Figure 7 – Precinct 5 Stormwater Management Measures (Source: Gilbert + Sutherland)
7.18 Erosion and Sediment Control

A detailed Erosion and Sediment Control Plan prepared by Gilbert + Sutherland is included at Appendix GG. It sets out measures for the management of erosion and sediment control during the bulk earthworks, civil construction and operational phases of development to minimise potential impacts of stormwater discharging from the site. This includes responsibilities, performance criteria, implementation strategies, monitoring, auditing and reporting actions.

Project 28 will implement the measures and actions in the Erosion and Sediment Control Plan.

This matter is addressed in the draft Statement of Commitments.

7.19 Existing Drainage Lines

The DGRs require an assessment of the necessity for the drains currently in operation across the site and an assessment of the impact of the on-going maintenance of any drains to be retained.

The flood modelling undertaken for the site undertaken by Gilbert + Sutherland (see Appendix CC) found that of the drainage lines on the site only the main east-west drain running through the SEPP 14 wetlands - also known as Blacks Creek - needs to be retained for flood management purposes. The drain needs to be periodically maintained to ensure the correct function of the drainage and flooding conveyance regimes at the site. The other minor drains on the site are not required to achieve the modelled level of flood immunity predicted for the developed site and therefore maintenance is not required.

This project application is seeking consent for on-going routine maintenance of the east-west drain. Accordingly, the likely impacts associated with periodic drainage maintenance were assessed by Gilbert + Sutherland (see Appendix HH).

Existing Conditions

The site is located within the Cudgen Creek catchment area and is predominantly drained in an easterly direction by the east-west drain which traverses the site from west to east. Runoff flows into the SEPP14 wetland prior to discharging from the Kings Forest site.

Assessment

The key objective of drain maintenance is to minimise hydraulic friction (roughness) to facilitate efficient drainage and conveyance. This is achieved by removing excessive vegetation growth, obstructions to the flow (snags etc.) and deposited sediment. Maintenance will not increase the depth of the drain and therefore will not result in groundwater drawdown. Based on the historical maintenance regime, it is expected that the frequency of disturbance would be low (approximately once every ten years).

On these occasions, the works may result in hydrological impacts, disturbance of acid sulfate soils, water quality impacts (short-term turbidity), erosion and sedimentation and impacts to flora and fauna. Previous studies have characterised these impacts as minor and the proposed frequency of maintenance means the impacts are likely to be experienced only in the short-term.
Management
To ensure that the identified potential impacts are avoided (where possible), minimised and/or managed in accordance with proven techniques, drains will be managed in strict compliance with the Drainage Maintenance Management Plan (DMMP) prepared by Gilbert + Sutherland (see Appendix II). The DMMP covers:

- Mechanical drainage maintenance
- Acid sulfate soil treatment
- Sediment and erosion control
- Surface water quality management
- Herbicide application.

This matter is addressed in the draft Statement of Commitments.

7.20 Heritage and Archaeology
The Concept Plan recorded and assessed 17 identified sites for their cultural heritage significance. The Cultural Heritage Assessment submitted and approved under the Concept Plan and the Conservation Heritage Management Plan (submitted January 2010) included site management recommendations for each site. The management recommendations included the preservation in situ of 7 sites and the collection and preservation of 8 sites. The remaining two sites did not have management recommendations.

The implementation of the Cultural Heritage Management Plan and also the determination of an appropriate Keeping Place for collected artefacts from the site are on-going issues. The development within Precincts 1 and 5 does not give rise to any new or additional impacts, requiring further assessment.

Implementation of the Cultural Heritage Management Plan
In November 2010, Everick Heritage Consultants (EHC) inspected the AHIMS Registered sites known as K3, K4, K5 and K6, which are four of the sites which have been preserved in situ and are located within the Environmental Protection areas. The purpose of the inspection was to ensure the terms of the CHMP were being met and to advise on on-going compliance.

The inspection found that each of the sites will be protected, as documented within EHC’s statement at Appendix JJ. Furthermore, their statement identifies the specific management strategies which are to be implemented to ensure the on-going protection of these sites.

Determination of an appropriate Keeping Place
As documented within the statement at Appendix JJ, despite meetings with the Tweed Byron Local Aboriginal Land Council (LALC) and other registered Aboriginal stakeholders, and the carrying out of a Keeping Place Survey, to date, no firm consensus to determine an appropriate Keeping Place has been reached. Everick are continuing to consult registered stakeholders in regard to this issue, however artefacts from the site will remain with the Tweed Byron LALC until such time as an alternative agreement from all stakeholders is reached.

7.21 Ecological Values of the Site
The approved Concept Plan included a comprehensive assessment of the impacts of development on the following significant ecological values of the site:

- six (6) flora species listed in the Threatened Species Conservation Act 1995 (TSC Act) and in the Environmental Protection & Biodiversity Conservation Act 1999 (EPBC Act) recorded on the site;
二十 (20) 禽类物种被列为 TSC 行动和/or EPBC 行动，在或近地点被记录；

进一步的七 (7) 受威胁的禽类物种，被认为可能在一定时间内在该地点出现，根据 NPWS 和 EPBC 动物数据库；以及

三 (3) 受危生态社区 (EECs) 列名于 TSC 行动第 1 条及 SEPP 14 湿地。

尤为值得注意的是，拟在 SEPP 14 湿地/高尔夫球场区域内建造的道路及整个 King 森林开发项目的拟议开发，在遵守 TSC 行动及联邦 EPBC 行动的要求下，进行了评估。

评估结论认为，该开发项目在概念计划内不会对受威胁的物种、物种群或生态社区及其栖息地产生显著影响，因此不需要为概念计划内拟议的开发进行物种影响声明或向联邦环境、水、遗产和艺术部进行转介。

此外，《概念计划概要报告》中关于动植物的有关结论包括：

- 部门满足于 EECs 和 SEPP 14 湿地在该地点已被适当测绘和保护通过分区、未来土地承诺及生态缓冲的应用。
- 部门支持在生态缓冲内保留湿地和在高尔夫球场区域内恢复被清除的缓冲区及那些需要在停止放牧或采伐松树林后进行恢复的环境保护区域。
- 部门满足于提案不会对场地上的任何受威胁的动植物产生显著影响，只要：
  - 禁止在场地内捕杀猫；
  - 通过特定道路设计、照明及标志要求，保持野生动物安全通过栖息地区域，以及通过考虑适当，围栏道路边缘、野生动物下道和类似措施，为未来各阶段的发展提供每项申请。
  - 更新为考拉和受威胁物种的管理计划在各阶段均提供；及
  - 大约 150 公顷的环境保护土地被承诺给 NPWS 用于纳入 Cudgen 自然保护区。

部门在原则上支持缓冲带设计，并认为在某些情况下某些道路和资产保护区域是可以接受的，因此需要对缓冲区及与缓冲区相邻的区域进行生态评估。此外，任何非农业缓冲区域的潜在影响也应进行评估。

考虑到该开发项目，本项目申请与概念计划及其推荐一致。项目申请不会对场地的生态价值产生任何新的或额外的负面影响，并包括需要进一步考虑的事项。

需要进一步评估的事项在以下章节中进行讨论。土地用于纳入 Cudgen 自然保护区的事项在第三章中讨论。
7.21.1 Wallum Sedge Frog

Notwithstanding the above discussion, a referral under the EPBC Act for the Wallum Sedge Frog (Acid frog), is to be concurrently made to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities. The referral documentation, prepared by James Warren & Associates, is appended at Appendix KK.

As described in the Threatened Species Management Plan for Precincts 1 and 5 (see Appendix SS and TT), Wallum sedge frogs (*Litoria olongburensis*), a vulnerable species (listed in the schedules of both the EPBC Act and the TSC Act), have been recorded within regenerating heath communities to the north and east of Precinct 5 and within the adjacent Cudgen Nature Reserve. They frogs may be impacted by the proposed development.

The Threatened Species Management Plan sets out the potential threats to the species and describes the management actions for their long-term management. These include, amongst others:

- maintenance of existing suitable habitat within environmental protection zones;
- creation of forage habitat within ecological buffers (the bio-retention swales) to offset unavoidable losses of habitat;
- maintenance of hydrology (particularly acidity), stormwater and run-off (including herbicides, pesticides, fuel etc) in constructed habitat areas;
- weed and feral animal control and management;
- disease control; and
- a monitoring program.

The Threatened Species Management Plan provides detailed information on the proposed Acid frog compensatory habitat strategy involving creating core Acid frog habitat within the Ecological Protection zones, the ecological buffers and the golf course at Kings Forest.

7.21.2 Management of Koalas

A revised Koala Plan of Management for Kings Forest, prepared by James Warren & Associates in accordance with the DGRs and addressing the statutory requirements of SEPP 44, is included at Appendix N. The revised KPoM recognises that any development within the Kings Forest site needs to:

- conserve the existing core Koala habitat;
- provide additional potential core habitat;
- provide access to existing and potential additional habitat which is safe from dog attack and motor vehicle strike;
- provide an effective bushfire management strategy for the site;
- allow for co-operation with the managers of Cudgen Nature Reserve in relation to bushfire management and other conservation matters;
- buffer core Koala habitat areas from development areas; and
- restrict koalas from entering the development areas.

In departing from the approach adopted in the KPoM approved as part of the Concept Plan (see Section 4.3 of this report), the revised KPoM identifies the difficulty in managing exposures to road traffic, domestic dogs and, to a lesser extent, swimming pools and proposes effective separation of koalas and their habitat from these threats, whilst maintaining and enhancing existing habitat linkages.
In order to mitigate and manage exposure of koalas to these identified threats, the KPoM requires the following:

- **Fencing** (in accordance with Figures 17 and 18 of the KPoM) to exclude koalas from the development areas in Precincts 1 and 5 in conjunction with the required road underpasses/bridging and grids. Fencing to the northern boundary of Precinct 2 is also be provided. All fencing is to be in place prior to the occupation of any buildings constructed within these precincts.

- **Measures on roads intersecting fauna linkages**, involving:
  - construction of grids (in accordance with Figures 17 and 18 of the KPoM) in roadways at both ends of the koala habitat, and the installation of appropriate lighting (capped) and signage at each grid location;
  - construction of a temporary grid to the Kings Forest Parkway, where it extends from Precinct 5 through to the western precincts;
  - construction of an underpass beneath the Kings Forest Parkway at the entrance of the estate to facilitate the movement of koalas (and other fauna); and connection of underpasses, bridging and grids to exclusion fencing and the connection of new fencing to the existing fencing along Tweed Coast Road, to effectively complete the enclosure of the defined Koala habitat area.

In addition, the KPoM details other measures to ameliorate impacts on koalas as a result of the proposed development. These include:

- protecting koalas during the construction phases of the development includes all clearing activities, bulk earthworks, road construction and building;
- retaining existing core koala habitat;
- bushfire management;
- ensuring koala observations are reported and incidents properly managed;
- promoting awareness of koala issues; and
- monitoring performance.

The KPoM also examines opportunities to improve the size or improve the condition of existing core koala habitat.

*The implementation of the KPoM is addressed in the draft Statement of Commitments.*

**Wildlife Corridors**

Condition B4 of the Instrument of Approval for the Concept Plan requires the establishment of an east-west wildlife corridor in the north-west of the site (with a minimum width of 50 metres and up to 100 metres wide). This was referred to in the Koala Plan of Management (Carrick, 2009) approved under the Concept Plan (since revised, as described above). Condition B4 also requires demonstration, prior to the determination of Stage 1, of the practicality or need for establishing a further 50 metre wide fauna corridor along the southern boundary of the site.

The east-west corridor proposed by Carrick (2009) is not considered necessary by JWA, or an appropriate allocation of resources, in that the prospect of the long-established sugar cane fields to the west becoming revegetated so as to offer meaningful koala habitat is considered extremely remote. For the same reason, JWA considers there is no need for an additional east-west movement linkage along the southern boundary of the western precinct of the site. Based on the established pattern of koala activity generally within lands to the east and south of the Kings Forest estate, there is no requirement to provide for additional movements to the west. Existing core koala habitat linkages on the Kings Forest site as shown in the KPoM will be retained and embellished.
Notwithstanding this, the Open Space plan in the Concept Plan drawings (Appendix H) indicates the location of the east-west corridor proposed by Carrick. The proponent is not seeking a modification of this aspect of the approved Concept Plan at this time and it is intended that the matter be further considered in a future development application(s) addressing the relevant part of the site.

*This matter is addressed in the draft Statement of Commitments.*

### 7.21.3 Prohibition of Cats

In accordance with the Concept Plan and DGRs, cats will be prohibited on the site and a section 88B or section 88E Instrument under the *NSW Conveyancing Act 1919* will be attached to the land title of each residential allotment within Precinct 5 prohibiting the keeping of cats.

*This matter is addressed in the draft Statement of Commitments*

### 7.22 Agricultural Buffers

The rural retail development within Precinct 1 will occur entirely on land within an agricultural buffer. Bulk earthworks will also occur within the buffers.

The zoning plan for the Kings Forest site includes agricultural buffer areas to protect against conflict between urban development and adjacent agricultural land uses. Under Clause 8 in Part 6 of Schedule 3 of SEPP (Major Development) development consent cannot be granted on land within an agricultural buffer without consideration of the potential impacts of the proposed development on agricultural activities on land adjoining the buffer as well the impacts of agricultural activities on the future occupiers of land within a buffer. The SEPP also requires that the (then) Department of Primary Industries (DPI) be consulted.

**Assessment**

The potential for conflict between the proposed development within the buffer in Precinct 1 and agricultural enterprises on adjoining land has been assessed and reported by Gilbert + Sutherland (see Appendix LL). Furthermore, the DPI has been briefed and provided with a copy of the relevant information and plans from the Agricultural Buffer Assessment Report. The main factors for potential conflict between the proposed development and the agricultural land in general are:

- agricultural chemical spray drift;
- noise;
- dust, smoke and ash;
- odour; and
- vandalism.

The proposed rural retail buildings are to be separated by a 7m wide service access, and the rear walls of the proposed buildings facing the site boundary will be fully enclosed (shown on the plans at Appendix I). Gilbert + Sutherland consider that this as well as the separation afforded by the regenerating Wallum Scrub on the adjoining land will act as a buffer to both land uses and any potential conflict between the rural land and the rural retail uses would be acceptable.

The proposed bulk earthworks will occur on land within an agricultural buffer. The impact of agricultural activities on this proposed development is considered to be of little concern at this stage. However, the bulk earthworks could potentially affect the adjoining land with:

- short-term dust drift; and
- short-term impacts on water quality.
Whilst the potential impacts are considered to be short-term, it is considered that measures to minimise the impacts are required.

Management

The measures within the Construction Management Plan (Appendix M) and the Erosion and Sediment Control Plan (Appendix GG) will be implemented to ensure that all impacts are minimised. With the implementation of these management plans, the potential impacts on the agricultural land uses during the bulk earthworks and during construction in Precinct 1 are considered to be acceptable.

*This matter is addressed in the draft Statement of Commitments.*

7.23 Ecological Buffers

As demonstrated in Section 7.1.4, there are no practicable alternatives to siting development within the ecological buffers. This section of the EAR examines the impacts of the proposed development in the ecological buffers and summarises proposed management and mitigation measures.

It is noted that while the potential impacts described below are relevant to all threatened fauna at the site, some species are likely to only use the site on an opportunistic basis or may forage widely in the locality and thus are unlikely to be significantly impacted from development of the site. Furthermore, the impacts on native flora and fauna occurring at the site are considered to be relatively insignificant given that very little intact vegetation (and hence habitat) will be lost as a result of the proposal.

It should be further noted that continued farming and ongoing weed infestations over the site have resulted in some changes to the extent and structure of the vegetation communities across Kings Forest since the previous detailed mapping which was undertaken in 2005. Accordingly, the mapping of vegetation communities within the ecological buffers was updated by James Warren & Associates in August 2011, and this information has been utilised to assess the impacts of the proposed development in the buffers.

The significant ecological values relevant to the various buffers are provided in the relevant Buffer Management Plans at Appendices MM and NN.

7.23.1 Precinct 1

Precinct 1 will be developed for a rural retail use in accordance with the approved Concept Plan. The Project Application proposes the following development within the Precinct 1 ecological buffers as shown in Figures 13A and 13B at Appendix MM:

 bulk earthworks within, and use of, the outer 20 metres of the buffer as an APZ; and
 use for a koala proof fence between the inner 30 metre and outer 20 metre buffer.

Assessment

Vegetation within the outer 20 m will be cleared for the APZ which will then be maintained in accordance with the Bushfire Risk Assessment report. There will be no impact by the development on the inner 30 metres of the buffer.

As described in the Buffer Management Plan for Precincts 1 and 5 at Appendix MM, development will result in the loss of 0.42 hectares of vegetation within the buffer zone for Precinct 1. Of this, 0.25 ha or 59.5% of the impact will be to highly modified vegetation (i.e. cleared and/or covered by exotic grasslands). The impacts on the remaining areas of native vegetation will be to Broad-leaved paperbark closed forest to woodland (0.06 hectares) and to Littoral rainforest (0.11 hectares).
Management
The inner 30 m buffer zone will be fully restored and a combination of weed control and koala and acid frog habitat enhancement will be implemented in accordance with the relevant management plans appended to this report.

The Buffer Management Plan for Precincts 1 and 5 sets out specific management strategies for the buffer to be implemented by the proponent (see Appendix MM) including:

- measures to protect vegetation, threatened flora and EECs during the construction and operational phases;
- management of stormwater, pests and weeds to ensure that development will not impact on the neighbouring Environmental Protection areas or SEPP 14 wetlands;
- measures to regenerate and revegetate the buffer areas to enhance their existing natural values, covering heath regeneration and revegetation, planting of koala compensatory habitat, and creation of Acid frog compensatory habitat.

Detailed requirements for maintenance and performance monitoring and measurement are set out in the Buffer Management Plan.

7.23.2 Precinct 5
Precinct 5 will ultimately be developed for residential uses as described elsewhere in this report. The following development is proposed in the ecological buffer to Precinct 5 as illustrated in Figures 13A and 13B at Appendix MM:

- bulk earthworks within, and use of, the outer 20 metres for roads, an APZ and bio-retention swales;
- use of the outer 20 metre buffer and parts of the inner 30 metre inner buffer for a bio-retention swale as shown at Appendix OO; and
- a koala proof fence between the inner and outer buffers, with the inner buffer zone east of the koala fence to be part of the land to be dedicated to NPWS.

Assessment
The construction of roads, services and a bio-retention swale will result in the removal of all of the vegetation within the 20 m outer buffer zone and portions of the inner 30 m buffer zone. The bio-retention swale will extend into the inner 30 m of the buffer zone in some areas as shown in Figure 8.

Groundwater
The location and extent of the bio-retention swale is critical for the protection of the adjacent wetlands and areas of habitat significance by virtue of its role in maintaining the existing hydrological regime in the neighbouring Cudgen Nature Reserve. As described in Section 4.4 of the Groundwater Assessment report prepared by Gilbert + Sutherland (at Appendix AA), the filling of Precinct 5 has the potential to alter the current hydrological regime by retaining ground water within Precinct 5 and prevent it being transmitted to the adjacent land to the east. This may result in some lowering of the water table even though the flow is unchanged.

In a conceptual assessment, Gilbert + Sutherland have identified that the groundwater regime in the nature reserve could be maintained by recharge from stormwater runoff that is infiltrated via the vegetated bio-retention swales located within the buffer along the eastern perimeter of Precinct 5 buffer. The model further indicates that placement of the swale 10m east - that is, closer to the target (within the inner buffer zone rather than the outer buffer zone) - delivers the recharge 41 days earlier. The earlier delivery mitigates the impact of extended dry periods.
While the preservation of the natural groundwater regime in the nature reserve helps to protect the wetland areas and the groundwater dependent ecological processes, the runoff directed to the swales is likely to contain nutrients at levels that are relatively higher than groundwater nutrient levels. It is considered that plant uptake of these nutrients within the swale will minimise their concentration in waters that ultimately contribute to the groundwater table.

The proposed recharge of groundwater via the stormwater treatment swale within the ecological buffer will minimise impacts to the nearby groundwater dependent ecosystems by ensuring that the post developed groundwater regime reflects the pre-developed groundwater regime. These overall off-site benefits would seem to override the impacts of the swale in the buffer - particularly given that proposed revegetation will result in improvements to the quality of the vegetation communities in the buffer.

**Vegetation communities**

The inner buffer zone adjacent the Cudgen Nature Reserve to a width of approximately 20 metres is heavily vegetated and includes substantial trees that will be retained (see Appendix MM). The balance of the inner buffer zone (i.e. approximately 10 metres) predominantly comprises exotic pasture grass. In the southern parts of Precinct 5 the inner 30 m of the ecological buffer consists predominantly of exotic pasture grass, with some native vegetation regrowth occurring between periodic slashing.

The earthworks in the Precinct 5 buffer will impact on 4.67 hectares of vegetation in total, as detailed at Appendix MM. Of this, 3.4 ha or 73% of the impact will be to highly modified vegetation (i.e. cleared and/or covered by exotic grasslands).

The impacts on the remaining areas of native vegetation will be to heath and shrubland communities (nearly 25% of the total impact), of which only a very small portion is in good condition. The majority of the heath to be lost (1.16 ha) is disturbed but regenerating. The remaining impacts will be to Freshwater wetland, Swamp Sclerophyll Forest and Open Forest.

It is considered that the above impacts will be off-set by the contribution of the swales to groundwater recharge in the Cudgen Nature Reserve as well as the proposed significant mitigation measures (described below) that will result in a net gain in heathland and extensive planting of koala food and shelter trees.
Mitigation and management

Groundwater
Potential impacts on groundwater quality and flow regimes will be avoided or mitigated through the implementation of the management plans appended to this EAR.

Vegetation communities
The heath communities will be regenerated and/or revegetated, and a combination of weed control and koala and acid frog habitat enhancement will be implemented in accordance with the relevant management plans. More specifically:

- The proposed regeneration and revegetation measures to 8.19 hectares will result in a long-term net gain of 7.03 ha of heathland within the Precinct 5 ecological buffers.

- The planting of Koala food and shelter trees (shown in Figure 17 of Appendix MM) will significantly mitigate the loss of any vegetation within the buffer zones.

- The compensatory habitat for Acid frogs within the ecological buffers will include core breeding habitat and forage habitat areas - as detailed in the Precinct 1 & 5 Threatened Species Management Plan at Appendix SS.
The Buffer Management Plan for Precincts 1 and 5 sets out specific management strategies for the buffer which will be implemented by the proponent (see Appendix MM) including:

- measures to protect vegetation, threatened flora and EECs during the construction and operational phases;
- management of stormwater, pests and weeds to ensure that development will not impact on the neighbouring Environmental Protection areas or Cudgen Nature Reserve;
- measures to regenerate and revegetate the buffer areas to enhance their existing natural values, covering heath regeneration and revegetation, planting of koala compensatory habitat, and creation of Acid frog compensatory habitat.

Detailed requirements for maintenance and performance monitoring and measurement are set out in the Buffer Management Plan.

7.23.3 Precincts 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13 and 14

The above precincts will be developed in the long term for residential uses and a golf course in accordance with the approved Concept Plan. The following development is proposed in the ecological buffers to these precincts (see Figure 9):

- Precincts 2 to 6 and 7 to 11 - bulk earthworks within the outer 20 metres of the buffer only (see Section 7.16) to achieve the 1:100 ARI flood immunity.
- Precincts 12, 13 and 14 - bulk earthworks generally within the outer 20 metres and inner 30 metres of the buffer, with the exception of sections of the inner buffer west of Precinct 12, to form the substrate for the proposed golf course in accordance with the Golf Course Management Plan approved under the Concept Plan.
- Construction of, and use for, the Kings Forest Parkway (Precinct 2) within the inner and outer buffers as approved under the Concept Plan.
- Construction of, and use for, two roads to Precincts 12, 13 and 14 through the inner 30 metre and outer 20 metre buffers as approved under the Concept Plan.
Assessment

All vegetation within the areas proposed for earthworks will be cleared. On completion of works, the golf course will be revegetated and function as the ecological buffer to the surrounding environmental protection areas.

The Buffer Management Plan for Precincts 2-4 and 6 to 14 prepared by James Warren & Associates (Appendix NN) calculates the collective impact on vegetation across these precincts. In summary, of the total buffer area of 122.06 hectares, the earthworks will impact on 73.99 hectares. Of this impact:

- 61% or 45.4 hectares will be to highly modified vegetation (i.e. cleared and/or covered by exotic grasslands);
- 34% will be to heath and shrubland communities, of which only a very small portion (approximately 9%) is in good condition, with the majority (91%) of that to be lost, disturbed but regenerating;
- nearly 5% will be to Sclerophyll Forest (4%), Freshwater wetland (0.5%) and Open Forest (0.1%).
Mitigation and Management

The majority of the ecological buffers within Precincts 2-4 & 6-14, including large areas within the golf course, will be regenerated and/or revegetated with heath communities. In total, 44.15 hectares will be regenerated and revegetated, resulting in a long term net gain of 18.99 hectares in these precincts.

Koala feed and shelter trees will be planted where appropriate within the buffers generally in combination with the above heath regeneration/revegetation (see Figure 15 at Appendix NN). Compensatory habitat areas for Acid frogs will also be created within the buffers and include core breeding habitat and forage habitat areas in accordance with the Precincts 2-4 & 6-11 Threatened Species Management Plan and the Precincts 12, 13 & 14 Threatened Species Management Plan (see Appendix TT).

In relation to the golf course, the proposed buffer will be a minimum 50 metres in width and in many places two or three times wider. It will provide an actively managed biological screen between urban land uses and the adjacent sensitive ecological areas. The above proposed regeneration and vegetation works will contribute to the overall buffer role of the golf course with the following benefits:

- the land will be actively managed to maintain its ecological integrity including regeneration;
- the costs of management will be paid for by the users of the golf course;
- the stormwater treatment measures will actively control the flow of water and contaminants to the SEPP 14 wetlands;
- the ecological zone will be protected through active management of access and security;
- the monitoring of the golf course and ecological zones will be on-going and for an indefinite period.

The Buffer Management Plan for Precincts 2-4 and 6-14 sets out specific management strategies for the buffer to be implemented by the proponent (see Appendix NN) including:

- measures to protect vegetation, threatened flora and EECs during the construction and operational phases;
- management of stormwater, pests and weeds to ensure that development will not impact on the neighbouring Environmental Protection areas;
- measures to regenerate and revegetate the buffer areas to enhance their existing natural values, covering heath regeneration and revegetation, planting of koala compensatory habitat, and creation of Acid frog compensatory habitat.

Detailed requirements for maintenance and performance monitoring and measurement are set out in the Buffer Management Plan.

*The implementation of the Buffer Management Plans is addressed within the draft Statement of Commitments.*
7.23.4 Conservation of Heathland

In relation to the further protection of heathland, Condition B3 of the Concept Plan approval requires the following:

*Further heathland is to be provided with long-term protection and allowed to naturally regenerate on the site. The further heathland to be protected is to be that contained within the 50m ecological buffer in the locations depicted as ‘Heath to be Naturally Regenerated’ in Figure 2A titled ‘Heath Regeneration and Revegetation Areas’ drawn (by) James Warren and Associates and dated 22 March 2010. The heathland in these locations is to be protected and regenerated for the full 50 m width of the ecological buffer.*

*The details of this further protection are to be submitted along with the preferred long term protection mechanism, such as land use zoning, to the satisfaction of the Director-General prior to determination of Stage 1.*

This section of the report details compliance with Condition B3.

As discussed elsewhere in this report, the Concept Plan and the accompanying Buffer Management Plan (JWA, 2009) foreshadowed that compatible works would be undertaken in the 20 metre outer area of the ecological buffer. The type and extent of works is described in the above section.

The extent of heathland to be revegetated in the buffers in ‘Figure 2A’ referred to in Condition B3 above is shown as Figure 16 in the Precincts 2-4 & 6-14 Buffer Management Plan at Appendix MM. In order to retain and protect regenerating heath communities in accordance with Condition B3, the extent of bulk earthworks and engineering in the buffers has been minimised as much as is feasible and practicable (see Plan 123-01 SK 038 at Appendix E and Figure 9).

The distribution and types of heath shown in ‘Figure 2A’ was based on mapping undertaken in 2005. Since then, continued farming practices (i.e. cattle grazing, periodic slashing etc) and ongoing weed infestations over the site have resulted in some changes to the extent of heathland. Accordingly, the mapping of vegetation communities within the ecological buffers was updated in August 2011 to provide better information on the current extent of heathland and to identify constraints to bulk earthworks and opportunities for further heathland protection.

The latest mapping undertaken by James Warren & Associates has identified that some areas previously mapped as ‘Existing heath to be retained’ have become significantly infested with weeds and are now designated as ‘Heath to be naturally regenerated’. Conversely, some areas of heath previously mapped as ‘Heath to be naturally regenerated’ have sufficiently regenerated and are now considered to be ‘Existing heath to be retained’. An updated version of Figure 2A based on amended vegetation mapping completed in August 2011 is shown as Figure 17 at Appendix MM.

The re-mapping of the heath communities and design of the Stage 1 bulk earthworks has allowed for an additional 3.24 hectares of heath to be retained and protected within the area originally defined by Figure 2A. The additional area of heath comprises 0.3 hectares of existing heath to be retained, plus 4.67 hectares of heath that will be naturally regenerated minus an area of 1.73 previously proposed to be revegetated. This is summarised in Table 6 which provides a comparison between the original ‘Figure 2A’ mapping and the revised August 2011 mapping of the areas of heath within the buffers to be retained and rehabilitated.
Table 7 – Comparison of heath in ecological buffers between 2005 and 2011 (Source: JWA)

<table>
<thead>
<tr>
<th></th>
<th>Existing heath to be retained (ha)</th>
<th>Heath to be naturally regenerated (ha)</th>
<th>Heath to be revegetated (ha)</th>
<th>Total heath areas within ecological buffers (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 2A</td>
<td>0.04</td>
<td>8.16</td>
<td>21.55</td>
<td>29.76</td>
</tr>
<tr>
<td>August 2011</td>
<td>0.34</td>
<td>12.83</td>
<td>19.82</td>
<td>32.99</td>
</tr>
<tr>
<td>Net loss/gain</td>
<td>+0.3</td>
<td>+4.67</td>
<td>-1.73</td>
<td>+3.24</td>
</tr>
</tbody>
</table>

It should be noted that this assessment addresses the heath within the area defined by Figure 2A referred to in Condition B3. Combined with regeneration and vegetation works elsewhere on the site there will be a net gain of 26.03 ha of heath vegetation on the Kings Forest site.

The measures to regenerate, revegetate and manage the heathland are set out in the Buffer Management Plans at Appendices MM and NN.

Given the increase in the area of heath within the ecological buffers in 'Figure 2A', the proposed measures for its ongoing regeneration and the overall net gain across the whole Kings Forest site, it is considered that the requirements of Condition B3 have been met.

### 7.24 Biodiversity Management Plans

In accordance with the Concept Plan and DGRs, the management plans for the site have been revised and updated. The new plans are listed below and Project 28 Pty Ltd has committed to implement the measures contained within them. Furthermore, it is considered that the measures set out within the management plans will also protect and manage the riparian corridors and adjacent aquatic habitats as outlined within the Tweed Coast Estuary Management Plan.

*The implementation of the management plans is addressed in the draft Statement of Commitments.*

#### 7.24.1 Site Based Management Plan

The Golf Course Management Plan has been revised in accordance with the DGRs and incorporated into the Site Based Management Plan (SBMP), prepared by Gilbert + Sutherland (Appendix Z). In respect of the golf course, the SBMP also incorporates the recommendations of the e-Par report which formed part of the original Golf Course Management Plan.

The SBMP acts as a tool for the integration and implementation of the range of management strategies in the various management plans prepared for Kings Forest. It also addresses a number of matters specific to the golf course including the Wallum frog species.

#### 7.24.2 Feral Animal Management Plan

A Feral Animal Management Plan (FAMP) for the site, prepared by James Warren & Associates, is included at Appendix PP. The FAMP aims to minimise the impacts of feral animals on native species and threatened species on the site.
The FAMP includes the following:

- a literature review on feral animal control;
- identification of feral animals recorded at the site;
- identification of species considered to warrant priority management;
- examination of control/eradication methods for ‘high priority’ feral animals; and
- recommendations the implementation of long term control methods, including monitoring and reporting.

7.24.3 Weed Management Plans

Three Weed Management Plans (WMP), prepared by James Warren & Associates, specific to Precincts 1 and 5, Precincts 2, 3, 4, 6, 7, 8, 9, 10, 11 and Precincts 12, 13 & 14 are included at Appendices QQ and RR. The WMPs aim to assist Project 28 and its contractors in the implementation of weed control strategies for the site and specifically include the following:

- weed assessments of the subject sites;
- designation of work areas for attention;
- specific tasks in each work unit;
- guidelines for the removal of weed species including Slash pine seedlings;
- guidelines for a maintenance programme; and
- monitoring and reporting schedules.

7.24.4 Threatened Species Management Plans

Threatened Species Management Plans (TSMP) specific to Precincts 1 and 5, Precincts 2, 3, 4, 6, 7, 8, 9, 10, 11 and Precincts 12, 13 & 14, prepared by James Warren & Associates, are included at Appendices SS and TT. The TSMPs provide guidelines and methods for the management of the threatened flora and fauna species recorded within the vicinity of the precincts. Specifically the TSMPs include:

- a summary of the threatened flora and fauna species occurring within the vicinity of each Precinct;
- a profile for each threatened species comprising:
  - a list of overall threats;
  - identification of threats from proposed development; and
  - recovery strategies including details of Approved Recovery Plans and/or Priority Actions;
- management strategies to be implemented, including:
  - strategies for the protection of threatened species during the construction and operational stages of the development;
  - weed control measures specific to areas containing listed threatened flora and fauna;
  - guidelines for the control of human and animal access to areas containing threatened species; and
  - strategies for the embellishment of threatened species habitat through revegetation works and/or the creation of compensatory habitat areas where required.
7.24.5 Vegetation Management Plans

Vegetation Management Plans (VMP) prepared by James Warren & Associates specific to Precincts 1 and 5, Precincts 2, 3, 4, 6, 7, 8, 9, 10, 11 and Precincts 12, 13 & 14 are included at Appendices UU and VV. The VMPs aim to protect and enhance the available habitat for flora and fauna (including threatened species) within the vicinity of the precincts and specifically include:

- a summary of the significant ecological values of each Precinct;
- guidelines and action plans detailing:
  - top soil re-use;
  - weed control;
  - revegetation of ecological buffers to Environmental Protection areas, SEPP 14 Wetlands and the Cudgen Nature Reserve;
  - the management and rehabilitation of significant areas of Koala habitat; and
- adaptive management; and
- monitoring and report guidelines.

7.24.6 Buffer Management Plans

Two Buffer Management Plans (BMP) have been prepared by James Warren & Associates for Precincts 1 & 5, and for Precincts 2 to 4 and 6 - 14 (Appendices MM and NN). The BMPs provide guidelines, strategies and methods for the treatment and management of the ecological buffers. Specifically the BMPs include:

- a summary of the significant ecological values of each Precinct;
- an assessment of the potential impacts of the proposed development on the ecological buffers;
- specific management strategies; and
- monitoring and reporting guidelines.

7.24.7 Koala Plan of Management

The revised Koala Plan of Management, prepared by James Warren & Associates, (Appendix N) is discussed above in Section 7.21.2 of the EAR.
8.0 Draft Statement of Commitments

In accordance with the Director-General’s Environmental Assessment Requirements, the proponent is required to include a Draft Statement of Commitments in respect of environmental management and mitigation measures on the site. The following are the commitments made by Project 28 Pty Ltd to manage and minimise potential impacts arising from the project.

8.1 Land Dedication

Proposed Lot 3 will be dedicated to the NSW National Parks & Wildlife Service (NPWS). The dedication will be subject to a Voluntary Planning Agreement between Project 28 Pty Ltd and NPWS.

Project 28 Pty Ltd will dedicate land in the Environmental Protection zone to Tweed Shire Council. This dedication will be subject to a future Voluntary Planning Agreement between Project 28 Pty Ltd and Tweed Shire Council.

8.2 Developer Contributions

In accordance with the relevant Tweed Shire Council Section 94 Contributions Plans and Section 64 of the Local Government Act 1993, prior to the issue of any construction certificate for the dwellings in Precinct 5, Project 28 Pty Ltd will pay developer contributions in relation to the development of Precinct 5.

8.3 Construction Management

Project 28 Pty Ltd will prepare detailed precinct specific construction management plans prior to the commencement of works within every precinct. The plans will build upon the strategies outlined in the Construction Management Plan appended to the Project Application and incorporate the measures, where relevant, outlined within the following management plans:

- Site Based Management Plan
- Overall Water Management Plan
- Groundwater Management Plan
- Acid Sulfate Soils Management Plan
- Erosion and Sediment Control Plan
- Flood Management Plan
- Stormwater Management Plan
- Bushfire Management Plan
- Integrated Water Cycle Management Plan
- Koala Plan of Management
- Feral Animal Management Plan
- Vegetation Management Plan Precincts 1 & 5
- Vegetation Management Plan Precincts 2, 3, 4, 6, 7, 8, 9, 10 & 11
- Vegetation Management Plan Precincts 12, 13 & 14
- Threatened Species Management Plan Precincts 1 & 5
- Threatened Species Management Plan Precincts 2, 3, 4, 6, 7, 8, 9, 10 & 11
- Threatened Species Management Plan Precincts 12, 13 & 14
• Buffer Management Plan Precincts 1 & 5
• Buffer Management Plan Precincts 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13 & 14
• Weed Management Plan Precincts 1 & 5
• Weed Management Plan Precincts 2, 3, 4, 6, 7, 8, 9, 10 & 11
• Weed Management Plan Precincts 12, 13 & 14.

8.4 Haulage Management
Prior to commencement of importation of fill, the Project 28 Pty Ltd will prepare, and provide to Tweed Shire Council, a Haulage Management Plan detailing the source of fill, haulage routes, traffic routes and volumes, any traffic impacts and any requisite environmental management measures.

8.5 Urban Design
A section 88B Instrument will be attached to the land title of each proposed residential allotment within Precinct 5 requiring any future dwelling to be designed in accordance with the design guidelines.

8.6 Affordable Housing
Subject to a successful application for NRAS funding, Project 28 will:
• provide between 1% and 3% of housing (45-135 dwellings) within the Kings Forest site as affordable housing for rent for a minimum of 10 years;
• provide dwellings at a minimum 20% discounted market rent to eligible low and moderate income households for the entire 10 year period, in keeping with NRAS requirements;
• prioritise smaller dwellings as affordable rental dwellings to meet the highest need group; and
• locate affordable housing in close proximity to the proposed centres to provide access to services and transport for high need users as well as the timely delivery of housing.

8.7 Water Supply
Project 28 Pty Ltd will undertake further analysis to confirm the timing and required reservoir size at the Duranbah Reservoir Complex to service the Kings Forest development prior to the commencement of construction of the dwellings within Precinct 5.

8.8 Accommodation for NSW Ambulance, SES and Fire Service
In consultation with the relevant NSW emergency services providers, Project 28 Pty Ltd will identify in future development applications the provision of suitable sites in Precinct 2 for bases for the NSW Ambulance Service, the Fire Service and the State Emergency Services.

8.9 Traffic
Project 28 Pty Ltd will prepare with every Development Application submitted for subsequent stages of the project, a traffic impact assessment which will include an assessment of the requirement for, and timing of, signalisation of the Kings Forest Parkway/Tweed Coast Road intersection.
8.10 Noise

Road Traffic Noise
Project 28 Pty Ltd will undertake, with development applications for the detailed design and construction of dwellings along the Kings Forest Parkway, an assessment to determine the extent of acoustic building shell treatments required to achieve the maximum internal noise criteria for habitable spaces.

Commercial Activity Noise
Project 28 Pty Ltd will assess, with development applications for Precincts 3 and 4, the acoustic impacts associated with the proposed development and provide additional acoustic treatments/mitigation measures where necessary.

Construction Noise
In order to manage construction noise, Project 28 Pty Ltd will implement the following measures:

- Restrict construction and bulk earthworks works as follows:
  - Monday - Friday: 7am - 6pm;
  - Saturday: 8am - 1pm.
- Prepare and implement a noise management plan which will include the following measures;
  - contacting occupants of the existing dwellings on the western side of Tweed Coast Road, at the earliest possible time before site work begins and explain the nature of the construction stages and the duration of noisier activities;
  - ensuring all equipment is in good working order, and that mobile plant commence work as far from the dwellings as possible in the mornings;
  - locating fixed plant as far from neighbouring property boundaries as possible; and
  - locating fixed plant behind buildings or materials stockpiles to take advantage of acoustical screening from physical barriers.

8.11 Contamination

Prior to the commencement of any bulk earthworks on the affected areas of the site, Project 28 Pty Ltd will undertake the following in relation to contamination:

- At the fuel storage site, excavation of soils beneath the above ground storage tank (AST) and validation of samples of the excavated material collected from the base and walls of the removed AST footprint.
- At the cattle dip site, further delineation studies of contamination prior to remediation of the site, in accordance with an updated Remediation Action Plan (if required).

8.12 Acid Sulfate Soils

Prior to the issue of the construction certificate(s) for bulk earthworks applications, Project 28 Pty Ltd will prepare a detailed Acid Sulfate Soils Management Plan (ASSMP) in accordance with the Acid Sulfate Soil Management Advisory Committee (ASSMAC) guidelines and the conditions of Consent for the Concept Plan, for approval by the Department of Planning and Infrastructure.

8.13 Bushfire

Project 28 Pty Ltd will implement the strategies outlined in the Bushfire Management Plan, prepared by Bushfiresafe (Aust) Pty Ltd, in order to meet the requirements of the Planning for Bushfire Protection and section 100B of the Rural Fires Act 1997.
8.14 Geotechnical Conditions

Project 28 Pty Ltd will implement the following to manage the geotechnical conditions of the site:

- prior to and during the construction works, the recommendations set out in the Geotechnical Assessment, prepared by Cardno Bowler; and
- prior to, and during, the pre-bulk earthworks, bulk earthworks, landform stabilisation and civil construction phases, the strategies within the Site Based Management Plan (June 2011) prepared by Gilbert + Sutherland.

8.15 Groundwater

During all construction phases and operational phases of the development, the proponent will implement the Groundwater Management Plan (February 2011), prepared by Gilbert + Sutherland, in conjunction with the Site Based Management Plan (June 2011), also prepared by Gilbert + Sutherland.

8.16 Flooding

In conjunction with Tweed Shire Council, the State Emergency Service and the Police, Project 28 Pty Ltd will prepare, and seek to incorporate, an evacuation response plan for Kings Forest into the Local Disaster Plan. The evacuation response plan will include the following alert level and activation sequencing:

- **Alert Level One:** Actual rainfall exceeds the 100 year ARI design and it is continuing to rain:
  - activation of evacuation response plan.

- **Alert Level Two:** Actual flood level reaches or exceeds the design ARI 100 year flood in less than 24 hours and the water level is still rising:
  - activation of evacuation notices to residents to be on standby and prepare for evacuation;
  - evacuation of sick, elderly and at risk groups; and
  - early voluntary evacuation to begin as soon as possible after reaching this stage.

- **Alert Level Three:** If the actual rainfall exceeds the ARI 500 year design rainfall or water level is still increasing and rate of rise data indicates less than 6-8 hours before roads or bridges will be cut:
  - general evacuation to commence.

8.17 Water Cycle Management

To ensure that stormwater run-off is adequately treated, Project 28 Pty Ltd will implement the provisions within the Overall Water Management Plan (June 2011), prepared by Gilbert + Sutherland during all the phases of construction and once the development is operational, as follows:

- For Precinct 5, a system or bio retention basins and trenches in conjunction with the Stormwater Management Plan (June 2011), prepared by Gilbert + Sutherland.

- For Precinct 1, treatment before release by means of a treatment train involving installation of:
  - a gross pollutant trap to capture sediment and hydrocarbons from the paved areas; and
  - a rainwater storage tank and use of the stored water for toilet flushing and external uses.
8.18 Erosion and Sediment Control

The proponent will implement the measures and actions in the Erosion and Sediment Control Plan (April 2011), prepared by Gilbert + Sutherland, during the bulk earthworks, civil construction and operational phases of development.

8.19 Drainage Maintenance

Project 28 Pty Ltd will manage the agricultural drains on the site during construction and when the site is operational in accordance with the Drainage Maintenance Management Plan (June 2011) prepared by Gilbert + Sutherland.

8.20 Prohibition of Cats

A section 88B or section 88E Instrument under the *NSW Conveyancing Act 1919* will be attached to the land title of each residential allotment within Precinct 5 prohibiting the keeping of cats.

8.21 Biodiversity Management Plans

To protect and manage the biodiversity of the site, Project 28 Pty Ltd will implement the following management plans, appended to the EAR:

- Site Based Management Plan (June 2011), prepared by Gilbert + Sutherland;
- Weed Management Plan - Precincts 1&5 (June 2011), prepared by James Warren & Associates;
- Weed Management Plan - Precincts 2-4 & 6-11 (June 2011), prepared by James Warren & Associates;
- Weed Management Plan - Precincts 12-14 (June 2011), prepared by James Warren & Associates;
- Threatened Species Management Plan - Precincts 1&5, prepared by James Warren & Associates;
- Threatened Species Management Plan - Precincts 2-4 & 6-11 (June 2011), prepared by James Warren & Associates;
- Vegetation Management Plan - Precincts 1&5 (June 2011), prepared by James Warren & Associates;
- Vegetation Management Plan - Precincts 2-4 & 6-11(June 2011), prepared by James Warren & Associates;
- Vegetation Management Plan - Precincts 12-14 (June 2011), prepared by James Warren & Associates;
- Buffer Management Plan - Precincts 1 & 5 (October 2011), prepared by James Warren & Associates;
- Buffer Management Plan - Precincts 2-4 & 6-11 (October 2011), prepared by James Warren & Associates; and
8.22 East-West Wildlife Corridor

The proponent will review and provide expert advice on the need for an east-west wildlife corridor in the north-west of the site at the time of any future application(s) for development over those areas of the site.
9.0 Conclusion and Justification

The proposed development of Stage 1 of the Kings Forest site has planning merit in the following respects:

- It is consistent with the relevant planning legislation, environmental planning instruments.
- It is generally consistent with the Part 3A Concept Plan for the Kings Forest Estate and with the relevant provisions within the Kings Forest Development Code.
- It includes a commitment for the dedication of approximately 150 ha of land to NPWS as an extension to the existing Cudgen Nature Reserve, in accordance with the Concept Plan.
- It provides a subdivision design and layout within Precinct 5 which facilitates a range of dwelling types and densities to provide a choice to future residents in both housing and lifestyle, and provides future residents with the opportunity for views of the neighbourhood park and surrounding environmental protection areas.
- It provides rural retail development to service the local and future local population.
- It provides the opportunity for the provision of affordable housing.
- It provides the first stage of the Kings Forest Parkway, internal access roads to future development areas within the site, and intersection works to Tweed Coast Road to ensure that adverse traffic impacts are mitigated and the road network can cater for traffic from Stage 1 and future development.
- It provides noise attenuation measures to reduce the noise impact from traffic along Tweed Coast Road.
- It includes a commitment to remediate the fuel storage and cattle dip sites to ensure the site can be made suitable for future development.
- It includes a commitment to appropriately treat and manage Acid Sulfate Soils on the site.
- It incorporates a suite of measures to manage the ecological values of the site and impacts on adjoining sensitive land, including management plans for the retention, rehabilitation and protection of native vegetation, threatened flora and fauna species, and endangered ecological communities.
- It commits to the implementation of the geotechnical recommendations to ensure that the proposed earthworks and construction works will not adversely impact upon the site's soil profile or stability.
- It includes a Groundwater Management Plan, which will be implemented to ensure that the groundwater flow regime or groundwater quality, SEPP 14 Wetlands or Environmental Protection areas on the site are adversely impacted.
- It provides residential pad levels and roads which will have flood immunity from the ARI 100 year high climate change level and 10% increase in rainfall intensity climate change level, as well as recommendations for an evacuation plan for larger flood events.
- It includes an integrated water cycle management plan, a stormwater management plan and erosion and sediment control management plan to ensure that the quality and quantity of stormwater run-off will be appropriately managed.

Given the above planning merits, the Project Application for Stage 1 of the Kings Forest development is justified and submitted for approval of the Minister for Planning.