Description of Threatened Ecological Communities

The results of the PMST search (project area plus a 5 km buffer) found the following Threatened Ecological Communities (TECs) likely to occur within the search area:

- Banksia Woodlands of the Swan Coastal Plain ecological community (Endangered)

The native vegetation present across 2.93 ha of the project area was described by 360 Environmental (2016b) as (Figure 5):

- **BiEt:** Woodland of *Banksia ilicifolia, Eucalyptus todtiana, Melaleuca preissiana* and *Banksia attenuata* over *Phlebocarya ciliata, Lepidosperma leptostachyum, Dasypogon bromeliifolius, Melaleuca seriata, Bossiaea eriocarpa* and *Adenanthos cygnorum* (1.144 ha)

- **BiMp:** Woodland of *Banksia ilicifolia, Melaleuca preissiana, Banksia menziesii* over *Kunzea glabrescens, Dasypogon bromeliifolius, Phlebocarya ciliata, Astartea scoparia, Jacksonia furcellata, Hypocalymma angustifolium, Xanthorrhoea preissii* and *Melaleuca thymoides* (0.318 ha)

- **BmXp:** Low Woodland of *Banksia menziesii* over *Xanthorrhoea preissii, Leucopogon conostephioides, Eremaea asterocarpa subsp. brachyclada, Hibbertia hypericoides* and *Conostephium pendulum* (1.468 ha)

360 Environmental (2016b) stated that vegetation condition ranged from Very Good to Completely Degraded with the majority of the project area (2.346 ha) considered to be in Good to Very Good condition (Figure 6). Approximately 1.7 ha of the project area has been previously cleared and there has been stockpiling of soil north of the driveway. Firebreaks, rural residential land use and proximity to the road has contributed to the introduction and spread of weeds and exotic species. The eastern side of the project area is within a Western Power High Voltage Powerline easement and as such the vegetation under the powerline is subject to continual maintenance involving controlled burns, pruning and fuel reduction. This has altered both the density, height and structure of the Banksia woodland. Weeds do not appear to be the dominating disturbance factor, and therefore, the vegetation that is still present is considered to be in Good condition. Not-with-standing this, the Banksia woodland is in an altered state (360 Environmental, 2016b).

Assessment of vegetation against key diagnostic criteria (according to DotEE Conservation Advice and draft EPBC Act referral guidance)

The DotEE listed the Banksia Woodland of the Swan Coastal Plain ecological community as a Threatened Ecological Community (TEC) on 16 September 2016. At this time, the DotEE also released *Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community* (DotEE, 2016) which provides guidance with regard to the diagnostic features of the community. The subsequent draft *Banksia Woodlands of the Swan Coastal Plain ecological community - Guidance for referrals under the EPBC Act* (DotEE, 2017) was provided to Coterra Environment in February 2017. The key diagnostic characteristics of the TEC discussed in these documents have been provided in Table 1, in relation to the vegetation found within the project area. Additional information to characterise the TEC patch found within the project area is provided in Table 2.

Table 1: Key diagnostic characteristics of the Banksia Woodlands TEC

Key diagnostic characteristics	Information	Key diagnostic questions (refer to Conservation Advice for details)	Response (yes/no/possibly) and discussion
Location and physical environments	Bioregion	Is the proposal site within the Swan Coastal Plain IBRA bioregion (including Dandaragan plateau), or adjacent areas within the Jarrah Forest IBRA bioregion?	Yes – SCP Bioregion.
Soils and Landform	Soil type	Is the soil type consistent with where the Banksia Woodlands TEC may occur?	Yes – Bassendean sands
	Location in the landscape, topography	Is the topography consistent with where the Banksia Woodlands TEC may occur?	Yes – sand plain landform
Structure	Tree composition, understory composition, diversity, species	Is the structure consistent with the characteristics set out in the conservation advice?	Yes - Vegetation structure consists of an overstorey of *Banksia attenuata, B. menziesii* and *B. ilicifolia* with very scattered *Eucapyptus todtiana* and *Melaleuca preissiana* over a midstorey of *Adenanthos sp., Allocasuarina fraseriana* and *Xanthorrhoea preissii* over an understorey of mixed native grasses and weeds (360 Environmental, 2016b)
Composition	Dominant tree species, emergent tree layer, understory	Is the composition consistent with the characteristics set out in the conservation advice?	Yes – Canopy is dominated / co-dominated by *B. attenuata, B. menziesii* and *B. ilicifolia*. Tree layer consists of occasional *E. todtiana* and *M. preissiana.* Understorey consists of a mix of native grasses and weeds (360 Environmental, 2016b).

Table 2: Additional information to characterise the Banksia Woodlands TEC

Key diagnostic characteristics	Information	Relevant content to be discussed in the referral	Response and discussion
Location and physical environments	Regional distribution and quality	Quantity / quality of vegetation community in, and in the region around, the site where the proposed action will occur	The project area contains 2.93ha of banksia woodland vegetation, identified as meeting the key diagnostic criteria of the Banksia Woodlands TEC.
Patch condition	Condition thresholds	What is the patch condition category?	The majority of the vegetation within the project area is considered to be in Very Good to

Key diagnostic characteristics	Information	Relevant content to be discussed in the referral	Response and discussion
			Good condition (based on the Keighery (1994) condition rating scale) (360 Environmental, 2016b). Vegetation extents by condition are described as follows: Very Good: 0.338 ha Good-Very Good: 0.318 ha Good: 1.690 ha Good-Degraded: 0.127 ha Degraded: 0.499 ha Completely Degraded (comprising non-endemic trees): 0.126 ha Cleared: 1.712 ha
Patch Size	Patch size in hectares	Is the patch size large enough to meet threshold criteria?	Yes – The minimum patch size relevant to vegetation in Very Good condition is 1 ha, and for vegetation in Good condition is 2 ha. The Banksia vegetation onsite is 2.93 ha. This ranges in condition from Very Good to Degraded. The broader patch may include the vegetation within the Kwinana Freeway road reserve and the lot directly south (Lot 28 Barfield Rd) depending on surveyed condition of vegetation.
	Surrounding buffer	What is the size and vegetation community of the surrounding buffer? (Section 2.2.3) and what is the connectivity to the surrounding vegetation?	Surrounding vegetation in the Kwinana Freeway road reserve and on Lot 28 to the south is likely to be similar to that on the project area. The condition of this vegetation is unknown. The onsite vegetation is fragmented by Barfield Road to the west, Kwinana Freeway to the east, and by cleared land (for residential development) to the north. The lot to the south (157 Barfield Road) is identified as 'Development' within the City of Cockburn Town Planning Scheme and as such it likely to be proposed for residential development in the future.

Key diagnostic characteristics	Information	Relevant content to be discussed in the referral	Response and discussion
Other condition considerations	Presence/absence and spread of *Phytophthora cinnamomi* (dieback)	If present, how much dieback exists and is the proposed action likely to spread dieback further? (Appendix D5) If not present, can its introduction be prevented?	The status of *Phytophthora* dieback onsite is unknown.
	Presence/absence weeds	Does the patch contain weeds? (Appendix D6) Which species are present and how can they be managed?	A total of 10 introduced or weed taxa were identified from the project area during the flora surveys. These are provided in 360 Environmental (2016b). One species, **Asparagus asparagoides*, is listed as Declared under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) and is also listed as a Weed of National Significance (WONS) (360 Environmental, 2016b).
	Any other notable disturbance to the site where relevant (i.e. fragmentation, fire regimes, bare patches, erosion, feral animals)	What disturbance is present which may degrade the quality of the community or species? (Appendix D) For any/each form of disturbance, what is the degree of the disturbance? Is there evidence of recruitment of key native plant species following disturbance?	Controlled burns are regularly undertaken to reduce fuel load within the powerline easement (360 Environmental, 2016b). Other sources of disturbance include past clearing for access, building construction and firebreaks, and weed invasion. Weeds do not appear to be the dominating disturbance factor, and therefore, the vegetation that is still present is considered to be in Good condition. Not-with-standing this, the Banksia woodland is in an altered state (360 Environmental, 2016b).
	Patch isolation	Is the patch connected to other areas of Banksia Woodland or is it isolated?	The patch is fragmented by roads and urban areas to the west, north and east, however there may be some patch connectivity with bushland to the south (157 Barfield Road) although this area is identified as 'Development' in the City of Cockburn Town Planning Scheme and as such is likely to be proposed for residential development in the future.
Sub-community and vegetation unit	Broad scale structural unit (Beard vegetation associations)	Provide the best corresponding Beard vegetation association (s)	Beard Association 1001: Medium very sparse woodland; jarrah, with low woodland; banksia & casuarina Heddle et al (1980) complex: Bassendean Complex – Central and South

Key diagnostic characteristics	Information	Relevant content to be discussed in the referral	Response and discussion
	Floristic community types (Gibson et al., 1994; Keighery *et al*., 2008)	Provide the closest resemblance of floristic community type(s)	Inferred FCTs include: SCP21c - Low lying *Banksia attenuata* woodlands or shrublands (represented by unit BiEt which extends over 1.144ha) SCP23a – Central *Banksia attenuata – B. menziesii* woodlands (represented by unit BiMp which extends over 0.318ha) SCP4 – *Melaleuca preissiana* damplands (represented by unit BmXp which extends over 1.468ha) (360 Environmental, 2016b)
	Western Australian ecological community listing	Is this ecological community listed in Western Australia? (Section 2.2.2)	SCP21c – Priority 3 (see P3 definition below this table)
Surveying	Timing of the surveying	Ideally surveys should be undertaken in spring with two sampling periods to capture early and late flowering species (Section 2.2.2). When was sampling undertaken at the proposed site? Is there any reason why the vegetation community could not be readily identified (e.g. due to recent disturbance such as fire)?	A Level 2 flora and vegetation survey, consistent with the Environmental Protection Authority's (EPA's) Guidance for the Assessment of Environmental Factors No. 51; EPA Guidance for the Level of Assessment Guidance Statement No. 10 and Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia, was undertaken. The field survey was undertaken on 27 September 2016.

Definition for Priority 3 Ecological Communities: Poorly known ecological communities

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:

(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;

(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

Description of Impacts

Significant impact criteria for the Banksia Woodlands TEC (DotEE, 2016; DotEE, 2017) is provided in Table 3 with reference to the development of the project area.

Table 3: Banksia Woodlands TEC Significant Impact Criteria Assessment

Significant Impact Criteria	Description of proposed action in relation to significant impact criteria	Likelihood (known, likely, possible, unlikely)
Reduce the extent of an ecological community	The proposed action will result in the removal / reduction of the onsite TEC by 2.49 ha.	Known
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	This lot is the northern extent of vegetation adjacent to the freeway in Hammond Park, therefore removal will not divide the remaining extent. The vegetation to be retained onsite will still connect to the vegetation along the Kwinana Freeway reserve.	Unlikely
Adversely affect habitat critical to the survival of an ecological community	As the vegetation onsite is in reduced condition from impacts of disturbance, is fragmented and is well represented in the local area removal of this vegetation is not assess to be critical to the survival of the ecological community.	Unlikely
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	Total water cycle management principles have guided the proposed development of the project area (RPS, 2016).	Unlikely
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	The vegetation retained onsite within POS and within the power line easement will be left in its natural state with improvement of condition anticipated to be achieved through targeted weed control and additional planting.	Unlikely
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: -- assisting invasive species, that are harmful to the listed ecological community, to become established, or -- causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community	The vegetation retained in POS and within the power line easement will be protected from weed invasion and other edge effects by the provision of hard edges (e.g. road, paths and mower strips) against any vegetation boundaries. The areas of retained vegetation will also fenced during the construction program to prevent inadvertent distance, damage or weed transference into this area.	Unlikely
Interfere with the recovery of an ecological community	This is not applicable to the project area.	Unlikely