the site with limited external visual exposure.

> The proposed concept plan appropriately retains, adapts and enhances the scenic resources of the site which include Mount Brown slopes, ridgelines, creek lines, lake foreshore edge and water bodies.

> It provides for new visual and physical linkages and internal road networks that provide increased and improved access to internal scenic resources as well as externalises the site with the surrounding context.

> Views of the important ridgelines, high points and prominent slopes will be maintained by strategic location of residential development below the visual horizon at the finer grain.

> There would not be any significant interruption of existing views from the external domain. The view composition of part of the view comprising the site may alter, but the overall visual experience will not be affected.

5.9.2 Concept Plan Modification Impact Assessment

The precinct boundary modifications proposed to the Approved Concept Plan has the potential to alter the Visual Impact Assessment conducted by Lamb (2011). Cardno (2017d) have prepared a Visual Impact Assessment to assess the impact that any modification will have to both internal and external sensitive receivers within the vicinity of the Tallawarra Lands, specifically relating to the North Shore and Central Precincts. The full report is contained at **Appendix K**, and is summarised below.

The Lamb (2011) assessment conducted to inform the overall Concept Approval remains the primary study for the Tallawarra Lands site, with the Cardno assessment providing supplementary assessment to reflect the proposed modifications.

5.9.2.1 Assessment of Modifications

The proposed modifications will provide additional residential lots to be included within both the North Shore and Central Precinct. The North Shore Precinct will see the southern boundary to the R2 zone moved further south into the E3 zoned land. This alteration will see the zone boundary relocate to the south side of the ridgeline that runs from Lake Illawarra through to the summit of Mount Brown. Additionally, the existing high voltage electricity towers will be removed with the transmission lines redirected underground. The Central precinct modifications primarily comprise of boundary adjustments to the R5 land on the southern slopes of Mount Brown eastwards also into the E3 zoned land.

These changes were assessed through a photographic survey and the production of artist impressions to determine the overall impact of the changes. The artist impressions were produced by John Haycraft of Haycraft Duloy, Architectural Illustrators who were responsible for the impressions produced within the Approved Concept Plan. This approach allowed a more direct comparison to be made between the Approved Concept Plan and the proposed modifications.

Within the North Shore Precinct, most of the views towards the site include the Illawarra Escarpment as a continuous backdrop and horizon, which provides the dominant visual feature and limits sky lining of future development. The additional development would not impact on the visual significance of the Escarpment, which is recognised as being of high visual value by the *Visual Quality Analysis of Escarpment Scenic Values* (DSB Landscape Architects 2006) and *Illawarra Escarpment Heritage Assessment* (Mayne – Wilson and Associates 2007). These reports are reflected in the *Illawarra Escarpment Strategic Management Plan* (2005) and informed the *Illawarra Escarpment Land Use Review Strategy* (1 June 2007 and *Illawarra Escarpment Explanatory Document* 1 June 2007 (HLA Envirosciences Pty Ltd on behalf of Wollongong City Council). The DCP Chapter B6 recognises and aims to protect the visual character of the Escarpment. The

DCP Chapter B6 notes that the *Illawarra Escarpment Strategic Management Plan* recognises the 'significant scenic and aesthetic value of the Escarpment'. Conversely, the immediate visual context of the site comprising Mount Brown is not recognised in literature as a visually significant site. Consequently, impacts on local views are not considered to be major constraints.

The proposed modifications will result in additional detached dwellings located along the ridgeline extending east from Mount Brown, with a minor extension onto the north facing slope of the Precinct. These changes will be offset by the proposed removal of the high voltage electricity transmission towers. The Lamb report (2011) recommends that to preserve the visual quality of the locality, building envelopes should not extend beyond the horizon line. The view analysis undertaken within the Cardno (2017d) assessment found that in all available views towards the North Shore Precinct, the Illawarra Escarpment is a continuous horizon element. As such, single dwellings on the ridgeline resulting from this modification will be viewed against the backdrop of the Escarpment and will not form horizon views. With the removal of the electricity towers, it is assessed that the proposed modifications to the North Shore Precinct are acceptable with respect to their visual impact.

The modifications within the Central Precinct are characterised by the same backdrop of the Escarpment as described for the North Shore Precinct from both medium and distant viewing locations. When observed from close range, the proposed additional dwellings accessed from Carlyle Close will form the horizon line. These close range viewing points are observable from Yallah Bay Road, with it being assessed as not critical as they are incidental views only and the view would quickly open up with movement to the east to include Mount Brown and its surrounding vegetation. Additionally, the visual character of the area when viewed from Yallah Bay Road will undergo substantial change as a result of the development, with the additional dwellings on the ridgeline comprising a minor portion of this view.

The impact of additional dwellings along the ridgeline fronting Carlyle Close could be further controlled by requiring houses to be set back from Carlyle Close, as well as controls to cap building height and to carry out ridgeline tree planting. Other extensions in zone boundaries along the western and eastern precinct edges would have minimal impacts on the visual quality of the locality when compared to the approved Concept Plan.

5.9.2.2 Recommendations

Cardno (2017d) provided a number of recommendations to further ensure that the development of the Tallawarra Lands does not create visual impacts within the surrounding area. These recommendations included;

> Envelope and height controls should be mandated to minimise the visibility of new development along ridgelines. Specifically, new development accessed from Carlyle Close should be subject to setback and height controls to ensure that its visibility above the ridgeline is minimised.

> Existing vegetation on the site should be retained and enhanced where possible.

> Landscape treatment should include large forest scale trees, preferably of species endemic to the locality. These should be planted within lots and as street trees and should be concentrated on the higher lands and ridgelines where new development is likely to be most visible.

> A materials and colours palette should be included as part of a suite of development controls for the site. This should be aimed at minimising visual impacts of new built form.

5.9.3 Mitigation Measures

5.9.3.1 Statement of Commitments

Mitigation measures identified by the SoCs that are applicable to Visual and Urban Design, and which would apply to the Modification Proposal, are listed in **Table 5-23** below.

Table 5-23 Tallawarra Lands Concept Plan Statement of Commitments – Visual and Urban Design

Tallawarra Lands Concept Plan Statement of Commitments		
Urban Design Strategies	10. The urban design strategies recommended in the Richard Lamb and Associates Visual, Landscape and Scenic Resource Management Considerations will be	BridgeHill commits to implementing the requirements stipulated within the Richard Lamb

	reviewed and adopted for future development I the following areas of the Concept Plan site as identified in the Report: • The large lot and central residential precinct in Visual Exposure Zone A and north shore residential precinct in Visual Exposure Zone B • The lakeside residential precinct in Visual Exposure Zone D • The employment in Visual Exposure Zones A and D	and Associates report that accompanied the Concept Approval and the additional requirements detailed within **Appendix K**

Visual and urban design issues associated with the development of the Tallawarra Lands would be managed in accordance with the Concept Plan Approval and associated SoCs referred to above. These are considered adequate to address the potential impacts of the Modification Proposal.

5.10 European Heritage

A Statement of Heritage Impact has been prepared for the North Shore and Central Precincts of the Tallawarra Lands by Biosis (2017a) to address the SEARs, with the full assessment contained at **Appendix L**. The SEARs addressed in this section are identified in **Table 5-24**.

Table 5-24 Secretary's Environmental Assessment Requirements (European Heritage)

Secretary's Environmental Assessment Requirements	Where Addressed
12. European Heritage and Aboriginal Cultural Heritage	
The modification request shall include a revised:	
• Heritage Impact Assessment prepared in accordance with the NSW Heritage Manual which addresses the significance of, and provides an assessment of, the impact on heritage significance of heritage items, landscape features and vegetation on the site and items in the vicinity, and	**Section 5.10.2 and Appendix L**
• Aboriginal Cultural Heritage Assessment in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (DECCW, 2011), and *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW).	**Section 5.11.2, Appendix M and Appendix N**

5.10.1 Tallawarra Lands Concept Approval

A Statement of Heritage Impact for the Tallawarra Lands was completed by Biosis (2010a) to inform the Tallawarra Lands Concept Plan Approval. The Environmental Assessment (DFP, 2011) that informed the Concept Approval summarised this report, detailed the heritage management measures that would be required by the Approved Concept Plan. These measures are detailed below.

This assessment was conducted through an extensive review of the existing Commonwealth, State and local statutory and non-statutory registers to determine the presence of any known heritage features within the vicinity of the Tallawarra Lands. In conjunction with this search, research was conducted into the historical context of the site. This focused on the settlement patterns of the area, with the aim of identifying the location of land grants to determine the ownership arrangements and positioning of structures throughout the site. These two processes identified three (3) listed sites and 10 possible archaeological sites as detailed in **Table 5-25** located both within and in the immediate surrounds of the Tallawarra Lands.

Table 5-25 Concept Approval list of European Heritage Sites

Secretary's Environmental Assessment Requirements	
Listed Heritage Items – Wollongong LEP 2009	
Mount Brown Reserve	Item No. 6339
Military Bunker	Item No. 61016
Yallah Homestead	Item No. 6437
Listed Heritage Items – Wollongong LEP 2009	

TH1	Existing Structure in the north west corner of the site, most recently a riding school. Possibly "O'Brien's House" present at least by 1916
TH2	Potential archaeological site near a large fig tree to the west of the site and adjacent to the Princes Higway. Possibly part of "Jordan's Farm" in the late nineteenth century.
TH3	Potential archaeological site slightly to the north of TH2. Possibly part of "Jordan's Farm" in the late nineteenth century
TH4	TH4 Potential archaeological site south of Duck Creek and adjacent to the Princes Highway. Possibly part of the Wollingurry Dairy, early 20th century
TH5	Potential archaeological site south of Duck Creek and east of TH4. House known as "Wollingurry" situated on Wollingurry Dairy, early 20th century.
TH6	Former Yallah Platform. Removed to Albion Park rail museum in 1980s. TH7 Former Smelting Company rail alignment (adjacent to the Study Area)
TH7	Former Smelting Company rail alignment (Adjacent to the Study Area)
TH8	Pair of existing tanks at the base of Mount Brown, built c.1950.
TH9	A more widespread group of structures in the southern part of the Study Area; grouped together as the aerial photographs are unclear. Shown as "Beachgrove" in 1970s and possibly part of Wollingurry Dairy, early 20th Century.
TH10	Group of structures east of TH6. Shown as "Roscommon" in the 1970s and possibly part of Wollingurry Dairy, early 20th Century.

The initial study conducted by Biosis (2010a) indicated that only TH1-6 and TH8-10 occurred within the study area and would potentially be affected by the developable areas of the Approved Concept Plan. The Biosis study (2010a) recommended the following measures be put in place to ensure that impacts to heritage items are minimised;

1. Where practicable, avoid impact to all identified heritage items and archaeological sites. Those sites have been identified as: TH1, TH2, TH3, TH4, TH5, TH9 and TH10. The area to the east of the concrete house (LEP Item 6437) may also be archaeologically sensitive.
2. Prepare an archaeological assessment for each potential archaeological site (including the area around the Concrete House) if impacts are unavoidable. This would include areas which are not built upon but will be affected by landscape works, infrastructure, road making, etc., depending on impacts to the landscape and ground levels. The appropriate stage for the preparation of archaeological assessments would be after Project Application and prior to construction commencing.
3. There is existing road and rail corridor infrastructure on the site which can inform the location of new roads through the development. It is recommended that when designing the street layout and street hierarchy of the development the reuse of these alignments are considered.
4. There are historical road and boundary alignments which are no longer visible on the ground (for example the boundaries and road through "Jordan's Farm") which could also inform the layout of streets and blocks within the study area.
5. If significant variations occur, for example a significant increase in or relocation of development areas, then a reassessment of the impact of the development may be required. Depending upon the location any such variations, additional archaeological survey and assessment by a qualified heritage consultant may be required.
6. Consult with the cultural heritage specialists if intending to do any invasive work on site (e.g. geotechnical investigation) in areas identified as heritage items or as potential archaeological sites.
7. Determine an interpretation strategy (location, content, design) as part of the subsequent detailed project application.

5.10.2 North Shore and Central Precinct Statement of Heritage Impact

The modifications to the boundaries for the North Shore and Central Precincts within the Concept Plan Approval has the potential to affect the assessment of European Heritage Impact discussed above. Biosis has prepared an updated Statement of Heritage Impact that focuses on the North Shore and Central

Precincts (Biosis, 2017a) to ensure that no further impacts occur to the surrounding heritage features. The full assessment is contained at **Appendix L**. The following summarises the key findings of this assessment and provides an updated Statement of Heritage Impact that relates to the modified North Shore and Central Precincts.

5.10.2.1 Background

The *Tallawarra Lands, Northern and Central Precincts: Statement of Heritage Impact* prepared by Biosis (2017a) investigated the impacts that the modification to the zone boundaries would have on the previous outcomes of the Statement of Heritage Impact conducted by Biosis (2010a). This specifically focused on the following:

> Identify and assess the heritage values associated with the study area. The assessment aims to achieve this objective through providing a brief summary of the principle historical influences that have contributed to creating the present – day built environment of the study area using resources already available and some limited new research.

> Assess the impact of the proposed works on the cultural heritage significance of the study area.

> Identifying sites and features within the study area which are already recognised for their heritage value through statutory and non-statutory heritage listings.

> Recommend measures to avoid or mitigate any negative impacts on the heritage significance of the study area.

This assessment was conducted in accordance with current heritage guidelines including *Assessing Heritage Significance* (NSW Heritage Office, 2001), *Assessing Significance of Historical Archaeological Sites and "Relics"* (NSW Heritage Branch, Department of Planning, 2009) and the *Burra Charter* (Australia ICOMOS, 2013). The Biosis (2010a) report was reviewed as part of the investigations undertaken and remains the overall Statement of Heritage Impact for the overall approved Concept Plan, with the Biosis (2017a) assessment providing additional focused assessment for the areas of proposed modifications consistent with the Biosis (2010a) assessment.

5.10.2.2 Assessment of Heritage Impact

The methodology undertaken for the updated report replicated that undertaken previously, with a review of Commonwealth, State and Local statutory and non-statutory registers and further research into the sites history. This approach allowed for further information to be incorporated into the initial study following ongoing research in this area.

This review identified that four of the identified potential archaeological sites lie in or adjacent to the North Shore and Central Precinct. **Table 5-26** details these four locations within the study area.

Table 5-26 Summary of heritage values associated with the study area

Item No.	Description	Date	Location
TH1	Existing structures in the north west corner of the Northern Precinct visible from 1949 to present, most recently a riding school. "O'Brien's House" identified present at least by 1916, appears to have been located 200 metres west of the present day structures and have been removed during the 1950s. Area is currently marked by a stand of trees.	c.1949 – present c.1905 – c.1950	North Shore Precinct
TH2	Series of buildings near a large fig tree to the west of the site and adjacent to the Princes Highway. Likely to have been constructed following the 1905 formation of the Lakelands Estate.	c.1949 – c,1994	Central Precinct
TH3	Series of buildings slightly to the north of TH2. Likely to have been constructed following the 1905 formation of the Lakelands Estate.	c.1949 – c,1994	Central Precinct

TH7 (Former Railway Alignment)	Former alignment of the Illawarra Harbour & Land Corporation Railway that borders the North Shore Precinct.	c.1897	North Shore Precinct

To assess the heritage significance of these areas, a site inspection was undertaken by Biosis with the aim of identifying heritage values associated with the study area. This inspection found that no evidence remains of these former site uses above ground, with the only discernible remains relating to the location of significant stands of vegetation that relate to former household gardens. Areas TH1-3 were identified as being associated with the 1905 subdivision of the land, with the structures being constructed after this date. The existing building at TH1 was assessed as being from the 1930's and not holding significant heritage value. O'Brien's House, which is located adjacent TH1 is associated with an earlier period of occupation of the site. The probable house location has no physical structures remaining. Biosis (2017a) has indicated that this style of occupation has many similar remaining examples throughout the Illawarra and wider NSW. Coral Vale, which is located to the West of the site, being an example of this.

TH7 relates to the former alignment of a railway line that ran to Tallawarra Point adjacent to the North Shore Boundary. No physical evidence of this alignment remains in this area, with other portions of the line locally listed within the West Dapto area. As such, these potential archaeological deposits were assessed as having a low potential.

The three registered heritage items in the vicinity of the study area were also assessed to determine the impact that the proposed modifications to the Concept Plan would have on these items. **Table 5-27** discusses these impacts.

Table 5-27 Assessment of impacts to heritage items either within or adjacent to the study area

Heritage Item	Significance	Discussion	Assessment	Mitigation Measures
Mount Brown Reserve	Local	The proposed North Shore and Central Precincts will not impact directly upon the Mount Brown Reserve, however they will result in an impact upon lines of sight from and to the reserve, specifically to and from the Lake Illawarra foreshore and escarpment. The proposed subdivision, specifically the proposed modification in the North Shore and Central Precinct is located on the northern slope and lower foothills of Mount Brown and will not be visible from many points within the Mount Brown Reserve. This is consistent with the level of impact to the item under the Concept Approval.	Indirect – visual	None
Military Bunker	Local	The Military Bunker is located outside of the study area within a heavily vegetated area and is not visible from either the Central or North Shore Precinct. As such, the development and specifically the modification will not impact upon this heritage item.	No impact	None

5.10.2.3 Statement of Heritage Impact

Biosis (2017a) provided the following Statement of Heritage Impact as a result of the proposed modifications to the Tallawarra Lands Concept Approval;

> *"The proposed modification will have a minimal impact upon the historical heritage values associated with the study area. The project will result in an indirect aesthetic impact upon the significance of Mount Brown Reserve, specifically views to and from the item. The North Shore Precinct is adjacent to the heritage item, with development within this location isolated to the northern slope, which will reduce the level of impact to views from the item. The Military Bunker is located within a heavily vegetated area and the proposed modification will have no impact to the item. The study area was identified to contain four sites, TH1, TH2, TH3 and O'Brien's Farm which have been assessed as not possessing any significance. Impacts to potential archaeological remains, if they are encountered these can be managed through an unexpected finds procedure during construction works.*
>
> *The project has been assessed as being acceptable from a heritage perspective."*

5.10.3 Mitigation Measures

5.10.3.1 Conditions of Approval

The Concept Plan Approval included a number of additional requirements for all future approvals under the Concept Plan Approval with regards to heritage management as detailed in **Table 5-28**. These requirements are considered sufficient for assessment of the Proposed Modification.

Table 5-28 Tallawarra Lands Concept Plan Conditions of Approval - Heritage

Tallawarra Lands Concept Plan Conditions of Approval		
Schedule 3 – Future Environmental Assessment Requirements		***Response***
Future Environmental Assessment Requirements	**8 Cultural Heritage Management Plan** The first future application to Council (refer to condition A6) shall be accompanied by a Cultural Heritage Management Plan that details how impacts on Aboriginal and non-Aboriginal heritage across the entire site will be minimised and managed. The plan shall include, but not necessarily be limited to: a) Specific measures to be applied to works undertaken in close proximity to identified Aboriginal and non-Aboriginal heritage items to minimise and avoid impacts on these items; b) How heritage items (Aboriginal objects and relics or works) discovered during the construction of the project will be considered and managed. This shall include a component within the site induction program for construction workers on Aboriginal and non-Aboriginal heritage within the project area; c) Stop-work and notification procedures to be implemented should any unexpected impact archaeological deposits and/or State significant relics not previously identified be discovered; d) A procedure for continued consultation with the relevant Aboriginal stakeholders; and e) Procedures to be followed should non-compliance against any of the provisions of the management plan occur. All future application must demonstrate how they will implement the Cultural Heritage Management Plan.	A Cultural Heritage Management Plan would be prepared to accompany the first future application. This would remain unchanged by this proposed modification.

5.10.3.2 Statement of Commitments

Mitigation measures identified by the SoCs that are applicable to Heritage management, and which would apply to the Modification Proposal, are listed in **Table 5-29** below.

Table 5-29 Tallawarra Lands Concept Plan Statement of Commitments – European Heritage

Tallawarra Lands Concept Plan Statement of Commitments		Response
European Heritage	17. TRUenergy commits to implementing the management recommendations in Section 7.2 of the *Statement of Heritage Impact: Tallawarra Lands Part 3A*, prepared by Biosis Research, dated September 2010. TRUenergy commits to obtaining assessments of significance / assessments of archaeological potential in relation to sites TH2, TH3, TH4, TH5, TH9 and TH10. TRUenergy commits to ensuring that if substantial intact archaeological deposits and/or State significant relics not previously identified are discovered, work will cease in the affected area(s), the Heritage Council will be notified and the required assessment / approval will be sought prior to works continuing in the affected area(s).	BridgeHill commits to implementing the recommendations contained within the initial investigation undertaken for the Concept Approval in addition to the recommendations contained within **Appendix L**
Heritage	17a. TRUenergy commits to preparing a Heritage Management Plan detailing how construction impacts on Aboriginal and non-	BridgeHill commits to implement the requirements stipulated within

Aboriginal heritage will be minimised and managed. The Plan shall include, but not necessarily be limited to: i. Specific measures to be applied to works undertaken in close proximity to identified Aboriginal and non-Aboriginal heritage items and "Defined Areas of Aboriginal Sensitivity" to minimise and avoid impacts on these items; ii. How heritage items (Aboriginal objects and relics or works) discovered during the construction will be considered and managed. This shall include a component within the site induction program for construction workers on Aboriginal and non-Aboriginal heritage within the site area; iii. Stop-work and notification procedures to be implemented compliant with Heritage Office and OEH guidelines should any unexpected intact archaeological deposits and/or State significant relics not previously identified be discovered; and iv. The procedure for continued consultation with the relevant Aboriginal stakeholders.	the TRU energy statement of commitments 17a.

Heritage issues associated with the development of the Tallawarra Lands would be managed in accordance with the Concept Plan Approval and associated SoCs referred to above. These are considered adequate to address the potential impacts of the Modification Proposal.

5.11 Aboriginal Heritage

Archaeological Reports and Aboriginal Cultural Heritage Assessments have been prepared for both the North Shore and Central Precincts of the Tallawarra Lands by Biosis (2017) to address the SEARs, with the assessments for the North Shore Precinct contained at **Appendix M** and the assessments for the Central Precinct contained at **Appendix N**. The SEARs addressed in this section are identified in **Table 5-30**.

Table 5-30 Secretary's Environmental Assessment Requirements (Aboriginal Heritage)

Secretary's Environmental Assessment Requirements	Where Addressed
12. European Heritage and Aboriginal Cultural Heritage	
The modification request shall include a revised:	
• Heritage Impact Assessment prepared in accordance with the NSW Heritage Manual which addresses the significance of, and provides an assessment of, the impact on heritage significance of heritage items, landscape features and vegetation on the site and items in the vicinity, and	**Section 5.10.2 and Appendix L**
• Aboriginal Cultural Heritage Assessment in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (DECCW, 2011), and *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW).	**Section 5.11.2, Appendix M and Appendix N**

5.11.1 Tallawarra Lands Concept Approval

To inform the Concept Plan Approval, Biosis completed an extensive assessment of the Aboriginal heritage of the Tallawarra Lands. The Report, Tallawarra Lands: Part 3A Concept Plan Aboriginal Archaeological Assessment (Biosis, 2010b), was summarised in the Environmental Assessment (DFP, 2011) that informed the Concept Approval. The Biosis (2010b) Assessment made a number of recommendations and mitigation measures, which were adopted in the Statement of Commitments that apply to the entire site.

The Biosis (2010b) Archaeological Assessment encompassed the following:

> **Aboriginal Consultation** – Biosis established a consultation process to engage with a range of Aboriginal Stakeholders that had expressed an interest in the site. This process was conducted in accordance with established guidelines at the time. This process ensured that the Aboriginal community were provided an opportunity to express a view about the methodology to be employed throughout the study of the Aboriginal Heritage values of the Tallawarra Lands site. This process continued throughout the assessment process, with the Aboriginal community invited to participate with archaeological investigations and to provide comment on all findings before processes were finalised.

- **Review of Heritage Registers and Planning Documents** – A search of all applicable databases and heritage registers was undertaken to determine the known Aboriginal Heritage sites within the Tallawarra Lands. This process identified 9 sites within the Tallawarra Lands site boundary within the Aboriginal Heritage Information Management System (AHIMS)
- **Investigation of site geology** – An assessment of the environmental background of the site was conducted providing context for the archaeological assessment and sub-surface investigations. The study area is characterised by its lake front position and its interface with the various tributaries that flow from the Escarpment. Mount Brown is prominent within the site with a significant ridge line running from the lake in an east-west direction to the top of Mount Brown. These features provide an abundance of different food sources based off the estuarine quality of the lake and the interface lands along creek lines. Mount Brown provides a significant land mark that is symbolic in Aboriginal culture.
- **Investigation of local Aboriginal Archaeology** – A review of the known Aboriginal Archaeological context of the local area. This investigation focused on developing local land use patterns to aid in the determination of areas of archaeological potential. This review highlighted the potential of the Mount Brown ridgeline and the areas where two different environments met. This review highlighted four previously identified Potential Archaeological Deposit (PAD) sites throughout the Tallawarra Lands.
- **Fieldwork** – To determine the potential of the PAD sites a series of 73 test pits was undertaken across 10 different sites. These sites were chosen based on the location of PADs and to test the different landform types throughout the site to establish historic land use patterns. A total of 24 Aboriginal stone artefacts and one small piece of ochre were uncovered. These artefacts predominately came from the creek and drainage line land formations. This process established eight new Aboriginal Archaeological Sites throughout the Tallawarra Lands. The Assessment at **Appendix M** details the revised PAD sites and Archaeological sites following the Biosis (2010b) assessment.
- **Findings Significance Assessment** – An assessment of the identified sites, from both the listed sites and from site investigations, was conducted against the significance values outlined in the Australia International Council of Monuments and Sites (ICOMOS) Burra Charter (Australia ICOMOS 1999). An assessment of significance was conducted for each of the identified sites, with all sites having a high Aboriginal Stakeholder cultural value; and a range of sites identified as having a low or moderate assessment of significance for Archaeological or scientific value.
- **Impact Assessment** – The assessment concluded with an assessment of the Concept Plan against the identified Aboriginal Heritage sites. This assessment identified each of the elements of the Approved Concept Plan and what impacts, if any, this would have on the identified Aboriginal Heritage. This information is contained within Table 58 of Biosis (2010b).
- **Site Management processes and recommendations** - The Assessment concluded with a range of recommendations and mitigation measures. These are detailed below;
  - Conservation through Avoidance. This is the primary mitigation and management strategy. As noted by Biosis, the Concept Plan has been refined to take in to account Aboriginal Heritage where possible.
  - Direct Impacts to known archaeological sites. Where registered Aboriginal archaeological sites, PADs and areas of high archaeological sensitivity cannot be avoided, further archaeological investigation will be required, including excavation and recording, to determine the archaeological and cultural significance of the site prior to ground disturbance. Where artefacts are recovered or require relocation, a Care and Control Agreement should be developed and implemented in consultation with registered Aboriginal stakeholders.
  - Aboriginal stakeholder consultation. This has commenced and further consultation will be required as noted in Biosis report.
  - Ongoing management. To successfully manage and mitigate Aboriginal cultural heritage within the Study Area, an Aboriginal Cultural Heritage Management Plan (ACHMP) should be developed, in consultation with relevant Aboriginal stakeholder groups and DECCW. This would consider the management and mitigation of Aboriginal cultural heritage at key stages of future development, including construction, and vegetation remediation/rehabilitation. The ACHMP will incorporate contingency plans to manage Aboriginal cultural heritage within the Study Area.

- Cultural heritage awareness training.
- Procedures for unanticipated Aboriginal sites identified during works
- Procedures for discovery of human remains identified during works.

5.11.2 Concept Plan Modification Impact Assessment

The proposed boundary increases contained within this modification of the Concept Plan Approval have the potential to impact further on Aboriginal Heritage items within the vicinity of the North Shore and Central precincts. Biosis has prepared two archaeological assessments and two Aboriginal cultural heritage assessments to meet this requirement, with the full assessments contained at **Appendix M** and **Appendix N**. The following sections summarise the key findings of these assessments. The methodology employed for these reports followed the methodology followed during the initial Concept Plan assessment, with minor modifications to allow for current guidelines.

These reports should be read in conjunction with the initial Tallawarra Lands Concept Plan Aboriginal Archaeological Assessment (Biosis, 2010b). This report remains the overarching assessment of the entire Tallawarra site, with the four Biosis assessments providing site specific advice for the North Shore and Central Precincts.

5.11.2.1 North Shore Precinct

Biosis (2017b) conducted a review of archaeological studies that have been undertaken throughout the vicinity of the North Shore Precinct since the completion of the initial Tallawarra lands Archaeological Assessment that informed the Concept Plan. Two further studies have been undertaken in the area since this time, with both relating to works along the Lake Illawarra Foreshore for a bike and pedestrian path. These studies identified two new PAD areas and one new artefact scatter at Tallawarra Point. A search of AHIMS database was undertaken, with two sites located within the North Shore Precinct.

An archaeological survey was undertaken throughout the Precinct to attempt to re-identify the Aboriginal archaeological sites identified within the AHIMS search and to undertake a systematic survey of the study area targeting areas with the potential for Aboriginal Heritage. A total of 5 transects were walked on the 29th June 2017 that did not yield any new Aboriginal sites or artefacts. Section 4 of the Archaeological Report **Appendix M** contains further details of this survey. This survey led the Biosis (2017b) assessment to conclude that the majority of the North Shore Precinct has a low Archaeological potential, with the ridgeline running from Lake Illawarra through to Mount Brown having a medium Archaeological potential.

Biosis (2017b) conducted a significance assessment against the two Aboriginal sites identified through the AHIMS search, with this assessment finding the sites to be of low scientific significance as discussed within **Table 5-31**. These two sites were predicted to be directly impacted by the proposed layout of the North Shore Precinct, with a total loss of value.

Table 5-31 Statements of scientific significance for archaeological sites recorded within the study area.

Site Name	Statement of Significance
Boomberry Point 1 52-5-0223	This site consisted of shell midden containing one shell species. The site was exposed on the side of a track in a hill slope landform. The site was noted to be badly disturbed with highly fragmented shell. The site has been assessed as having low archaeological significance.
Elizabeth Point 1 52-5-0225	Elizabeth Point (52-5-0225) was recorded as an isolated stone artefact located on a walking track. The artefact was a grey chert flake piece, common in the region and was observed to have been disturbed by the walking track. The site has been assessed as having low archaeological significance.

5.11.2.1.2 North Shore Precinct Recommendations

> **Recommendation 1**: Further archaeological assessment is required in areas of moderate archaeological potential

Areas identified as having high and moderate archaeological potential should be avoided wherever possible (Figure 10 of **Appendix M**). If impact to these areas cannot be avoided subsurface investigations (test excavations) will be required prior to the commencement of works as a condition of

the DA or concept approval. Test excavations should be conducted in accordance with the *Code of Practice for archaeological investigation for Aboriginal objects in NSW* (DECCW 2010b) and *Aboriginal cultural heritage consultation requirements for proponents in New South Wales* (DECCW 2010c).

> **Recommendation 2**: No further archaeological assessment is required in areas of low archaeological potential

No further archaeological work is required in areas identified as having low archaeological potential except in the event that unexpected Aboriginal sites, objects or human remains are unearthed during development (refer to Recommendations 6 and 7 below).

> **Recommendation 3**: Fencing of AHIMS sites

AHIMS sites or PAD areas located within 30 metres of the area of proposed works should be clearly marked and fenced in order to avoid unintentional impacts during construction.

> **Recommendation 4**: Aboriginal cultural heritage induction for workers and contractors

The locations of each AHIMS site and PAD area located within the Tallawarra Lands development should be clearly mapped. Workers and contactors working at, or visiting the site should be made aware of the location of all AHIMS sites and PAD areas within the Tallawarra Lands development through an Aboriginal cultural heritage induction.

> **Recommendation 5**: Application for an Aboriginal heritage impact permit (AHIP)

Should the Development Application (DA) be approved, it is recommended that an application be made to OEH for an AHIP to destroy the listed Aboriginal sites within the study **The AHIP should be for a term of ten (10) years.** The sites that will be impacted by the proposed works are as follows:

- Boomberry Point 1 (AHIMS 52-5-0223)
- Elizabeth Point (AHIMS 52-5-0225)

> **Recommendation 6**: Discovery of Unanticipated Aboriginal Objects

All Aboriginal objects and places are protected under the *NSW National Parks and Wildlife Act 1974*. It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by the OEH. Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object, the archaeologist will provide further recommendations. These may include notifying the OEH and Aboriginal stakeholders.

> **Recommendation 7**: Discovery of Aboriginal Ancestral Remains

Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity you must:

1. Immediately cease all work at that location and not further move or disturb the remains
2. Notify the NSW Police and OEH's Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location
3. Not recommence work at that location unless authorised in writing by OEH.

> **Recommendation 8**: Continued consultation with the registered Aboriginal stakeholders

As per the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010a), it is recommended that the proponent provides a copy of this draft report to the Aboriginal stakeholders and considers all comments received. The proponent should continue to inform these groups about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project.

> **Recommendation 9**: Continued consultation with the registered Aboriginal parties

5.11.2.2 Continue to inform these groups about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project. This recommendation is in keeping with the consultation requirements. Central Precinct

Biosis (2017c) conducted a review of archaeological studies that have been undertaken throughout the vicinity of the Central Precinct since the completion of the initial Tallawarra lands Archaeological Assessment that informed the Concept Plan. Two further studies have been undertaken in the area since this time, with both relating to works along the Lake Illawarra Foreshore for a bike and pedestrian path. These studies identified to new PAD areas and one new artefact scatter at Tallawarra Point. A search of AHIMS database was undertaken, with four sites located within the Central precinct.

An archaeological survey was undertaken throughout the Precinct to attempt to re-identify the Aboriginal archaeological sites identified within the AHIMS search and to undertake a systematic survey of the study area targeting areas with the potential for Aboriginal Heritage. A total of 5 transects were walked on the 29th June 2017 that did not yield any new Aboriginal sites or artefacts. Section 4 of **Appendix N** contains further details of this survey. This survey led to the Biosis (2017c) assessment concluding that the majority of the Central Precinct has a medium Archaeological potential, with the southern slope of Mount Brown assessed as having a low potential and the drainage line that runs through the middle of the Central precinct having a High Archaeological potential.

Biosis (2017c) conducted a significance assessment against the four Aboriginal sites identified through the AHIMS search, with this assessment finding three sites of low scientific value and one of medium value, as discussed within **Table 5-32**. These four sites were predicted to be directly impacted by the proposed layout for the Central Precinct, with a total loss of value.

Table 5-32 Statements of scientific significance for archaeological sites recorded within the study area.

Site Name	Statement of Significance
Tallawarra Pipeline PAD 3 **52-5-0523**	This PAD site was registered by the Wadi Wadi Coomaditchie following the completion of a field survey for a proposed pipeline easement. The PAD area is situated on a mid slope ridge on a moderate slope. It overlooks a small drainage feature to the south west and Duck Creek to the south. PAD sites represent a common example of a site within the Illawarra region. However; archaeological testing has not been conducted at this site, therefore the site content and representativeness of the site cannot be adequately assessed. The site has no direct historical or aesthetic associations. This site has been assessed as having unknown scientific significance. The site displays low levels of disturbance and represents a common example of a site within the area. The site also has no direct historical or aesthetic associations and has a low scientific potential. The scientific significance of this site has been assessed as moderate.
TLPD AFT 7 **52-5-0613**	Site was recorded as a stone artefact scatter following test excavations conducted at the site. The excavations identified one chert core and one silcrete flake. The site was located on a drainage feature in an upper slope landform. The site displays low levels of disturbance and represents a common example of a site within the area. The site has no direct historical or aesthetic associations. The scientific significance of this site has been assessed as moderate.
TLPD AFT 8 **52-5-0614**	Site was recorded as a stone artefact scatter located on a moderate slope north or Yallah Bay Road. Two artefacts were identified during test excavations of the site, consisting of one chert flake and one chert flake fragment. The site displays low levels of disturbance and represents a common example of a site within the area. The site has no direct historical or aesthetic associations. The scientific significance of this site has been assessed as moderate.
TLPD AFT 9 **52-5-0615**	The site was recorded as an isolated artefact and was located on a spurline in a hillcrest landform. The artefact was uncovered during test excavations of the site and one piece of debitage was identified. A fig tree associated with TLPD AFT 9 (52-5-0615) was identified as being culturally important in previous assessments (Biosis 2010b). The fig tree is of cultural value as they are the main trees used for either men's business or women's business, as meeting places, and are known to be used in the area as birthing trees. The site displays low levels of disturbance and represents a common example of a site within the area. The site has no direct historical or aesthetic associations. The scientific significance of this site has been assessed as moderate.

5.11.2.2.2 Central Precinct Recommendations

> **Recommendation 1**: Further archaeological assessment is required in areas of moderate and high archaeological potential

Areas identified as having high and moderate archaeological potential should be avoided wherever possible (Figure 10 of **Appendix M**). If impact to these areas cannot be avoided subsurface investigations (test excavations) will be required prior to the commencement of works as a condition of the DA or concept approval. Test excavations should be conducted in accordance with the *Code of Practice for archaeological investigation for Aboriginal objects in NSW* (DECCW 2010b) and *Aboriginal cultural heritage consultation requirements for proponents in New South Wales* (DECCW 2010c).

> **Recommendation 2**: Further archaeological assessment is required at Tallawarra Pipeline PAD 3 (AHIMS 52-5-0523)

If impacts to Tallawarra Pipeline PAD 3 (AHIMS 52-5-0523) cannot be avoided, subsurface investigations (test excavations) will be required prior to the commencement of works as a condition of the DA or concept approval. Test excavations should be conducted in accordance with the *Code of Practice for archaeological investigation for Aboriginal objects in NSW* (DECCW 2010b) and *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010a).

> **Recommendation 3**: Conservation of Fig Tree associated with TLPD AFT 9 (AHIMS 52-5-0615)

If possible the Fig Tree associated with TLPD AFT 9 (AHIMS 52-5-0615) should be conserved and incorporated into the modification of the concept approval.

> **Recommendation 4**: No further archaeological assessment is required in areas of low archaeological potential

No further archaeological work is required in areas identified as having low archaeological potential except in the event that unexpected Aboriginal sites, objects or human remains are unearthed during development (refer to Recommendations 8 and 9 below).

> **Recommendation 5**: Fencing of AHIMS sites

AHIMS sites or PAD areas located within 30 metres of the area of proposed works should be clearly marked and fenced in order to avoid unintentional impacts during construction.

> **Recommendation 6**: Aboriginal cultural heritage induction for workers and contractors

The locations of each AHIMS site and PAD area located within the Tallawarra Lands development should be clearly mapped. Workers and contactors working at, or visiting the site should be made aware of the location of all AHIMS sites and PAD areas within the Tallawarra Lands development through an Aboriginal cultural heritage induction.

> **Recommendation 7**: Application for an Aboriginal heritage impact permit (AHIP)

Should the Development Application be approved, it is recommended that an application be made to OEH for an AHIP to destroy the listed Aboriginal sites within the study area which are currently protected under the NSW *National Parks and Wildlife Act 1974*. **The AHIP should be for a term of ten (10) years.** The sites that will be impacted by the proposed works are as follows:

- Tallawarra Pipeline PAD 3 (AHIMS 52-5-0523)
- TLPD AFT 7 (AHIMS 52-5-0613)
- TLPD AFT 8 (AHIMS 52-5-0614)
- TLPD AFT 9 (AHIMS 52-5-0615)

> **Recommendation 8**: Discovery of Unanticipated Aboriginal Objects

All Aboriginal objects and places are protected under the *NSW National Parks and Wildlife Act 1974*. It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by the OEH. Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is

determined to be an Aboriginal object, the archaeologist will provide further recommendations. These may include notifying the OEH and Aboriginal stakeholders.

> **Recommendation 9**: Discovery of Aboriginal Ancestral Remains

Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity you must:

1. Immediately cease all work at that location and not further move or disturb the remains
2. Notify the NSW Police and OEH's Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location
3. Not recommence work at that location unless authorised in writing by OEH.

> **Recommendation 10**: Continued consultation with the registered Aboriginal stakeholders

As per the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010a), it is recommended that the proponent provides a copy of this draft report to the Aboriginal stakeholders and considers all comments received. The proponent should continue to inform these groups about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project.

5.11.3 Mitigation Measures

5.11.3.1 Conditions of Approval

The Concept Plan Approval included a number of additional requirements for all future approvals with regards to Aboriginal heritage as detailed in **Table 5-33**. These requirements are considered sufficient for assessment of the Proposed Modification.

Table 5-33 Tallawarra Lands Concept Plan Conditions of Approval – Aboriginal Heritage

Tallawarra Lands Concept Plan Conditions of Approval		
Schedule 3 – Future Environmental Assessment Requirements		***Response***
Future Environmental Assessment Requirements	**8 Cultural Heritage Management Plan** The first future application to Council (refer to condition A6) for shall be accompanied by a Cultural Heritage Management Plan that details how impacts on Aboriginal and non-Aboriginal heritage across the entire site will be minimised and managed. The plan shall include, but not necessarily be limited to: f) Specific measures to be applied to works undertaken in close proximity to identified Aboriginal and non-Aboriginal heritage items to minimise and avoid impacts on these items; g) How heritage items (Aboriginal objects and relics or works) discovered during the construction of the project will be considered and managed. This shall include a component within the site induction program for construction workers on Aboriginal and non-Aboriginal heritage within the project area; h) Stop-work and notification procedures to be implemented should any unexpected impact archaeological deposits and/or State significant relics not previously identified be discovered; i) A procedure for continued consultation with the relevant Aboriginal stakeholders; and j) Procedures to be followed should non-compliance against any of the provisions of the management plan occur. All future application must demonstrate how they will implement the Cultural Heritage Management Plan.	A Cultural Heritage Management Plan would be prepared to accompany the first future application. This would remain unchanged by this proposed modification.

5.11.3.2 Statement of Commitments

Mitigation measures identified by the SoCs that are applicable to Aboriginal Heritage, and which would apply to the Modification Proposal, are listed in **Table 5-34** below.

Table 5-34 Tallawarra Lands Concept Plan Statement of Commitments – Aboriginal Heritage

Tallawarra Lands Concept Plan Statement of Commitments		Response
Aboriginal Heritage	16. TRUenergy commits to implementing the recommendations of the Aboriginal Archaeological Assessment.	BridgeHill commits to implementing the recommendations contained within the initial investigation undertaken for the Concept Approval in addition to the recommendations contained within **Appendix M** and **Appendix N**
Heritage	17a. TRUenergy commits to preparing a Heritage Management Plan detailing how construction impacts on Aboriginal and non-Aboriginal heritage will be minimised and managed. The Plan shall include, but not necessarily be limited to: v. Specific measures to be applied to works undertaken in close proximity to identified Aboriginal and non-Aboriginal heritage items and "Defined Areas of Aboriginal Sensitivity" to minimise and avoid impacts on these items; vi. How heritage items (Aboriginal objects and relics or works) discovered during the construction will be considered and managed. This shall include a component within the site induction program for construction workers on Aboriginal and non-Aboriginal heritage within the site area; vii. Stop-work and notification procedures to be implemented compliant with Heritage Office and OEH guidelines should any unexpected intact archaeological deposits and/or State significant relics not previously identified be discovered; and viii. The procedure for continued consultation with the relevant Aboriginal stakeholders.	BridgeHill commits to implement the requirements stipulated within the TRU energy statement of commitments 17a.

Aboriginal heritage issues associated with the development of the Tallawarra Lands would be managed in accordance with the Concept Plan Approval and associated SoCs referred to above. There are considered adequate to address the potential impacts of the Modification Proposal.

5.12 Utility Servicing

The SEARs identified a requirement to investigate the existing capacity of the site and any additional requirements required by the proposed medication. Additionally, an investigation of sustainability initiatives into reducing drinking water demand is to be undertaken. The SEARs addressed in this section are identified in **Table 5-35**.

Table 5-35 Secretary's Environmental Assessment Requirements (Utilities)

Secretary's Environmental Assessment Requirements	Where Addressed
17. Utilities	
The modification request shall: • Address, in consultation with relevant agencies, the existing capacity and requirements of the proposal for the provision of utilities, including staging of infrastructure works and protection of utilities' assets; and	**Section 5.12.2**
• Outline any proposed sustainability initiatives to reduce the demand for drinking water, including alternative water supply, end users of drinking and non-drinking water, water sensitive urban design and proposed water conservation measures..	**Section 5.3 and Appendix E**

5.12.1 Tallawarra Lands Concept Approval

To aid in the design of the Tallawarra Lands Concept Plan, Northrop (2010) prepared a 'Report on Siteworks and Utilities Infrastructure'. This report investigated the existing service provision across the site, identifying what service infrastructure would need to be provided. This report was summarised in the Environmental Assessment prepared by DFP (2011). The Northrop investigation identified the following;

5.12.1.1 Sewerage

No sewer connections points are readily available for servicing the ultimate development of the Tallawarra Lands. There is the potential for some of the development within the Central Precinct to be serviced with access to sewer within the Princes Highway.

Preliminary advice from Sydney Water indicated that sewer servicing could occur by connection to existing Sydney Water infrastructure to the north of the development. This would require at least one Sydney Water Sewerage Pump Station to be established on-site. Sydney Water were investigating options for this, with a determination indicated to be made available in November 2011.

5.12.1.2 Water

Preliminary investigations and discussions with Sydney Water confirmed that water servicing of the Tallawarra Lands could occur by extension of the Dapto Reservoir Supply system at the north of the site. This would require;

> The establishment of the main water supply connection point and extension to occur as part of the initial development phases. This will provide the main source of potable, fire and back-up water supply.

> The implementation of rainwater harvesting and re-use opportunities to encourage mains water conservation (at least) through localised non-potable uses. This is expected to be promoted throughout the development stages.

5.12.1.3 Natural Gas

Whilst extensive natural gas services exist on site associated with the Tallawarra CCGT power station, the Tallawarra Lands will require new local network services. Alinta advised that current network planning allows for servicing of the Tallawarra Lands. This provision of services generally occurs as development demands, with the overall strategy for the site being determined by on-going demands and staging of the development.

5.12.1.4 Electricity

Integral Energy indicated that the site is not readily serviced by the existing major on-site infrastructure. Local networks in the area do not have the capacity to service much (if any) of the Tallawarra Lands. Preliminary advice indicated that electricity supply to the ultimate development of Tallawarra will require the establishment of a 132kV / 11kV Zone Substation, with this required within 3 to 4 years of the commencement of development works.

5.12.1.5 Telecommunications

Consultation with Telstra indicated that optical fibre would be available in July 2011. Implementation of the telecommunications network will then take place as development demands, and staging will therefore be progressive.

5.12.2 Concept Plan Modification Impact Assessment

In order to assess the potential impact of the increased densities and proposed adjustments to the precinct boundaries, Cardno undertook preliminary discussions with the various service providers to determine the degree of impact to developed servicing strategies. The advice contained below summarises these findings. It should be noted that the Northrop (2010) investigation remains the technical document for the Tallawarra Lands Concept Approval, with follow up investigations forming supplementary information to the completed investigation.

5.12.2.1 Northern Precinct

5.12.2.1.1 Sewerage

A feasibility application has been submitted to Sydney Water and the assessment found that the current wastewater system could accommodate up to 300 dwellings, which is less than the approved concept number of dwellings for the area (approximately 360 dwellings). Given the increase in density and lot yield proposed in this modification Sydney Water notes that the findings of their current report need to be revisited to define an appropriately sized scheme to ensure the development is adequately serviced. Based on a preliminary concept design undertaken by Cardno's Sydney Water Accredited Water Servicing Coordinator (WSC), the system could be serviced by either an upsizing of the previously proposed main or by constructing a duplicate main. This would need to be confirmed during the concept and detailed design stages of the development as part of the Section 73 application process.

Based on preliminary advice received and noted above, it is expected that the additional densities and lot yield increases can be accommodated however this will require further network analysis by Sydney Water, design iterations by an accredited WSC and possible changes to the proposed system upgrades suggested in Sydney Water's planning report for the area. It should be noted that the concept design approved number of dwellings was greater than what the system could have potentially handled so additional modelling and design work would have been required irrespective of this modification.

5.12.2.1.2 Water

A feasibility application has been submitted to Sydney Water and the assessment found that drinking water could be supplied to the proposed development from the existing drinking water system in Gilba Street (from Goondah Avenue). It was noted in the advice letter from Sydney Water that this section of watermain may need be to upsized from 100mm to 150mm to ensure sufficient supply to the increased development area. This will be reviewed and addressed as part of future Section 73 applications once development consent is obtained from the consent authority.

Based on the preliminary advice received and noted above, it is expected that there will be no water supply issues that would prevent the density increase proposed, nor the increase in proposed developable land for the northern precinct.

5.12.2.1.3 Natural Gas

A preliminary design was completed by Jemena back in 2011. Jemena are still to confirm the increased density and lot yield can be accommodated. Previous experience within the Illawarra indicates that the size of the mains proposed in the preliminary design are not expected to be an issue.

5.12.2.1.4 Electricity

Preliminary investigations undertaken by previous consultants indicated that the existing local electricity supply network in Gilba Road had capacity to supply approximately 240 residential lots in the North Shore Precinct. To service further lots, augmentation to the existing network would be required via construction of a new 11kV feeder between Kanahooka Road and Edgeworth Avenue. Further work was proposed to reconfigure the 11kV network to make the supply available to supply further lots.

Given the number of lots in the approved concept design required further upgrades to the existing system, it is expected that the proposed upgrades would enable the increased densities and lot yield to be satisfactorily serviced without impacting on existing Endeavour Energy (EE) customers. Cardno's experience on similar projects indicates that EE would be able to make minor adjustments to the existing network prior to making significant infrastructure investments (i.e. zone substations) and be able to service the proposed increase in densities/lot yield in the northern precinct.

5.12.2.1.5 Telecommunications

Previous investigations by other consultants confirmed that Telstra could supply the development on an as needs basis. Tallawarra Lands have been registered with NBN Co.

Given the increase in densities/yield is fairly minor in the overall telecommunications network for the area, it is expected that any changes in infrastructure required would be minor, if any. This would be confirmed by either Telstra or NBN Co at the time of further design development.

5.12.2.2 Central Precinct

5.12.2.2.1 Sewerage

A feasibility application has been submitted for the overall development (in addition to the separate one submitted for the North Shore Precinct) rather than a distinct one for the Central Precinct. A previous feasibility application submitted by another consultant, which outlined a number of options to service the central precinct with a wastewater strategy, was submitted to Sydney Water. At the time of preparation of the current feasibility application it was noted by the consultant that Sydney Water's Growth Servicing Plan (GSP) highlighted the development to occur in the Tallawarra Lands area. Further reports have since been prepared by Sydney Water and their design consultants that outlines a strategy for the delivery by Sydney Water of a wastewater pump station (WWPS) and section of rising (pressure) main to service the central (and southern) precincts.

Based on the level of infrastructure to be delivered by Sydney Water it is expected that the currently proposed WWPS and rising main would have sufficient capacity to service the proposed increase in densities/lot yield within the central precinct. This would need to be confirmed by Sydney Water during design for the appropriate stage.

5.12.2.2.2 Water

A feasibility application has been submitted for the overall development (in addition to the separate one submitted for the North Shore Precinct) rather than a distinct one for the Central Precinct. A previous feasibility application submitted by another consultant outlined the connection to an existing 300mm drinking watermain on the corner of Yallah Bay Road and Princes Highway. This strategy would need to be confirmed by Sydney Water during the detailed design and Section 73 application for the Central Precinct.

Given the size (and subsequent capacity of this main) it is expected that the increase in densities/lot yield would be able to be serviced by the 300mm watermain without any further augmentation to the system. This would need to be confirmed by Sydney Water during design for the appropriate stage however based previous experience water supply will not be a constraint to increasing the developable area nor increased density.

5.12.2.2.3 Natural Gas

A preliminary design was completed by Jemena back in 2011. Jemena are yet to confirm the increased density and lot yield can be accommodated. Previous experience within the Illawarra indicates that the size of the mains proposed in the preliminary design are not expected to be an issue.

5.12.2.2.4 Electricity

Preliminary investigations undertaken by previous consultants indicated that the existing local electricity supply network had the capacity to service approximately 150 dwellings in the central precinct. The 11kV supply point of connection would need to be confirmed by EE once an application was made to connect as part of the detailed design phase. Further upgrades and the construction of a new zone substation (funded by EE) would need to be constructed, not only as part of the Tallawarra Lands project, but other major urban land releases in the vicinity. The timing of the delivery of the proposed zone substation would be dependent on the number of applications for connection received by EE.

Similar to the North Shore Precinct the existing electricity supply network did not have sufficient capacity (without further augmentations) to supply the concept approved number of lots within the central precinct (approximately 300 lots). Based on this, and the required augmentations to achieve the concept approved number of lots, previous experience suggests that by constructing a new zone substation in the vicinity of the site EE would have sufficient additional capacity to service the increased densities/lot yield in the Central Precinct.

5.12.2.2.5 Telecommunications

Previous investigations by other consultants confirmed that Telstra could supply the development on an as needs basis. Tallawarra Lands have been registered with NBN Co.

Given the increase in densities/yield is fairly minor in the overall telecommunications network for the area, it is expected that any changes in infrastructure required would be minor, if any. This would be confirmed by either Telstra or NBN Co at the time of further design development.

5.12.3 Mitigation Measures

5.12.3.1 Conditions of Approval

The Concept Plan Approval included a number of additional requirements for all future approvals with regards to Utilities as detailed in **Table 5-36**. These requirements are considered sufficient for assessment of the Proposed Modification.

Table 5-36 Tallawarra Lands Concept Plan Conditions of Approval – Utilities

Tallawarra Lands Concept Plan Conditions of Approval		
Schedule 3 – Future Environmental Assessment Requirements		***Response***
Sydney Water Requirements	**22 Options Report and the endorsement of a Preferred Servicing Strategy** The first development application to Council (refer to Condition A6) submitted to Wollongong City Council must be accompanied by a Preferred Servicing Strategy endorsed by Sydney Water.	.A plan will be prepared by Sydney Water to accompany the first development application.

5.12.3.2 Statement of Commitments

Mitigation measures identified by the SoCs that are applicable to Utilities, and which would apply to the Modification Proposal, are listed in **Table 5-37** below.

Table 5-37 Tallawarra Lands Concept Plan Statement of Commitments – Aboriginal Heritage

Tallawarra Lands Concept Plan Statement of Commitments		Response
Utilities Infrastructure	15. TRUenergy commits to implementing the utilities servicing strategies identified in the Report on Siteworks and Utilities Infrastructure, prepared by Northrop.	BridgeHill also commits to implementing the utilities and servicng strategies identified in the Northrop Report.

Utilities issues associated with the development of the Tallawarra Lands would be managed in accordance with the Concept Plan Approval and associated SoCs referred to above. There are considered adequate to address the potential impacts of the Modification Proposal.

6 Conclusion & Recommendations

This section provides a conclusion to the report

6.1 Conclusions

The Tallawarra Lands Concept Plan Approval (Concept Plan) (MP09_0131) was approved on 23 May 2013 for a mixed use development including residential, commercial, industrial, retail and public open space, along with conservation areas. The approval provides the overarching requirements for the future residential development of the land. Since this approval was granted the need for housing within the Illawarra has increased and the type of housing stock required has shifted as the demographics of the area changed. Additionally, the southern Lakeside Precinct is being held by Energy Australia and not therefore developable, reducing the overall yield of residential and employment lands.

The proposed modification seeks to increase the density of development within the northern half of the site that is proposed to be developed by amending zone boundaries and minimum lot sizes to meet this increase in demand and the changing demographic requirements. The modification also seeks to amend a number of conditions of the original Concept Plan approval to acknowledge changes that have occurred over the four years since the approval was granted. These changes primarily comprise the separation of the North Shore and Central precincts from the Southern Precinct and the associated requirements of the first development application.

The Tallawarra Lands is a Transitional Part 3A project, and the modification provisions under section 75W (now repealed) of the EP&A Act continue to apply. A review of the legal precedent for section 75W modifications has been undertaken, which illustrates that the scale of modification is within the bounds of section 75W.

Comprehensive assessment of the potential environmental impacts associated with the project has been undertaken. The assessments have reviewed the existing studies that informed the Concept Approval in consideration of the existing land use and legislative context. The studies have then considered the potential for additional impacts resulting from the modification and, where required, how these impacts can be offset. A summary of the findings of the key studies is below.

The acoustic assessment considered the industrial, transport and urban noise affectation. The assessment found that the noise impacts resulting from the development will not be any greater than noise impacts on the previously approved lots. Therefore, no land use planning issues from cumulative industrial operations are expected for the North Shore or Central precincts.

The traffic impact assessment prepared for the modification found that the revised development yield did not result in any critical network operational concerns or significant differences when compared with the approved yield. The report identified a number of intersections that had performance issues in the future, however it was noted these could be addressed by standard intersection upgrades, either by traffic signals or roundabout control.

The ecological assessment considered direct and indirect impacts resulting from the proposed modification. Direct impacts to the ecological values are limited, as the majority of the development is associated with cleared land, with only a further 4.2% of the development site being cleared as a result.

Indirect impacts from the proposed development may include noise and/or erosion associated with the construction phase of the project. These impacts will be managed through the development of a CEMP and a landscape scheme using native species to help reintroduce vegetation in areas of the site currently comprising cleared grass, improving biodiversity and visual amenity, with associated environmental sustainability benefits.

The proposed modification has been assessed against the provisions within *Planning for Bush fire Protection 2006* (PBP) to ensure compliance can be achieved. These provisions require Asset Protection Zones and Access to be provided. These measures have been incorporated into the proposed modification layout to ensure compliance with PBP.

The potential for stability issues has been considered through desk top and intrusive investigations. The assessment found that the expanded Central Precinct poses moderate geotechnical risks, with the North Shore Precinct having low risk. The potential risks can be managed by appropriate engineering design, which would be determined through future intrusive investigation and assessment prior to works commencing.

The contamination investigation comprised desk top and intrusive investigations. The assessment identified that there are currently no Contaminants of Potential Concern (COPC) present in the Central and North Shore Precinct modification areas at concentrations above the Tier I human health screening values.

Copper is present at the site at concentrations above the Tier I ecological screening values. However, ecological receptors of significance were not identified at or within close proximity to the modification areas. The overall potential risk to the local environment based on the measured copper concentrations is considered low. A site auditor accredited under the Contaminated Land Management Act 1997, has been engaged by Bridgehill to provide audit services during the assessment and remediation of the site. The auditing provides an additional level of diligence to ensure a comprehensive assessment is undertaken.

A visual assessment has been undertaken using the methodology employed for the Concept Approval. The assessment found that while the development would result in additional urban development being visible from viewing points beyond the site, the potential impact is limited and partially offset through the relocation of powerlines underground and removal of associated stanchion's.

The proposed changes are assessed and clearly illustrated through a photographic survey and the production of artist impressions to determine the overall impact of the changes. The modifications are characterised by the backdrop of the Escarpment, which forms the dominant feature and minimises sky lining, which in conjunction with controls to cap building height and to carry out ridgeline tree planting will limit visual impact.

The environmental assessments illustrate that the proposed modification subject to the identified mitigation and management measures will not create a significant environmental impact beyond that approved by the Concept Plan. The modification would contribute to meeting the residential and employment needs of the Illawarra consistent with State and local strategic planning documentation. Consequently, the modification provides a contemporary approach to realising the potential of the site, while addressing the potential for impact and is considered worthy of support.

7 References

This section identifies reference material used in this report

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SEARS

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SEARS COMPLIANCE TABLE

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LANDSCAPE PLAN

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